



Technical Report

# OnCommand Plug-In 4.1.1 for Microsoft Best Practices Guide

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## Abstract

The NetApp® OnCommand® Plug-In 4.1.1 for Microsoft (OCPM 4.1.1) is an enterprise-class storage monitoring application. The plug-in provides integration with 2012 R2 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 on NetApp storage.

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# 1 Introduction

The NetApp OnCommand® Plug-In 4.1.1 for Microsoft (OCPM 4.1.1) is an enterprise-class storage monitoring application. The plug-in provides integration with 2012 R2 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 on NetApp storage.

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

Table 1) Acronyms and abbreviations.

| Acronym or Abbreviation | Definition  |
|-------------------------|---|
| OCPM                    | NetApp OnCommand Plug-In 4.1.1 for Microsoft.   |
| SC                      | Microsoft System Center solutions are a set of management products that help IT professionals 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. SCOM helps organizations increase efficiency while enabling greater control of the IT environment.  |
| SCOM console and server | <ul style="list-style-type: none"><li>• 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.</li><li>• SCOM server refers to the computer that has the SCOM console installed.</li></ul>  |
| SCOM agent              | SCOM agent refers to the software installation of SCOM in which the SCOM software developer's kits and connectors are installed on a system that does not have the SCOM console installed. This installation does not have the UI. 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"><li>• Unified management of physical machines and virtual machines (VMs)</li><li>• Performance and resource optimization (PRO) for dynamic and responsive management of virtual infrastructure</li><li>• Consolidation of underused physical servers</li><li>• Rapid provisioning of new VMs by leveraging the expertise and investments in Microsoft Windows Server technology</li></ul> |
| PRO                     | Performance and resource optimization, a feature of System Center Suite that in SC 2012 SP1 can be implemented in SCOM and SCVMM and ties specific alerts from SCOM to remediation actions in SCVMM. Management packs (MPs) that allow using this SCVMM PRO feature are referred to as NetApp Data ONTAP® PRO MPs.  |
| MP                      | The management pack contains definitions of a healthy state for applications, services, or hardware monitored by SCOM.  |
| SCO (or SCORCH)         | 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.   |

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

## 1.1 Target Audience

The audience for this technical report is NetApp storage and Windows Server administrators who use NetApp OCPM to manage NetApp storage systems. OCPM is installed on the SCOM server, which offers Windows IT administrators a central interface for monitoring NetApp storage systems. OCPM also includes a System Center Orchestrator integration pack (OIP) and PRO-enabled MPs and rapid provisioning cmdlets.

OCPM discovers the hardware and storage layouts of your NetApp storage systems and provides alerts, health views, and various performance views. The PRO feature of System Center enables dynamic management of virtualized infrastructure, providing alerts and events.

To benefit from the information in this technical report, you need a good understanding of Windows administration and of SCOM, SCVMM, and SCO. You should also understand NetApp storage concepts. The recommendations in this document are guidelines to help you configure OCPM. NetApp recommends that you study the following documents before using this technical report:

- [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#)
- One of the following, as appropriate for your environment:
  - [OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Clustered Data ONTAP](#)
  - [OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Data ONTAP Operating in 7-Mode Environments](#)
- [OnCommand Plug-In 4.1 for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide](#)
- [OnCommand Plug-In 4.1.1 for Microsoft Release Notes](#)

## 2 Installation and Basic Configuration

### 2.1 OCPM System Requirements

Table 2 lists the requirements for installing OCPM.

Table 2) OCPM installation requirements.

| Category              | Requirements   |
|-----------------------|--|
| Hardware requirements | <ul style="list-style-type: none"> <li>• Microsoft System Center Operations Manager 2012 R2 / SP1 (SCOM)</li> <li>• Microsoft System Center Virtual Machine Manager 2012 R2 / SP1 (SCVMM)</li> <li>• Microsoft System Center Orchestrator 2012 R2 / SP1 (SCO)</li> <li>• Hardware requirements; for more information, see <a href="#">System Center 2012 R2 and</a></li> </ul> |

| Category                  | Requirements  |
|---------------------------|---|
|                           | <a href="#">System Center 2012</a>  |
| Data ONTAP requirements   | <ul style="list-style-type: none"> <li>• 8.1 and later in the Data ONTAP 8.1 release family operating in 7-Mode</li> <li>• 8.2 and later in the Data ONTAP 8.2 release family operating in 7-Mode</li> <li>• Clustered Data ONTAP 8.2 release family</li> <li>• Clustered Data ONTAP 8.3 release family</li> </ul>  |
| Software requirements     | <ul style="list-style-type: none"> <li>• Windows PowerShell V3, .NET 4.1 or later, Microsoft System Center Operations Manager 2012 SP1 (SCOM) for MPs</li> <li>• Microsoft System Center Virtual Machine Manager 2012 R2 / SP1 (SCVMM) for cloning cmdlets and SCVMM add-ins</li> <li>• Microsoft System Center Orchestrator 2012 R2 / SP1 (SCO) for SCORCH integration packs</li> <li>• For more information, see the <a href="#">Microsoft TechNet</a> website.</li> </ul>  |
| SCOM configuration        | You must configure Microsoft System Center Operations Manager 2012 R2 / SP1 (SCOM) for reporting so that the reporting MP appears with the other MPs. To do this, you must correctly configure the SQL Server reporting services. For more information, see the <a href="#">Microsoft TechNet</a> website.  |
| SCOM library requirements | <p>The following System Center Operations Manager MPs are required for OnCommand Discovery Agent functionality:</p> <ul style="list-style-type: none"> <li>• Microsoft.SystemCenter.Library</li> <li>• Microsoft.SystemCenter.InstanceGroup.Library</li> <li>• Microsoft.SystemCenter.NetworkDevice.Library</li> <li>• Microsoft.Windows.Library</li> <li>• System.Health.Library</li> <li>• System.Library</li> <li>• System.Performance.Library</li> <li>• System.Snmp.Library</li> <li>• Microsoft.SystemCenter.VirtualMachineManager.Pro.Library</li> <li>• Microsoft.SystemCenter.VirtualMachineManager.Library</li> </ul> <p>The following System Center Operations Manager libraries are required for reporting functionality:</p> <ul style="list-style-type: none"> <li>• Microsoft.SystemCenter.DataWarehouse.Report.Library</li> <li>• Microsoft ODR Report Library</li> <li>• Microsoft.SystemCenter.DataWarehouse.ServiceLevel.Report.Library</li> </ul> <p>Microsoft licenses:</p> <ul style="list-style-type: none"> <li>• Windows Server 2012 and 2012 R2, Windows Server 2008 R2 SP1</li> <li>• Microsoft SQL Server 2008 R2 SP1 and earlier</li> <li>• Microsoft System Center Operations Manager 2012 R2 / SP1</li> <li>• Microsoft System Center Virtual Machine Manager 2012 R2 / SP1</li> <li>• Microsoft System Center Orchestrator 2012 R2 / SP1</li> </ul> |
| OCPM requirements         | <ul style="list-style-type: none"> <li>• OCPM 4.1.1 supports upgrade from 4.0.1 or from 4.1.</li> <li>• OCPM 4.1.1 SCOM MPs are upgradable and are backward compatible with OCPM 4.1.0 and 4.0.1 MPs during the installation process.</li> <li>• Make sure that firewalls, proxies, and other network devices do not interfere with</li> </ul>  |



| Category                               | Requirements   |
|--|--|
|  | traffic. The required ports are SNMP and HTTP or HTTPS.  |
| OnCommand Discovery Agent requirements | <ul style="list-style-type: none"> <li>• Hyper-V server role enabled</li> <li>• Windows Server 2012 and 2012 R2</li> <li>• Windows Server 2008 R2 SP1</li> </ul>   |
| Orchestrator integration packs (OIPs)  | <ul style="list-style-type: none"> <li>• You must install SCO and deploy the integration packs to the runbook server.</li> <li>• To enable cloning, provisioning, and disaster recovery (DR) functionality, OnCommand Plug-In Virtual Infrastructure Management (VIM) web services must be installed in the Windows Server 2008 R2 SP1 or later host.</li> <li>• You must have .NET 4 or a later version installed on the SCO runbook server.</li> </ul> |

## 2.2 OCPM Preinstallation Requirements

After Microsoft SCOM and SCVMM are installed and properly configured, you can continue installing OCPM 4.1.1. This installation involves two main tasks:

- SCOM and SCVMM must be properly integrated for VM-based alerts and functionality.
- Hyper-V hosts must also be added to both SCOM and SCVMM servers for two purposes:
  - To facilitate PRO functionality
  - To enable VM discovery during the virtualization discovery task in the SCOM console

The following procedures can help you determine whether SCVMM has been properly integrated with SCOM.

### Confirming SCVMM Configuration with SCOM

To confirm that SCVMM is configured with SCOM, complete the following steps:

1. From the SCVMM console, click the Administration tab.
2. Select System Center settings.
3. Right-click Operations Manager Server.
4. Type in the SCOM server name and establish the connection to the SCVMM server.

### Confirming Addition of Hyper-V Nodes to SCVMM

To confirm that Hyper-V nodes are added to SCVMM, complete the following steps:

1. From the SCVMM console, click the VMs and Services tab.
2. Select and expand All Hosts.
3. Confirm that Hyper-V hosts are listed.
4. Use the Add Hyper-V Hosts and Clusters action to provide Hyper-V host and credential information.
5. From the SCOM console, click the Monitoring tab.
6. Select Virtual Machine Manager 2012 Views.
7. Select Diagram View and make sure that the Hyper-V VMs are visible.

To facilitate smooth installation and configuration, use the Microsoft System Center documentation. For more information, see [System Requirements for System Center 2012 – Operations Manager](#). Also see the NetApp OnCommand documentation listed in section 1.1, “Target Audience.”

## 2.3 Adding Missing OCPM Permissions

If you do not have the OCPM permissions needed for a nonadministrator to connect to clustered Data ONTAP, the storage administrator must add the following permissions:

```
security login role create -role OCPM -access readonly "statistics catalog instance show"
security login role create -role OCPM -access readonly "statistics catalog counter show"
security login role create -role OCPM -access readonly "statistics catalog object show"
security login role create -role OCPM -access readonly "metrocluster show"
```

If you do not have the OCPM permission for monitoring NetApp MetroCluster™ software, the storage administrator must add the following permission:

```
security login role create -role OCPM -access readonly "storage bridge show"
```

## 2.4 Adding Data ONTAP Storage Controller Credentials in 7-Mode Environments

If you cannot connect to the controller that is entered into the Manage Controller Credentials, you might need to configure the Run As action account. To configure it, complete the following steps:

1. Add the OCPM Run As action account as an administrator on the local host.
2. Navigate to SCOM Administration > Run As Configuration > Accounts > Action Account.
3. Change the credentials of the OCPM Run As action account to a user with the appropriate privileges to allow it to run.

## 2.5 Adding a Clustered Data ONTAP Storage System

If you cannot connect to the controller entered into the Manage Storage System, you might need to configure the Run As action account. To configure it, complete the following steps:

1. Add the OCPM Run As action account as an administrator on the local host.
2. Navigate to SCOM Administration > Run As Configuration > Accounts > Action Account.
3. Change the credentials of the OCPM Run As action account to a user with privileges that allow it to run.

## 2.6 New Profile Accounts in This Release

Before version 4.4.1, all OCPM workflows used the default action account. This release introduces optional Run As profiles that can be set to the user-created Run As profile account instead of using the default action account. These profiles are listed in Table 3.

Table 3) New Run As profiles.

| Account Name            | Account Purpose   | Account Permissions  |
|-------------------------|---|--|
| <Domain>\DOTDiscMon     | Data ONTAP: Discovery and Monitoring Account                    | This profile must have the following privileges: <ul style="list-style-type: none"><li>• All of the same permissions as the Data ONTAP: Discovery and Monitoring Account</li><li>• Member of local administrators group on the Hyper-V hosts being monitored</li></ul> |
| <Domain>\DOTDiscMonVirt | Data ONTAP: Discovery and Monitoring Account for Virtualization | This profile must have the following privileges: <ul style="list-style-type: none"><li>• All of the same permissions as the Data ONTAP: Discovery and Monitoring Account</li><li>• Member of local administrators group on the Hyper-V hosts being monitored</li></ul> |

| Account Name          | Account Purpose                    | Account Permissions  |
|-----------------------|------------------------------------|--|
| <Domain>\DOTMaintAcct | Data ONTAP:<br>Maintenance Account | This profile must have the same permissions as the Data ONTAP: Discovery and Monitoring Account. |

**Note:** If you use the optional profile, the same privileges are required as those that were set for the default action account. If you do not use this optional profile, then the default action account privileges must be set using these same criteria and procedures.

You must create a login on the SQL Server instance and map it to the database-owner user for the OCPM database (OCPMDB); the `db_owner` permission is required on the OCPMDB.

**Note:** These requirements were configured during the installation of OCPM for the user account running the installation.

## Setting Permission for Local Administrators' Group

To set the permission for a member of the local administrators' group, complete the following steps on every management server:

1. From the Control Panel, select Manage User Accounts.
2. On the Users tab, add a new local administrator user account.

## Setting Permission for Local Performance Monitor Users' Group

To set the permission for a member of the local performance monitor users' group, complete the following steps on every manager server:

1. From the Control Panel, select Manage User Accounts.
2. On the Advanced tab, click Advanced.
3. In the left pane, double-click Groups.
4. In the middle pane, double-click Performance Monitor Users.
5. Add the new user account.

Instead of using the local administrators' group membership, you can use the domain-based security groups listed in Table 4.

**Table 4) Recommended global security groups.**

| Account Name                  | Group Scope | Members   |
|-------------------------------|-------------|---|
| <Domain>\SCOM-Admins          | Global      | <Domain>\DOTDiscMon<br><Domain>\DOTDiscMonVirt<br><Domain>\DOTMaintAcct |
| <Domain>\OM-Operators         | Global      | SCOM operators privileged administrator accounts                        |
| <Domain>\OM-AdvancedOperators | Global      | SCOM advanced operators privileged administrator accounts               |

## Setting Permission for Local Login

To set the permission to allow local login (`SetInteractiveLogonRight`) on the Windows servers (hosts) that are used as SCOM management servers, complete the following steps:

1. From the Control Panel, select Administrative Tools and open Local Security Settings.
2. In the console tree, click Security Settings.

3. Under Local Policies, select User Rights Assignment.
4. Double-click Allow Logon Locally.
5. Click Add User or Group and add the new user account as the action account.

## Setting Windows Profile

Set the associated Windows profile by logging in once to each management server through the Run As account. To set the public server role on the OCPMDB and on the `OperationsManager` and `OperationsManagerDW` databases, complete the following steps:

1. Open SQL Server Management Studio and connect to your SQL Server instance.
2. Under Databases, expand Security.
3. Expand Logins.
4. Right-click the user name for the default action account and select Properties.
5. On the left, select the Server Roles page.
6. On the right, make sure that the public server role option is selected.

## Setting Database Role Memberships

You must set the appropriate database role memberships (`public`, `dbmodule_users`, and either `db_owner`, `db_datareader`, `db_datawriter`, or `db_ddladmin`) on the OCPMDB, `OperationsManager`, and `OperationsManagerDW` databases. To set the database role memberships, complete the following steps:

1. Open SQL Server Management Studio and connect to your SQL Server instance.
2. Under Databases, expand Security.
3. Expand Logins.
4. Right-click the user name for the default action account and select Properties.
5. On the left, select the User Mappings page.
6. In the box on the upper right, under Users Mapped to This Login, select the row for each database.
7. In the lower left, make sure that the following options are selected:
  - `Public`
  - `dbmodule_users`
  - `db_owner` or `db_datareader`, `db_datawriter`, `db_ddladmin`

**Note:** `db_owner` is required on the OCPMDB.

## Setting SCOM User Role to Run As Account

The SCOM user role of Operations Manager operator must be set to the same Run As account as either the Data ONTAP: Discovery and Monitoring account, if used, or the default action account. To set the SCOM user role to the appropriate account, complete the following steps:

1. Navigate to SCOM > Administration > Security > User Roles > Operations Manager Operator > Add Users.
2. Add the Run As account as the user.

## 2.7 NetApp Storage Minimal Read Access Control for OCPM Monitoring

Some IT environments require a detailed assignment of the minimal permissions. Table 5 lists the permissions needed to connect to the storage system from OCPM and to gather monitoring data by using

a local account on the storage system. This set of permissions is purely for monitoring OCPM basic functions. The set does not include any of the advanced features.

This local Data ONTAP account must be assigned a customized role. It contains the permissions listed in the following procedure. The permissions in clustered Data ONTAP are based not on ZAPIs but on command or directory permissions.

To create a user for OCPM that has permissions only on the clustered Data ONTAP controller required by OCPM, complete the following steps:

1. Run the following command:

```
security login role create -role OCPM -access readonly "vserver cifs share access-control show"
security login role create -role OCPM -access readonly "storage aggregate show"
security login role create -role OCPM -access readonly "storage failover show"
security login role create -role OCPM -access readonly "vserver cifs share show"
security login role create -role OCPM -access readonly "vserver cifs show"
security login role create -role OCPM -access readonly "vserver cifs share access-control show"
security login role create -role OCPM -access readonly "cluster identity show"
security login role create -role OCPM -access readonly "cluster show"
security login role create -role OCPM -access readonly "cluster peer show"
security login role create -role OCPM -access readonly "vserver show"
security login role create -role OCPM -access readonly "vserver peer show"
security login role create -role OCPM -access readonly "storage disk show"
security login role create -role OCPM -access readonly "vserver fcp show"
security login role create -role OCPM -access readonly "cluster show"
security login role create -role OCPM -access readonly "vserver iscsi show"
security login role create -role OCPM -access readonly "lun show"
security login role create -role OCPM -access readonly "network interface show"
security login role create -role OCPM -access readonly "network port show"
security login role create -role OCPM -access readonly "statistics show"
security login role create -role OCPM -access readonly "volume qtree show"
security login role create -role OCPM -access readonly "volume quota report"
security login role create -role OCPM -access readonly "storage disk show"
security login role create -role OCPM -access readonly "volume efficiency show"
security login role create -role OCPM -access readonly "snapmirror show"
security login role create -role OCPM -access readonly "snapmirror policy show"
security login role create -role OCPM -access readonly "system node show"
security login role create -role OCPM -access readonly "version"
security login role create -role OCPM -access readonly "volume show"
```

2. Create a user named OCPM with the role of OCPM and with these settings:

- -application http
- -authmethod password

3. Run the command again with -application ontapi.

```
security login create -username OCPM -role OCPM -application http -authmethod password security
login create -username OCPM -role OCPM -application ontapi -authmethod password
```

**Note:** This step is necessary for OCPM to connect to the controller.

4. Optional: If you want to monitor NetApp MetroCluster software, you must give the OCPM user the following additional permissions:

```
security login role create -role OCPM -access readonly "metrocluster check config-replication
show-aggregate-eligibility"
security login role create -role OCPM -access readonly "metrocluster check aggregate show"
security login role create -role OCPM -access readonly "metrocluster check config-replication
show"
security login role create -role OCPM -access readonly "metrocluster check show"
security login role create -role OCPM -access readonly "metrocluster check lif repair-placement"
security login role create -role OCPM -access readonly "metrocluster check node show"
security login role create -role OCPM -access readonly "metrocluster check run"
security login role create -role OCPM -access readonly "metrocluster configure"
security login role create -role OCPM -access readonly "metrocluster show"
security login role create -role OCPM -access readonly "metrocluster heal"
security login role create -role OCPM -access readonly "metrocluster interconnect adapter show"
```

```
security login role create -role OCPM -access readonly "metrocluster interconnect mirror show"
security login role create -role OCPM -access readonly "metrocluster interconnect mirror
multipath show"
security login role create -role OCPM -access readonly "metrocluster show"
security login role create -role OCPM -access readonly "metrocluster node show"
security login role create -role OCPM -access readonly "metrocluster check lif show"
security login role create -role OCPM -access readonly "metrocluster switchback"
security login role create -role OCPM -access readonly "metrocluster switchover"
security login role create -role OCPM -access readonly "metrocluster vserver show"
security login role create -role OCPM -access readonly "metrocluster vserver resync"
```

Table 5 lists the NetApp storage permissions that are required for basic monitoring in Data ONTAP systems operating in 7-Mode.

