

OMi Management Pack for Hadoop

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Operations Manager i for Linux and Windows® operating systems

User Guide

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Chapter 1: OMi Management Pack for Hadoop

The OMi Management Pack for Hadoop (OMi MP for Hadoop) works with Operations Manager i (OMi) and enables you to monitor Hadoop environment using the Business Service Management (BSM) or OMi console. The OMi MP for Hadoop provides out-of-the-box Management Template for monitoring Hadoop in a Big Data environment. The Management Template comprises of a wide range of Aspects which enable monitoring the Hadoop core components - Hadoop Distributed File System (HDFS) and MapReduce. The administrators can seamlessly deploy the out of the box Management Templates for monitoring Hadoop in an environment.

The Subject Matter Experts (SMEs) and developers can easily customize the Management Templates.

The OMi MP for Hadoop also provides the following additional functionalities to support a unified monitoring solution:

- Configuration Item (CI) based deployment and configuration
- Supports agent monitoring by integrating with the product Operations Agent
- Supports Run Time Service Model (RTSM) based deployment

Chapter 2: Getting Started

The following section provides step-by-step instructions for monitoring Hadoop environments using OMi MP for Hadoop.

Task 1: Adding Nodes to the BSM 9.2x or OMi 10.x console

Before you begin monitoring, you need to add the CI to the BSM 9.2x or OMi 10.x console.

1. Open the Monitored Nodes pane from Administration:

On BSM 9.2x, click Admin > Operations Management > Setup > Monitored Nodes.

On OMi 10.x, click Administration > Setup and Maintenance > Monitored Nodes.

- In the Node Views pane, click Predefined Node Filters > Monitored Nodes and then click and then click Computer > Windows or Unix. The Create New Monitored Node dialog box appears.
- Specify the Primary DNS Name, IP address, Operating System, and Processor Architecture of the node and click OK.

The newly created node is saved as a Configuration Item (CI) instance in Run-time Service Model (RTSM).

Note: The proxy node with Operations Agent needs to be activated on OMi server and certificate needs to be granted.

Task 2: Enabling the Enrichment Rules

You must enable the following enrichment rules to populate the Hadoop CI's display label with additional information about container or the hostname:

- SoftwareElementDisplayLabelForNewHost
- SoftwareElementDisplayLabelForExistingHost

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SoftwareElementDisplayLabelPopulator

To enable the Enrichment rules, follow these steps:

1. Open the Enrichment manager pane:

On BSM 9.2x, click Admin > RTSM Administration > Modeling > Enrichment manager.

On OMi 10.x, click Administration > RTSM Administration > Modeling > Enrichment manager.

- 2. In the Enrichment Rules pane, select **SoftwareElementDisplayLabelForNewHost** from the list.
- 3. Right-click and select **Properties**. The Enrichment Rule Properties window appears.
- 4. Click Next.
- 5. Select Rule is Active.
- 6. Click Finish.
- 7. In the Enrichment Rules pane, click 🛅 to save the changes.
- 8. Select SoftwareElementDisplayLabelForExistingHost and repeat steps 3 to 7.
- 9. Select SoftwareElementDisplayLabelPopulator and repeat steps 3 to 7.

Task 3: Deploying the Hadoop Discovery Aspect

To discover the Hadoop CIs in the environment, you must deploy the Hadoop Discovery Aspect on the Name Node CIs on which NameNode service is running by following these steps:

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. In the Configuration Folders pane:

Configuration Folders > BigData Management > Hadoop > Aspects

- In the Aspects folder, click the Hadoop Discovery Aspect that you want to deploy, and then click . The Assign and Deploy wizard opens.
- 4. In the **Configuration Item** tab, click the **CI** and then click **Next** to go to **Required Parameters**.

- 5. (Optional). In the Required Parameters tab, click Next.
- 6. *(Optional).* In the **All Parameters** tab on BSM 9.2x or **Parameter Summary** tab on OMi 10.x, click **Next**.
- 7. *(Optional)*. In the **Configure Options** tab, if you do not want to enable the assignment immediately, perform the following:

On BSM 9.2x, clear the **Enable Assigned Objects** check box.

On OMi 10.x, clear the **Enable Assignment(s)** check box.

You can then enable the assignment later by using the Assignments & Tuning pane.

8. Click Finish.

Note: After the Hadoop Service Discovery Aspect is deployed, a message stating the Assignment and deployment jobs created appears. To check the status of the deployment jobs, go to the following location:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Deployment Jobs.

On OMi 10.x, click Administration > Monitoring > Deployment Jobs.

Task 4: Verifying Discovery

After you deploy the Hadoop Service Discovery Aspect, you must verify if the CIs are populated in the Top view.

To view the CIs populated in the top view, follow these steps:

1. Open the Event Perspective pane:

On BSM 9.2x, click Applications > Operations Management > Event Perspective.

On OMi 10.x, click **Workspaces > Operations Console > Event Perspective**.

2. In the View Explorer, select the Hadoop_Topology view.

Task 5: Deploying Management Template or Aspects

This section provides information about deploying management template and aspects. For more information, go to "Task 5a: Deploying Essential Hadoop Management Template"

Note: Before deploying the Essential Hadoop Management Template or Hadoop Aspects, you must discover the Hadoop CIs on all the managed nodes using the Hadoop Discovery Aspect.

Task 5a: Deploying Essential Hadoop Management Template

You **must** deploy the Hadoop Service Discovery Aspect even if the CIs are already populated by any other source such as SiteScope, DDM and so on. For more information, see Task 3: Deploying the Hadoop Discovery Aspect.

You can deploy the Essential Hadoop Management Template by following these steps:

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. In the Configuration Folders pane:

Configuration Folders > BigData Management > Hadoop > Management Templates.

- 3. In the **Management Templates** folder, click the Essential Hadoop Management Template that you want to deploy, and then click 🏶. The Assign and Deploy wizard opens.
- 4. In the **Configuration Item** tab, click the CI to which you want to assign the Management Template, and then click **Next**.
- 5. In the Required Parameters tab, click Next.

- 6. In the All Parameters tab on BSM 9.2x or Parameter Summary tab on OMi 10.x, select the Application Instance (NameNode | Resource Manager | JobTracker| Secondary NameNode) parameter and click . The Edit Instance Parameter: Application Instance dialog box opens. To modify the dependent parameters for Hadoop Master, follow these steps:
 - a. Select the dependent parameter and click . For example, you can select the parameter **Severity of Hadoop_MasterService_Availability**.
 - b. Click **Value** and specify the value and then click **OK**.
 - c. Click OK.
- 7. In the All Parameters tab on BSM 9.2x or Parameter Summary tab on OMi 10.x tab, select the Application Instance (DataNode | NodeManager | TaskTracker) parameter and click . The Edit Instance Parameter: Application Instance dialog box opens. To modify the dependent parameters for Hadoop Slave, follow these steps:
 - a. Select the dependent parameter and click . For example, you can select the parameter **Severity of Hadoop_SlaveService_Availability**.
 - b. Click Value and specify the value and then click OK.
 - c. Click OK.
- 8. Click Next to go to Configure Options tab.
- 9. *Optional.* In the **Configure Options** tab, if you do not want to enable the assignment immediately, perform the following:

On BSM 9.2x, clear the Enable Assigned Objects check box.

On OMi 10.x, clear the **Enable Assignment(s)** check box.

You can then enable the assignment later using the Assignments & Tuning pane.

10. Click Finish.

Task 5b: Deploying Hadoop Aspects

You **must** deploy the Hadoop Service Discovery Aspect even if the CIs are already populated by any other source such as SiteScope, DDM and so on. For more information, see Task 3: Deploying the Hadoop Discovery Aspect.

You can deploy the Hadoop Aspects by following these steps:

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. In the Configuration Folders pane:

Configuration Folders > BigData Management > Hadoop > Aspects.

- 3. In the **Aspects** folder, click the Aspect that you want to deploy, and then click ⁴. The Assign and Deploy wizard opens.
- 4. In the **Configuration Item** tab, click the CI to which you want to assign the Aspect, and then click **Next**.
- 5. In the **Required Parameters** tab, click **Next**.
- 6. In the All Parameters tab on BSM 9.2x or Parameter Summary tab on OMi 10.x, select the Application Instance (NameNode | Resource Manager | JobTracker| Secondary NameNode) parameter and click
 . The Edit Instance Parameter: Application Instance dialog box opens. To modify the dependent parameters for Hadoop Master, follow these steps:
 - a. Select the dependent parameter and click . For example, you can select the parameter **Severity of Hadoop_MasterService_Availability**.
 - b. Click Value and specify the value and then click OK.
 - c. Click OK.
- 7. In the All Parameters tab on BSM 9.2x or Parameter Summary tab on OMi 10.x, select the Application Instance (DataNode | NodeManager | TaskTracker) parameter and click . The Edit Instance Parameter: Application Instance dialog box opens. To modify the dependent parameters for Hadoop Slave, follow these steps:
 - a. Select the dependent parameter and click . For example, you can select the parameter **Severity of Hadoop_SlaveService_Availability**.
 - b. Click Value and specify the value and then click OK.
 - c. Click OK.
- 8. Click **Next** to go to **Configure Options** tab.
- 9. *Optional*. In the **Configure Options** tab, if you do not want to enable the assignment immediately, perform the following:

On BSM 9.2x, clear the Enable Assigned Objects check box.

On OMi 10.x, clear the **Enable Assignment(s)** check box.

You can then enable the assignment later using the Assignments & Tuning pane.

10. Click Finish.

Monitoring Hadoop Environment

After you deploy Management Template and Aspects, you can analyze the health and performance of Hadoop CIs from the following perspectives:

- Event Perspective
- Health Perspective
- Performance Perspective

Event Perspective

The Event Perspective provides complete information of events from an Event Perspective. In the Event Perspective, you can view the event information of the Hadoop CI that are monitored by OMi MP for Hadoop.

To view the Event Perspective of Hadoop CIs, follow these steps:

1. Open the Event Perspective pane:

On BSM 9.2x, click Applications > Operations Management > Event Perspective.

On OMi 10.x, click **Workspaces > Operations Console > Event Perspective**.

