HPE Operations Agent

Software Version: 12.03

For the Windows®, HP-UX, Linux, Solaris, and AIX operating systems

Concepts Guide

Hewlett Packard Enterprise

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This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

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Chapter 1: Introduction

HPE Operations Agent helps you to monitor a system by collecting metrics that indicate the health, performance, resource utilization and availability of essential elements of the system. With its embedded data collector, HPE Operations Agent continuously collects performance and health data across your system and stores the collected data in the Metrics Datastore.

When you use the HPE Operations Agent in conjunction with HPOM, Operations Manager i (OMi), Performance Manager and Performance Dashboard you can add the capability to monitor business applications, infrastructure (system resources) as well as application workloads running on the monitored systems. HPE Operations Agent consolidates fault and enables performance monitoring across IT application infrastructure by enabling:

- **Operations Management** - HPE Operations Agent consolidates events and performance data from heterogeneous sources
- **Performance Management** - HPE Operations Agent identifies performance issues and provides real time diagnostic capabilities

The following diagram provides you an overview of the functioning of the HPE Operations Agent in a network environment:
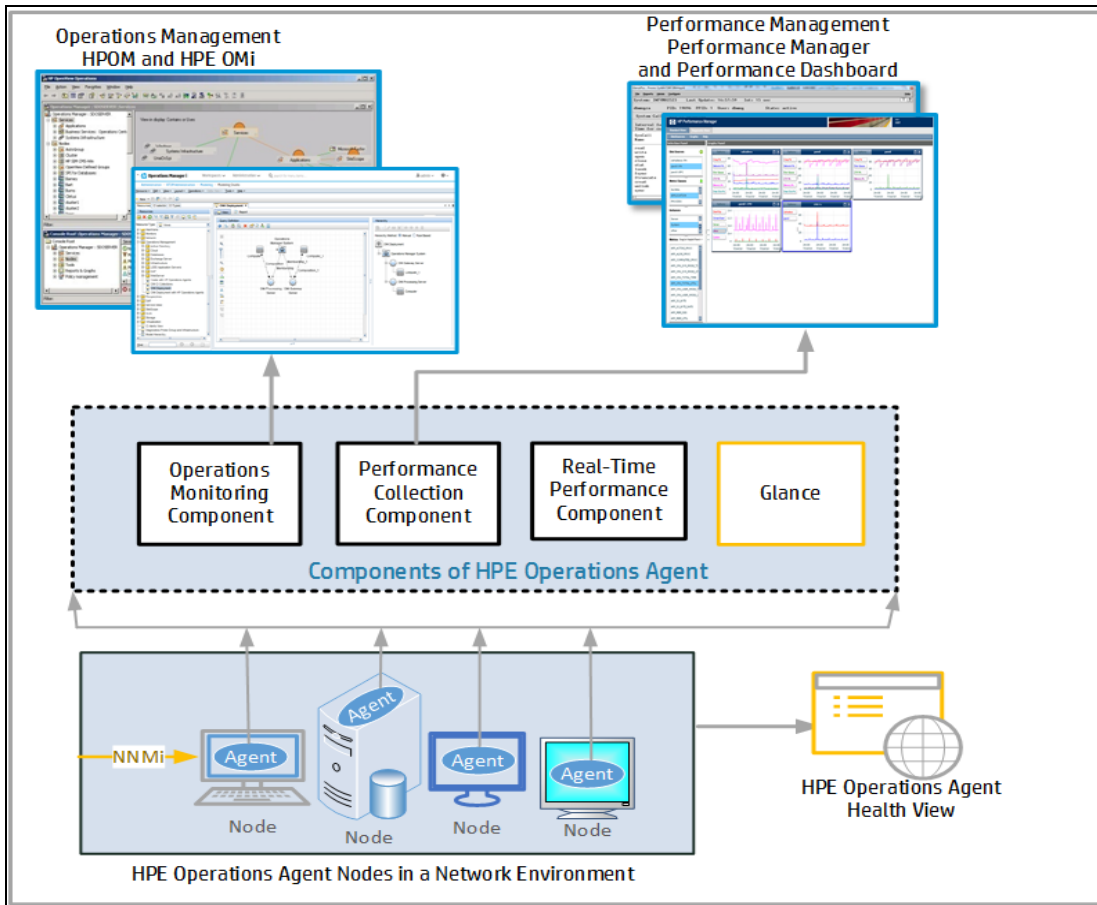
Interactive image - Click on each component to view more information.
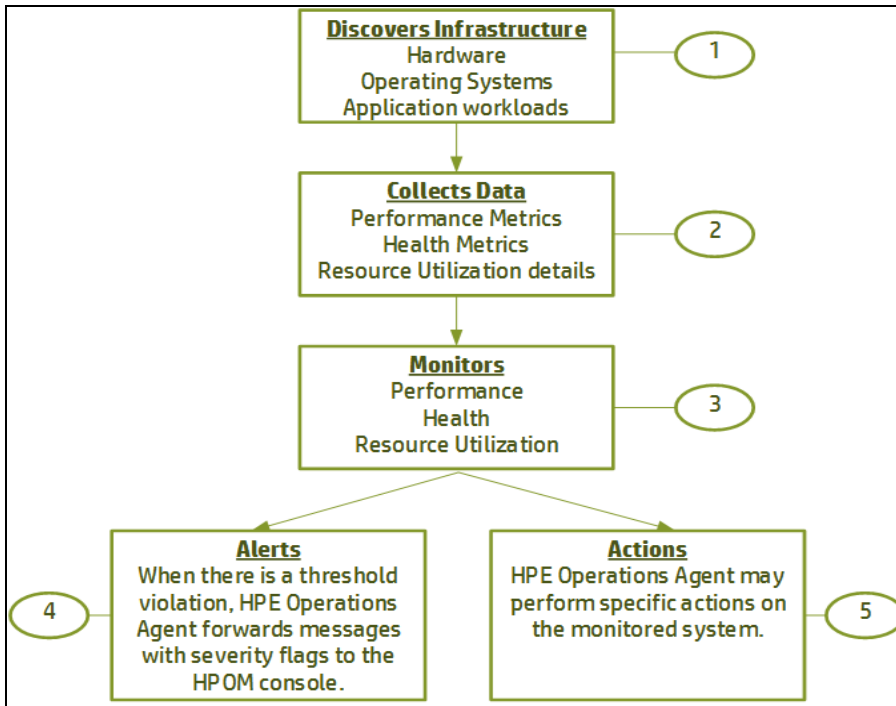
Working with HPE Operations Agent