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

**Table 5) NetApp storage permissions for basic monitoring in Data ONTAP 7-Mode.**

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

## Example

The following sample command shows how to add or 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
```

The previous command is the same as the following sample command that shows each of the required permissions added, with each field separated by a comma:

```
useradmin role modify scom-user-roles -a API1, API2, API3, etc.
```

## Example

The following sample Windows PowerShell command uses the NetApp 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-qtrees-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
```

## 2.8 OCPM 4.1.1 Installation

Administrators have the option of installing the entire OCPM 4.1.1 package or selecting specific components with the custom installation option. The installation package software checks the system being installed and automatically selects or deselects components.

For more information about the components available for installation, see the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#).

During installation, the installer performs the following tasks:

- Automatically removes the SCOM MPs feature from the feature tree if SCOM 2012 R2 / SP1 installation is not detected on the system.
- Automatically removes the SCVMM console add-ins feature from the feature tree if SCVMM 2012 R2 / SP1 installation is not detected on the system.
- Checks for any missing MP requirements and provides a list to the user. For MP dependencies, see the following section, "Management Pack Dependencies."
- Automatically imports MPs (those that have met all requirements) into SCOM.

## 2.9 Management Pack Dependencies

Although most Microsoft MPs can be found in the SCOM installation, others might need to be downloaded. Check the Microsoft MP catalog for missing MPs available at [System Center Core](#).

OCPM MPs have the following MP dependencies:

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

## 2.10 OCPM Overrides and Defaults

Administrators are asked to enable specific rules, such as the discovery rule, to start the discovery process. The changes to these rules, called “overrides,” must be saved in an MP. Saving overrides in the default MP causes problems with upgrades and uninstallation of OCPM. To mitigate any future problems, create a new MP and save the OCPM overrides to the pack before enabling any overrides for OCPM 4.1.1.

The default discovery interval is 24 hours. In most cases, this interval should not be changed because the SCOM environment might be disrupted if the discovery interval is set too short, causing a shortage in resources such as CPU, memory, and network. NetApp recommends not setting the interval to anything less than 4 hours, and as a best practice recommends that the interval be kept at the 24-hour default. The reason for this recommendation is that the discovery rule is set to run every 24 hours. To speed up the process, override the discovery rule to run the discovery more frequently.

To change the discovery interval, complete the following steps:

1. On the SCOM console, click Authoring.
2. Select Management Pack Object > Rules.
3. Under Management Server, select Discovery Rule.
4. Right-click the rule.
5. Select Overrides.
6. Override the rule For All Objects of Class: Management Server by setting the override and modifying the interval seconds to 3,600.
7. Create and select the new customer-created MP.
8. Click OK.
9. Select Overrides.
10. Override the rule For All Objects of Class: Management Server.

Figure 1 shows the Data ONTAP discovery rule override selection.



Figure 1) Data ONTAP discovery rule override selection.

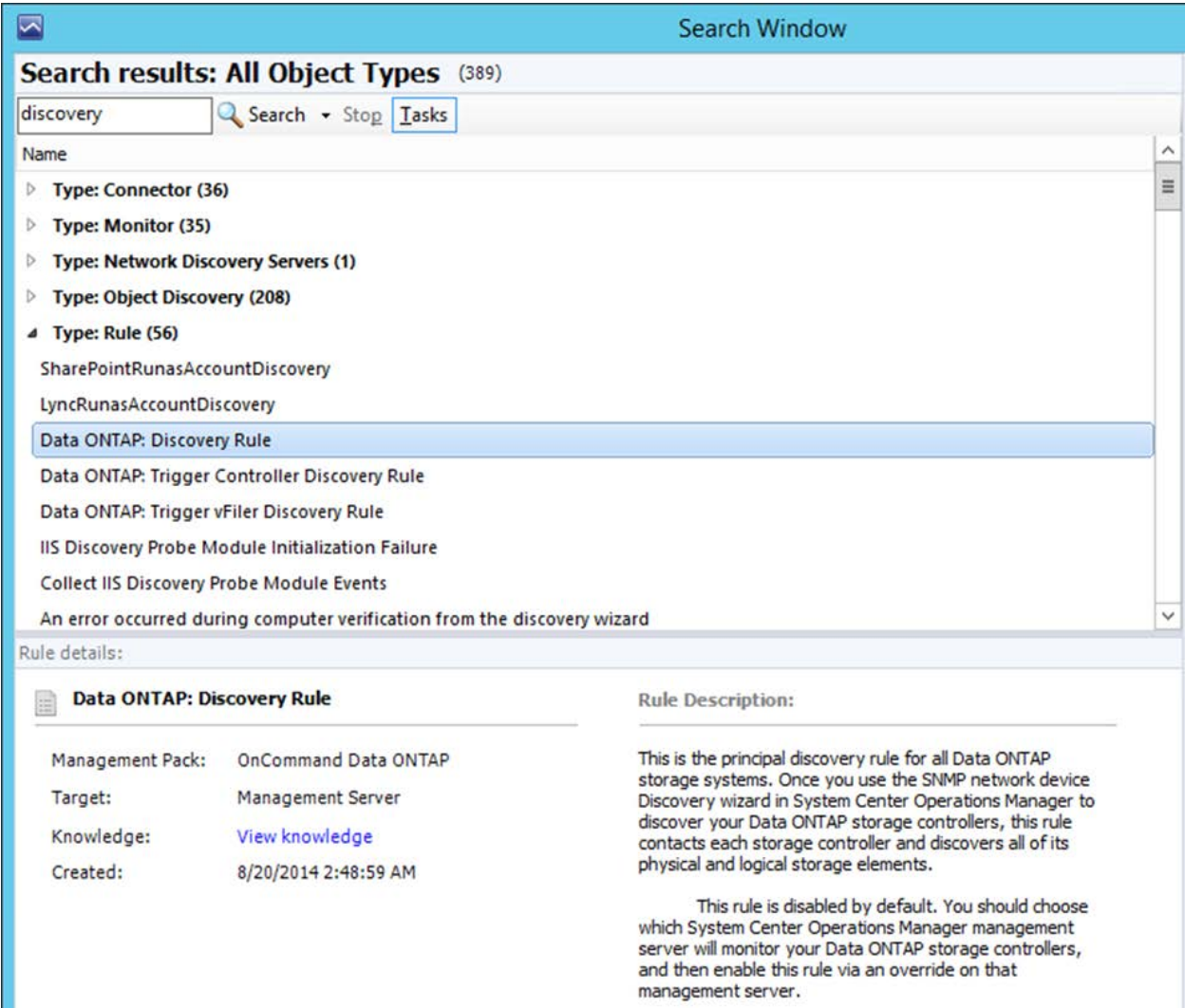


Figure 2 shows the Data ONTAP discovery rule overrides.

**Figure 2) Data ONTAP discovery rule overrides.**

### Override Properties

Rule name: Data ONTAP: Discovery Rule

Category: Discovery

Overrides target: Class: Management Server

[Show Rule Properties...](#)

Override-controlled parameters:

|   | Override                            | Parameter Name   | Parameter Type | Default Value | Override Value | Effective Value | Change Status |  |
|---|-------------------------------------|------------------|----------------|---------------|----------------|-----------------|---------------|--|
| ▶ | <input checked="" type="checkbox"/> | Enabled          | Boolean        | False         | True           | False           | [Added]       |  |
|   | <input checked="" type="checkbox"/> | Interval Seconds | Integer        | 86400         | 86400          | 86400           | [Added]       |  |
|   | <input type="checkbox"/>            | Sync Time        | String         | 21:00         | 21:00          | 21:00           | [No change]   |  |
|   | <input type="checkbox"/>            | TimeoutSeconds   | Integer        | 3600          | 3600           | 3600            | [No change]   |  |

III

>

Details:

**Enabled**

The new custom override will be created in the '[Not available]'. Click apply to view the new effective value for this parameter.

Description

[Edit...](#)

**Management pack**

Select destination management pack:

<Select Management Pack>

<Select Management Pack>

Client Monitoring Overrides Management Pack  
 Default Management Pack  
 Microsoft.SystemCenter.SecureReferenceOverride  
 Network: Discovery Internal  
 OnCommand Data ONTAP PRO Working  
 System Center 2012 Virtual Machine Manager Diagram View  
 Virtual Machine Manager Overrides  
 Virtual Machine Manager PRO V2 HyperV Host Performance Working

New...

Cancel

## 2.11 OCPM for Monitoring Data ONTAP 7-Mode Systems

The process of configuring SCOM and SCVMM to work with OCPM requires many steps. To function correctly, OCPM also requires a number of steps after the installation of SCOM and SCVMM. The following list includes general tasks required for OCPM to function properly. For more information, see the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#).

The tasks described in the following sections prepare OCPM to function correctly.

## Completing SCOM Installation Prerequisites

To complete the SCOM installation prerequisites, take the following steps:

1. Review the [SCOM Deployment Guide](#) for requirements.
2. Install the SCOM Reporting module (required).
3. Install SCVMM and integrate PRO (required).
4. Make sure that all installation requirements are met. Confirm proper functionality before proceeding with OCPM installation.

**Note:** For more information, see the Microsoft documentation for SCOM, SCVMM, or reporting at the [Microsoft TechNet library for System Center Operations Manager](#).

## Installing OCPM 4.4.1

To install OCPM 4.1.1, complete the following steps:

1. Download the OCPM 4.1.1 installation files from the NetApp Support site.
2. Install OCPM 4.1.1 from the [NetApp Support](#) site.
3. Run the OCPM 4.1.1 executable on the SCOM server.

### SNMP Version Support

- For Data ONTAP versions earlier than 7.3, only SNMP V1 is supported.
- For Data ONTAP version 7.3 and later, SNMP V2C and SNMP V1 are supported.
- OCPM is compatible with SNMP 1 and SNMP 2 for discovering controllers and generating alerts. SNMP 3 should not be set up in SCOM 2012 R2. OCPM automatically sets the SNMP version to 1 when 7-Mode controllers are added for monitoring.

## Adding NetApp Storage Controller

To add the NetApp storage controller, navigate to Monitoring > Management Server Data ONTAP: Run Discovery Task Discovered Inventory. (Make sure that the Discovered Inventory scope is set to Management Server.)

**Note:** You can also add controllers individually by using Data ONTAP: Add Controller.

## Adding NetApp Storage Credentials

To add the NetApp storage credentials, select Data ONTAP: Manage Controller Credentials.

**Note:** Make sure that the user credentials have appropriate roles and capabilities assigned. For minimum roles and capabilities, see section 2.7, “NetApp Storage Minimal Read Access Control for OCPM Monitoring.”

## Enabling Discovery

To enable discovery, complete the following steps:

1. Navigate to Authoring > Rules > Filter.
2. Select Data ONTAP: Discovery Rule under Management Server (not Data ONTAP Management Server).
3. Optional: If PRO is installed and configured, enable it.
4. Right-click the rule and select Overrides > Override the Rule > For All Objects of Class: Management Server.
5. Select Override for Enabled and set the override value to True.
6. Follow the best practice for overrides described in section 2.10, “OCPM Overrides and Defaults,” and save all OCPM 4.1 overrides to a new MP.

**Note:** The OCPM 4.1.1 upgrade process deletes any custom MPs that customers created by using earlier versions of OCPM.

## Enabling PRO Tips

To enable PRO tips in PRO tips environments, complete the following steps:

1. If monitoring is required by OCPM 4.1.1, install the OCPM 4.1.1 agent on all Hyper-V parent nodes managed by SCVMM.

**Note:** This step is needed only if the Hyper-V host has LUNs mapped through the Fibre Channel protocol.

2. From the SCVMM console, navigate to Settings > Operations Manager Settings.
3. Select the checkbox labeled Enable Performance and Resource Optimizations.

## 2.12 OCPM for Monitoring Clustered Data ONTAP Systems

The MP for clustered Data ONTAP enables you to perform tasks such as adding storage systems, discovering and configuring storage systems, and defining MP rules.

### Adding Storage System

To add a storage system, complete the following steps:

1. In the SCOM console navigation pane, click Monitoring.
2. Select Clustered Data ONTAP > Management Servers.
3. In the Tasks pane, click clustered Data ONTAP: Manage Storage Systems.
4. In the Manage Storage Systems dialog box that appears, click Add.
5. Type the name or IP address of the storage system.
6. Indicate whether the storage system is a cluster or an SVM.
7. Type the user credentials of the system you want to add.

### Running Discovery on Clustered Data ONTAP

To run discovery on clustered Data ONTAP, complete the following steps:

1. In the SCOM console navigation pane, click Monitoring.
2. Select Clustered Data ONTAP > Management Servers.
3. In the Tasks pane, click Clustered Data ONTAP Cluster: Discovery Task.
4. In the Discovery Task dialog box that appears, select the storage targets on which you want to run discovery and click Run.

The clustered Data ONTAP SCOM MP has clustered Data ONTAP storage discovery and clustered Data ONTAP virtualization discovery enabled by default. For the clustered Data ONTAP SCOM MP, the discovery rules are targeted at a resource pool. Therefore, the discovery rules are enabled by default. You can use the `Debug-OCHost` cmdlet to verify that they are enabled. Figure 3 shows the `Debug-OCHost` output.

Figure 3) Debug-OCHost output.

```
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                      : SCOM2012R2
OCPM SQL server port                          : 1433
```

## Running Virtualization Discovery on Clustered Data ONTAP

To run virtualization discovery on clustered Data ONTAP, complete the following steps:

1. In the SCOM console navigation pane, click Monitoring.
2. Select Clustered Data ONTAP > Management Servers.
3. In the Tasks pane, click Clustered Data ONTAP: Virtualization Discovery Task.
4. In the Virtualization Discovery Task dialog box that appears, select the storage targets on which you want to run discovery and click Run.

## Initiating Storage Discovery in SCOM

To initiate storage discovery in SCOM, complete the following steps:

1. In the SCOM console navigation pane, click Monitoring.
2. Select Clustered Data ONTAP > Management Servers.
3. In the Tasks pane, click Clustered Data ONTAP Cluster: Manage Storage Systems.
4. In the Manage Storage Systems dialog box that appears, click Discover.
5. Select the storage targets on which you want to run discovery and click Run.

## Overriding Clustered Data ONTAP Management Pack Rules

To override clustered Data ONTAP MP rules, complete the following steps:

1. In the SCOM console navigation pane, click Authoring.
2. In the navigation pane, select Management Pack Objects > Rules.
3. In the search field, type `clustered Data ONTAP` and click Find Now.
4. In the list of rules, right-click any rule and set the overrides for all objects, for specific objects, or for the entire group.

**Note:** Select the overrides you want to set according to whether you want to enable or disable the rule, alter the frequency, or change the start time for the rule.

5. Save the changes to a new MP.

## Adding Data ONTAP Storage Controller Credentials in SCOM

If you cannot connect to the controller entered into the Manage Storage System, you might need to configure the Run As action account. This requires you to have Data ONTAP storage credentials in SCOM.

To add Data ONTAP storage controller credentials in SCOM, complete the following steps:

1. Add the OCPM Run As action account as an administrator on the local host.
2. Prepare to edit the credentials by navigating to SCOM Administration > Run As Configuration > Accounts > Action Account.
3. Change the credentials of the OCPM Run As action account to a user with privileges that allow it to run.

## Retrying When Discovery and Monitoring Tasks Fail to Run the PowerShell Script

The discovery and monitoring scripts used by OCPM are called by using Windows PowerShell. They are run under the context of an action account in SCOM. This account should have a Windows profile created to run the PowerShell script. If this account is not used to log in to the SCOM server before running the OCPM SCOM MP, the discovery and monitoring tasks fail to run the PowerShell script.

To troubleshoot a failed attempt at running the PowerShell script, complete the following steps and retry the operation:

1. Log in to the SCOM server with the default action account.
2. Restart the SCOM service.
3. Run a manual discovery in SCOM.

## 2.13 Manual Discovery of Data ONTAP 7-Mode Storage Systems

After OCPM 4.1.1 and all of the required MPs are installed, a discovery process is required to capture all of the data to populate the SCOM console with the NetApp information. You can start the manual process by launching the Data ONTAP run discovery task. For Data ONTAP 7-Mode systems, the discovery is disabled by default. In this case, follow the steps in section 2.7, “OCPM for Monitoring Data ONTAP 7-Mode Systems,” to enable the discovery process. For more information about proper setup of the environment before running manual discovery, see the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#) and the accompanying [OnCommand Plug-In 4.1.1 for Microsoft Release Notes](#).