- 2. In the Operations Management pane, click **Event Perspective** tab. The View Explorer pane appears.
- 3. In the **Browse Views** tab, select **Hadoop Topology** that contains the Hadoop CIs for which you want to view the events. Alternatively, you can use **Search** tab to find a Hadoop CI.
- 4. Click the **Hadoop CI** for which you want to view the Event Perspective. The list of events for the selected Hadoop CI appears on the Event Browser pane.

When you click an event from the Event Browser, the Event Details pane opens where you can view the following details:

- **General** Displays the detailed information about the selected event such as Severity, Lifecycle State, Priority, Related CI and so on.
- Additional Info Displays more detailed information about the attributes of the selected event.

- **Source Info** Displays an overview of the information available about the source of the selected event.
- **Actions** Displays the list of actions available for a selected event. There are two types of possible actions: User Actions and Automatic Action.
- Annotations Displays a list of the annotations attached to the selected event.
- **Custom Attributes** Displays a list of the attributes that either an administrator or the responsible user manually configured and added to the selected event.
- **Related Events** Displays an overview of all the events that are related to the event selected in the Event Browser.
- **History** Displays the history of the selected event.
- **Resolver Hints** Displays the information used to identify the node and CI associated with an event.
- **Instructions** Displays instruction information designed to help operators handle the associated event.
- Forwarding Displays the transfer of ownership details if any, for the events.

Health Perspective

The Health Perspective provides a high-level view of the overall health information of the related CIs in the context of events. In the Health Perspective, you can view the health information of the Hadoop CIs that are monitored by OMi MP for Hadoop.

To view the Health Perspective of Hadoop CIs, follow these steps:

1. Open the Health Perspective pane:

On BSM 9.2x, click **Applications > Operations Management > Health Perspective**.

On OMi 10.x, click Workspaces > Operations Console > Health Perspective.

- In the Browse Views tab, select Hadoop Topology that contains the Hadoop CIs for which you want to view the health related events. Alternatively, you can use Search tab to find a a Hadoop CI.
- 3. Click the **Hadoop CI** for which you want to view the Health Perspective. The list of health related events for the selected Hadoop CI appears on the Event Browser pane.

When you click an event from the Event Browser pane, the following panes appear:

- Health Top View Displays the health top view of the selected event.
- **Health Indicators** Displays the Key Performance Indicators (KPIs) and HIs related to the CI that you select from the Health Top View pane.
- Actions Displays the list of actions available for a selected event.

Performance Perspective

Performance Perspective enables you to populate graphs from existing graph templates. You can also plot customized graphs by selecting the required metrics for a specific CI.

To view the Performance Perspective of Hadoop CIs using graphs, follow these steps:

1. Open the Performance Perspective pane:

On BSM 9.2x, click **Applications > Operations Management > Performance Perspective**.

On OMi 10.x, click **Workspaces > Operations Console > Performance Perspective**.

- In the Browse Views tab, select Hadoop Topology. The list of CIs appear. Select a specific CI. The performance pane appears, which lists the default graphs available for the Hadoop Topology view.
- 3. Click the graph you want to plot from the **Graphs** tab, and then click **M Draw Graphs**. The selected graph is plotted on the right pane.

Note: For more information about Event Perspective, Health Perspective, and Performance Perspective, see the *Operations Manager i Concepts Guide*.

Chapter 3: Components

The includes the following components for monitoring Microsoft SQL Server databases in an environment:

- "Hadoop Management Templates"
- "Hadoop Aspects"
- "Parameters"
- "Configuration Items (CIs) and Configuration Item Types (CITs)"
- "Run-time Service Models Views"
- "Health Indicators (HIs)"
- "Event Type Indicators (ETIs)"
- "Dashboard for Hadoop"
- "Tools"
- "Graph Templates"

Hadoop Management Templates

The Hadoop Management Templates provide a complete management solution for monitoring Hadoop. The Management Templates comprises of several Aspects which enables you to monitor Hadoop clusters in an environment. You can deploy the out of the box Management Templates with the default settings or you can customize the Management Templates based on your requirements. In addition, you can also create Management Templates based on the monitoring requirements.

Note: Before you begin monitoring Hadoop using the Hadoop Management Templates, you must ensure that the environment is JMX enabled. For more information about the prerequisites for Hadoop monitoring, see the *OMi Management Packs Installation Guide*.

The OMi MP for Hadoop comprises the Essential Hadoop Management Template.

How to Access Hadoop Management Templates

1. Open the Management Template & Aspects pane:

On BSM 9.2x, click Admin >Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. Click Configuration Folders > BigData Management > Hadoop > Management Templates.

Tasks

How to Deploy Hadoop Management Templates

For more information about deploying Hadoop Management Templates, go to "Task 5: Deploying Management Template or Aspects".

How to Automatically Assign Hadoop Management Templates and Hadoop Aspects

To automatically assign Hadoop Management Templates or Hadoop Aspects, follow these steps:

1. Open Automatic Assignment Rules pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Automatic Assignment Rules.

On OMi 10.x, click Administration > Monitoring > Automatic Assignment Rules.

Automatic Assignment Rules consists of Auto-Assignment Rules pane at the top and Parameters pane at the bottom.

- 2. In the Auto-Assignment Rules pane, click **New Assignment** and select the appropriate option. The Create Auto-Assignment Rule wizard opens.
- 3. In the **Select Target View** tab, select the view for which you want to create the automatic assignment rule, and then click **Next**.
- 4. In the **Select Item to Assign** tab, click the Management Template or an Aspect that you want to automatically assign to all the CIs, and then click **Next**.

The latest version of the Management Template or Aspect that you want to assign is selected by default. Click **Next**.

5. In the **Required Parameters** tab, click **Next**.

Note: Hadoop Management Templates or Aspects do not have mandatory parameters. You will get a notification stating that There are no parameters that require editing for this Assignment.

- 6. *(Optional).* In the **Configure Option** tab, clear the **Activate Auto- Assignment Rule** check box if you do not want to activate the assignment rule immediately.
- 7. Click **Finish** to save the changes. The assignment rule is added to the list of auto-assignment rules.

An assignment may trigger an event to be sent to OMi if one of the following situations applies:

- A deployment job fails.
- An auto-assignment fails.
- An auto-assignment succeeds. This behavior can be configured in the Infrastructure Settings.

You can check if the automatic assignment rule successfully created the expected assignments as by following these steps:

1. Open the Assignments & Tuning pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Assignments & Tuning.

On OMi 10.x, click Administration > Monitoring > Assignments & Tuning.

- 2. In the **Browse Views** tab, select the view you identified while creating your automatic assignment rule.
- Expand the view, and select a node that corresponds to the root CI type of the assigned item. Assignments created as a result of Automatic Assignment Rules are shown in the list of assignments at the top of the right pane, and have the value Auto-Assignment in the column Assigned By.

You can consider the following options for tuning the assignment:

- Use the Automatic Assignment Rules screen to tune the parameter values for all assignments triggered by the automatic assignment rule.
- Use the Assignments and Tuning screen to tune, redeploy, delete, and enable or disable individual assignments.

Essential Hadoop Management Template

The Essential Hadoop Management Template can be used to monitor the Hadoop components in an environment. It comprises of essential Hadoop Aspects and Infrastructure Aspects for monitoring the availability, health, and performance of Hadoop environments.

Note: To use and deploy Infrastructure Aspects, you must install OMi Management Pack for Infrastructure software.

How to Access Essential Hadoop Management Template

1. Open the Management Template & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

 In the Configuration Folders pane, click Configuration Folders > BigData Management > Hadoop > Management Templates > Essential Hadoop Management Template.

User Interface Reference

Management Template - General

UI Element	Description
Name	Essential Hadoop Management Template
Description	Monitors the Hadoop components - HDFS and MapReduce.
ID	A unique identifier for this version.
Version ID	A unique identifier for this version of the Management Template.
Version	The current version of the Management Template.
Change Log	Text that describes what is new or modified in this version of the Management Template.

Management Template - Topology View

UI Element	Description
Topology View	Hadoop Topology is the Topology View for Essential Hadoop Management Templates. It contains the Hadoop related CI types that you want to manage using the Management Template.
СІ Туре	The type of CIs that the Essential Hadoop Management Template enables you to manage. This is the type of CI to which the Management Template can be assigned. The Essential Hadoop Management Templates contains Hadoop Master, Hadoop Slave, Computer, Node, and Cluster CI Types.

Hadoop Management Template - Aspects

Management Template - Aspects

The Essential Hadoop Management Template contains the following Aspects:

- DataNode DFS Statistics
- DataNode Operations
- Hadoop Base
- Hadoop Discovery
- Hadoop Master Services HeartBeats
- Hadoop Master Services JVM Statistics
- Hadoop Master Services Network Statistics
- Hadoop Master Services Availability
- Hadoop Slave Services HeartBeats
- Hadoop Slave Services Network Statistics
- Hadoop Slave Services JVM Statistics
- Hadoop Slave Services Availability
- JobTracker BlackListed TaskTrackers
- JobTracker Jobs Status
- JobTracker MapReduce Statistics
- NameNode Blocks Statistics
- NameNode Capacity Trend
- NameNode File Operations
- NodeManager Container Statistics
- Resource Manager Application Status
- TaskTracker Operations

List of Infrastructure MP Aspects

The Essential Hadoop Management Template comprises of the following Infrastructure Aspects:

Bandwidth Utilization and Network IOPS

The Bandwidth Utilization and Network IOPS Aspect monitors IO operations, and performance of the systems in the network. It monitors the network IO operations and performance based on the bandwidth used, outbound queue length and average bytes transferred per second.

CPU Performance

The CPU Performance Aspect monitors the overall CPU performance like the CPU utilization percentage and spike in CPU usage. Individual CPU performance monitoring is based on total CPU utilization, CPU utilization in user mode, CPU utilization in system mode and interrupt rate.

Memory and Swap Utilization

The Memory and Swap Utilization Aspect monitors memory performance of the system. Memory performance monitoring is based on Memory utilization (in percentage), Swap space utilization (in percentage), Free memory available (in MBs) and Free swap space available (in MBs).

Remote Disk Space Utilization

The Remote Disk Space Utilization Aspect monitors space utilization of remote disk.

