Guide to Microsoft System Center Management Pack for SQL Server Analysis Services

Published in December 2020 by Microsoft Corporation.

This guide is based on version 7.0.29.0 RTM of the management pack for SQL Server Analysis Services.

The Operations Manager team encourages you to provide any feedback on the management pack by sending it to sqlmpsfeedback@microsoft.com.

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Changes History

December 2020 - version 7.0.29.0 RTM

- **What's New**
  - Improved performance of partition discovery for multidimensional databases
  - Updated and improved SCOM 2019 HTML Dashboards to display SSAS health and alerts

June 2020 - version 7.0.22.0 RTM

- **What's New**
    - Added tasks Start/Stop Analysis Services Windows Service
    - Updated display strings

December 2019 - version 7.0.19.0 CTP

- **What's New**
    - Added support for SQL Server Analysis Services 2012, 2014, and 2016 in addition to previously supported 2017 and up
    - Implemented Database Status monitor
    - Updated display strings

October 2018 - version 7.0.10.0 RTM

- **What's New**
    - Replaced the Core Library in the delivery with the version 7.0.7.0, that version which is delivered with the most recent RTM version of the management pack for SQL Server 2017+.
    - Improved displaying of the SSAS instance version (now shows Patch Level version instead of Version).
    - Added missed dependency monitors required to roll up the instance health appropriately.
    - Updated Summary dashboards.
    - Updated display strings.
- **Bug Fixes**
    - Fixed alert for "Partition Storage Free Space" monitor.

June 2018 - version 7.0.8.0 CTP

- The original release of this management pack.

Management Pack Scope and Supported Configurations

Analysis Services Configurations and Features

Operating Systems and Platforms

List of supported operating systems/platforms is as following:

- Windows Server 2012
- Windows Server 2016
- Windows Server 2019

SQL Server Analysis Services Features

The following is a list of features and configurations supported by Management Pack for SQL Server Analysis Services. Unsupported features and configurations are also on this list marked as "Not supported":

- An instance of SQL Server Analysis Services running in one of these modes:

    - Multidimensional Mode
    - Tabular Mode
    - PowerPivot Mode
- SQL Server Analysis Services Databases
- SQL Server Analysis Services Database Partitions
- Clustered installation of SSAS

This management pack supports at least 3 SSAS instances having overall 100 databases on a single agent.

SCOM Configurations

Management Pack for SQL Server Analysis Services is designed for the following versions of System Center Operations Manager:

- System Center Operations Manager 2012 R2
- System Center Operations Manager 2016
- System Center Operations Manager 1801
- System Center Operations Manager 1807
- System Center Operations Manager 2019

A dedicated Operations Manager management group is not required for this management pack.

This management pack does not support least-privilege configurations of monitoring and requires an action account to be a local administrator on servers with SSAS installed.

Prerequisites

- **.NET Framework 4.5+**

  Installation of .NET Framework 4.5 or newer is required

- **Management Pack for Windows Server Operating System**

  As a best practice, you should import Windows Server Management Pack for the operating system you are using. The management packs monitor aspects of the operating system that influence the performance of computers running SQL Server Reporting Services such as disk capacity, disk performance, memory utilization, network adapter utilization and processor performance.

- **For Clustered environment each agent has the Agent Proxy option enabled**

  Enable the Agent Proxy option on all agents installed on the servers that are members of a cluster. It is not necessary to enable this option for standalone servers.

  To enable Agent Proxy option, perform following steps:

  1. Open the Operations Console and click **Administration**.
  2. In the **Administrator** pane, click **Agent Managed**.
  3. Double-click an agent.
  4. On the **Security** tab, select *Allow this agent to act as a proxy* and discover managed objects on other computers.

- **SQL Server Browser service is enabled for SQL Server Instance**

The SQL Server Browser service is required for Analysis Services discovery and monitoring and must be installed and running on computers with Analysis Services.

- **Run As Profile associated with an account that has administrator rights on SSAS instance**

  Associate Microsoft SQL Server Run As profiles with an account that has **administrator** permissions for both the Windows Server and the SQL Server Analysis Services instance.

Management Pack Delivery

You can download Management Pack for SQL Server Analysis Services from the Microsoft portal or find it in the System Center Operations Manager Online Catalog.

- **Microsoft.SQLServer.AnalysisServices.ManagementPack.msi**

  A set of .MP and .MPB files to start monitoring of Analysis Services on Windows.

- **SQLServerAnalysisServicesGuide.md**

  A SSAS operations guide.