The HPE Operations Agent functions in the following sequence:

```
Interactive image - Click on each component to view more information.
```

1. **Discovers Infrastructure:** After HPE Operations Agent is installed and configured on a system, it discovers infrastructure elements such as hardware (CPU, Disk and the like), operating systems and application workloads.

2. **Data Collection:** HPE Operations Agent starts collecting and logging system performance data. The collected system parameters are stored in the agent's datastore in the form of metrics. You can configure HPE Operations Agent to modify the default collection schedule and the range of metrics it stores.

3. **Monitoring:** Based on the specifications in the deployed policies, HPE Operations Agent compares the values of metrics with preset values.

4. **Alerting:** In the event of threshold violation, HPE Operations Agent forwards messages with severity flags to the HPOM console to notify you about the performance bottlenecks on the monitored system.

5. **Actions:** HPE Operations Agent performs specific pre-configured actions on the monitored system.

Chapter 2: Monitoring with HPE Operations Agent

Based on your requirement, you can install the HPE Operations Agent to monitor both performance and health of a system or one of the following:

- Centralized Health Monitoring
- Performance Monitoring

Centralized Health Monitoring

The management concept of HPOM is based on communication between a management server and managed nodes. After installing HPE Operations Agent in an HPOM-based management environment, you can monitor and manage systems and applications deployed in your network environment from a central console. With the help of policies deployed from the HPOM console on the agent node, you can enable different monitoring capabilities of the agent.

HPE Operations Agent collects a rich set of system performance metrics, processes events, and then forwards relevant information to the HPOM console in the form of messages. HPOM responds to these messages with actions to either prevent or correct problems on the managed nodes.

With the help of SPIs, you can collect important metrics on the application workloads running on the monitored system. The combination of system performance and application metrics enables you to perform a well-rounded study of the health and performance of hardware and software assets.