Space Availability and Disk IOPS

The Space Availability and Disk IOPS Aspect monitors the disk IO operations and space utilization of the system.

System Infrastructure Discovery

The System Infrastructure Discovery Aspect discovers and gathers information regarding the system resources, operating system, and applications on a managed node.

Hadoop Aspects

Hadoop Aspects can be used to monitor the building blocks or units of Hadoop. A Hadoop aspect comprises of policy templates, instrumentation, and parameters for monitoring the health and performance of Hadoop. Each Hadoop Aspect provides the ability to monitor a Hadoop CI.

How to Access Hadoop Aspects

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin >Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

 In Configuration Folders, click Configuration Folders > BigData Management > Hadoop > Aspects.

Tasks

How to Create Hadoop Aspects

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects > BigData Management > Hadoop > Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects > BigData Management > Hadoop > Aspects.

- 2. In the Configuration Folders pane, click the configuration folder in which you want to create the new aspect. If you need to create a new configuration folder, click *.
- 3. In the Management Templates & Aspects pane, click **, and then click Mappet. The Create Aspect wizard opens.
- 4. In the General tab, type a unique Name for the new aspect. Click Next.
- In the CI Type tab, select one or more Available CI Types to which this aspect can be assigned, and then click the ⇒ to add them to the list of assigned CI types. (Press CTRL to select several CI types.). Click Next.
- In the Instrumentation tab, click I to add instrumentation to the aspect. The Add Instrumentation dialog box opens, which enables you to select the instrumentation that you want to add. Click Next.
- 7. *Optional.* In the **Aspects** tab, click 🗣, and then click 🖾 **Add Existing Aspect**. The Add Existing Aspect dialog box opens, which enables you to select an existing aspect that you want to nest within this aspect. Click an aspect, and then click **OK**.

- 8. If suitable Aspects do not exist, click 🌳 , and then click 🖾 Add New Aspect to create new Aspects. Click Next.
- In the Policy Templates tab, click I . The Add Policy Template to Aspect dialog box opens. Select the policy templates that you want to add, and then click OK. (Press CTRL to select several policy templates.)
- 10. If suitable policy templates do not exist, click **, and then click ** Add New Policy Template on BSM 9.2x and Add Policy Template from List on OMi 10.x to create them from here.
- 11. Select the Measurement Threshold Policy Template from the Type drop-down list.
- 12. In the Policy Templates page, select the **Version** of the policy templates that you want to add.

Each modification to a policy template is stored in the database as a separate version. Aspects contain specific versions of policy templates. Update the aspects when a new version of policy template are available.

- 13. Optional. In the Policy Templates tab, click the policy template to which you want to add a deployment condition, click
 , and then click the Edit Deployment Condition. The Edit Deployment Condition dialog box opens, which enables you to specify deployment conditions for the selected policy template. Set the condition and then click OK.
- 14. In the Policy Templates page, click **Next**.
- 15. In the **Parameters** tab, you see a list of all the parameters from the policy templates that you added to this aspect.

To combine parameters:

- a. Press CTRL and click the parameters that you want to combine.
- b. Click . The Edit/Combine Parameters dialog box opens.
- c. Type a **Name** for the combined parameters.
- d. *Optional.* Specify a **Description**, **Default Value**, and whether the combined parameter is **Read Only**, an **Expert Setting**, or **Hidden**.

Read Only prevents changes to the parameter value when the aspect is assigned to a configuration item. Hidden also prevents changes, but additionally makes the parameter invisible. Users can choose whether to show expert settings when they make an assignment.

e. You can set either a specific default value, or you can click **From CI Attribute** and then browse for a CI attribute. When you specify a CI attribute, Operations Management sets the

parameter value automatically during deployment of the policy templates, using the actual value of this attribute from the CI. You can also set conditional parameter values here.

- f. Click OK.
- 16. You can also edit the parameters without combining them, to override the defaults in the policy template. Click one parameter, and then click . The Edit/Combine Parameters dialog box opens.
- 17. In the Create Aspect wizard, click **Finish** to save the aspect and close the wizard. The new aspect appears in the Management Templates & Aspects pane.

How to Deploy Hadoop Aspects

If you are using **Monitoring Automation for Server** license, you must deploy the Hadoop Aspects to the CI. For more information about deploying Hadoop Aspects, see "Task 5b: Deploying Hadoop Aspects".

List of Hadoop Aspects

Hadoop Aspects can be used to monitor the core components of Hadoop - HDFS and Map Reduce. The Aspects are categorized based on the Hadoop Master and Hadoop Slave in the Hadoop cluster.

General	Provides an overview of the general attributes of the Hadoop Aspects.
СІ Туре	The type of CIs that the Aspect can be assigned to. This is the type of CI to which the Management Template can be assigned. The Hadoop Aspects contain the Computer, Node, Cluster, Hadoop Master and Hadoop Slave CI types.
Instrumentation	Provides a single package which contains the binaries for discovery, collection, and data logging.
Aspects	Provides an overview of any Aspects that the Hadoop Aspect contains. You can expand each item in the list to see more details about the nested aspect. The Hadoop Base aspect is part of all the other Aspects.
Policy Templates	Provides an overview of the policy templates that the Hadoop Aspect contains. You can expand each item in the list to see more details about the policy template.

User Interface Reference

List of Hadoop Aspects

The OMi MP for Hadoop comprises of the following Aspects:

DataNode DFS Statistics

This Aspect monitors the Hadoop Slave DataNode DFS Statistics

CI Type	Policy Template	Policy Description	Policy Type	
Hadoop Slave	Hadoop_DataNode_Capacity	Monitors the DataNode DFS capacity in bytes.	Measurement Threshold Template	
	Hadoop_DataNode_Dfsused	Monitors the DataNode DFS used in bytes.		
	Hadoop_DataNode_Remaining	Monitors the DataNode DFS remaining in bytes.		

DataNode Operations

This Aspect monitors the datanode operations.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Slave	Hadoop_DataNode_ ReadBlockAverageTime	Monitors the average time for read block operations.	Measurement Threshold Template
	Hadoop_DataNode_ ReadBlockOperations	Monitors the number of read block operations.	
	Hadoop_DataNode_ ReadsLocalClient	Monitors the number of reads from local client.	
	Hadoop_DataNode_ ReadsRemoteClient	Monitors the number of reads from the remote client.	
	Hadoop_DataNode_ WriteBlockAverageTime	Monitors the average time for write block operations.	
	Hadoop_DataNode_ WriteBlockOperations	Monitors the average time for write block operations.	
	Hadoop_DataNode_ WritesLocalClient	Monitors the number of writes from local client.	

СІ Туре	Policy Template	Policy Description	Policy Type
	Hadoop_DataNode_ WritesRemoteClient	Monitors the number of writes from remote client.	
	Hadoop_DataNode_ ReadThroughputOperation	Monitors the throughput of read operations.	
	Hadoop_DataNode_ WriteThroughputOperation	Monitors the throughput of write operations.	

Hadoop Base

This is the base aspect for Hadoop monitoring.

СІ Туре	Policy Template	Policy Description	Policy Type
Hadoop Master, Hadoop Slave	Hadoop_ Configuration	This policy template contains the Hadoop configuration.	ConfigFile Template
	Hadoop_High	Runs JMX collector/analyzer every high schedule.	Schedule Task Template
	Hadoop_Low	Runs JMX collector/analyzer low schedule.	Schedule Task Template
	Hadoop_ Medium	Runs JMX collector/analyzer every medium schedule.	Schedule Task Template
	Hadoop_ Messages	Interception of messages submitted by Hadoop programs.	Open Message Interface Template
	Hadoop_ VeryHigh	Runs JMX collector/analyzer every very high schedules.	Schedule Task Template

Hadoop Discovery

This Aspect discovers the Hadoop components - NameNode, SecondaryNameNode, JobTracker,DataNode, TaskTracker, and Clusters.

CI Type	Policy Template	Policy Description	Policy Type
Computer, Node	Hadoop Discovery	Discovers the Hadoop components.	Service Auto-Discovery Template
	Hadoop_	Interception of messages submitted by	Open Message Interface

CI Type	Policy Template	Policy Description	Policy Type
	Messages	Hadoop programs.	Template

Hadoop Master Services Heart Beats

This Aspect monitors Hadoop Master NameNode and Job Tracker for HeartBeats.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_ HeartBeatAverageTime	Monitors the average time for heartbeat for the Hadoop Job Tracker.	Measurement Threshold Template
	Hadoop_JobTracker_ HeartBeatOperations	Monitors the number of operations for heartbeat for the Hadoop JobTracker.	
	Hadoop_NameNode_ HeartBeatAverageTime	Monitors the average time for heartbeat for the Hadoop NameNode.	
	Hadoop_NameNode_ HeartBeatOperations	Monitors the number of operations for heartbeat for the Hadoop NameNode.	
	Hadoop_ ResourceManager_ ProcessingTime_AvgTime	Monitors the average time for rpc processing time in milli seconds.	
	Hadoop_ ResourceManager_ QueueTime_AvgTime	Monitors the average time for rpc queue time in milli seconds.	

Hadoop Master Service JVM Statistics

This Aspect monitors Hadoop Master components for Java Heap usage and Garbage Collection.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_GC_ TimeSpent	Monitors the total GC time in seconds for the Hadoop Job Tracker.	Measurement Threshold
	Hadoop_JobTracker_ HeapMemoryUsage	Monitors the heap memory used in MB for the Hadoop Job Tracker.	lemplate
	Hadoop_NameNode_GC_ TimeSpent	Monitors the total GC time in seconds for the Hadoop NameNode.	
	Hadoop_NameNode_ HeapMemoryUsage	Monitors the heap memory used in MB for the Hadoop NameNode.	

CI Type	Policy Template	Policy Description	Policy Type
	Hadoop_ ResourceManager_GC_ TimeSpent	Monitors the total GC time in seconds for the Resource Manager.	
	Hadoop_ ResourceManager_ HeapMemoryUsage	Monitors the heap memory used in Mb for the Resource Manager.	

