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Hitachi Converged Adapter for VMware vCenter Operations Manager 2.0

HCA for vC Ops Administration Manual

Hitachi Data Systems

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Contents

Preface

This book explains how to install and use version 2.0 of **Hitachi Converged Adapter for VMware vCenter Operations Manager (HCA for vC Ops)**.

Intended audience

This book is intended for VMware system administrators who want to use vC Ops to monitor UCP. For an understanding of the technology involved, see *UCP Administration Manual*.

Product version

This guide applies to HCA for vC Ops version 2.0.

Document organization

This book contains four chapters.

Chapter/Appendix	Description
Chapter 1, "Introduction," on page 1	Contains an overview of the HCA for vC Ops.
Chapter 2, "Installation," on page 5	Covers the information needed to install and configure the HCA for vC Ops.
Chapter 3, "Sample dashboards," on page 9	Discusses the sample dashboards that are added to vC Ops
Chapter 4, "Storage performance metrics," on page 17	Explains the storage-specific metrics that are displayed by the HCA for vC Ops.

UCP document set

The following documents contain information about HCA for vC Ops version 2.0:

- *HCA for vC Ops Administration Manual* — Contains technical and usage information for HCA for vC Ops.
- *HCA for vC Ops Third-Party Copyrights and Licenses* — Contains copyright and license information for the third-party software distributed with or embedded in HCA for vC Ops.

Getting help

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- The circumstances surrounding the error or failure
- The exact content of any returned messages

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Include the document title, number, and revision, and refer to specific sections and paragraphs whenever possible.

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1

Introduction

This chapter contains an overview of HCA for vC Ops.

HCA for vC Ops overview

Many datacenters that use vCenter also use vCenter Operations Management Suite (vC Ops) to monitor the performance, health, relationship, risk, and capacity characteristics of their virtual environment. HCA for vC Ops is used to integrate hardware information collected by UCP Director, the software that is used to manage UCP, into vC Ops.

This enables vC Ops to be aware of the hardware that is used to power the virtual infrastructure. It also helps to bring clarity to the interactions between the virtual and physical infrastructures. The analytics in vC Ops can also be used to help plan for future capacity needs and determine where bottlenecks are or find the root cause of a system failure.

HCA for vC Ops is an embedded adapter. It uses a pull model to collect information from UCP Director through the UCP Director API regarding the resources managed by UCP Director. HCA for vC Ops can only collect information from one instance of UCP Director, and each instance of UCP Director is configured to manage only one UCP site.

If more than one HCA for vC Ops is loaded, data from each instance of UCP Director will be retrieved. To restrict dashboard data to display information from only a single instance of UCP, use the vC Ops dashboard filtering feature.

All information collected by HCA for vC Ops is displayed in the vC Ops custom UI.

Resources

HCA for vC Ops begins to collect resource information from UCP Director immediately after it is configured. Depending on the type of UCP rack you use, HCA for vC Ops will collect the resource information as indicated in the following table.

Resource	UCP Single-Rack	UCP Multi-Rack
Chasis	✓	✓
Server	✓	✓
Converged switches	✓	
Converged switch ethernet ports	✓	
Converged switch FC ports	✓	
Converged switch FCoE ports	✓	
Storage system	✓	✓
Storage pools	✓	✓
Storage ports	✓	✓
Storage volumes	✓	✓
Storage parity groups	✓	✓
Storage physical devices	✓	✓
Storage processors	✓	✓
Ethernet switches		✓
Ethernet switch ports		✓
Fibre channel switches		✓
Fibre channel switch ports		✓

Alerts

UCP Director regularly receives SNMP events from its associated hardware components. Events in UCP Director are retained according to the retention policy set in vCenter. HCA for vC Ops uses the UCP Director API to collect hardware-related events from UCP Director. This information is then presented to vC Ops.

This enables you to take advantage of vC Ops data analysis algorithms to analyze the health, performance, and utilization status of UCP resources. Because it takes time to build up a history of the data, vC Ops monitors the

hardware for a bit to determine a baseline before it begins to trigger resource alerts. Please refer to VMware documentation for further information on configuring alerts.

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Installation

This contains an overview of the installation process, a list of the requirements in order to install HCA for vC Ops, and the steps involved in installing it.

