

MySQL Server Management Pack for System Center Technical Preview – Operations Manager

Microsoft Corporation

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Contents

Contents

[MySQL Server Management Pack Guide 4](#_Toc416781104)

[Guide History 4](#_Toc416781105)

[Supported Configurations 5](#_Toc416781106)

[Supported Versions of MySQL Server 5](#_Toc416781107)

[Supported Installations of MySQL Server 5](#_Toc416781108)

[Supported Operating Systems 5](#_Toc416781109)

[Prerequisites 5](#_Toc416781110)

[Files in this Management Pack 5](#_Toc416781111)

[Management Pack Purpose 6](#_Toc416781112)

[Monitoring Scenarios 6](#_Toc416781113)

[Configuring the MySQL Server Management Pack 6](#_Toc416781114)

[Best Practice: Create a Management Pack for Customizations 6](#_Toc416781115)

[Deploying and Enabling the MySQL OMI Provider 7](#_Toc416781116)

[Configuring the MySQL OMI Provider 8](#_Toc416781117)

[MySQL OMI Authentication File 8](#_Toc416781118)

[MySQL OMI Authentication File Program 10](#_Toc416781119)

[Tuning Performance Threshold Monitors 11](#_Toc416781120)

[Creating a MySQL User 13](#_Toc416781121)

[Appendix: Management Pack Contents 13](#_Toc416781122)

[Monitored MySQL Server (Linux) 14](#_Toc416781123)

[MySQL Server Database (Linux) 19](#_Toc416781124)

MySQL Server Management Pack Guide

The MySQL Server Management Pack helps you monitor installations of MySQL Server running on Linux computers that are managed by System Center Operations Manager.

The MySQL Server Management Pack alerts you to problems with performance and availability so you can continuously monitor the MySQL Servers on which your business depends.

This guide was written based on the 7.6.1065.0 version of the MySQL Server Management Pack.

## Guide History

| **Release Date** | **Changes** |
| --- | --- |
| 04/16/2015 | Original release of this guide |
| 10/12/2016 | General availability update |

## Supported Configurations

### Supported Versions of MySQL Server

* Version 5.0
* Version 5.1
* Version 5.5 / MariaDB 5.5
* Version 5.6 / MariaDB 10.0
* Version 5.7

### Supported Installations of MySQL Server

MySQL Server installations are discovered and supported for monitoring when:

* MySQL Server was installed from a package provided by the Linux distribution vendor (i.e. from the distribution repository)
* MySQL Server was compiled and installed from source, using the default configuration files and directory locations

Multiple installations of MySQL Server per Linux host server are supported for automatic discovery when both installations are listed in mysqld\_multi format outlined by Oracle

<http://dev.mysql.com/doc/refman/5.0/en/mysqld-multi.html>

### Supported Operating Systems

* All versions of Linux supported by the current version of Operations Manager

### Prerequisites

The MySQL client library respective the running MySQL server must be installed. This file has the name libmysqlclient.so and generally is installed with most distribution installs of MySQL.

The System Center Linux agent must be installed on the managed computer. For agent prerequisites, see: [Supported UNIX and Linux Operating](http://go.microsoft.com/fwlink/?LinkID=244214)

[System Versions](http://go.microsoft.com/fwlink/?LinkID=244214) (http://go.microsoft.com/fwlink/?LinkID=244214)

## Files in this Management Pack

The following table describes the files that are included in this management pack:

| **File name** | **Display name** |
| --- | --- |
| Microsoft.Oss.Library.mp | Microsoft Monitoring Library for Open Source Software |
| Microsoft.MySQLServer.Library.mp | Microsoft MySQL Server Library |

## Management Pack Purpose

The MySQL Server Management Pack provides both proactive and reactive monitoring of MySQL Server running on managed Linux computers.

The monitoring provided by this management pack includes availability monitoring, performance data collection, and default thresholds. You can integrate the monitoring of MySQL Server components into your service-oriented monitoring scenarios.

In addition to health monitoring capabilities, this management pack includes reports, diagnostics, and views that enable near real-time diagnosis and resolution of detected issues.

For details on the discoveries, rules, monitors, views, and reports contained in this management pack, see [Appendix: Management Pack Contents](#zf475f3cc57b84a049d89cda7b1f37ba8).