Hadoop Master Service Network Statistics

This Aspect monitors Hadoop Master NameNode, JobTracker and Resource Manager for Bytes Transfer.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_ ReceivedBytes	Mo nitors the RPC received bytes count for the JobTracker.	Measurement Threshold Template
	Hadoop_JobTracker_ SentBytes	Monitors the RPC sent bytes count for the JobTracker.	
	Hadoop_NameNode_ ReceivedBytes	Monitors the RPC received bytes count for the NameNode.	
	Hadoop_NameNode_ SentBytes	Monitors the RPC sent bytes count for the NameNode.	
	Hadoop_ ResourceManager_ ReceivedBytes	Monitors the RPC received bytes count for the Resource Manager.	
	Hadoop_ ResourceManager_ SentBytes	Monitors the RPC sent bytes count for the Resource Manager.	

Hadoop Master Service Availability

This Aspect monitors the availability of Hadoop Master components - NameNode, JobTracker, SecondaryNameNode, and Resource Manager.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_Availability	Monitors Hadoop JobTracker availability metric.	Measurement Threshold Template

СІ Туре	Policy Template	Policy Description	Policy Type
	Hadoop_JobTracker_Availability_ Check	Monitors Hadoop JobTracker service availability every 5 minutes.	Scheduled Task Template
	Hadoop_NameNode_Availability	Monitors the Hadoop NameNode availability metric.	Measurement Threshold Template
	Hadoop_NameNode_Availability_ Check	Monitors the Hadoop NameNode service availability every 5 minutes.	Scheduled Task Template
	Hadoop_SecondaryNameNode_ Availability	Monitors the Hadoop Secondary Name Node Availability Metric.	Measurement Threshold Template
	Hadoop_SecondaryNameNode_ AvailabilityCheck	Checks Hadoop Secondary Name Node Service Availability every 5 minutes.	Scheduled Task Template
	Hadoop_ResourceManager_ Availability	Monitors the Hadoop Resource Manager Availability Metric.	Measurement Threshold Template
	Hadoop_ResourceManager_ Availability_Check	Checks the availability of the Resource Manager every five minutes.	Scheduled Task Template

Hadoop Slave Service Availability

This Aspect monitors the availability of Hadoop Slave components - DataNode, Node Manager, and Task Tracker.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Slave	Hadoop_DataNode_ Availability	Monitors the Hadoop DataNode availability metric	Measurement Threshold Template
	Hadoop_DataNode_ Availability_Check	Checks the Hadoop DataNode service every 5 minutes.	Scheduled Task Template
	Hadoop_	Monitors the Hadoop Node Manager availability metric.	Measurement

СІ Туре	Policy Template	Policy Description	Policy Type
	NodeManager_ Availability		Threshold Template
	Hadoop_ NodeManager_ Availability_Check	Monitors the Hadoop Node Manager service availability every 5 minutes.	Scheduled Task Template
	Hadoop_TaskTracker_ Availability	Monitors the Hadoop Task Tracker Availability Metric.	Measurement Threshold Template
	Hadoop_TaskTracker_ Availability_Check	Checks the availability of the Task Tracker every five minutes.	Scheduled Task Template

Hadoop Slave Services JVM Statistics

This Aspect monitors Hadoop Slave components for Java Heap usage and Garbage Collection.

СІ Туре	Policy Template	Policy Description	Policy Type
Hadoop Slave	Hadoop_DataNode_ GC_TimeSpent	Monitors the total GC time in seconds for the Hadoop DataNode.	Measurement Threshold Template
	Hadoop_DataNode_ HeapMemoryUsage	Monitors the heap memory used in MB for the Hadoop DataNode.	
	Hadoop_NodeManager_ GC_TimeSpent	Monitors the Java heap usage and garbage collection for the Job Tracker.	
	Hadoop_NodeManager_ HeapMemoryUsage	Monitors the Heap memory used in Mb for the Job Tracker.	
	Hadoop_TaskTracker_ GC_TimeSpent	Monitors the total GC time in seconds for the TaskTracker.	
	Hadoop_TaskTracker_ HeapMemoryUsage	Monitors the heap memory used in Mb for the TaskTracker.	

Hadoop Slave Service Network Statistics

This Aspect monitors Hadoop Master DataNode, Node Manager, and task Tracker for Bytes Transfer.

Hadoop Slave	Hadoop_DataNode_ ReceivedBytes	Monitors the RPC received bytes count for the JobTracker.	Measurement Threshold Template
	Hadoop_DataNode_	Monitors the RPC sent bytes count	

SentBytes	for the JobTracker.
Hadoop_NodeManager_ ReceivedBytes	Monitors the RPC received bytes count for the TaskTracker.
Hadoop_NodeManager_ SentBytes	Monitors the RPC sent bytes count for the TaskTracker.
Hadoop_TaskTracker_ ReceivedBytes	Monitors the RPC received bytes count for the NameNode.
Hadoop_TaskTracker_ SentBytes	Monitors the RPC sent bytes count for the NameNode.

Hadoop Slave Services HeartBeats

This Aspect monitors Hadoop Slave DataNode and Node Manager for HeartBeats.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Slave	Hadoop_DataNode_ HeartBeatAverageTime	Monitors the average time for heartbeat for the Hadoop DataNode.	Measurement Threshold
	Hadoop_DataNode_ HeartBeatOperations	Monitors the number of operations for heartbeat for the Hadoop DataNode.	Template
	Hadoop_NodeManager_ HeartBeatAverageTime	Monitors the average time for heartbeat for the Hadoop Node Manager.	
	Hadoop_NodeManager_ HeartBeatOperations	Monitors the number of operations for heartbeat for the Hadoop Node Manager.	

Job Tracker Black Listed Task Trackers

This Aspect monitors the availability statistics of Task Trackers in a cluster.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop	Hadoop_JobTracker_	Monitors the number of	Measurement
Master	BlackListedTrackers	blacklisted trackers.	Threshold Template

Job Tracker Jobs Status

This Aspect monitors the jobs of the job tracker.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_ JobsCompleted	Monitors the number of jobs completed.	Measurement Threshold Template
	Hadoop_JobTracker_ JobsFailed	Monitors the number of jobs failed.	
	Hadoop_JobTracker_ JobsSubmitted	Monitors the number of jobs submitted.	
	Hadoop_ ThroughputRunningJobs	Monitors the throughput of running jobs.	

Job Tracker Map Reduce Statistics

This Aspect monitors the job tracker map reduce statistics.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_JobTracker_ MapsLaunched	Monitors the number of maps launched.	Measurement Threshold Template
	Hadoop_JobTracker_ MapsSlots	Monitors the number of map slots.	
	Hadoop_JobTracker_ ReducedLaunched	Monitors the number of reduces launched.	
	Hadoop_JobTracker_ ReducesSlots	Monitors the number of reduces slots.	
	Hadoop_JobTracker_ WaitingMaps	Monitors the number of waiting maps.	
	Hadoop_JobTracker_ WaitingReduces	Monitors the number of waiting reduces.	
	Hadoop_JobTracker_ MapSlotUsagePct	Monitors the percentage of map slots used.	
	Hadoop_JobTracker_ ReduceSlotUsagePct	Monitors the percentage of reduced slots used.	

NameNode Blocks Statistics

This Aspect monitors the NameNode Blocks Statistics.

СІ Туре	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_NameNode_ BlockCapacity	Monitors the block capacity of the NameNode	Measurement Threshold
	Hadoop_NameNode_ BlocksTotal	Monitors the total blocks of the NameNode	remplate
	Hadoop_NameNode_ CorruptBlocks	Monitors the corrupt blocks of the NameNode	
	Hadoop_NameNode_ ExcessBlocks	Monitors the excess blocks of the NameNode	
	Hadoop_NameNode_ MissingBlocks	Monitors the missing blocks of the NameNode	
	Hadoop_NameNode_ PendingReplicationBlocks	Monitors the Pending replication blocks of the NameNode	
	Hadoop_NameNode_ UnderReplicatedBlocks	Monitors the Underreplicated blocks of the NameNode	

NameNode Capacity Trend

This Aspect monitors the capacity of the name node.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_ CapacityLoadHDFS	Monitors the capacity load on HDFS	Measurement Threshold Template
	Hadoop_NameNode_ CapacityTotalGB	Monitors the total capacity of the namenode in GB.	
	Hadoop_NameNode_ CapacityUsedGB	Monitors the capacity used in GB.	

NameNode File Operations

This Aspect monitors the Name Node File Operations.

СІ Туре	Policy Template	Policy Description	Policy Type
Hadoop	Hadoop_NameNode_	Monitors the number of files	Measurement Threshold

CI Type	Policy Template	Policy Description	Policy Type
Master	FilesCreated	created.	Template
	Hadoop_NameNode_ FilesDeleted	Monitors the number of files deleted.	
	Hadoop_NameNode_ FilesRenamed	Monitors the number of files renamed.	
	Hadoop_NameNode_ FilesTotal	Monitors the number of total files.	

Node Manager Container Statistics

This Aspect monitors the containers.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_NameNode_ FilesCreated	Monitors the number of files created.	Measurement Threshold Template
	Hadoop_NameNode_ FilesDeleted	Monitors the number of files deleted.	
	Hadoop_NameNode_ FilesRenamed	Monitors the number of files renamed.	
	Hadoop_NameNode_ FilesTotal	Monitors the number of total files.	

Resource Manager Application Status

This Aspect monitors the status of the application.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop Master	Hadoop_AppsThroughput	Monitors the throughput of running applications.	Measurement Threshold Template
	Hadoop_ResourceManager_ AllocatedContainers	Monitors the number of containers allocated.	
	Hadoop_ResourceManager_ AppsCompleted	Monitors the number of applications completed.	
	Hadoop_ResourceManager_ AppsFailed	Monitors the number of applications that have failed.	

СІ Туре	Policy Template	Policy Description	Policy Type
	Hadoop_ResourceManager_ AppsKilled	Monitors the number of applications that are killed.	
	Hadoop_ResourceManager_ AppsRunning	Monitors the number of applications that are running.	
	Hadoop_ResourceManager_ AppsSubmitted	Monitors the number of applications that are submitted.	
	Hadoop_ResourceManager_ PendingContainers	Monitors the number of containers that are pending.	

Task Tracker Operations

This Aspect monitors the Task Tracker activities.