Installation overview

HCA for vC Ops is distributed through VMware's third-party adapter distribution system. To download it, download the **ucp_vCOPs_adapter-2.pak** file from the VMware website.

After downloading HCA for vC Ops, you can install it in the same way that other vC Ops adapters are installed. For more information on installing a vC Ops adapter, see VMware vC Ops documentation.

After installing HCA for vC Ops, you will need to configure it to access the UCP Director instance that you want it to receive data from. Each HCA for vC Ops is able to receive data from only one UCP site. To receive data from additional sites, you will need to register additional instances of HCA for vC Ops for each site.

When first installed, HCA for vC Ops will add several sample dashboards to vC Ops. The sample dashboards are only added during a new installation of HCA for vC Ops. If you install another version of HCA for vC Ops it will not overwrite any sample dashboards that are present. Sample dashboards are only added on subsequent installs if they have been deleted.

Requirements

Before installing HCA for vC Ops, make sure that UCP and vC Ops are installed and functioning properly.

Configuring HCA for vC Ops

After installing HCA for vC Ops, you will need to configure it for the instance of UCP Director that it will connect to. To configure HCA for vC Ops:

1. Open the vCenter Operations Manager custom UI.
2. Move the mouse over **Environment > Configuration** and then click on the **Adapter Instances** link.
3. Double-click on HCA for vC Ops.
4. On the **Edit Adapter Instance** dialog:
   - In the **Collector** field, select the vCenter Operations server.
   - In the **Adapter Kind** field, select HCA for vC Ops.

- In the **Adapter Instance Name** field, type the name that you want to use to identify HCA for vC Ops.

- In the **UCP Management URL** field, type the URL of the UCPManagement VM.

- In the **Credential** field, select the credentials to use if they are present or, if not, click on the Add button. If you need to add credentials:

    1. In the **Adapter Kind** field, select HCA for vC Ops.

    2. In the **Credential Kind** field, select **UCP Credentials**.

    3. In the **Instance Name** field, type the name that you will assign to the credentials.

    4. In the **Username** field, type the domain and username of the user that has access.

    5. In the **Password** field, type the password associated with the designated username.

    6. Click on the **OK** button.

5. To test the configuration, click on the Test button, and then click on the **OK** button when done.

6. Click on the **OK** button.

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Sample dashboards

This chapter explains the sample dashboards that are added to vC Ops when HCA for vC Ops is installed.

Sample dashboard overview

When first installed, HCA for vC Ops populates vC Ops with several sample dashboards. This is done to simplify viewing inventory, utilization, performance, and heatmap data regarding UCP components.

Some of the provided sample dashboards are designed specifically for administrators that use a specific type of UCP rack, either single-rack or multi-rack, while other sample dashboards can be used on both rack types.

Depending on the type of UCP rack you use, use only the sample dashboards indicated in the following table which correspond to your rack type.

Sample Dashboard	UCP Single-Rack	UCP Multi-Rack
Inventory Dashboards		
UCP Converged Network	✓	
UCP Network		✓
UCP Storage		✓
Utilization Dashboards		
UCP Converged Network Utilization	✓	
UCP Network Utilization		✓
UCP Storage Utilization	✓	✓
Performance Dashboards		
UCP Converged Network Performance	✓	
UCP Converged Storage Performance	✓	
UCP Network Performance		✓
UCP Storage Performance		✓
Heatmap Dashboards		
UCP Converged Heatmaps	✓	
UCP Heatmap		✓

The metrics that are included by default on the dashboards may or may not reflect the hardware components that are in UCP. Because of this, you may need to customize the dashboards to best suit your needs.

The sample dashboards that are populated by HCA for vC Ops are standard vC Ops dashboards. You can clone, edit, or customize them as needed. When customizing a dashboard with metrics from UCP Director, only those metrics for your hardware components that have been configured properly will appear. For example, to see storage metrics, both HDvM and Tuning Manager need to be configured properly. Additionally, not all storage performance metrics apply to all storage system models. If the metric is not supported by your storage system, it will not appear in the vC Ops list of available metrics.

The following sections detail the sample HCA for vC Ops dashboards.

For more information on storage metrics, see Chapter 4, “Storage performance metrics,” on page 17.