> **Note:** HPE Operations Agent nodes use the HTTPS mode of communication to communicate with each other as well as with the management servers. For more information, see the chapter *HPE Operations Agent in a Secure Environment* in the *HPE Operations Agent User Guide* and the chapter *Configuring the HPE Operations Agent in a Secure Environment* in the *HPE Operations Agent and HPE Operations Smart Plug-ins for Infrastructure Installation Guide.*

For more information on policies and SPIs, see the following documentation:

- *HPE Operations Smart Plug-in for System Infrastructure User Guide*
- *HPE Operations Smart Plug-in for Cluster Infrastructure User Guide*
- *HPE Operations Smart Plug-in for Virtualization Infrastructure User Guide*

Performance Monitoring

When HPE Operations Agent is not managed by HPOM, HPE Operations Agent continuously collects performance data across your system and stores the collected data in the datastore.

You can use the utility such as `ovcodautil` or the `extract` program to extract the collected data. For more information about the `extract` program, see the *HPE Operations Agent User Guide*. You can integrate the HPE Operations Agent with data analysis tools such as the HP Performance Manager or HP Reporter to analyze the data with the help of graphs and reports.

Metrics

A metric is a measurement that defines a specific operational or performance characteristic of a system (or application). The collection mechanism of the HPE Operations Agent collects these measurements and stores them in the datastore for future use. Metric values can be numbers, Boolean values, strings, and so on.

Metric Classes

A set of related metrics that give a complete picture of the performance of a system element are represented in the agent's datastore as metric classes.

The HPE Operations Agent uses the following metric classes:

1. **Global:** HPE Operations Agent collects data from all instances of a resource. For a multi instance resource, HPE Operations Agent aggregates the metric values of all the instances, and then logs the aggregated (average) value under the Global class. Metrics of this class are prefixed with GBL_.

2. **Process:** Includes the metrics related to all the processes running on the monitored system. Metrics of this class are prefixed with PROC_.

3. **Application:** HPE Operations Agent provides you with a mechanism to define applications that are actually collections of multiple processes that run on the monitored system. After you define them in the HPE Operations Agent configuration, the application class includes the metrics related

to all the predefined applications running on the monitored system. Metrics of this class are prefixed with APP_.

4. **Disk:** Includes the metrics related to the disk of the monitored system. Metrics of this class are prefixed with BYDSK_.

5. **Network Interface:** Includes the metrics related to all the network interfaces available on the monitored system. Metrics of this class are prefixed with BYNETIF_.

6. **CPU:** Includes the metrics related to all the CPUs available on the monitored system. Metrics of this class are prefixed with BYCPU_.

7. **Core CPU:** Includes all the metrics that indicate the per core values of a CPU on a hyper threading enabled system. Metrics of this class are prefixed with BYCORE_.

8. **File System:** Includes the metrics related to all the file systems available on the monitored system. Metrics of this class are prefixed with FS_.

9. **Logical System:** You can install the HPE Operations Agent on a virtual system. This class of metrics includes all the metrics that indicate the performance of the logical elements (elements of the guest systems) of the host system. Metrics of this class are prefixed with BYLS_.

10. **Logical Volume:** Includes all the metrics related to the logical volumes of the monitored system. Metrics of this class are prefixed with LV_.

11. **Transaction:** Includes the metrics related to all the system transactions performed on the monitored system. Metrics of this class are prefixed with TT_.

12. **HBA**: Includes the metrics related to all the host bus adapters (HBA) running on the monitored system. Metrics of this class are prefixed with BYHBA_.

Baselining

The monitoring and alerting capability of HPE Operations Agent is enhanced with baselining. Baselining is a process to compute and provide reference values based on the historical data[1] stored in the metric datastore. To compute baseline data for a specific time period, metric data collected at corresponding time periods from previous weeks is used. Baseline data is computed at the end of every hour and is stored in the metrics datastore. Baseline data includes minimum, maximum, average, and standard deviation values.

Baseline data is used to:

- Provide reference values to monitor daily performance.

- Provide reference values to analyze performance trends.

- Dynamically set optimal threshold values to analyze the pattern of resource utilization.

Using the Baseline Data with Smart Plug-ins for Infrastructure (Infrastructure SPIs)

> **Note:**
>
> Infrastructure SPI 11.1x (AdaptiveThresholding) policies will work with HPE Operations Agent version 12.03.
>
> Infrastructure SPI 12.03 (AdaptiveThresholding) policies will not work with HPE Operations Agent version 11.xx.

