

Guide to Microsoft System Center Management Pack for System Center 2016 – Virtual Machine Manager

Microsoft Corporation

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If you have an idea or suggestion about this management pack, the Operations Manager team encourages you to share it at the [SCOM Feedback site](http://systemcenterom.uservoice.com/forums/293064-general-operations-manager-feedback/filters/top).

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# Guide to Management Pack for System Center 2016 – Virtual Machine Manager

This guide was written based on version 10.0.6.0 of the System Center Management Pack for System Center 2016 - Virtual Machine Manager.

## Changes History

| **Release Date** | **Changes** |
| --- | --- |
| October, 2016 | Original release of this guide |
| June, 2017 | Minor corrections |

## Supported Configurations

The VMM management pack monitors System Center 2016 – Virtual Machine Manager (VMM) and all hosts and virtual machines that VMM manages, including hosts supported versions of Microsoft Hyper-V, and VMware ESX. If you are using VMM to manage a VMware vSphere 4 or VMware Infrastructure 3 (VI3) environment, the management pack monitors virtual machines deployed on the VMware ESX hosts from an in-guest perspective.

The Operations Manager configuration must meet the following requirements:

 The VMM management pack requires System Center 2016 - Operations Manager.

 The virtual environment managed by a management server must be monitored by a single management group in the Operations Manager. However, an Operations Manager management group can monitor multiple VMM instances.

 The VMM management pack does not support agentless management of hosts and virtual machines in the Operations Manager.

The following table details the supported configurations for the VMM management pack:

|  |  |
| --- | --- |
| Configuration | Support |
| Clustered VMM management servers | Yes |
| Clustered hosts | Yes |
| Agentless monitoring | No |
| Virtual environment | Yes |

## Management Pack Scope

This management pack supports up to 400 hosts with up to 8000 virtual machines.

### Prerequisites

The following requirements must be met to run this management pack:

 PowerShell 2.0 must be installed on all Operations Manager management servers.

 The Operations console must be installed on the VMM management server. The version must match the version of the Operations Manager.

 The management server must have the following management packs installed:

 Windows Server Internet Information Services 2016

 Windows Server Internet Information Services Library

 SQL Server Core Library

### Mandatory Configuration

In order to use the VMM management pack, you need to integrate the Operations Manager with VMM as described in [Configuring Operations Manager Integration with VMM](http://go.microsoft.com/fwlink/p/?LinkId=247273). Unlike other management packs, you do not need to import the .mp files in the Operations console.

Important

After you integrate VMM with the Operations Manager, if there are updates to the VMM management pack files, you need to update the registry on your VMM management server. For more information, see [How to Connect VMM with Operations Manager](http://go.microsoft.com/fwlink/p/?linkID=248499).

### Updates to this Management Pack

When an updated version of the management pack files become available, you can either remove or re-create the connection between VMM and the Operations Manager as described in [How to Connect VMM with Operations Manager](http://go.microsoft.com/fwlink/p/?linkID=248499). Otherwise, you can import a new management pack version as described in the following procedure.

1. On the VMM management server, update the registry to reflect the version number of the new management pack files, and then restart the System Center Virtual Machine Manager service. For more information, see [How to Connect VMM with Operations Manager](http://go.microsoft.com/fwlink/p/?linkID=248499).

Note

To obtain the version number of the management pack, check the most recent version of this guide. The version number is also available in the Import Management Packs dialog box, described later in this procedure.

2. On the VMM management server, open the management packs directory. By default, the location is C:\Program Files\Microsoft System Center 2016\Virtual Machine Manager\ManagementPacks.

3. Back up the existing .mp files.

4. Extract the new .mp files to the management pack directory, overwriting the existing .mp files.

5. In the Operations console, in the Administration workspace, under Actions, select Import Management Packs.

6. In the Import Management Packs dialog box, click Add and then select Add from disk.

7. In the Select Management Packs to import dialog box, navigate to the management packs directory on the VMM management server, select all management packs, and then click Open.

Note

Verify that the management packs show the appropriate version number.

8. Click Install.

After installation is complete, verify the update in the VMM console. To do this, open the Settings workspace. In the Settings pane, click System Center Settings. In the results pane, right-click Operations Manager Server, and then click Properties. On the Management Pack page, verify the installed version of the management packs.

### Files in this Management Pack

The integration between VMM and the Operations Manager installs the following files:

* Microsoft.SystemCenter.VirtualMachineManager.2016.Discovery.mp
* Microsoft.SystemCenter.VirtualMachineManager.2016.Monitoring.mp
* Microsoft.SystemCenter.VirtualMachineManager.2016.Reports.mp
* Microsoft.SystemCenter.VirtualMachineManager.2016.Dashboard.mp
* Microsoft.SystemCenter.VirtualMachineManager.Library.mp
* Microsoft.SystemCenter.VirtualMachineManager.Storage.Library.mp
* Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.Discovery.mp
* Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.Monitoring.mp
* Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.Dashboard.mp
* Microsoft.SystemCenter.VirtualMachineManager.Override.xml
* Microsoft.SystemCenter.VirtualMachineManager.Pro.2012.Diagnostics.mp
* Microsoft.SystemCenter.VirtualMachineManager.PRO.Library.mp
* Microsoft.SystemCenter.VirtualMachineManager.PRO.V2.HyperV.HostPerformance.mp
* Microsoft.SystemCenter.VirtualMachineManager.PRO.V2.Library.mp
* Microsoft.SystemCenter.VirtualMachineManager.Pro.2008.Library.mp
* Microsoft.SystemCenter.VirtualMachineManager.Network.Dashboard.mpb

### Recommended Additional Management Packs

The following management packs can extend and enhance the capabilities of the VMM management pack:

 PRO-enabled management packs

You can take maximum advantage of Performance and Resource Optimization (PRO) in your virtualized environment using PRO-enabled management packs. VMM partners create PRO-enabled management packs to extend PRO capabilities to their system, application, and hardware products by defining performance and health criteria that are implemented through PRO tips. The Virtual Machine Manager product team will announce new PRO-enabled management packs as they become available.

To download a management pack, go to [System Center Marketplace](http://go.microsoft.com/fwlink/p/?LinkId=82105) page. The catalog includes management packs developed by PRO partners.

Important

The following management packs should not be installed on the Operations Manager management group:

 Microsoft Virtual Server 2005 R2

 Microsoft Virtualization Core Library

## Management Pack Purpose

The VMM management pack for System Center 2016 - Operations Manager monitors availability of VMM and the availability, health, and performance of all virtual machines and virtual machine hosts that VMM manages.