CI Type	Policy Template	Policy Description	Policy Type
Hadoop	Hadoop_TaskTrackers_	Monitors the number of tasks failed due to timeout.	Measurement
Slave	TasksFailedTimeout		Threshold template

Parameters

Parameters are variables that are integral components of Hadoop Management Templates, Hadoop Aspects, and Policy Templates. Each parameter corresponds to a variable. Parameters contain default values that are used for monitoring the different components of Hadoop. You can modify the values of the variables to suit your monitoring requirements.

List of Parameters

The parameters are grouped as follows:

- **Mandatory Parameters** These parameters contain the essential information required by policy templates. For example, Hadoop instance name is a mandatory parameter.
- Expert Parameters These parameters can be used by SMEs and Administrators.

Hadoop Parameters

The following table provides information about the Hadoop Parameters:

Parameter	Parameter Type	Description	Default Value
Application Instance	Mandatory	Hadoop Instance Name where Hadoop instance is running.	
Frequency	Mandatory	Frequency of monitoring Hadoop metrics by a policy template. For example, the frequency of monitoring Hadoop DataNode Service availability.	
Threshold	Mandatory	Threshold of a policy template.For example, the threshold of monitoring Hadoop DataNode Service availability.	
Severity	Mandatory	Severity level of a policy template. For example, the severity levels of monitoring Hadoop DataNode Service availability.	
Frequency of High Scheduler	Expert	Frequency of the scheduler, which is expected to run for long intervals (in minutes).	15
Frequency of Low Scheduler	Expert	Frequency for the scheduler which is expected to run for short intervals (in hours).	24
Frequency of Medium Scheduler	Expert	Frequency for the scheduler which is expected to run for medium intervals (in hour).	1
Frequency of Very High Scheduler	Expert	Frequency for the scheduler which is expected to run for very high intervals (in minutes).	5

Note: The frequency, threshold, and severity parameters are defined for each policy template. For example, the Hadoop_AvIDbNode policy template contains the following parameters:

- Frequency of monitoring Hadoop DataNode Service availability
- Threshold of monitoring Hadoop DataNode Service availability
- Severity of monitoring Hadoop DataNode Service availability

Tuning of Parameters

You can edit the parameters of the Hadoop Management Templates that are already deployed to the CIs.

1. Open the Assignments & Tuning pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Assignments & Tuning.

On OMi 10.x, click Administration > Monitoring > Assignments & Tuning.

- 2. In the **Browse Views** tab, select the **Hadoop Topology** View that contains the CI for which you want to tune parameters. Alternatively, you can use the Search tab to find a CI.
- 3. From the list of Hadoop CIs, select a CI. The Assignments pane shows details of any existing assignments for the Hadoop CI.
- 4. Select the assignment for which you want to tune parameters. The Details of Assignment pane shows the current parameter values.
- 5. In the Assignment Details pane, change the parameters by following these steps:
 - a. Optional. By default, the list shows only mandatory parameters.
 - b. Select a parameter in the list, and then click 🦉.
 - For standard parameters, the Edit Parameter dialog box opens.

Click Value, specify the value, and then click OK.

• For instance parameters, the Edit Instance Parameter dialog box opens.

Change the instance values if necessary, and then for each instance value, change dependent parameter values. After you change the instances and dependent parameter values, click **OK**.

6. In the Details of Assignment pane, click **Save Changes**. Operations Management deploys the new parameter values to the relevant HP Operation Agents.

Configuration Items (CIs) and Configuration Item Types (CITs)

CIs are components that have to be managed in order to deliver an IT Service. CIs typically include IT Services, hardware, and software.

CIT describes the type of a CI and its attributes. The Hadoop CIs that are discovered in an environment are grouped under the CITs. OMi MP for Hadoop comprises the following CITs:

- Hadoop Master
- Hadoop Slave

Run-time Service Models Views

A View enables you to build and visualize a subset of the overall CI model that comprises CITs related to Hadoop clusters. Using the Views, you can visualize the topology of a Hadoop environment. In addition, Views can be used to do the following:

- Manage the Event Perspective of Hadoop CIs
- Manage the Health Perspective of Hadoop CIs
- Assigning and Tuning the Management Templates, Aspects, and Policy Templates

How to Access RTSM Views

1. Open the Modeling Studio pane:

On BSM 9.2x, click Administration > RTSM Administration > Modeling > Modeling Studio.

On OMi 10.x, click Admin > RTSM Administration > Modeling > Modeling Studio.

- 2. Click **Resource Type** as Views.
- 3. Select **Root > Cluster** from the list.

You can see the Hadoop Topology View for OMi MP for Hadoop.

By default, OMi MP for Hadoop contains the following View:

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Hadoop Topology



Health Indicators (HIs)

HIs analyze the events that occur in Hadoop CIs and report the health of the Hadoop CIs. The OMi MP for Hadoop includes the following HIs to monitor the related events:

How to Access Health Indicators

1. Open the Indicators pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Indicators.

On OMi 10.x, click Administration > Service Health > CI Status Calculation > Event and Health Type Indicators.

- 2. In the CI Type pane:
 - For Hadoop System or Hadoop Cluster, click Configuration Item > Infrastructure Element
 > Application System > Hadoop System or Hadoop Cluster.

 For Hadoop Master or Hadoop Slave, click Configuration Item > Infrastructure Element > Application System > Hadoop System or Hadoop Cluster.

СІ Туре	Health Indicator	Description	Value
Hadoop Cluster	Cluster Performance	Indicates the performance of Hadoop Cluster. This indicator shows the aggregated health status of the cluster nodes.	Normal Critical
	Cluster Availability	Indicates the availability of the Hadoop Cluster.	Normal Critical
Hadoop Master	MapReduce Slot Usage	Shows the usage statistics of Maps and Reduces in the Hadoop Cluster.	Normal Critical
Hadoop Master	Apps Throughput	Indicates the throughput of applications.	Normal Warning
Hadoop Master	Jobs Throughput	Indicates the throughput of running jobs.	Normal Warning
Hadoop Master	JobTracker Availability	Indicates the availability of JobTracker Process in the Hadoop Cluster.	Normal Critical
Hadoop Master	Secondary NameNode Availability	Indicates the availability of Secondary NameNode Process in the Hadoop Cluster.	Normal Critical
Hadoop Master	NameNode Availability	Indicates the availability of NameNode Process in the Hadoop Cluster.	Normal Critical
Hadoop Master	Performance Analytics		Normal Warning Critical
Hadoop Master	Resource Manager Availability	Indicates the availability of Resource Manager.	Normal Critical
Hadoop Master	Under Replication Status		Normal Critical
Hadoop Master	Legacy System		Normal Warning Critical

СІ Туре	Health Indicator	Description	Value
Hadoop Slave	TaskTracker Availability	Indicates the availability of TaskTracker Process in the Hadoop Cluster.	Normal Critical
Hadoop Slave	Capacity Trend	Shows the DFS used by DataNodes in the Hadoop Cluster.	Normal Low
Hadoop Slave	DataNode Availability	Indicates the availability of DataNode Process in the Hadoop Cluster.	Normal Critical
Hadoop Slave	Heart Beats	Indicates the number of operations for Heartbeats.	Normal Critical
Hadoop Slave	Garbage Collection Statistics	Indicates the time spent on Garbage Collection.	Normal Warning
Hadoop Slave	Legacy		Normal Warning Critical
Hadoop Slave	Node Manager Availability	Indicates the availability of Node Manager.	Normal Critical
Hadoop Slave	Performance Analytics		Normal Warning Critical

Event Type Indicators (ETIs)

OMi MP for Hadoop contains the following ETIs:

How to Access Event Type Indicators

1. Open the Indicators pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Indicators.

On OMi 10.x, click Administration > Service Health > CI Status Calculation > Event and Health Type Indicators.

2. For Hadoop System or Hadoop Cluster:

Click Configuration Item > Infrastructure Element > Application System > Hadoop System or Hadoop Cluster .

3. For Hadoop Master or Hadoop Slave:

Click Configuration Item > Infrastructure Element > Running Software > Hadoop Master or Hadoop Slave.

СІ Туре	Event Type Indicator	Description	Value
Hadoop Master	Blacklisted TaskTrackers	Indicates the number of Blacklisted TaskTrackers.	Normal Major
	Block Statistics	Indicates the Block Statistics, such as, Corrupt Blocks and Missing Blocks.	Normal Warning
	Block Replication Status	Shows the status of Block Replication in the Hadoop Cluster.	Normal Warning
	Heart Beats	Indicates the number of operations for Heartbeats.	Normal Critical
	Capacity Trend	Indicates the capacity usage by all nodes in the Hadoop Cluster.	Normal Low
	Garbage Collection Statistics	Indicates the time spent on Garbage Collection by the Hadoop Master nodes.	Normal High
	Heap Usage	Indicates the Heap Memory Usage by the Hadoop Master nodes.	Normal High
	Downtime		Normal
Hadoop Slave	Heap Usage	Indicates the Heap Memory Usage by the Hadoop Slave nodes.	Normal High
	TaskTracker Failed	Indicates the number of TaskTrackers failed due to timeout.	Normal Critical
	Read Write Throughput	Indicates throughput of Read and Write operations on the DataNodes.	Normal Minor
	Downtime		Normal

Tools

The OMi MP for Oracle WebLogic is packaged with tools which enables administering, monitoring, and

troubleshooting the Hadoop CIs. OMi MP for Hadoop comprises of the following tools:

How to Access Tools

1. Open the Tools pane:

On BSM 9.2x, click Admin > Operations Management > Operations Console.

On OMi 10.x, click **Administration > Operations Console > Tools**.

CI Type	ΤοοΙ	Description
Hadoop	Restart Hadoop Monitoring	Restarts Hadoop monitoring on the managed server.
	Stop Hadoop Monitoring	Stops Hadoop monitoring on the managed server.
	Start Hadoop Monitoring	Starts Hadoop monitoring on the managed server.

Graph Templates

OMi MP for Hadoop contains graph templates for the following components:

- Hadoop Master
- Hadoop Slave

The following table lists the graphs and corresponding metrics for OMi MP for Hadoop.