- **SQLServerDashboardsGuide.pdf**

  An operations guide for SQL MP Dashboards.

- **SSASMPWorkflowList.pdf**

  A complete list of SSAS MP workflows with descriptions and parameters.

Management Pack for SQL Server Analysis Services consists of the following files:

File	Description
Microsoft.SQLServer.AnalysisServices.Windows.Discovery.mpb	Microsoft SQL Server Analysis Services (Discovery).This management pack discovers Microsoft SQL Server Analysis Services Instances and related objects. The management pack contains discovery logic only and requires a separate monitoring management pack to be imported to monitor the discovered objects.
Microsoft.SQLServer.AnalysisServices.Windows.Monitoring.mpb	Microsoft SQL Server Analysis Services (Monitoring). This management pack enables the monitoring of Microsoft SQL Server Analysis Services. It depends on Microsoft SQL Analysis Services (Discovery) management pack.

File	Description
Microsoft.SQLServer.AnalysisServices.Core.Views.mp	Microsoft SQL Server Analysis Services Core Library (Views). This management pack defines views for Microsoft SQL Server Analysis Services.
Microsoft.SQLServer.AnalysisServices.Core.Library.mpb	Microsoft SQL Server Analysis Services Core Library. This library contains basic components required for the monitoring of Microsoft SQL Server Analysis Services.
Microsoft.SQLServer.Visualization.Library.mpb	Microsoft SQL Server Visualization Library. This library contains basic visual components required for SQL Server dashboards.
Microsoft.SQLServer.Core.Library.mpb	Microsoft SQL Server Core Library. This Management Pack is the core library for all versions of SQL Server. It defines all SQL Server base classes and relationships.

Management Pack Purpose

This management pack provides monitoring of SQL Server 2012 (and higher) Analysis Services instances, databases and partitions.

For details on discoveries, rules, monitors, views and reports, see **Appendix: Management Pack Contents** in the **SSASMPWorkflowsList.pdf** file.

Monitoring Scenarios

Instance Monitoring

This scenario provides health monitoring of SSAS instances.

Service State

This monitor alerts when the Windows service for SSAS instance is not in the running state for a period longer than the specified threshold.

Memory Configuration Conflict with SQL Server

This monitor alerts if there is a SQL Server relational database engine process running on the server and the *TotalMemoryLimit* configuration for a SSAS instance is higher than the specified threshold.

TotalMemoryLimit Configuration

This monitor alerts when configured *TotalMemoryLimit* for SSAS instance exceeds the specified threshold, risking allocation of physical memory required for the operating system to perform the necessary basic functions (at least 2 GB).

Memory Usage

This monitor reports a warning when memory allocations by SSAS instance surpass the configured warning threshold expressed as a percentage of the *TotalMemoryLimit* setting for a SSAS instance. The monitor issues a critical alert when these allocations surpass the configured critical threshold.

Memory Usage on the Server

This monitor observes the memory usage by non-SSAS processes on the server to ensure that *TotalMemoryLimit* for Analysis Services is always available.

Processing Pool I/O Job Queue length

This monitor alerts when the length of the processing pool I/O job queue for SSAS instance is greater than the configured threshold.

Processing Pool Job Queue length

This monitor alerts when the length of the processing pool job queue for SSAS instance is greater than the configured threshold.

Query Pool Queue Length

This monitor alerts when the length of the query pool queue for SSAS instance is greater than the configured threshold.

Default Storage Free Space

This monitor reports a warning when the available free space for the instance default storage drops below Warning Threshold setting, expressed as a percentage of the sum of estimated default storage folder (DataDir) size and disk free space. The monitor reports a critical alert when the available space drops below Critical Threshold. The monitor does not take into account the databases or partitions located in folders other than the default storage folder (DataDir).

CPU utilization

This monitor alerts if the CPU usage by the SSAS process is high.

Database Monitoring

This scenario provides health monitoring of SSAS Databases.

Database Free Space

This monitor reports a warning when the available disk space for SSAS database storage folder drops below Warning Threshold setting, expressed as a percentage of the sum of the estimated database storage folder size and disk free space. The monitor reports a critical alert when the available space drops below Critical Threshold.

Blocking Duration

This monitor alerts if at least one session is blocked longer than the configured threshold.

Blocking Session Count

This monitor alerts when the number of sessions blocked for a longer period than the configured WaitMinutes setting exceeds the configured threshold.

Partition Monitoring

This scenario provides monitoring for health aspects of SSAS Multidimensional Databases partitions.

