

Hitachi Infrastructure Management Pack for VMware Operations

v02.11.0

User's Guide

This document describes main functions and system prerequisites, and it provides installation and environment configuration instructions for the operation of Hitachi Infrastructure Management Pack for VMware Operations.

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Preface

This document describes the main functions, system prerequisites, installation and environment configuration procedures, and operation of Hitachi Infrastructure Management Pack for VMware Operations. It also includes troubleshooting information for issues that may occur while using Hitachi Infrastructure Management Pack for VMware Operations.

This document does not describe how to configure the vSphere environment or the Hitachi storage system management software, both of which are required prior to using Hitachi Infrastructure Management Pack for VMware Operations. To complete the prerequisite system configuration, contact your vSphere environment administrator, Hitachi storage system management software administrator, or your VM administrator.

Please read this document carefully to understand how to use this product, and maintain a copy for your reference.



Note: The use of Hitachi Infrastructure Management Pack for VMware Operations and all other Hitachi Vantara products is governed by the terms of your agreements with Hitachi Vantara LLC.

Product Version

This document supports Hitachi Infrastructure Management Pack for VMware Operations v02.11.0.

Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document. Release notes are available on the Hitachi Vantara documentation website: <https://docs.hitachivantara.com>.

Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10 ³) bytes
1 megabyte (MB)	1,000 KB or 1,000 ² bytes
1 gigabyte (GB)	1,000 MB or 1,000 ³ bytes
1 terabyte (TB)	1,000 GB or 1,000 ⁴ bytes
1 petabyte (PB)	1,000 TB or 1,000 ⁵ bytes
1 exabyte (EB)	1,000 PB or 1,000 ⁶ bytes

Logical capacity values (for example, logical device capacity, cache memory capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KB Open-systems: <ul style="list-style-type: none"> ▪ OPEN-V: 960 KB ▪ Others: 720 KB
1 KB	1,024 (2 ¹⁰) bytes
1 MB	1,024 KB or 1,024 ² bytes
1 GB	1,024 MB or 1,024 ³ bytes
1 TB	1,024 GB or 1,024 ⁴ bytes
1 PB	1,024 TB or 1,024 ⁵ bytes
1 EB	1,024 PB or 1,024 ⁶ bytes

Storage model abbreviations

This document uses the following abbreviations for storage models.

Abbreviation	Full name
VSP family	Hitachi Virtual Storage Platform family

Abbreviation	Full name
	Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP E series ▪ VSP F series ▪ VSP G series ▪ VSP N series ▪ VSP 5000 series
VSP E series	Hitachi Virtual Storage Platform E series Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP E590 ▪ VSP E790 ▪ VSP E990 ▪ VSP E1090 ▪ VSP E590H ▪ VSP E790H ▪ VSP E1090H
VSP E590	Hitachi Virtual Storage Platform E590
VSP E790	Hitachi Virtual Storage Platform E790
VSP E990	Hitachi Virtual Storage Platform E990
VSP E1090	Hitachi Virtual Storage Platform E1090
VSP E590H	Hitachi Virtual Storage Platform E590H
VSP E790H	Hitachi Virtual Storage Platform E790H
VSP E1090H	Hitachi Virtual Storage Platform E1090H
VSP F series	Hitachi Virtual Storage Platform F series Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP F350 ▪ VSP F370

Abbreviation	Full name
	<ul style="list-style-type: none"> ▪ VSP F700 ▪ VSP F900 ▪ VSP F400 ▪ VSP F600 ▪ VSP F800 ▪ VSP F1500
VSP Fx00 models	Hitachi Virtual Storage Platform Fx00 models Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP F350 ▪ VSP F370 ▪ VSP F700 ▪ VSP F900 ▪ VSP F400 ▪ VSP F600 ▪ VSP F800
VSP F350	Hitachi Virtual Storage Platform F350
VSP F370	Hitachi Virtual Storage Platform F370
VSP F700	Hitachi Virtual Storage Platform F700
VSP F900	Hitachi Virtual Storage Platform F900
VSP F400	Hitachi Virtual Storage Platform F400
VSP F600	Hitachi Virtual Storage Platform F600
VSP F800	Hitachi Virtual Storage Platform F800
VSP F1500	Hitachi Virtual Storage Platform F1500
VSP G series	Hitachi Virtual Storage Platform G series

Abbreviation	Full name
	Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP G350 ▪ VSP G370 ▪ VSP G700 ▪ VSP G900 ▪ VSP G200 ▪ VSP G400 ▪ VSP G600 ▪ VSP G800 ▪ VSP G1000 ▪ VSP G1500
VSP Gx00 models	Hitachi Virtual Storage Platform Gx00 models Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP G350 ▪ VSP G370 ▪ VSP G700 ▪ VSP G900 ▪ VSP G200 ▪ VSP G400 ▪ VSP G600 ▪ VSP G800
VSP G350	Hitachi Virtual Storage Platform G350
VSP G370	Hitachi Virtual Storage Platform G370
VSP G700	Hitachi Virtual Storage Platform G700
VSP G900	Hitachi Virtual Storage Platform G900
VSP G200	Hitachi Virtual Storage Platform G200

Abbreviation	Full name
VSP G400	Hitachi Virtual Storage Platform G400
VSP G600	Hitachi Virtual Storage Platform G600
VSP G800	Hitachi Virtual Storage Platform G800
VSP G1000	Hitachi Virtual Storage Platform G1000
VSP G1500	Hitachi Virtual Storage Platform G1500
VSP N series	Hitachi Virtual Storage Platform N series Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP N400 ▪ VSP N600 ▪ VSP N800
VSP N400	Hitachi Virtual Storage Platform N400
VSP N600	Hitachi Virtual Storage Platform N600
VSP N800	Hitachi Virtual Storage Platform N800
VSP 5000 series	Hitachi Virtual Storage Platform 5000 series Collective name for the following storage models: <ul style="list-style-type: none"> ▪ VSP 5100 ▪ VSP 5200 ▪ VSP 5500 ▪ VSP 5600 ▪ VSP 5100H ▪ VSP 5200H ▪ VSP 5500H ▪ VSP 5600H
VSP 5100	Hitachi Virtual Storage Platform 5100
VSP 5200	Hitachi Virtual Storage Platform 5200
VSP 5500	Hitachi Virtual Storage Platform 5500
VSP 5600	Hitachi Virtual Storage Platform 5600

Abbreviation	Full name
VSP 5100H	Hitachi Virtual Storage Platform 5100H
VSP 5200H	Hitachi Virtual Storage Platform 5200H
VSP 5500H	Hitachi Virtual Storage Platform 5500H
VSP 5600H	Hitachi Virtual Storage Platform 5600H
VSP One Block	Hitachi Virtual Storage Platform One Block Collective name for the following storage models: <ul style="list-style-type: none"> ▪ Hitachi Virtual Storage Platform One Block 24 ▪ Hitachi Virtual Storage Platform One Block 26 ▪ Hitachi Virtual Storage Platform One Block 28
VSP One B20	Hitachi Virtual Storage Platform One Block 20 Collective name for the following storage models: <ul style="list-style-type: none"> ▪ Hitachi Virtual Storage Platform One Block 24 ▪ Hitachi Virtual Storage Platform One Block 26 ▪ Hitachi Virtual Storage Platform One Block 28
VSP One SDS Block	Hitachi Virtual Storage Platform One SDS Block

Accessing product documentation

Product user documentation is available on: <https://docs.hitachivantara.com>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

The [Hitachi Vantara Support Website](#) is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to the Hitachi Vantara Support Website for contact information: https://support.hitachivantara.com/en_us/contact-us.html.

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Comments

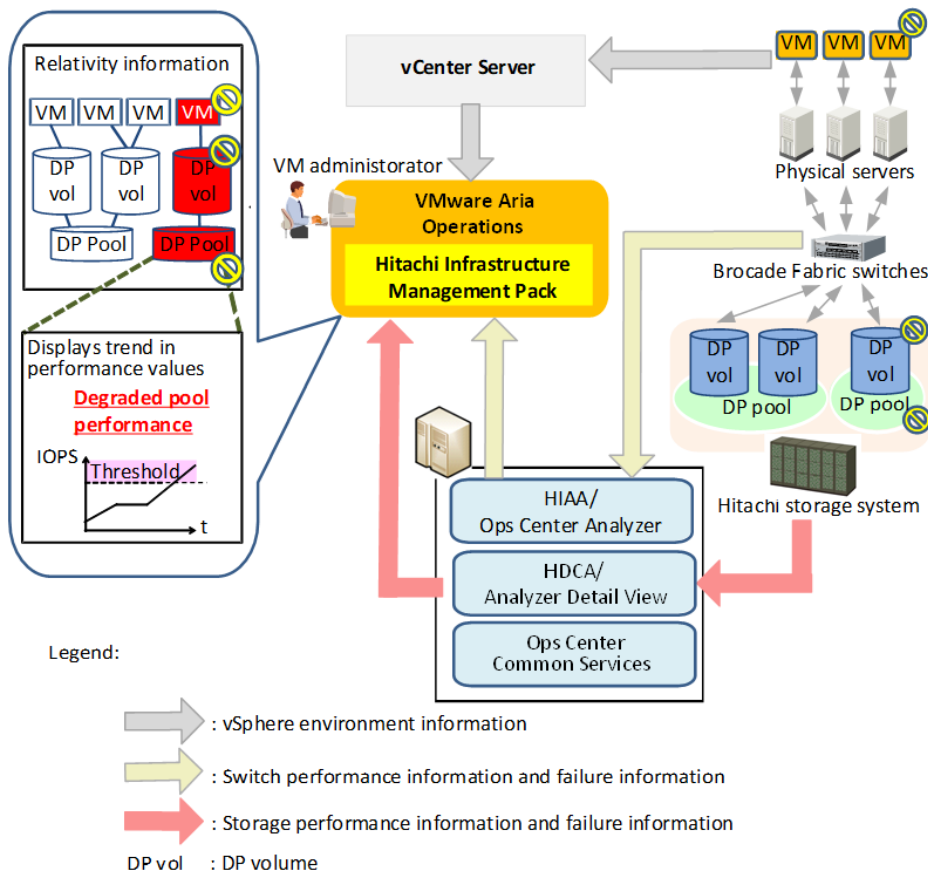
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Thank you!

Chapter 1: Overview

Hitachi Infrastructure Management Pack for VMware Operations (Hitachi Infrastructure Management Pack) is an embedded adapter for VMware Aria Operations. There are two types of adapters: Hitachi Storage Adapter, which collects information about Hitachi storage systems, and Hitachi Network Adapter, which collects network information. Both adapters store the collected information in VMware Aria Operations.

In VMware Aria Operations, you can visualize the stored data by using tools such as the VMware Aria Operations dashboard. An overview of this product is shown below.



- Displays the relationships between virtual systems and storage system resources, and between virtual systems and the Brocade Fabric switch.

You can check the relationships among Hitachi storage systems that are used in the same environment as objects in a vSphere environment, and the relationships among Brocade Fabric switches that are used in the same environment as objects in a vSphere environment.

- Displays performance information and resource performance degradation.

You can check for bottlenecks and performance problems related to Hitachi storage systems and the Brocade Fabric switch if degradation and problems occur in the vSphere environment.

- Displays alerts when a failure occurs on a Hitachi storage system or a Brocade Fabric switch.

Note: The procedures described in this manual are based on the procedures in VMware Aria Operations 8.18.

From v10.0.0, the names of Hitachi Infrastructure Analytics Advisor components were changed as follows:

Old name	New name
Hitachi Infrastructure Analytics Advisor (HIAA)	Hitachi Ops Center Analyzer (Ops Center Analyzer)
Hitachi Data Center Analytics (HDCA)	Hitachi Ops Center Analyzer Detail View (Analyzer Detail View)
Analytics probe server	Analyzer probe server

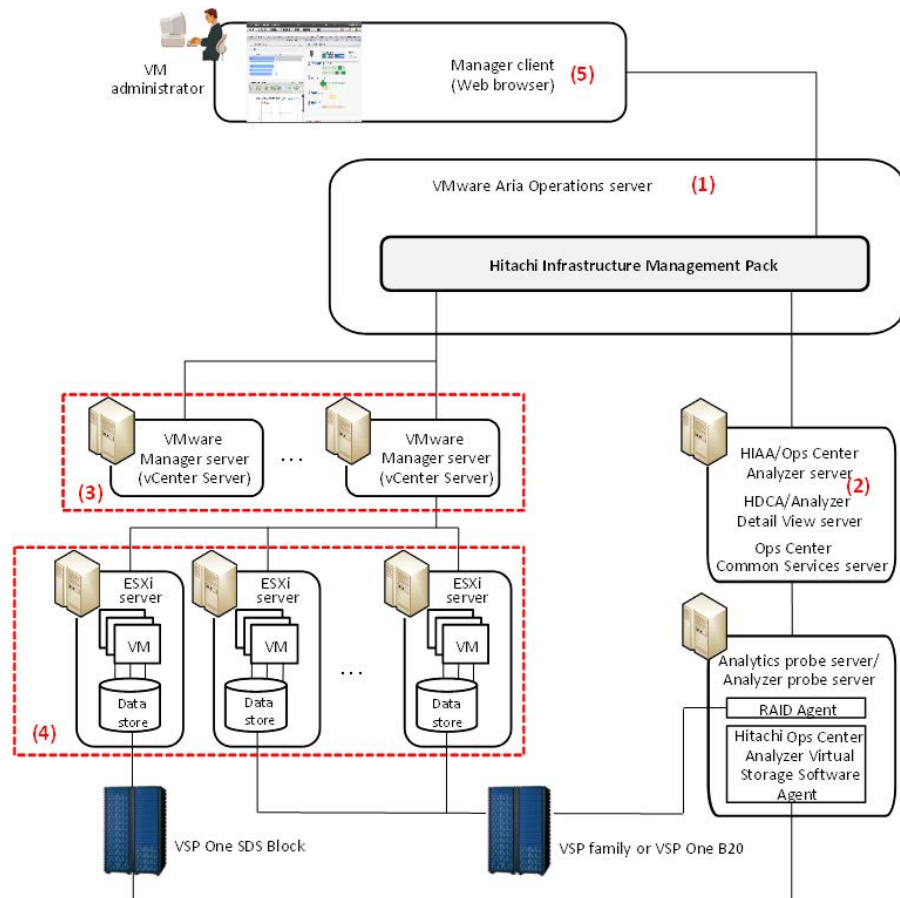
Old product names are not displayed in the GUI and messages. If you are using Hitachi Infrastructure Analytics Advisor, replace the new names in the GUI and messages with the old names.

Chapter 2: System Requirements

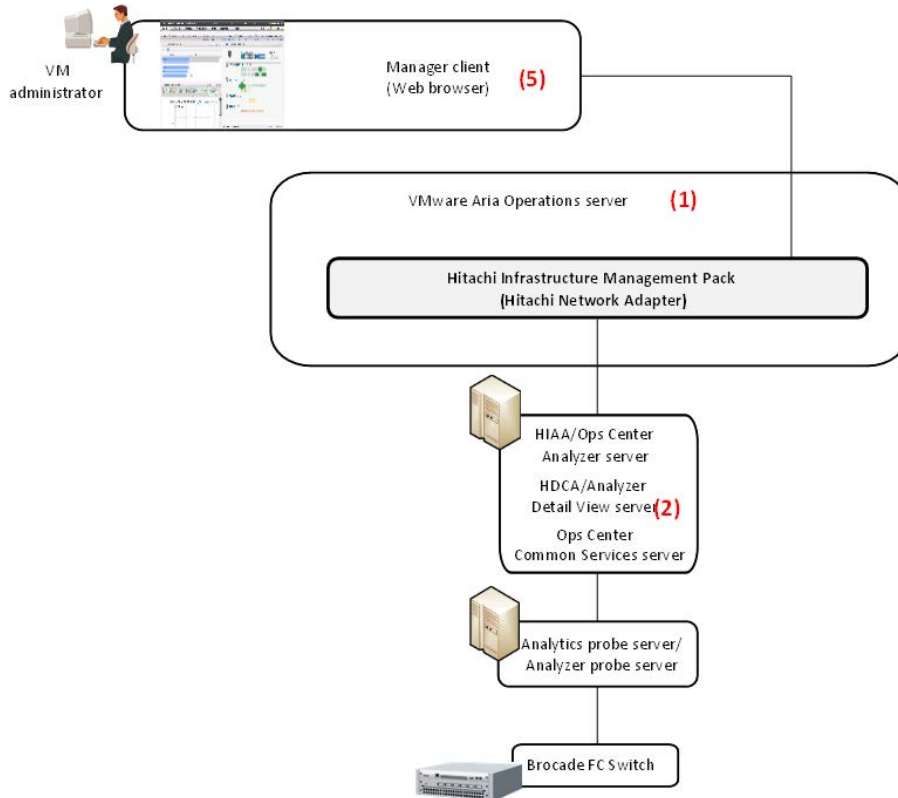
System configuration

A typical system configuration for Hitachi Infrastructure Management Pack contains the major components shown in the figure below.

Hitachi Storage Adapter system configuration



Hitachi Network Adapter system configuration



Major components

1. VMware Aria Operations

VMware Aria Operations consists of one or more nodes. Hitachi Infrastructure Management Pack runs on the master node or a data node.

2. Hitachi Infrastructure Analytics Advisor/Hitachi Ops Center Analyzer (Ops Center Analyzer), Hitachi Ops Center Common Services

Hitachi Data Center Analytics (HDCA)/Hitachi Ops Center Analyzer Detail View (Analyzer Detail View) processes performance and configuration data collected from software probes connected to monitored devices. HIAA/Ops Center Analyzer uses that data to provide end-to-end performance analysis, troubleshooting, and reporting. Ops Center Common Services performs user authentication by linking with Active Directory or the LDAP server, and uses the Single Sign-On function to connect to the Ops Center Analyzer server or the Analyzer Detail View server.

3. vCenter Server

vCenter Server manages multiple ESXi servers. By registering vCenter Server in VMware Aria Operations, the virtual environment object information managed by vCenter Server can be referenced by VMware Aria Operations.

4. ESXi Servers

ESXi servers manage multiple VMs and datastores. Hitachi Infrastructure Management Pack is able to associate datastores with Dynamic Provisioning Volumes and physical LDEVs.

5. Management Client (usable in a web browser)

Management Client (usable in a web browser) provides a user interface for monitoring collected storage device performance information.

Network

The network configuration among the components and servers requires a LAN (Ethernet)-enabled environment that uses Internet Protocol Version 4 (IPv4). Internet Protocol Version 6 (IPv6) is not supported.

Hardware requirements

Hitachi Infrastructure Management Pack supports the hardware described below.

Ensure that each hardware component in your system configuration meets the specified requirements.

VMware Aria Operations

For details about hardware requirements for VMware Aria Operations and recommendations related to sizing, check the following website:

<https://kb.vmware.com/s/article/2093783>

In addition to the hardware requirements for VMware Aria Operations, Hitachi Infrastructure Management Pack requires free hard disk space to accommodate the log files it generates. Make sure you consider the size of these logs when determining the size for your VMware Aria Operations configuration.

- Default log size: 0.2 GB
- Maximum log size: 25 GB



Note: We do not recommend that you modify the default settings for log file size and number of log generations. If necessary, you can modify them in the maintenance configuration file. See [Modifying the maintenance configuration file \(on page 180\)](#).

If there is not enough free hard disk space available for VMware Aria Operations, create more free disk space by setting a shorter retention period for the performance data or by adding a disk.

Hitachi Ops Center

For details about the hardware requirements for HIAA/Ops Center Analyzer, HDCA/Analyzer Detail View, and Ops Center Common Services, see the *Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide*, the *Hitachi Ops Center Analyzer Installation and Configuration Guide*, or the *Hitachi Ops Center Installation and Configuration Guide*.

vCenter Server

The hardware requirements for the vCenter server are the same as the system requirements for VMware.

For details, see your VMware documentation or visit the VMware website.

ESXi server

The hardware requirements for ESXi server are the same as the system requirements for VMware.

For details, see your VMware documentation or visit the VMware website.

Management Client (web browser)

The hardware requirements for the Management Client are the same as the Microsoft Windows OS system requirements determined by Microsoft.

For details, see your Microsoft Windows OS documentation or visit the Microsoft website.

Software requirements

Hitachi Infrastructure Management Pack requires the software listed in the following table. For installation prerequisites, see the appropriate user documentation.

Hitachi Storage Adapter

Type	Software	Version	Notes
Web browser	Microsoft Edge	Versions supported by VMware Aria Operations.	Installed in the VMware Aria Operations client.
	Mozilla Firefox		
	Google Chrome		
VMware Aria Operations server	VMware Aria Operations	<ul style="list-style-type: none"> ▪ 8.16 ▪ 8.17 ▪ 8.18 	
VMware Manager server	VMware vCenter Server (Standalone and Appliance)	<ul style="list-style-type: none"> ▪ 7.0 Update 3 ▪ 8.0 Update 3 	
ESXi server	VMware ESXi server	<ul style="list-style-type: none"> ▪ 7.0 Update 3 ▪ 8.0 Update 3 	

Type	Software	Version	Notes
VASA Provider	Hitachi Storage Provider for VMware vCenter	3.7.2 or later	To use the VASA Provider Health Monitoring dashboard, 3.7.2 or later is required.
Storage operation management: HIAA	HIAA server	Supported HIAA versions differ depending on the storage model. For details, see Storage system requirements (on page 28) .	
	HDCA server	Depends on the HIAA prerequisite version	
	Analytics probe server	Depends on the HIAA prerequisite version	
Operation management: Ops Center Analyzer	Ops Center Analyzer server	Supported Ops Center Analyzer versions differ depending on the storage model. For details, see Storage system requirements (on page 28) .	To use the Single Sign-On function, 10.8.2 or later is required.
	Analyzer Detail View server	Depends on the Ops Center Analyzer prerequisite version	
	Analyzer probe server	Depends on the Ops Center Analyzer prerequisite version	
Ops Center Common Services server	Ops Center Common Services	10.8.2 or later	Required when using the Single Sign-On function to connect to the Ops Center Analyzer server.
Operating system	VMware Management Client Operating System	Microsoft Windows (dependent on the versions supported by VMware Aria Operations)	

Hitachi Network Adapter

Type	Software	Version	Notes
Web browser	Microsoft Edge	Versions supported by VMware Aria Operations.	Installed in the VMware Aria Operations client.
	Mozilla Firefox		
	Google Chrome		
VMware Aria Operations server	VMware Aria Operations	<ul style="list-style-type: none"> ▪ 8.16 ▪ 8.17 ▪ 8.18 	
Operation management: HIAA	HIAA server	4.4.0 or later	
	HDCA server	Depends on the HIAA prerequisite version	
	Analytics probe server	Depends on the HIAA prerequisite version	
Operation management: Ops Center Analyzer	Ops Center Analyzer server	10.0.0 or later	If you are using the Single Sign-On function, 10.8.2 or later is required.
	Analyzer Detail View server	Depends on the Ops Center Analyzer prerequisite version	
	Analyzer probe server	Depends on the Ops Center Analyzer prerequisite version	
Ops Center Common Services server	Ops Center Common Services	10.8.2 or later	Required when using the Single Sign-On function to connect to the Ops Center Analyzer Detail View server.
Operating system	VMware Management Client Operating System	Microsoft Windows (dependent on the versions supported by VMware Aria Operations)	

Service requirements

Before using Hitachi Storage Adapter, configure the HIAA/Ops Center Analyzer services. Similarly, before using Hitachi Network Adapter, configure the HIAA/Ops Center Analyzer and HDCA/Analyzer Detail View services.

To set up the HIAA/Ops Center Analyzer services or the HDCA/Analyzer Detail View services, check the system requirements in the *Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide* or the *Hitachi Ops Center Analyzer Installation and Configuration Guide*.


HIAA/Ops Center Analyzer service requirements

Before using Hitachi Storage Adapter or Hitachi Network Adapter, configure the HIAA/Ops Center Analyzer services as shown in the following table.