Graph	Metric	Metric Name (in CODA)	Description
JobTracker_Availability	JobTracker Availability	JT_AVAILABILITY	Shows the availability of JobTracker process with value 0 as down and 1 as up and running. This is a default graph.
JobTracker_ BlackListed_ TaskTrackers	BlackListed TaskTrackers by JobTracker	JT_BLACKLTD_ TRACKERS	Shows the BlackListed TaskTrackers by JobTracker.
JobTracker_GC_ TimeSpent	GC time spent in milliseconds	JT_GC_ TIMESPENT	Shows the GC time spent in milliseconds by JobTracker.
JobTracker_ HeapUsage	Heap memory used in MB	JT_HEAP_ USAGE	Shows the Heap Usage in MB by JobTracker.
JobTracker_Jobs_	Number of Jobs	JT_JOBS_	Shows the Jobs Status on

Graph	Metric	Metric Name (in CODA)	Description
Status	Completed Number of Jobs Failed Number of Jobs Submitted Throughput of Running Jobs 	COMPLETED JT_JOBS_FAILED JT_JOBS_ SUBMITTED JT_RUNJOB_ THGPUT	JobTracker. This is a default graph.
JobTracker_Map_ Statistics	 Number of Maps Launched Number of Maps Slots Number of Waiting Maps 	JT_MAPS_ LAUNCHED JT_MAPS_SLOTS JT_WAITING_ MAPS	Shows the Map Statistics on JobTracker.
JobTracker_ MapsVsReduces	 Percentage of Map Slots used Percentage of Reduce Slots used 	JT_MAPSLOT_ USE_PER JT_REDSLOT_ USE_PER	Shows the Maps versus Reduces Statistics on JobTracker. This is a default graph.
JobTracker_Network_ Statistics	 RPC received bytes count in MB RPC sent bytes count in MB 	JT_RECEIVED_ BYTES JT_SENT_BYTES	Shows the SentBytes and ReceivedBytes by JobTracker.
JobTracker_Reduce_ Statistics	 Number of Reduces Launched Number of Reduces Slots Number of Waiting Reduces 	JT_REDUCES_ LAUNCHED JT_REDUCES_ SLOTS JT_WAITING_ REDUCES	Shows the Reduces statistics on JobTracker.
JobTracker_ HeartBeats	 Number of operations for Heartbeat Average time for Heartbeat in milliseconds 	JT_HEARTBEAT_ OPT JT_HRTBEAT_ AVGTIME	Shows the HeartBeatOperations and HeartBeatAverageTime JobTracker takes.

Graph	Metric	Metric Name (in CODA)	Description
NameNode_ Availability	Name Node availability	NN_ AVAILABILITY	Shows the availability of Name Node process with value 0 as down and 1 as up and running.
			This is a default graph.
NameNode_Blocks_ Statistics	 RPC received bytes count in MB 	NN_BLOCK_ CAPACITY NN_BLOCK_	Shows the SentBytes and ReceivedBytes by NameNode.
	RPC sent bytes count in MB	CORRUPT	
		NN_BLOCK_ EXCESS	
		NN_BLOCK_ MISSING	
		NN_BLOCK_ TOTAL	
		NN_PENDREP_ BLOCK	
		NN_UNDERREP_ BLOCK	
NameNode_Capacity_ Trend		NN_CAPACITY_ LOAD	
		NN_CAPACITY_ TOTAL	
		NN_CAPACITY_ USED	
NameNode_File_ Operations		NN_FILES_ CREATED NN_ FILES_DELETED NN_FILES_ RENAMED NN_ FILES_TOTAL	
NameNode_GC_ TimeSpent	GC time spent in milliseconds	NN_GC_ TIMESPENT	Shows the Garbage Collection (GC) time spent in milliseconds by Name Node.
NameNode_ HeapUsage	Heap memory used in MB	NN_HEAP_ USAGE	Plots Heap Usage in MB by Name Node.

Graph	Metric	Metric Name (in CODA)	Description
NameNode_ HeartBeats	Average time for Heartbeat in milliseconds	NN_ HEARTBEAT_ OPT	Shows the HeartBeat Operations and HeartBeatAverageTime taken
	 Number of operations for Heartbeat 	of NN_HRTBEAT_ ns for AVGTIME at AVGTIME	
NameNode_Network_ Statistics	 RPC sent bytes count in MB RPC received bytes count in MB 	NN_RECEIVED_ BYTES NN_ SENT_BYTES	Shows the SentBytes and ReceivedBytes by NameNode.
ResourceManager_ Applications_Status		RM_APPS_ THGPUT	Plots the application status.
ResourceManager_ Availability	Resource Manager Availability	RM_ AVAILABILITY	Plots availability of ResourceManager Process with value 0 as down and 1 as up and running
ResourceManager_ GC_TimeSpent	GC time spent in milliseconds	RM_GC_ TIMESPENT	Plots GC time spent in milliseconds by ResourceManager
ResourceManager_ HeapUsage	Heap memory used in MB	RM_HEAP_ USAGE	Plots Heap Usage in MB by Resource Manager.
SecondaryNameNode_ Availability	Secondary Name Node availability	SN_ AVAILABILITY	Shows the availability of Secondary Name Node process with value 0 as down and 1 as up and running.
			This is a default graph.
DataNode_Availability	DataNode Availability	DD_ AVAILABILITY	Plots the availability of DataNode Process with value 0 as down and 1 as up and running.
			This is a default graph.
DataNode_DFS_ Statistics	 DFS Capacity in GB DFS Used in GB DFS Remaining 	DN_CAPACITY DN_DFS_USED DN_REMAINING	Shows the DFS Statistics on DataNode. This is a default graph.

Graph	Metric	Metric Name (in CODA)	Description
	in GB		
DataNode_GC_ TimeSpent	GC time spent in milliseconds	DN_GC_ TIMESPENT	Shows the Garbage Collection (GC) time spent in milliseconds by DataNode.
DataNode_HeapUsage	Heap memory used in MB	DN_HEAP_ USAGE	Shows the Heap usage in MB by DataNode.
DataNode_HeartBeats	 Average time for Heartbeat in milliseconds Number of operations for Heartbeat 	DN_ HEARTBEAT_ OPT DN_HRTBEAT_ AVGTIME	Shows the HeartBeat Operations and HeartBeatAverageTime taken by DataNode.
DataNode_Network_ Statistics	 RPC sent bytes count in MB RPC received bytes count in MB 	DN_RECEIVED_ BYTES DN_SENT_ BYTES	Shows the SentBytes and ReceivedBytes by DataNode.
DataNode_Read_ Operations	 Average time for Read Block Operations in milliseconds Number of Read Block Operations Number of Reads from Local Client Number of Reads from Reads from Remote Client 	DN_READ_BLK_ AVGTIME DN_READ_BLK_ OPTN DN_READS_ LCLIENT DN_READS_ RCLIENT	Shows the Read Operations on DataNode.
DataNode_Write_ Operations	 Average time for Write Block Operations in milliseconds Number of Write Block Operations Number of 	DN_WRITE_BLK_ AVGTIME DN_WRITE_BLK_ OPTN DN_WRITES_ LCLIENT DN_WRITES_ RCLIENT	Shows the Write Operations on DataNode.

Graph	Metric	Metric Name (in CODA)	Description
	Writes from Local Client		
	Number of Writes from Remote Client		
DataNode_ ReadsVsWrites	DN_READ_ OPR_THGPUT	DN_READ_OPR_ THGPUT	Shows the Reads versus Writes statistics on DataNode.
	• DN_WRITE_ OPR_THGPUT	DN_WRITE_ OPR_THGPUT	This is a default graph.
NodeManager_ Availability	Node Manager Availability	NM_ AVAILABILITY	Plots availability of NodeManager Process with value 0 as down and 1 as up and running
NodeManager_ HeapUsage	Node Manager Heap Usage	NM_HEAP_ USAGE	Shows the Heap Usage in MB by Node Manager.
TaskTracker_ Availability	Task Tracker Availability	TT_AVAILABILITY	Plots availability of Task Tracker.
TaskTracker_GC_ TimeSpent	Task Tracker Garbage Collection Time Spent	TT_GC_ TIMESPENT	Shows the Garbage Collection (GC) time spent in milliseconds by Task Tracker.
TaskTracker_ HeapUsage	Heap memory used in MB	TT_HEAP_ USAGE	Shows the Heap Usage in MB by TaskTracker.
TaskTracker_ Network_Statistics	 RPC received bytes count in MB RPC sent bytes count in MB 	TT_RECEIVED_ BYTES TT_SENT_BYTES	Shows the SentBytes and ReceivedBytes by TaskTracker.
TaskTracker_ TasksFailedTimeout	Number of TaskTrackers failed due to timeout	TT_TASKFAIL_ TIMEOUT	Shows the number of TaskTrackers failed due to timeout. This is a default graph.

For more information about viewing a graph, see "Performance Perspective".

Chapter 4: Dashboard for Hadoop

Dashboard for Hadoop on OMi is a platform for monitoring Hadoop cluster and its nodes. It is used to manage alerts, view metrics, filter events based on Hadoop Topology view, and drill down to the cause of the problem. It provides an overview of the overall state of the Hadoop cluster and its nodes.

Hadoop NOC Dashboard × Hadoop Operator Dashboard ×	Select Page
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The following figure shows the **Dashboard for Operator**.

Monitoring Hadoop

Hadoop provides a distributed processing of large scale data and infrastructure, using cluster of commodity hardware and network. Hadoop provides metrics and counters along with other information, such as log files for monitoring and diagnosing the problems in the ecosystem.

Hadoop includes monitoring of individual elements such as:

- System Resources
- Network
- Hadoop Services

Hadoop monitoring requires metrics collection, such as system and service metrics, from the nodes in any cluster to know the health of the Hadoop cluster. The data is also used for generating alerts and correlating events to find the root cause of problems.

Key features of Dashboard for Hadoop

- Capability to drill down into performance problems, reported events, and metrics.
- Real time health and topology of the Hadoop environment.

Creating Dashboard for Hadoop in My Workspace

Hadoop is packaged with tools which enable administering and monitoring the Hadoop CIs. You can use the tools to create a customized dashboard view of your environment. To create an Event Dashboard page, see **User Guide > Operations Management > Event Dashboards > How to Create an Event Dashboard Page in MyBSM** in the BSM Online Help. To create a Monitoring Dashboard page in OMi console, see **User Guide > My Workspace > Dashboard > Monitoring Dashboard > How to Create a Monitoring Dashboard Page in MyWorkspace** in the OMi Online Help.