Partition Storage Free Space

This monitor reports a warning when the available free space for the partition storage location drops below Critical Threshold setting expressed as a percentage of the sum of the total size of the folder plus disk free space.

The monitor reports a critical alert when the available space drops below the Warning threshold. The monitor does not monitor available space for the default storage location for a SSAS instance.

Performance Collection Rules

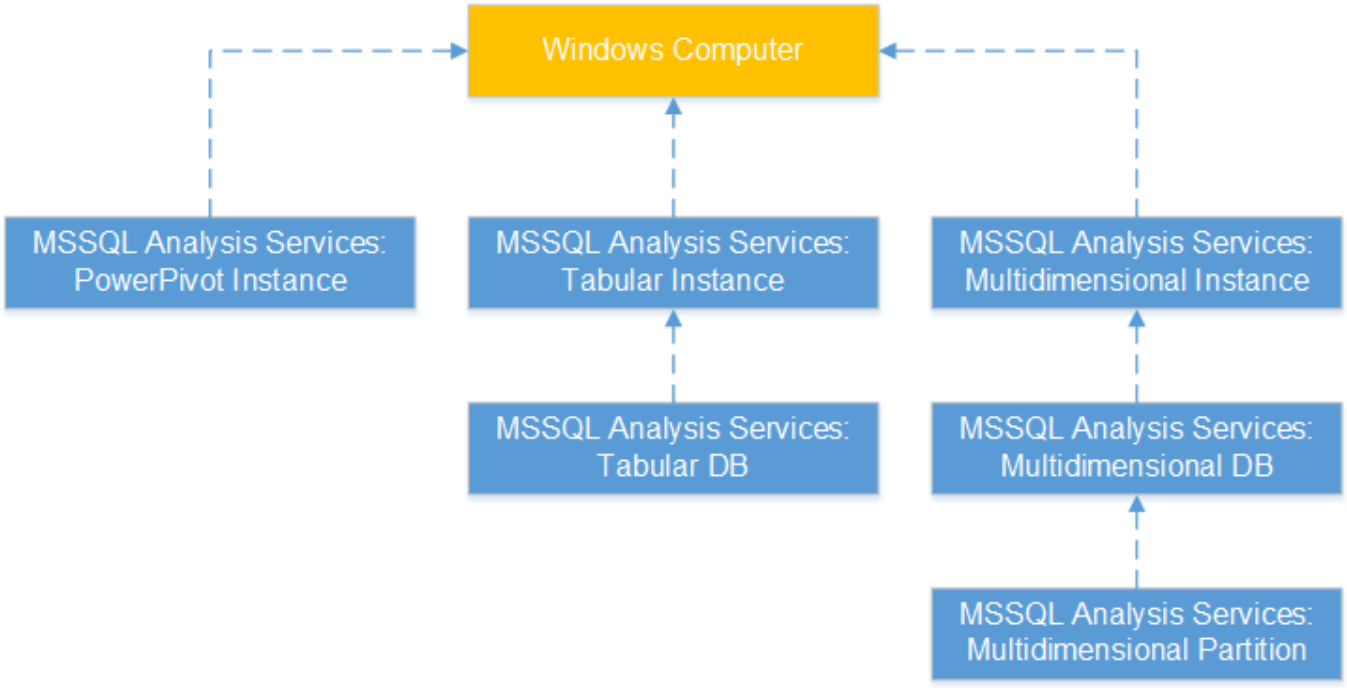
This scenario collects various important performance metrics such as:

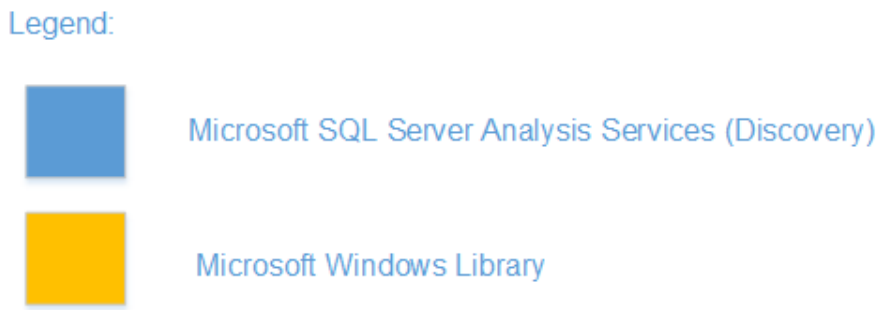
- SSAS: Database Disk Free Space (GB)
- SSAS: Database Drive Space Used By Others (GB)
- SSAS: Database Blocking Duration (minutes)
- SSAS: Database Free Space (%)
- SSAS: Database Free Space (GB)
- SSAS: Number of Database Blocked Sessions
- SSAS: Database Size (GB)
- SSAS: Database Storage Folder Size (GB)
- SSAS: Partition Size (GB)
- SSAS: Partition Free Space (GB)
- SSAS: Partition Used by Others (GB)
- SSAS: Partition Free Space (%)
- SSAS: Total Drive Size (GB)
- SSAS: Drive Used Space (GB)
- SSAS: Actual System Cache (GB)
- SSAS: Instance Free Space (%)
- SSAS: Instance Free Space (GB)