You must install this management pack before you can configure the following VMM features:

 Performance and Resource Optimization (PRO)

 Maintenance Mode integration

 Reporting in VMM

 Support for SQL Server Analysis Services (SSAS)

The VMM management pack enables the integration of the Operations Manager with VMM and monitors the health of virtual machines running on Microsoft Hyper-V and VMware ESX. In VMware vSphere 4 or VMware Infrastructure 3 (VI3) environments that are managed by using VMM, this management pack also monitors the health of virtual machines running on VMware ESX.

You can view VMM reports in all languages into which VMM is localized: English (ENU), German (DEU), Spanish (ESN), French (FRA), Italian (ITA), Japanese (JPN) and Simplified Chinese (CHS).

The VMM management pack supports monitoring of VMM Self-Service web sites that are hosted by Internet Information Services (IIS) 7.0.

PRO remediation actions support live migration of highly available virtual machines (HAVMs) that are deployed on host clusters created by Windows Server 2008 R2 Hyper-V technology and managed by using VMM. With live migration, you can move running virtual machines from one Hyper-V physical host to another without any disruption of service or perceived downtime.

In this section:

 [Monitoring Scenarios](#z6d49efde49b940ae8a948bb3f0aed3a5)

 [Support for PRO](#zade8b9c6b1f44bc6b0fc442ec181d83e)

 [How Health Rolls Up](#zdaa90ef3af22483785faa73a58643ba2)

For details on the discoveries, rules, monitors, views, and reports contained in this management pack, see [Appendix: Management Pack Contents](#z687af6c264eb4beba5b98bf2406d394f).

## Monitoring Scenarios

The following table describes key monitoring scenarios that the VMM management pack supports for the Operations Manager administrators using the Operations console.

| **Monitoring scenario** | **Description** |
| --- | --- |
| Management server | **** Monitor VMM service availability.  **** Start and stop the VMM service.  **** View a Diagram view that maps relationships between elements managed by a VMM management server. The Diagram views are available in the Operations console. |
| VMM database | **** Monitor database health and availability through the SQL Server management pack. |
| Managed hosts running Hyper-V | **** Monitor host availability.  **** Start and stop the VMM agent. |
| Hyper-V and VMware ESX virtual machines managed by VMM | **** Monitor health, availability, and performance of the virtual machines.  **** Perform the following tasks on deployed virtual machines: Start, Stop, Pause, Shut Down, Save State, Create Checkpoint. |
| Virtual Machine Manager library | **** Monitor library server availability.  **** Perform the following tasks on stored virtual machines: Start, Stop, Pause, Shut Down, Save State, Create Checkpoint. |
| Virtual machine self-service | **** Monitor availability of VMM Self-Service Portals.  **** Perform the following tasks on the Web sites through the IIS management pack: Pause Web Site, Start Web Site, List Web Site, Start Web Site Diagnostics, Start Computer Management Console. |
| VMware vCenter Server 4.1 | **** Monitor and perform tasks on virtual machine hosts and host clusters running the following versions of VMware: ESXi 4.1, ESX 4.1, ESXi 3.5, and ESX 3.5.  **** VMware vCenter server and ESX hosts are discovered and displayed in Diagram views but are not monitored by the Operations Manager except through PRO. |
| IP address pool and MAC address pool | **** View alerts, performance, state, and health for IP address and MAC address pools. |

## Support for PRO

Performance and Resource Optimization (PRO) allows you to tie specific Operations Manager alerts to remediation actions that can be implemented automatically or manually in System Center 2016 – Virtual Machine Manager (VMM). PRO tips can return the virtualized environment to a healthy state.

PRO-enabled management packs define PRO target classes and groups, and provide monitors that watch the performance of virtual machines, hosts, applications, and hardware to identify opportunities to optimize a virtualized environment.

Any Operations Manager alert that targets a PRO class generates a PRO tip in VMM, which can include a remedial action to return the virtualized environment to a healthy state. The remedial action can be implemented automatically or can be manually approved in VMM. A PRO tip might load-balance virtual machines between physical hosts when specific thresholds are exceeded (transactions per second, CPU utilization, an e-mail message delivery SLA, and so forth) or migrate virtual machines when a hardware failure is detected.

Note

In addition to PRO Tips, System Center 2016 – VMM supports Dynamic Optimization and Power Optimization. These features implement some functionality formerly implemented with PRO.

You can view and implement PRO tips by using the PRO window in the VMM console. PRO tips are closed automatically and dismissed from the PRO window when a monitored object returns to a healthy state.

The VMM management pack includes several PRO-enabled management packs that define the basic classes and groups that support PRO and provide monitors to optimize the performance of hosts and virtual machines based on CPU and memory thresholds. The VMM product team is working with the partners to develop additional PRO-enabled management packs. To find out more about available PRO-enabled management packs, go to the [System Center Marketplace](http://go.microsoft.com/fwlink/p/?LinkId=82105) site. All other PRO-enabled management packs are dependent on the VMM management pack.

For more information about PRO-enabled management packs, see [PRO-Enabled Management Packs](#zecfd95b8429b43528d8827e4c3d5fbac) in this management pack guide. For information about PRO, see [How to Enable PRO Tips in VMM](http://go.microsoft.com/fwlink/p/?linkID=247275).

### Managing PRO Tips in the Operations Console

To ensure a consistent monitoring experience, the Operations console displays the corresponding alerts for PRO tips. The PRO alerts are resolved automatically in the Operations Manager when the unhealthy state is resolved in VMM and VMM closes the PRO tip.

In some cases, a PRO condition triggers an additional alert in the Operations Manager, which the Operations Manager operator can process normally. The second alert enables the operator to resolve systemic issues related to a VMM issue. For example, if a fan goes out, the VMM administrator’s problem is resolved after all virtual machines are migrated to a different physical server; however, the Operations Manager operator still needs to fix the fan.

### Managing PRO-Enabled Management Packs

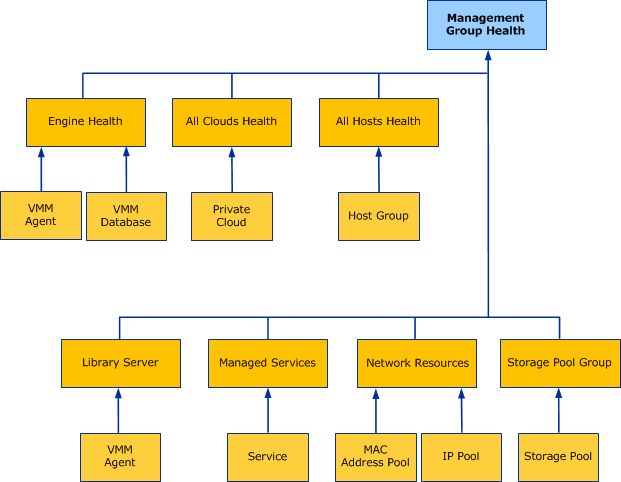
To support PRO, an Operations Manager agent must be installed on all Hyper-V hosts and on all virtual machines. If you are managing a VMware environment by using VMM, no agents are required on the VMware ESX hosts; however, you must install an agent on each virtual machine that is deployed on the ESX hosts.