## Monitoring Scenarios

| **Monitoring scenario** | **Description** | **Associated rules and monitors** |
| --- | --- | --- |
| MySQL Server Health | Availability and performance monitoring for MySQL Server instances | See Appendix: ManagementPack Contents |

## Configuring the MySQL Server Management Pack

This section provides guidance on configuring and tuning this management pack.

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

 Deploying and Enabling the MySQL OMI Provider

 [Tuning Performance Threshold Monitors](#_Tuning_Performance_Threshold)

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

By default, 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 “MySQL 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.

### Deploying and Enabling the MySQL OMI Provider

Monitoring of MySQL Server requires that the corresponding OMI Provider deployed to the managed computer. The MySQL OMI provider uses a preconfigured MySQL user and the MySQL client library to retrieve performance and health data back to Operations Manager.

**Deploying the OMI Provider**

The MySQL OMI provider package is automatically deployed during the installation of the Operations Manager Linux agent if an installation of MySQL Server and the presence of MySQL client libraries are detected. This detection and automatic installation occurs when installing the Linux agent for the first time on a computer, and it also occurs when upgrading a previous agent version to the current version.

If MySQL Server is installed to the Linux computer *after* the Operations Manager agent is installed or the MySQL client libraries are obtained *after* the Operations Manager agent is installed - the MySQL OMI Provider can be manually installed through the following mechanism:

**Installing the MySQL OMI Provider:**

* Copy the appropriate “scx” installation bundle to the target computer. The available packages can be found on the Management Server in the Operations Manager program files directory, under \Server\AgentManagement\UnixAgents\DownloadedKits. For example, an Ubuntu 14.04 x64 server would require the *scx-1.6.0-<build number>.universald.1.x64.sh* package.
* Run the installation package with the -*-upgrade --force* switches. This will reinstall the package but not modify any existing configuration customization:

|  |
| --- |
| sudo sh ./scx-1.6.0-166.universald.1.x64.sh --ugprade --force  |

* The “scx” installation bundle contains .rpm or .deb packages for OMI and the Operations Manager agent providers, as well as bundles for additional software monitoring, such as MySQL Server. If you prefer to install the MySQL OMI Provider with native package managers such as RPM or DPKG, you can extract the bundle to access the .rpm or .deb packages:

|  |
| --- |
| sudo sh ./scx-1.6.0-166.universald.1.x64.sh --extractcd scxbundle.\*sudo ./mysql-cimprov-1.0.0-123.universal.1.x86\_64.sh --extractcd mysql |

### Configuring the MySQL OMI Provider

After the MySQL Management Pack is imported all MySQL installations from source or native rpm / deb packages will be discovered and enter a not-monitored state. The MySQL OMI provider requires a preconfigured MySQL user and installed MySQL client libraries in order to query the performance/health information from the MySQL instance. For more information about creating a MySQL user for monitoring see **Creating a MySQL User**

### MySQL OMI Authentication File

MySQL OMI provider uses an authentication file to determine what bind-address and port the MySQL instance is listening on and what credentials to use to gather metrics. During installation the MySQL OMI provider will scan MySQL my.cnf configuration files (default locations) for bind-address and port and partially set the MySQL OMI authentication file.

The following options are available to complete monitoring of a MySQL server instance:

1. Run the management pack task “Set Default MySQL Credentials”
2. Add a pre generated MySQL OMI authentication file into the correct directory
	1. Refer to **Authentication File Format**  and **Authentication File location** below
3. Use the MySQL OMI authentication file program to configure a new MySQL authentication file
	1. Refer to **MySQL OMI Authentication File Program** below

#### Authentication File Format

The MySQL OMI authentication file is a text file that contains information about the Port, Bind-Address, MySQL username, and a Base64 encoded password. The MySQL OMI authentication file only grants privileges for read/write to the Linux user that generated it.

|  |
| --- |
| *[Port]=[Bind-Address], [username], [Base64 encoded Password]**(Port)=(Bind-Address), (username), (Base64 encoded Password)**(Port)=(Bind-Address), (username), (Base64 encoded Password)**AutoUpdate=[true|false]* |

A default MySQL OMI authentication file contains a default instance and a port number depending on what information is available and parsed from the found MySQL configuration file.