- SSAS: Cache Evictions/sec
- SSAS: Cache Inserts/sec
- SSAS: Cache KB added/sec
- SSAS: CPU utilization (%)
- SSAS: Default Storage Folder Size (GB)
- SSAS: Low Memory Limit (GB)
- SSAS: Cleaner Current Price
- SSAS: Memory Usage on the Server (GB)
- SSAS: Memory Usage on the Server (%)
- SSAS: Memory Usage by AS Non-shrinkable (GB)
- SSAS: Processing Pool I/O Job Queue Length
- SSAS: Processing Pool Job Queue Length
- SSAS: Processing Rows read/sec
- SSAS: Instance Memory (GB)
- SSAS: Instance Memory (%)
- SSAS: Query Pool Job Queue Length
- SSAS: Storage Engine Query Rows sent/sec
- SSAS: Total Memory Limit (GB)
- SSAS: Total Memory on the Server (GB)
- SSAS: Used Space on Drive (GB)

How Health Rolls Up

The following diagram shows the roll up of the object health states.





Security Configuration

This management pack does not support the least-privilege configuration of monitoring and requires the action account to be a local administrator on the servers with SSAS installed.

Run As Profiles

When the management pack is imported for the first time, it creates the following Run As profiles:

- **Microsoft SQL Server Discovery Run As Profile**

  This profile is associated with all discoveries.

- **Microsoft SQL Server Monitoring Run As Profile**

  This profile is associated with all monitors and rules.

By default, all discoveries and monitors defined in the SQL Server management pack use accounts defined in the *Default Action Account* Run As profile.

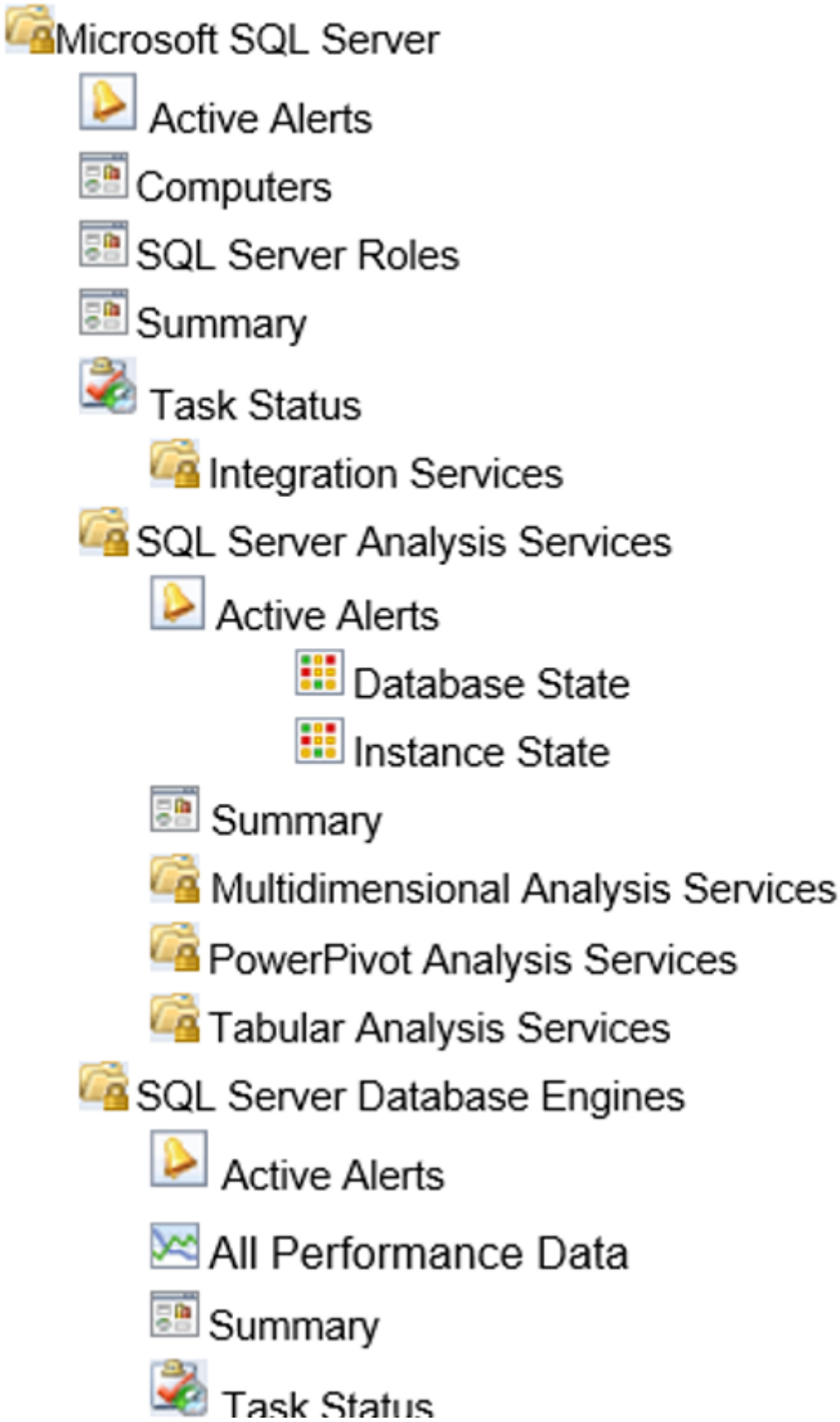
If the default action account for the given system does not have necessary permissions to discover or monitor instances of SQL Server Analysis Services, those systems can be bound to more specific credentials in "Microsoft SQL Server" Run As profiles that have access.