PRO is not enabled by default. To take advantage of the PRO monitors in the VMM Management Pack, the VMM administrator must enable PRO in VMM for the specific PRO enabled objects, such as hosts, private clouds, and services, through the properties page of the PRO-enabled object. For more information, see [How to Enable PRO Tips in VMM](http://go.microsoft.com/fwlink/p/?linkID=247275).

If you import a PRO-enabled management pack that contains VMM-level PRO tips, you will need to alert the VMM administrator to configure VMM PRO settings in the appropriate property page.

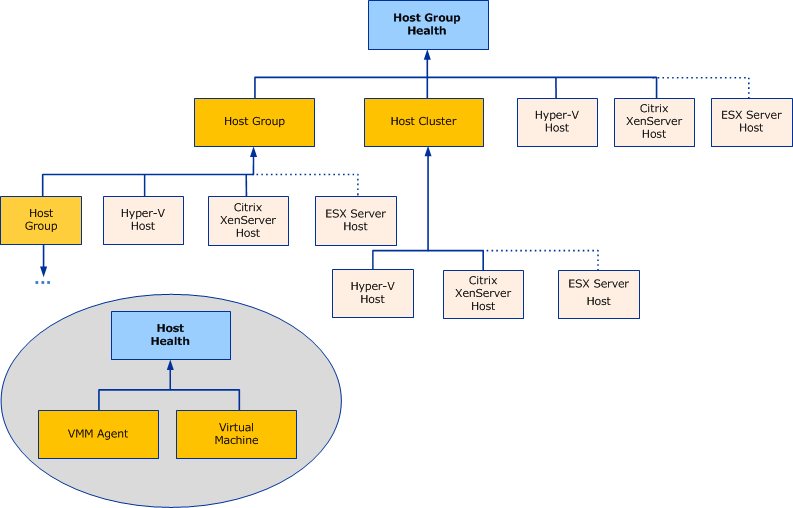
## How Health Rolls Up

In System Center 2016 – Virtual Machine Manager (VMM), the health of the VMM service and database, all VMM agents (on virtual machine hosts and library servers), virtual machines on managed hosts, and VMM Self-Service portals roll up to the health of a VMM management group. Each VMM management server is represented by a management group. The diagram below shows how the health states roll up in this management pack.



Engine health is determined by two factors. In addition to the monitors that roll up the health of the VMM database, the Virtual Machine Manager service, and the Virtual Machine Manager agent on the VMM management server, any failed discovery (monitored by a unit monitor) causes a Failed state for the VMM engine.

The health of the managed hosts is rolled up through host groups. The diagram below shows how host group health rolls up.



The health of virtual machine hosts, child host groups, and child host clusters rolls up to the health of the host group. The exception is the health of VMware ESX hosts. Although the Operations Manager monitors the health of ESX hosts and the virtual machines on the hosts, the health of an ESX host does not roll up to the host group.

If the VMM management server is running on a virtual machine that is managed by the same instance of VMM, the health of host groups is reported as “Not Available”. However, the health of hosts and virtual machines within host groups is monitored.

The illustrations in this topic show the relationships among the monitored objects. The objects do not represent specific rollup monitors in the VMM Management Pack. For details about specific monitors, use Health Explorer in the Operations console to view the health monitors in the management pack.

## Configuring the Management Pack for VMM

Use the information in this section to configure your VMM Management Pack.

 [Best Practice: Create a Management Pack for Customizations](#z2)

 [Security Configuration](#z3)

 [Tuning Performance Threshold Rules](#z4)

### Best Practice: Create a Management Pack for Customizations

By default, the Operations Manager saves all customizations such as overrides to the Default Management Pack. As a best practice, you should instead create a separate management pack for each sealed management pack you want to customize.

When you create a management pack for the purpose of storing customized settings for a sealed management pack, it is helpful to base the name of the new management pack on the name of the management pack that it is customizing, such as “VMM Management Server Customizations”.

Creating a new management pack for storing customizations of each sealed management pack makes it easier to export the customizations from a test environment to a production environment. It also makes it easier to delete a management pack, because you must delete any dependencies before you can delete a management pack. If customizations for all management packs are saved in the Default Management Pack and you need to delete a single management pack, you must first delete the Default Management Pack, which also deletes customizations to other management packs.

## Security Configuration

To support interactions between the VMM management pack and Virtual Machine Manager, the VMM service account must be an administrator in the Operations Manager, and the action account on each Operations Manager management server must be a member of the Administrator user role in VMM.

### VMM Service Account Requirements

VMM connects to the Operations Manager server as the VMM service account. The service account can be either Local System or an Active Directory domain account with administrative rights in the Operations Manager. The service account is specified when you integrate VMM with the Operations Manager.

By default, the Operations Manager Administrator role is populated by the accounts in the local Administrators group. Therefore, adding the account to that group provides the administrator the rights that VMM requires. However, the local group that populates the Administrator role is a configurable option in the Operations Manager. If a different local group has been specified for this purpose, you must add the VMM service account to that group manually. The run-as account for the VMM server can be either Local System or a domain account. When you configure VMM to work with the Operations Manager, VMM adds the run-as account to the Operations Manager Administrator role.

### Action Account Requirements for PRO on Management Servers

To provide the credentials to perform PRO remedial actions in VMM, the management server action account on each of your Operations Manager management servers must be a member of the Administrator role in VMM.

The action account can be the Local System account, or it can be an Active Directory domain account that has administrative rights on the management server. You do not need to use the same action account on all of your management servers.

To make the account a VMM administrator, add it to the Administrator role in VMM. User roles are configured in the Security node, under User Roles in the Settings workspace of the VMM console. For a procedure, see [Configuring Operations Manager Integration with VMM](http://go.microsoft.com/fwlink/?LinkId=247273).

### Groups

You can delegate authority to a precise level with user roles. For more information about user roles, see [About User Roles in the Operations Manager](http://go.microsoft.com/fwlink/p/?linkID=108357) in the Operations Manager Help or [Implementing User Roles](http://go.microsoft.com/fwlink/p/?linkID=232869).

The VMM management pack defines the following computer groups, which can be used for scoping and roles authorization:

 All Clouds

 All Hosts

 Library Servers

 Virtual Machine Manager Management Group

## Tuning Performance Threshold Rules

In the VMM management pack, performance thresholds for hosts and virtual machines are set by monitors in the PRO-enabled management packs. For information about tuning those thresholds, see [Tuning PRO Performance Thresholds](#z5) in this guide. The VMM management server, library servers, and self-service Web servers are monitored for availability but not performance.