Data collected by the HPE Operations Agent's data collector is used to compute the baseline data. Baseline data is used by the InfraSPI policies: SI-ConfigureBaselining policy and SI-AdaptivethresholdingMonitor policy, to monitor performance and resource utilization.

SI-ConfigureBaselining policy and SI-AdaptivethresholdingMonitor policy use the concept of adaptive thresholding to set optimal threshold values. Adaptive threshold helps to dynamically calculate the threshold values. Alert messages are generated whenever there is a threshold violation.

For more information, see the HPE Operations Agent *User Guide*.

Metric Streaming

HPE Operations Agent enables you to log custom metrics into the Metrics Datastore along with the default system performance metric classes.

With the HPE Operations Agent 12.01, custom and system performance metrics are also available for streaming by using the Metric Streaming functionality. You can configure metric streaming by using the **Metric Streaming Configuration** policy.

How it works:

Metric Streaming enables you to stream metrics data to a target subscriber (For example: Performance Engine) and use the data for graphing and analysis. You can submit data to **hpsensor** and deploy the **Metric Streaming Configuration** policy from the HPE Operations Manager i (OMi) to the HPE Operations Agent to stream metrics data.

REST based interface is provided to submit data to **hpsensor**. **hpsensor** will publish the submitted data to the target subscriber at a configured interval. Before submitting data to **hpsensor**, you must post registration information to **hpsensor** using the REST API provided.

For more information about Logging Custom Data and how to use the Metric Streaming functionality, see the *HPE Operations Agent User Guide*.

[1]Historical Data is the data collected till the previous hour and stored in the metric datastore.

Chapter 3: Components of the HPE Operations Agent

HPE Operations Agent includes the following major operational components:

- Operations Monitoring

- Performance Collection

- Real-Time Measurement

- Real-Time Metric Access

- GlancePlus
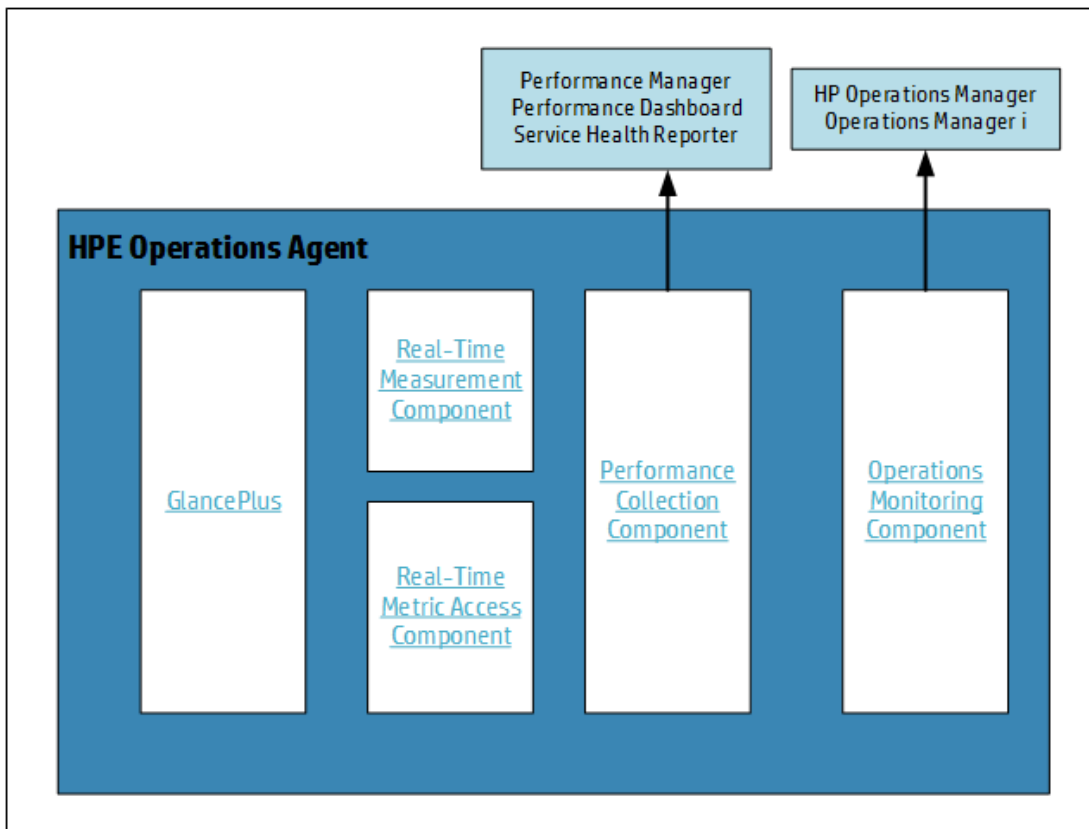
Interactive image - Click on each component to view more information.