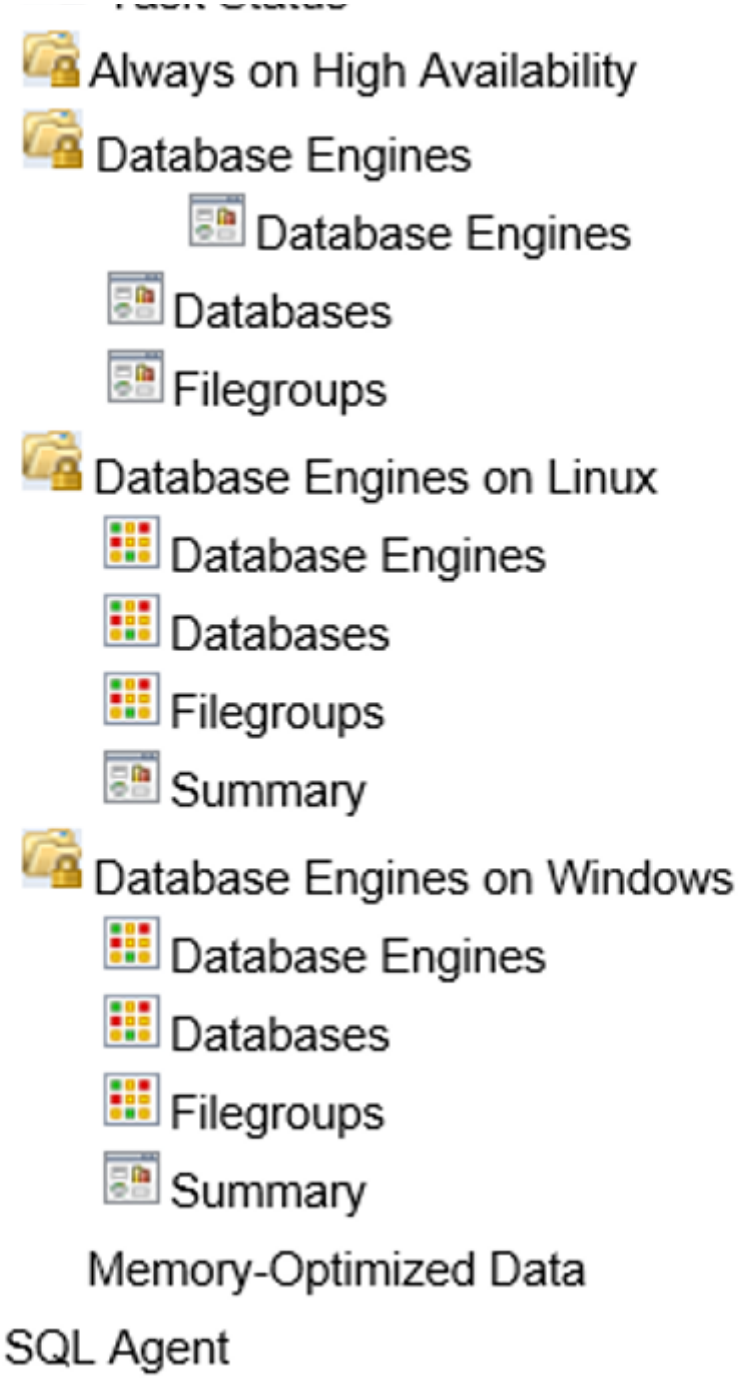
View Information in the Operations Manager Console