## PRO-Enabled Management Packs

The topics in this section explain the operations of PRO-enabled management packs that support Performance and Resource Optimization (PRO) in System Center 2016 – Virtual Machine Manager (VMM). The VMM management pack includes PRO-enabled management packs that define the base classes that support PRO and provide monitors to optimize the performance of hosts and virtual machines leveraging dynamic memory technology.

 System Center 2016 Virtual Machine Manager PRO Diagnostics

 Virtual Machine Manager PRO Library

 Virtual Machine Manager PRO V2 Hyper-V Host Performance

 Virtual Machine Manager PRO V2 Library

All other PRO-enabled management packs are dependent on the System Center Virtual Machine Manager 2008 PRO Library management pack, version 3.0.6005.0 or later, which is part of the VMM management pack.

Notes

The Pro Diagnostics Target class is for internal use only. Do not attempt to use it or create a subclass of it.

The Pro V2 Base class is for internal use only, although its subclasses are available for use. Do not create your own subclass of this base class.

### How PRO Works

Performance and Resource Optimization (PRO) is implemented in VMM through specially designed PRO-enabled management packs that define PRO classes and groups, and provide monitors that collect data about virtual machines, hosts, applications, and hardware to identify opportunities to optimize a virtualized environment.

Any Operations Manager alert that targets a PRO class will generate a PRO tip in VMM, which can include a script that performs a remedial action to return the virtualized environment to a healthy state. The remedial action can be implemented automatically or can be manually approved by in VMM.

VMM administrators view and implement PRO tips using the PRO Tips window in the VMM console. PRO tips are closed automatically and dismissed from the PRO Tips window when a monitored object returns to a healthy state.

The VMM administrator enables PRO for individual host groups, host clusters, and PRO-enabled objects, such as private clouds and services. Enabling PRO for a host group or cluster in turn enables PRO for the hosts and virtual machines within it. PRO tips can be implemented automatically or manually, and the VMM administrator can set the monitor and remediate properties of individual PRO monitors. These choices are implemented in the properties of individual host groups, host clusters, and PRO-enabled objects.

### Types of PRO Tips

PRO-enabled management packs can define several types of PRO tips:

 **PRO tips for hosts**

PRO tips for hosts can recommend actions, such as migrating a virtual machine, to return a host to a healthy state based on resource usage or other performance and health measures on the host.

 **PRO tips for virtual machines**

PRO tips for virtual machines can recommend actions, such as a configuration update to return a virtual machine to a healthy state, based on resource usage or other performance and health measures in virtual machines.

 **PRO tips for VMM**

PRO tips can target Virtual Machine Manager to resolve issues that affect multiple VMM-managed computers throughout your virtualized environment. For example, a PRO tip that targets VMM might define a remediation action for an overheated blade chassis, for an issue with a distributed application, such as Microsoft Exchange, that is deployed on multiple physical computers, or for an issue with a storage array.

 **PRO tips for VMM Services**

PRO tips can target Virtual Machine Manager services and service tiers to resolve issues that affect service and/or tier instances. For example, a PRO tip that targets a service might define a remediation action for a service tier, which initiates a tier scale-out action when the existing tier instances breach a particular performance threshold.

Enabling PRO for a specific host group or host cluster in turn enables PRO for each of the hosts, services, and virtual machines within them. Similarly, enabling PRO for a specific private cloud in turn enables PRO for each of the services and virtual machines within the private cloud. PRO tips can also be enabled for specific services or virtual machines on the PRO Configuration page of the object’s properties dialog box. PRO tips for Virtual Machine Manager are enabled through the PRO Configuration page of the VMM management server properties dialog box.

### Tuning PRO Performance Thresholds

The following tables list the performance thresholds and sampling methods for the PRO monitors in the VMM management pack.

| **Monitor** | **Threshold Calculation** | **Sampling Interval** | **Calculation** |
| --- | --- | --- | --- |
| Virtual Machine Manager Dynamic Memory VM Pressure | VM current memory / assigned memory  **** Warning Level – 80%  **** Critical Level – 100% | 300 sec | Consecutive value of past 3 samples |
| Virtual Machine Manager Maximum Dynamic Memory Monitor | Sum of virtual machine configured maximum memory values  **** Warning Level – 125%  **** Critical Level – 150% | 900 sec | Current sample |

You can customize the warning and critical threshold for each PRO monitor in the Operations Manager.

## Links

The following links connect you to information about common tasks that are associated with System Center Management Packs:

 [Administering the Management Pack Life Cycle](http://go.microsoft.com/fwlink/?LinkId=211463) (http://go.microsoft.com/fwlink/?LinkId=211463)

 [How to Import a Management Pack in the Operations Manager](http://go.microsoft.com/fwlink/?LinkID=142351) (http://go.microsoft.com/fwlink/?LinkID=142351)

 [How to Monitor Using Overrides](http://go.microsoft.com/fwlink/?LinkID=117777) (http://go.microsoft.com/fwlink/?LinkID=117777)

 [How to Create a Run As Account in the Operations Manager](http://go.microsoft.com/fwlink/?LinkID=165410) (http://go.microsoft.com/fwlink/?LinkID=165410)

 [How to Modify an Existing Run As Profile](http://go.microsoft.com/fwlink/?LinkID=165412) (http://go.microsoft.com/fwlink/?LinkID=165412)

 [How to Export Management Pack Customizations](http://go.microsoft.com/fwlink/?LinkId=209940) (http://go.microsoft.com/fwlink/?LinkId=209940)

 [How to Remove a Management Pack](http://go.microsoft.com/fwlink/?LinkId=209941) (http://go.microsoft.com/fwlink/?LinkId=209941)

For questions about the Operations Manager and management packs, see the [System Center Operations Manager community forum](http://go.microsoft.com/fwlink/?LinkID=179635) (http://go.microsoft.com/fwlink/?LinkID=179635).

A useful resource is the [System Center Operations Manager Unleashed blog](http://opsmgrunleashed.wordpress.com/) (http://opsmgrunleashed.wordpress.com/), which contains “By Example” posts for specific management packs.