Operations Monitoring Component

You can use this component only if you use the HP Operations OS Inst Adv SW LTU and HP Ops OS Inst to Realtime Inst LTU.

The Operations Monitoring Component builds up the monitoring and messaging functionality of HPE Operations Agent. With the Operations Monitoring Component, you can perform the following tasks:

- Monitor the data collected by data collectors against predefined thresholds
- Generate alert messages when the monitored metrics violate preset thresholds
- Forward the messages to the HPOM console

The Operations Monitoring Component consists of the following components:
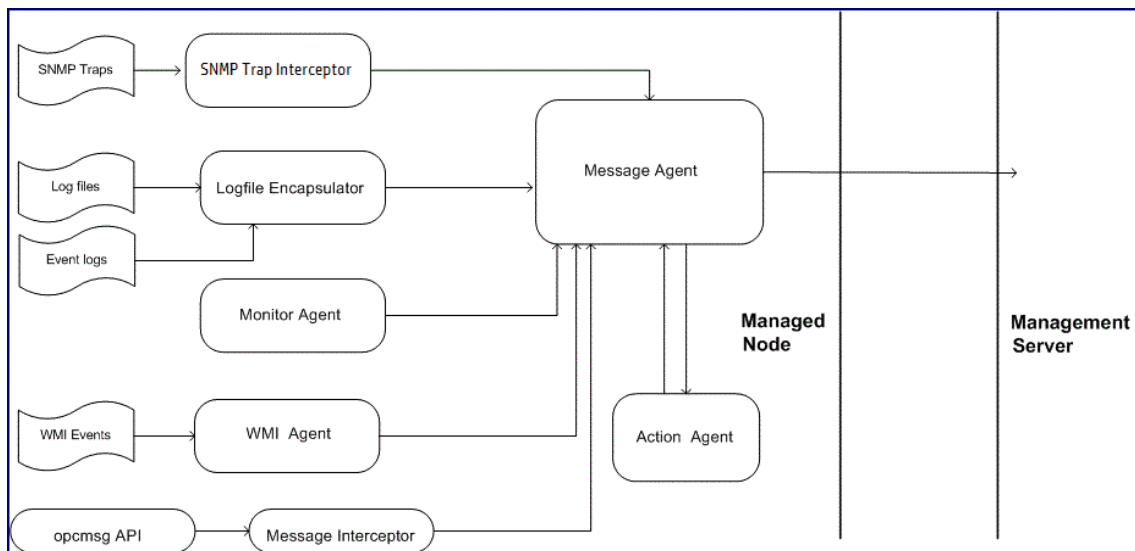
Message Agent - The message agent receives messages from different message sources such as the monitor agent, log file encapsulator, and event interceptor. It then sends appropriate alerts and notifications to the HPOM message browser.

SNMP Trap Interceptor - The SNMP trap interceptor intercepts the SNMP traps generated on a node or from an application. It integrates or suppresses the events based on policies and triggers the message agent to send the SNMP traps to the HPOM message browser.

Logfile Encapsulator - The logfile encapsulator component analyzes different log files, which are generated by the operating system or an application running on the node.

Based on the information available with the Logfile Entry policies available on the node, the logfile encapsulator scans the available log files for specific messages or patterns. When the message string or pattern is matched, the logfile encapsulator sends the message to the message agent, which sends appropriate notifications to the HPOM message browser.

Monitor Agent - At regular intervals, the monitor agent evaluates the data obtained from different sources (monitored objects) against pre-defined thresholds and sends appropriate messages to the message agent in the event of threshold violation.

WMI Interceptor - The WMI interceptor enables you to communicate with remote nodes (or the local node) using the Windows Management Instrumentation (WMI).

With the Windows Management Interface type of policies, you can instruct the HPE Operations Agent to monitor WMI classes and instances available locally or on a remote system. Based on the conditions set in the policy, the WMI interceptor can generate appropriate messages or initiate actions.