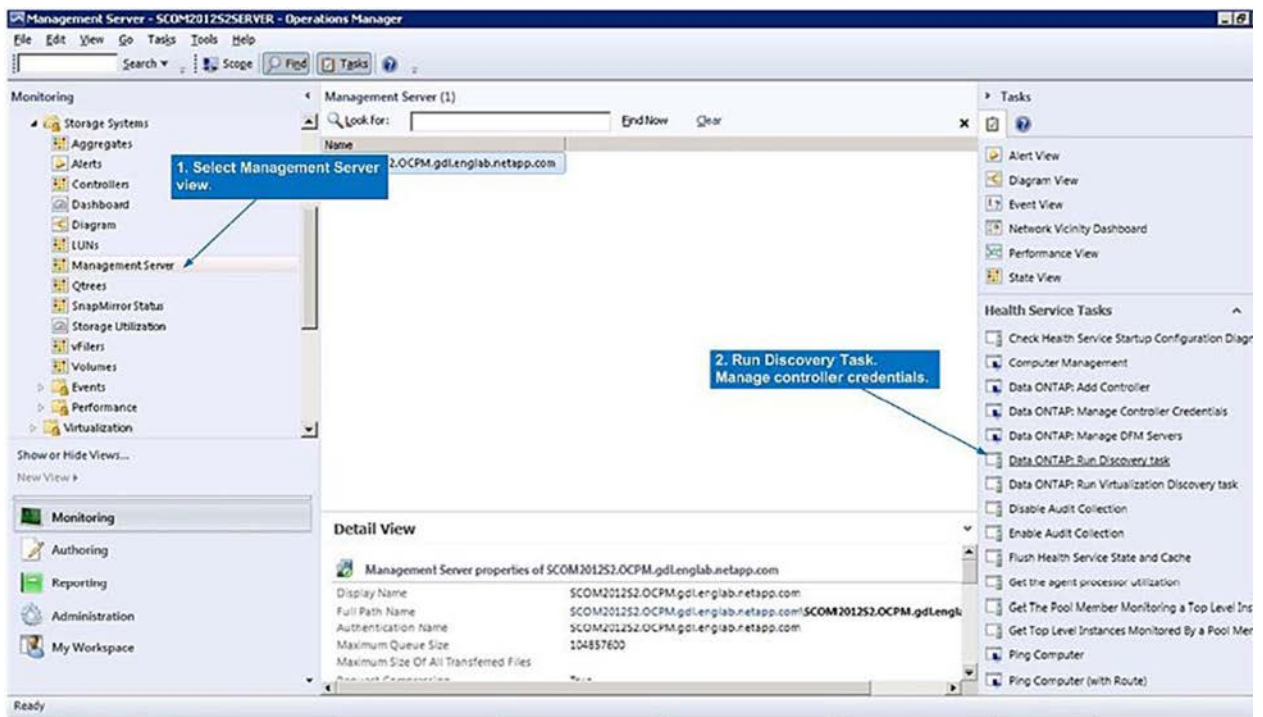
To manually run a discovery task, complete the following steps:

1. Under the Data ONTAP folder and the Storage Systems subfolder, select the Management Server view.
2. Click Data ONTAP: Run Discovery Task to initiate the manual discovery process.

Figure 4 shows the manual discovery task.



Figure 4) Manual discovery task.



## 2.14 Manual Discovery of NetApp Clustered Data ONTAP Storage Systems

After installing OCPM 4.1.1 and all of the required MPs, you must run the clustered Data ONTAP discovery task.

Unlike Data ONTAP 7-Mode, SCOM clustered Data ONTAP storage discovery and SCOM clustered Data ONTAP virtualization discovery are enabled by default. You do not have to enable them manually through the authoring space as you do for clustered Data ONTAP 7-Mode in section 2.7, “NetApp Storage Minimal Read Access Control for OCPM Monitoring.”

1. In the Clustered Data ONTAP folder, select the Management Server view.
2. Click Clustered Data ONTAP: Discovery Task to initiate the manual discovery process.

After you add the storage system from one console, OCPM allows you to perform the discovery task. You use the Discover button to run both a clustered Data ONTAP discovery task and a clustered Data ONTAP virtualization discovery task.

Figure 5 and Figure 6 show the manual discovery task for the clustered Data ONTAP SCOM MP.

Figure 5) Manage storage systems.

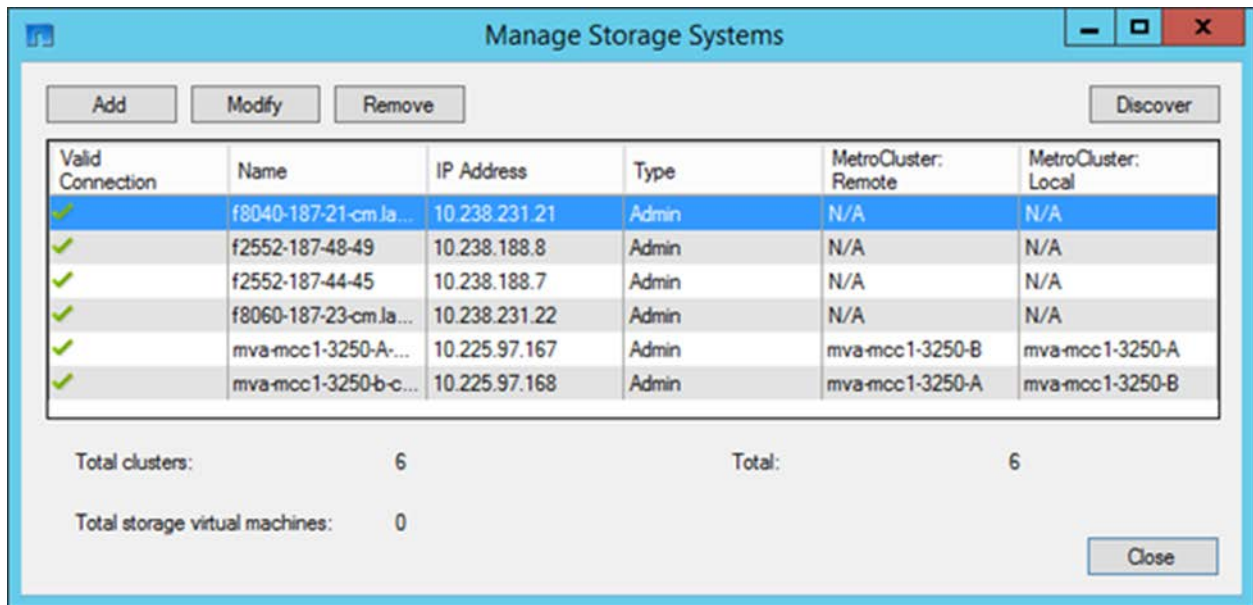
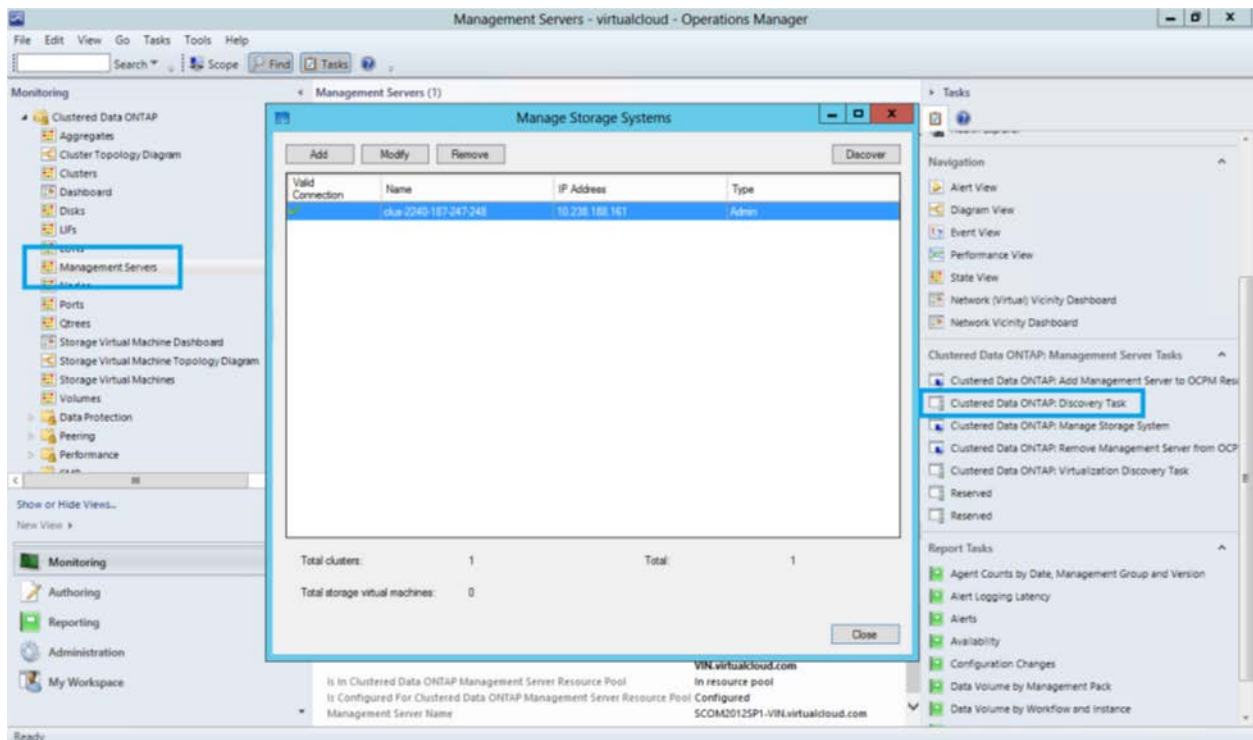


Figure 6) Clustered Data ONTAP manual discovery task.



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

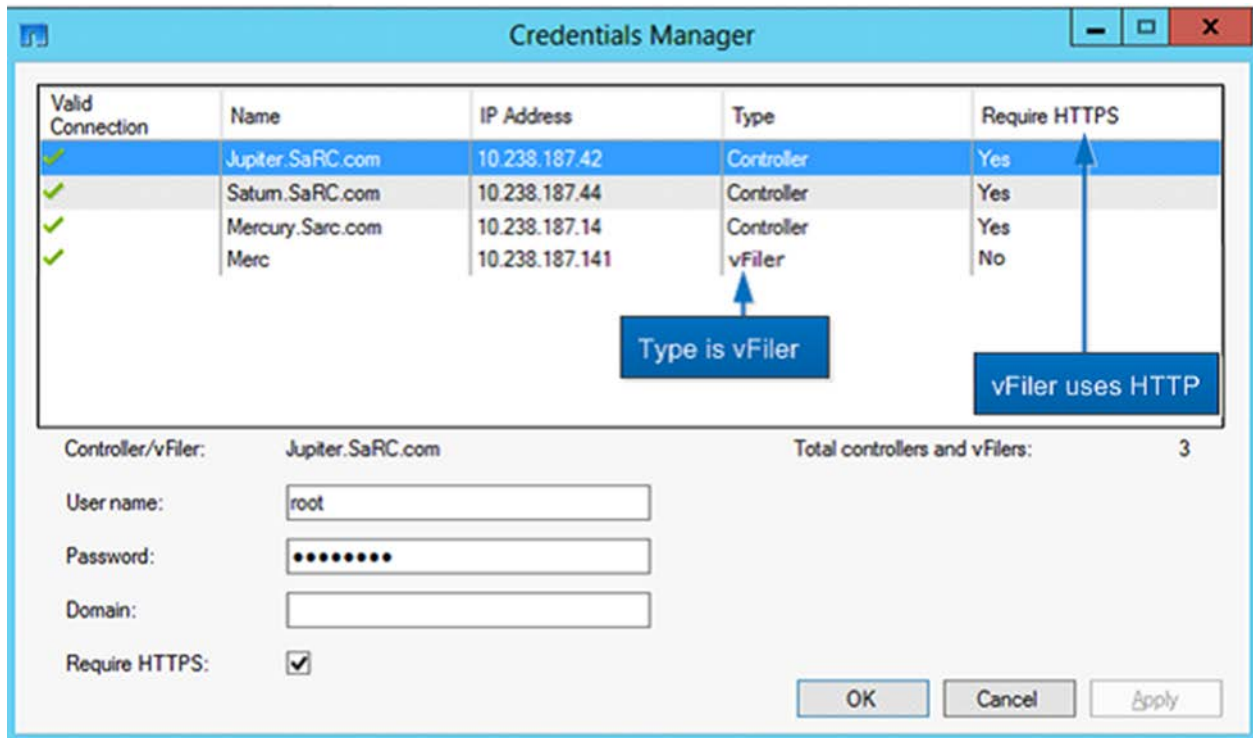
MultiStore units, also known as vFiler units in OCPM 4.1.1, are monitored as individual objects, including their storage, health roll-up, and utilization. vFiler unit discovery is part of the Data ONTAP discovery action. During the discovery process, vFiler unit information, such as volume information, qtree information, and LUN information, is also gathered. Because a vFiler unit's volume, qtree, and LUN path



are also the physical appliance's path, these identifiers are mapped to the corresponding aggregates. The collected information is used to create the object model shown in Figure 7.

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. The HTTP option is available in the Manage Controller Credentials action. Figure 7 shows the controllers and MultiStore units (vFiler units) listed in the Credentials Manager window.

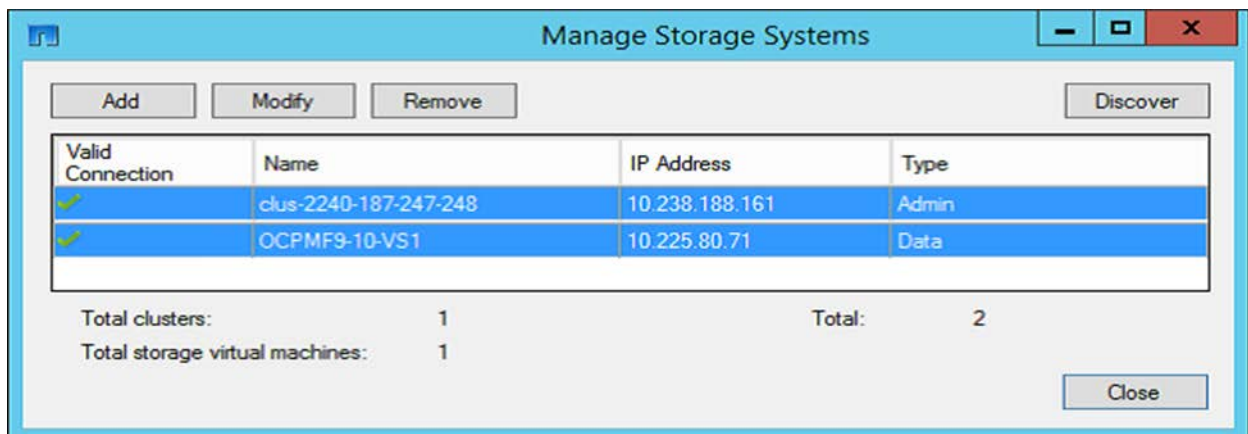
Figure 7) List of controllers and MultiStore units (vFiler units) in Credentials Manager window.



## 2.16 Support for SVMs for Clustered Data ONTAP Systems

In OCPM version 4.1.1, the clustered Data ONTAP MP enables you to monitor SVMs. Figure 8 shows the OCPMF9-10-VS1 SVM, which has been added. It also shows the total number of SVMs. OCPM 4.1.1 enables you to perform the discovery task after adding the storage system from one console. The Discover button enables you to do this by running both the clustered Data ONTAP discovery task and the clustered Data ONTAP virtualization discovery task. Figure 8 shows the list of clustered Data ONTAP systems and SVMs in the Manage Storage Systems window.

Figure 8) List of clustered Data ONTAP systems and SVMs in the Manage Storage Systems window.



**Note:** Domain credentials manage and add clustered Data ONTAP storage systems that can be used to establish a cluster connection for MetroCluster clusters and clustered Data ONTAP clusters.

## 2.17 OCPM Resource Pool Support for Clustered Data ONTAP Management Pack

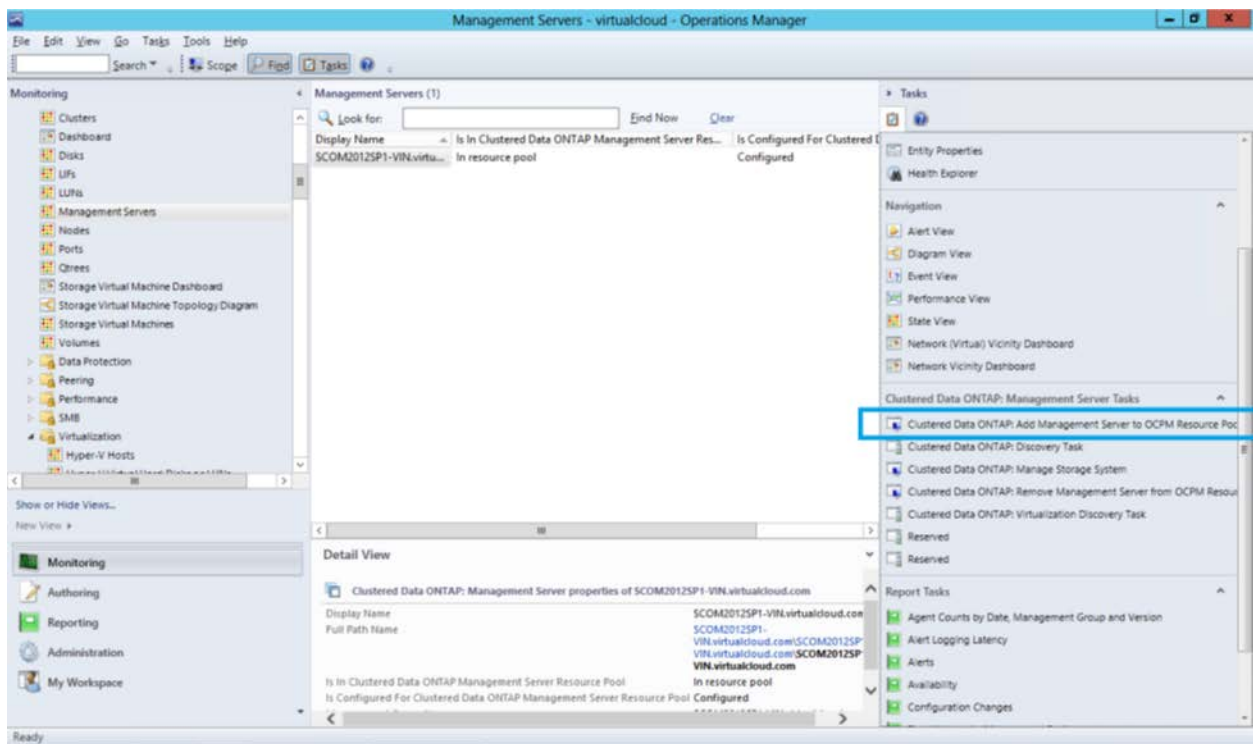
In OCPM version 4.1.1, the clustered Data ONTAP MP supports the concept of resource pools.

SCOM 2012 includes the Resource Pool feature. A resource pool is a collection of management servers that balance a work load among the servers in the resource pool and take over work from a failed server in the pool. Resource pools enable 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 point to the same SCOM database. The clustered Data ONTAP MP consists of an OCPM resource pool. You can add SCOM servers to the resource pool individually by selecting a management server and clicking Clustered Data ONTAP: Add Management Server to OCPM Resource Pool under Clustered Data ONTAP: Management Server Tasks. Figure 9 shows the Operations Manager window used to add management servers to an OCPM resource pool.