For additional information about the Operations Manager, see the following blogs:

 [Operations Manager Team Blog](http://blogs.technet.com/momteam/default.aspx) (http://blogs.technet.com/momteam/default.aspx)

 [Kevin Holman's OpsMgr Blog](http://blogs.technet.com/kevinholman/default.aspx) (http://blogs.technet.com/kevinholman/default.aspx)

 [Thoughts on OpsMgr](http://thoughtsonopsmgr.blogspot.com/) (http://thoughtsonopsmgr.blogspot.com/)

 [Raphael Burri’s blog](http://rburri.wordpress.com/) (http://rburri.wordpress.com/)

 [BWren's Management Space](http://blogs.technet.com/brianwren/default.aspx) (http://blogs.technet.com/brianwren/default.aspx)

 [The System Center Operations Manager Support Team Blog](http://blogs.technet.com/operationsmgr/) (http://blogs.technet.com/operationsmgr/)

 [Ops Mgr ++](http://blogs.msdn.com/boris_yanushpolsky/default.aspx) (http://blogs.msdn.com/boris\_yanushpolsky/default.aspx)

 [Notes on System Center Operations Manager](http://blogs.msdn.com/mariussutara/default.aspx) (http://blogs.msdn.com/mariussutara/default.aspx)

Important

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## Appendix: Management Pack Contents

The System Center Management Pack for System Center 2016 – Virtual Machine Manager supports the object types described in the following sections. Unlike some Management Packs, object types are added when VMM is configured to work with the Operations Manager.

### Agent Watcher

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager VMM Agent Reachable | Monitors whether the VMM is reachable by the VMM management server. | 300 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager VMM Agent Monitored By OpsMgr | Monitors whether the VMM agent is monitored by System Center Operations Manager. | 300 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| AgentWatcher Alerts | Displays any active VMM agent alerts |
| AgentWatcher State | Displays the current state of each VMM agent |

### Agent Watcher Group

There are no monitors, rules, or views associated with Agent Watcher Group.

### All Clouds Group

There are no monitors, rules, or views associated with All Clouds Group.

### ComputerTier

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Tier Memeber (sic) Count | Monitors whether or not a service computer tier is within its minimum and maximum tier instance count. | 300 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |

There are no rules or views associated with ComputerTier.

### ESX Host

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Host Number Of VMs Running | Monitors the current number of running virtual machines, ensuring the count is within supported limits. | 7200 | True  Alert priority: Medium  Alert severity: Critical | Automatic | True | Not applicable |

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.PercentProcessorTime | Tracks the % processor time of each managed ESX host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskPercentFreeSpace | Tracks the free disk space of each managed ESX host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskWriteBytesTotalPerSec | Tracks the Disk I/O of each managed ESX host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.MemoryAvailableMBytes | Tracks the available memory of each managed ESX host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskReadBytesTotalPerSec | Tracks the Disk I/O of each managed ESX host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.NetworkAvgBytesTotalPerSec | Tracks the Network I/O of each managed ESX host. | False |  | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| Host Active Alerts | Displays any active host-related alerts. |
| Host Performance | Displays all available host-related performance counters. |
| Host State | Displays the current state of all managed hosts. |

### Host Agent

Related Monitors

| **Monitor** | **Data source** | **Interval** | **Alert** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager AgentService | Monitors the state of the Virtual Machine Manager Agent service. | Not applicable | True  Priority: Normal  Severity: Error | True | Not applicable |

There are no rules associated with Host Agent.

Related Views

| **View** | **Description** |
| --- | --- |
| Agent Alerts | Displays any active VMM agent-related alerts. |
| Agent State | Displays the current state of each managed VMM agent. |

### Host Cluster

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Host Cluster Commit State | Monitors whether or not a host cluster is overcommitted. | 7200 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |

There are no rules associated with Host Cluster.

Related Views

| **View** | **Description** |
| --- | --- |
| Host Cluster Performance | Displays all available host cluster related performance counters. |
| Host Cluster Active Alerts | Displays all active host cluster-related alerts. |
| Host Cluster State | Displays the current state of each managed host cluster. |

### Host Group

There are no monitors, rules, or views associated with Host Group.

### Hyper-V Host

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Host CPU Utilization | Monitors the CPU utilization of each managed Hyper-V Host. | 180 | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host Memory Utilization | Monitors the memory utilization of each managed Hyper-V Host. | 180 | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host Number Of VMs Running | Monitors the number of running virtual machines on each Hyper-V host, ensuring the count is within supported limited. | 7200 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host Parent Partition CPU Utilization | Monitors the CPU utilization in the Hyper-V parent partition. | 180 | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host Requires Update | Monitors whether or not each managed Hyper-V host has required host updates installed. | 7200 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host VMM Agent Version | Monitors whether the VMM agent version is up to date. | 7200 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Hyper-V Service | Monitors whether the Hyper-V service is running. | Not applicable | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager ImageManagementService | Monitors whether the image management service is running. | Not applicable | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager NetworkingManagementService | Monitors whether the NetworkingManagementService is running | Not applicable | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager VMM Host State | Monitors the state of the VMM hosts (such as running, responding). | 300 | True  Alert priority: Normal  Alert severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager WinRM Version | Monitors whether the correct version of Windows Remote Management is installed. | 7200 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager WinRMService targeted against Host | Monitors the state of the Windows Remote Management service. | Not applicable | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Host Cluster Updates (rollup) | Monitors whether required host cluster updates are installed. | 86400 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Hyper-V Host Updates Rollup (rollup) | Monitors whether required Hyper-V host updates are installed. | 86400 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |

The System Center 2016 Virtual Machine Manager Host Cluster Updates monitor rolls up System Center 2016 Virtual Machine Manager Host Cluster Update <number> for the following updates: 951308, 958065.

The System Center 2016 Virtual Machine Manager Hyper-V Host Updates Rollup monitor rolls up System Center 2016 Virtual Machine Manager Hyper-V Update <number> for the following updates: 950050, 952247, 956697, 957967, 958184, 959978, 971677, 956774, 958124, 954563, and 955805.

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.NetworkAvgReceivedBytesTotalPerSec | Tracks the Network I/O of each managed Hyper-V host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskPercentFreeSpace | Tracks the disk free space of each managed Hyper-V host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.MemoryAvailableMBytes | Tracks the available memory of each managed Hyper-V host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.NetworkAvgSentBytesPerSec | Tracks the Network I/O of each managed Hyper-V hosts. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.PercentProcessorTime | Tracks the % processor time of each managed Hyper-V host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskReadBytesTotalPerSec | Tracks the disk I/O of each managed Hyper-V host. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskWriteBytesTotalPerSec | Tracks the disk I/O of each managed Hyper-V host. | False |  | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| Host Active Alerts | Displays all active host-related alerts. |
| Host Performance | Displays all available host-related performance metrics. |
| Host State | Displays the current state of all managed hosts. |

### IPAddress Pool

There are no monitors or rules associated with IPAddress Pool.