Version-Independent (Generic) Views and Dashboards

This management pack introduces a common folder structure that will be used in future releases of management packs for different components of SQL Server.

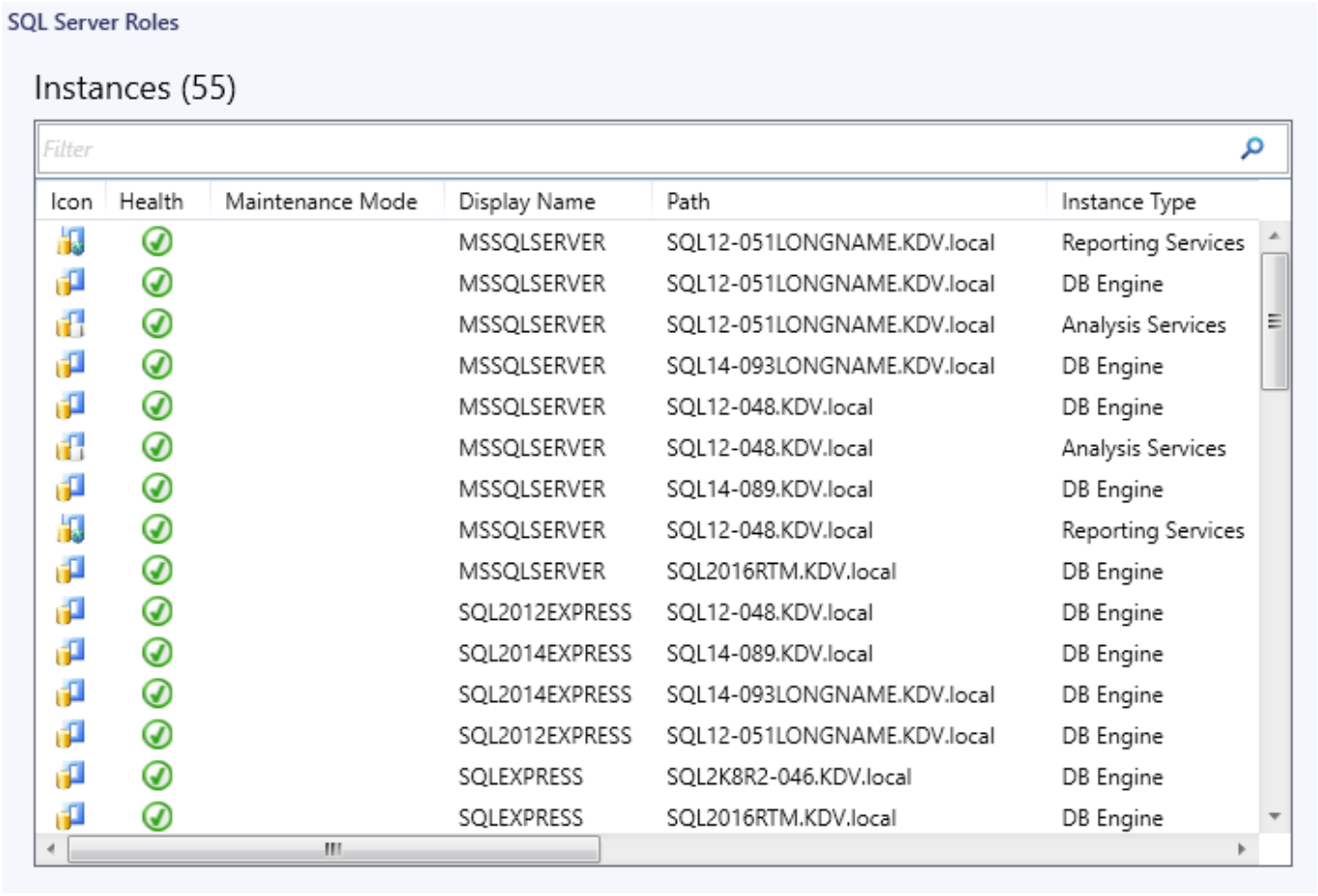
The following views and dashboards are version-independent and show information about all versions of SQL Server.