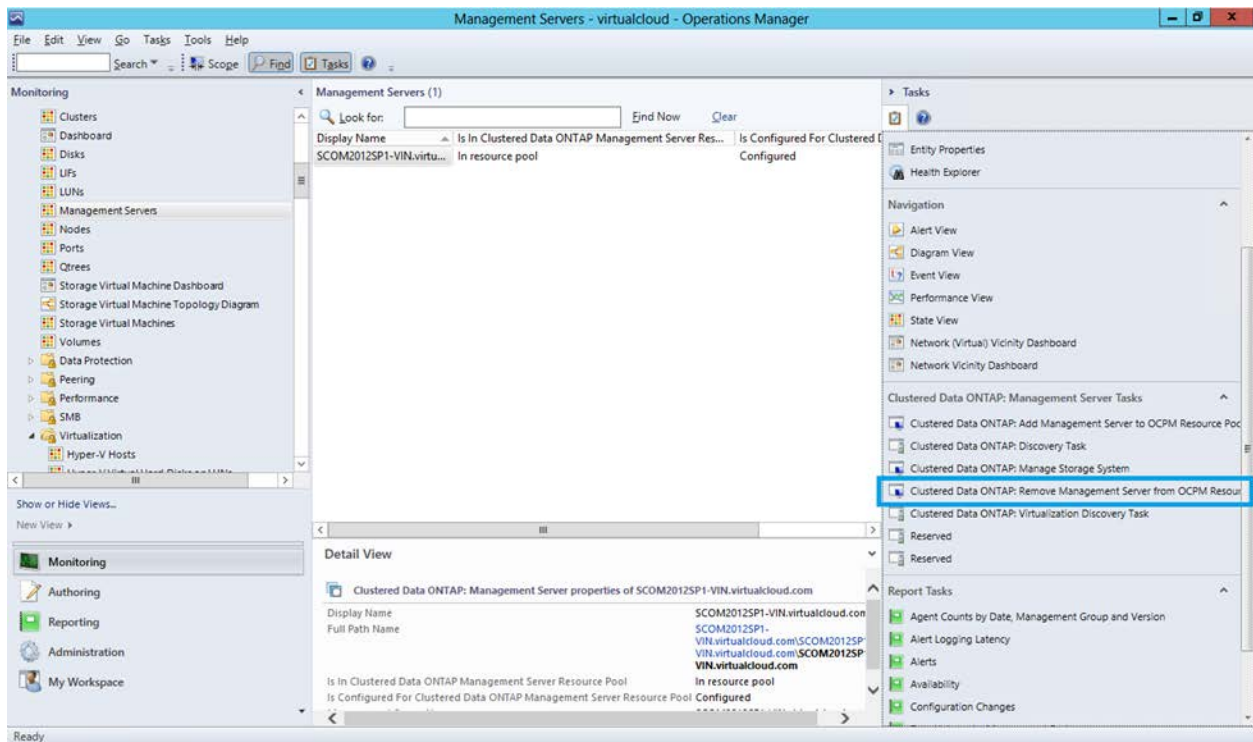
Figure 9 shows management servers being added to the OCPM resource pool.

Figure 9) 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 10 shows the Operations Manager window used to remove management servers from an OCPM resource pool.

Figure 10) Removing management servers from OCPM resource pool.



For example, if there are four nodes in the resource pool, the discovery task would be run from the node on which OCPM is installed. All other tasks, such as alerting and monitoring, can be run in parallel from other nodes that are part of the resource pool.

You cannot run the discovery task on these servers, but you can execute other monitoring and management tasks there.

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

## 2.18 Microsoft Vulnerability Reported by OCPM

Some Microsoft vulnerabilities are exposed if OCPM 4.1.1 is installed on a Windows Server 2012 machine. Figure 11 shows the vulnerability report from the Nessus vulnerability scanner tool after OCPM is installed.

Figure 11) Vulnerability report from Nessus tool after OCPM is installed.

| 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 (2849565)         |
|              |                 | 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   |

The Nessus tool alerts shown in Figure 11 relate to several high-level and medium-level vulnerabilities that are exposed if OCPM is installed in a “vanilla” Windows Server 2012 OS. To fix these critical vulnerabilities, use the solutions provided in Table 6.

Table 6) Fixes for critical vulnerabilities.

| Vulnerability  | Fix  |
|--|--|
| MSRDP uses non-network-level authentication sessions to log on to servers. | Change remote settings to allow connection running remote desktop with network-level authentication.   |
| SMB certificate is not trusted.  | Turn SMB signing and trusting on or off. Follow the directions in <a href="#">How to Disable SMB Signing on Windows Servers to Improve SMB Performance</a> .   |
| KB2862973 is not installed: This may cause a vulnerability.                | Download and install Microsoft <a href="#">KB Windows 8-RT-KB2862973-x64</a> .   |
| SSL sessions are not signed.   | Investigate SSL signing issues. Follow the directions in <a href="#">How to Disable SMB Signing on Windows Servers to Improve SMP Performance</a> and <a href="#">How to Disable Weak SSL Protocols and Ciphers in IIS</a> . |
| Servers store user logon details in local registry.                        | Change the registry key on all servers:<br>Set HKLM\Software\Microsoft\WindowsNT\<br>CurrentVersion\Winlogon\CachedLogonsCount to 0.   |

Figure 12 shows the result in the Nessus tool after all of these vulnerabilities are fixed.

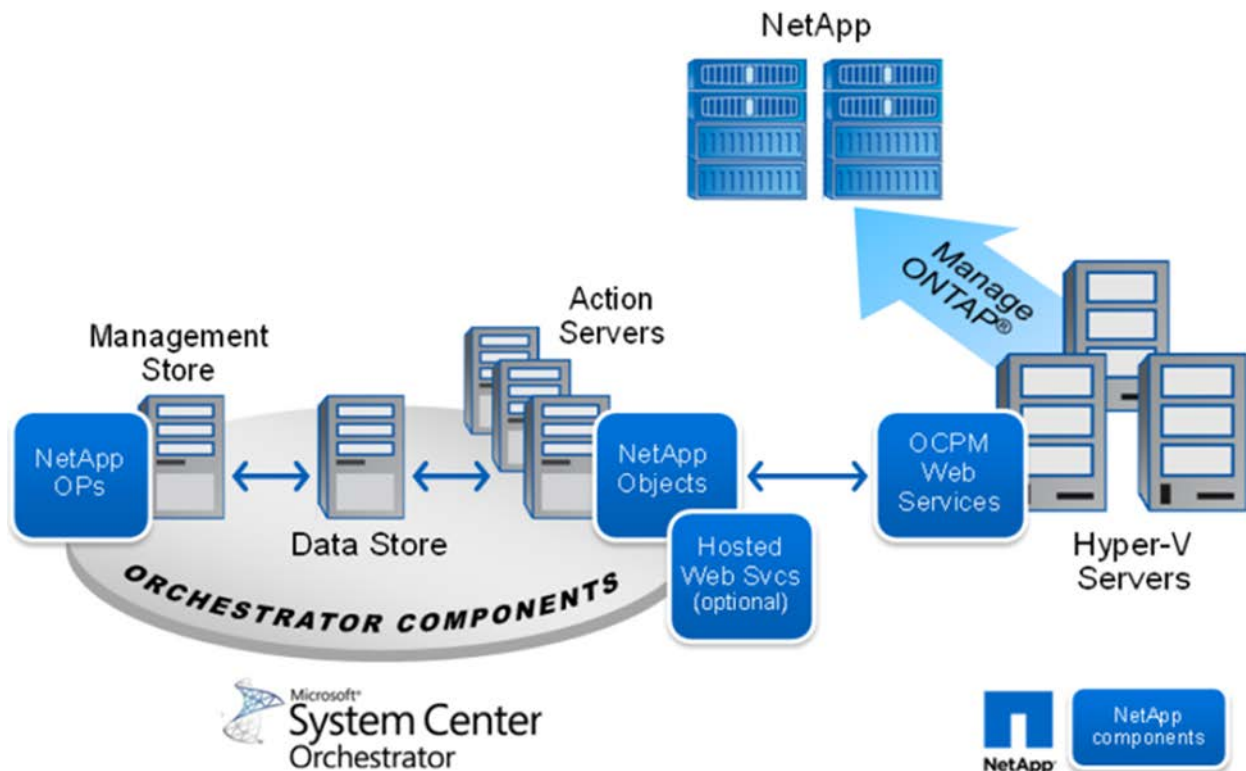
Figure 12) Nessus tool output after vulnerabilities are fixed.

| Plugin ID | Count | Severity | Name   | Family        |
|-----------|-------|----------|--|---------------|
| 23974     | 1     | info     | Microsoft Windows SMB Share Hosting Office Files     | Windows       |
| 63620     | 1     | info     | Windows Product Key Retrieval                        | Windows       |
| 52001     | 1     | 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       |

## 2.19 Installing SCO Components

When you install and use System Center Orchestrator (SCO) components, it is important to realize that the SCO integration packs (OIPs) run on both the management server and all of the action servers. The Orchestrator Deployment Manager tool manages OIP deployment, but the administrator should be aware that the OIPs try to contact the Hyper-V server designated in the runbook through web services. This attempt implies that there is IP connectivity on the designated port between the action servers and the Hyper-V servers you are trying manage. Figure 13 shows how OCPM is integrated with SCO.

Figure 13) OCPM-SCO integration.



**Note:** Clustered Data ONTAP environments do not support SCO components.



### Best Practice

As a best practice, NetApp recommends installing the OCPM VIM service on all of the Hyper-V servers in your environment that you plan to manage. Installing this service enables the runbooks to work consistently.

In addition, OCPM 4.1.1 stores all credential-related information in OCPMDB, so you need to enter the credentials only once.

## 2.20 Uninstalling OCPM SCOM Management Packs

Custom configurations set during the setup of OCPM 4.1.1 can cause the uninstall process of OCPM 4.1.1 to react differently. To completely uninstall OCPM 4.1.1 and restore the SCOM environment to its original state, complete the following tasks:

1. Navigate to the Administration tab in SCOM.
2. Select the Data ONTAP MPs that were installed.
3. Delete the Data ONTAP MP and all other Data ONTAP MPs that were installed.

### Caution

If you try to delete the OCPM MPs, SCOM might prompt you to remove the Microsoft default MP dependency. This message occurs if you save any override MP values to the default MP.

You will lose all override settings stored in the default MP. To eliminate any loss of settings, remove the override settings for Data ONTAP stored in the default MP before uninstalling OCPM 4.1.

4. To check for Data ONTAP override values, navigate to Authoring > Overrides.
5. Navigate to the target where the overrides were saved and delete the Data ONTAP overrides.
6. Delete OCPM MPs.
7. Uninstall the OCPM 4.1.1 application from the Windows control panel and reboot.

For further information and for detailed step-by-step procedures, see the following documents:

- [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#)
- [OnCommand Plug-In 4.1.1 for Microsoft Release Notes](#)

## 2.21 Uninstalling Data ONTAP OCPM SCOM Management Packs with SCOM Windows PowerShell

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

```
Import-Module OperationsManager
Get-SCOMManagementPack | where{ $_.name -like "DataONTAP*" } | Remove-SCOMManagementPack
```

If the clustered Data ONTAP MPs are accidentally deleted, the OCPM resource pool does not initialize correctly. During installation, the OCPM MPs are automatically imported while the OCPM resource pool is initialized and the management servers are discovered.

NetApp does not recommend manually deleting and then reimporting the MPs because the OCPM resource pool does not initialize correctly. If the MPs are deleted, you must uninstall OCPM completely and then reinstall it.

## 3 Sizing and Scalability for OCPM 4.1.1 Resource Pool

OCPM 4.1.1 supports up to eight nodes in a cluster. If any nodes contain more than 2,000 objects per node, you might need to set overrides to increase the interval seconds and the timeout seconds across all rules in the OCPM MPs.

### 3.1 Increasing Parameter Settings

Parameters in the SCOM registry have default settings for the following limits:

- The number of Windows PowerShell scripts that can run simultaneously
- The amount of time the scripts can remain in the queue before timing out

Increasing these settings from their defaults can help reduce the number of monitors that time out on large configurations. To increase the settings, complete the following steps:

1. On all management servers in the resource pool, edit the (decimal) `ScriptLimit` setting to 100 and the `QueueMinutes` setting 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.
```

2. Restart the System Center management service.

Restarting the management service raises the SCOM default limits for script execution and queuing timeout. This change should lead to improved scalability.

### 3.2 Flushing Health Service State and Cache

If discovery has timing-out problems, the event viewer registers event logs such as the following:

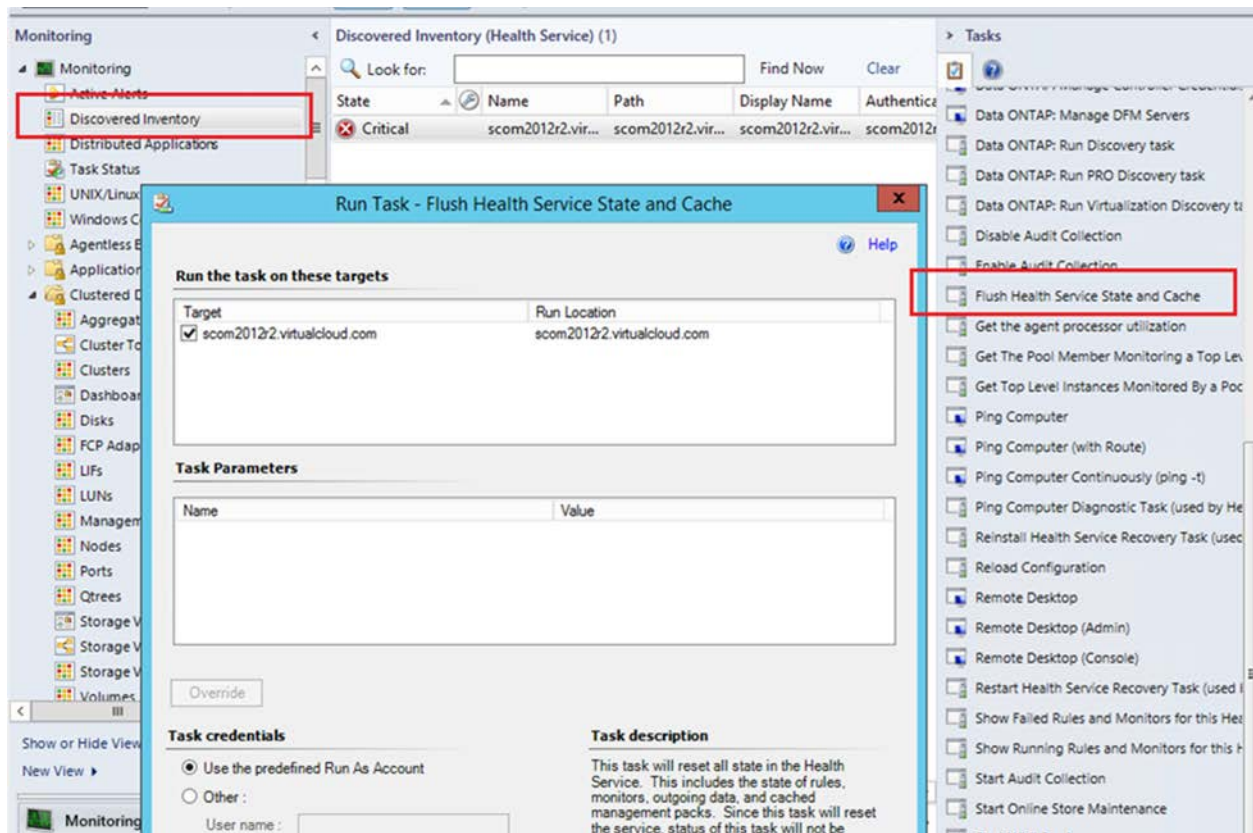
```
Event ID: 22411  
Description: The PowerShell script will be dropped because it has been waiting in the queue for  
more than 10 minutes. Script Name: MCCMonitoring.psl one or more workflows were affected by this.  
Event ID: 22402  
Description: Forced to terminate the following PowerShell script because it ran past the  
configured timeout 450 seconds.
```

To troubleshoot this problem, NetApp recommends flushing the health service state and the cache in the SCOM console. To flush the health service state and the cache, complete the following steps:

1. Navigate to SCOM Monitoring.
2. On the left, select Discovered Inventory.
3. On the upper right, select Change Target Type.
4. In the pop-up window, select Health Service as the target type.
5. Run Flush Health Service State and Cache, as shown in Figure 14.



Figure 14) Flushing health service state and cache.



6. Using PowerShell, restart the health service, as shown in Figure 15.

Figure 15) Restarting the health service.



7. Restart Microsoft Monitoring Agent service on each of the management servers.

**Note:** The service must be restarted for the new registry settings to take effect. (These are the settings made by the OCPM installer to increase the number of PowerShell scripts that can be executed concurrently.)

### 3.3 Workaround for Discovery-Related Problems

For multiple management servers in a scaled-up environment, NetApp suggests the following workaround for discovery-related problems. This workaround isolates all of the SCOM scripts onto a single management server to avoid overloading by the very active OCPM script workload.

To isolate the SCOM scripts, complete the following steps:

1. Set the SCOM resource pool to manual by running this PowerShell cmdlet:

```
Get-SCOMResourcePool -DisplayName "all Management servers resource Pool" | Set-SCOMResourcePool -EnableAutomatic Membership 0
```

2. Navigate to Administration > Resource Pools > All Management Resource Properties > Pool Membership.
3. Set only one server dedicated to SCOM.
4. Remove the SCOM-dedicated server from the resource pool.

**Note:** The SCOM server on which OCPM is installed should have adequate compute resources to enable better performance during the discovery process. To avoid problems with CPU spikes, NetApp recommends having 24 vCPUs on SCOM VMs; the minimum number is 8 vCPUs and 8GB of additional RAM.

The SCOM management servers can be part of multiple resource pools. However, if a particular resource pool is used for heavy monitoring, NetApp recommends not having the management servers in that pool be part of other pools. For better performance and efficiency, management servers that are part of the OCPM resource pool should not be part of other resource pools.

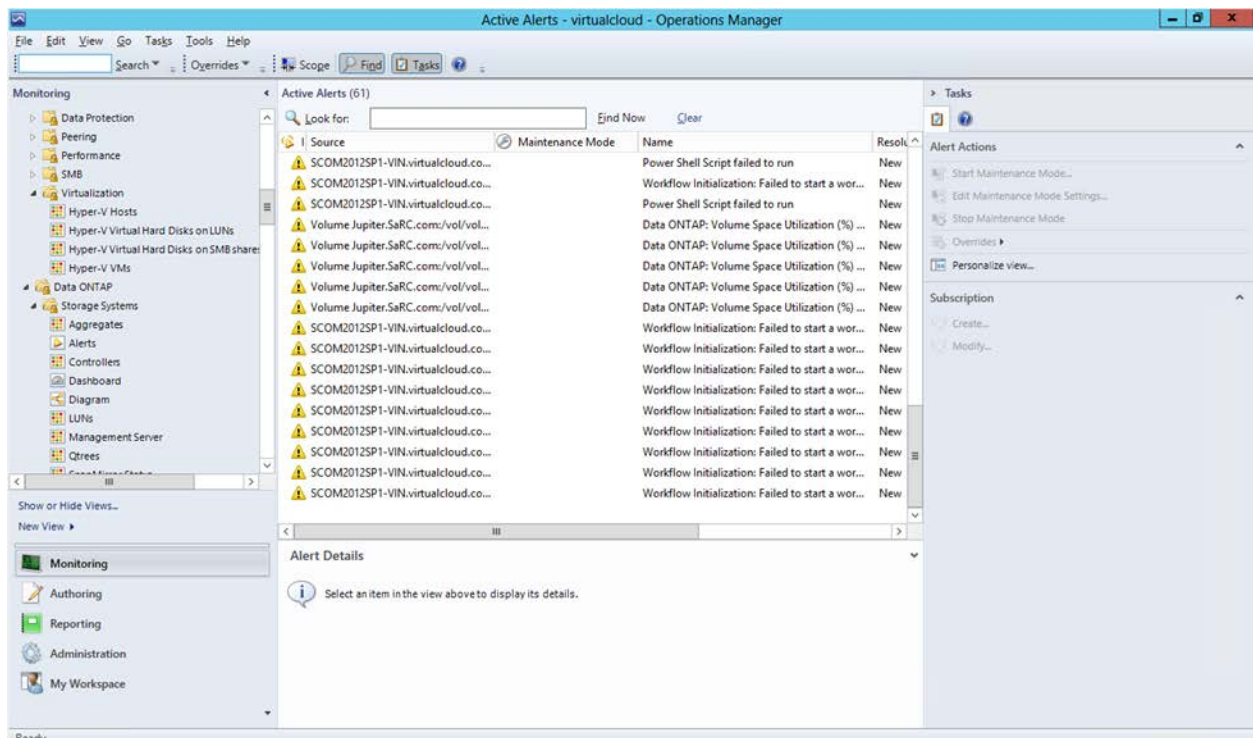
## 4 OCPM 4.1.1 Alerts, Monitoring, and Views

OCPM 4.1.1 offers various alerts, monitoring options, and views for your NetApp storage array. After installing and discovering all objects in the environment, you can see information about LUNs, qtrees, volumes, aggregates, and other detailed views. These tools help you efficiently manage your NetApp storage systems.

### 4.1 Alerts

The Alerts view allows administrators to instantly view and report problems in their NetApp environment. Figure 16 shows the locations of the important details of each alert.

Figure 16) Alerts window.



## 4.2 Guidelines for Number of Objects per SCOM Server

Because the SCOM infrastructure monitors more NetApp controllers, care must be taken to scale the SCOM installation to protect it from being overburdened. Each NetApp object being monitored requires some CPU assets on the SCOM server to monitor, manage, and process it.

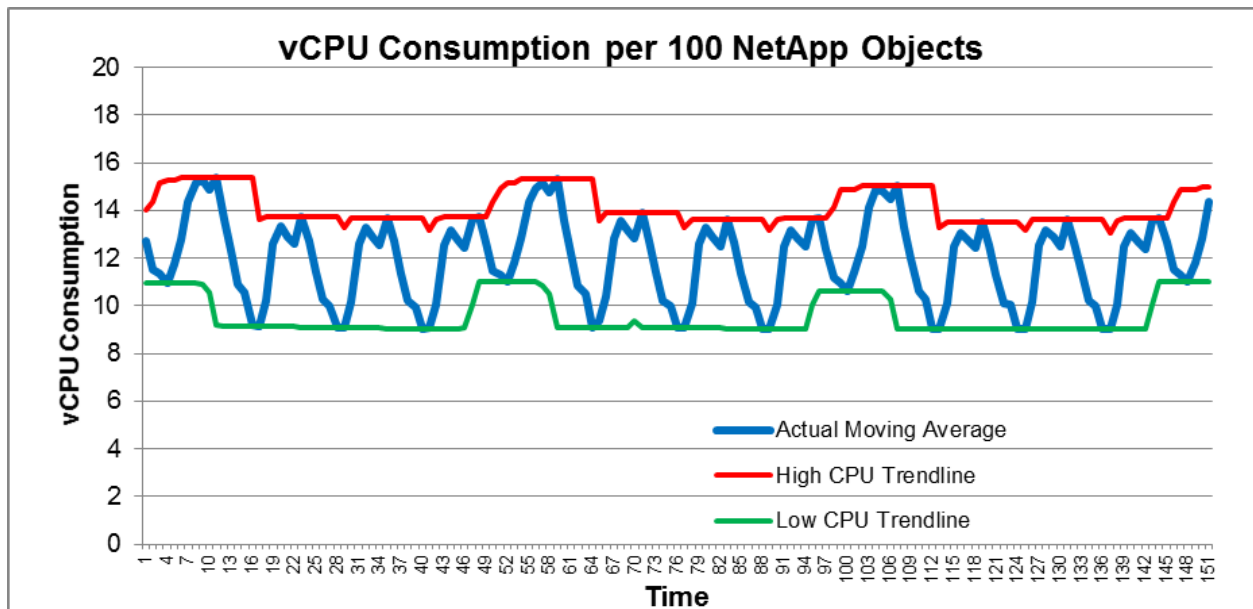
**Note:** In this context, each manageable device in a NetApp cluster is considered an object. Items as small as individual disks, logical constructs such as aggregates or volumes, and complex items such as SVMs or nodes are all objects.

Although four CPUs are required to run the OCPM discovery process, NetApp highly recommends increasing this number (or distributing it among multiple SCOM servers) for large NetApp installations with high numbers of objects under management.

**Note:** All CPU discussions in this section assume virtual CPUs because the CPUs are assigned to a virtual server. If you use physical servers, your CPU performance should exceed that of a vCPU, but these calculations still have validity for your situation.

For each 100 objects being managed, expect an additional 12% (+/-3%) of vCPU consumption. The SCOM application can produce very bursty results during benchmarking. Therefore, a simple average CPU utilization report might indicate more CPU headroom than actually exists. The graph in Figure 17 shows that the SCOM agents drive up CPU significantly and maintain low CPU between polling times. As an example, this graph shows results across a set of SCOM servers with performance gathered at five-minute intervals. The CPU use averages 12%; however, performance fluctuates between 9% and 15% CPU utilization.

Figure 17) Graph of sample vCPU consumption per 100 NetApp objects.



If, for example, a SCOM server manages a four-node NetApp cluster and an eight-node NetApp cluster, these two clusters might contain the quantities shown in Table 7.

Table 7) Example NetApp object list.

| NetApp Objects              | Quantity                         |
|-----------------------------|----------------------------------|
| Clusters                    | 2                                |
| Cluster nodes               | 4 nodes + 8 nodes                |
| Aggregates                  | 44 (across all nodes)            |
| Disks                       | 530                              |
| FCP adapters                | 18                               |
| LIFs                        | 259                              |
| LUNs                        | 1,020                            |
| Volumes                     | 1,159                            |
| SVMs                        | 63                               |
| DP policies + relationships | 340 policies + 227 relationships |
| Peering SVMs                | 18                               |
| SMB servers                 | 30                               |
| SMB shares                  | 158                              |
| Total                       | Roughly 3,880 objects            |

Because this example is only an estimate, you can round the total up to 4,000 objects. Each 15% (using the worst-case high load) of vCPU can support roughly 100 objects. This number equates to a consumption of 0.15% (high load), 0.12% (average load), or 0.09% (low load) per individual object. To discover the CPU requirements, multiply 4,000 objects by 15% (for high load) to gain the required CPU consumption. In this case, the result is 600. Therefore, the management of this infrastructure requires roughly the equivalent of six vCPUs of processing power because each CPU can service only 100%.

In this situation, a single four-vCPU SCOM server would be sized far too small to accomplish the goal. You might choose to manage this cluster through an eight-vCPU SCOM server, or you might divide the management of this infrastructure among multiple SCOM servers. Both approaches are common.

If the objects in this example were deployed to an eight-vCPU SCOM server, the SCOM server scale would be selected against the upper performance number. Table 8 shows the CPU usage statistics expected from deployment.

**Note:** The average 60% utilization is expected to burst as high as 75% and to idle as low as 45%.

Table 8) Performance expectations for eight-vCPU SCOM server.

| Performance Required to Support 4,000 Objects | vCPU Requirement | Six-vCPU Server      | Eight-vCPU Server   |
|---|------------------|----------------------|---------------------|
| Assuming 15% vCPU usage per 100 objects       | 600 vCPU %       | 100% CPU utilization | 75% CPU utilization |
| Assuming 12% vCPU usage per 100 objects       | 480 vCPU %       | 80% CPU utilization  | 60% CPU utilization |
| Assuming 9% vCPU usage per 100 objects        | 360 vCPU %       | 60% CPU utilization  | 45% CPU utilization |

### 4.3 Guidelines for Performance Latency Monitor Rules in SCOM

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

OCPM SCOM MPs can effectively monitor and manage your NetApp storage environment out of the box. However, SCOM 2012 SP1 provides a mechanism for customizing the configuration of any MP object to allow scenarios in which the default configuration does not provide optimal results.

If users access the authoring space in the operations console, they can modify or override the threshold values of the Data ONTAP or clustered Data ONTAP monitors to trigger alerts based on specified threshold values.

For specific steps and details, see the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#). For supplemental information, see the [OnCommand Plug-In 4.1.1 for Microsoft Release Notes](#).

The threshold values are environment specific, and they vary widely for different customers. NetApp recommends baselining your performance statistics on your storage environment, ascertaining appropriate thresholds, and overriding and enabling the relevant performance monitors.

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

In keeping with best practices, the latency threshold should be set at 30ms to 40ms to avoid spamming of alerts. For more sensitive apps, the latency threshold should be lowered further.

The performance monitors include:

- Node latency (ms)
- Volume latency (ms)
- LUN latency (ms)
- Disk data read per node (KBps)
- Disk data written per node (KBps)

These performance monitors are also what SCOM MPs recommend for similar performance metrics.

To display the list of monitors that are enabled or disabled by default for OCPM, open a Windows PowerShell prompt in administrative mode and enter the following set of cmdlets:

```
Import-Module operationsmanager
Get-SCOMMonitor | ?{$_.displayname -match "ONTAP"} | ?{$_.enabled -match "false"}
```

To display 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 18 lists the monitors that are disabled by default.



Figure 18) List of monitors 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 19 lists the monitors that are enabled by default.

Figure 19) List of monitors 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 Monitor                        | ManagementPackEle... |
| true    | Data ONTAP: Disk State Monitor  | ManagementPackEle... |
| true    | Clustered Data ONTAP: Power Supply State Monitor                            | ManagementPackEle... |
| true    | Data ONTAP: Volume Quota Monitor  | ManagementPackEle... |
| true    | Clustered Data ONTAP: Node Availability Depends on Port Availability Mon... | ManagementPackEle... |
| true    | Data ONTAP: Power Supply State monitor                                      | ManagementPackEle... |
| true    | Data ONTAP Virtualization: Hyper-V LUN Volume Snapshot autodelete Monitor   | ManagementPackEle... |
| true    | Data ONTAP: Controller Latency Monitor                                      | ManagementPackEle... |
| true    | Data ONTAP PRO: Hyper-V Host Volume Space Utilization Monitor               | ManagementPackEle... |
| true    | Data ONTAP PRO: Hyper-V Host VHD Alignment Monitor                          | ManagementPackEle... |
| true    | Clustered Data ONTAP: Storage Virtual Machine FCP Service Monitor           | ManagementPackEle... |
| true    | Data ONTAP PRO: Hyper-V Host LUN Alignment Monitor                          | ManagementPackEle... |
| true    | Data ONTAP PRO: Hyper-V Host Volume Deduplication Enabled Monitor           | ManagementPackEle... |
| true    | Clustered Data ONTAP: Aggregate Space Utilization (%) Monitor               | ManagementPackEle... |
| true    | Clustered Data ONTAP: Volume Quota Monitor                                  | ManagementPackEle... |
| true    | Clustered Data ONTAP Virtualization: Virtual Hard Disk LUN Space Utiliza... | ManagementPackEle... |
| true    | Data ONTAP Virtualization: Hyper-V VM Availability Depends on VHD Availa... | ManagementPackEle... |
| true    | Data ONTAP PRO: Hyper-V Host Thin Provisioning LUN Space Reservation Dis... | ManagementPackEle... |
| true    | Data ONTAP: Controller Connection Monitor                                   | ManagementPackEle... |
| true    | Data ONTAP Virtualization: Hyper-V LUN Volume Dedupe Licensed               | ManagementPackEle... |
| true    | Data ONTAP: Fan State Monitor   | ManagementPackEle... |
| true    | Data ONTAP Virtualization: Hyper-V LUN Volume Dedupe Enabled Monitor        | ManagementPackEle... |
| true    | Clustered Data ONTAP Virtualization: Virtual Hard Disk Volume Snapshot A... | ManagementPackEle... |
| true    | Data ONTAP Virtualization: Hyper-V LUN Volume Used Space Monitor            | ManagementPackEle... |
| true    | Clustered Data ONTAP: Node Availability Depends on LIF Availability Monitor | ManagementPackEle... |

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

OCPM 4.1.1 includes a new Data ONTAP virtualization MP with all virtualization objects and their related storage discovered and monitored, including the Hyper-V host, Hyper-V LUN, and Hyper-V VHD objects. Table 9 lists all of the objects contained in the Data ONTAP virtualization MP.

**Table 9) Data ONTAP virtualization MP objects.**

| Data ONTAP Virtualization Objects               | Description   |
|---|---|
| Hyper-V virtual hard disks on LUNs              | <ul style="list-style-type: none"> <li>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.</li> <li>This object represents a NetApp LUN that is mapped to the Hyper-V host object as a Windows disk or Cluster Shared Volume (CSV).</li> <li>In the case of CSVs, there is a Hyper-V LUN object for each host that maps to this LUN.</li> <li>If the LUN is not a CSV, the cluster name and CSV name properties display as N/A.</li> </ul> |
| Hyper-V virtual machine (VM)                    | <ul style="list-style-type: none"> <li>This object represents all VMs associated with VHDs on a NetApp LUN or a NetApp SMB share.</li> </ul>  |
| Hyper-V virtual hard disks (VHDs) on SMB shares | <ul style="list-style-type: none"> <li>This object represents a VHD that resides on a NetApp SMB share.</li> <li>During virtualization discovery, all VHDs attached to a VM are discovered as Data ONTAP virtualization: Hyper-V virtual hard disk instances.</li> </ul>  |
| Hyper-V VHD                                     | <ul style="list-style-type: none"> <li>This object represents a VHD that resides on a NetApp LUN. During virtualization discovery, all VHDs, whether attached to a VM or not, are discovered as Data ONTAP virtualization: Hyper-V virtual hard disk instances.</li> <li>For clustered Data ONTAP virtualization discovery, the VHDs residing on clustered Data ONTAP LUNs and SMB shares should be attached to the VMs.</li> </ul>   |

## 4.5 Running 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 VMs, and Hyper-V virtual hard disks. In some cases, Data ONTAP virtualization discovery requires the OnCommand Discovery Agent on the Hyper-V host.

To invoke the Data ONTAP virtualization discovery rule manually, complete the following steps:

1. Navigate to the Management Server view under the Data ONTAP node.
2. On the management server, click Data ONTAP Virtualization: Run Virtualization Discovery Task.  
This rule targets the management server. It has a default interval of four hours and a default timeout of one hour. The following conditions determine whether 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 GUIDs, and the SCOM server is not running Windows 2008 R2 SP1 or later.

## 4.6 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.

To invoke the clustered Data ONTAP virtualization discovery rule manually, complete the following steps:

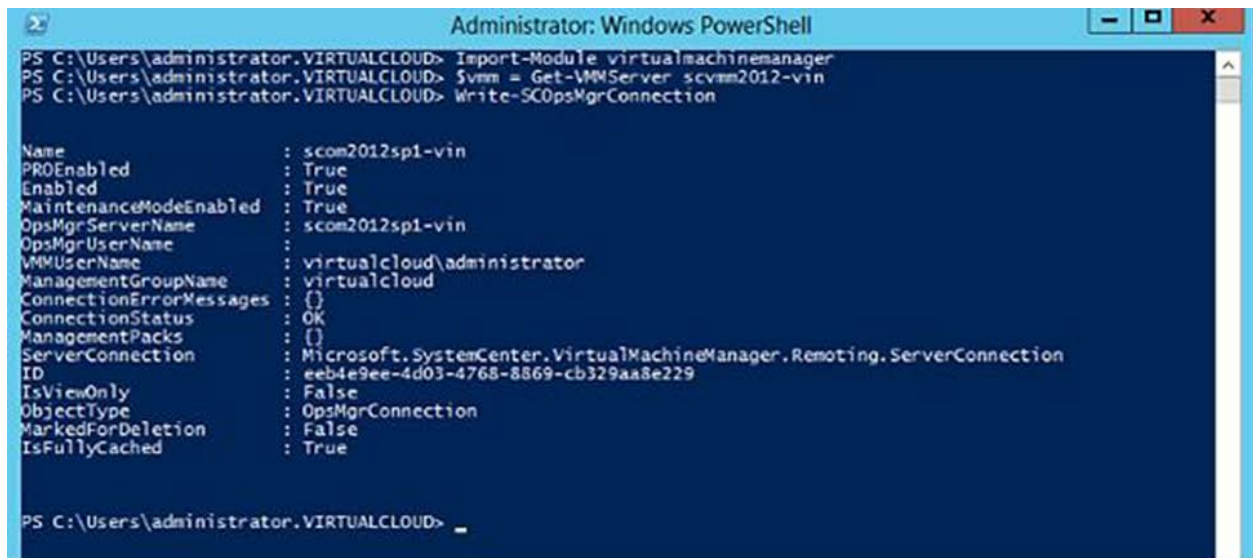
1. Click Monitoring.
2. In the Navigation pane, select Clustered Data ONTAP > Management Servers.
3. In the Tasks pane, click Clustered Data ONTAP: Virtualization Discovery Task.
4. In the Virtualization Discovery Task dialog box that opens, select the storage targets on which you want to run discovery. Click Run.

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

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

Figure 20 shows Operations Manager updated with the most current information from SCVMM.

Figure 20) Operations Manager updated with most current information from SCVMM.



**Note:** For virtualization discovery to run properly, make sure that Update Rollup 3 for SCVMM Server is installed.

If failed virtualization discovery is observed on MetroCluster systems after switchover, NetApp recommends running the base discovery after switchover and then running virtualization discovery. For failed discovery of VMs on SMB 3.0 shares, verify that the character case of the volume junction path's name remains the same after switchover.

Virtualization discovery might not show all VMs hosted on the LUN. A temporary workaround is to install the OnCommand Discovery Agent on each Hyper-V host that owns the VMs.

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

Misalignments between LUNs and VHDs cause I/O performance problems. It is crucial to detect and correct LUN and VHD misalignments to improve storage performance. Usually, 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 a master boot record (MBR) or a GUID partition table (GPT) partition. The GPT partition is also checked for misalignment. In the case of GPT, however, it is very uncommon for customers to have a VHD file with more than a couple of primary partitions. For that reason, only the first four primary partitions of GPT are checked for misalignment problems. No further checking is needed because, if any partition is misaligned, the VHD is marked as misaligned.

**Note:** Only primary partitions are checked for misalignment problems. The system or reserved partitions in a VHD are not checked for misalignment.

NetApp LUNs should be partitioned with a single primary partition. Detection of LUN and VHD misalignment is supported only for clustered Data ONTAP 7-Mode storage systems and not for clustered Data ONTAP systems.

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

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

For VHD alignment checking, remote Windows PowerShell must be enabled on these hosts. For instructions about how to enable Windows PowerShell on remote Hyper-V hosts, see [Enable-PSRemoting](#).

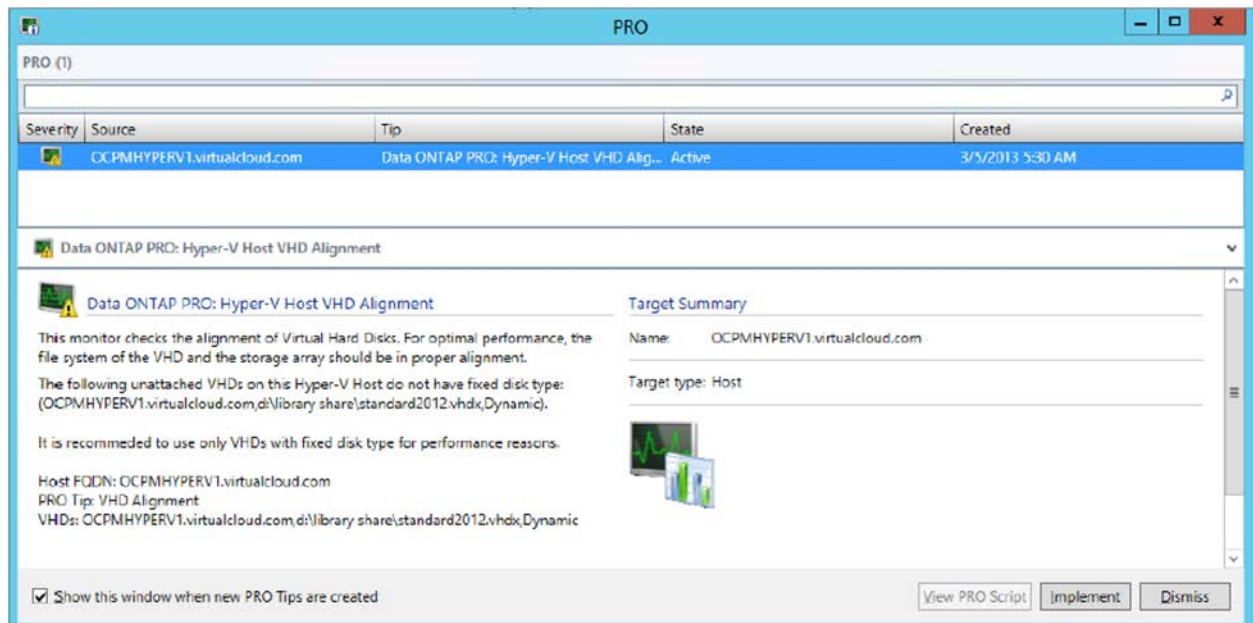
#### Limitations

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

The misalignment check can be invoked by a rule to run on a schedule. Alternatively, tasks on the virtualization LUN view and the host view can invoke misalignment detection on both the LUN and the Hyper-V host levels.

Figure 21 shows a VHD misalignment alert in the SCOM console.

Figure 21) VHD misalignment alert in SCOM console.



## 5 OCPM 4.1.1 Reporting in Data ONTAP 7-Mode and Clustered Data ONTAP Systems

OCPM 4.1.1 includes a reporting MP that enables you to view reports about various aspects of your NetApp storage. To use the Data ONTAP reporting MP, you must configure SCOM 2012 for reporting.

For more information about setting up reporting for SCOM, see the [Microsoft TechNet](#) website.

### 5.1 Custom Reporting

The Data ONTAP reporting MP in OCPM includes various prepackaged reports. You can also create custom reports for specific NetApp objects.

To create a custom report, complete the following steps:

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. Use the word “ONTAP” as the keyword to filter for available report options.

Figure 22 shows the custom reporting option.

Figure 22) Custom reporting option.

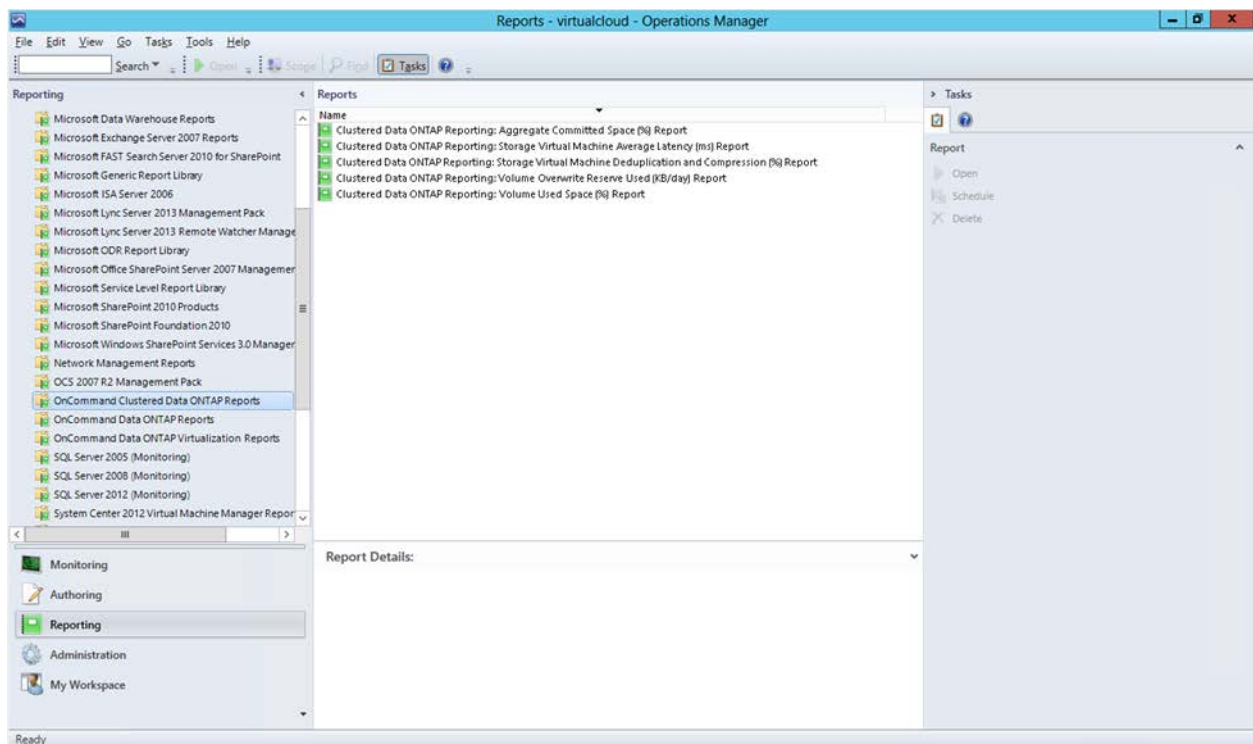


Figure 23 shows how to create custom reports for the Data ONTAP inventory.

Figure 23) Creating custom reports for Data ONTAP inventory.

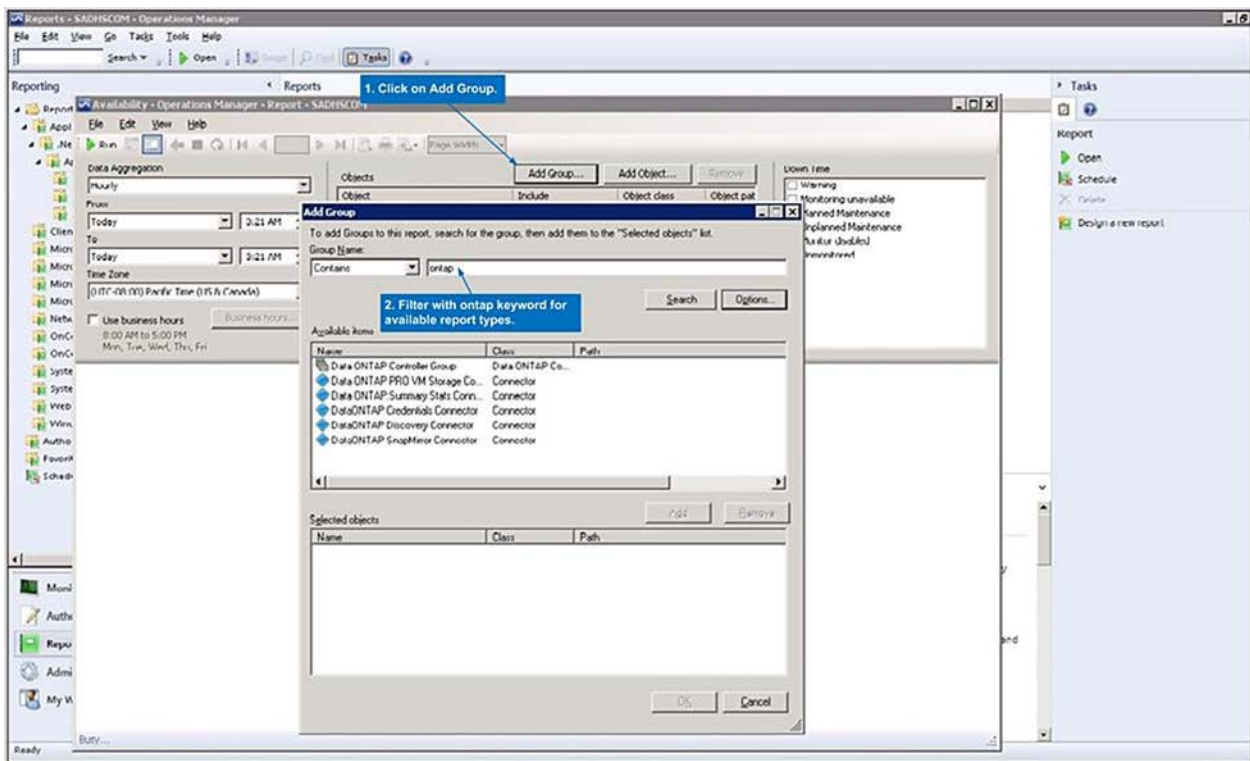
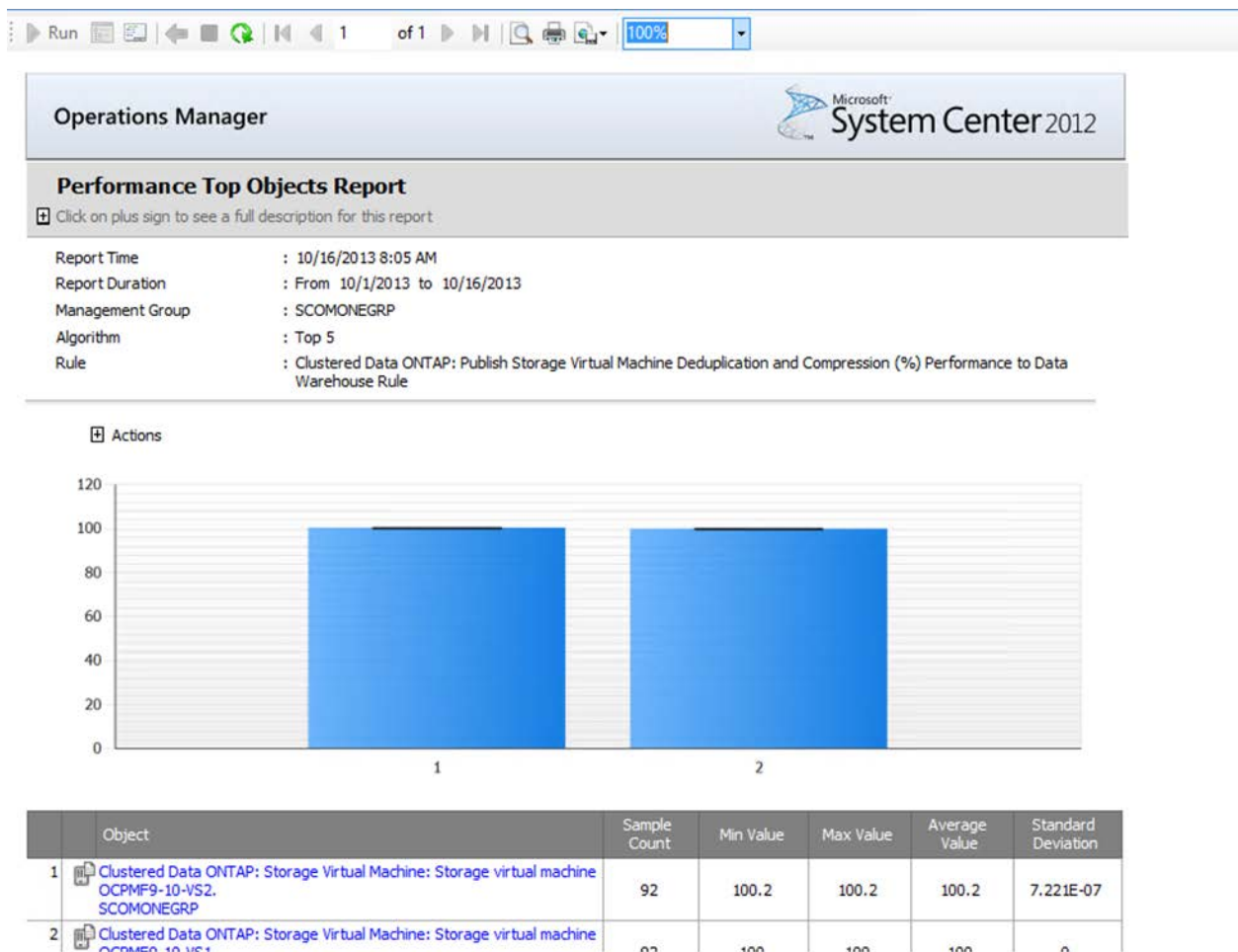


Figure 24 shows a deduplication and compression report for SVM. You can generate this report by accessing the Reporting view in the SCOM navigation pane.

Figure 24) Clustered Data ONTAP reporting: SVM deduplication and compression (%) report.



## 6 OCPM 4.1.1 PRO Tips for Data ONTAP 7-Mode Systems

PRO tips are a type of alert that you can use with SCVMM to notify you if storage-related problems occur in your virtual environment. You can also enable them to automatically repair many of those problems. To receive problems related to VMs, you must subscribe to the SCVMM event log. When OCPM receives these events, PRO rules are triggered in the MP to immediately generate PRO tips.

PRO tips are part of the OCPM MP. 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.

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

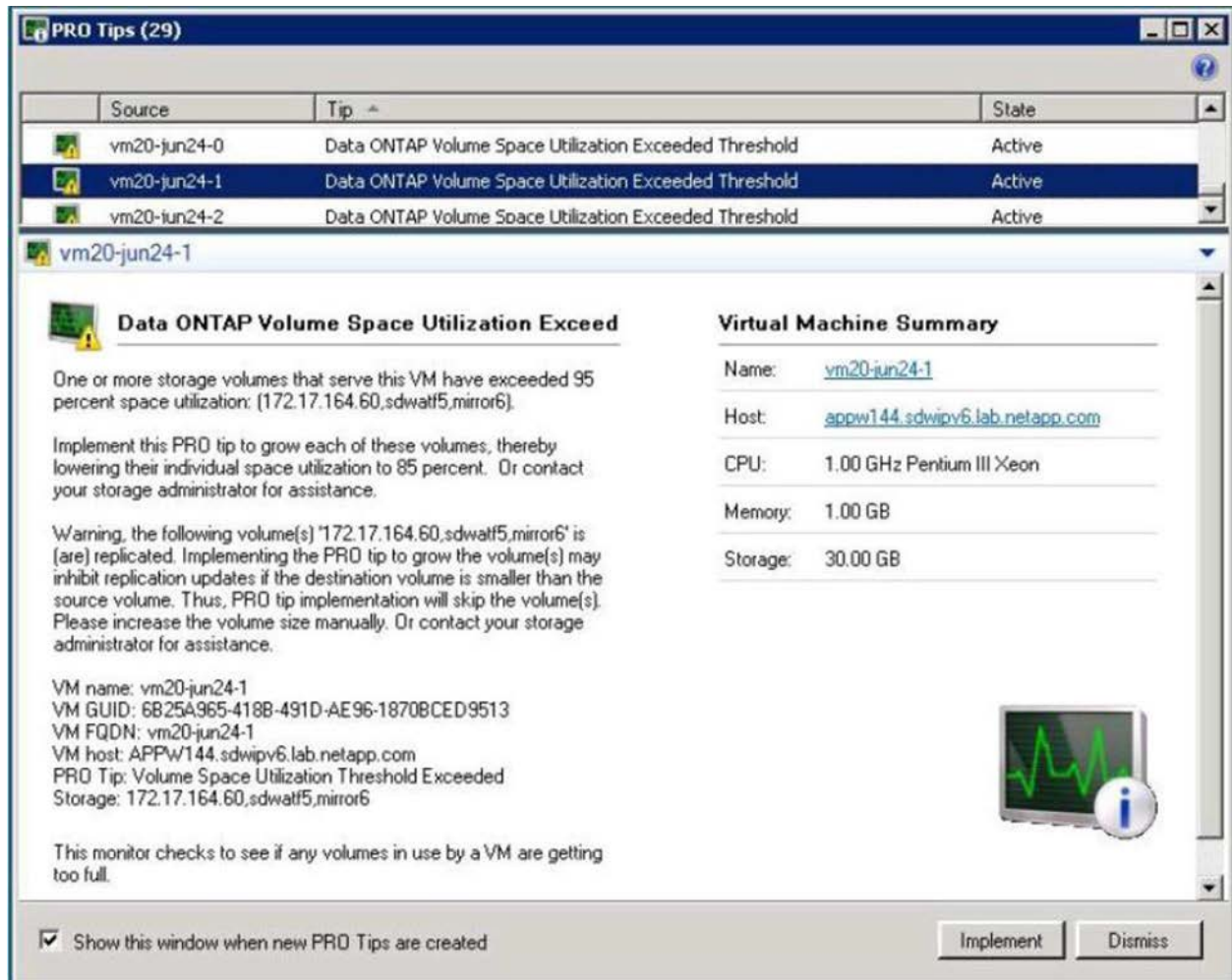
### 6.1 Volume Space Utilization PRO Tip

Implementing this PRO tip increases the size of a volume. Sometimes the size of a volume cannot be automatically increased; for example, because the aggregate does not have sufficient free space or because the volume is the source of a NetApp SnapMirror® relationship. (Growing the source volume larger than the destination volume would inhibit replication updates.) In these situations, clicking the Implement button does not change the size of the volume.

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

Figure 25 shows a volume space utilization PRO tip.

Figure 25) Volume space utilization PRO tip.



## 6.2 Best Practices for Snapshot Autodelete PRO Tip

The thin-provisioning NetApp Snapshot® autodelete PRO tip checks whether Snapshot autodelete is turned off for volumes hosting Hyper-V VMs. If it is implemented, the PRO tip enables Snapshot autodelete for the volume.

### Caution

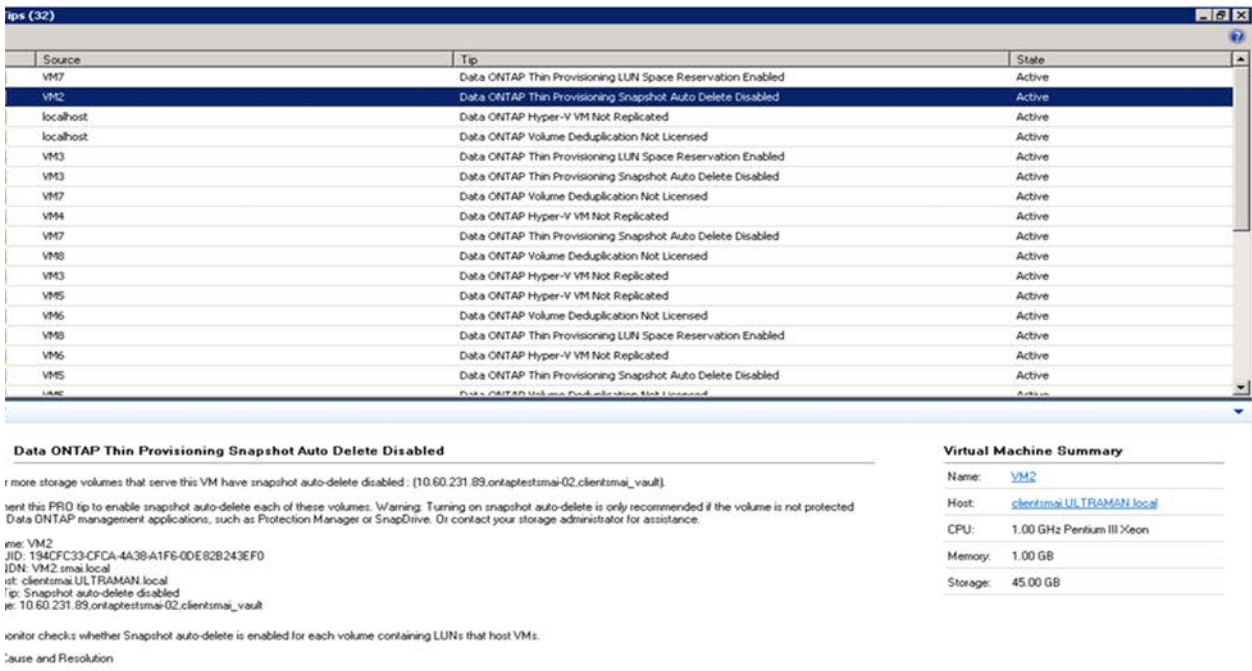
Do not enable Snapshot autodelete for volumes that are currently protected by other NetApp management applications such as System Manager or NetApp SnapManager® for Hyper-V. Enabling Snapshot autodelete on these volumes might disrupt the other protection mechanisms and cause problems with consistency.



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

Figure 26 shows Snapshot autodelete PRO tips.

Figure 26) Snapshot autodelete PRO tips.



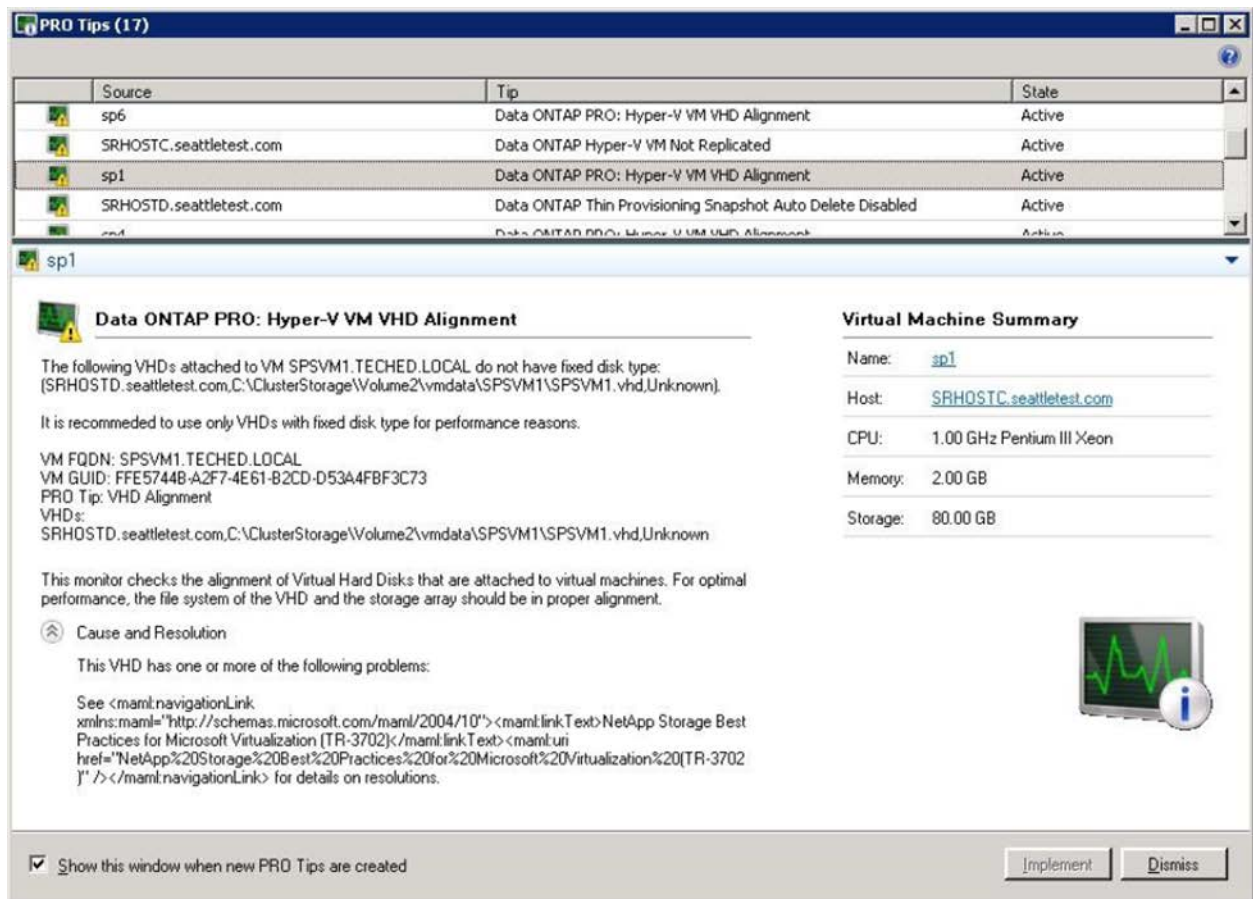
### 6.3 Best Practices for LUN and VHD Alignment PRO Tips

PRO tips are generated at the Hyper-V host level for misaligned LUNs and for 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 problems. Instead, the PRO tips include references to methods for fixing them.

For more information about how to prevent, detect, and correct file system misalignment problems for VMs hosted on Hyper-V, see [TR-3747: Best Practices for File System Alignment in Virtual Environments](#).

Figure 26 illustrates VHD misalignment PRO tips.

Figure 27) VHD misalignment PRO tips.



## 7 OCPM 4.1.1 Rapid Provisioning and Cloning Cmdlets for Data ONTAP 7-Mode Systems

The rapid provisioning and cloning cmdlets are installed separately from the core MPs and do not depend on them. The rapid provisioning and cloning cmdlets are used with Microsoft SCVMM to dramatically speed up provisioning of Hyper-V VMs and to minimize storage requirements.

**Note:** Rapid Cloning Utility (RCU) cmdlets are supported only in clustered Data ONTAP 8.3 release family environments and only by the `New-OCClone` cmdlet for cloning VMs from the VM template.

For more information about provisioning and cloning cmdlets, see [OnCommand Plug-In 4.1 for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide](#).

### 7.1 OC.Cmdlets Using Windows PowerShell

The following Windows PowerShell commands must be used:

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



## 7.2 Cmdlets and User Access Control

The cmdlets included with the OCPM 4.1.1 rapid provisioning and cloning cmdlets fail if user account control (UAC) is enabled in the Windows operating system. They also fail if the Run As Administrator option is not used in opening the terminal. For that reason, either disable UAC or use Run As Administrator to open a cmdlet window.

## 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 it can be accessed directly by using the `New-OCCLoneFile` cmdlet. These same features can be accessed through the SCO rapid provisioning OIP. In all 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 in a mounted LUN on a Windows host or guest. This operation is performed by the OCPM VIM service. It requires the source and destination LUN to be mounted on the local host. If the `new-OCCLone` cmdlet is used, the new LUN is managed automatically. However, if the `New-OCCLoneFile` cmdlet (or an associated clone NTFS file OIP) is used, 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 comes 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 is exceeded because of deduplication, Data ONTAP copies the affected block rather than cloning the block. For all versions of Data ONTAP earlier than 8.1, this maximum number of copies is 255. For large, fixed-sized VHDs, this action could involve copying tens of thousands of blocks and could result in cloning delays of up to an hour.

When deploying the rapid provisioning features of OCPM, determine whether the source volume 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.)

OCPM does not support MBR partitions. GPT is the default partition type for Windows Server 2008 R2, but systems that have been upgraded from older Windows versions might 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 restriction is consistent with [TR-3702: NetApp Storage Best Practices for Microsoft Virtualization and NetApp SnapManager for Hyper-V](#). The restriction is also consistent with the Microsoft best practice to use only fixed VHDs for production VMs, as explained in [Frequently Asked Questions: Virtual Hard Disks in Windows 7 and Windows Server 2008 R2](#).

## 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 NetApp FlexClone® volumes 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` performs a sub-LUN clone operation of the VM's VHD file first, and then it uses this cloned file to create the new VM.

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. It is a SCVMM requirement that the guest OS installed on the VHD must also be sysprepped before the clone operation.

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 VMs are created in a clustered disk in a clustered environment. If a server switch is not specified by default, it takes the local cluster name.

Table 10 lists the supported and unsupported configurations for a clustered environment.

**Table 10) Supported configuration for a clustered environment.**

| Cluster Disk Type | Specific Case                                   | Description  | Support Status |
|-------------------|---|--|----------------|
| New shared        | Mount point specified                           | Creation of a shared disk on a specified mount point and cloning into that shared disk | Supported      |
|                   | No mount point specified                        | Multiple copying of template cloning into multiple new different shared disks          | Supported      |
|                   | New mount point /AllinSingleLUN specified       | Multiple copying of template cloning into a single shared disk                         | Not supported  |
| Existing shared   | Existing mount point specified                  | Template cloning into a single shared disk   | Not supported  |
|                   | Existing mount point specified                  | Multiple copying of template cloning into a single shared disk                         | Not supported  |
| New CSV           | CSV specified                                   | Creation of CSV disk and cloning into that CSV disk                                    | Supported      |
|                   | CSV and /AllinSingleLUN specified               | Multiple copying of template cloning into a single CSV disk                            | Supported      |
|                   | CSV specified and /AllinSingleLUN not specified | Multiple copying of template cloning into multiple new different CSV disks             | Not supported  |
| Existing CSV      | Existing mount point specified                  | Cloning into a specified CSV   | Supported      |
|                   | Existing mount point specified                  | Multiple copying of template cloning into a specified CSV disk                         | Supported      |

In a dedicated environment, a non-HA VM is created in a dedicated disk. If the 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 or dedicated disk is not supported.

Table 11 lists the supported configurations for a dedicated environment.

**Table 11) Supported configurations for a dedicated environment.**

| Cluster Disk Type | Specific Case                          | Description   | Support Status |
|-------------------|--|---|----------------|
| New dedicated     | New mount point or no mount point with | Creation of a dedicated disk and cloning into that dedicated disk | Supported      |

| Cluster Disk Type  | Specific Case                  | Description   | Support Status |
|--------------------|--------------------------------|---|----------------|
|                    | /AllinSingleLUN                | Multiple copying of template cloning into a single dedicated disk | Supported      |
| Existing dedicated | Existing mount point specified | Cloning into a specified dedicated disk                           | Supported      |
|                    |                                | Multiple copying of template cloning into a single dedicated disk | Supported      |

Table 12 lists the supported and unsupported configurations for remote cloning.

**Table 12) Supported and unsupported configurations for remote cloning.**

| Cluster Disk Type | Specific Case  | Description  | Support Status |
|-------------------|--|--|----------------|
| New shared        | Mount point specified                                  | Creation of a dedicated disk and cloning into that dedicated disk          | Supported      |
|                   | No mount point specified                               | Multiple copying of template cloning into a single dedicated disk          | Supported      |
|                   | New mount point /AllinSingleLUN specified              | Multiple copying of template cloning into a single shared disk             | Not supported  |
| New CSV           | CSV specified  | Creation of a CSV disk and cloning into that CSV disk                      | Supported      |
|                   | CSV specified  | Multiple copying of template cloning into multiple new different CSV disks | Not supported  |
|                   | CSV and /AllinSingleLUN specified                      | Multiple copying of template cloning into a single CSV disk                | Not supported  |
| New dedicated     | New mount point or no mount point with /AllinSingleLUN | Creation of a dedicated disk and cloning into that dedicated disk          | Supported      |
|                   | New mount point or no mount point with /AllinSingleLUN | Multiple copying of template cloning into a single dedicated disk          | Supported      |

For 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 while it runs, and you cannot clone a file that is currently opened by the Hyper-V manager.

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

**Note:** When cloning VMs from VM templates in clustered Data ONTAP environments, as a best practice place the template VHDs on the same SMB share as the destination clone location. This action is needed so that the copy process does not use Windows copy and the copy is offloaded to

storage systems. Cloning from SMB to SMB on a different volume takes a very long time because it uses the Windows copy function.

Cloning requires the Windows Management Instrumentation (WMI) provider to be installed. The WMI provider is installed when OCPM cmdlets are installed. Run the `Debug-OCHost -CheckSettings` command to verify that the WMI provider is configured, as shown in Figure 28.

## 7.5 OCPM 4.1.1 Specific Debug Commands

Figure 28 shows how to use the `Debug-OCHost -CheckSettings` command to verify that the WMI provider is configured. This screenshot shows the OCPM WMI Provider Status displayed as OK.

Figure 28) Use `Debug-OCHost -CheckSettings` to verify that WMI provider is configured.