Related Views

| **View** | **Description** |
| --- | --- |
| IP Address Pool Performance | Displays all available IP Pool-related performance metrics. |
| IP Address Pool Active Alerts | Displays all active IP Pool-related alerts. |
| IP Address Pool State | Displays the current state of all IP Pools. |

### Library

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Library Server Available | Monitors whether a VMM library server is available. | 180 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |

There are no rules associated with Library.

Related Views

| **View** | **Description** |
| --- | --- |
| Library Server Alerts | Displays all active library server-related alerts. |
| Library Server State | Displays the current state of each managed library server. |

### Library Agent

There are no monitors or rules associated with Library Agent.

Related Views

| **View** | **Description** |
| --- | --- |
| Agent Alert | Displays all active library agent-related alerts. |
| Agent State | Displays the current state of each library server agent. |

### Library Server Group

There are no monitors, rules, or views associated with Library Server Group.

### MAC Address Pool

There are no monitors or rules associated with MAC Address Pool.

Related Views

| **View** | **Description** |
| --- | --- |
| MAC Address Pool Performance | Displays all available MAC Pool-related performance metrics. |
| MAC Address Pool Active Alerts | Displays all active MAC Pool-related alerts. |
| MAC Address Pool State | Displays the current state of all MAC Pools. |

### Managed Services

There are no monitors, rules, or views associated with Managed Services.

### Management Group

There are no monitors or views associated with Management Group.

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.DiskTotalBytesPerSec | Tracks the Disk I/O of each managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Memory | Tracks the memory utilization of each managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.NetReceivedBytesPerSec | Tracks the Network I/O of each managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.NetSentBytesPerSec | Tracks the Network I/O of each managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.PercentCPU | Tracks the CPU utilization of each managed virtual machine. | False |  | True | Not applicable |

### Network Resources

There are no monitors, rules, or views associated with Network Resources.

### Offline Virtual Machine

There are no monitors, rules, or views associated with Offline Virtual Machine.

### Private Cloud

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Cloud CPUUsageCount | Tracks the aggregate CPU utilization of all virtual machines hosted by a private cloud. | 300 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Cloud CustomQuotaUsageCount | Tracks the aggregate custom quota points of all virtual machines hosted by a private cloud. | 300 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Cloud MemoryUsageMB | Tracks the aggregate memory utilization of all virtual machines hosted by a private cloud. | 300 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Cloud StorageUsageGB | Tracks the aggregate disk space consumed by all virtual machines hosted by a private cloud. | 300 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Cloud VMUsageCount | Tracks the aggregate number of virtual machines hosted by a private cloud. | 300 | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |

There are no rules associated with Private Cloud.

Related Views

| **View** | **Description** |
| --- | --- |
| Cloud Active Alert | Displays all active cloud-related alerts. |
| Cloud State | Displays the current state of all managed private clouds. |

### Self Service Site

There are no monitors, rules, or views associated with Self Service Site.

### Self Service Site Group

There are no monitors, rules, or views associated with Self Service Site Group.

### Service

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| Updated resources available | Monitors whether updated disk resources are available for a particular service. | 7200 | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager Service Instance Health Rollup | Provides for health rollup of unhealthy computer tiers to the service object. | Not applicable | True  Priority: Normal  Severity: Error | Automatic | True | Not applicable |

There are no rules associated with Service.

Related Views

| **View** | **Description** |
| --- | --- |
| Service Performance | Displays all Service-related performance counters. |
| Service Active Alerts | Displays all active Service-related alerts. |
| Service State | Displays the current state of all managed Services. |

### StoragePool

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Storage Pool Capacity | Monitors the available space of a managed storage pool. | 300 | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | True | Not applicable |

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.StoragePool.TotalCapacity | Tracks the total storage capacity of a managed storage pool. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.StoragePool.UsedCapacity | Tracks the used storage capacity of a managed storage pool. | False |  | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| Storage Pool Performance | Displays all storage pool-related performance counters. |
| Storage Pool Active Alerts | Displays all active storage pool-related alerts. |
| Storage Pool State | Displays the current state of all managed storage pools. |

### StoragePool Group

There are no monitors, rules, or views associated with StoragePool Group.

### Virtual Disk Drive

There are no monitors, rules, or views associated with Virtual Disk Drive.

### Virtual Machine

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager VM State | Monitors the state (such as running, failed) of each managed virtual machine. | 180 | True  Priority: Normal  Severity: Normal | Automatic | True | Not applicable |
| System Center 2016 Virtual Machine Manager VM VGS Install | Monitors whether virtual guest services are present with each managed virtual machine. | 7200 | True  Priority: Normal  Severity: Normal | Automatic | True | Not applicable |

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.CPUCount | Tracks the number of virtual processors assigned to a managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.TotalRAM | Tracks the total memory assigned to a managed virtual machine. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.TotalSizeOfVirtualDisks | Tracks the total storage assigned to a managed virtual machine. | False |  | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| Virtual Machine Active Alerts | Displays all active virtual machine-related alerts. |
| Virtual Machine State | Displays the current state of all managed virtual machines. |

### Virtual Nic

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Mac Address | Monitors whether the host-assigned MAC address pool is out of addresses. | Not applicable | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | False | Not applicable |
| System Center 2016 Virtual Machine Manager VNic Dynamic Address | Monitors whether the dynamic MAC address is valid. | Not applicable | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | False | Not applicable |

There are no rules or views associated with Virtual Nic.

### Virtual Switch

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager External Switch Connection | Monitors connectivity between a virtual switch and the corresponding Hyper-V virtual network port. | Not applicable | True  Priority: Normal  Severity: MatchMonitorHealth | Automatic | False | Not applicable |

There are no rules or views associated with Virtual Switch.

### Virtualization Candidate Computer

There are no monitors or views associated with Virtualization Candidate Computer.

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Virtualization Candidate Server: Total Physical Memory | Tracks the total physical memory assigned to a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Disk Avg Bytes Total/sec | Tracks the total Disk I/O of a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Network Avg Bytes/sec | Tracks the total Network I/O of a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Number of Processors | Tracks the total number of processors assigned to a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Disk Percent Free Space | Tracks the total free disk space of a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Available MBytes | Tracks the total available memory of a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: % Processor Utilization | Tracks the total processor utilization of a virtualization candidate computer. | False |  | True | Not applicable |
| Virtualization Candidate Server: Processor Speed | Tracks the processor speed of a virtualization candidate computer. | False |  | True | Not applicable |

### VMM Database

There are no monitors, rules, or views associated with VMM Database.

### VMM Infrastructure

There are no monitors, rules, or views associated with VMM Infrastructure.

### VMM Managed Resources

There are no monitors, rules, or views associated with VMM Managed Resources.