Hitachi Storage Adapter

Item	Description
Register storage systems	Register all storage systems to be managed by Hitachi Storage Adapter as target objects for collection by RAID Agent or Hitachi Ops Center Analyzer Virtual Storage Software Agent.
Enable SSL communication	To use HTTPS communication, set the HIAA/Ops Center Analyzer server to be used as the SSL server.
Register records as collection targets for RAID Agent	To shorten the interval at which RAID Agent collects metrics, modify the RAID Agent record collection interval as necessary.
Set RAID Agent instance environment	For the instance settings for storage systems monitored by RAID Agent, set <code>Unassigned Open Volume Monitoring</code> to [Y] (the default value is Y).
Configure Performance Monitor, which is a prerequisite for RAID Agent	To collect information related to TrueCopy, Universal Replicator, and global-active device volumes, as a prerequisite for RAID Agent, you must set the CUs of those volumes as monitoring targets in Performance Monitor. For details about configuring the CUs of monitoring targets, see the <i>Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide</i> or the <i>Hitachi Ops Center Analyzer Installation and Configuration Guide</i> .
Set the method for collecting performance data	To manage a storage system of one of the following models, select access type 1 (Command device and SVP) or 2

Item	Description
	<p>(Command device and REST API)* for the method of collecting performance data:</p> <ul style="list-style-type: none"> ▪ VSP F350, F370, F700, F900, or VSP G350, G370, G700, G900 (if you are using HIAA version 4.1.0 or later or Ops Center Analyzer to manage storage systems) ▪ VSP E590, E790, E990, E1090, E590H, E790H, E1090H or VSP 5000 series <p>To manage a VSP One B20 storage system, select access type 2 (Command device and REST API)* for the method of collecting performance data.</p>
Create HIAA/Ops Center Analyzer credential	<p>To register a Hitachi Storage Adapter instance, create an HIAA/Ops Center Analyzer user account:</p> <ul style="list-style-type: none"> ▪ HIAA <p>Create a new HIAA user account, and assign the user Admin or Modify permissions.</p> ▪ Ops Center Analyzer <p>Perform the following procedure to create a new Ops Center Analyzer user account.</p> <ol style="list-style-type: none"> 1. Access the Ops Center Analyzer login window. 2. Log in by using the system account. 3. On the Administration tab, select User Management > Users and Permissions, and then create a new user account. 4. In the Change Permission window, select the options for Admin or Modify permission for IAA, and then click OK. 5. Specifying the user created by this procedure and the following request line, run the <code>curl</code> command on VMware Aria Operations. <p>Request line:</p> <pre>GET <protocol>://<host-name>:<port-number>/ Analytics/RAIDAgent/v1/objects/AgentForRAID/</pre> <p>Execution example:</p> <pre># curl -v -k -u user001:user001_pass -X GET https://host001:22016/Analytics/RAIDAgent/v1/ objects/AgentForRAID</pre> <p>Verify that the command ended normally.</p>

Item	Description
	<p>If the command ended normally, communication between VMware Aria Operations and Ops Center Analyzer will successfully authenticate the user.</p> <div style="background-color: #e0f2f1; padding: 5px; border: 1px solid #ccc;"> <p> Note: This user account is different from the user account used for Single Sign-On in the Ops Center Portal login window (the Ops Center Portal user).</p> </div>
<p>* If you select access type 2 for a monitoring target that includes a global-active device configuration, the W3200010 message will be output to the log, and metric information of the Virtual Logical Device object will not be collected for the global-active device configuration.</p> <p>The following replication-related information is not collected:</p> <ul style="list-style-type: none"> ▪ Metrics related to TrueCopy, Universal Replicator, or global-active device for storage objects ▪ Metrics and properties related to TrueCopy, Universal Replicator, or global-active device for Dynamic Provisioning Volume, Logical Device, and Virtual Logical Device objects ▪ Journal Group objects 	

Hitachi Network Adapter

Item	Description
Register probe	Register Brocade FC Switch (CLI) probe in HDCA/Analyzer Detail View.

HDCA/Analyzer Detail View service requirements

Before using Hitachi Network Adapter, configure the HDCA/Analyzer Detail View services as shown in the following table.

Item	Description
Enable SSL communication	To use HTTPS communication, set the HDCA/Analyzer Detail View server to be used as the SSL server.

Ops Center Common Services service requirements

If you are using the Single Sign-On function, configure Ops Center Common Services according to the following table prior to using Hitachi Storage Adapter and Hitachi Network Adapter.

Hitachi Storage Adapter

Item	Description
Configure the Single Sign-On function	<ul style="list-style-type: none"> ▪ Register Ops Center Analyzer in Ops Center Common Services. ▪ Configure Ops Center Common Services and Ops Center Analyzer so that they can be used as SSL servers. ▪ Using the Ops Center Common Services portal, assign the Admin or Modify permissions for Ops Center Analyzer to the group to which the Single Sign-On user belongs.

Hitachi Network Adapter

Item	Description
Configure the Single Sign-On function	<ul style="list-style-type: none"> ▪ Register Ops Center Analyzer Detail View in Ops Center Common Services. ▪ Configure Ops Center Common Services and Ops Center Analyzer Detail View so that they can be used as SSL servers.

Storage system requirements

The following table shows the requirements for storage systems supported by Hitachi Storage Adapter.

Supported storage models and HIAA/Ops Center Analyzer versions

The following table shows the storage models supported by Hitachi Storage Adapter, along with the microcode versions or software versions. This table also shows the corresponding HIAA/Ops Center Analyzer versions.

Storage model	Microcode version or software version	HIAA/Ops Center Analyzer version
VSP E590, E790	93-03-01 or later	Ops Center Analyzer 10.5.1 or later
VSP E590H, E790H	93-05-02 or later	Ops Center Analyzer 10.7.0 or later

Storage model	Microcode version or software version	HIAA/Ops Center Analyzer version
VSP E990	93-02-01 or later	Ops Center Analyzer 10.1.1 or later
VSP E1090, E1090H	93-06-01 or later	Ops Center Analyzer 10.8.0-01 or later Note, however, that Ops Center Analyzer 10.8.1-00 or later is required to monitor NVMe over FC connections.
VSP F350, F370, F700, F900	88-01 or later	HIAA 4.4.0 or later Ops Center Analyzer 10.0.0 or later
VSP G350, G370, G700, G900	88-01 or later	HIAA 4.4.0 or later Ops Center Analyzer 10.0.0 or later
VSP F400, F600, F800	83-02-01 or later	HIAA 3.2.0 or later Ops Center Analyzer 10.0.0 or later
VSP G200, G400, G600, G800	83-02-01 or later	HIAA 3.2.0 or later Ops Center Analyzer 10.0.0 or later
VSP N400, N600, N800	83-06-01 or later	HIAA 4.4.0 or later Ops Center Analyzer 10.0.0 or later
VSP 5100, 5500, 5100H, 5500H	90-01-41 or later	Ops Center Analyzer 10.0.0 or later Note, however, that Ops Center Analyzer 10.8.1-00 or later is required to monitor NVMe over FC connections.
VSP 5200, 5600, 5200H, 5600H	90-08-01 or later	Ops Center Analyzer 10.8.0-01 or later Note, however, that Ops Center Analyzer 10.8.1-00 or later is required to monitor NVMe over FC connections.

Storage model	Microcode version or software version	HIAA/Ops Center Analyzer version
VSP F1500, VSP G1500	80-05 or later	HIAA 3.2.0 or later Ops Center Analyzer 10.0.0 or later
VSP G1000	80-03-31 or later	HIAA 3.2.0 or later Ops Center Analyzer 10.0.0 or later
VSP One B20	A3-02-21 or later	Ops Center Analyzer 11.0.2-00 or later
VSP One SDS Block	01.12.00.xx ¹	Ops Center Analyzer 10.8.2-00 or later Note, however, that Ops Center Analyzer 11.0.3-00 or later is required to monitor NVMe/TCP connections.
	01.13.00.xx ²	Ops Center Analyzer 10.9.3-00 or later Note, however, that Ops Center Analyzer 11.0.3-00 or later is required to monitor NVMe/TCP connections.
	01.14.00.xx ²	Ops Center Analyzer 11.0.2-00 or later Note, however, that Ops Center Analyzer 11.0.3-00 or later is required to monitor NVMe/TCP connections.
	01.16.00.xx ²	Ops Center Analyzer 11.0.3-00 or later
<p>Notes:</p> <ol style="list-style-type: none"> 1. Virtual machine models are supported. 2. Virtual machine models and bare metal models are supported. 		

Supported protocols

Hitachi Storage Adapter supports the protocols shown below. This is based on the support status of the storage system.

- VSP family and VSP One B20: Fibre Channel connections, iSCSI connections, NVMe over FC connections, and NVMe/TCP connections
- VSP One SDS Block: Fibre Channel connections, iSCSI connections, and NVMe/TCP connections

Notes on model notation for the VSP N series

Because storage systems in the VSP N series are equivalent to those in the VSP F series or VSP G series, Hitachi Storage Adapter uses the VSP F series or the VSP G series storage model names to indicate storage system models in the VSP N series. Information that applies to VSP F series or VSP G series storage systems also applies to the corresponding models in the VSP N series.

The following table lists each model in the VSP N series and the corresponding model in the VSP F series or in the VSP G series.

VSP N series storage system	Notation in Hitachi Storage Adapter
VSP N400	VSP F400 or VSP G400
VSP N600	VSP F600 or VSP G600
VSP N800	VSP F800 or VSP G800

Network device requirements

The supported versions of Brocade Fabric OS, corresponding to the Brocade Fabric switch supported by Hitachi Network Adapter, are as follows.

- 6.1.2b1
- 6.2.2d
- 6.3.2e8
- 7.0.2e
- 7.2.1a
- 7.4.1b
- 8.2.0
- 8.2.0a
- 8.2.0b

Restrictions and considerations

Environment configuration

Restrictions and considerations for the environment configuration are listed in the following table.

Common to both adapters

Item	Description
Installation folder	<p>When installing Hitachi Infrastructure Management Pack, estimate the number of metrics created by Hitachi Infrastructure Management Pack. Before installing VMware Aria Operations, confirm there is sufficient free disk space. See Hardware requirements (on page 21).</p> <p>The installation folder is in the following location:</p> <pre><VMware-Aria-Operations-installation-folder>/user/plugins/inbound</pre>

Hitachi Storage Adapter

Item	Description
HIAA/Ops Center Analyzer server and communication port	<p>Hitachi Storage Adapter accesses the HIAA/Ops Center Analyzer server as a manager client by using HTTPS (for SSL communication) or HTTP (for non-SSL communication). For this reason, check with the administrator of each server to obtain a valid protocol type and port number for communication between Hitachi Storage Adapter and the HIAA/Ops Center Analyzer server. The default HIAA/Ops Center Analyzer server port numbers for the communication protocols are as follows.</p> <ul style="list-style-type: none"> ▪ HTTPS: 22016 ▪ HTTP: 22015 <p>Starting from version 10.8.0-01, HTTP can no longer be used.</p>
Synchronization of the server time	<p>NTP must be used to synchronize the server time in HIAA/Ops Center Analyzer, VMware Aria Operations, VMware vCenter Server, and ESXi.</p>

Item	Description
Ops Center Common Services server and communication port	Confirm the valid port numbers for communication with the Ops Center Common Services server. The default communication port setting is port number 443. To use a port number other than the default, designate the appropriate port number when you register the Hitachi Storage Adapter instance.

Hitachi Network Adapter

Item	Description
HDCA/Analyzer Detail View server and communication port	<p>Hitachi Network Adapter accesses the HDCA/Analyzer Detail View server as a manager client by using HTTPS (for SSL communication) or HTTP (for non-SSL communication). For this reason, check with the administrator of each server to obtain a valid protocol type and port number for communication between Hitachi Network Adapter and the HDCA/Analyzer Detail View server. The default HDCA/Analyzer Detail View server port numbers for the communication protocols are listed below.</p> <ul style="list-style-type: none"> ▪ HTTPS: 8443 ▪ HTTP: 8080 <p>Starting from version 10.8.0-01, HTTP can no longer be used.</p>
Synchronization of the server time	NTP is used to synchronize the time between the HDCA/Analyzer Detail View server and the VMware Aria Operations server.
Ops Center Common Services server and communication port	Confirm the valid port numbers for communication with the Ops Center Common Services server. The default communication port setting is port number 443. To use a port number other than the default, designate the appropriate port number when you register the Hitachi Network Adapter instance.

Operation

Common to both adapters

Item	Description
Changing the log level	If the log level has been changed by using the log level changing function in the log window of VMware Aria Operations, this setting cannot be enabled for Hitachi Infrastructure Management Pack.
Log file	If a value smaller than the default value is set for the log file size or the number of log generations in the maintenance configuration file, the earlier entries in the backed up log file will be overwritten, which might result in the loss of information that is needed for troubleshooting. For more information about the maintenance configuration file, see Modifying the maintenance configuration file (on page 180) . Do not set a value smaller than the default value in the maintenance configuration file, unless forced to do so.
Re-installation after changing the maintenance configuration files	If you re-install Hitachi Infrastructure Management Pack after changing the contents of the maintenance configuration files (<code>hilogger.config</code> , <code>hiconfig.properties</code>), the contents of the maintenance configuration files will be restored to their default values. Therefore, after re-installation, change the contents of the maintenance configuration files again.
Editing the maintenance configuration file	<p>To edit the maintenance configuration file (<code>hilogger.config</code>) while Hitachi Infrastructure Management Pack is running, stop collection by the adapter instance, and then restart collection or restart the VMware Aria Operations VM.</p> <p>VMware Aria Operations operation: Edit the maintenance configuration file on the master node, and then restart the cluster service from the VMware Aria Operations administration interface.</p>

Item	Description
Editing the maintenance configuration file and the adapter configuration file	To change the maintenance configuration file and the adapter configuration file while Hitachi Infrastructure Management Pack is running, access the master node and edit the files. For more information about the files, see Modifying the maintenance configuration file (on page 180) and Modifying the adapter configuration file (on page 183) . After editing the files, apply the changes by restarting the cluster service from the VMware Aria Operations Administration interface.
Detecting object information	Hitachi Infrastructure Management Pack detects object information automatically. Therefore, object information cannot be detected manually from the object detection window of VMware Aria Operations. If the object information of Hitachi Infrastructure Management Pack is removed from the object window of VMware Aria Operations, the object information is detected automatically during the next scheduled information collection.

Hitachi Storage Adapter

Item	Description
Virtual Volume	If a physical volume and a virtual volume with the same storage model name, serial number, and volume name exist, Hitachi Infrastructure Management Pack collects the information of the virtual volume.
GAD configuration	Register both storage systems that make up a GAD pair in the same instance of HIAA/Ops Center Analyzer.
Model identification	<p>For a VSP G400 or VSP G600 model storage system, "VSP G400 G600" is displayed as the object identifier and in messages.</p> <p>For a VSP F400 or VSP F600 model storage system, "VSP F400 F600" is displayed as the object identifier and in messages.</p> <p>For a VSP 5100, 5200, 5500, 5600 model storage system, "VSP 5000 series AFA" is displayed as the object identifier and in messages.</p> <p>If you upgrade a storage system whose model is VSP G1000 to VSP G1500, the model displayed as the object identifier and in messages changes from VSP G1000 to VSP G1500.</p>

Item	Description
	<p>For a VSP N400, N600, or N800 storage system, "VSP G400, G600, G800" or "VSP F400, F600, F800" is displayed as the object identifier and in messages.</p> <p>For a VSP 5100H, 5200H, 5500H, 5600H model storage system, "VSP 5000 series hybrid" is displayed as the object identifier and in messages.</p>
Virtual model identification	<p>For a virtual storage machine whose model is VSP G400, G600, G800, or VSP F400, F600, F800, the object identifier and messages differ as follows, depending on the storage system microcode version.</p> <p>Microcode versions prior to 83-03</p> <ul style="list-style-type: none"> ▪ VSP G400, G600: VSP G400 G600 ▪ VSP G800: VSP G800 <p>Microcode versions 83-03 and later</p> <ul style="list-style-type: none"> ▪ VSP G400, G600, and VSP F400, F600: VSP G400/G600 and VSP F400/F600 ▪ VSP G800 and VSP F800: VSP G800 and VSP F800 <p>If the virtual model is VSP G1000, VSP G1500 or VSP F1500, the object identifier and messages differ as follows, depending on the Hitachi Infrastructure Management Pack version.</p> <p>Versions 01.4.0 and earlier</p> <p>VSP G1000: VSP G1000</p> <p>Versions 01.5.0 and later</p> <p>VSP G1000, VSP G1500, and VSP F1500: G1000/G1500 and VSP F1500</p> <p>If the virtual model is VSP N400, N600, or N800, "VSP G400/G600 and VSP F400/F600" or "VSP G800 and VSP F800" is displayed as the object identifier and in messages.</p> <p>For a virtual storage machine whose model is VSP 5100, 5200, 5500, 5600, "VSP 5000 series AFA" is displayed as the object identifier and in messages.</p> <p>For a virtual storage machine whose model is VSP 5100H, 5200H, 5500H, 5600H, "VSP 5000 series hybrid" is displayed as the object identifier and in messages.</p>

Hitachi Network Adapter

Item	Description
Brocade Fabric Overview dashboard	<p>We recommend that you specify the value <code>Last 12 hours</code> for the Range setting in the following widgets:</p> <ul style="list-style-type: none"> ▪ Top Switch Ports by RX Utilization ▪ Top Switch Ports by TX Utilization ▪ Top Switch Ports by Error Count <p>You can set the value of Range by using each widget's toolbar.</p>

About VMware Aria Operations

Common to both adapters

Item	Description
Detecting new object information and collecting metrics	If the resource is newly created or collected by an adapter instance, the resource name without a metric is stored in VMware Aria Operations. The metric of the resource is collected and stored in VMware Aria Operations during the next collection cycle.
Removing objects	If an object is removed from the HIAA/Ops Center Analyzer server or other server from which information is collected, information about the object that was collected previously remains in the object management window of VMware Aria Operations. To remove the corresponding object information from VMware Aria Operations, remove it manually from the list in the object window.
Modifying credentials following a version update	To modify existing user credentials following an update installation, you cannot set them as new credentials; instead, you must create new credentials.
Overwriting imports during installation	When re-installing this product or performing an update installation, the Hitachi Infrastructure Management Pack supermetrics, dashboards, metric configurations, report templates, and views are overwritten. Before re-installing or updating the adapter, back up these items as needed.

Hitachi Storage Adapter

Item	Description				
Distributed parity group configurations	<p>The capacity information listed below is not collected for parity groups comprising distributed parity groups.</p> <table border="1" data-bbox="756 422 1419 575"><thead><tr><th data-bbox="756 422 1086 485">Resource type</th><th data-bbox="1086 422 1419 485">Metric</th></tr></thead><tbody><tr><td data-bbox="756 485 1086 575">Parity group</td><td data-bbox="1086 485 1419 575">totalCapacity, totalFreeSpace</td></tr></tbody></table>	Resource type	Metric	Parity group	totalCapacity, totalFreeSpace
Resource type	Metric				
Parity group	totalCapacity, totalFreeSpace				
Dynamic Provisioning Pool objects	<p>In v01.7.0 and later, the information collected by Dynamic Provisioning Pool objects includes information about Thin Image pools. However, the metrics that correspond to the PI_PLS records of HIAA/Ops Center Analyzer and that collect information about Thin Image pools are not collected. See Dynamic Provisioning Pool (on page 80).</p>				

Chapter 3: Installation and Configuration

When you install and configure Hitachi Infrastructure Management Pack, the components in your system must be set up and configured before you install Hitachi Infrastructure Management Pack itself. After you install the adapter, configure adapter instances and set the collection interval. The procedures described below guide you through the Hitachi Infrastructure Management Pack installation and configuration process. To set up the other components of your system, see the relevant documentation.

Installation and configuration workflow

The following workflow summarizes the tasks required to install and configure Hitachi Infrastructure Management Pack. The required settings differ depending on the adapter.

Hitachi Storage Adapter

1. Check the requirements for the components of your system configuration. See [System Requirements \(on page 19\)](#).
2. Configure the HIAA/Ops Center Analyzer server. See [Configuring HIAA/Ops Center Analyzer \(on page 40\)](#).
3. Configure the Ops Center Common Services server. See [Configuring Ops Center Common Services \(on page 40\)](#).
4. Configure VMware Aria Operations. See [Configuring VMware Aria Operations \(on page 40\)](#).
5. Create the vCenter adapter. See [Creating a vCenter adapter \(on page 41\)](#).
6. Install Hitachi Infrastructure Management Pack. See [Installing Hitachi Infrastructure Management Pack \(on page 41\)](#).
7. Configure Hitachi Infrastructure Management Pack.
 - a. Add Hitachi Storage Adapter instance. See [Adding a Hitachi Storage Adapter instance \(on page 42\)](#).
 - b. Set up the collection interval. See [Setting the collection interval \(on page 46\)](#).
 - c. Apply a supermetric. See [Applying a supermetric \(on page 47\)](#).

Hitachi Network Adapter

1. Verify the requirements for the components of your system configuration. See [System Requirements \(on page 19\)](#).
2. Configure the HIAA/Ops Center Analyzer server. See [Configuring HIAA/Ops Center Analyzer \(on page 40\)](#).
3. Configure the HDCA/Analyzer Detail View server. See [Configuring HDCA/Analyzer Detail View \(on page 40\)](#).

4. Configure the Ops Center Common Services server. See [Configuring Ops Center Common Services \(on page 40\)](#).
5. Configure VMware Aria Operations. See [Configuring VMware Aria Operations \(on page 40\)](#).
6. Install Hitachi Infrastructure Management Pack. See [Installing Hitachi Infrastructure Management Pack \(on page 41\)](#).
7. Configure Hitachi Infrastructure Management Pack.
 - a. Add Hitachi Network Adapter instance. See [Adding a Hitachi Network Adapter instance \(on page 44\)](#).
 - b. Set up the collection interval. See [Setting the collection interval \(on page 46\)](#).

Configuring HIAA/Ops Center Analyzer

HIAA/Ops Center Analyzer must be configured before installing Hitachi Infrastructure Management Pack. For installation and configuration procedures, see the *Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide* or the *Hitachi Ops Center Analyzer Installation and Configuration Guide*.

The HIAA/Ops Center Analyzer service settings must be set prior to installing Hitachi Infrastructure Management Pack. See [Service requirements \(on page 25\)](#).

Configuring HDCA/Analyzer Detail View

To use Hitachi Network Adapter, HDCA/Analyzer Detail View must be configured before Hitachi Infrastructure Management Pack is installed. For installation and configuration procedures, see the *Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide* or the *Hitachi Ops Center Analyzer Installation and Configuration Guide*.

The HDCA/Analyzer Detail View service settings must be set prior to installing Hitachi Infrastructure Management Pack. See [Service requirements \(on page 25\)](#).

Configuring Ops Center Common Services

To use the Single Sign-On function, Ops Center Common Services must be configured prior to installing Hitachi Infrastructure Management Pack. For installation and configuration procedures, see the *Hitachi Ops Center Installation and Configuration Guide*.

The Ops Center Common Services service settings must be set prior to installing Hitachi Infrastructure Management Pack. See [Service requirements \(on page 25\)](#).

Configuring VMware Aria Operations

VMware Aria Operations must be configured prior to installing Hitachi Infrastructure Management Pack.

The procedure for configuring VMware Aria Operations is not covered by this document. See the VMware documentation for the relevant procedure.

Creating a vCenter adapter

The vCenter adapter collects vSphere environment (VM, ESXi, datastore) information that is managed by the vCenter server. Create a vCenter adapter with a specific vCenter server for managing the datastore configured for storage systems.

To use Hitachi Storage Adapter, you must create a vCenter adapter instance prior to installing Hitachi Infrastructure Management Pack. See your VMware documentation for the relevant procedure.

Installing Hitachi Infrastructure Management Pack

Check and complete all of the prerequisites listed below, and then follow the procedure to install and configure Hitachi Infrastructure Management Pack.

Before you begin

- All system components meet the requirements. See [System Requirements \(on page 19\)](#).
- HIAA/Ops Center Analyzer settings are configured. See [HIAA/Ops Center Analyzer service requirements \(on page 25\)](#).
- VMware Aria Operations is configured. See [Managing objects \(on page 64\)](#).
- To use Hitachi Storage Adapter, the following requirements must also be met:
 - vCenter Adapter is created and configured. See [Creating a vCenter adapter \(on page 41\)](#).
 - A snapshot of all virtual machines for all nodes of VMware Aria Operations has been created (as a backup) from vCenter Server. See your VMware documentation.
- To use Hitachi Network Adapter, HDCA/Analyzer Detail View settings must be configured. See [Configuring HDCA/Analyzer Detail View \(on page 40\)](#).
- To use the Single Sign-On function, Ops Center Common Services settings must be configured. See [Configuring Ops Center Common Services \(on page 40\)](#).

Procedure

1. For the installation file, select Hitachi-InfraMP-operations-setup(<version>)-01.pak. Save the installation file to any VMware management client folder.
2. Log in to VMware Aria Operations as an administrator.
3. In the **Integrations** window, click the **Repository** tab.
4. Click **ADD**.
5. Select a PAK file to import. To select a file, click **BROWSE** and then select the installation file you saved in step 1.

6. Check the adapter name and version number, and then click **UPLOAD**. Other installation options are listed below.

Install the PAK file, even if it is already installed.

To install the file in an environment where the file is already installed, select this option. All previously installed files will be overwritten. If this option is not selected, clicking **UPLOAD** will cause an error.



Note: Any modifications to default alert definitions, symptoms, recommendations, policy definitions, views, dashboards, widgets, or reports will be overwritten. If you are installing an update to the software, be sure to clone or back up your content before proceeding.

7. When the upload finishes, click **NEXT**.
8. Read the *End User License Agreement*. Select **I accept the terms of this agreement**, and then click **NEXT**.
9. Click **FINISH**.
10. Verify that the adapter version matches the version listed in the *Release Notes*.

Configuring Hitachi Infrastructure Management Pack

To configure Hitachi Infrastructure Management Pack, add adapter instances and then configure the collection interval and other settings.

Adding a Hitachi Storage Adapter instance

Hitachi Storage Adapter instances collect performance and failure information for storage systems that are registered with Hitachi Infrastructure Management Pack. Adding instances of the adapter is part of the configuration process.



Note: When adding storage adapter instances, be aware of the following:

- You can register the following number of settings for one storage adapter instance:
 - HIAA/Ops Center Analyzer server information: 1 setting only
 - vCenter Server information: 1 to 3 settings

To register more HIAA/Ops Center Analyzer server or vCenter Server settings, you need to add multiple storage adapter instances.

- You can modify or delete any storage adapter instance as an administrator.

Before you begin

Hitachi Infrastructure Management Pack is installed.

You are logged in to VMware Aria Operations as an administrator.

For the basic settings, you will need:

- The host name or IP address of the HIAA/Ops Center Analyzer server and a user ID and password for the HIAA/Ops Center Analyzer server
(The user ID created in HIAA/Ops Center Analyzer. For details on creating a user ID and password, see [HIAA/Ops Center Analyzer service requirements \(on page 25\)](#).)
- The communication protocol whether http or https for accessing the HIAA/Ops Center Analyzer server
- The port number to be used to access the HIAA/Ops Center Analyzer server

For the optional settings, you might need:


- The host name or IP address, user ID, and password for the vCenter Server that manages vVols

If you are using the Single Sign-On function, you need the following information:

- The host name or IP address for the Ops Center Common Services server
- The communication port for the Ops Center Common Services server

Procedure

1. In the **Integrations** window, click **ADD** from the **Accounts** tab.
2. Click **Hitachi Storage Adapter**.
3. In **Cloud Account Information**, enter a display name. You can also choose to enter an optional description.
4. Enter the host name or IP address for the HIAA/Ops Center Analyzer server.
5. (Optional) To use the vVol function with VMware Aria Operations, enter the host names for vCenter for vVols.
6. Select a credential. You can add a new credential, select an existing credential, or modify an existing credential. Verify that the name of the credential you want to use is displayed in the **Credential** list box.