The default instance is a means to make managing multiple MySQL instances on one Linux host easier, and is denoted by the instance with port 0. All added instances will inherit properties set from the default instance. For example if MySQL instance listening on port ‘3308’ is added, the default instance’s bind-address, username, and Base64 encoded password will be used to try and monitor the instance listening on 3308. If the instance on 3308 is binded to another address and uses the same MySQL username and password pair only the re specification of the bind-address is needed and the other properties will be inherited.

Examples of the authentication file can be found below

|  |  |
| --- | --- |
| Default instance and instance with port 3308  | 0=127.0.0.1, root, cnBwdA==3308=, ,AutoUpdate=true |
| Default instance and instance with port 3308 + different Base 64 encoded password | 0=127.0.0.1, root, cnBwdA==3308=127.0.1.1, , AutoUpdate=true |

|  |  |
| --- | --- |
| **Property** | **Description** |
| Port | Port represents the current port the MySQL instance is listening on. The port 0 implies that the properties following are used for default instance. |
| Bind-Address | the Bind Address is the current MySQL bind-address |
| username | This the username of the MySQL user you wish to use to monitor the MySQL server instance. |
| Base64 encoded Password | This is the password of the MySQL monitoring user encoded in Base64. |
| AutoUpdate | When the MySQL OMI Provider is upgraded the provider will rescan for changes in the my.cnf file and overwrite the MySQL OMI Authentication file. Set this flag to true or false depending on required updates to the MySQL OMI authentication file. |

#### Authentication File Location

The MySQL OMI Authentication File is by default located in the following location and named “mysql-auth”:

|  |
| --- |
| /var/opt/microsoft/mysql-cimprov/auth/<Linux/UNIX Run As Account Username>/mysql-auth |

If the “Linux/UNIX Run As Account” is configured as the root account the mysql-auth file will be located in the following location:

|  |
| --- |
| /var/opt/microsoft/mysql-cimprov/auth/mysql-auth |

**Important note**: if the Linux/UNIX Run As Account changes the mysql-auth file must be reconfigured or imported. Additionally, if the mysql-auth file is being imported from another source, ensure that the Linux/UNIX Run AS Account currently configured has the proper privileges to read/write from the file.

### MySQL OMI Authentication File Program

Included with the installation of the MySQL OMI provider is a MySQL OMI authentication file program which can be used to stream line the creation of the MySQL OMI Authentication file. The MySQL OMI authentication file program can be found at the following location

|  |
| --- |
| /opt/microsoft/mysql-cimprov/bin/mycimprovauth |

**Important Note:** The mycimprovauth program should be run with the same Linux/UNIX Run As Account that will be used to monitor the MySQL Server, as the program will grant read/write to the current user.

The following operations can be used

|  |  |  |
| --- | --- | --- |
| **Operation** | **Example** | **Description** |
| autoupdate *false|true* | mycimprovauth autoupdate false | this operations sets whether or not the authentication file will be automatically updated on restart or update |
| default *bind-address username password* | mycimprovauth default 127.0.0.1 root root | this operations sets the default instance in the MySQL OMI authentication file.The password field should be entered in plain text - the password in the MySQL OMI authentication file will be Base 64 encoded |
| delete *default|port\_num* | mycimprovauth default | this operation will delete the specified instance by either *default* or by port number |
| help | mycimprov help | this operation prints out a list of commands to use |
| print | mycimprov print | this operation prints out an easy to read MySQL OMI authentication file |
| update *port\_num bind-address username password* | mycimprov update 3307 127.0.0.1 root root | this operation updates the following instance or adds the instance if it does not existThe password field should be entered in plain text - the password in the MySQL OMI authentication file will be Base 64 encoded |

##### RunAs Account

The RunAs Account used for “Set Default MySQL Credentials” tasks is the RunAs account associated with the UNIX/Linux Action Account RunAs profile for the Linux computer.

**Note:** If the UNIX/Linux RunAs Account is changed for the MySQL host Linux server the MySQL OMI Authentication File must be regenerated.

#### Upgrading the MySQL OMI Provider to a new version

The MySQL OMI Provider will be upgraded automatically to the latest available version when upgrading the Linux agent for Operations Manager to the latest available version.