### VMM Server

Related Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager Operations Manager Console | Monitors whether the System Center Operations Manager console is installed on the VMM management server (required for integration). | 7200 | True  Alert priority: Normal  Alert severity: Error | Automatic |  | Not applicable |
| System Center 2016 Virtual Machine Manager VMMService | Monitors the state of the VMM service. | Not applicable | True  Alert priority: Normal  Alert severity: Error | Automatic |  | Not applicable |
| System Center 2016 Virtual Machine Manager WinRM Service targeted against VMM Server | Monitors the state of the Windows Remote Management service on the VMM management server. | Not applicable | True  Alert priority: Normal  Alert severity: Error | Automatic |  | Not applicable |
| System Center Virtual Machine Manager OM Agent Proxy Enabled | Monitors whether the VMM management server is configured to allow agent proxy in the Operations Manager. | 24 hours | True  Alert priority: Normal  Alert severity: Error | Automatic |  | Not applicable |

Related Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| Microsoft.SystemCenter.VirtualMachineManager.2016.VMHostPowerStateCollections | Tracks the power state of managed hosts for reporting purposes. | False |  | True | Not applicable |
| Microsoft.SystemCenter.VirtualMachineManager.2016.CloudUsageCollection | Tracks the resource usage of managed clouds for reporting purposes. | False |  | True | Not applicable |

Related Views

| **View** | **Description** |
| --- | --- |
| Virtual Machine Manager Server State | Displays the current state of the Virtual Machine Manager server. |
| Virtual Machine Manager Server Alerts | Displays all active VMM management server-related alerts. |

### Reports

Related Reports

| **Report** | **Description** | **Class Selection Criteria** |
| --- | --- | --- |
| Capacity Utilization | Details usage for VM hosts and other objects. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.CapacityUtilization |
| Chargeback | Provides information to calculate chargeback to cost centers for virtual machines. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.Chargeback |
| Host Group Forecasting | Predicts host activity based on history of disk space, memory, disk IO, network IO, and CPU usage. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.ForecastHostGroup |
| SAN Usage Forecasting | Predicts SAN usage based on history. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.ForecastSAN |
| Host Utilization | Shows the number of virtual machines that are running on each host and average usage, along with total or maximum values for host processors, memory, and disk space. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.HostUtilization |
| Host Utilization Growth | Shows the percentage change in resource usage and the number of virtual machines that are running on selected hosts during a specified time period. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.HostUtilizationGrowth |
| Power Savings | Shows how much power is saved through Power Optimization. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.PowerSavings |
| Virtualization Candidates | Helps identify physical computers that are good candidates for conversion to virtual machines. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.VirtualizationCandidates |
| Virtual Machine Allocation | Provides information about allocation of virtual machines. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.VirtualMachineAllocation |
| Virtual Machine Utilization | Provides information about resource utilization by virtual machines, including average usage and total or maximum values for virtual machine processors, memory, and disk space. | Microsoft.SystemCenter.VirtualMachineManager.2016.Report.VirtualMachineUtilization |
| Microsoft.Virtualization.Reports.ForecastMachineGroupCPU | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.ForecastMachineGroupCPU |
| Host Group Disk IO Forecasting | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.ForecastMachineGroupDiskIO |
| Host Group Disk Space Forecasting | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.ForecastMachineGroupDiskSpace |
| Host Group Memory Usage Forecasting | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.ForecastMachineGroupMemory |
| Host Group Network IO Forecasting | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.ForecastMachineGroupNetworkIO |
| Memory Utilization by Virtual Machines on Host | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.VMMemoryPerformance |
| Resource Utilization by Virtual Machines on Host | See [Server Virtualization Management Pack Guide](http://go.microsoft.com/fwlink/p/?linkID=120443). | Microsoft.Virtualization.Reports.VMPerformance |

### Additional Monitors, Rules, and Views

Additional Monitors

| **Monitor** | **Description** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- | --- |
| System Center 2016 Virtual Machine Manager VMMServer Reachable Via PowerShell (sic) 2.0 | Monitors whether PowerShell remote management is enabled and available on the VMM management server. | 180 | True  Alert priority: Normal  Alert severity: Error | Automatic | False | Not applicable |
| VMM PRO Diagnostics Monitor | Monitor used to test that VMM PRO integration is configured and functioning properly. | Not applicable | True  Alert priority: Normal  Alert severity: Warning | Automatic | True | Not applicable |

Additional Rules

| **Rule** | **Description** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| PRO Diagnostics Recovery Rule | Recovery rule used to test the VMM PRO integration is configured and functioning correctly. | False |  | True | Not applicable |

Additional Views

| **View** | **Description** |
| --- | --- |
| Library Server Alerts | Displays all active library server-related alerts. |
| Library Server State | Displays the current state of all managed library servers. |
| Agent Alerts | Displays all active VMM agent-related alerts. |
| Agent State | Displays the current state of all VMM agents. |
| Host Performance | Displays all available host-related performance counters. |
| Host Active Alerts | Displays all active host-related alerts. |
| Host State | Displays the current state of all managed hosts. |
| Active Tips | Displays all active PRO tips. |
| PRO Object State | Displays the state of all managed PRO objects. |

Additional Health and Performance Views

| **View** | **Description** |
| --- | --- |
| Library Server Alerts | Displays all active library server-related alerts. |
| Host Health | Displays the current state of all managed hosts. |
| Host Cluster Health | Displays the current state of all managed host clusters. |
| Virtual Machine Health | Displays the current state of all managed virtual machines. |
| Service Health | Displays the current state of all managed Services. |
| MAC Address Pool Health | Displays the current state of all managed MAC Address pools. |
| IP Address Pool Health | Displays the current state of all managed IP Address pools. |
| Storage Pool Health | Displays the current state of all managed Storage Pools. |
| Virtual Machine Manager Server Health | Displays the current state of the Virtual Machine Manager server. |
| Library Server Health | Displays the current state of all managed Library servers. |
| Virtual Machine Performance | Displays all available virtual machine-related performance counters. |
| Cloud Performance | Displays all available private cloud-related performance counters. |
| Cloud Health | Displays the current state of all managed private clouds. |

## Known Issues and Troubleshooting

The following table lists issues that can occur with the System Center Management Pack for System Center 2016 - Virtual Machine Manager and possible solutions.