```
PS C:\Users\administrator.VIRTUALCLOUD> Debug-OCHost -CheckSettings
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     : SCUMM2012R2
OCPM SQL server port         : 1433
PS C:\Users\administrator.VIRTUALCLOUD> _
```

You can use the verbose mode for commands such as `New-OCClone` to provide a much more detailed view into the command's actions and activities. Figure 29 shows an example of a command that would normally return nothing more than a prompt indicating success. With the `-Verbose` qualifier added, the command displays all of the necessary steps that are being performed to accomplish the clone operation.

Figure 29) Verbose mode used with `New-OCClone` command.

```
New-OCClone -Verbose -Template VMtemplate_SMBShare -NumberOfClones 2 -VMMServer scvmm2012r2 -
BaseVMName smbvm -Server hyperv01 -MountPoint \\192.160.16.21\smbshare
VERBOSE: Starting New-OCClone
VERBOSE: Performing the operation "New-OCClone" on target "New-OCClone".
VERBOSE: Processing New-OCClone Inputs ...
VERBOSE: Proceeding with New-OCClone. The user confirmed the Input parameters.
VERBOSE: hyperv01:Starting Clone operation
VERBOSE: hyperv01:Retrieving Template details from SCVMM server...
VERBOSE: hyperv01:Querying template information from the SCVMM host
VERBOSE: hyperv01:Template information query completed
VERBOSE: hyperv01:Non-HA template information is successfully found for sysclone.
VERBOSE: hyperv01:Querying VHD information from the SCVMM host
VERBOSE: hyperv01:VHD information query completed
VERBOSE: hyperv01:Retrieving VHD disk paths...
VERBOSE: hyperv01:Retrieving Template details from SCVMM server...
VERBOSE: hyperv01:Querying template information from the SCVMM host
VERBOSE: hyperv01:Template information query completed
VERBOSE: hyperv01:Non-HA template information is successfully found for sysclone.
VERBOSE: hyperv01:Querying VHD information from the SCVMM host
VERBOSE: hyperv01:VHD information query completed
VERBOSE: hyperv01:Retrieving VHD disk paths...
VERBOSE: hyperv01:Querying the existing VM names for the target host hyperv01
VERBOSE: hyperv01:VM query completed for target host hyperv01
VERBOSE: hyperv01:Hostname hyperv01 and Non-HA template have been given, so a dedicated VM will
be created.
VERBOSE: hyperv01:Cloning source file '\\192.160.16.21\smbshare\w2008R2EE_fixed.vhd' to
'\\192.160.16.21\smbshare\w2008R2EE_fixed-clone-sisclone-1.vhd'
VERBOSE: hyperv01:Creating VM Task: [Host: hyperv01, VM Name: smbvm-1] .
VERBOSE: hyperv01:Create VM task: [Host: hyperv01, VM Name: > smbvm-1] completed
```

```
VERBOSE: hyperv01:Create VMs task completed with successful count 1.
VERBOSE: Operation completed. Exiting progress message processing Status
VERBOSE: Completed New-OCClone
```

## 7.6 Best Practices for Rapid Deployment

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

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

In this way, you can have 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:** This script creates a new disk signature before presenting the LUN to the cluster. This step is required because the Windows failover cluster does 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 and then call SCVMM to create the VM.

The following Windows PowerShell script is a sample using SCVMM cmdlets. 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>>
$VMPPath = <<Path for VM>>
new-vm -name $JName -Path $VMPPath -Template $TemplateName -VMHost $TargetHost -
UseLocalVirtualHardDisks -JobGroup $JobGroupID -StartVM -ComputerName $JName -RunAsynchronously
```

## 8 OCPM 4.1.1 SCVMM Add-Ins for Data ONTAP 7-Mode Systems

System Center 2012 R2 / SP1 added the capability to author and add ribbon extensions; OCPM 4.1 leverages this functionality for SCVMM add-ins.