Message Interceptor - The message interceptor component performs additional processing tasks on the messages that arrive from the `opcmsg` utility and different APIs. Based on the configuration details set in the message interceptor policies available on the managed node, the message interceptor can take the following actions:

- Filter messages

- Discard the message

- Forward the message to the HPOM console

Action Agent - The action agent receives instructions from the management server or the message agent and then starts an action on the local node. Actions are classified into Automatic and Operator initiated. Automatic actions are pre-configured, message-linked responses to events that are triggered as soon as an event is generated. Operator initiated actions are pre-configured, message-linked responses to events that are triggered by an operator.

Discovery Agent - The discovery agent helps the HPE Operations Agent gather the details of the services running on the managed node and store the collected details in the local datastore.

Performance Collection Component

You can use Performance Collection Component only if you use the HP Operations OS Inst Adv SW LTU, Glance Pak Software LTU, HP Operations OS Inst Perf SW LTU, and HP Ops OS Inst to Realtime Inst LTU.

At the core of the HPE Operations Agent is the Performance Collection Component, which helps you collect performance metrics from the node and store the collected information in the datastore. The

performance data collector— **oacore** —helps you collect system performance metrics at regular intervals. You can configure the type of data to be collected, and the collection interval. The *performance alarm* feature of the Performance Collection Component enables you to generate events based on predefined conditions.

Data Collection using oacore

The performance data collector–**oacore**– gathers a large set of system performance metrics, which present a wide view of the health and performance of the system. The collected information is stored in the datastore and is available on the system for analysis and use with tools such as the HP Performance Manager and HP Reporter. The data collector captures the following information:

- System-wide resource utilization information

- Process data

- Performance data for different devices

- Transaction data

- Logical systems data

The Collection Parameters file or the **parm** file contains instructions for the data collector to collect specific types of data and defines the data collection interval. This is an ASCII file that you can use to customize the default data collection mechanism. For more information see *HPE Operations Agent User Guide.*

Metrics Datastore

With the HPE Operations Agent version 12.03, Metrics Datastore replaces the log file based datastore. Multiple datastores such as CODA, SCOPE, and DSI log files have been consolidated into a single Relational Database Management System (RDBMS) based datastore.

The CODA and Scope processes (`scopeux` on UNIX and Linux nodes and `scopent` on Windows nodes) are consolidated into a single process called **oacore** process. The **oacore** process provides both read and write interface for system performance and custom data.

Old data stored in the CODA database files, SCOPE log files and the DSI log files are retained in read-only mode. You can access the old data through utilities such as `ovcodautil`, extract, or through reporting tools such as HP Performance Manager and HP Reporter.

The following figure gives an overview of the new architecture of HPE Operations Agent:
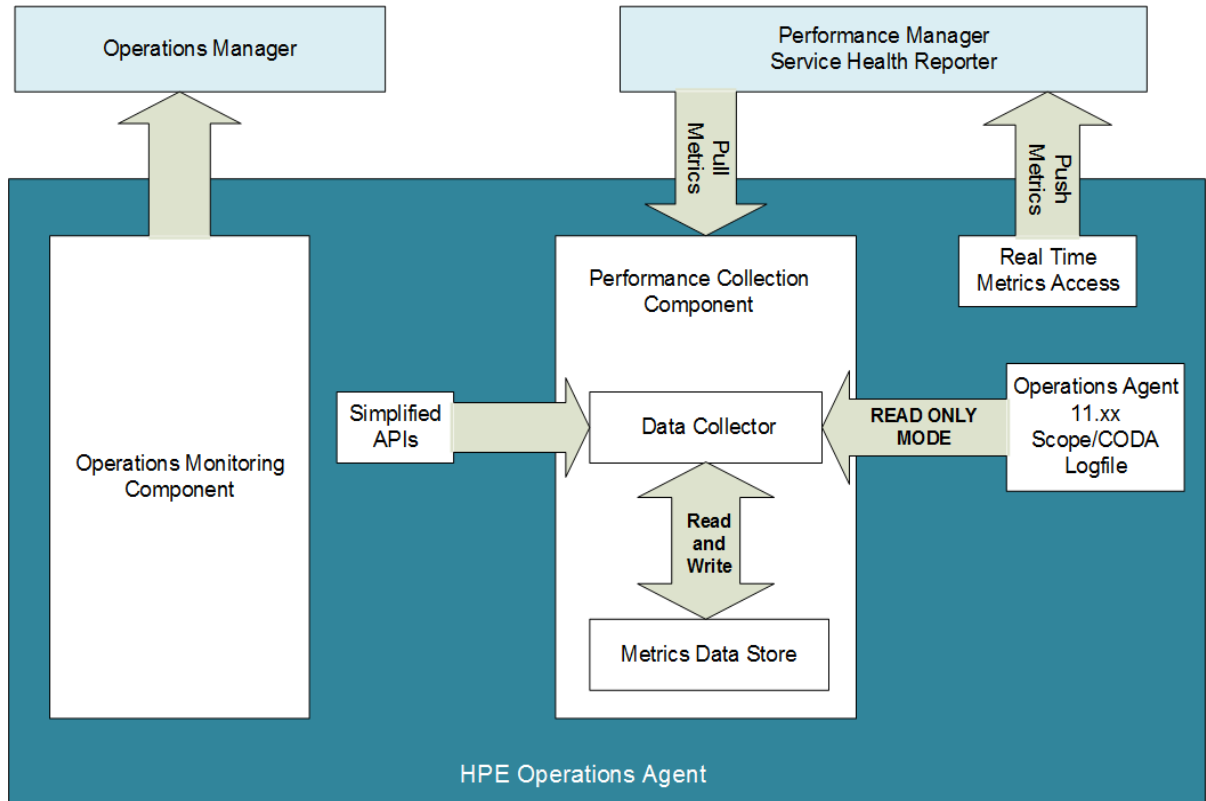
```
Interactive image - Click on each component to view more information.
```