Inventory dashboards

HCA for vC Ops comes with the following sample inventory dashboards:

- For multi-racks, **UCP Network** and **UCP Storage**
- For single-racks, **UCP Converged Network**

These dashboards are used to display the Ethernet and storage system inventory, and their respective component relationships. Each of these dashboards contain the following widgets:

- **Resources** – Lists all of the resources of the corresponding type. When selecting a resource, the **Metric Sparklines** widget will display state information for the selected resource.
- **Metric Selector** – Shows all of the metrics that are related to the selected resource. Selecting a metric will display corresponding performance data in the **Metric Graph** widget.
- **Metric Sparklines** – Displays numeric and graphical values for some of the metrics related to the selected resource.
- **Metric Graph** – Graphically displays recent performance related to a selected metric.
- **Relationship** – Shows the health of the selected resource, as well as the health of all parent and child resources. Selecting a resource highlights it, as well as all resources that it is directly or indirectly connected to. For example, selecting an Ethernet switch port will also highlight the

corresponding Ethernet switch, as well as the corresponding server and host system. Only those resources that are related to the selected resource are displayed.

Utilization dashboards

HCA for vC Ops comes with the following sample utilization dashboards:

- For multi-racks, **UCP Network Utilization** and **UCP Storage Utilization**
- For single-racks, **UCP Converged Network Utilization** and **UCP Storage Utilization**

These dashboards are used to display the utilization characteristics of the Ethernet and storage system components.

The **Network Utilization** dashboards display utilization characteristics for the following metrics:

- For Ethernet switches:
  - CPU Usage
  - Memory Usage
- For Ethernet switch ports:
  - Broadcast Receive Count
  - Data Receive Rate
  - Data Transmit Rate
  - Broadcast Transmit Count

The **Storage Utilization** dashboards display utilization characteristics for the following metrics:

- For storage pools:
  - Current Subscription Percentage
  - Used Percentage

- For the storage system:
  - Cache Memory Usage Percentage
  - Free Space
- For the storage port: Average Transfer Rate
- For the storage volume: Used Percentage

Beneath each metric is a history widget. To populate the history widget and display history for the associated metric, click on the metric to select it.

Performance dashboards

HCA for vC Ops comes with the following sample performance dashboards:

- For multi-racks, **UCP Network Performance** and **UCP Storage Performance**
- For single-racks, **UCP Converged Network Performance** and **UCP Converged Storage Performance**

These dashboards are used to display the performance characteristics of the Ethernet and storage system components.

The **Network Performance** dashboards display performance characteristics for the following metrics for Ethernet switch ports:

- Packets Received Count
- Receive Packets Dropped Count
- Packet Receive Errors Count
- Packets Transmitted Count
- Transmit Packets Dropped Count
- Packet Transmit Errors Count
- Unicast Receive Count
- Unicast transmit Count

The **Storage Performance** dashboards display performance characteristics for the following metrics:

- For storage volumes:
  - Read I/O Rate (IOPS)
  - Write I/O Rate (IOPS)
  - Read Hit Percentage
  - Write Hit Percentage
  - Read Response Rate (micro sec)
  - Write Response Rate (micro sec)
- For the storage system:
  - Cache Write Pending Percentage
  - Processor Busy Percentage
- For the storage system ports: Average I/O Rate (IOPS)

The **UCP Converged Network Utilization** sample dashboard for Single Rack displays performance metrics for:

- Converged Switch Ethernet Ports
- Converged Switch FC Ports
- Converged Switch FCoE Ports

Heatmap dashboards

HCA for vC Ops comes with the following sample Heatmap dashboards:

- For multi-racks, **UCP Heatmaps**
- For single-racks, **UCP Converged Heatmaps**

The sample **UCP Heatmaps** dashboard is used to display the performance information for UCP components using vC Ops heatmap widget. This dashboard displays heatmap performance information for the following metrics:

- For the Ethernet switches:
  - CPU Usage (%)
  - Memory Usage (%)
- For the Ethernet switch ports:
  - Data Receive Rate (Mbps)
  - Data Transmit Rate (Mbps)
- For the storage system:
  - Cache Memory Usage (%)
  - Cache Write Pending (%)
- For storage system pools:
  - Used Percentage
  - Current Subscription Percentage
- For the storage volumes: Used Percentage

The **UCP Converged Heatmaps** sample dashboard for single-racks displays performance metrics for all the metrics supported by the **UCP Heatmaps** sample dashboard plus the following:

- Converged Switch FC Ports
- Converged Switch FCoE Ports.