Option	Description
Adding a new credential	<ol style="list-style-type: none"> a. Click the Add New icon. b. Enter a name for the new credential. c. Enter the user ID and password for the HIAA/Ops Center Analyzer server. If you are using the Single Sign-On function, enter the user ID and password for Ops Center Common Services. d. Enter the user IDs and passwords for the optional system components. <div style="border: 1px solid #ccc; background-color: #e0f2f1; padding: 10px; margin: 10px 0;">  Tip: If no scroll bar appears in the Manage Credential window, you can scroll by using the Tab key to move the focus. </div> <ol style="list-style-type: none"> e. Click OK.

Option	Description
Selecting an existing credential	Select a credential from the credential list.
Modifying a credential	<ol style="list-style-type: none"> a. From the Credential list, select the credential you want to modify. b. Click the Edit Credential icon. c. Modify the credential settings, as needed. d. Click OK.

7. Enter the advanced settings. Expand **Advanced Settings** to view the settings.
 - a. In **Hitachi Ops Center Analyzer Protocol**, select the communication protocol.
 - b. In **Hitachi Ops Center Analyzer Port Number**, enter the port number for the HIAA/Ops Center Analyzer server.
 - c. (Optional) If you are using the Single Sign-On function, in **Hitachi Ops Center Common Services Host Name**, enter the host name for the Ops Center Common Services server.
 - d. (Optional) If you are using the Single Sign-On function, in **Hitachi Ops Center Common Services Port Number**, enter the port number for the Ops Center Common Services server.
8. Click **VALIDATE CONNECTION** to check the connection between the storage adapter instance and the HIAA/Ops Center Analyzer server and any optional system components. If you used **Advanced Settings** to specify Ops Center Common Services information, also check the connection to Ops Center Common Services. Modify the connection settings, if necessary.
9. Click **ADD**.

Adding a Hitachi Network Adapter instance

Hitachi Network Adapter instances collect performance and failure information for the Brocade Fabric switch registered with Hitachi Infrastructure Management Pack. Adding instances of the adapter is part of the configuration process.



Note: Any network adapter instance can be modified or deleted by any user with administrator credentials.

Before you begin

- Hitachi Infrastructure Management Pack is installed.
- You are logged in to VMware Aria Operations as an administrator.
- You have obtained the host name or IP address, user ID, and password for the HDCA/Analyzer Detail View server.
- You have obtained the communication protocol (HTTP or HTTPS) for accessing the HDCA/Analyzer Detail View server.

- You have obtained the port number used to access the HDCA/Analyzer Detail View server.
- If you are using the Single Sign-On function, you have obtained the host name or IP address, user ID, and password for the Ops Center Common Services server.
- If you are using the Single Sign-On function, you have obtained the port number used to access the Ops Center Common Services server.

Procedure

1. In the **Integrations** window, click **ADD** from the **Accounts** tab.
2. Click **Hitachi Network Adapter**.
3. In **Cloud Account Information**, enter a display name. You can also choose to enter an optional description.
4. Enter the host name or IP address for the HDCA/Analyzer Detail View server.
5. Select a credential. You can add a new credential, select an existing credential, or modify an existing credential. Verify that the name of the credential you want to use is displayed in the **Credential** list box.

Option	Description
Adding a new credential	<ol style="list-style-type: none"> a. Click the Add New icon. b. Enter a name for the new credential. c. Enter the user ID and password for the HDCA/Analyzer Detail View server. If you are using the Single Sign-On function, enter the user ID and password for Ops Center Common Services. d. Click OK.
Selecting an existing credential	Select a credential from the credential list.
Modifying a credential	<ol style="list-style-type: none"> a. From the Credential list, select the credential you want to modify. b. Click the Edit Credential icon. c. Modify the credential setting values, as needed. d. Click OK.

6. Enter the advanced settings. Expand **Advanced Settings** to view the settings.
 - a. For **Analyzer detail view Protocol**, select the communication protocol.
 - b. For **Hitachi Ops Center Analyzer detail view Port Number**, enter the port number for the HDCA/Analyzer Detail View server.
 - c. (Optional) If you are using the Single Sign-On function, for **Hitachi Ops Center Common Services Host Name**, enter the host name for the Ops Center Common Services server.
 - d. (Optional) If you are using the Single Sign-On function, for **Hitachi Ops Center Common Services Port Number**, enter the port number for the Ops Center Common Services server.

7. Click **VALIDATE CONNECTION** to check the connection between the network adapter instance and the HDCA/Analyzer Detail View server. If you used **Advanced Settings** to specify Ops Center Common Services information, also check the connection to Ops Center Common Services. Modify the connection settings, if necessary.
8. Click **ADD**.

Configuring advanced settings for Hitachi Storage Adapter instances

Setting the collection interval

The collection interval is the frequency in minutes at which VMware Aria Operations collects object information. Set the value according to the scale of your environment.

The default interval value is 5 minutes. However, you might want to increase the interval to 10 minutes or more if the number of objects in your environment is several thousand or more, or if you have a large-scale environment where the total number of Dynamic Provisioning volumes and logical devices exceeds 15,000. Otherwise, performance information might not be completely displayed.

Be sure to set the collection interval to a frequency that is longer than the amount of time required to actually collect the object information. If the interval is too short to collect all of the object information, the collection for the next interval is skipped and added to the collection for the following interval, resulting in an ever-increasing time between actual collections.



Note: Collection performance might degrade in environments with very large numbers of storage systems (including virtual storage machines).

Before you begin

- You are logged into VMware Aria Operations as an administrator.
- Confirm that an adapter instance has been created and that the basic settings have been configured.

Procedure

1. In the **Inventory Management** window, expand **Adapter Instances** from the inventory list.
2. Select **Hitachi Storage Adapter Instance** or **Hitachi Network Adapter Instance**. A list of all existing adapter instances is displayed on the **Objects** tab.
3. Select the adapter instance for which you want to set the collection interval, and then click the **Edit Object** icon.
4. Scroll to the bottom of the **Edit Object** window, and then expand **Advanced Settings**.
5. Enter a value of 1 or more whole minutes for the collection interval. The value you enter should be appropriate for the scale of your environment. The default value is 5 minutes.
6. Click **OK**.

Applying a supermetric

A supermetric is a combination of metrics registered in VMware Aria Operations that determines a new metric. For example, Hitachi Pool I/O Density is a supermetric that is the sum of metrics Read I/O and Write IOPS per DP pool size. Supermetrics are applied as the last step in configuring Hitachi Storage Adapter instance.

Before you begin

- You are logged into VMware Aria Operations as an administrator.
- Confirm that an instance of Hitachi Storage Adapter has been created and that the basic and advanced settings have been configured.

Procedure

1. In the **Policy Definition** window, select the policy that is currently being used. Then, click **EDIT POLICY**.
2. Click **Metrics and Properties**.
3. From the **Select Object Type** list, select the object type.
4. From the list of supermetrics, select the supermetric that you want to use.
5. From the **ACTIONS** menu, select **State > Activated**.

Managing credentials

Credentials are collections of user IDs and passwords that permit the adapter instance to access the HIAA/Ops Center Analyzer server, HDCA/Analyzer Detail View server, and other system components. A credential is required for each adapter instance. You can manage credentials when adding adapter instances, and you can also independently add new credentials, edit existing credentials, or delete credentials.

Adding a new credential

You can add a new credential when configuring an adapter instance, or you can create a new credential independently as described below.

Before you begin

- You are logged into VMware Aria Operations as an administrator.

You will need:

- A user ID and password for the HIAA/Ops Center Analyzer server, or if you are using the Single Sign-On function, a user ID and password for Ops Center Common Services (for Hitachi Storage Adapter)
- A user ID and password for the HDCA/Analyzer Detail View server, or if you are using the Single Sign-On function, a user ID and password for Ops Center Common Services (for Hitachi Network Adapter)

For optional system components, you might need (for Hitachi Storage Adapter):

- User IDs and passwords for any vCenter servers (up to three)

Procedure

1. In the **Integrations** window, click **CREDENTIALS**.
2. Click **ADD**.
3. From the **Adapter Type** list in the **Manage Credential** window, select **Hitachi Storage Adapter** or **Hitachi Network Adapter**.
4. Enter a name for the new credential.
5. Enter the user ID and password for the HIAA/Ops Center Analyzer server or the HDCA/ Analyzer Detail View server. If you are using the Single Sign-On function, enter the user ID and password for Ops Center Common Services.
6. (For Hitachi Storage Adapter) Enter the user IDs and passwords for the optional system components.



Tip: If no scroll bar appears in the **Manage Credential** window, you can scroll by using the **Tab** key to move the focus.

7. Save the credential settings. Click **OK**.

Editing a credential

You can edit the user IDs and passwords contained in a credential. For example, you can edit an existing credential when configuring an adapter instance, or you can edit a credential independently as described below. If you update a user ID or password for the HIAA/Ops Center Analyzer server, update the credentials accordingly.

Before you begin

- You are logged into VMware Aria Operations as an administrator.
- You have collected the user IDs and passwords for the system components you want to edit.

Procedure

1. In the **Integrations** window, click **CREDENTIALS**.
2. From the menu at the beginning of the line corresponding to the credential to be edited, select **Edit**.
3. Edit the credential settings as needed.
4. Click **OK**

Deleting a credential

You can delete any credential that is not being used by an adapter instance. For example, you can delete a credential when configuring a storage adapter instance, or you can delete a credential independently as described below. If you accidentally delete a credential, or if you need to use a credential that you previously deleted, add it as a new credential.

Before you begin

You are logged into VMware Aria Operations as an administrator.

Procedure

1. In the **Integrations** window, click **CREDENTIALS**.
2. From the menu at the beginning of the line corresponding to the credential to be deleted, select **Delete**.
3. Click **Yes** to confirm that you want to delete the selected credentials.
4. Click **OK**.
5. Confirm that the deleted credentials are no longer displayed in the credentials list. Click the **Refresh** icon, if necessary.

Managing adapter instances

You can manage adapter instances after they have been added. You can update the settings or delete an instance altogether.

Editing an adapter instance

You can edit an adapter instance. For example, if you change the host name or port number for the HIAA/Ops Center Analyzer server, or the vCenter server, edit the settings for the storage adapter instances accordingly.

Before you begin

- You are logged into VMware Aria Operations as an administrator.
- You have collected the values for the adapter instance settings you want to edit.

Procedure

1. From the **Accounts** tab in the **Integrations** window, click the name of the instance to be edited.
2. Edit the settings, as needed.
3. Click **VALIDATE CONNECTION** to check the new settings. Edit the settings, if necessary.
4. Save the adapter instance settings. Click **SAVE**.

Deleting an adapter instance

You can delete adapter instances. For example, you can delete adapter instances after collecting storage object information from the HIAA/Ops Center Analyzer server or from any optional servers in your configuration.

If you accidentally delete an adapter instance, or if you need an adapter instance that you previously deleted, add the adapter instance again as a new adapter instance.

Before you begin

You are logged into VMware Aria Operations as an administrator.

Procedure

1. In the **Integrations** window, click the **Accounts** tab.
2. From the menu at the beginning of the line corresponding to the instance to be deleted, select **Delete**.
3. Click **DELETE** to continue.
4. Confirm that the instance you deleted no longer appears in the list of accounts.

Upgrading Hitachi Infrastructure Management Pack

The procedure to upgrade Hitachi Infrastructure Management Pack is the same as the procedure for a new installation. See [Installing Hitachi Infrastructure Management Pack \(on page 41\)](#).

Chapter 4: Operation

Hitachi Infrastructure Management Pack collects performance and alert information about target storage objects from HIAA/Ops Center Analyzer and vCenter Server. It also collects performance and alert information about target network objects from HDCA/Analyzer Detail View. You can start and stop the collection of these types of information, and change the collection interval.

Collecting performance/alert information

The performance/alert information collection function collects performance and alert information about storage objects from HIAA/Ops Center Analyzer and vCenter Server, as well as performance and alert information about network objects from HDCA/Analyzer Detail View.

Collection targets and intervals

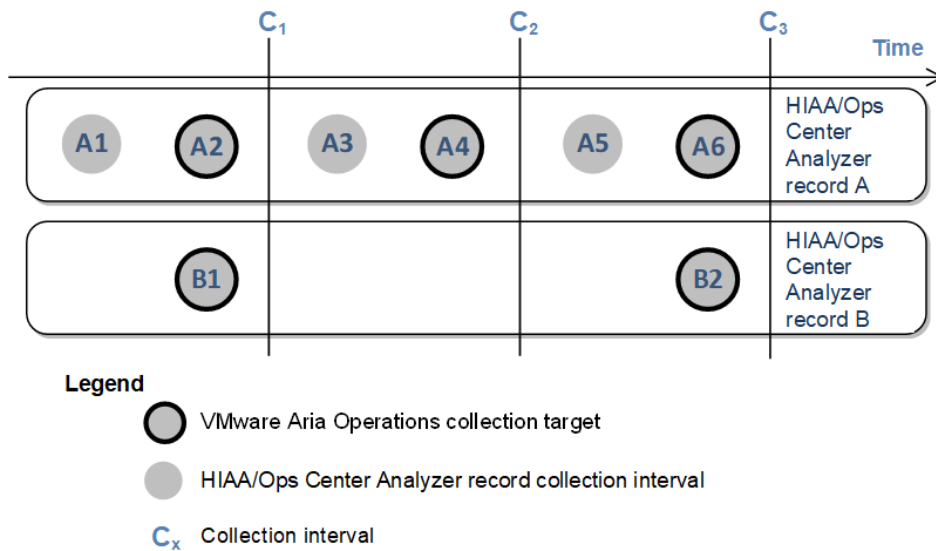
Performance and alert information is collected from VMware Aria Operations once per collection interval (5 minutes by default). The collection interval can be set for each individual adapter instance. The collection interval is specified in minutes. For environments where the total number of Dynamic Provisioning volumes and physical logical devices that configure the datastores and virtual machines exceeds 15,000, we recommend setting a collection interval of 10 or more minutes. If the set interval is shorter than the time that it takes to collect the information, the next collection process will be skipped, resulting in a collection interval that exceeds the set interval.

This collection interval is different from the update interval for HIAA/Ops Center Analyzer records and the update interval for HDCA/Analyzer Detail View performance information. When setting the collection interval, consider the following guidelines.

Collection Target	Performance Information Collection Interval	Notes
Performance information collected from HIAA/Ops Center Analyzer	<ul style="list-style-type: none"> ▪ For VSP family and VSP One B20 storage systems: Update interval of the HIAA/Ops Center Analyzer record. The time when performance information is collected from HIAA/Ops Center Analyzer becomes the time stamp of the HIAA/Ops Center Analyzer record. ▪ For VSP One SDS Block: The time when performance information is collected from HIAA/Ops Center Analyzer matches the time when information is collected by VMware Aria Operations. 	If the HIAA/Ops Center Analyzer record update interval is shorter than the VMware Aria Operations collection interval, some HIAA/Ops Center Analyzer records might not be collected and the performance information display interval might not be the same as the HIAA/Ops Center Analyzer record update interval.
Performance information collected from HDCA/Analyzer Detail View	<p>The display interval of the performance information is the same as the update interval of the HDCA/Analyzer Detail View performance information.</p> <p>The time stamp of the performance information is the same as that of the HDCA/Analyzer Detail View performance information.</p>	If the update interval of the HDCA/Analyzer Detail View performance information is shorter than the VMware Aria Operations collection interval, some HDCA/Analyzer Detail View performance information might not be collected.
Performance information collected from vCenter Server	The time at which performance information is collected from the vCenter Server matches the time collection implemented by VMware Aria Operations.	vCenter Server information is collected only while the adapter instance is registered.

Collecting performance information from HIAA/Ops Center Analyzer (for VSP family and VSP One B20 storage systems)

Performance information is collected from HIAA/Ops Center Analyzer at each VMware Aria Operations collection interval by using the HIAA/Ops Center Analyzer REST API. The REST API returns only the most recent records of all the HIAA/Ops Center Analyzer records collected over the elapsed HIAA/Ops Center Analyzer collection interval. Depending on the duration of the VMware Aria Operations collection interval, some HIAA/Ops Center Analyzer records might be generated, but not collected. The following figure shows an example of the HIAA/Ops Center Analyzer records collected during each collector process.

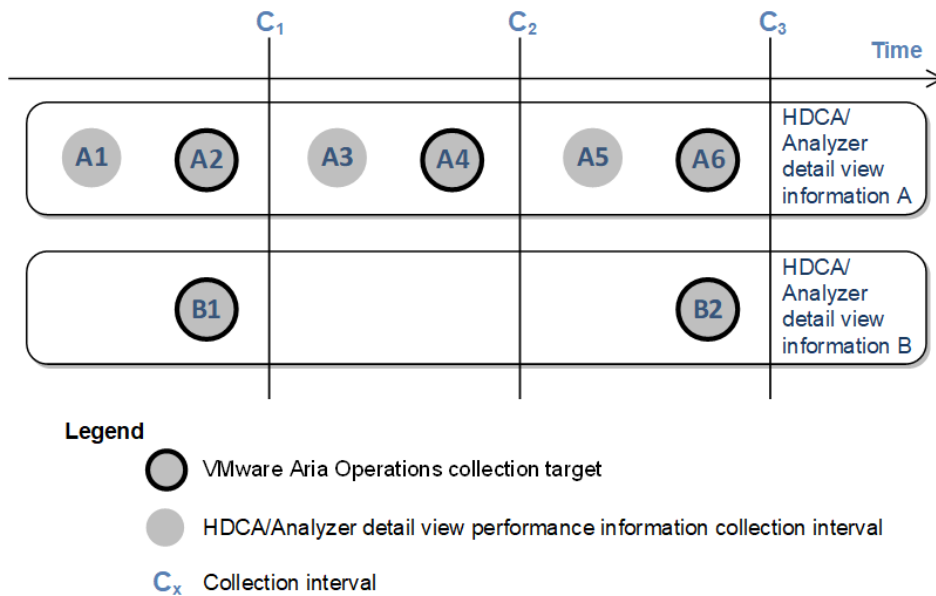


Collecting performance information from HIAA/Ops Center Analyzer (for VSP One SDS Block)

Performance information is collected from HIAA/Ops Center Analyzer at each VMware Aria Operations collection interval by using the HIAA/Ops Center Analyzer REST API. Because the HIAA/Ops Center Analyzer REST API returns information with the API time stamp, VMware Aria Operations collection time information is also collected.

Collecting performance information from HDCA/Analyzer Detail View

The latest information is collected from HDCA/Analyzer Detail View at each VMware Aria Operations collection interval. Therefore, depending on the VMware Aria Operations collection interval, some HDCA/Analyzer Detail View performance information might not be collected. The following figure shows an example of the HDCA/Analyzer Detail View performance information that is collected during each collector process.



Collecting performance information from vCenter Server

Performance information is collected from the vCenter Server at each VMware Aria Operations collection time interval by using the vSphere API. Because the vSphere API returns information with the API time stamp, VMware Aria Operations collection time information is also collected.

Starting collection of object information

You can manually start the collection of object information after selecting an adapter instance. Collection of performance information targeted by Hitachi Infrastructure Management Pack also starts when the collection of object information is started.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. In the **Inventory Management** window, expand **Adapter Instances** from the inventory list.
2. Select **Hitachi Storage Adapter Instance** or **Hitachi Network Adapter Instance**. A list of all existing adapter instances is displayed on the **Objects** tab.
3. Select the adapter instance for which you want to start collection, and then click the **Start Collecting** icon.

Stopping collection of object information

You can manually stop the collection of object information after selecting an adapter instance. Collection of performance information targeted by Hitachi Infrastructure Management Pack also stops when the collection of object information is stopped.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. In the **Inventory Management** window, expand **Adapter Instances** from the inventory list.
2. Select **Hitachi Storage Adapter Instance** or **Hitachi Network Adapter Instance**. A list of all existing adapter instances is displayed on the **Objects** tab.
3. Select the adapter instance for which you want to stop collection, and then click the **Stop Collecting** icon.

Chapter 5: Collected Information


Performance Information




Collected object type information

Hitachi Infrastructure Management Pack only collects and displays object information that corresponds to datastores and virtual machines managed by VMware Aria Operations as object information, and that is registered with HIAA/Ops Center Analyzer, vCenter Server, or HDCA/Analyzer Detail View.

The following table shows the information collected for each object type.

VSP family and VSP One B20

Object Type	Description	Naming convention
Virtual Logical Device	Virtual logical device information corresponding to the datastore  Note: For the model names and serial numbers of virtual storage machines in global storage virtualization configurations, check the identifier information of the Virtual Logical Device.	<i><virtual-logical-device-number>@<virtual-model>(SN:<virtual-serial-number>)</i> Example: 00:00:0C@VSP G1000(SN:12345)

Object Type	Description	Naming convention
Dynamic Provisioning Volume	<ul style="list-style-type: none"> ▪ Dynamic Provisioning volume information corresponding to the datastore (including Dynamic Provisioning volumes registered as namespaces in the NVM subsystem) ▪ Dynamic Provisioning volume information that configures the virtual logical device corresponding to the datastore ▪ Dynamic Provisioning volume information corresponding to the virtual machine <div style="border: 1px solid black; background-color: #e0f2f1; padding: 5px; margin-top: 10px;">  Note: If adaptive data reduction is used, DRS-VOLs are supported. </div>	<p><i><logical-device-number-of-Dynamic-Provisioning-volume>@<model>(SN:<serial-number>)</i></p> <p>Example:</p> <p>00:00:12@VSP G1000(SN:54321)</p>
Tier	<p>All tier information configured in HDT or active flash in the storage systems corresponding to the datastore or virtual machine</p> <div style="border: 1px solid black; background-color: #e0f2f1; padding: 5px; margin-top: 10px;">  Note: This object is not collected on VSP One B20. </div>	<p><i>DP<pool-ID>-<tier-number>@<model>(SN:<serial-number>)</i></p> <p>Example:</p> <p>DP9-1@VSP G1000(SN:54321)</p>
Dynamic Provisioning Pool	<p>Information of all Dynamic Provisioning pools, Dynamic Tiering pools, or active flash pools in the storage systems corresponding to the datastore or virtual machine</p>	<p><i>DP<pool-ID>@<model>(SN:<serial-number>)</i></p> <p>Example:</p> <p>DP1@VSP G1000(SN:54321)</p>
Logical Device	<ul style="list-style-type: none"> ▪ Logical devices corresponding to the Dynamic Provisioning pool ▪ Logical devices corresponding to the datastore ▪ Logical devices that configure the virtual logical devices corresponding to the datastore (including logical volumes registered as namespaces in the NVM subsystem) <div style="border: 1px solid black; background-color: #e0f2f1; padding: 5px; margin-top: 10px;">  Note: This object is not collected on VSP One B20. </div>	<p><i><logical-device-number>@<model>(SN:<serial-number>)</i></p> <p>Example:</p> <p>00:00:0C@VSP G1000(SN:54321)</p>

Object Type	Description	Naming convention
Parity Group	All parity group information in the storage systems corresponding to the datastore or virtual machine	<p><parity-group-number>@<model>(SN:<serial-number>)</p> <p>Example:</p> <p>1-6@VSP G1000(SN:54321)</p>
Cache	All cache (CLPR) information in the storage systems corresponding to the datastore or virtual machine	<p>CLPR<CLPR-number>@<model>(SN:<serial-number>)</p> <p>Example:</p> <p>CLPR0@VSP G1000(SN:54321)</p>
Host Group	All host group information in the storage systems corresponding to the datastore or virtual machine	<p><host-group-name>@<model>(SN:<serial-number>)</p> <p>Example:</p> <p>HOST1234@VSP G1000(SN:54321)</p>
Port	All port information in the storage systems corresponding to the datastore or virtual machine	<p><port-name>@<model>(SN:<serial-number>)</p> <p>Example:</p> <p>CL1-A@VSP G1000(SN:54321)</p>
Management Processor Blade	All Management Processor Blade information in the storage systems corresponding to the datastore or virtual machine	<p>For VSP G1000, VSP G1500, and VSP F1500 storage systems:</p> <p>MPB<MPB-number>@<model>(SN:<serial-number>)</p> <p>For VSP E series, VSP Gx00, VSP Fx00, VSP 5000 series, and VSP One B20 storage systems:</p> <p>MPU-<MPU-number>@<model>(SN:<serial-number>)</p> <p>Example:</p>

Object Type	Description	Naming convention
		MPB1@VSP G1000(SN:54321)
Journal Group	All journal group information in the storage systems corresponding to the datastore or virtual machine	<journal-group-ID>@<model>(SN:<serial-number>) Example: 003@VSP G1000(SN:54321)
Storage	Storage system information corresponding to the datastore or virtual machine	<model>(SN:<serial-number>) Example: VSP G1000(SN:54321)

VSP One SDS Block

Object Type	Description	Naming convention
Dynamic Provisioning Volume	<ul style="list-style-type: none"> ▪ Volume information corresponding to the datastore ▪ Volume information corresponding to the virtual machine 	<volume-number>@<model>(<storage-nickname>) Example: 0@VSSB(SC01)
Dynamic Provisioning Pool	Information of all storage pool in the storage systems corresponding to the datastore or virtual machine	<pool-name>@<model>(<storage-nickname>) Example: SP01@VSSB(SC01)
Protection Domain	All protection domain information in the storage systems corresponding to the datastore	<protection-domain-name>@<model>(<storage-nickname>) Example: SC01-PD01@VSSB(SC01)

Object Type	Description	Naming convention
Storage Node	All storage node information in the storage systems corresponding to the datastore (performance information about input and output to storage nodes, performance information about the CPUs and memory of storage nodes, etc.)	<storage-node-name>@<model>(<storage-nickname>) Example: SN01@VSSB(SC01)
Port	All compute port information in the storage systems corresponding to the datastore or virtual machine	<port-name>@<model>(<storage-nickname>) Example: iqn.1994-04.jp.co.hitachi:rsd.sph.t.10e7c.000@VSSB(SC01)
Storage	Storage cluster information corresponding to the datastore or virtual machine	<model>(<storage-nickname>) Example: VSSB(SC01)

Brocade FC switch

Object Type	Description	Naming convention
Brocade Fabric World	Information about One Brocade Fabric World registered in VMware Aria Operations (summary information for all switches)	Brocade Fabric World
Brocade Fabric Switch	Information about all switches registered in HDCA/Analyzer Detail View (for example, performance information about the switches' CPUs and memory)	<switch-name> Example: Brocade5000-05
Brocade Fabric Switch Port	Information about all ports on switches registered in HDCA/Analyzer Detail View (for example, performance and error information related to the data transfer of switch ports)	<switch-port-name> Example: 10:00:00:05:33:FF:01:F5^1

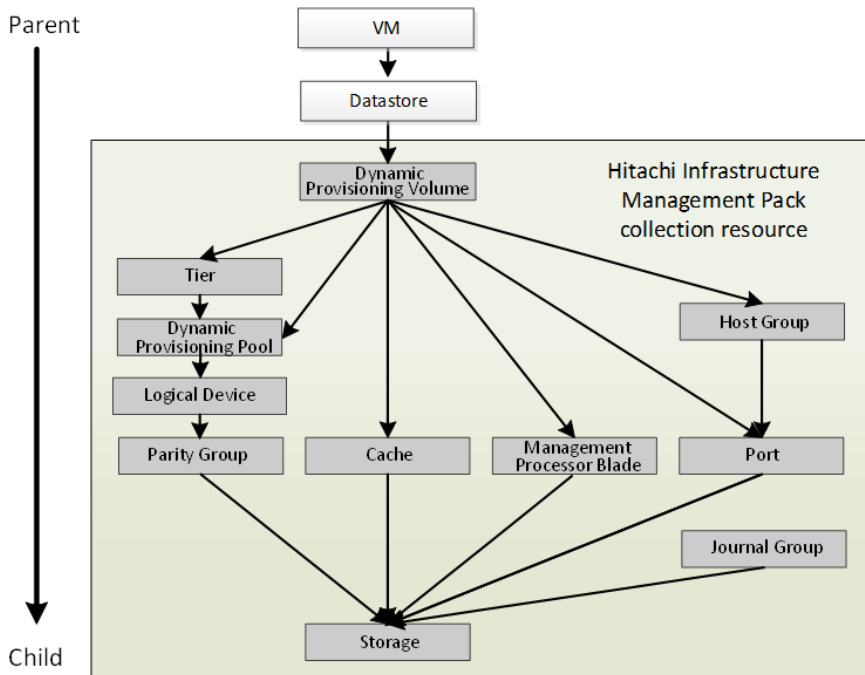
Parent-child relationships among object types

Parent-child relationships are defined among object types when Hitachi Infrastructure Management Pack collects storage information. The following figures illustrate the parent-child relationships among object types.