### Tuning Performance Threshold Monitors

The following table lists performance threshold monitors that have default thresholds that might require additional tuning to suit your environment. Evaluate these monitors to determine whether the default thresholds are appropriate for your environment. If a default threshold is not appropriate for your environment, you should obtain a baseline for the relevant performance counters, and then adjust the thresholds by applying an override to them.

| **Monitor Name** | **Default Threshold**  | **Default Repeat Count** |
| --- | --- | --- |
| MySQL Server Key Cache Hit Percent | Warning: Less than 95 %Critical: Less than 90 % | 1 |
| MySQL Server Key Cache Write Percent | Warning: Less than 90 %Critical: Less than 80 % | 1 |
| MySQL Server Key Cache Use Percent | Warning: Greater than 70 %Critical: Greater than 85 % | 1 |
| MySQL Server Query Cache Hit Percent | Warning: Less than 90 %Critical: Less than 80 % | 1 |
| MySQL Server Query Cache Prunes Percent | Warning: Greater than 70 %Critical: Greater than 80 % | 1 |
| MySQL Server Query Cache Use Percent | Warning: Greater than 85 %Critical: Greater than 95 % | 1 |
| MySQL Server Table Cache Hit Percent | Warning: Less than 80 %Critical: Less than 70 % | 1 |
| MySQL Server Table Lock Contention Percent | Warning: Greater than 45 %Critical: Greater than 55 % | 1 |
| MySQL Server Table Cache Use Percent | Warning: Greater than 85 %Critical: Greater than 95 % | 1 |
| MySQL Server InnoDB Buffer Pool Hit Percent | Warning: Less than 95 %Critical: Less than 90 % | 1 |
| MySQL Server InnoDB Buffer Pool Use Percent | Warning: Greater than 80 %Critical: Greater than 95 % | 1 |
| MySQL Server Full Table Scan Percent | Warning: Greater than 80 %Critical: Greater than 95 % | 1 |
| MySQL Server Slow Query Percent | Warning: Greater than 15 %Critical: Greater than 25 % | 1 |
| MySQL Server Connections Use Percent | Warning: Greater than 80 %Critical: Greater than 90 % | 1 |

### Creating a MySQL User

If there is no pre-existing MySQL user that can be used for monitoring purposes use the following commands with privileged MySQL User in the mysql command line

|  |
| --- |
| mysql> CREATE USER ‘monuser’@’localhost’ IDENTIFIED by ‘mypass’; |

#### Setting MySQL User Privileges

The MySQL OMI provider will use the defined MySQL user to query the MySQL system tables for performance and configuration information. The MySQL user must have read access to these tables otherwise data will not be received. Additionally the MySQL management pack will only display the MySQL databases that the defined MySQL user has read access to.

To grant permissions to a MySQL monitoring user the granting user must have the ‘GRANT option’ privilege as well as the privilege being granted. In order for the MySQL User to return performance data the user will need access to the following queries

|  |
| --- |
| SHOW GLOBAL STATUS; |
| SHOW GLOBAL VARIABLES: |

In addition to these queries the MySQL user requires SELECT access to the following default tables: *information\_schema, mysql*. These privileges can be granted by running the following grant commands.

|  |
| --- |
| GRANT SELECT ON information\_schema.\* TO ‘monuser’@’localhost’; |
| GRANT SELECT ON mysql.\* TO ‘monuser’@’localhost’; |

# Appendix: Management Pack Contents

The MySQL Server management pack discovers the object types described in the following sections.

[Monitored MySQL Server (Linux)](#ApacheHTTPServer)

[MySQL Server Database (Linux)](#ApacheHTTPVirtualhost)

##  Monitored MySQL Server (Linux)

Discovery Information

| **Interval** | **Enabled** | **When to Enable** |
| --- | --- | --- |
| 14400 | True | Not applicable |

Related Monitors

| **Monitor** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |
| MySQL Server Status Monitor | 300 | Alert priority: MediumAlert severity: Critical | Automatic | True | Not applicable |
| MySQL Server Key Cache Hit Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Key Cache Write Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Key Cache Use Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Query Cache Hit Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Query Cache Prunes Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Query Cache Use Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Table Cache Hit Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Table Lock Contention Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Table Cache Use Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server InnoDB Buffer Pool Hit Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | False | When using InnoDB as a default storage engine for MySQL tables |
| MySQL Server InnoDB Buffer Pool Use Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | False | When using InnoDB as a default storage engine for MySQL tables |
| MySQL Server Full Table Scan Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Slow Query Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Connections Use Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |
| MySQL Server Aborted Connection Percent Monitor | 300 | Alert priority: MediumAlert severity: Warning/Critical | Automatic | True | Not applicable |