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Storage performance metrics

This section lists the storage-related metrics that are reported by HCA for vC Ops.

Storage system

The following are the performance metrics for the storage system:

- **Physical Space (Bytes)** – Total physical capacity of the storage system.
- **Reserved Space (Bytes)** – Total physical capacity of the reserved volumes. For example, volumes allocated (designated) to the storage pool will be regarded as reserved volumes.
- **Free Space (Bytes)** – The amount of pool space available for data write activity. Each HCA for vC Ops instance will represent exactly one storage system. So if only one site is registered, only one storage system will be shown with this metric. This shows the collective amount of free space from all pools within a storage system.
- **Allocated Space (Bytes)** – Total virtual capacity of volumes that are connected to hosts.
- **Unallocated Space (Bytes)** – Total virtual capacity of volumes that are not connected to hosts.
- **Cache Memory Usage Percent** – High utilization of microprocessor utilization on the storage system is actually a good thing. If the cache is well used, it means the storage system's microprocessor is keeping up with host demands. Cache is used in a way that helps the hosts with read/write activity.
- **Cache Memory Usage (%)** – Of the cache memory in the storage system, the amount that is being used (MB).
- **Cache Write Pending (MB)** – Amount of cache memory that is being used by write-pending data (MB).
- **Cache Write Pending (%)** – Percentage of cache memory that is being used by write-pending data.

Storage pools

The following are the performance metrics for storage pools in Hitachi storage systems:

- **Read Response Rate (Microseconds)** – Average processing time (in microseconds) per read request for the pool.

- **Write Response Rate (Microseconds)** – Average processing time (in microseconds) per write request for volumes mapped to the pool.
- **Read IO Rate (IOPS)** – Frequency of read operations (times per second) for volumes mapped to the pool.
- **Write IO Rate (IOPS)** – Frequency of write operations (times per second) for volumes mapped to the pool.
- **Capacity (Bytes)** – The physical capacity of the pool. Typically constant, dependent on the capacity of the pool volumes (provisioned from parity groups) that are allocated to the pool.
- **Subscribed Capacity (Bytes)** – The subscribed capacity of the pool as determined by the capacity of the virtual volumes in the pool, regardless of whether or not they've been assigned to hosts.
- **Used Capacity (Bytes)** – The amount of physical capacity that currently has data written to it.
- **Current Subscription Percentage** – Configured to represent from 0-200% by default. As a result, a default HUS-VM oversubscription rate of 130% would appear a little past the middle of the bar graph.
- **Used Percentage** – The amount of disk space actually consumed by write I/O activity. Designed to claim a red status when usage consumes 60% of physical quantity of storage in a pool (regardless of oversubscription rate). This may or may not be the same as the threshold that is set in the storage system, which vC Ops would also use as a basis for displaying this metric with a red status.
- **Subscription Limit Percentage** – A constant value that is configured through the storage element manager. The default value for HUS is 13%, but is adjustable. There is no default value preconfigured for VSP or HUS-VM.

Storage volumes

The following are the performance metrics for storage pools in Hitachi storage systems:

- **Random Total I/O Rate** – Frequency of random operations (times per second).

- **Random Total Transfer Rate** – Data transfer rate of random operations (megabytes per second).
- **Read Hit Percentage** – Cache hit rate for read operations.
- **Read I/O Rate** – Read frequency (times per second).
- **Read Response Rate** – Average processing time per read request (microseconds).
- **Read Transfer Rate** – Read data transfer rate (megabytes per second).
- **Sequential Total I/O Rate** – Frequency of sequential operations (times per second).
- **Sequential Total Transfer Rate** – Data transfer rate of sequential operations (megabytes per second).
- **Total Response Rate** – Average processing time per read and write request (microseconds).
- **Write Hit Percentage** – Cache hit rate for write operations.
- **Write I/O Rate** – Write frequency (times per second).
- **Write Response Rate** – Average processing time per write request (microseconds).
- **Write Transfer Rate** – Write data transfer rate (megabytes per second).
- **Total Capacity** – The subscribed capacity of a volume, which is the total amount that is presented to hosts. Hosts can use this entire quantity for creating partitions and formatting as logical volumes. Even if a volume is in an over-provisioned pool, a host can allocate this entire capacity, and the storage system will allocate the actual physical capacity as needed.
- **Used Capacity** – Updated every 24 hours, this tracks the allocated capacity from pools to thin provisioned volumes. This is not the same as the used capacity from the perspective of a host.
- **Used Percentage** – The percentage of the total volume size that currently has data written to it. The overprovisioning rate on the pool does not affect this measurement.