VSP family and VSP One B20

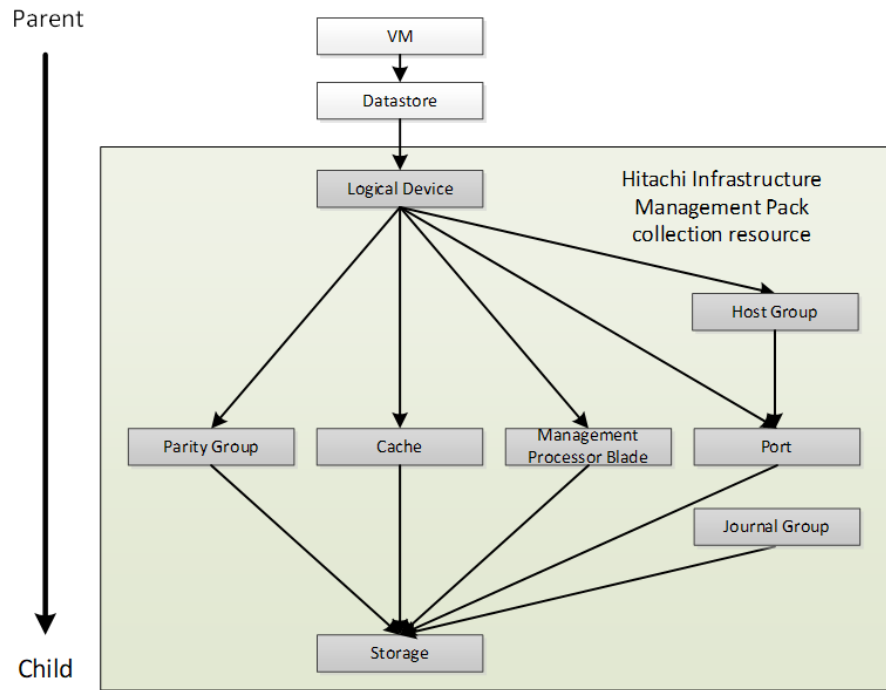
Configuration with HDT/active flash/HDP configured (when global storage virtualization is not configured)

The following figure shows the parent-child relationship among object types when HDT/active flash/HDP is configured, and the global storage virtualization is not configured.



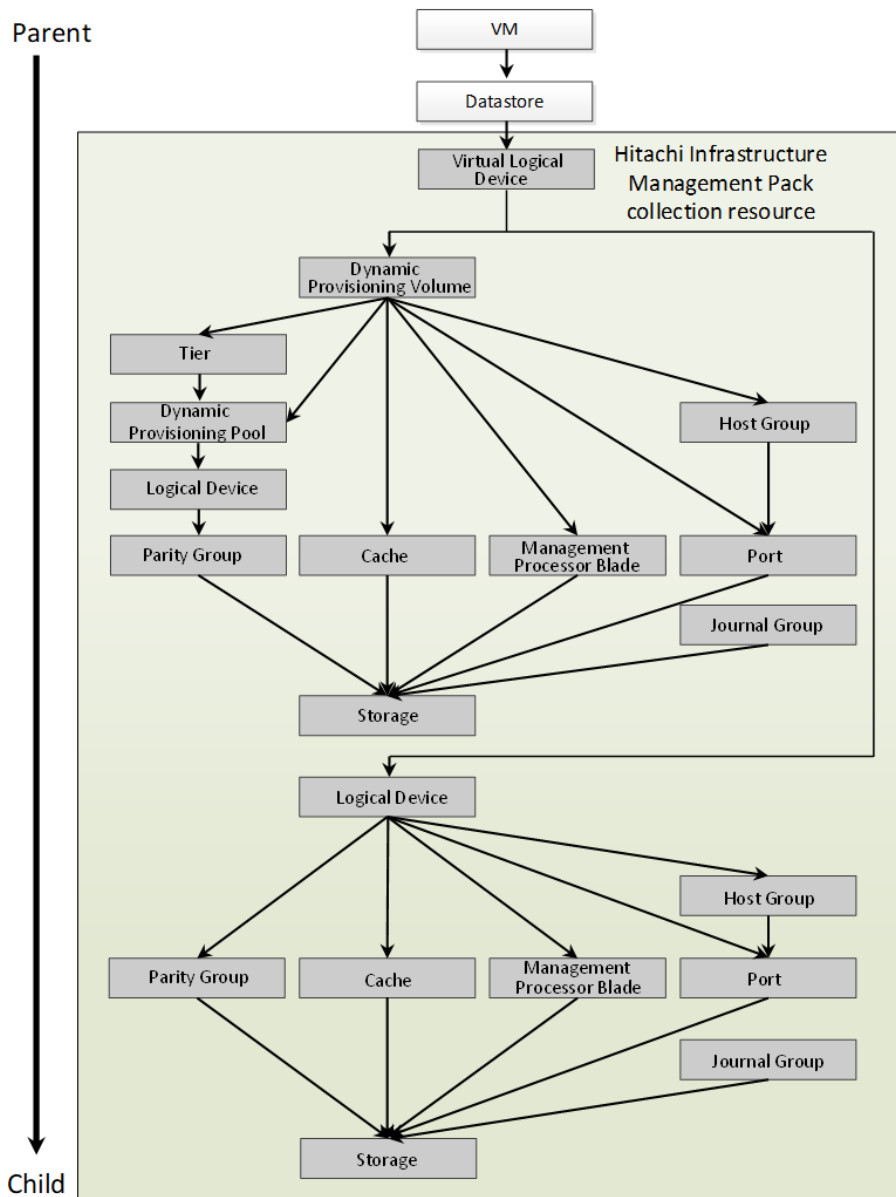
Configuration without HDT/active flash/HDP configured (when global storage virtualization is not configured)

The following figure shows the parent-child relationship among object types when HDT/active flash/HDP is not configured, and the global storage virtualization is not configured.



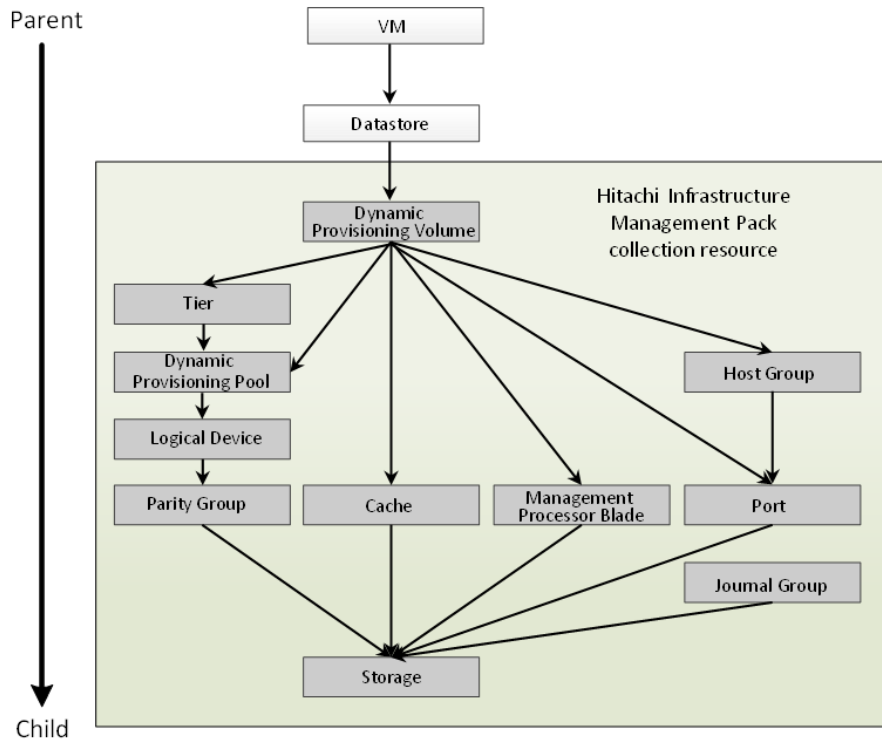
Configuration with global storage virtualization configured

The following figure shows the parent-child relationship among object types when global storage virtualization is configured.

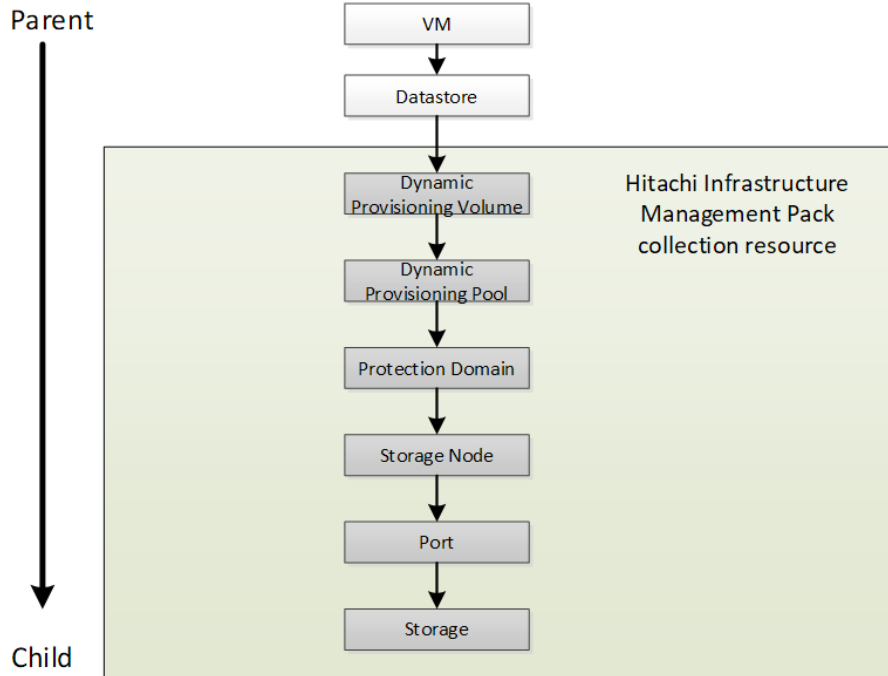


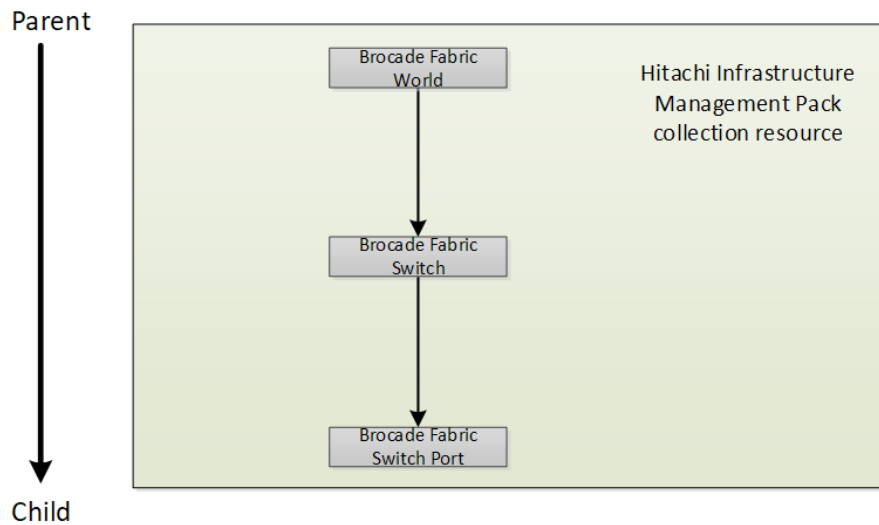
Configuration with Virtual Volumes configured

The following figure shows the parent-child relationship among object types when Virtual Volumes (vVols) is configured.



VSP One SDS Block



Brocade FC switch**Collecting performance/alert information**

The performance/alert information collection function collects performance and alert information about storage objects from HIAA/Ops Center Analyzer and vCenter Server, as well as performance and alert information about network objects from HDCA/Analyzer Detail View.

Managing objects

Observe the following guidelines when adding or removing objects in a system configuration.

When adding objects

When VMware Aria Operations first detects an object that has been newly added to the system configuration, it collects only the identifiers for that object. It begins collecting the metrics for that object at the subsequent interval.

When removing an object

Even though you remove an object from your system configuration, any data already collected for that object remains in VMware Aria Operations. To remove the object data, you must remove it manually. For details, see the VMware Aria Operations documentation.

List of collection items (VSP family and VSP One B20)**Virtual Logical Device**

The following tables show identifier, metric, and property information for Virtual Logical Device objects.

Virtual Logical Device identifiers

Identifier	Data Source*		Description
	Record	Key	
VLDEVNumber	-	-	Virtual logical device number
VDKCName	-	-	Product name of the virtual storage machine
VDKCSerialNumber	-	-	Serial number of the virtual storage machine
<p>* These columns show the information that is collected as the identifier or metric. If an identifier or metric has been collected from HIAA/Ops Center Analyzer RAID Agent, its name is shown in the Record column and the Key column, respectively. For details about the record and key names, refer to the HIAA/Ops Center Analyzer documentation. If the identifier or the metric has been collected from HIAA/Ops Center Analyzer, it is shown in the Key column.</p>			

Virtual Logical Device metrics

Information about a simplex LDEV or about the primary logical device of a global-active device pair is collected.

Metric	Category	Data Source		Description
		Record	Key	
Random Total I/O per second	DISK IO Operation	PI_LDS	RANDOM_TOTAL_IO_RATE	Frequency of random processing (sum total of random read processing and random write processing per second).
Random Total Xfer Rate (MBps)	DISK IO Operation	PI_LDS	RANDOM_TOTAL_XFER_RATE	Transfer speed of random processing (sum total, in MB, of random read processing and random write processing per second).
Read Hit (%)	DISK IO Operation	PI_LDS	READ_HIT_RATE	Cache hit ratio of read processing.
Read I/O per second	DISK IO Operation	PI_LDS	READ_IO_RATE	Frequency of read processing (per second).
Read Response Rate (us)	DISK IO Operation	PI_LDS	READ_RESPONSE_RATE	Average processing time per read processing request (microseconds).

Metric	Category	Data Source		Description
		Record	Key	
Read Xfer Rate (MBps)	DISK IO Operation	PI_LDS	READ_XFER_RATE	Transfer speed of read processing (MB per second).
Sequential Total I/O per second	DISK IO Operation	PI_LDS	SEQUENTIAL_TOTAL_IO_RATE	Frequency of sequential processing (sum total of sequential read processing and sequential write processing per second).
Sequential Total Xfer Rate (MBps)	DISK IO Operation	PI_LDS	SEQUENTIAL_TOTAL_XFER_RATE	Transfer speed of sequential processing (sum total of MB of sequential read processing and sequential write processing per second).
Total Response Rate (us)	DISK IO Operation	PI_LDS	TOTAL_RESPONSE_RATE	Average processing time per read processing and write processing request (microseconds).
Write Hit (%)	DISK IO Operation	PI_LDS	WRITE_HIT_RATE	Cache hit ratio of write processing.
Write I/O per second	DISK IO Operation	PI_LDS	WRITE_IO_RATE	Frequency of write processing (per second).
Write Response Rate (us)	DISK IO Operation	PI_LDS	WRITE_RESPONSE_RATE	Average processing time per write processing request (microseconds).
Write Xfer Rate (MBps)	DISK IO Operation	PI_LDS	WRITE_XFER_RATE	Transfer speed of write processing (MB per second).
Aggregate of R/W IOPS	DISK IO Operation	PI_LDS	-	Total frequency of read and write processing. This value is calculated by using the following formula: READ_IO_RATE + WRITE_IO_RATE

Metric	Category	Data Source		Description
		Record	Key	
Aggregate of R/W Xfer Rate (MBps)	DISK IO Operation	PI_LDS	-	Total transfer speed of read and write processing. This value is calculated by using the following formula: READ_XFER_RATE + WRITE_XFER_RATE
Initial Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	INITIAL_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during the initial copy for TrueCopy and global-active device
Update Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	UPDATE_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during an update copy for TrueCopy and global-active device
Total Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	-	Total transfer speed (MB per second) for TrueCopy and global-active device. This value is calculated by using the following formula: INITIAL_COPY_XFER_RATE + UPDATE_COPY_XFER_RATE

Virtual Logical Device properties

Property	Category ¹	Data Source		Description
		Record	Key	
Label	Configuration	PD_LDC	LDEV_NAME	Label (property) of the physical volume that makes up the virtual volume. If no label is defined, this property is blank.

Property	Category ¹	Data Source		Description
		Record	Key	
Replication Status	Replication Aggregate of all instances	PD_LDCC/ PD_LDC	-	<p>The TrueCopy, global-active device, or Universal Replicator replication status.</p> <ul style="list-style-type: none"> ▪ Error: There is at least one pair for which an error has occurred. ▪ Normal: There are no pairs for which an error has occurred. ▪ Unknown: The status is unknown. <p>The status is one of the following:</p> <ul style="list-style-type: none"> • There is a TrueCopy or Universal Replicator pair whose status could not be acquired. • There is a global-active device pair. <ul style="list-style-type: none"> ▪ -: The configuration is not a replication configuration, or an error occurred during processing to get replication information.
Pair Volume	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>Information about pair volumes. Values are collected in the following format:</p> <p><i><logical-device-number>(SN:<storage-system-serial-number>)</i></p> <p>If information about a pair volume is unknown, then the value is shown as a dash (-). If there are no pairs, then no values are collected.</p>
Replication Status	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	The pair status.

Property	Category ¹	Data Source		Description
		Record	Key	
				<p>For details about pair statuses, see the <i>Hitachi TrueCopy® User Guide</i> and the <i>Hitachi Universal Replicator User Guide</i> for the storage system you are using.</p> <p>If the status of a TrueCopy or Universal Replicator pair cannot be acquired or if the pair is a global-active device pair, then the value is shown as a dash (-). If there are no pairs, then no values are collected.</p>
Replication Type	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>The replication type.</p> <ul style="list-style-type: none"> ▪ TrueCopy ▪ Universal Replicator ▪ global-active device <p>If no pairs exist, no values are collected.</p>
Replication Volume Type	Replication Pair<number> ²	PD_LDCC/ PD_LDD	-	<p>The volume type.</p> <ul style="list-style-type: none"> ▪ Primary: The volume is a primary volume. ▪ Secondary: The volume is a secondary volume. <p>If no pairs exist, no values are collected.</p>
NVMNamespaceID	Configuration	PD_LDC	NVM_NAMESPACE_ID	<p>The NVM namespace ID of the volume allocated to the NVMe namespace.</p> <p>This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.</p>
NVMSubsystemID	Configuration	PD_LDC	NVM_SUBSYSTEM_ID	<p>The NVM subsystem ID of the volume allocated to the NVMe namespace.</p> <p>This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.</p>

Property	Category ¹	Data Source		Description
		Record	Key	
Notes:				
1. Category names containing a vertical bar () indicate a subcategory in the following format: <category> <subcategory>.				
2. <number> is a value in the range from 1 to 3.				

Dynamic Provisioning Volume

The following tables show identifier, metric, and property information for Dynamic Provisioning Volume objects.

Dynamic Provisioning Volume identifiers

Identifier	Data Source		Description
	Record	Key	
LDEVNumber	PD_VV C	LDEV_NUMBER	The logical device number of the V-VOL.
DKCName	PD	DKC_NAME	The product name of the storage system.
DKCSerialNumber	PD	DKC_SERIAL_N UMBER	The serial number of the storage system.

Dynamic Provisioning Volume metrics

Metric	Category ¹	Data Source		Description
		Record	Key	
Pool Free Capacity (%)	Capacity	PD_VV C	POOL_FREE_C APACITY_RATE	Ratio of the free capacity of the Dynamic Provisioning pool to which the V-VOL belongs, to the free capacity of the V-VOL. If the free capacity of the V-VOL is small, the value of this field might become extremely large.

Metric	Category ¹	Data Source		Description
		Record	Key	
				If the pool consists of flash drives, this value is calculated according to the logical capacity. ² If the pool consists of non-flash drives, this value is calculated according to the physical capacity.
Virtual Volume Capacity (GB)	Capacity	PD_VV C	VIRTUAL_VOLU ME_CAPACITY	Virtual capacity of the V-VOL (GB)
Free Capacity (GB)	Capacity	PD_VV C	FREE_CAPACIT Y	Free capacity of the V-VOL (GB)
Usage (%)	Capacity	PD_VV C	USAGE_RATE	Percentage of the actual capacity used as the virtual capacity of the V-VOL
Used Capacity (GB)	Capacity	PD_VV C	USED_CAPACIT Y	Actual capacity that is used for the V-VOL (GB)
Random Total I/O per second	DISK IO Operation	PI_LD S	RANDOM_TOTA L_IO_RATE	Frequency of random processing (operations per second)
Random Total Xfer Rate (MBps)	DISK IO Operation	PI_LD S	RANDOM_TOTA L_XFER_RATE	Transfer speed of random processing (MB per second)
Read Hit (%)	DISK IO Operation	PI_LD S	READ_HIT_RAT E	Cache hit ratio of read processing.
Read I/O per second	DISK IO Operation	PI_LD S	READ_IO_RATE	Frequency of read processing. (operations per second)
Read Response Rate (us)	DISK IO Operation	PI_LD S	READ_RESPON SE_RATE	Average processing time per read process request. (microsecond)
Read Xfer Rate (MBps)	DISK IO Operation	PI_LD S	READ_XFER_R ATE	Transfer speed of read processing. (MB per second)
Sequential Total I/O per second	DISK IO Operation	PI_LD S	SEQUENTIAL_T OTAL_IO_RATE	Frequency of sequential processing. (operations per second)

Metric	Category ¹	Data Source		Description
		Record	Key	
Sequential Total Xfer Rate (MBps)	DISK IO Operation	PI_LDS	SEQUENTIAL_TOTAL_XFER_RATE	Transfer speed of sequential processing. (MB per second)
Total Response Rate (us)	DISK IO Operation	PI_LDS	TOTAL_RESPONSE_RATE	Average processing time per the read/write processing request (microseconds)
Write Hit (%)	DISK IO Operation	PI_LDS	WRITE_HIT_RATE	Cache hit ratio of write processing
Write I/O per second	DISK IO Operation	PI_LDS	WRITE_IO_RATE	Frequency of write processing. (operations per second)
Write Response Rate (us)	DISK IO Operation	PI_LDS	WRITE_RESPONSE_RATE	Average processing time per write processing request (microseconds)
Write Xfer Rate (MBps)	DISK IO Operation	PI_LDS	WRITE_XFER_RATE	Transfer speed of write processing (MB per second)
Aggregate of R/W IOPS	DISK IO Operation	PI_LDS	-	Total frequency of read and write processing. This value is calculated by using the following formula: READ_IO_RATE + WRITE_IO_RATE
Aggregate of R/W Xfer Rate (MBps)	DISK IO Operation	PI_LDS	-	Total transfer speed of read and write processing. This value is calculated by using the following formula: READ_XFER_RATE + WRITE_XFER_RATE
Usage in Tier (%)	tier<number> ³ Capacity	PD_VVTC	USAGE_RATE	The ratio of the virtual capacity of the V-VOL to the actual capacity used for the tier
Used Capacity in Tier (GB)	tier<number> ³ Capacity	PD_VVTC	USED_CAPACITY	The amount of the virtual capacity of the V-VOL that is actually used for the tier (GB)

Metric	Category ¹	Data Source		Description
		Record	Key	
Avg I/O per second	tier<number> ³ I/O Operation	PI_VV TI	AVG_IO_RATE	Average frequency (per second) of the read/write processing for the tier. Note, however, that because this value does not include cache hits, it does not match the performance information of the virtual volume.
Initial Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	INITIAL_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during the initial copy for TrueCopy and global-active device
Update Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	UPDATE_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during an update copy for TrueCopy and global-active device
Total Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDT C	-	Total transfer speed (MB per second) for TrueCopy and global-active device. This value is calculated by using the following formula: INITIAL_COPY_XFER_RATE + UPDATE_COPY_XFER_RATE
<p>Notes:</p> <ol style="list-style-type: none"> Category names containing a vertical bar () indicate a subcategory in the following format: <category> <subcategory>. When a VSP F350, F370, F700, F900 storage system, a VSP G350, G370, G700, G900 storage system, or a VSP 5000 series storage system is used, these values change automatically. When a VSP G1000, VSP G1500, or VSP F1500 storage system is used, these values change automatically if all of the following conditions are met. <ul style="list-style-type: none"> The pool auto expansion function is enabled for the pool. HIAA 4.1.0 or later, or Hitachi Ops Center Analyzer is used. <number> is a value corresponding to the tier number. 				