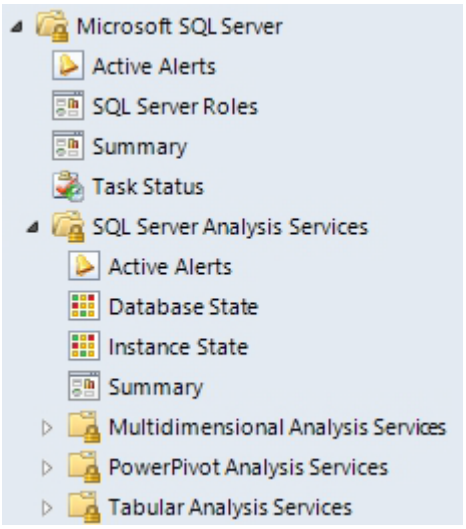
The **Computers** view displays computers on which agents are installed and management pack discovery is running. Note that this view does not display computers configured for agentless monitoring.

The **SQL Server Roles** dashboard provides information about instances of SQL Server Database Engine, SQL Server Reporting Services, SQL Server Analysis Services and SQL Server Integration Services.



Analysis Services Views and Dashboards

Management Pack for Microsoft SQL Server Analysis Services introduces a comprehensive set of state, performance and alert views that can be found in the dedicated folder.



Some views may contain a very long list of objects or metrics.

To find a specific object or group of objects, you can use Scope, Search and Find buttons on the Operations Manager toolbar. For more information, see Finding Data and Objects in the Operations Manager Consoles.

This management pack includes a set of rich dashboards that provide detailed information about SQL Server Analysis Services (Instances) and Databases.

Links

The following links provide information about common tasks associated with System Center Management packs:

- Management Pack Life Cycle
- How to Import an Operations Manager Management Pack
- Creating a Management Pack for Overrides
- Managing Run As Accounts and Profiles
- How to Export an Operations Manager Management Pack
- How to Remove an Operations Manager Management Pack

If you have any questions about the Operations Manager and management packs, refer to System Center Operations Manager community forum (http://go.microsoft.com/fwlink/?LinkID=179635).

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Appendix: Run As Profiles

Microsoft SQL Server Discovery Run As Profile

Account with administrator permissions for both Windows Server and SQL Server Analysis Services instance should be used.

- Workflow Type: *Discovery*
  - MSSQL Analysis Services: Multidimensional DB Discovery
  - MSSQL Analysis Services: Multidimensional Instance Discovery
  - MSSQL Analysis Services: Multidimensional Partition Discovery
  - MSSQL Analysis Services: PowerPivot Instance Discovery
  - MSSQL Analysis Services: Tabular DB Discovery
  - MSSQL Analysis Services: Tabular Instance Discovery

Microsoft SQL Server Monitoring Run As Profile

Account with administrator permissions for both Windows Server and SQL Server Analysis Services instance should be used.

- Workflow Type: *Monitor*
  - Blocking Duration
  - Blocking Session Count
  - CPU Utilization (%)
  - Database Free Space
  - Default Storage Free Space
  - Memory Configuration
  - Conflict with SQL Server Memory Usage
  - Memory Usage on the Server
  - Partition Storage Free Space
  - Processing Pool I/O Job Queue length
  - Processing Pool Job Queue length