Despite the change in data storing and data collection mechanism, threshold comparison process through policies remains the same.

GlancePlus

You can use this component only if you use the Glance Pak Software LTU and Glance Software LTU. This component is available only on UNIX nodes.

HP GlancePlus is a powerful online real-time system performance monitoring and diagnostic tool. It also enables you to identify and troubleshoot system performance problems as they occur on the local or a remote system. GlancePlus provides an option to drill down to the root of a problem and enables you to visualize the problems that occurred on the system.

For example, if the CPU utilization is found to be above the threshold value for a long period of time, you can look at a list of all the applications running, and then identify the process with the highest CPU utilization from the process list. Furthermore, you can see the threads associated with the particular process and drill down to the actual thread that consumes the most amount of the CPU resource.

Real-Time Measurement Component

You can use this component only if you use the HP Ops OS Inst to Realtime Inst LTU.

The Real-Time Measurement (RTM) component helps you to access real-time performance metrics over the secure HTTPS mode of communication while communicating with different nodes using the RTMA component. In the absence of this component, you can use the RTMA component only through TCP/IP.

Real-Time Metric Access Component

You can use this component only if you use the HP Ops OS Inst to Realtime Inst LTU, Glance Pak Software LTU, or Glance Software LTU.

The Real-Time Metric Access (RTMA) component provides you with real-time access to system performance metrics, locally or remotely. The central module of the RTMA component— the performance daemon (perfd)—starts by default when you start the HPE Operations Agent and facilitates accessing system performance metrics on a real-time basis. From a central HPE Operations Agent node, you can monitor the real-time performance metrics of other nodes where the RTMA component is available.

Chapter 4: HPE Operations Agent in a Virtualization Environment

You can use HPE Operations Agent to monitor the health and performance of a virtual system, as well as the physical system that hosts the virtual system. HPE Operations Agent supports the following virtualization technologies:

- **Complete virtualization** - HP Integrity Virtual Machines (Integrity VM)

- **Paravirtualization** - AIX Logical Partitions (LPAR)

- **OS-level virtualization** - Solaris Zones, AIX Workload Partitions (WPAR)

HPE Operations Agent in the Integrity VM Environment

The integrity VM environment includes the following major components:

- VM Hosts

- Virtual machines (guests)

When you install the HPE Operations Agent on the VM Host, you can collect the following data:

- System-wide performance, application, transaction, and resource usage data

- Performance and resource usage data for individual virtual machines

- Performance and resource data for individual guest operating systems (logged with the BYLS metric class)

All the information that you can collect from the HPE Operations Agent installed on a physical system, can be collected when HPE Operations Agent is installed on a virtual machine hosted on a VM Host.