Dynamic Provisioning Volume properties

Property	Category ¹	Data Source		Description
		Record	Key	
Label	Configuration	PD_LDC	LDEV_NAME	Label (property) of the logical device. If no label is defined, this value is blank.
Data Saving	Configuration	PD_VVC	DATA_SAVING	Settings for deduplication and compression: <ul style="list-style-type: none"> ▪ Disabled: Deduplication and compression are disabled. ▪ Compression: Only compression is enabled. ▪ Compression and Deduplication: Both deduplication and compression are enabled.
Replication Status	Replication Aggregate of all instances	PD_LDCC/ PD_LDC	-	The TrueCopy, global-active device, or Universal Replicator replication status. <ul style="list-style-type: none"> ▪ Error: There is at least one pair for which an error has occurred. ▪ Normal: There are no pairs for which an error has occurred. ▪ Unknown: The status is unknown. <p>The status is one of the following:</p> <ul style="list-style-type: none"> • There is a TrueCopy or Universal Replicator pair whose status could not be acquired. • There is a global-active device pair. <ul style="list-style-type: none"> ▪ -: The configuration is not a replication configuration, or an error occurred during processing to get replication information.

Property	Category ¹	Data Source		Description
		Record	Key	
Pair Volume	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	Information about pair volumes. Values are collected in the following format: <logical-device-number>(SN:<storage-system-serial-number>) If information about a pair volume is unknown, then the value is shown as a dash (-). If there are no pairs, then no values are collected.
Replication Status	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	The pair status. For details about pair statuses, see the <i>Hitachi TrueCopy® User Guide</i> and the <i>Hitachi Universal Replicator User Guide</i> for the storage system you are using. If the status of a TrueCopy or Universal Replicator pair cannot be acquired or if the pair is a global-active device pair, then the value is shown as a dash (-). If there are no pairs, then no values are collected.
Replication Type	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	The replication type. <ul style="list-style-type: none"> ▪ TrueCopy ▪ Universal Replicator ▪ global-active device If no pairs exist, no values are collected.
Replication Volume Type	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	The volume type. <ul style="list-style-type: none"> ▪ Primary: The volume is a primary volume. ▪ Secondary: The volume is a secondary volume. If no pairs exist, no values are collected.

Property	Category ¹	Data Source		Description
		Record	Key	
NVMNamespaceID	Configuration	PD_LDC	NVM_NAMESPACE_ID	The NVM namespace ID of the volume allocated to the NVMe namespace. This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.
NVMSubsystemID	Configuration	PD_LDC	NVM_SUBSYSTEM_ID	The NVM subsystem ID of the volume allocated to the NVMe namespace. This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.
<p>Notes:</p> <ol style="list-style-type: none"> 1. Category names containing a vertical bar () indicate a subcategory in the following format: <category> <subcategory>. 2. <number> is a value in the range from 1 to 3. 				

Tier

The following tables show identifier and metric information for Tier objects.

Tier identifiers

Identifier	Data Source		Description
	Record	Key	
PoolID	PD_PL TC	POOL_ID	The Pool ID of the HDP, HDT, or active flash pool
TierNumber	PD_PL TC	TIER_NUMBER	The tier number
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system

Tier metrics

Metric	Category	Data Source		Description
		Record	Key	
Total Capacity (GB)	Capacity	PD_PLT C	<ul style="list-style-type: none"> ▪ PHYSICAL_F MC_CAPACI TY_TOTAL ▪ TOTAL_CAPA CITY 	<p>Actual capacity of the tier (GB)</p> <p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled*: The physical capacity is displayed. ▪ For pools other than the above: The logical capacity is displayed.
Free Capacity (GB)	Capacity	PD_PLT C	<ul style="list-style-type: none"> ▪ PHYSICAL_F MC_CAPACI TY_FREE ▪ FREE_CAPA CITY 	<p>Free capacity of the tier (GB)</p> <p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled*: The physical capacity is displayed. ▪ For pools other than the above: The logical capacity is displayed.

Metric	Category	Data Source		Description
		Record	Key	
Usage in Pool (%)	Capacity	PD_PLTC	<ul style="list-style-type: none"> ▪ PD_PLTC.PHYSICAL_FMC_CAPACITY_USED / PD_PLTC.PHYSICAL_CAPACITY_TOTAL *100 ▪ USAGE_RATE_IN_POOL 	<p>Ratio of the capacity used for the tier, to the actual total logical capacity of the Dynamic Provisioning pool that manages the tier.</p> <p>If the pool consists of non-flash drives, the value is calculated according to the physical capacity. If the pool consists of flash drives, the value is calculated as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled*: The value is calculated according to the physical capacity. ▪ For pools other than the above: The value is calculated according to the logical capacity.
Usage in Tier (%)	Capacity	PD_PLTC	<ul style="list-style-type: none"> ▪ PHYSICAL_FMC_CAPACITY_USAGE_RATE ▪ USAGE_RATE_IN_TIER 	Ratio of the used capacity to the actual logical capacity of the tier.

Metric	Category	Data Source		Description
		Record	Key	
				<p>If the pool consists of non-flash drives, the value is calculated according to the physical capacity. If the pool consists of flash drives, the value is calculated as follows, according to the conditions.</p> <ul style="list-style-type: none"> For pools for which the pool auto expansion function is enabled*: The value is calculated according to the physical capacity. For pools other than the above: The value is calculated according to the logical capacity.
Used Capacity (GB)	Capacity	PD_PLT C	<ul style="list-style-type: none"> PHYSICAL_F MC_CAPACI TY_USED USED_CAPA CITY 	<p>The capacity that is used for the tier (GB)</p> <p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> For pools for which the pool auto expansion function is enabled*: The physical capacity is displayed. For pools other than the above: The logical capacity is displayed.
Avg I/O per second	Tier IO Operation	PI_PLTI	AVG_IO_RATE	Average read/write processing frequency for the tier (per second). Backend I/O for the tier.

Metric	Category	Data Source		Description
		Record	Key	
Avg I/O per second - predicted value	Tier IO Operation	PD_PLT S	AVG_IO_RATE	Frequency of I/O processed by the tier processed within the period set in the storage system (per second).
Avg IOPS Utilization - predicted value (%)	Tier IO Operation	PD_PLT S	AVG_IOPS_UTILIZATION_RATE	Operation rate of the tier (%). A ratio of the number of I/O operations that the tier actually processed to the number of I/O operations that the tier has the ability to process within the period set in the storage system.
Demoted Pages	Tier Pages	PD_PLT R	DEMOTED_PAGES	The number of pages that were moved to the lower tier.
Promoted Pages	Tier Pages	PD_PLT R	PROMOTED_PAGES	The number of pages that were moved to the upper tier.
<p>* This information applies to VSP F350, F370, F700, F900, VSP G350, G370, G700, G900, and VSP 5000 series storage systems.</p> <p>This information also applies to pools that use VSP G1000, VSP G1500, or VSP F1500 storage systems, and that meet all of the following conditions.</p> <ul style="list-style-type: none"> ▪ The pool auto expansion function is enabled for the pool. ▪ HIAA 4.1.0 or later, or Hitachi Ops Center Analyzer is used. 				

Dynamic Provisioning Pool

The following tables show identifier, metric, and property information for Dynamic Provisioning Pool objects.

Dynamic Provisioning Pool identifiers

Identifier	Data Source		Description
	Record	Key	
PoolID	PD_PL C	POOL_ID	The pool ID of the pool.
DKCName	PD	DKC_NAME	The product name of the storage system.

Identifier	Data Source		Description
	Record	Key	
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system.

Dynamic Provisioning Pool metrics

Metric	Category	Data Source		Description
		Record	Key	
Free Capacity (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ PHYSICAL_CAPACITY_FREE ▪ FREE_CAPACITY 	<p>The free capacity of the pool (GB).</p> <p>If deduplication and compression are enabled, this value indicates the free capacity after deduplication and compression.</p> <p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled*: The physical capacity is displayed. ▪ For pools other than the above: The logical capacity is displayed.
Total Actual Capacity (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ PHYSICAL_CAPACITY_TOTAL ▪ TOTAL_ACTUAL_CAPACITY 	Total actual capacity of the pool (GB).

Metric	Category	Data Source		Description
		Record	Key	
				<p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled for the pool*: The physical capacity is displayed. ▪ For pools other than the above: The logical capacity is displayed.
Total Managed Capacity (GB)	Capacity	PD_PLC	TOTAL_MANAGED_CAPACITY	Virtual capacity of all Dynamic Provisioning virtual volumes mapped on the pool (GB).
Usage (%)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ PHYSICAL_CAPACITY_USAGE_RATE ▪ USAGE_RATE 	<p>Ratio of the used capacity to the total volume of the pool.</p> <p>If deduplication and compression are enabled, the value indicates the usage ratio after deduplication and compression.</p>

Metric	Category	Data Source		Description
		Record	Key	
				<p>If the pool consists of non-flash drives, this value is calculated according to the physical capacity. If the pool consists of flash drives, this value is calculated as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled for the pool*: The value is calculated according to the physical capacity. ▪ For pools other than the above: The value is calculated according to the logical capacity.
Used Capacity (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ PHYSICAL_CAPACITY_USED ▪ USED_CAPACITY 	<p>Used capacity of the pool (GB). If deduplication and compression are enabled, the value indicates the used capacity after deduplication and compression.</p> <p>If the pool consists of non-flash drives, the physical capacity is displayed. If the pool consists of flash drives, the capacity is displayed as follows, according to the conditions.</p> <ul style="list-style-type: none"> ▪ For pools for which the pool auto expansion function is enabled for the pool*: The physical capacity is displayed. ▪ For pools other than the above: The logical capacity is displayed.

Metric	Category	Data Source		Description
		Record	Key	
Read I/O per second	POOL IO Operation	PI_PLS	READ_IO_RATE	Frequency of read processing of virtual volumes mapped on the pool (per second)
Read Response Rate (us)	POOL IO Operation	PI_PLS	READ_RESPONSE_RATE	Average processing time per read processing request of the virtual volumes mapped on the pool (microseconds)
Read Xfer Rate (MBps)	POOL IO Operation	PI_PLS	READ_XFER_RATE	Total transfer speed of read processing of the virtual volumes mapped on the pool (MB per second)
Write I/O per second	POOL IO Operation	PI_PLS	WRITE_IO_RATE	Frequency of write processing of the virtual volumes mapped on the pool (per second)
Write Response Rate (us)	POOL IO Operation	PI_PLS	WRITE_RESPONSE_RATE	Average processing time per write processing request of the virtual volumes mapped on the pool (microseconds)
Write Xfer Rate (MBps)	POOL IO Operation	PI_PLS	WRITE_XFER_RATE	Total transfer speed of write processing of the virtual volumes mapped on the pool (MB per second)
Pool I/O Density	Super Metric	Super Metric	-	The ratio of input and output to the capacity of the pool. This value is calculated by using the following formula: = $(\text{value-of-} \text{"Read I/O per second"} + \text{value-of-} \text{"Write I/O per second"}) / \text{value-of-} \text{"Total Actual Capacity"}$
Total Used Capacity before Data reduction (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ DATA_VOLUME_USED_CAPACITY ▪ DKC_SAVING_CAPACITY + USED_CAPACITY 	Capacity before any deduplication and compression.

Metric	Category	Data Source		Description
		Record	Key	
Total Used Capacity after Data reduction (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ PHYSICAL_CAPACITY_USED ▪ USED_CAPACITY - FMC_POOL_CAPACITY_SAVING 	Capacity after any deduplication and compression.
Total Capacity Savings (GB)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ SAVING_CAPACITY ▪ DKC_SAVING_CAPACITY + FMC_POOL_CAPACITY_SAVING 	Total capacity saved after deduplication and compression, and accelerated compression.
Total Capacity Savings (%)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ $(1 - (1 / \text{SAVING_RATIO})) * 100$ ▪ $(\text{DKC_SAVING_CAPACITY} + \text{FMC_POOL_CAPACITY_SAVING}) / (\text{DKC_SAVING_CAPACITY} + \text{USED_CAPACITY}) * 10$ 	Percentage of capacity saved by using deduplication and compression, and accelerated compression.

Metric	Category	Data Source		Description
		Record	Key	
Total Capacity Savings Ratio	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ SAVING_RATIO ▪ $(DKC_SAVING_CAPACITY + USED_CAPACITY) / (USED_CAPACITY - FMC_POOL_CAPACITY_SAVING)$ 	Total used capacity before data reduction / Total used capacity after data reduction.
Deduplication + Compression Capacity Savings (%)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ $(1 - (1 / DKC_SAVING_RATIO)) * 100$ ▪ $DKC_SAVING_CAPACITY / (DKC_SAVING_CAPACITY + USED_CAPACITY) * 100$ 	Percentage of capacity saved by using deduplication and compression.
Compression Capacity Savings (%)	Capacity	PD_PLC	<ul style="list-style-type: none"> ▪ $(1 - (1 / FMC_POOL_CAPACITY_COMP_RATIO)) * 100$ ▪ $FMC_POOL_CAPACITY_SAVING / USED_CAPACITY * 100$ 	Accelerated compression.
<p>* This information applies to pools that use VSP F350, F370, F700, F900, VSP G350, G370, G700, G900, and VSP 5000 series storage systems.</p> <p>This information also applies to pools that use VSP G1000, VSP G1500, or VSP F1500 storage systems, and that meet all of the following conditions.</p> <ul style="list-style-type: none"> ▪ The pool auto expansion function is enabled for the pool. ▪ HIAA 4.1.0 or later, or Hitachi Ops Center Analyzer is used. 				

Dynamic Provisioning Pool properties

Property	Category	Data Source		Description
		Record	Key	
Data Saving	Configuration	PD_PLC	DATA_SAVING	Settings for deduplication: <ul style="list-style-type: none"> ▪ Deduplication not available: Deduplication is disabled. ▪ Deduplication available: Deduplication is enabled.

Logical Device

The following tables show identifier, metric, and property information for Logical Device objects.

Logical Device identifiers

Identifier	Data Source		Description
	Record	Key	
LDEVNumber	PD_LD C	LDEV_NUMBER	The logical device number.
DKCName	PD	DKC_NAME	The product name of the storage system.
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system.

Logical Device metrics

Metric	Category	Data Source		Description
		Record	Key	
Busy (%)	DISK IO Operation	PI_LDE	BUSY_RATE	The usage ratio (%) of the logical device.
Random Total I/O per second	DISK IO Operation	PI_LDS	RANDOM_TOTAL_IO_RATE	Frequency of random processing (sum total of the number of times of random read processing and random write processing are performed per second)

Metric	Category	Data Source		Description
		Record	Key	
Random Total Xfer Rate (MBps)	DISK IO Operation	PI_LDS	RANDOM_TOTAL_XFER_RATE	Transfer speed of random processing (sum total, in MB, of random read processing and random write processing per second).
Read Hit (%)	DISK IO Operation	PI_LDS	READ_HIT_RATE	Cache hit ratio of read processing
Read I/O per second	DISK IO Operation	PI_LDS	READ_IO_RATE	Frequency of read processing (times per second)
Read Response Rate (us)	DISK IO Operation	PI_LDS	READ_RESPONSE_RATE	Average processing time per read processing request (microseconds)
Read Xfer Rate (MBps)	DISK IO Operation	PI_LDS	READ_XFER_RATE	Transfer speed of read processing (MB per second)
Sequential Total I/O per second	DISK IO Operation	PI_LDS	SEQUENTIAL_TOTAL_IO_RATE	Frequency of sequential processing (total number of sequential read processing and sequential write processing are performed per second)
Sequential Total Xfer Rate (MBps)	DISK IO Operation	PI_LDS	SEQUENTIAL_TOTAL_XFER_RATE	Transfer speed of sequential processing (sum total, in MB, of sequential read processing and sequential write processing per second)
Total Response Rate (us)	DISK IO Operation	PI_LDS	TOTAL_RESPONSE_RATE	Average processing time per read/write processing request (microseconds)
Write Hit (%)	DISK IO Operation	PI_LDS	WRITE_HIT_RATE	Cache hit ratio of write processing
Write I/O per second	DISK IO Operation	PI_LDS	WRITE_IO_RATE	Frequency of write processing (per second)
Write Response Rate (us)	DISK IO Operation	PI_LDS	WRITE_RESPONSE_RATE	Average processing time per write processing request (microseconds)
Write Xfer Rate (MBps)	DISK IO Operation	PI_LDS	WRITE_XFER_RATE	Transfer speed of write processing (MB per second)

Metric	Category	Data Source		Description
		Record	Key	
Aggregate of R/W IOPS	DISK IO Operation	PI_LDS	-	Total frequency of read and write processing. This value is calculated by using the following formula: READ_IO_RATE + WRITE_IO_RATE
Aggregate of R/W Xfer Rate (MBps)	DISK IO Operation	PI_LDS	-	Total transfer speed of read and write processing. This value is calculated by using the following formula: READ_XFER_RATE + WRITE_XFER_RATE
Initial Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDTC	INITIAL_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during the initial copy for TrueCopy and global-active device
Update Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDTC	UPDATE_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during an update copy for TrueCopy and global-active device
Total Copy Xfer Rate (MBps)	Replication IO Operation	PI_LDTC	-	Total transfer speed (MB per second) for TrueCopy and global-active device. This value is calculated by using the following formula: INITIAL_COPY_XFER_RATE + UPDATE_COPY_XFER_RATE

Logical Device properties

Property	Category ¹	Data Source		Description
		Record	Key	
Label	Configuration	PD_LDC	LDEV_NAME	Label of the physical device (property). If no label is defined, this value is blank.
Replication Status	Replication Aggregate of all instances	PD_LDCC/ PD_LDC	-	<p>The status of TrueCopy, global-active device, or Universal Replicator replication:</p> <ul style="list-style-type: none"> ▪ Error: There is at least one pair for which an error has occurred. ▪ Normal: There are no pairs for which an error has occurred. ▪ Unknown: The status is unknown. <p>The status is one of the following:</p> <ul style="list-style-type: none"> • There is a TrueCopy or Universal Replicator pair whose status could not be acquired. • There is a global-active device pair. <ul style="list-style-type: none"> ▪ -: The configuration is not a replication configuration, or an error occurred during processing to get replication information.
Pair Volume	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>Information about pair volumes. Values are collected in the following format:</p> <p><i><logical-device-number>(SN:<storage-system-serial-number>)</i></p> <p>If information about a pair volume is unknown, then the value is shown as a dash (-). If there are no pairs, then no values are collected.</p>

Property	Category ¹	Data Source		Description
		Record	Key	
Replication Status	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>The pair status.</p> <p>For details about pair statuses, see the <i>Hitachi TrueCopy® User Guide</i> and the <i>Hitachi Universal Replicator User Guide</i> for the storage system you are using.</p> <p>If the status of a TrueCopy or Universal Replicator pair cannot be acquired or if the pair is a global-active device pair, then the value is shown as a dash (-). If there are no pairs, then no values are collected.</p>
Replication Type	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>The replication type.</p> <ul style="list-style-type: none"> ▪ TrueCopy ▪ Universal Replicator ▪ global-active device <p>If no pairs exist, no values are collected.</p>
Replication Volume Type	Replication Pair<number> ²	PD_LDCC/ PD_LDC	-	<p>The volume type.</p> <ul style="list-style-type: none"> ▪ Primary: The volume is a primary volume. ▪ Secondary: The volume is a secondary volume. <p>If no pairs exist, no values are collected.</p>
NVMNamespaceID	Configuration	PD_LDC	NVM_NAME SPACE_ID	<p>The NVM namespace ID of the volume allocated to the NVMe namespace.</p> <p>This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.</p>

Property	Category ¹	Data Source		Description
		Record	Key	
NVMSubsystemID	Configuration	PD_LDC	NVM_SUBSYSTEM_ID	The NVM subsystem ID of the volume allocated to the NVMe namespace. This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.
Notes: <ol style="list-style-type: none"> Category names containing a vertical bar () indicate a subcategory in the following format: <category> <subcategory>. <number> is a value in the range from 1 to 3. 				

Parity Group

The following tables show identifier and metric information for Parity Group objects.

Parity Group identifiers

Identifier	Data Source		Description
	Record	Key	
RAIDGroupNumber	PD_RG C	RAID_GROUP_ NUMBER	The parity group number
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_N UMBER	The serial number of the storage system

Parity Group metrics

Metric	Category	Data Source		Description
		Record	Key	
Busy (%)	DISK IO Operation	PI_RGS	BUSY_RATE	The usage rate of the parity group.

Metric	Category	Data Source		Description
		Record	Key	
Random Total I/O per second	DISK IO Operation	PI_RGS	RANDOM_TOTAL_IO_RATE	Frequency of random processing. (total number of times random read processing and random write processing are performed per second)
Random Total Xfer Rate (MBps)	DISK IO Operation	PI_RGS	RANDOM_TOTAL_XFER_RATE	Transfer speed of random processing. (sum total, in MB, of random read processing and random write processing operations performed per second)
Read Hit (%)	DISK IO Operation	PI_RGS	READ_HIT_RATE	Cache hit ratio of read processing
Read I/O per second	DISK IO Operation	PI_RGS	READ_IO_RATE	Frequency of read processing (per second)
Read Response Rate (us)	DISK IO Operation	PI_RGS	READ_AVG_RESPONSE	Average processing time per reading process request (microseconds)
Read Xfer Rate (MBps)	DISK IO Operation	PI_RGS	READ_XFER_RATE	Transfer speed of read processing (MB per second)
Sequential Total I/O per second	DISK IO Operation	PI_RGS	SEQUENTIAL_TOTAL_IO_RATE	Frequency of sequential processing (total number of sequential read processing and sequential write processing operations performed per second)
Sequential Total Xfer Rate (MBps)	DISK IO Operation	PI_RGS	SEQUENTIAL_TOTAL_XFER_RATE	Transfer speed of sequential processing. (sum total, in MB, of sequential read processing and sequential write processing per second)
Total Response Rate (us)	DISK IO Operation	PI_RGS	TOTAL_RESPONSE_RATE	Average processing time (in microseconds) per read /write processing request
Write Hit (%)	DISK IO Operation	PI_RGS	WRITE_HIT_RATE	Cache hit ratio of write processing
Write I/O per second	DISK IO Operation	PI_RGS	WRITE_IO_RATE	Frequency of write processing (times per second)

Metric	Category	Data Source		Description
		Record	Key	
Write Response Rate(us)	DISK IO Operation	PI_RGS	WRITE_AVG_RESPONSE	Average processing time per write processing request. (microsecond)
Write Xfer Rate (MBps)	DISK IO Operation	PI_RGS	WRITE_XFER_RATE	Transfer speed of write processing. (MB per second)
totalCapacity (GB)	Capacity	PD_RGD	TOTAL_CAPACITY	Total actual capacity of parity groups (GB) If the parity group consists of flash drives, the logical capacity is displayed.* If the parity group consists of non-flash drives, the physical capacity is displayed.
totalFreeSpace (GB)	Capacity	PD_RGD	FREE_CAPACITY	The capacity, within the total capacity of the parity group, that is not used by LDEVs (GB) If the parity group consists of flash drives, the logical capacity is displayed.* If the parity group consists of non-flash drives, the physical capacity is displayed.
<p>* When a VSP F350, F370, F700, F900 storage system, a VSP G350, G370, G700, G900 storage system, or a VSP 5000 series storage system is used, these values change automatically.</p> <p>When a VSP G1000, VSP G1500, or VSP F1500 storage system is used, these values change automatically if all of the following conditions are met.</p> <ul style="list-style-type: none"> ▪ The pool auto expansion function is enabled for the pool. ▪ HIAA 4.1.0 or later, or Hitachi Ops Center Analyzer is used. 				