Parity groups

The following are the performance metrics for parity groups in Hitachi storage systems:

- **Busy Percentage** – An expression of parity group usage.
- **Random Read I/O Percentage** – Percentage of the total number of read and write operations that are random read operations.
- **Random Read I/O Rate (IOPS)** – Frequency of random read operations (times per second).
- **Random Read Transfer Rate (MBps)** – Data transfer rate of random read operations (megabytes per second).
- **Random Read Transfer Percentage** – Percentage of the total amount of transfers that are random read operations.
- **Random Total I/O Rate (IOPS)** – Frequency of random operations (times per second).
- **Random Total Transfer Rate (MBps)** – Data transfer rate of random operations (megabytes per second).
- **Random Write I/O Percentage** – Percentage of the total number of read and write operations that are random write operations.
- **Random Write I/O Rate (IOPS)** – Frequency of random write operations (times per second).
- **Random Write Transfer Percentage** – Percentage of the total amount of transfers that are random write operations.
- **Random Write Transfer Rate (MBps)** – Data transfer rate of random write operations (megabytes per second).
- **Read Hit Percentage** – Cache hit rate for read operations.
- **Read I/O Percentage** – Percentage of the total number of read and write operations that are read operations.
- **Read I/O Rate (IOPS)** – Read frequency (times per second).

- **Read Transfer Percentage** – Percentage of the total amount of transfers that are read operations.
- **Read Transfer Rate (MBps)** – Data transfer rate of read operations (megabytes per second).
- **Sequential Read I/O Percentage** – Percentage of the total number of read and write operations that are sequential read operations.
- **Sequential Read I/O Rate (IOPS)** – Frequency of sequential read operations (times per second).
- **Sequential Read Transfer Percentage** – Percentage of the total amount of transfers that are sequential read operations.
- **Sequential Read Transfer Rate (MBps)** – Data transfer rate of sequential read operations (megabytes per second).
- **Sequential Total I/O Rate (IOPS)** – Frequency of sequential operations (times per second).
- **Sequential Total Transfer Rate (MBps)** – Data transfer rate of sequential operations (megabytes per second).
- **Sequential Write I/O Percentage** – Percentage of the total number of read and write operations that are sequential write operations.
- **Sequential Write I/O Rate (IOPS)** – Frequency of sequential write operations (times per second).
- **Sequential Write Transfer Percentage** – Percentage of the total amount of transfers that are sequential write operations.
- **Sequential Write Transfer Rate (MBps)** – Data transfer rate of sequential write operations (megabytes per second).
- **Write Hit Percentage** – Cache hit rate for write operations
- **Write Hit I/O Percentage** – Cache hit rate for write operation to the parity group.
- **Write I/O Percentage** – Percentage of the total number of read and write operations that are write operations.
- **Write I/O Rate (IOPS)** – Write frequency (times per second).

- **Write Transfer Percentage** – Percentage of the total amount of transfers that are write operations.
- **Write Transfer Rate (MBps)** – Data transfer rate for write operations (megabytes per second).

Storage physical devices

The following are the performance metrics for physical devices in Hitachi storage systems:

- **Average Tag Count** – Average number of commands accumulated in the command queue of the drive.
- **Busy Percentage** – Drive usage.

Storage ports

The following are the performance metrics for storage ports in Hitachi storage systems:

- **Average I/O Rate (IOPS)** – Average read and write frequency (times per second) for storage system ports.
- **Average Transfer Rate (MBps)** – The average transfer rate of all data being transferred through the storage system port out of the total bandwidth of the port. The speed of the connected HBA ports do not affect the total speed shown for the storage system port.

Storage processor

The following is the performance metric for the storage processor in a Hitachi storage system:

- **Processor Busy Percentage** – The percentage of the processor used for storage-related tasks, such as read, write, and cache processing.

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