Viewing Dashboard for Hadoop in My Workspace

To view the Hadoop Dashboard, follow these steps:

1. Open dashboard:

On BSM 9.2x, click **MyBSM**.

On OMi 10.x, click Workspaces > My Workspace > Dashboards > Monitoring Dashboard.

2. Select *Hadoop NOC Dashboard* or *Hadoop Operator Dashboard* from the **Select Page** drop down list.

User Permissions

To access user-defined pages, you must have certain permissions. For more information about accessing user-defined pages in the BSM console, see *User Guide > MyBSM > How to Set Up the MyBSM Workspace > User Permissions in MyBSM* in the *BSM Online Help*. For more information about accessing user-defined pages in the OMi console, see *User Guide > My Workspace > How to Set Up My Workspace > User Permissions in Workspaces* in the OMi Online Help.

Dashboard View

The OOTB dashboard is designed for Operators and IT Administrators. These dashboards can be customized based on your requirements.

The OMi MP for Hadoop Dashboard consists of:

Dashboard for Operator

Hadoop Operator Dashboard provides an overview of the alerts generated for your Hadoop cluster. To view the dashboard on BSM console, select **MyBSM** from the BSM console and click **Hadoop Operator Dashboard** from the **Select Page** drop down list. To view the dashboard on OMi console, click **Workspaces > My Workspace > Dashboards > Monitoring Dashboard** from the OMi console and click **Hadoop Operator Dashboard** from the **Select Page** drop down list.

To view the image corresponding to the Dashboard for Operator, see ""

Components on the Hadoop Operator Dashboard are as follows:

- Top View
- Events Browser
- Performance Graphs
- Health Indicators
- Actions
- Lean Status Bar

• NOC Dashboard for IT Administrators

Network Operation Center (NOC) Dashboard gives the overall view of the health of the environment. To view the dashboard, select **MyBSM** from the BSM console and click **Hadoop NOC Dashboard** from the **Select Page** drop down list. To view the dashboard on OMi console, click **Workspaces > My Workspace > Dashboards > Monitoring Dashboard** from the OMi console and click **Hadoop NOC Dashboard** from the **Select Page** drop down list.

The following figure shows the Hadoop NOC Dashboard:

Components on the Hadoop NOC Dashboard are as follows:

- \circ Top View
- Event Dashboard
- Performance Graphs
- Watch list for Hadoop CIs such as NAMENODE and JOBTRACKER

Filters

Filters enable you to display events based on the selection of Hadoop Topology View. You can apply filter in the Event Browser to limit the number of events arrived. To define a filter on the CI type in the Event Browser, select the **<No Filter>** drop down list or **Manage Event Filters** dialog box.

You can filter events based on the view and CI type. Dashboard for Hadoop consists of the following OOTB filters:

- Filter based on view:
 - Hadoop Topology
- Filters based on CI Type:
 - Hadoop Master Events
 - Hadoop Slave Events

Using Hadoop Dashboard

The **Top View** on BSM or **360⁰ View** on OMi on the dashboard provides the complete topology of the Hadoop cluster and the connected nodes.

The **Hadoop Events Overview** window is the central console for all the events arriving for Hadoop CIs. By default, it displays the events that are filtered, based on the Hadoop Topology view. In the context of an event, the HIs, Actions, and Performance Graphs tabs are refreshed. In the context of an event from the pop-up menu, the operator can drill down into details, launch the graphs for detailed analysis of the problem, and manage events. For more information, see *Event Browser* section in *Business Service Management Operations Manager i Concepts Guide*.

The Watch list tab helps you to configure the most critical CIs.

The **Performance Graphs** tab displays the default graphs and helps in drill down and analysis of the data.

Components

Dashboard for Hadoop consists of the following components:

- Top View/360⁰ View: Provides the top view of the Hadoop topology view.
- Event Summary: Summarizes the number of events arrived for Hadoop elements. The events are filtered based on the Hadoop view.
- Event Browser: Event Browser helps in managing events and for drill down into problems.
- Performance Graphs: Displays graphs for Hadoop, based on the CI selected in the Top View.
- Lean Status Bar: It helps the operator to sort the events by workgroup, assigned to the operator, only Hadoop related events, and infrastructure events.
- Watch list: Watch list shows the status in terms of HIs or KPIs for the configured CIs. You can configure the Watch list by selecting the CIs from the Top View.

For more information on the above components, see the OMi Online Help.

Note: The Out-Of-the-Box (OOTB) components do not include **Watch list** as it needs actual CIs. Customize the Watch list after installing the OMi MP for Hadoop.

Chapter 5: Customization Scenarios

OMi MP for Hadoop can be customized to suit your monitoring requirements. You can edit the existing Hadoop Management Templates or create new Hadoop Management Templates to monitor Hadoop in your environment.

You can customize OMi MP for Hadoop to optimally and seamlessly monitor Hadoop clusters in your environment. OMi MP for Hadoop provides the following customization scenarios:

- Creating Hadoop Management Templates
- Editing Hadoop Management Templates

Creating Hadoop Management Templates

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. In the Configuration Folders pane:

Configuration Folders > BigData Management > Hadoop .

- Select the Hadoop configuration folder and if you need to create a new configuration folder, click
 * The Create Configuration Folder opens.
- 4. Type the name of the new configuration folder and the description. For example, you can type the new configuration folder name as **Test**.
- 5. Click **OK**. The new configuration folder is created.

Configuration Folders > BigData Management > Hadoop > Management Templates >Test.

- 6. In the Management Templates & Aspects pane, select the new configuration folder and click and then click **Management Template**. The Create Management Template wizard opens.
- 7. In the General tab, type a Name for the new Hadoop Management Template. Click Next.
- 8. A Hadoop Management Template enables you to manage Hadoop configuration items and all the

related dependent CIs. Select **Hadoop Topology** from the list as the Topology View. The Hadoop_Topology shows the Hadoop CIs and all the related CI types.

- Select an item in the topology map to select the CI Type of the CIs that this Management Template enables you to manage. This is the type of CI to which the Management Template can be assigned. For example, you can select Hadoop to monitor Hadoop. Click Next.
- In the Aspects tab, add the Aspects to the Management Template. You must add the Hadoop Base Aspect to the new Management Template. The Hadoop Base Aspect contains the config file, open message interface, and scheduled task, and logfile policy templates, which are essential for data collection.

To add an existing Aspect, follow these steps:

- a. Select the Aspect you want to add from the Available Aspects matching the CI Types pane. You can use CTRL or SHIFT key to select multiple Aspects.
- b. Click while to move the Aspect to the Selected Aspects pane. The Aspect is added to the Management Template.
- c. Click Next.
- 11. In the **Parameters** tab, you see a list of all the parameters from the Aspects that you added to this Management Template.

To combine parameters:

- a. Press CTRL and click the parameters that you want to combine.
- c. Type a Name for the combined parameters.
- d. *Optional.* Specify a **Description**, **Default Value**, and whether the combined parameter is **Read Only**, an **Expert Setting**, or **Hidden**.

You can specify either a specific default value, or you can click **From CI Attribute** and then browse for a CI attribute. When you specify a CI attribute, Operations Management sets the parameter value automatically during the deployment of the underlying policy templates, using the actual value of this attribute from the CI. You can also change values of conditional parameters. (The conditions are read-only and cannot be changed at Management Template level.)

Read Only prevents changes to the parameter value when the Management Template is assigned to a configuration item. Hidden also prevents changes, but additionally makes the

parameter invisible when the Management Template is assigned, and during parameter tuning. Users can choose whether to show expert settings when they make an assignment.

e. Click OK.

You can also edit the parameters without combining them, to override the defaults in the Aspects or policy templates. Click one parameter, and then click . The Edit/Combine Parameters dialog box opens.

12. In the Create Management Template wizard, click **Finish** to save the Management Template and close the wizard. The new Management Template appears in the Management Templates & Aspects pane.

Editing Hadoop Management Templates

You can edit the Hadoop Management Templates to modify the following artifacts:

- Parameters
- Aspects

Editing Parameters

Use Case: You are using Essential Hadoop Management Template to monitor Hadoop in a Big Data environment. You are monitoring the service availability of DataNode in the environment and want to modify the corresponding parameters.

To closely monitor the service availability of DataNode in your environment, you must modify the parameter - Frequency of DataNode Availability Scheduler.

1. Open the Management Templates & Aspects pane:

On BSM 9.2x, click Admin > Operations Management > Monitoring > Management Templates & Aspects.

On OMi 10.x, click Administration > Monitoring > Management Templates & Aspects.

2. In the Configuration Folders pane:

Configuration Folders > BigData Management > Hadoop > Management Templates.

- 3. Select the **Essential Hadoop Management Template** from the list, and then click <a>!. The Edit Management Template dialog box opens.
- 4. Click the **Parameters** tab. The list of parameters appear.
- 5. Double-click the **Frequency of DataNode Availability Scheduler** parameter. The Edit/Combine Parameters window appears.
- 6. Select the appropriate value from the drop down list.
- 7. Click **OK**. The Edit Management Template dialog box opens.
- 8. Click **OK**. The version of the Hadoop Management Template is incremented.

Note: The version number of the Hadoop Management Template is incremented when any customizations are made to the Hadoop Management Template.

Chapter A: Data Source and Metrics

The following table provides information about the metrics that are logged into the data source.