Cache

The following tables show identifier and metric information for Cache objects.

Cache identifiers

Identifier	Data Source		Description
	Record	Key	
CLPRName	PD_CL PC	CLPR_NAME	The CLPR name
CLPRNumber	PD_CL PC	CLPR_NUMBER	The CLPR number
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_N UMBER	The serial number of the storage system

Cache metrics

Metric	Category	Data Source		Description
		Record	Key	
Cache Memory Usage (%)	Cache	PI_CLPS	CACHE_MEMO RY_USAGE_RA TE	The usage rate of the cache memory assigned to the CLPR
Cache Write Pending Usage (%)	Cache	PI_CLPS	CACHE_WRITE _PENDING_RAT E	The percentage of cache memory, among the cache memory assigned to the CLPR, for which a data-write operation is pending. (Unit: MB)

Host Group

The following tables show identifier and metric information for Host Group objects.

Host Group identifiers

Identifier	Data Source		Description
	Record	Key	
HostGroupName	PD_HG C	HOST_GROUP_ NAME	The name of the host group

Identifier	Data Source		Description
	Record	Key	
PortNumber	PD_HGC	PORT_NUMBE R	The port number of the storage system
HostGroupID	PD_HGC	HOST_GROUP_ ID	The ID of the host group
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_N UMBER	The serial number of the storage system

Host Group metrics

Metric	Category	Data Source		Description
		Record	Key	
HostCount	Host Group	PD_HGC	HOST_COUNT	The number of hosts

Port

The following tables show identifier and metric information for Port objects.

Port identifiers

Identifier	Data Source		Description
	Record	Key	
PortName	PD_PT C	PORT_NAME	The port name of the storage system
PortNumber	PD_PT C	PORT_NUMBE R	The port number of the storage system
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_N UMBER	The serial number of the storage system

Port metrics

Metric	Category	Data Source		Description
		Record	Key	
Avg I/O per second	Port IO Operation	PI_PTS	AVG_IO_RATE	The average frequency of read and write operations to and from storage system ports (times per second)
Avg Xfer Rate (Mbps)	Port IO Operation	PI_PTS	AVG_XFER_RATE	The average transfer rate of read and write operations to and from storage system ports (MB per second)

Port properties

Property	Category	Data Source		Description
		Record	Key	
PortMode	Configuration	PD_PTC	PORT_MODE	Port mode. This property is stored if the Hitachi Ops Center Analyzer version is 10.8.1-00 or later.

Management Processor Blade

The following tables show identifier and metric information for Management Processor Blade objects.

Management Processor Blade identifiers

Identifier	Data Source		Description
	Record	Key	
AdaptorID	PI_PRCS	ADAPTOR_ID	Character string used to identify the Management Processor Blade
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system

Management Processor Blade metrics

Metric	Category	Data Source		Description
		Record	Key	
Cache Write Pending Usage (%)	CLPR<number> Cache	PI_CLMS	CACHE_WRITE_PENDING_RATE	The percentage of cache memory used by LDEV write-pending data, from among the cache memory assigned to the CLPR. The target LDEVs are those whose owner is MP Blade in the MP Blade ID field.
Processor Busy (%)	Processor	PI_PRC S	PROCESSOR_BUSY_RATE	The average usage rate of the processor.

Journal Group

The following tables show identifier and metric information for Journal Group objects.

Journal Group identifiers

Identifier	Data Source		Description
	Record	Key	
JournalID	PI_JNLX	JOURNAL_ID	The ID of the journal group
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system

Journal Group metrics

Metric	Category	Data Source		Description
		Record	Key	
M JNL Async Xfer Rate (MBps)	Replication IO Operation	PI_JNLX	M_JNL_ASYNC_XFER_RATE	Transfer speed of processing for each journal on the primary storage system (total MB per second for write processing)

Metric	Category	Data Source		Description
		Record	Key	
R JNL Async Xfer Rate (MBps)	Replication IO Operation	PI_JNLX	R_JNL_ASYNC_XFER_RATE	Transfer speed of processing for each journal on the secondary storage system (total MB per second for write processing)

Storage

The following tables show identifier and metric information for Storage objects.

Storage identifiers

Identifier	Data Source		Description
	Record	Key	
DKCName	PD	DKC_NAME	The product name of the storage system
DKCSerialNumber	PD	DKC_SERIAL_NUMBER	The serial number of the storage system

Storage metrics

Metric	Category	Data Source		Description
		Record	Key	
Read I/O per second	DISK IO Operation	PI_LDA	READ_IO_RATE	Frequency of read processing (times per second)
Write I/O per second	DISK IO Operation	PI_LDA	WRITE_IO_RATE	Frequency of write processing (times per second)
Cache Write Pending Usage (%)	Cache	PI	CACHE_WRITE_PENDING_RATE	Percentage of the cache memory for which data-write processing is pending
Hitachi Processor Busy (%) Range	Super Metric	Super Metric	-	Difference between the maximum and minimum values of the processor usage rate of the storage system.

Metric	Category	Data Source		Description
		Record	Key	
				<p>This value is calculated by using the following formula:</p> $= \max(\text{Management Processor Blade: Processor Busy}(\%)) - \min(\text{Management Processor Blade: Processor Busy}(\%))$
Hitachi Total Capacity Savings (%)	Super Metric	Super Metric	-	<p>Ratio of data reduction for the storage system as a whole (%).</p> <p>This value is calculated by using the following formula:</p> $= (1 - \frac{\text{sum}(\text{Dynamic Provisioning Pool: Capacity Total Used Capacity after Data reduction (GB)})}{\text{sum}(\text{Dynamic Provisioning Pool: Capacity Total Used Capacity before Data reduction (GB)})}) * 100$
Hitachi Total Capacity Savings (GB)	Super Metric	Super Metric	-	<p>Amount of data reduced for the storage system as a whole (GB).</p> <p>This value is calculated by using the following formula:</p> $= \text{sum}(\text{Dynamic Provisioning Pool: Capacity Total Used Capacity before Data reduction (GB)}) - \text{sum}(\text{Dynamic Provisioning Pool: Capacity Total Used Capacity after Data reduction (GB)})$

Metric	Category	Data Source		Description
		Record	Key	
Hitachi Total Capacity Savings Ratio	Super Metric	Super Metric	-	Ratio of data reduced for the storage system as a whole (N:1). This value is calculated by using the following formula: =sum(Dynamic Provisioning Pool: Capacity Total Used Capacity before Data reduction (GB)) / sum(Dynamic Provisioning Pool: Capacity Total Used Capacity after Data reduction (GB))
Initial Copy Xfer Rate (MBps)	Replication IO Operation	PI_SCPS	INITIAL_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during the initial copy for TrueCopy and global-active device
Update Copy Xfer Rate (MBps)	Replication IO Operation	PI_SCPS	UPDATE_COPY_XFER_RATE	Transfer speed of remote I/O processing (MB per second) during an update copy for TrueCopy and global-active device
Total Copy Xfer Rate (MBps)	Replication IO Operation	PI_SCPS	-	Total transfer speed (MB per second) for TrueCopy and global-active device. This value is calculated by using the following formula: INITIAL_COPY_XFER_RATE + UPDATE_COPY_XFER_RATE
UR M JNL Async Xfer Rate (MBps)	Replication IO Operation	PI_SCPS	UR_M_JNL_ASYNC_XFER_RATE	Transfer speed of the primary storage system (MB per second) for Universal Replicator
UR R JNL Async Xfer Rate (MBps)	Replication IO Operation	PI_SCPS	UR_R_JNL_ASYNC_XFER_RATE	Transfer speed of the secondary storage system (MB per second) for Universal Replicator

Storage properties

Property	Category	Data Source		Description
		Record	Key	
DKCDetailName	Configuration	PD	DKC_DETAIL_NAME	The detailed product name of the storage system. This property is stored if the Hitachi Ops Center Analyzer version is 10.8.0-01 or later.

List of collection items (VSP One SDS Block)**Dynamic Provisioning Volume**

The following tables show identifier, metric, and property information for Dynamic Provisioning Volume objects.

Dynamic Provisioning Volume identifiers

Identifier	Data Source		Description
	Record	Key	
LDEVNumber	volumeSummary	volumeNumber	The volume number
DKCName	storage	modelName	The model name of the product
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Dynamic Provisioning Volume metrics

Metric	Category*	Data Source		Description
		Record	Key	
Virtual Volume Capacity (GB)	Capacity	volumeSummary	totalCapacity	The total capacity of the volume (GB)
Free Capacity (GB)	Capacity	volumeSummary	-	The free capacity of the volume (GB)

Metric	Category*	Data Source		Description
		Record	Key	
Usage (%)	Capacity	volumeSummary	-	The usage rate of the volume
Used Capacity (GB)	Capacity	volumeSummary	usedCapacity	The used capacity of the volume (GB)
Read I/O per second	DISK IO Operation	detailVolumePerformance	readIOPS	The number of read operations (per second)
Read Xfer Rate (MBps)	DISK IO Operation	detailVolumePerformance	readTransferRate	Transfer speed of read processing (MB per second)
Write I/O per second	DISK IO Operation	detailVolumePerformance	writeIOPS	Frequency of write operations (per second)
Write Xfer Rate (MBps)	DISK IO Operation	detailVolumePerformance	writeTransferRate	Transfer speed of write processing (MB per second)
Aggregate of R/W IOPS	DISK IO Operation	detailVolumePerformance	-	The total number of read and write operations (per second)
Aggregate of R/W Xfer Rate (MBps)	DISK IO Operation	detailVolumePerformance	-	Total transfer speed of read and write processing (MB per second)
* Category names containing a vertical bar () indicate a subcategory in the following format: <category> <subcategory>.				

Dynamic Provisioning Volume properties

Property	Category	Data Source		Description
		Record	Key	
Label	Configuration	volumeSummary	nickname	The volume nickname
ID	Configuration	volumeSummary	id	The volume ID

Dynamic Provisioning Pool

The following tables show identifier, metric, and property information for Dynamic Provisioning Pool objects.

Dynamic Provisioning Pool identifiers

Identifier	Data Source		Description
	Record	Key	
PoolID	pool	id	The storage pool ID of the pool
DKCName	storage	modelName	The model name of the product
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Dynamic Provisioning Pool metrics

Metric	Category	Data Source		Description
		Record	Key	
Free Capacity (GB)	Capacity	pool	freeCapacity	The free capacity of the storage pool (GB)
Total Actual Capacity (GB)	Capacity	pool	totalCapacity	The logical capacity of the storage pool (GB)
Usage (%)	Capacity	pool	capacityManagement.usedCapacityRate	The usage rate of the storage pool
Used Capacity (GB)	Capacity	pool	usedCapacity	The used capacity of the storage pool (GB)
Read I/O per second	POOL IO Operation	poolPerformance	volumeReadIOPS	The number of read operations to all volumes mapped on the storage pool (per second)
Read Xfer Rate (MBps)	POOL IO Operation	poolPerformance	volumeReadTransferRate	Transfer speed of read operations to all volumes mapped on the storage pool (MB per second)
Write I/O per second	POOL IO Operation	poolPerformance	volumeWriteIOPS	The number of write operations to all volumes mapped on the storage pool (per second)

Metric	Category	Data Source		Description
		Record	Key	
Write Xfer Rate (MBps)	POOL IO Operation	poolPerformance	volumeWriteTransferRate	Transfer speed of write operations to all volumes mapped on the storage pool (MB per second)
Pool I/O Density	Super Metric	Super Metric	-	The ratio of input and output to the capacity of the storage pool. This value is calculated by using the following formula: = $(\text{value-of-} \text{"Read-I/O per second"} + \text{value-of-} \text{"Write I/O per second"}) / \text{value-of-} \text{"Total Actual Capacity"}$

Dynamic Provisioning Pool properties

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
ID	Configuration	pool	id	The storage pool ID of the pool
Redundant Policy	Configuration	pool	redundantPolicy	A form of data assurance

Port

The following tables show identifier, metric, and property information for Port objects.

Port identifiers

Identifier	Data Source		Description
	Record	Key	
PortName	portSummary	<ul style="list-style-type: none"> ▪ For Fibre Channel or iSCSI connections: name ▪ For NVMe/TCP connections: nickname 	<ul style="list-style-type: none"> ▪ For Fibre Channel connections: The WWN of the compute port ▪ For iSCSI connections: The iSCSI name of the compute port ▪ For NVMe/TCP connections: The nickname of the compute port
PortNumber	portSummary	id	The ID of the compute port
DKCName	storage	modelName	The model name of the product
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Port metrics

Metric	Category	Data Source		Description
		Record	Key	
Avg I/O per second	Port IO Operation	portPerformance	-	<p>Total number of read and write operations (per second)</p> <p>If the compute port is Fibre Channel or NVMe/TCP, this metric is stored in the following Hitachi Ops Center Analyzer version or later:</p> <ul style="list-style-type: none"> ▪ Fibre Channel: Version 10.8.2-00 or later ▪ NVMe/TCP: Version 11.0.3-00 or later

Metric	Category	Data Source		Description
		Record	Key	
Avg Xfer Rate (MBps)	Port IO Operation	portPerformance	-	<p>Total transfer speed of read and write operations (MB per second)</p> <p>If the compute port is Fibre Channel or NVMe/TCP, this metric is stored in the following Hitachi Ops Center Analyzer version or later:</p> <ul style="list-style-type: none"> ▪ Fibre Channel: Version 10.8.2-00 or later ▪ NVMe/TCP: Version 11.0.3-00 or later

Port properties

Property	Category	Data Source		Description
		Record	Key	
ID	Configuration	portSummary	id	The ID of the compute port
Protocol	Configuration	portSummary	protocol	<p>The communication protocol of the compute port</p> <p>If the compute port is for NVMe/TCP connections, this property is stored in Hitachi Ops Center Analyzer version 11.0.3-00 or later.</p>
Type	Configuration	portSummary	type	The type of the compute port

Storage

The following tables show identifier, metric, and property information for Storage objects.

Storage identifiers

Identifier	Data Source		Description
	Record	Key	
DKCName	storage	modelName	The model name of the product
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Storage metrics

Metric	Category	Data Source		Description
		Record	Key	
collectionStatus	Status	-	-	The value is always "normal".

Storage properties

Property	Category	Data Source		Description
		Record	Key	
ID	Configuration	storage	id	The UUID of the storage cluster

Protection Domain

The following tables show identifier, metric, and property information for Protection Domain objects.

Protection Domain identifiers

Identifier	Data Source		Description
	Record	Key	
ProtectionDomainID	protectionDomainSummary	id	Protection domain ID
DKCName	storage	modelName	The model name of the product

Identifier	Data Source		Description
	Record	Key	
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Protection Domain metric

Metric	Category	Data Source		Description
		Record	Key	
collectionStatus	Status	-	-	The value is always "normal".

Protection Domain properties

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
ID	Configuration	protectionDomainSummary	id	Protection domain ID
Redundant Policy	Configuration	protectionDomainSummary	redundantPolicy	A form of data assurance

Storage Node

The following tables show identifier, metric, and property information for Storage Node objects.

Storage Node identifiers

Identifier	Data Source		Description
	Record	Key	
StorageNodeID	storageNode	id	The ID of the storage node
DKCName	storage	modelName	The model name of the product

Identifier	Data Source		Description
	Record	Key	
DKCSerialNumber	storage	internalId	The serial number of the storage cluster

Storage Node metric

Metric	Category	Data Source		Description
		Record	Key	
Volume Read I/O per second	DISK IO Operation	storageNodePerformance	volumeReadIOPS	The number of volume read operations (per second)
Volume Write I/O per second	DISK IO Operation	storageNodePerformance	volumeWriteIOPS	The number of volume write operations (per second)
Avg Usage (%)	CPU	storageNodePerformance	-	Average CPU usage rate
Usage (%)	CPU CPU<number>	storageNodePerformance	cpu.usage	Usage rate of the CPU core <number> is a value obtained from the CPU core number.
Usage (%)	Memory	storageNodePerformance	memory.usage	Memory usage rate

Storage Node properties

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
ID	Configuration	storageNode	id	Storage node ID
BiosUuid	Configuration	storageNode	biosUuid	UUID of the storage node. This UUID is registered in SMBIOS.

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
Cluster Role	Configuration	storageNode	clusterRole	Role of the storage node within the storage cluster.

List of collection items (Brocade FC switch)

Brocade Fabric World

The following tables show identifier and metric information for Brocade Fabric World objects.

Brocade Fabric World identifiers

Identifier	Data Source		Description
	Resource Type	Attribute ID	
Identifier	-	-	Identifier The value of this identifier is "Brocade Fabric World".

Brocade Fabric World metrics

Metric	Category	Data Source		Description
		Resource Type	Attribute ID	
Switch Count	Analyzer Detail View_<host-name-or-IP-address-of-HDCA/Analyzer-Detail-View-server> Hardware	-	-	Number of switches for each HDCA/Analyzer Detail View server Starting from version 2.6, the following Switch Count information will be collected by using the new metric and will no longer be collected by using the old metric. Version 2.5 and earlier

Metric	Category	Data Source		Description								
		Resource Type	Attribute ID									
				<table border="1"> <thead> <tr> <th>Resource type</th> <th>Metric</th> </tr> </thead> <tbody> <tr> <td>Brocade Fabric World</td> <td>HDCA_<host> Hardware Switch Count</td> </tr> </tbody> </table> <p>Version 2.6 and later</p> <table border="1"> <thead> <tr> <th>Resource type</th> <th>Metric</th> </tr> </thead> <tbody> <tr> <td>Brocade Fabric World</td> <td>Analyzer Detail View_<host> Hardware Switch Count</td> </tr> </tbody> </table>	Resource type	Metric	Brocade Fabric World	HDCA_<host> Hardware Switch Count	Resource type	Metric	Brocade Fabric World	Analyzer Detail View_<host> Hardware Switch Count
Resource type	Metric											
Brocade Fabric World	HDCA_<host> Hardware Switch Count											
Resource type	Metric											
Brocade Fabric World	Analyzer Detail View_<host> Hardware Switch Count											

Brocade Fabric Switch

The following tables show identifier, metric, and property information for Brocade Fabric Switch objects.

Brocade Fabric Switch identifiers

Identifier	Data Source		Description
	Resource Type	Attribute ID	
Signature	fabBrocade Switch	signature	Identifier of the switch

Brocade Fabric Switch metrics

Metric	Category	Data Source		Description
		Resource Type	Attribute ID	
CPU Utilization (%)	Hardware	fabBrocade Switch	fabSwitchCPUUtil	Percentage of CPU utilization
Memory Utilization (%)	Hardware	fabBrocade Switch	fabSwitchMemoryUtil	Percentage of memory utilization

Brocade Fabric Switch properties

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
IP Address	Configuration	fabBrocade Switch	ip	IP address of the switch
Firmware Version	Configuration	fabBrocade Switch	firmwareVersion	Firmware version of the switch
WWN	Configuration	fabBrocade Switch	wwn	WWN of the switch
Status	Configuration	fabBrocade Switch	status	Status of the switch
Port Count	Configuration	fabBrocade Switch	portCount	Number of ports on the switch

Brocade Fabric Switch Port

The following tables show identifier, metric, and property information for Brocade Fabric Switch port objects.

Brocade Fabric Switch Port identifiers

Identifier	Data Source		Description
	Resource Type	Attribute ID	
Signature	fabBrocadeSwitchPort	signature	Identifier of the switch port

Brocade Fabric Switch Port metrics

Metric	Category	Data Source		Description
		Resource Type	Attribute ID	
RX Utilization (%)	Network	fabBrocadeSwitchPort	fabPortRXUtil	Percentage of bandwidth usage of the switch port at the time of data reception
TX Utilization (%)	Network	fabBrocadeSwitchPort	fabPortTXUtil	Percentage of bandwidth usage of the switch port at the time of data transmission
Invalid CRC Count	Error Count	fabBrocadeSwitchPort	fabPortCrcErrors	Number of invalid CRC (cyclic redundancy check) errors
Signal Loss Count	Error Count	fabBrocadeSwitchPort	fabPortSignalLosses	Number of signal losses
Sync Loss Count	Error Count	fabBrocadeSwitchPort	fabPortSyncLosses	Number of synchronization losses
Link Failure Count	Error Count	fabBrocadeSwitchPort	fabPortLinkFailures	Number of link failures
Link Reset Count	Error Count	fabBrocadeSwitchPort	fabPortLinkResets	Number of link resets
Dropped Packet Count	Error Count	fabBrocadeSwitchPort	fabPortDroppedPackets	Number of dropped packets

Metric	Category	Data Source		Description
		Resource Type	Attribute ID	
Total Error Count	Error Count	-	-	Total number of errors. This value is calculated by using the following formula: = fabPortCrcErrors + fabPortSignalLosses + fabPortSyncLosses + fabPortLinkFailures + fabPortLinkResets + fabPortDroppedPackets

Brocade Fabric Switch Port properties

Property	Category	Data Source		Description
		Resource Type	Attribute ID	
Status	Configuration	fabBrocadeSwitchPort	status	Status of the switch port

Alert information

Adapter instance object alerts

An adapter instance object alert is issued in the following cases:

- When a failure occurs in communication with the HIAA/Ops Center Analyzer server, vCenter Server, Ops Center Common Services Server, or HDCA/Analyzer Detail View server.
- When unauthorized authentication occurs.
- When an error that is output as an adapter instance object alert occurs in VMware Aria Operations.

If the alert persists, check the contents. If the alert has already been resolved, cancel the status.

Name	Object type	Impact	Alert type	Alert subsystem	Alert cause
Hitachi storage adapter instance is down	Hitachi Storage Adapter Instance	Health	Application	Availability	A Hitachi storage adapter instance failed to collect information from HIAA/Ops Center Analyzer.
Hitachi network adapter instance is down	Hitachi Network Adapter Instance	Health	Application	Availability	A Hitachi network adapter instance failed to collect information from HDCA/Analyzer Detail View.

If a collection-failure alert occurs, the collection status of the corresponding Hitachi storage adapter instance changes. The table below shows the collection statuses and the specific conditions that they indicate.

Status	Description
Object down	An error occurred in the connection to the HIAA/Ops Center Analyzer, vCenter Server, Ops Center Common Services Server, or HDCA/Analyzer Detail View.
Error	An internal error other than an error in the connection to the HIAA/Ops Center Analyzer, vCenter Server, Ops Center Common Services Server, or HDCA/Analyzer Detail View (an authentication error or a file read error) occurred.
Data receiving	Collection was successful.

Registering alerts by the metric value of an object

You can register the alert data for an object according to the metric value of the object collected by Hitachi Infrastructure Management Pack. The cause of the error is described in the alert information. The table below shows the alert definitions.

If any alerts exist that have not yet been canceled, check the contents and, if the alert has already been resolved, cancel the status.

Only alerts for collected objects are output. The objects to be collected vary depending on the storage system or adapter type. For details, see [Collected object type information \(on page 55\)](#).

Name	Object type	Impact	Alert type	Alert subsystem	Alert cause
Cache Write Pending Usage (%) of Storage exceeds 60.	Storage	Health	Application	Availability	The Hitachi Storage Adapter instance issues a warning-level alert if the value of the metric "Cache Cache Write Pending Usage (%)" is greater than 60 (%) for 3 cycles.
Processor Busy (%) Range of Storage is 30 or more. ¹	Storage	Health	Application	Availability	The Hitachi Storage Adapter instance issues a warning-level alert if the value of the metric "Super Metric(s) Hitachi Processor Busy (%) Range" is 30 (%) or larger for 3 cycles.
Processor Busy (%) of Management Processor Blade is 40 or more.	Management Processor Blade	Health	Application	Availability	The Hitachi Storage Adapter instance issues an immediate-level alert if the value of the metric "Processor Processor Busy (%)" is 40 (%) or larger for 3 cycles.
Avg I/O per second of Port exceeds Dynamic Threshold.	Port	Health	Application	Availability	The Hitachi Storage Adapter instance issues a warning-level alert if the metric "Port IO Operation Avg I/O per second" exceeds the dynamic threshold for 3 cycles.
Usage (%) of Dynamic Provisioning Pool is 80 or more.	Dynamic Provisioning Pool	Health	Application	Availability	The Hitachi Storage Adapter instance issues an immediate-level alert if the value of the metric "Capacity Usage (%)" is 80 (%) or larger for 3 cycles. ²

Name	Object type	Impact	Alert type	Alert subsystem	Alert cause
Usage (%) of Dynamic Provisioning Pool is 90 or more. ³	Dynamic Provisioning Pool	Health	Application	Availability	The Hitachi Storage Adapter instance issues a critical-level alert if the value of the metric "Capacity Usage (%)" is 90 (%) or larger for 3 cycles. ³
Used Capacity (GB) of Dynamic Provisioning Pool exceeds Dynamic Threshold.	Dynamic Provisioning Pool	Health	Application	Availability	The Hitachi Storage Adapter instance issues a warning-level alert if the value of the metric "Capacity Used Capacity (GB)" exceeds the dynamic threshold for 3 cycles.
Replication Status of one or more pairs in Dynamic Provisioning Volume is error.	Dynamic Provisioning Volume	Health	Application	Availability	The Hitachi Storage Adapter instance issues an immediate-level alert when the value of the property "Replication Aggregate of all instances Replication Status" becomes "Error".
Replication Status of one or more pairs in Logical Device is error.	Logical Device	Health	Application	Availability	The Hitachi Storage Adapter instance issues an immediate-level alert when the value of the "Replication Aggregate of all instances Replication Status" property becomes "Error".
Status of Brocade Fabric Switch is Faulty.	Brocade Fabric Switch	Health	Application	Availability	The Hitachi Network Adapter instance issues a critical-level alert if the value of the "Configuration Status" property is "Faulty" for one cycle.