Related Rules

| **Rule** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- |
| MySQL Server Key Cache Hit Percent Collection | False |  | True | Not applicable |
| MySQL Server Key Cache Write Percent Collection | False |  | True | Not applicable |
| MySQL Server Key Cache Use Percent Collection | False |  | True | Not applicable |
| MySQL Server Query Cache Hit Percent Collection | False |  | True | Not applicable |
| MySQL Server Query Cache Prunes Percent Collection | False |  | True | Not applicable |
| MySQL Server Query Cache Use Percent Collection | False |  | True | Not applicable |
| MySQL Server Table Cache Hit Percent Collection | False |  | True | Not applicable |
| MySQL Server Table Lock Contention Percent Collection | False |  | True | Not applicable |
| MySQL Server Table Cache Use Percent Collection | False |  | True | Not applicable |
| MySQL Server InnoDB Buffer Pool Hit Percent Collection | False |  | True | When using InnoDB as a default storage engine for MySQL tables |
| MySQL Server InnoDB Buffer Pool Use Percent Collection | False |  | True | When using InnoDB as a default storage engine for MySQL tables |
| MySQL Server Full Table Scan Percent Collection | False |  | True | Not applicable |
| MySQL Server Slow Query Percent Collection | False |  | True | Not applicable |
| MySQL Server Connections Use Percent Collection | False |  | True | Not applicable |
| MySQL Server Aborted Connection Percent Collection | False |  | True | Not applicable |

Related Views

| **View** | **Description** | **Rules and Monitors that Populate the View** |
| --- | --- | --- |
| Active Alerts | All active MySQL Server alerts | * All alert-generating rules
 |
| MySQL Servers | MySQL Servers state view | * MySQL Server Installation Discovery (Linux)
* Managed MySQL Server Discovery (Linux)
 |
| All Performance Data | All MySQL Server performance view | * All performance collection rules
 |

Related Reports

| **Report** | **Description** | **Class Selection Criteria** |
| --- | --- | --- |
| MySQL Server Key Cache Performance | Performance history report (Daily aggregation)Metrics:* MySQL Server Key Cache Hit Percent Collection
* MySQL Server Key Cache Write Percent Collection
* MySQL Server Key Cache Use Percent Collection
 | Monitored MySQL Server (Linux) |
| MySQL Server Table Cache Performance | Performance history report (Daily aggregation)Metrics:* MySQL Server Table Cache Hit Percent Collection
* MySQL Server Table Cache Lock Contention Percent Collection
* MySQL Server Table Cache Use Percent Collection
 | Monitored MySQL Server (Linux) |
| MySQL Server Connection Performance | Performance history report (Daily aggregation)Metrics:* MySQL Server Connections Use Percent Collection
* MySQL Server Aborted Connections Percent Collection
 | Monitored MySQL Server (Linux) |
| MySQL Server Query Cache Performance | Performance history report (Daily aggregation)Metrics:* MySQL Server Query Cache Hit Percent Collection
* MySQL Server Query Cache Prunes Percent Collection
* MySQL Server Query Cache Use Percent
 | Monitored MySQL Server (Linux) |
| MySQL Server InnoDB Buffer Pool Performance | Performance history report (Daily aggregation)Metrics:* MySQL Server InnoDB Buffer Pool Hit Percent Collection
* MySQL Server InnoDB Buffer Pool Use Percent Collection
 | Monitored MySQL Server (Linux) |

## MySQL Server Database (Linux)

Discovery Information

| **Interval** | **Enabled** | **When to Enable** |
| --- | --- | --- |
| 14400 | True | Not applicable |

Related Monitors

| **Monitor** | **Interval** | **Alert** | **Reset Behavior** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- | --- |

Related Rules

| **Rule** | **Alert** | **Notes** | **Enabled** | **When to Enable** |
| --- | --- | --- | --- | --- |
| MySQL Database Number of Tables Collection | False |  | True | Not applicable |
| MySQL Database Disk Space in Bytes | False |  | True | Not applicable |

Related Views

| **View** | **Description** | **Rules and Monitors that Populate the View** |
| --- | --- | --- |
| MySQL Databases | MySQL Databases state view | * MySQL Server Databases Discovery (Linux)
 |

Related Reports

| **Report** | **Description** | **Class Selection Criteria** |
| --- | --- | --- |