Data Source: HADOOP_AVAIL

Class Name	Data Type	Category Type	Metric
HADOOP_NN_ AVA	KEY	UTF8	NN_INSTANCE_NAME
HADOOP_NN_ AVA	GGE	R64	NN_AVAILABILITY
HADOOP_JT_ AVA	KEY	UTF8	JT_INSTANCE_NAME
HADOOP_JT_ AVA	GGE	R64	JT_AVAILABILITY
HADOOP_DN_ AVA	KEY	UTF8	DN_INSTANCE_NAME
HADOOP_DN_ AVA	GGE	R64	DD_AVAILABILITY
HADOOP_TT_ AVA	KEY	UTF8	TT_INSTANCE_NAME
HADOOP_TT_ AVA	GGE	R64	TT_AVAILABILITY
HADOOP_SN_ AVA	KEY	UTF8	SN_INSTANCE_NAME
HADOOP_SN_ AVA	GGE	R64	SN_AVAILABILITY
HADOOP_RM_ AVA	GGE	R64	RM_AVAILABILITY
HADOOP_NM_ AVA	CGE	R64	NM_AVAILABILITY
HADOOP_ RESOURCEMGR	KEY	UTF8	RM_INSTANCE_NAME
HADOOP_ RESOURCEMGR	KEY	UTF8	RM_NODE_NAME

Class Name	Data Type	Category Type	Metric
HADOOP_ RESOURCEMGR	CGE	R64	RM_HEAP_USAGE
HADOOP_ RESOURCEMGR	CGE	R64	RM_GC_TIMESPENT
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_SUBMITTED
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_COMPLETED
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_THGPUT
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_FAILED
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_KILLED
HADOOP_ RESOURCEMGR	CGE	R64	RM_APPS_RUNNING
HADOOP_ RESOURCEMGR	CGE	R64	RM_PROCTIME_AVGTIME
HADOOP_ RESOURCEMGR	CGE	R64	RM_QUETIME_AVGTIME
HADOOP_ RESOURCEMGR	CGE	R64	RM_SENT_BYTES
HADOOP_ RESOURCEMGR	CGE	R64	RM_RECEIVED_BYTES
HADOOP_ RESOURCEMGR	CGE	R64	RM_PENDING_CONT
HADOOP_ RESOURCEMGR	CGE	R64	RM_ALLOCATED_CONT
HADOOP_ NODEMANAGER	KEY	UTF8	NM_INSTANCE_NAME
HADOOP_ NODEMANAGER	KEY	UTF8	NM_NODE_NAME
HADOOP_ NODEMANAGER	CGE	R64	NM_HEAP_USAGE
HADOOP_	CGE	R64	NM_GC_TIMESPENT

Class Name	Data Type	Category Type	Metric
NODEMANAGER			
HADOOP_ NODEMANAGER	CGE	R64	NM_CONT_LAUNCHED
HADOOP_ NODEMANAGER	CGE	R64	NM_CONT_COMPLETED
HADOOP_ NODEMANAGER	CGE	R64	NM_CONT_RUNNING
HADOOP_ NODEMANAGER	CGE	R64	NM_CONT_KILLED
HADOOP_ NODEMANAGER	CGE	R64	NM_CONT_FAILED
HADOOP_ NODEMANAGER	CGE	R64	NM_SENT_BYTES
HADOOP_ NODEMANAGER	CGE	R64	NM_RECEIVED_BYTES
HADOOP_ NODEMANAGER	CGE	R64	NM_QUETIME_AVGTIME
HADOOP_ NODEMANAGER	CGE	R64	NM_PROCTIME_AVGTIME

Data Source: HADOOP_DATA

Class Name	Data Type	Category Type	Metric
HADOOP_NAMENODE	KEY	UTF8	NN_INSTANCE_NAME
HADOOP_NAMENODE	GGE	R64	NN_HEAP_USAGE
HADOOP_NAMENODE	GGE	R64	NN_GC_TIMESPENT
HADOOP_NAMENODE	GGE	R64	NN_FILES_CREATED
HADOOP_NAMENODE	GGE	R64	NN_FILES_DELETED
HADOOP_NAMENODE	GGE	R64	NN_FILES_RENAMED
HADOOP_NAMENODE	GGE	R64	NN_FILES_TOTAL
HADOOP_NAMENODE	GGE	R64	NN_CAPACITY_USED
HADOOP_NAMENODE	GGE	R64	NN_CAPACITY_TOTAL
HADOOP_NAMENODE	GGE	R64	NN_CAPACITY_LOAD

Class Name	Data Type	Category Type	Metric
HADOOP_NAMENODE	GGE	R64	NN_PENDREP_BLOCK
HADOOP_NAMENODE	GGE	R64	NN_UNDERREP_BLOCK
HADOOP_NAMENODE	GGE	R64	NN_BLOCK_CAPACITY
HADOOP_NAMENODE	GGE	R64	NN_BLOCK_CORRUPT
HADOOP_NAMENODE	GGE	R64	NN_BLOCK_MISSING
HADOOP_NAMENODE	GGE	R64	NN_BLOCK_TOTAL
HADOOP_NAMENODE	GGE	R64	NN_BLOCK_EXCESS
HADOOP_NAMENODE	GGE	R64	NN_HEARTBEAT_OPT
HADOOP_NAMENODE	GGE	R64	NN_HRTBEAT_AVGTIME
HADOOP_NAMENODE	GGE	R64	NN_SENT_BYTES
HADOOP_NAMENODE	GGE	R64	NN_RECEIVED_BYTES
HADOOP_JOBTRACKER	KEY	UTF8	JT_INSTANCE_NAME
HADOOP_JOBTRACKER	GGE	R64	JT_HEAP_USAGE
HADOOP_JOBTRACKER	GGE	R64	JT_GC_TIMESPENT
HADOOP_JOBTRACKER	GGE	R64	JT_WAITING_MAPS
HADOOP_JOBTRACKER	GGE	R64	JT_WAITING_REDUCES
HADOOP_JOBTRACKER	GGE	R64	JT_MAPS_LAUNCHED
HADOOP_JOBTRACKER	GGE	R64	JT_MAPS_SLOTS
HADOOP_JOBTRACKER	GGE	R64	JT_MAPSLOT_USE_PER
HADOOP_JOBTRACKER	GGE	R64	JT_REDUCES_LAUNCHED
HADOOP_JOBTRACKER	GGE	R64	JT_REDUCES_SLOTS
HADOOP_JOBTRACKER	GGE	R64	JT_REDSLOT_USE_PER
HADOOP_JOBTRACKER	GGE	R64	JT_BLACKLTD_TRACKERS
HADOOP_JOBTRACKER	GGE	R64	JT_JOBS_SUBMITTED
HADOOP_JOBTRACKER	GGE	R64	JT_JOBS_COMPLETED
HADOOP_JOBTRACKER	GGE	R64	JT_RUNJOB_THGPUT
HADOOP_JOBTRACKER	GGE	R64	JT_JOBS_FAILED

Class Name	Data Type	Category Type	Metric
HADOOP_JOBTRACKER	GGE	R64	JT_HEARTBEAT_OPT
HADOOP_JOBTRACKER	GGE	R64	JT_HRTBEAT_AVGTIME
HADOOP_JOBTRACKER	GGE	R64	JT_SENT_BYTES
HADOOP_JOBTRACKER	GGE	R64	JT_RECEIVED_BYTES
HADOOP_DATANODE	KEY	UTF8	DN_INSTANCE_NAME
HADOOP_DATANODE	GGE	R64	DN_HEAP_USAGE
HADOOP_DATANODE	GGE	R64	DN_GC_TIMESPENT
HADOOP_DATANODE	GGE	R64	DN_READS_LCLIENT
HADOOP_DATANODE	GGE	R64	DN_READS_RCLIENT
HADOOP_DATANODE	GGE	R64	DN_READ_BLK_OPTN
HADOOP_DATANODE	GGE	R64	DN_READ_OPR_THGPUT
HADOOP_DATANODE	GGE	R64	DN_READ_BLK_AVGTIME
HADOOP_DATANODE	GGE	R64	DN_WRITES_LCLIENT
HADOOP_DATANODE	GGE	R64	DN_WRITES_RCLIENT
HADOOP_DATANODE	GGE	R64	DN_WRITE_BLK_OPTN
HADOOP_DATANODE	GGE	R64	DN_WRITE_OPR_THGPUT
HADOOP_DATANODE	GGE	R64	DN_WRITE_BLK_AVGTIME
HADOOP_DATANODE	GGE	R64	DN_HEARTBEAT_OPT
HADOOP_DATANODE	GGE	R64	DN_HRTBEAT_AVGTIME
HADOOP_DATANODE	GGE	R64	DN_SENT_BYTES
HADOOP_DATANODE	GGE	R64	DN_RECEIVED_BYTES
HADOOP_DATANODE	GGE	R64	DN_DFS_USED
HADOOP_DATANODE	GGE	R64	DN_CAPACITY
HADOOP_DATANODE	GGE	R64	DN_REMAINING
HADOOP_TASKTRACKER	KEY	UTF8	TT_INSTANCE_NAME
HADOOP_TASKTRACKER	GGE	R64	TT_HEAP_USAGE
HADOOP_TASKTRACKER	GGE	R64	TT_GC_TIMESPENT

Class Name	Data Type	Category Type	Metric
HADOOP_TASKTRACKER	GGE	R64	TT_TASKFAIL_TIMEOUT
HADOOP_TASKTRACKER	GGE	R64	TT_SENT_BYTES
HADOOP_TASKTRACKER	GGE	R64	TT_RECEIVED_BYTES

Eventable Metrics in Hadoop

Metric_ID	Metric_Name
10001	NameNode_HeapMemoryUsage
10002	NameNode_GC_TimeSpent
10007	NameNode_CapacityUsedGB
10009	NameNode_PendingReplicationBlocks
10010	NameNode_UnderReplicatedBlocks
10012	NameNode_CorruptBlocks
10013	NameNode_MissingBlocks
10016	NameNode_HeartBeatOperations
10020	JobTracker_HeapMemoryUsage
10021	JobTracker_GC_TimeSpent
10028	JobTracker_BlackListedTrackers
10032	JobTracker_HeartBeatOperations
10036	DataNode_HeapMemoryUsage
10037	DataNode_GC_TimeSpent
10046	DataNode_HeartBeatOperations
10050	DataNode_DfsUsed
10053	TaskTracker_HeapMemoryUsage
10054	TaskTracker_GC_TimeSpent
21000	RM_HEAP_USAGE

Metric_ID	Metric_Name
21001	RM_GC_TIMESPENT
20C06	RM_APPS_THGPUT
20000	NM_HEAP_USAGE
20001	NM_GC_TIMESPENT

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Feedback on User Guide (OMi Management Pack for Hadoop 1.10)

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