Name	Object type	Impact	Alert type	Alert subsystem	Alert cause
Status of Brocade Fabric Switch Port is Faulty.	Brocade Fabric Switch Port	Health	Application	Availability	The Hitachi Network Adapter instance issues a critical-level alert if the value of the "Configuration Status" property is "Faulty" for one cycle.
Total Error Count of Brocade Fabric Switch Port exceeds Dynamic Threshold.	Brocade Fabric Switch Port	Health	Application	Availability	The Hitachi Network Adapter instance issues an immediate-level alert if the metric "Error Count Total Error Count" exceeds its dynamic threshold.
<p>Notes:</p> <ol style="list-style-type: none"> 1. To enable this alert, enable the supermetric "Hitachi Processor Busy (%) Range". 2. This control value has been changed from 90 or larger to 80 or larger in v01.6.0 and later. 3. This control value has been changed from 100 to 90 or larger in v01.6.0 and later. 					

Managing alert definitions

Enabling alert definitions

When an alert definition is enabled for an object, alerts are generated and sent to VMware Aria Operations when metric values for that object meet the conditions in the alert definitions.

Before you begin

You are logged into VMware Aria Operations as an administrator.

Procedure

1. From the **Policy Definition** window, select the policy that is currently being used. Then, click **EDIT POLICY**.
2. Click **Alerts and Symptoms**.
3. From the **Select Object Type** list in the **Alert Definitions** tab, select the object type.
4. Select the definitions that you want to enable. From the **ACTIONS** menu, select **State > Activated**.
5. Click **SAVE**.

Disabling alert definitions

When an alert definition is disabled, alerts are not generated even if the metric values for the object meet the conditions in the alert definition.

Before you begin

You are logged into VMware Aria Operations as an administrator.

Procedure

1. From the **Policy Definition** window, select the policy that is currently being used. Then, click **EDIT POLICY**.
2. Click **Alerts and Symptoms**.
3. From the **Select Object Type** list in the **Alert Definitions** tab, select the object type.
4. Select the definitions you want to disable. From the **ACTIONS** menu, select **State > Deactivate**.
5. Click **SAVE**.

Editing an alert definition threshold value

You can edit the threshold metric values for alert definitions by editing the corresponding symptom definitions.

Before you begin

- You are logged into VMware Aria Operations as an administrator.

- In the following table, identify the alert definition and corresponding symptom definition you want to edit.

Hitachi Storage Adapter

Object type	Alert definition	Symptom definition
Storage	Cache Write Pending Usage (%) of Storage exceeds 60.	Cache Cache Write Pending Usage (%) > 60
Storage	Processor Busy (%) Range of Storage is 30 or more.	Processor Busy (%) Range >= 30
Management Processor Blade	Processor Busy (%) of Management Processor Blade is 40 or more.	Processor Processor Busy (%) >= 40
Port	Avg I/O per second of Port exceeds Dynamic Threshold.	Port IO Operation Avg I/O per second above Dynamic Threshold
Dynamic Provisioning Pool	Usage (%) of Dynamic Provisioning Pool is 80 or more.	Capacity Usage (%) < 90 Capacity Usage (%) >= 80
Dynamic Provisioning Pool	Usage (%) of Dynamic Provisioning Pool is 90 or more.	Capacity Usage (%) >= 90
Dynamic Provisioning Pool	Used Capacity (GB) of Dynamic Provisioning Pool exceeds Dynamic Threshold.	Capacity Used Capacity (GB) above Dynamic Threshold
Dynamic Provisioning Volume	Replication Status of one or more pairs in Dynamic Provisioning Volume is error.	Replication Aggregate of all instances Replication Status = Error
Logical Device	Replication Status of one or more pairs in Logical Device is error.	Replication Aggregate of all instances Replication Status = Error

Hitachi Network Adapter

Object type	Alert definition	Symptom definition
Brocade Fabric Switch	Status of Brocade Fabric Switch is Faulty.	Switch Configuration Status = Faulty
Brocade Fabric Switch Port	Status of Brocade Fabric Switch Port is Faulty.	Switch Port Configuration Status = Faulty

Object type	Alert definition	Symptom definition
Brocade Fabric Switch Port	Total Error Count of Brocade Fabric Switch Port exceeds Dynamic Threshold.	Error Count Total Error Count above Dynamic Threshold

Procedure

1. In the **Symptom Definitions** window, click the **Click here to apply filters** icon.
2. For **Name**, enter `Hitachi Storage Adapter` or `Hitachi Network Adapter`, and then click **APPLY**.
3. From the menu at the beginning of the symptom definition you want to edit, select **Edit**.
4. Edit the threshold values, as needed.
5. Click **SAVE**.

Inventory trees

Inventory trees enable you to view the hierarchical arrangement of objects in different views directly from the standard VMware Aria Operations window.

You can start an investigation of storage objects from a virtual machine under the vSphere Storage menu, but inventory trees under the Hitachi Storages menu use the parent-child object tree structure to enable you to drill down through pools to easily view and analyze storage objects for root-cause issues. You can also use the Brocade Fabric Switches menu to view Brocade Fabric switches and ports to analyze Hitachi network objects.

Procedure

1. Click the **Integrations** icon in the **Inventory** window. Under **Hitachi Infrastructure Management Pack**, select **Hitachi Storages** or **Brocade Fabric Switches**.
2. Select a storage system or a Brocade Fabric switch to conduct a more detailed investigation.

Chapter 6: Dashboards

The Hitachi Infrastructure Management Pack dashboards are VMware Aria Operations dashboards configured to display storage system performance information collected by Hitachi Infrastructure Management Pack.

Dashboard limitations and considerations

When using dashboards, keep in mind the following limitations and considerations.

Monitoring metrics

When using a dashboard to monitor metrics, verify that metric collection has started.

Only the metrics for collected objects are displayed on the dashboard. The objects to be collected vary depending on the storage system or adapter type. For details, see [Collected object type information \(on page 55\)](#).

Dashboards requiring VMware Tools software

Some dashboards reference VM metrics that are created by using VMware Tools software. Accordingly, the VMware Tools software must be installed and running on the virtual machine being monitored by VMware vCenter Operations Manager. For the software requirements for the VMware Tools that are needed to acquire metrics, see [Software requirements \(on page 22\)](#).

The following table lists the dashboards that require VMware Tools software for proper display.

Dashboard	Requires VMware Tools
Brocade Fabric Details	No
Brocade Fabric Overview	No
Datastore & Hitachi Storage Utilization	Yes
Hitachi Storage Pool (DP-Pool) Capacity	No
Hitachi TopN of Storage Controllers	No
Hitachi TopN of Storage Pools (DP-POOLS)	No
Hitachi TopN of Storage Volumes (DP-VOLs)	No

Dashboard	Requires VMware Tools
Hitachi VM And Storage Relationship	Yes
Hitachi VM Capacity	Yes
Hitachi VM Performance	Yes
Right-Size Environment	Yes
Replication Health Monitoring	Yes
Storage Processor (MPB) Utilization	No
Troubleshoot Datastore & Hitachi Storage	No
Troubleshoot Hitachi Storage	No
Troubleshoot Host & Hitachi Storage	No
VASA Provider Health Monitoring	Yes

Dashboards requiring supermetrics

The following table lists the dashboards that require a supermetric and the supermetric name as displayed in VMware Aria Operations. It also lists the applicable object type.

Dashboard	Supermetric name	Object type
Brocade Fabric Details	-	-
Brocade Fabric Overview	-	-
Datastore & Hitachi Storage Utilization	-	-
Hitachi Storage Pool (DP-Pool) Capacity	Hitachi Total Capacity Savings (%) Hitachi Total Capacity Savings (GB) Hitachi Total Capacity Savings Ratio	Storage
Hitachi TopN of Storage Controllers	-	-
Hitachi TopN of Storage Pools (DP-POOLS)	Hitachi Pool I/O Density	Dynamic Provisioning Pool
Hitachi TopN of Storage Volumes (DP-VOLs)	-	-

Dashboard	Supermetric name	Object type
Hitachi VM And Storage Relationship	-	-
Hitachi VM Capacity	-	-
Hitachi VM Performance	-	-
Right-Size Environment	-	-
Replication Health Monitoring	-	-
Storage Processor (MPB) Utilization	-	-
Troubleshoot Datastore & Hitachi Storage	Hitachi Pool I/O Density	Dynamic Provisioning Pool
Troubleshoot Hitachi Storage	Hitachi Pool I/O Density	Dynamic Provisioning Pool
Troubleshoot Host & Hitachi Storage	-	-

Brocade Fabric dashboard

The Brocade Fabric dashboard collects and displays information related to Brocade Fabric switches and their ports.

Brocade Fabric Details dashboard

This dashboard displays information related to the Brocade Fabric switch and its ports.

Dashboard name

Dashboard name: Brocade Fabric Details

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Brocade Fabric Details dashboard consists of the following panes:

- Brocade Fabric Switch List
- CPU/Memory Utilization of selected switch
- Brocade Fabric Switch Ports in the selected switch
- Xfer Utilization of selected switch port
- Error Count of selected switch port

Checking performance information for a Brocade Fabric switch and its ports after receiving an alert notification

If the number of errors counted for each port is large or if the status of the Brocade Fabric switch and its ports is "Offline", an alert will notify you of the status of the Brocade Fabric switch and its ports. By using the Brocade Fabric Details dashboard, you can check the status of the Brocade Fabric switch or the port on which a problem might have occurred.

Before you begin

- You are logged into VMware Aria Operations.
- The following alerts must be enabled:
 - Status of Brocade Fabric Switch is Faulty.
 - Status of Brocade Fabric Switch Port is Faulty.
 - Total Error Count of Brocade Fabric Switch Port exceeds Dynamic Threshold.

Procedure

1. Confirm that you have received notification of the following alerts:
 - Status of Brocade Fabric Switch is Faulty.
 - Status of Brocade Fabric Switch Port is Faulty.
 - Total Error Count of Brocade Fabric Switch Port exceeds Dynamic Threshold.
2. From the **Dashboards** menu, open the Brocade Fabric Details dashboard.
3. Check the performance information of the Brocade Fabric switch or the port about which the alert was issued.

Brocade Fabric Overview dashboard

This dashboard displays information related to the Brocade Fabric switch and its ports.

Dashboard name

Dashboard name: Brocade Fabric Overview

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Brocade Fabric Overview dashboard consists of the following panes.

- Network Device Overview
- Sparkline Chart of selected resource
- Top Switch Ports by RX Utilization
- Top Switch Ports by TX Utilization
- Top Switch Ports by Error Count

Checking performance information for a Brocade Fabric switch and its ports when performing regular monitoring

By using the Brocade Fabric Overview dashboard, you can check performance information for a Brocade Fabric switch and its ports when performing regular monitoring of the network environment.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. During regular monitoring of the network environment, open the Brocade Fabric Overview dashboard from the **Dashboards** menu.
2. Check the performance information for the Brocade Fabric switch and its ports.

Datastore & Hitachi Storage Utilization dashboard

The Datastore & Hitachi Storage Utilization dashboard displays the content of the Datastore Utilization dashboard (a standard VMware Aria Operations dashboard) and information about the capacity and usage of the DP volumes and DP pools that make up the datastore.

Dashboard name

Dashboard name: Datastore & Hitachi Storage Utilization

Supermetrics

This dashboard requires the following supermetrics to check the datastore status in the Virtual Volumes (vVols) configuration.

Supermetric name	Resource type	Metric	Description
Hitachi Total DP-Pools Usage (GB)	Datastore	sum(Dynamic Provisioning Pool: Capacity Used Capacity (GB))	Displays the total data usage of all DP pools corresponding to datastores.

Supermetric name	Resource type	Metric	Description
Hitachi Total DP-Pools Usage (%)	Datastore	$(\text{sum}(\text{Dynamic Provisioning Pool: Capacity} \text{Used Capacity (GB)}) / \text{sum}(\text{Dynamic Provisioning Pool: Capacity} \text{Total Actual Capacity (GB)})) * 100$	Displays the data usage rate (percentage) of all DP pools corresponding to datastores.

Configuration

The Datastore & Hitachi Storage Utilization dashboard consists of the following panes.

- Datastore Capacity & Utilization (Green=Good, Grey=Under, Red=Over). Select a Datastore
- Usage Trend of Selected Datastore (TB)
- VMs in the selected datastore
- All Shared Datastores in the Environment (Expand icon to see more details)
- DP-Vols in the selected datastore (Top 15 by Usage)
- Usage (GB) Trend of selected DP-Vol
- Usage (%) Trend of selected DP-Vol
- DP-Pools in the selected datastore (Top 15 by Usage)
- Usage (GB) Trend of selected DP-Pool
- Usage (%) Trend of selected DP-Pool
- Total DP-Pools Usage in the selected datastore
- Total DP-Pools Usage (GB) Trend in the selected datastore
- Total DP-Pools Usage (%) Trend in the selected datastore

Checking the statuses of the DP pools and DP volumes corresponding to a datastore

By using the Datastore & Hitachi Storage Utilization dashboard, you can check the status of a selected datastore, and the past usage trends and forecast usage of the DP volumes and DP pools corresponding to the selected datastore. Use this information for reference when expanding the capacity of the datastore.

Before you begin

- You are logged into VMware Aria Operations.
- To check the datastore status in a Virtual Volumes (vVols) configuration, enable the following supermetrics:
 - Hitachi Total DP-Pools Usage (GB)
 - Hitachi Total DP-Pools Usage (%)

Procedure

1. Open the Datastore & Hitachi Storage Utilization dashboard from the **Dashboards** menu.
2. From **Datastore Capacity & Utilization (Green=Good, Grey=Under, Red=Over)**. **Select a Datastore**, select the datastore whose status you want to check.
3. In **Usage Trend of Selected Datastore(TB)**, **VMs in the selected datastore**, and **All Shared Datastores in the Environment (Expand icon to see more details)**, check the status of the datastore.
4. Check the usage and usage rates of the DP volumes corresponding to the selected datastores.
5. Check the usage and usage rates of the DP pools corresponding to the selected datastores.
6. In a Virtual Volumes (vVols) configuration, check the usage and usage rate that are the totals for all the DP pools corresponding to the selected datastores.

Hitachi Storage Pool (DP-Pool) Capacity dashboard

The Hitachi Storage Pool (DP-Pool) Capacity dashboard displays a list of DP pools and the relationships between datastores and the DP pools. This dashboard also displays information about DP pool capacities and the capacity of the parity group related to the selected DP pool.

Dashboard name

Dashboard name: Hitachi Storage Pool (DP-Pool) Capacity

Supermetrics

This dashboard requires the supermetrics listed in the following table.

Supermetric name	Resource type	Metric	Description
Hitachi Total Capacity Savings (%)	Storage	Storage Super Metric(s) Hitachi Total Capacity Savings (%)	Indicates the percentage of data reduced for the storage system as a whole.

Supermetric name	Resource type	Metric	Description
Hitachi Total Capacity Savings (GB)	Storage	Storage Super Metric(s) Hitachi Total Capacity Savings (GB)	Indicates the amount of data reduced for the storage system as a whole.
Hitachi Total Capacity Savings Ratio	Storage	Storage Super Metric(s) Hitachi Total Capacity Savings Ratio	Indicates the ratio of data reduced for the storage system as a whole.

Configuration

The Hitachi Storage Pool (DP-Pool) Capacity dashboard consists of the following panes and views.

- Storage Pool (DP-Pool) List
- Datastore to DP-Pool Relationship
- Datastore Capacity & Utilization in the selected DP-Pool
- DP-Pool | Used Capacity (GB) Graph
- DP-Pool | Usage (%) Graph
- DP-Pool | Total Used Capacity before/after Data reduction (GB) Graph
- DP-Pool | Total Capacity Savings (GB) Graph
- DP-Pool | Capacity Savings (%) Graph
- DP-Pool | Total Capacity Savings Ratio (N:1) Graph
- DP-Pool | Total Managed Capacity (GB) Graph
- Storage | Total Capacity Savings (GB) Graph
- Storage | Total Capacity Savings (%) Graph
- Storage | Total Capacity Savings Ratio (N:1) Graph
- Parity Group Capacity in the selected DP-Pool

Checking the status of a storage pool (DP-Pool)

By using the Hitachi Storage Pool (DP-Pool) Capacity dashboard, you can check the capacity information of a DP pool to monitor usage, plan capacity, and manage free space.

Before you begin

- You are logged into VMware Aria Operations.
- The supermetric "Hitachi Total Capacity Savings (%)" must be enabled.
- The supermetric "Hitachi Total Capacity Savings(GB)" must be enabled.

- The supermetric "Hitachi Total Capacity Savings Ratio" must be enabled.
- The alert "Used Capacity (GB) of Dynamic Provisioning Pool exceeds Dynamic Threshold." must be enabled.

Procedure

1. Confirm that you have received a notification with the alert "Used Capacity (GB) of Dynamic Provisioning Pool exceeds Dynamic Threshold."
2. Open the Hitachi Storage Pool (DP-Pool) Capacity dashboard from the **Dashboards** menu.
3. Select the DP pool for which the alert is displayed.
4. Check the capacity, usage, and reduced space of the DP pool.
5. To view details about the datastore, use the Datastore to DP-Pool Relationship widget to go to the datastore details window.

Hitachi TopN dashboard

The Hitachi TopN dashboard displays the ranking of the monitoring targets as determined by the defined metric. It also displays the time transition for changes in the metric value.

Hitachi TopN of Storage Controllers dashboard

The Hitachi TopN of Storage Controllers dashboard can be used to check whether any issues have occurred in your storage systems. This dashboard displays metrics related to storage controllers in a ranked order. You can also check the hour-by-hour changes in each metric.

Dashboard name

Dashboard name: Hitachi TopN of Storage Controllers

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Hitachi TopN of Storage Controllers dashboard consists of the following panes.

- Top 20 PORTS | AVG IOPS [IO PER SECOND]
- Top 20 STORAGE PROCESSORS (MPBs) | BUSY RATE [%]
- Top 20 STORAGE | CACHE WRITE PENDING USAGE [%]
- Top 20 PORTS | AVG IOPS GRAPH
- Top 20 STORAGE PROCESSORS (MPBs) | BUSY RATE GRAPH
- Top 20 STORAGES | CACHE WRITE PENDING USAGE GRAPH

Hitachi TopN of Storage Pools (DP-POOLS) dashboard

The Hitachi TopN of Storage Pools (DP-POOLS) dashboard can be used to check whether any issues have occurred in your storage systems. This dashboard displays metrics related to DP pools in ranked order. You can also check the hour-by-hour changes in each metric.

Dashboard name

Dashboard name: Hitachi TopN of Storage Pools (DP-POOLS)

Supermetrics

This dashboard requires the supermetric listed in the table below.

Supermetric name	Resource type	Metric	Description
Hitachi Pool I/O Density	Dynamic Provisioning Pool	Super Metric(s) Hitachi Pool I/O Density	Frequency of read and write operations

Configuration

Hitachi TopN of Storage Pools (DP-POOLS) dashboard consists of the panes listed below.

- Top 20 STORAGE POOLS | HITACHI POOL I/O DENSITY
- Top 20 STORAGE POOLS | USAGE [%]
- Top 20 STORAGE POOLS | HITACHI POOL I/O DENSITY GRAPH
- Top 20 STORAGE POOLS | USAGE GRAPH

Hitachi TopN of Storage Volumes (DP-VOLs) dashboard

The Hitachi TopN of Storage Volumes (DP-VOLs) dashboard can be used to check whether any issues have occurred in your storage systems. This dashboard displays metrics related to DP volumes in a ranked order. You can also check the hour-by-hour changes in each metric.

Dashboard name

Dashboard name: Hitachi TopN of Storage Volumes (DP-VOLs)

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Hitachi TopN of Storage Volumes (DP-VOLs) dashboard consists of the following panes.

- Top 20 STORAGE VOLUMES | WRITE IOPS [IO PER SECOND]
- Top 20 STORAGE VOLUMES | READ IOPS [IO PER SECOND]
- Top 20 STORAGE VOLUMES | SEQUENTIAL TOTAL IOPS [IO PER SECOND]
- Top 20 STORAGE VOLUMES | RANDOM TOTAL IOPS [IO PER SECOND]
- Top 20 STORAGE VOLUMES | TOTAL RESPONSE RATE [MICROSECOND]
- Top 20 STORAGE VOLUMES | WRITE RESPONSE RATE [MICROSECOND]
- Top 20 STORAGE VOLUMES | READ RESPONSE RATE [MICROSECOND]
- Top 20 STORAGE VOLUMES | USAGE [%]
- Top 20 STORAGE VOLUMES | VIRTUAL VOLUME CAPACITY [GIGABYTE]
- Top 20 STORAGE VOLUMES | WRITE IOPS GRAPH
- Top 20 STORAGE VOLUMES | READ IOPS GRAPH
- Top 20 STORAGE VOLUMES | SEQUENTIAL TOTAL IOPS GRAPH
- Top 20 STORAGE VOLUMES | RANDOM TOTAL IOPS GRAPH
- Top 20 STORAGE VOLUMES | TOTAL RESPONSE RATE GRAPH
- Top 20 STORAGE VOLUMES | WRITE RESPONSE RATE GRAPH
- Top 20 STORAGE VOLUMES | READ RESPONSE RATE GRAPH
- Top 20 STORAGE VOLUMES | USAGE GRAPH
- Top 20 STORAGE VOLUMES | VIRTUAL VOLUME CAPACITY GRAPH

Checking performance information in a ranked order

By using the Hitachi TopN of Storage Controllers dashboard, the Hitachi TopN of Storage Pools (DP-POOLS) dashboard, or the Hitachi TopN of Storage Volumes (DP-VOLs) dashboard, you can check information about the performance of storage systems in a ranked order.

Before you begin

- You are logged into VMware Aria Operations.
- The supermetric "Hitachi Pool I/O Density" must be enabled.

Procedure

1. Depending on the metric that you want to check, select one of the following dashboards from the **Dashboards** menu: the Hitachi TopN of Storage Controllers dashboard, the Hitachi TopN of Storage Pools (DP-POOLS) dashboard, or the Hitachi TopN of Storage Volumes (DP-VOLs) dashboard.
2. On the left side of the window, check for issues in the metrics, which are displayed in a ranked order.
3. Select a metric that seems to have an issue.

4. On the right side of the window, check trends in the selected metric.



Tip: If the usage rate of a Dynamic Provisioning volume is excessive, you can use the Hitachi VM Capacity dashboard to check whether the issue is caused by the virtual machine environment. For details about how to do this, see [Checking the usage rate of Dynamic Provisioning volumes \(on page 136\)](#).

Hitachi VM And Storage Relationship dashboard

The Hitachi VM And Storage Relationship dashboard displays the relationships between the virtual machines in the environment and their corresponding storage systems.

Dashboard name

Dashboard name: Hitachi VM And Storage Relationship

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Hitachi VM And Storage Relationship dashboard consists of the following panes.

- Virtual Machine List
- VM to Storage Relationship
- Object Property List

Checking whether a storage system is the cause of a failure or performance degradation on a virtual machine

When a failure occurs or performance degrades on a virtual machine, you can use the Hitachi VM And Storage Relationship dashboard to check whether the problem is caused by a storage system related to the virtual machine.

Before you begin

- You are logged into VMware Aria Operations.
- A failure occurred or performance degraded on a virtual machine.

Procedure

1. Open the Hitachi VM And Storage Relationship dashboard from the **Dashboards** menu.
2. Select a virtual machine.
3. Check the relationship between the virtual machine and storage resources, and see whether a storage resource is causing the failure or performance degradation.

Hitachi VM Capacity dashboard

The Hitachi VM Capacity dashboard displays the capacity and utilization of a Dynamic Provisioning volume and the relationships between the virtual resources and the storage system resources that were created on the Dynamic Provisioning volume.

Dashboard name

Dashboard name: Hitachi VM Capacity

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Hitachi VM Capacity dashboard consists of the following panes.

- Capacity Heat Map
- Storage Capacity Resources
- Object Property List

Checking the usage rate of Dynamic Provisioning volumes

By using the Hitachi VM Capacity dashboard during regular monitoring of a storage system used for a virtual system, you can check the usage rate of Dynamic Provisioning volumes. If you find the usage rate of a Dynamic Provisioning volume is excessive, you can check whether the issue is caused by the virtual machine environment.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. During regular monitoring of a storage system used in a virtual machine, open the Hitachi VM Capacity dashboard from the **Dashboards** menu.
2. Check the usage rates of the Dynamic Provisioning volumes on the heat map.
3. If you find that the usage rate of a Dynamic Provisioning volume is excessive, check the relevant storage resources to identify the storage system causing the problem.

Hitachi VM Performance dashboard

The Hitachi VM Performance dashboard displays the performance of the virtual machines in your environment and the relationships between those virtual machines and storage resources.

Dashboard name

Dashboard name: Hitachi VM Performance

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Hitachi VM Performance dashboard consists of the panes listed below.

- VMDK Heat Map
- VM to Storage Relationship
- Object Property List

Checking virtual machines or datastores on which a performance degradation or an issue seems likely to occur

During regular monitoring of virtual machines or datastores, you can use the Hitachi VM Performance dashboard to check the virtual machines and datastores on which a performance degradation or an issue seems likely to occur. You can also identify bottlenecks by checking the relevant storage resources.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. During regular monitoring of virtual machines or datastores, open the Hitachi VM Performance dashboard from the **Dashboards** menu.
2. Check the list of performance statuses for the virtual machines or datastores.
3. If you find virtual machines or datastores on which a performance degradation or an issue is likely to occur, check the relevant storage resources and identify the storage resources that might cause the failure or performance degradation.

Right-Size Environment dashboard

The Right-Size Environment dashboard can be used to check virtual machines and datastores that consume a lot of space, but are not frequently used by hosts. You can also use this dashboard to select targets whose storage policies you want to change. From the list of virtual machines and datastores on this dashboard, you can check IOPS information and trends in IOPS.