In OCPM version 4.1.1., you can clone Hyper-V VMs and SCVMM templates by using SCVMM add-ins; these add-ins provide functionality similar to that of RCU cmdlets in GUI mode.





SCVMM add-ins must be imported into the SCVMM console after OCPM installation. To import the SCVMM add-ins from the SCVMM console, complete the following steps:

1. Click Settings > Import Console Add In.
2. Browse to C:\Program Files\NetApp\OnCommand\MS\_Plugin.
3. Import all of the add-ins listed.
4. Click Next and install the add-ins.

Four SCVMM add-ins are added to the SCVMM consoles ribbon after they are imported.

Table 13 describes the buttons that appear in the SCVMM ribbon.

**Table 13) Buttons in the SCVMM ribbon.**

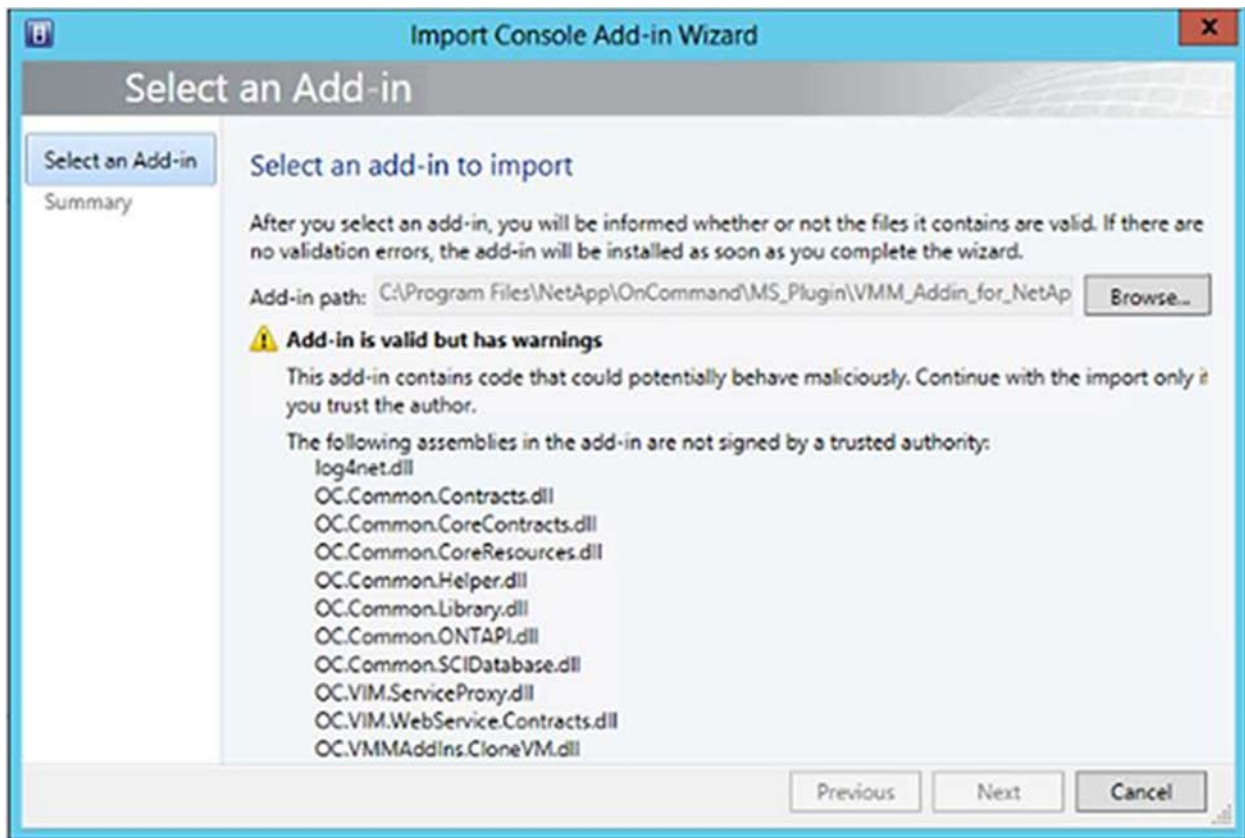
| Button  | Description   |
|---|---|
|    | Enables automated configuration and installation of OCPM across all the Hyper-V hosts managed by SCVMM.   |
|    | Enables administrators to create numerous clones of a VM; it is a GUI interface for the new-OCClone with -VMName parameter.                                     |
|   | Enables administrators 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. |
|  | Enables administrators to manage (add or remove) controllers in SCVMM; it is a GUI interface for the Add-OCStorageSystem cmdlet.                                |

While you are importing the plug-ins, you might not be able to see the Next button. If this happens, manually resize the window so you can click Next. Manual resizing is necessary because the window is not resized automatically. You might experience this problem on version 3.1.6011.0 of SCVMM.

As you start to import the plug-ins, you might see the Import Console Add-In wizard page, shown in Figure 30.



Figure 30) Import console add-in wizard.



To fix this problem, download and 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 install this update, the window is resized automatically. This update also adds some performance optimizations for SCVMM. After the update is installed, the build version of SCVMM changes to version 6018. Install all of the cumulative updates that are present for SCVMM.

**Note:** Installing OCPM 4.1 SCVMM add-ins might lead to compatibility problems when VMware vCenter is added to SCVMM.

## 9 OCPM 4.1.1 Disaster Recovery for Data ONTAP 7-Mode Systems

OCPM lets you move VMs from one Hyper-V cluster to another for DR. This feature depends heavily on the NetApp SnapMirror capability. For more information about SnapMirror, refer to [TR-3326: 7-Mode SnapMirror Sync and SnapMirror Semi-Sync Overview and Design Considerations](#). For more information about the OCPM DR feature, refer to the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#).

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

### 9.1 Configuring OCPM Disaster Recovery

Before failing over workloads to your secondary site, you must correctly configure both the DR process and the underlying storage. When you design your Hyper-V deployment, take care to identify which VMs



must 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. The example listed in Table 14 uses gold, silver, and bronze service tiers. Each tier is associated with recovery point objectives (RPOs) and recovery time objectives (RTOs). Each tier is also associated with the storage features required to achieve those objectives.

**Table 14) 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 semisync replication | Hourly Snapshot copy, 30-day retention |

Table 14 is only a sample. Each organization must discuss internal and external service level objectives so that the service tiers established in the system reflect business requirements.

After the service tiers are established, storage infrastructure can be aligned. In the example, this alignment implies a volume-level configuration and mapping. Because operations such as SnapMirror mirroring and dedupe are performed at the volume level, NetApp recommends that each volume be assigned a service tier. Then LUNs and VMs can be provisioned against volumes in the correct service tier.

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

As soon as these relationships are established, you can begin to provision Hyper-V VMs into your cluster. After the VMs are 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 are created on the secondary site when you execute the `Invoke-OCDRFailover` cmdlet or associated cmdlets.

By default, this file is placed into `C:\ProgramData\OnCommand\MS_Plugin`. For ease of use, this directory is also shared by the OCPM installer as `MS_Plugin`. 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 copy or replicate the file is to place it into a container (such as a CIFS share) on the primary site to be replicated to the secondary site.

You must offline VMs hosted on a Windows Server 2008 R2 Hyper-V cluster before you run the `New-OCDRPlan` cmdlet. For this reason, NetApp recommends running the cmdlet before the VMs are placed into production. Running the cmdlet first prevents you from having to schedule an outage to create the DR plan. This recommendation does not apply to VMs running on Windows Server 2012 Hyper-V hosts.

## 9.2 Best Practices for Disaster Recovery

When you implement a planned failover for VMs running on Windows Server 2008 R2 Hyper-V hosts, NetApp recommends gracefully shutting down the VMs on the primary site before failing over to the secondary site. This approach enables the guest OSs to come up correctly and eliminates any problems with open files or corrupt application databases. The approach is not applicable to 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. On Windows Server 2008 R2 SP1 platforms, however, the VMs are exported, and their VM configuration files are generated along with the DR plan file.

For effective DR, follow these guidelines:

- 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 must reside on mirrored LUNs. VMs that are not highly available are not discovered by the `New-OCDRPlan` and `Update-OCDRPlan` cmdlets.
- SnapMirror software is used to mirror the volumes at the primary data center to a secondary location.
- Volumes must be created with a similar size and on the same type of aggregate (large or not large aggregate).
- Make sure that all host names and cluster names can be resolved through DNS.
- Make sure that the Hyper-V node on which you run the cmdlets is the primary node of the cluster. Also make sure that the node 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 before running the restore process. Doing so enables you to commit the final VHD changes to the secondary site before you try to restore them. Again, this eliminates any problems with open files or corrupt application databases. After the update is complete, quiesce the link so that no additional transactions can be committed.

Use the following Windows PowerShell commands:

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

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 might need to run `Get-OCDRMirrorStatus` several times before the status returns to `Idle`.

During an unplanned failover, it is not possible to update the mirror or to gracefully shut down the VMs; additional application recovery steps might need to be taken. For database-driven applications such as SQL Server or Exchange Server, NetApp recommends performing additional application-specific backups with a tool 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 in the usual way. SnapMirror replicates all volume Snapshot data along with all other data contained in the volume as part of its normal replication. Usually, the VM restarts with no corrective action, but NetApp recommends providing a second layer of protection to protect against database corruption.

## 10 OCPM 4.1.1 Troubleshooting

For basic troubleshooting guidelines, see the troubleshooting section in the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#).

### 10.1 Clearing SCOM-Related Cache Problems

Sometimes it might be necessary to clear the cached UI view in SCOM so that you can troubleshoot the environment. To launch a new instance of the SCOM console with a cleared UI cache, run the following command:

## 10.2 Reinstalling OCPM 4.1.1 and Running Discovery

If reinstallation of OCPM 4.1.1 is required, follow the instructions provided in the [OnCommand Plug-In 4.1 for Microsoft Administration Guide](#). Also, depending on your environment, follow the instructions in either the [OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Clustered Data ONTAP](#) or the [OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Data ONTAP Operating in 7-Mode Environments](#).

After reinstallation is complete, you must reinitiate discovery even if it was executed in the previous installation. To rediscover the plug-in after reinstallation, complete the following steps:

1. Set up your credentials through the Data ONTAP Manage Controller Credentials dialog box in the Actions pane.
2. Click Data ONTAP: Run Discovery Task.
3. Follow the procedure provided in section 2.14, "Manual Discovery of NetApp Clustered Data ONTAP Storage Systems."
4. Optional: If you need network load-balanced SCOM servers to run discovery tasks on the node that is installed with OCPM, click Data ONTAP > Management Server.

### Notes

- If the clustered Data ONTAP MPs are accidentally deleted, the OCPM resource pool does not initialize correctly.
- During installation, the OCPM MPs are imported automatically while the OCPM resource pool is initialized and the management servers are discovered.
- NetApp does not recommend manually deleting and then importing the MPs because the OCPM resource pool does not initialize correctly.
- If you unimport the MPs, you must completely uninstall OCPM and reinstall the plug-in.

## 10.3 SCOM Database

In the Monitoring view, the host, the controllers, and the entities in the controllers display colored icons indicating critical, warning, or healthy states. If the database updates are hindered or if the database is full, these icons appear grayed out instead of in color.

If the SQL Server database is full but space remains on the drive where it resides, you might choose to allow the database to autogrow. With autogrow, the SQL Server system continues to increase the size of the SQL Server database until the drive is full. Alternatively, you might need to work with your SQL Server DBA to determine how to support SCOM data growth.

To resolve this space problem by using database autogrow, complete the following steps:

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. Look for two rows in the SQL Server table displayed with the logical names MOM\_DATA and MOM\_LOG.
6. In the Autogrowth column, double-click the button on the right showing an ellipsis (...).
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

To troubleshoot any OCPM 4.1.1 discovery problems, open a console window to the NetApp storage array. If access is denied or if there are problems with user permissions, the following message is logged:

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

If access and discovery completed successfully, the following message is logged:

```
[NetAppStorage01: app.log.info:info]: VM1.local OnCommand 4.1.0.0: (100) OnCommand Plugin For
Microsoft: DataONTAP MP discovery rule
```

## 10.5 Event Viewer Logs

Use the Windows event viewer to review the OCPM-specific logs for further information about any problems. In the event viewer, an OCPM-specific event log is displayed under Applications and Services Logs. In addition to the OCPM-specific logs, important information is displayed in the application logs and the Operations Manager logs. Use these logs to find problems specific to OCPM discovery or any other types of problems.

## 10.6 Debugging

To enable debug logging for OCPM, you must set the `DEBUG` value in the `OC.Common.Library.LogSettings.xml` file. The `LogSettings.xml` file is located in the OCPM installation directory. The following pathway shows the default location:

```
C:\Program Files\NetApp\OnCommand\MS_Plugin\OC.Common.Library.LogSettings.xml.
```

To enable OCPM debugging, change the `INFO` value to `DEBUG` in 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>
```

## 10.7 Advanced Troubleshooting

If basic troubleshooting does not resolve a problem with OCPM 4.1.1, use one of the many support features provided to NetApp customers.

- [NetApp Community](#), a public forum in which customers can discuss topics with NetApp experts about specific technologies
- [NetApp Global Support Center](#), a support center that NetApp customers with support contracts can call 24/7 for immediate support
- [NetApp Support Community](#), a support forum for customers with specific NetApp technology questions

## References

The following documents and resources are mentioned in this report:

- Enable-PSRemoting  
<http://technet.microsoft.com/en-us/library/dd819498.aspx>
- Frequently Asked Questions: Virtual Hard Disks in Windows 7 and Windows Server 2008 R2  
[http://technet.microsoft.com/en-us/library/dd440865\(WS.10\).aspx#fixed](http://technet.microsoft.com/en-us/library/dd440865(WS.10).aspx#fixed)
- How to Disable SMB Signing on Windows Servers to Improve SMP Performance  
<http://support.exinda.com/topic/how-to-disable-smb-signing-on-windows-servers-to-improve-smb-performance>
- How to Disable Weak SSL Protocols and Ciphers in IIS  
<http://www.waynezim.com/2011/03/how-to-disable-weak-ssl-protocols-and-ciphers-in-iis/>
- Microsoft KB Windows 8-RT-KB2862973-x64  
<http://www.microsoft.com/en-us/download/details.aspx?id=39911>
- Microsoft TechNet  
<https://technet.microsoft.com/en-us/>
- Microsoft TechNet library for System Center Operations Manager  
<http://technet.microsoft.com/en-us/library/hh205987.aspx>
- NetApp Community  
<http://community.netapp.com/>
- NetApp Global Support Center  
<http://www.netapp.com/us/services-support/hgs-contacts.aspx>
- NetApp Support Community  
<http://mysupport.netapp.com/>
- OnCommand Plug-In 4.1 for Microsoft Administration Guide  
[https://library.netapp.com/ecm/ecm\\_download\\_file/ECMP12453547](https://library.netapp.com/ecm/ecm_download_file/ECMP12453547)
- OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Clustered Data ONTAP  
[https://library.netapp.com/ecm/ecm\\_download\\_file/ECMP12423523](https://library.netapp.com/ecm/ecm_download_file/ECMP12423523)
- OnCommand Plug-In 4.1 for Microsoft Installation and Setup Guide for Data ONTAP Operating in 7-Mode Environments  
[https://library.netapp.com/ecm/ecm\\_download\\_file/ECMP12423524](https://library.netapp.com/ecm/ecm_download_file/ECMP12423524)
- OnCommand Plug-In 4.1.1 for Microsoft Release Notes  
[https://library.netapp.com/ecm/ecm\\_get\\_file/ECMP12496101](https://library.netapp.com/ecm/ecm_get_file/ECMP12496101)
- OnCommand Plug-In 4.1 for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide  
[https://library.netapp.com/ecm/ecm\\_get\\_file/ECMP1650594](https://library.netapp.com/ecm/ecm_get_file/ECMP1650594)
- System Center 2012 R2 and System Center 2012  
<http://technet.microsoft.com/en-us/library/hh546785.aspx>
- System Requirements for System Center 2012—Operations Manager  
<http://technet.microsoft.com/en-us/library/hh205990.aspx>
- TR-3326: 7-Mode SnapMirror Sync and SnapMirror Semi-Sync Overview and Design Considerations  
<http://www.netapp.com/us/media/tr-3326.pdf>
- TR-3483: Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment  
<http://www.netapp.com/us/media/tr-3483.pdf>
- TR-3702: NetApp Storage Best Practices for Microsoft Virtualization and NetApp SnapManager for Hyper-V  
<http://www.netapp.com/us/media/tr-3702.pdf>
- TR-3747: Best Practices for File System Alignment in Virtual Environments  
<http://www.netapp.com/us/media/tr-3747.pdf>

These additional articles in the NetApp knowledge base also provide useful information about OCPM:

- List of break-fix articles  
[https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND\\_PLUGIN\\_FOR\\_MICROSOFT&CHANNEL=BREAK\\_FIX](https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND_PLUGIN_FOR_MICROSOFT&CHANNEL=BREAK_FIX)
- List of FAQ articles  
[https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND\\_PLUGIN\\_FOR\\_MICROSOFT&CHANNEL=FAQ](https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND_PLUGIN_FOR_MICROSOFT&CHANNEL=FAQ)
- List of how-to articles  
[https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND\\_PLUGIN\\_FOR\\_MICROSOFT&channel=HOW\\_TO](https://kb.netapp.com/support/index?page=content&CAT=ONCOMMAND_PLUGIN_FOR_MICROSOFT&channel=HOW_TO)

## Contributors

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## Version History

| Version     | Date          | Document Version History | Author         |
|-------------|---------------|--------------------------|----------------|
| Version 2.0 | December 2015 | Update for v4.1.1        | Chris Lionetti |
| Version 1.0 | November 2014 | Initial release v4.1     | Vineth Menon   |



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