- Query Pool Queue length
- Service State
- Total Memory Limit Configuration
- Database Status
- SSAS: Actual System Cache (GB)
- SSAS: Cache added KB/sec
- SSAS: Cache Evictions/sec
- SSAS: Cache Inserts/sec
- SSAS: Cleaner Current Price
- SSAS: CPU utilization (%)
- SSAS: Database Blocking Duration (minutes)
- SSAS: Database Blocking Duration (minutes)
- SSAS: Database Disk Free Space (GB)
- SSAS: Database Disk Free Space (%)
- SSAS: Database Drive Space Used By Others (GB)
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- SSAS: Database Free Space (%)
- SSAS: Database Free Space (%)
- SSAS: Database Free Space (GB)
- SSAS: Database Free Space (GB)
- SSAS: Database Size (GB)
- SSAS: Database Size (GB)
- SSAS: Database Storage Folder Size (GB)
- SSAS: Database Storage Folder Size (GB)
- SSAS: Default Storage Folder Size (GB)
- SSAS: Drive Used Space (GB)
- SSAS: Drive Used Space (GB)
- SSAS: Instance Free Space (%)
- SSAS: Instance Free Space (GB)
- SSAS: Instance Memory (%)
- SSAS: Instance Memory (GB)
- SSAS: Low Memory Limit (GB)
- SSAS: Memory Usage by AS Non-shrinkable (GB)
- SSAS: Memory Usage on the Server (%)
- SSAS: Memory Usage on the Server (GB)
- SSAS: Number of Database Blocked Sessions
- SSAS: Number of Database Blocked Sessions
- SSAS: Partition Free Space (%)
- SSAS: Partition Free Space (GB)
- SSAS: Partition Size (GB)
- SSAS: Partition Used by Others (GB)
- SSAS: Processing Pool I/O Job Queue Length
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- SSAS: Query Pool Job Queue Length
- SSAS: Storage Engine Query Rows sent/sec

- SSAS: Total Drive Size (GB)
- SSAS: Total Drive Size (GB)
- SSAS: Total Drive Size (GB)
- SSAS: Total Memory Limit (GB)
- SSAS: Total Memory on the Server (GB)
- SSAS: Used Space on Drive (GB)

Appendix: Known Issues and Troubleshooting

Several performance rules do not work with SSAS instances

Issue: The following performance rules do not work with SSAS instances of SQL Server with cumulative update versions lower than 14.0.3015.40.

- Processing Pool I/O Job Queue length
- Processing Pool Job Queue length
- Query Pool Queue length

The rules do not gather performance data and throw error events in the Operations Manager event log. The root cause is the wrong path to a library file in the SSAS settings stored in the Windows registry.

In SCOM issue can be indicated by alert from SSAS Management Pack "SSAS: An Error occurred during execution of a SSAS MP managed module". One of the following modules mentioned in alert description with Message "Category does not exist":

- *Microsoft.SQLServer.AnalysisServices.Windows.Module.Monitoring.MemoryMonitor*
- *Microsoft.SQLServer.AnalysisServices.Windows.Module.Monitoring.Performance.PerfomanceCounterDataProvider*

Resolution: Install the most recent SQL Server cumulative update. If it does not help, correct the corresponding .DLL file name in the Windows registry:

1. Start regedit
2. Go to *HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\MSOLAP$[instanceName]\Performance*
3. Find a key with the following value:

   *C:\Program Files\Microsoft SQL Server\MSAS14.[instance name]\OLAP\bin\Counters\MSMDCTR **140**.DLL*
4. Update it as follows:

   *C:\Program Files\Microsoft SQL Server\MSAS14.[instance name]\OLAP\bin\Counters\ **MSMDCTR**.DLL*
5. Restart the Analysis Service.

SCOM issue: Configuration Service may be frozen after Management Pack re-installation

Issue : Configuration Service may be frozen after Management Pack re-installation. This appears to be a SCOM issue.

Resolution : No resolution.

Errors may occur after installation of a cumulative update for SQL Server

Issue: When SQL Server is upgraded by means of a new cumulative update, the following errors may occur:

- System.InvalidOperationException: Could not Read Category Index: 13688.
- System.InvalidOperationException: The Counter layout for the Category specified is invalid, a counter of the type: AverageCount64, AverageTimer32, CounterMultiTimer, CounterMultiTimerInverse, CounterMultiTimer100Ns, CounterMultiTimer100NsInverse, RawFraction, or SampleFraction has to be immediately followed by any of the base counter types: AverageBase, CounterMultiBase, RawBase or SampleBase.

Resolution: Restart the "Microsoft Monitoring agent" service (HealthService).

Health Service may frequently restart when monitoring a huge number of Databases due to exceeding default thresholds for Private bytes and Handle Count monitors

Issue: While monitoring over 50 Databases per SSAS instance, you may face exceeding the default thresholds for Private bytes and Handle Count monitors. This causes frequent Health Service restarting on the agents.

Resolution: Override the monitors for only "Agent" class in the following way: Private bytes monitor threshold should be set to 943718400 (default is 300MB), Handle Count monitor threshold should be set to 30000 (the default is 6000).