|  |  |
| --- | --- |
| Issue | Solution |
| The following elements lack display strings:   * Microsoft.SystemCenter.VirtualMachineManager.2016.StoragePool.UsedCapacity [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.StoragePool.TotalCapacity [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskPercentFreeSpace [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskReadBytesTotalPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskWriteBytesTotalPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.DiskFreeMegabytes [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.MemoryAvailableMBytes [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.NetworkAvgSentBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.NetworkAvgReceivedBytesTotalPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.HyperVHost.PercentProcessorTime [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskPercentFreeSpace.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskFreeMegabytes.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.PercentProcessorTime.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.MemoryAvailableMBytes.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskReadBytesTotalPerSec.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.DiskWriteBytesTotalPerSec.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.ESXHost.NetworkAvgBytesTotalPerSec.V2 [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.PercentCPU [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Memory [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.DiskTotalBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.NetReceivedBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.NetSentBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.Service.PercentCPU [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.Service.Memory [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.Service.DiskTotalBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.Service.NetReceivedBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.Service.NetSentBytesPerSec [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Capacity.TotalRAM [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Capacity.CPUCount [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Capacity.TotalSizeOfVirtualDisks [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.TotalRAM [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.Runtime [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.CPUCount [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.VirtualMachine.TotalSizeOfVirtualDisks [PerformanceHealth] * Microsoft.SystemCenter.VirtualMachineManager.2016.VMHostPowerStateCollections [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.EnableCredSSPClient [PerformanceCollection] * Microsoft.SystemCenter.VirtualMachineManager.2016.CloudUsageCollection [PerformanceCollection] | No workaround |
| "Host state" dashboard shows incorrect number of virtual machines | No workaround |
| VMM Library management pack contains two elements with the same display string:  Microsoft.SystemCenter.VirtualMachineManager.UserRole | No workaround |
| Performance counters are not collected from Virtual ports, though performance monitor on the corresponding host shows collected data. | No workaround |
| The following update monitors appear to be obsolete for Windows Server 2016 and switch to critical state if enabled:   * System Center 2016 Virtual Machine Manager Hyper-V host update 950050 * System Center 2016 Virtual Machine Manager Hyper-V host update 952247 * System Center 2016 Virtual Machine Manager Hyper-V host update 954563 * System Center 2016 Virtual Machine Manager Hyper-V host update 955805 * System Center 2016 Virtual Machine Manager Hyper-V host update 958124 * System Center 2016 Virtual Machine Manager Hyper-V host update 959978 * System Center 2016 Virtual Machine Manager Hyper-V host update 971677 * System Center 2016 Virtual Machine Manager Hyper-V host update 958124 * System Center 2016 Virtual Machine Manager Hyper-V host update 958184 * System Center 2016 Virtual Machine Manager Hyper-V host update 956697 * System Center 2016 Virtual Machine Manager Host Cluster Update 951308 * System Center 2016 Virtual Machine Manager Host Cluster Update 958065 | No workaround |
| Script for "Hyper-V Host Attestation WMI-based" Monitor doesn't support NULL | No workaround |
| The following performance rules provide irrelevant values:   * VirtualMachine.NetReceivedBytesPerSec * VirtualMachine.NetSentBytesPerSec | No workaround |
| Network load balancer discovery and monitoring do not work | No workaround |
| The following monitors do not work (the state is always “Healthy”):   * System Center 2016 Virtual Machine Manager VMM Agent Monitored By OpsMgr * System Center 2016 Virtual Machine Manager VMMServer Reachable Via PowerShell 2.0 * System Center Virtual Machine Manager OM Agent Proxy Enabled | No workaround |
| Virtualization Candidate Computer Discovery does not work | No workaround |
| VirtualMachine.DiskTotalBytesPerSec rule does not work: it keeps showing zero values, and the chart does not seem to be affected by anything done in the VM. | No workaround |
| File Server Discovery has ID instead of display name in the display strings | No workaround |
| The following UnitMonitorTypes do not have display names:   * Microsoft.SystemCenter.VirtualMachineManager.2016.Performance.PowerShellBasedConsecutiveSamplesTwoThresholdsMonitorType * Microsoft.SystemCenter.VirtualMachineManager.2016.TimedPowerShell.TwoStatesMonitorType * Microsoft.SystemCenter.VirtualMachineManager.2016.UserRoleUsageUnitMonitorType * Microsoft.SystemCenter.VirtualMachineManager.2016.CloudFabricUsageUnitMonitorType * Microsoft.SystemCenter.VirtualMachineManager.2016.StoragePoolCapacityMonitorType * Microsoft.SystemCenter.VirtualMachineManager.2016.CheckAgentProxyEnabledMonitorType * Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.StorageLUNCapacityMonitorType * Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.CheckValueWithinRangeMonitorType | No workaround |
| "Fabric Health Dashboard" duplicates are displayed in task pane after upgrade from VMM/SCOM 2012 to VMM/SCOM 2016 (the issue appears when 2012 and 2016 management packs are working side-by-side) | No workaround |
| After upgrade from 2012 to 2016 MP, user gets 2 root folders for Virtual Machine Manager with duplicated 2016 MP objects in several views | No workaround |
| Hyper-V Image Management service and Hyper-V Networking Management service monitors cannot be checked, as long as VHDSVC.exe and NVSPWMI.exe are not available | No workaround |
| EnableCredSSPClient rule does not work correctly | No workaround |
| It is impossible to switch HostVMMAgentVersionMonitor to critical state | No workaround |
| File Server (Windows) discovery does not work and blocks other related workflows. The affected workflows are as follows:   * Microsoft.SystemCenter.VirtualMachineManager.Storage.2016.Discovery.FileServerDiscovery * Host Bus Adapter Discovery * HBA Port State Monitor | No workaround |
| Pool Used Bytes and LUN Used Bytes monitors do not change their states (always in Healthy state) | No workaround |
| SCOM discovers odd VMM Storage Pools (even those not selected for management in VMM) | No workaround |
| The following VirtualMachine Tasks are executed with error (Error Code: -2130771918 (Unknown error (0x80ff0032)).)   * Create Checkpoint * Pause * Save State * Shutdown * Start * Stop | No workaround |
| Storage Pool class instances are not discovered via VMM connector, and this behavior blocks the following related workflows:   * Storage Pool Used Capacity rule * Storage Pool Total Capacity rule * Storage Pool Capacity monitor | No workaround |
| Several reports are not present in SCOM Console, as long as they are set invisible by default. The affected reports are as follows:   * Microsoft.Virtualization.2016.Reports.VMPerformance * Microsoft.Virtualization.2016.Reports.VMMemoryPerformance * Microsoft.Virtualization.2016.Reports.ForecastMachineGroupCPU * Microsoft.Virtualization.2016.Reports.ForecastMachineGroupDiskIO * Microsoft.Virtualization.2016.Reports.ForecastMachineGroupDiskSpace * Microsoft.Virtualization.2016.Reports.ForecastMachineGroupMemory * Microsoft.Virtualization.2016.Reports.ForecastMachineGroupNetworkIO * Microsoft.SystemCenter.VirtualMachineManager.2016.Report.Chargeback | No workaround |