HPE Operations Agent with AIX

HPE Operations Agent supports paravirtualization on AIX Logical Partitions (LPAR). You can collect performance data from all AIX LPARs available on a single frame by installing the HPE Operations

Agent on only one LPAR node. You can also configure the agent to collect performance data from the AIX frame where all the monitored LPARs reside.

The log **logicalsystems** parameter in the **parm** file enables HPE Operations Agent's data collector to record information about the logical systems to the datastore. In AIX, logical system is supported on LPAR on AIX 5L V5.3 ML3 and later and WPAR on AIX 6.1 TL2 in Global environment only.

HPE Operations Agent with Solaris Zones

A virtualization environment on a Solaris (10 or higher) server is made up of the following components:

- Global zone: The default zone of the system, which also acts as the system-wide administration console.

- Non-global zones: Non-global zones are logical entities created on the Solaris system. A logical system is equivalent of a guest system.

You can install the HPE Operations Agent on both the global and non-global zones. On the global zone, HPE Operations Agent can log resource utilization data using individual zones against the BYLS metric class. HPE Operations Agent deems a non-global zone as a single physical system and logs the data indicating health and performance of the zone.

Chapter 5: Monitoring the Health of HPE Operations Agent using the HPE Operations Agent Health View

HPE Operations Agent Health View is a health monitoring tool that provides a quick overview of the health of HPE Operations Agent. In a large environment with multiple managed nodes, if HPE Operations Agent Health View is enabled on agent nodes, it helps to identify and troubleshoot issues quickly.

HPE Operations Agent Health View provides the following:

- A central consolidated view or the dashboard view that provides an overview about the health of the HPE Operations Agent.

- Node view that provides health and performance status of individual nodes. You can view the details of resource utilization in the form of graphs.

- Process view that provides resource utilization, health, and policy parameter details of the HPE Operations Agent processes.

HPE Operations Agent Health View helps to identify and troubleshoot issues quickly in an environment with multiple managed nodes. For more information, see the *HPE Operations Agent User Guide - Health View*.

Chapter 6: Integration with Other HPE Software Products

You can integrate HPE Operations Agent with other HPE Software products to view and analyze the data collected by the HPE Operations Agent or the data stored in the HPE Operations Agent's datastore.

HPOM

The Operations Monitoring Component of the HPE Operations Agent provides you with the ability to integrate an agent node with the HPOM management server to create a distributed monitoring environment. For more information, see *HPE Operations Agent Installation Guide.*

HPE Operations Manager i (HPE OMi)

When you use the HPE Operations Agent in conjunction with HPE OMi, you can add the capability to monitor business applications running on monitored systems. Metrics gathered by HPE Operations Agent is used by HPE OMi to generate and display graphs, charts, and tables for events. HPE Operations Agent sends alerts to centralized console and enables HPE OMi to attach an action to an event.

Performance Dashboard Component of HPE OMi:

Performance Dashboard component of HPE OMi uses data collected by the HPE Operations Agent and enables you to create and customize dashboards for configuration item types (CITs) that you are monitoring. The custom dashboards help you evaluate the performance of monitored entities and analyze usage trends.

HPE OMi Management Packs

OMi Management Packs are used to increase the monitoring capabilities of the HP OMi. The availability and performance metrics are stored in the datastore of the HPE Operations Agent which is consumed by reporting (HPE Operations Bridge Reporter) and graphing (Performance Manager i) solutions.

HP Reporter

HP Reporter can create detailed reports in multiple formats from the data collected by the HPE Operations Agent. For information on the operation and the discovery feature of HP Reporter, see the *HP Reporter Concepts Guide.*

HP Performance Manager

You can use HP Performance Manager to view and analyze the data available with the datastore of the HPE Operations Agent in the form of graphs and charts.

If you purchase the additional license for the Real-Time Measurement (RTM) component of the HPE Operations Agent and if you use the Diagnostic View feature of HP Performance Manager 9.00, you can monitor real-time metric data (along with the historical data) gathered from different nodes.

HPE Operations Bridge Reporter (HPE OBR)

HPE OBR is a cross-domain historical infrastructure performance reporting solution. It collects data from the agent datastore and stores it in its own datastore. HPE OBR uses JCodaAccess APIs provided by the HPE Operations Agent to collect data. Data collected from the agent datastore is used for capacity planning and performance and health analysis.

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