Dashboard name

Dashboard name: Right-Size Environment

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Right-Size Environment dashboard consists of the panes listed below.

- Virtual Machine List (ascending order by Average IOPS)
- Total IOPS of selected Virtual Machine
- Datastore List (ascending order by Average IOPS)
- Total IOPS of selected Datastore

Checking virtual machines and datastores that are not frequently used

By using the Right-Size Environment dashboard, you can check virtual machines and datastores that are not frequently used.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. Open the Right-Size Environment dashboard from the **Dashboards** menu.
2. From the list of virtual machines and datastores displayed on the left side of the window, select a virtual machine or datastore that has a low IOPS.
3. Check the trends in the IOPS of the selected virtual machine or datastore.

Replication Health Monitoring dashboard

The Replication Health Monitoring dashboard displays information related to the configuration, status, and performance of remote copy (TrueCopy, Universal Replicator, or global-active device) environments, as well as their related resources.

Dashboard name

Dashboard name: Replication Health Monitoring

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Replication Health Monitoring consists of the panes listed below.

- Replication Volume Alert List
- Storage List
- Storage | TC/GAD Xfer Rate Graph
- Storage | UR Xfer Rate Graph
- Replication Volume List
- Volume | TC/GAD Xfer Rate Graph
- Resource Relationships
- Volume | Property List
- Journal Group List
- Journal Group | UR Xfer Rate Graph

Checking the replication status of remote copy after receiving an alert notification

If a failure occurs in the remote copy of a storage system, you will receive an alert notification. By using the Replication Health Monitoring dashboard, you can check the replication health status.

Before you begin

- You are logged into VMware Aria Operations.
- The following alerts must be enabled:
 - Replication Status of one or more pairs in Dynamic Provisioning Volume is error.
 - Replication Status of one or more pairs in Logical Device is error.

Procedure

1. Confirm that you have received notification of the following alerts:
 - Replication Status of one or more pairs in Dynamic Provisioning Volume is error.
 - Replication Status of one or more pairs in Logical Device is error.
2. From the **Dashboards** menu, open the Replication Health Monitoring dashboard.
3. In the alert, check the volume for which a failure has occurred, and then check the health of the storage system.

Checking the replication status of remote copy when performing regular monitoring

By using the Replication Health Monitoring dashboard during regular monitoring of a storage system used for a virtual machine, you can check for degradation in the remote copy performance of the storage system.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. During regular monitoring of a storage system used for a virtual machine, open the Replication Health Monitoring dashboard from the **Dashboards** menu.
2. In the list of storage systems and volumes, check the copy speed for remote copy.
3. Identify volumes and storage systems for which the copy speed of the replication path is significantly slower than the normal speed.

Checking the replication health of a volume on a storage system for a virtual machine or datastore

By using the Replication Health Monitoring dashboard, you can check the storage resources for a virtual machine or datastore and then check the replication health of the storage system.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. From the **Dashboards** menu, open the Replication Health Monitoring dashboard.
2. In the list, check the performance of the storage system for the virtual machine or datastore, and then check for storage resources for which performance has degraded or an abnormality might have occurred.

Storage Processor (MPB) Utilization dashboard

The Storage Processor (MPB) Utilization dashboard can be used to check for imbalances in the usage rates of storage processors (MPBs). This dashboard displays the MPB usage rate of the selected storage system, as well as the IOPS of the DP volumes associated with the MPB. To change the MPBs that are allocated to LDEVs, see the *Provisioning Guide* or *Provisioning Guide for Open Systems* for the currently used storage model.

Dashboard name

Dashboard name: Storage Processor (MPB) Utilization

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Storage Processor (MPB) Utilization dashboard consists of the panes listed below.

- Storage List
- Storage Processors (MPBs) in the selected Storage
- Processor Busy (%) of selected MPB
- Storage Volumes in the selected MPB
- Aggregate of R/W IOPS of selected Volume
- Write IOPS of selected Volume
- Aggregate of R/W Xfer Rate (MBps) of selected Volume

Checking for imbalances in storage processor (MPB) usage rates

By using the Storage Processor (MPB) Utilization dashboard, you can check for imbalances in storage processor (MPB) usage rates.

Before you begin

- You are logged into VMware Aria Operations.
- Enable the supermetric "Hitachi Processor Busy (%) Range".
- Enable the alert "Processor Busy (%) Range of Storage is 30 or more."

Procedure

1. After confirming the alert that notifies you of imbalances in MPB usage rates (the alert "Processor Busy (%) Range of Storage is 30 or more."), open the Storage Processor (MPB) Utilization dashboard from the **Dashboards** menu.
2. From the list of storage systems, select the storage systems for which there is an imbalance in the MPB usage rates.



Tip: To display multiple objects in a single graph for comparison, select the objects you want to compare in the widget "Storage Processors (MPBs) in the selected Storage" or in the widget "Storage Volumes in the selected MPB", and then click the **Perform Multi-Select Interaction** icon on the toolbar.

3. From the list of MPBs, select the MPB whose usage rate trends you want to check.
4. Check the trends in the MPB usage rates, and note the time when the imbalance began to occur.
5. Check the IOPS and response times of the DP volumes associated with the MPB.

Troubleshoot Datastore & Hitachi Storage dashboard

After using the Troubleshoot a Datastore dashboard (a standard VMware Aria Operations dashboard) to identify the datastore for which a problem occurred, you can use the Troubleshoot Datastore & Hitachi Storage dashboard to investigate the cause of the storage-

resource bottleneck. The Troubleshoot Datastore & Hitachi Storage dashboard displays a heat map of the datastore, a list of storage resources related to the datastore, and graphs about the performance information of the storage resources.

Dashboard name

Dashboard name: Troubleshoot Datastore & Hitachi Storage

Supermetrics

This dashboard requires the supermetric listed in the following table.

Supermetric name	Resource type	Metric	Description
Hitachi Pool I/O Density	Dynamic Provisioning Pool	Super Metric(s) Hitachi Pool I/O Density	Frequency of read and write operations

Configuration

The Troubleshoot Datastore & Hitachi Storage dashboard consists of the panes listed below.

- Datastores with high latency and outstanding I/Os. Look after the red ones.
- Search for a datastore (use filter)
- Dynamic Provisioning Volume
- DP-Vols in the selected datastore (Top 15 by Total Response Rate)
- IOPS Trend of selected DP-Vol
- Cache Hit (%) Trend of selected DP-Vol
- Response Rate (us) Trend of selected DP-Vol
- Xfer Rate (MBps) Trend of selected DP-Vol
- Dynamic Provisioning Pool
- DP-Pools in the selected datastore (Top 15 by Read Response Rate)
- IOPS Trend of selected DP-Pool
- Response Rate (us) Trend of selected DP-Pool
- Xfer Rate (MBps) Trend of selected DP-Pool
- Port
- Ports in the selected datastore (Top 15 by IOPS)
- IOPS Trend of selected Port
- Xfer Rate (MBps) Trend of selected Port
- Management Processor Blade
- MPBs in the selected datastore (Top 15 by Processor Busy)
- Processor Busy (%) Trend of selected MPB

Checking the statuses of the storage resources corresponding to a datastore

By using the Troubleshoot Datastore & Hitachi Storage dashboard, you can check the statuses of the DP volumes, DP pools, ports, and the MPB that correspond to a selected datastore. Use this dashboard to investigate and identify storage-resource bottlenecks.

Before you begin

- You are logged into VMware Aria Operations.
- Enable the supermetric "Hitachi Pool I/O Density".

Procedure

1. Open the Troubleshoot Datastore & Hitachi Storage dashboard from the **Dashboards** menu.
2. From **[Datastores with high latency and outstanding I/Os. Look after the RED ones.]** or **[Search for a datastore (use filter)]**, select the datastore whose status you want to check.
3. Check the status of the DP volumes corresponding to the selected datastore.
4. Check the status of the DP pools corresponding to the selected datastore.
5. Check the status of the ports corresponding to the selected datastore.
6. Check the status of the MPB corresponding to the selected datastore.

Troubleshoot Hitachi Storage dashboard

Use this dashboard to resolve problems related to the performance of storage resources. The Troubleshoot Hitachi Storage dashboard displays active alerts related to storage resources, a list of storage systems, and information about the health and performance of connections between the storage systems and their related resources.

Dashboard name

Dashboard name: Troubleshoot Hitachi Storage

Supermetrics

This dashboard requires the supermetric listed in the following table.

Supermetric name	Resource type	Metric	Description
Hitachi Pool I/O Density	Dynamic Provisioning Pool	Super Metric(s) Hitachi Pool I/O Density	Frequency of read and write operations

Configuration

The Troubleshoot Hitachi Storage dashboard consists of the following panes.

- 1. Any alerts on the Hitachi Storage resources?
- 2. Select an Environment (Select vSphere World to see All Environment)
- 3. Are the relatives healthy?
- 4. Is the Storage busy?
- 5. Are the I/Os high on DP-Vols?
- 6. Is the capacity utilization high on DP-Vols?
- 7. Is the Response Rate (us) high on DP-Vols?
- 8. Is the capacity utilization high on DP-Pools?
- 9. Are the I/Os high on DP-Pools?
- 10. Are the I/Os high on Ports?
- 11. Are the Management Processor Blades busy?
- 12. Is the cache congested on Storage?

Checking the status of a storage system after receiving an alert notification

On the Troubleshoot Hitachi Storage dashboard, you can view the alerts related to storage resources to check whether an issue exists in the environment.

Before you begin

- You are logged into VMware Aria Operations.
- Enable the supermetric "Hitachi Pool I/O Density".

Procedure

1. Open the Troubleshoot Hitachi Storage dashboard from the **Dashboards** menu.
2. In **1. Any alerts on the Hitachi Storage resources?**, check the list of alerts.
3. If an alert appears for a storage resource, take appropriate action to resolve the problem. If no alert appears, check the questions from **2. Select an Environment (Select vSphere World to see All Environment)** to **12. Is the cache congested on Storage?**, and make sure there are no issues with the main performance values of the storage system.

Troubleshoot Host & Hitachi Storage dashboard

The Troubleshoot Host & Hitachi Storage dashboard can be used to determine whether the slow response of a host is due to a problem related to a storage system or a problem related to the vSphere environment. This dashboard displays the response time of the selected host as well as trends in the response time. You can also check the IOPS of the host, the storage

processor (MPB) usage rate by the host, and the response times of DP volumes associated with the host.

Dashboard name

Dashboard name: Troubleshoot Host & Hitachi Storage

Supermetrics

This dashboard does not require any supermetrics.

Configuration

The Troubleshoot Host & Hitachi Storage dashboard consists of the following panes.

- Hosts Sized By IOPS & Colored by Avg Disk Latency (ms)
- Latency (ms) Trend of selected Host
- Search for a host (use filter)
- IOPS Trend of selected Host
- Storage Processors (MPBs) in the selected Host (Top 15 by Processor Busy)
- Processor Busy (%) Trend of selected MPB
- Storage Volumes (DP-Vols) in the selected Host (Top 15 by Total Response Rate)
- Response Rate (us) Trend of selected DP-Vol

Checking the response times of a host

If a host is slow to respond, you can use the Troubleshoot Host & Hitachi Storage dashboard to determine whether the slow response is due to a problem related to a storage system or the vSphere environment.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. Open the Troubleshoot Host & Hitachi Storage dashboard from the **Dashboards** menu.
2. From the list of hosts, select the host whose performance you want to check.
3. Check the trends in the response time of the host.
4. Check the IOPS of the host.
5. Check the storage processor (MPB) usage rate of the host.
6. From the volumes allocated to the host you selected in step 2, select a volume whose response time is slow.
7. Check the graph of the trends in the response time of the volume you selected in step 6.

VASA Provider Health Monitoring dashboard

The VASA Provider Health Monitoring dashboard displays the list of VASA Provider VMs and their health, the status of service objects and resources for VMs, disk utilization (GB), and disk utilization (%).

Dashboard name

Dashboard name: VASA Provider Health Monitoring

Supermetrics

This dashboard does not require any supermetrics.

Configuration

VASA Provider Health Monitoring dashboard consists of the following panes:

- Virtual Machine List
- Disk Utilization (GB) Trend of selected VM
- Disk Utilization (%) Trend of selected VM
- Resource Relationships



Important: Settings must be configured in advance in order to check the status of VASA Provider VM services. Check the following items:

- You must be using the Advanced or Enterprise edition of VMware Aria Operations.
- You must be using Hitachi Storage Provider for VMware vCenter 3.7.2 or a later version.
- Check the prerequisites listed in the *Configure Service and Application Discovery* chapter of the *VMware Aria Operations Configuration Guide*.
- Refer to the procedure described in the *Configure Service and Application Discovery* chapter of the *VMware Aria Operations Configuration Guide*, and enable monitoring of VASA Provider VM services.
- Refer to *Discovered Services - Custom Services* in the *Service and Application Discovery* chapter of the *VMware Aria Operations Configuration Guide*, and register the custom services by using the following settings:
 - Type:Regex
 - Regex:postm.*er
 - Display Name:PostgreSQL
- Refer to *Horizontal Ellipsis > Activate Service Monitoring* in the *Toolbar Options* table in the *Manage Services* chapter of the *VMware Aria Operations Configuration Guide*, and enable service monitoring for VASA Provider VMs.

Checking the service status of a VASA Provider VM

By using the VASA Provider Health Monitoring dashboard, you can check the health of a VASA Provider VM. When health is 100%, the value is displayed in green. As health decreases, the color changes from green to yellow, then orange, and then to red.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. Open the VASA Provider Health Monitoring dashboard from the **Dashboards** menu.
2. Use the VASA Provider VM list to check the health.
3. From the VASA Provider VM list, select the VM whose resources status you want to check.
4. Referring to the **Resource Relationships** pane, check the status of resources and the operational status of services.

Checking the disk usage of a VASA Provider VM

By using the VASA Provider Health Monitoring dashboard, you can check whether disk space might run out.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. Open the VASA Provider Health Monitoring dashboard from the **Dashboards** menu.
2. From the VASA Provider VM list, select the VM whose disk usage you want to check.
3. Referring to the **Disk Utilization (GB) Trend of selected VM** and **Disk Utilization (%) Trend of selected VM** panes, check whether disk space might run out.

Chapter 7: Reports

Hitachi Infrastructure Management Pack includes a custom report template for creating reports in VMware Aria Operations. These reports show storage performance information collected by Hitachi Infrastructure Management Pack. You can specify which metrics to include in a report and specify whether to display each metric in a list, summary, or distribution view. The name of the generated report is Hitachi Storage Adapter Report.

Before generating a report, you must first apply the following supermetric: Hitachi Pool I/O Density. For details, see [Applying a supermetric \(on page 47\)](#).

The Hitachi Storage Adapter Report can be output either of the following formats.

- PDF: For human readability
- CSV: For software processing

For details about how to create a report, see the VMware Aria Operations documentation.

Report metrics for output

You can select one or more object-type metrics to be output to a report.

To include all Hitachi Infrastructure Management Pack objects as outputs for a report, create a custom group that includes all of the object types listed in the following table. Select the custom group when generating a report.

Only collected objects can be output to a report. The objects to be collected vary depending on the storage system or adapter type. For details, see [Collected object type information \(on page 55\)](#).

Object Type	Metric
Port	Port IO Operation Avg I/O per second
Dynamic Provisioning Volume	DISK IO Operation Write I/O per second
Management Processor Blade	Processor Processor Busy (%)
Dynamic Provisioning Volume	Capacity Usage (%)
Dynamic Provisioning Pool	Capacity Usage (%)
Dynamic Provisioning Volume	DISK IO Operation Read I/O per second
Dynamic Provisioning Volume	DISK IO Operation Sequential Total I/O per second

Object Type	Metric
Dynamic Provisioning Volume	DISK IO Operation Total Response Rate
Dynamic Provisioning Volume	DISK IO Operation Random Total I/O per second
Dynamic Provisioning Volume	Capacity Virtual Volume Capacity (GB)
Dynamic Provisioning Pool	Super Metric(s) Hitachi Pool I/O Density
Dynamic Provisioning Volume	DISK IO Operation Read Hit (%)
Dynamic Provisioning Volume	DISK IO Operation Write Hit (%)

Report views

There are three views available for displaying metrics in a report: the List view, the Summary view, and the Distribution view.

List view

The List view displays metric values in descending order.

1. DYNAMIC PROVISIONING POOL | USAGE_List

Jun 11, 2024 01:48 PM - Jun 18, 2024 01:48 PM (GMT+09:00)

Name	Capacity Usage (%)
DP13@VSP E1090(SN:700120)	90
DP51@VSP E1090(SN:700120)	44
DP62@VSP E1090(SN:700120)	44
DP0@VSP E1090(SN:700120)	31
DP1@VSP E1090(SN:700120)	25
DP35@VSP E1090(SN:700120)	24
DP48@VSP E1090(SN:700120)	23
DP66@VSP E1090(SN:700120)	21
DP12@VSP E1090(SN:700120)	19
DP54@VSP E1090(SN:700120)	19

Summary view

The Summary view displays summarized statistical information of the metric values.

2. DYNAMIC PROVISIONING POOL | USAGE_Summary

Jun 11, 2024 01:48 PM - Jun 18, 2024 01:48 PM (GMT+09:00)

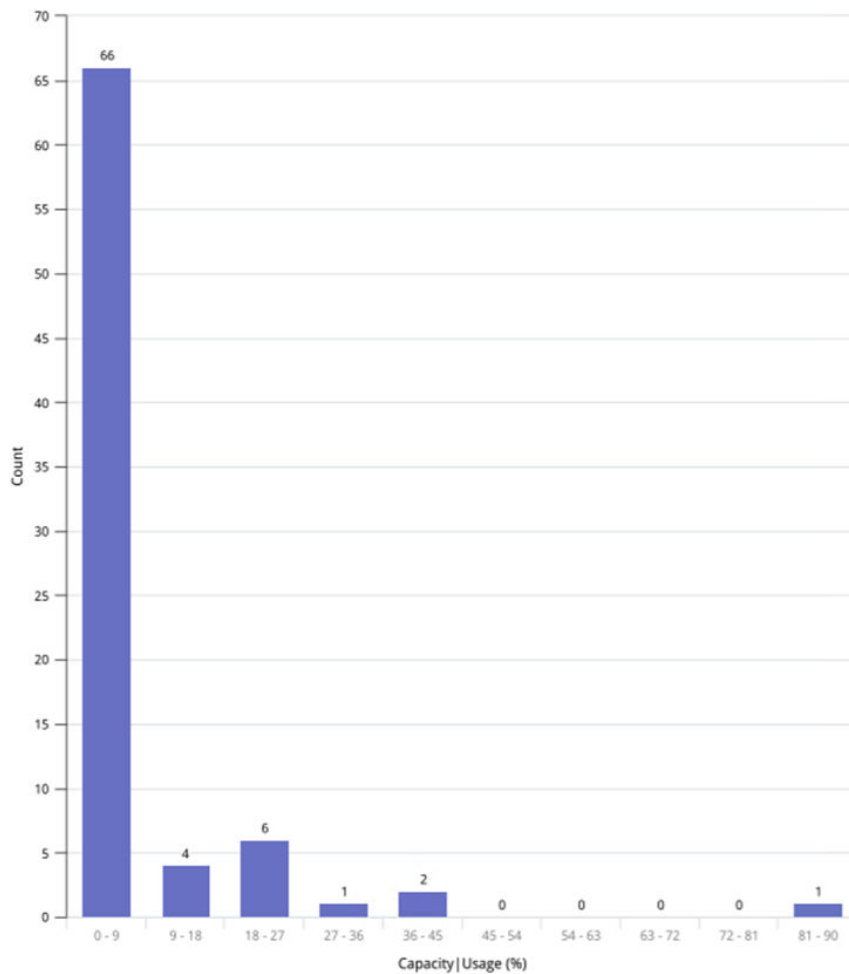
	Maximum	Minimum	Average	Sum	Standard Deviation
Capacity Usage (%)	90	0	6.1	488	13.3

Distribution view

The Distribution view displays a distribution of the metric values.

3. DYNAMIC PROVISIONING POOL | USAGE_Distribution

Jun 11, 2024 01:48 PM - Jun 18, 2024 01:48 PM (GMT+09:00)



Imported views

When the Hitachi Storage Adapter Report is imported, the views listed in the following table are also imported automatically.

View
PORT AVG IOPS_List
PORT AVG IOPS_Summary
PORT AVG IOPS_Distribution
DYNAMIC PROVISIONING VOLUME WRITE IOPS_List
DYNAMIC PROVISIONING VOLUME WRITE IOPS_Summary
DYNAMIC PROVISIONING VOLUME WRITE IOPS_Distribution
MANAGEMENT PROCESSOR BLADE BUSY RATE_List

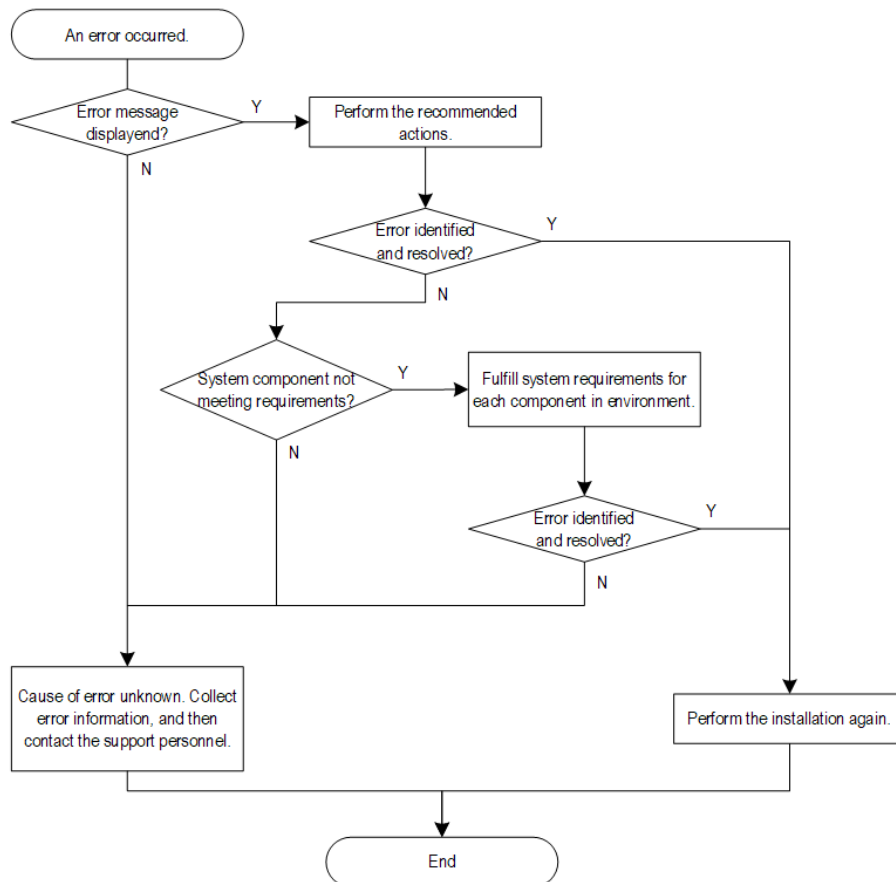
View
MANAGEMENT PROCESSOR BLADE BUSY RATE_Summary
MANAGEMENT PROCESSOR BLADE BUSY RATE_Distribution
DYNAMIC PROVISIONING VOLUME USAGE_List
DYNAMIC PROVISIONING VOLUME USAGE_Summary
DYNAMIC PROVISIONING VOLUME USAGE_Distribution
DYNAMIC PROVISIONING POOL USAGE_List
DYNAMIC PROVISIONING POOL USAGE_Summary
DYNAMIC PROVISIONING POOL USAGE_Distribution
DYNAMIC PROVISIONING VOLUME READ IOPS_List
DYNAMIC PROVISIONING VOLUME READ IOPS_Summary
DYNAMIC PROVISIONING VOLUME READ IOPS_Distribution
DYNAMIC PROVISIONING VOLUME SEQUENTIAL TOTAL IOPS_List
DYNAMIC PROVISIONING VOLUME SEQUENTIAL TOTAL IOPS_Summary
DYNAMIC PROVISIONING VOLUME SEQUENTIAL TOTAL IOPS_Distribution
DYNAMIC PROVISIONING VOLUME TOTAL RESPONSE RATE_List
DYNAMIC PROVISIONING VOLUME TOTAL RESPONSE RATE_Summary
DYNAMIC PROVISIONING VOLUME TOTAL RESPONSE RATE_Distribution
DYNAMIC PROVISIONING VOLUME RANDOM TOTAL IOPS_List
DYNAMIC PROVISIONING VOLUME RANDOM TOTAL IOPS_Summary
DYNAMIC PROVISIONING VOLUME RANDOM TOTAL IOPS_Distribution
DYNAMIC PROVISIONING VOLUME VIRTUAL VOLUME CAPACITY_List
DYNAMIC PROVISIONING VOLUME VIRTUAL VOLUME CAPACITY_Summary
DYNAMIC PROVISIONING VOLUME VIRTUAL VOLUME CAPACITY_Distribution
DYNAMIC PROVISIONING POOL HITACHI POOL I/O DENSITY_List
DYNAMIC PROVISIONING POOL HITACHI POOL I/O DENSITY_Summary
DYNAMIC PROVISIONING POOL HITACHI POOL I/O DENSITY_Distribution
DYNAMIC PROVISIONING VOLUME READ HIT_List
DYNAMIC PROVISIONING VOLUME READ HIT_Summary

View
DYNAMIC PROVISIONING VOLUME READ HIT_Distribution
DYNAMIC PROVISIONING VOLUME WRITE HIT_List
DYNAMIC PROVISIONING VOLUME WRITE HIT_Summary
DYNAMIC PROVISIONING VOLUME WRITE HIT_Distribution

Chapter 8: Troubleshooting

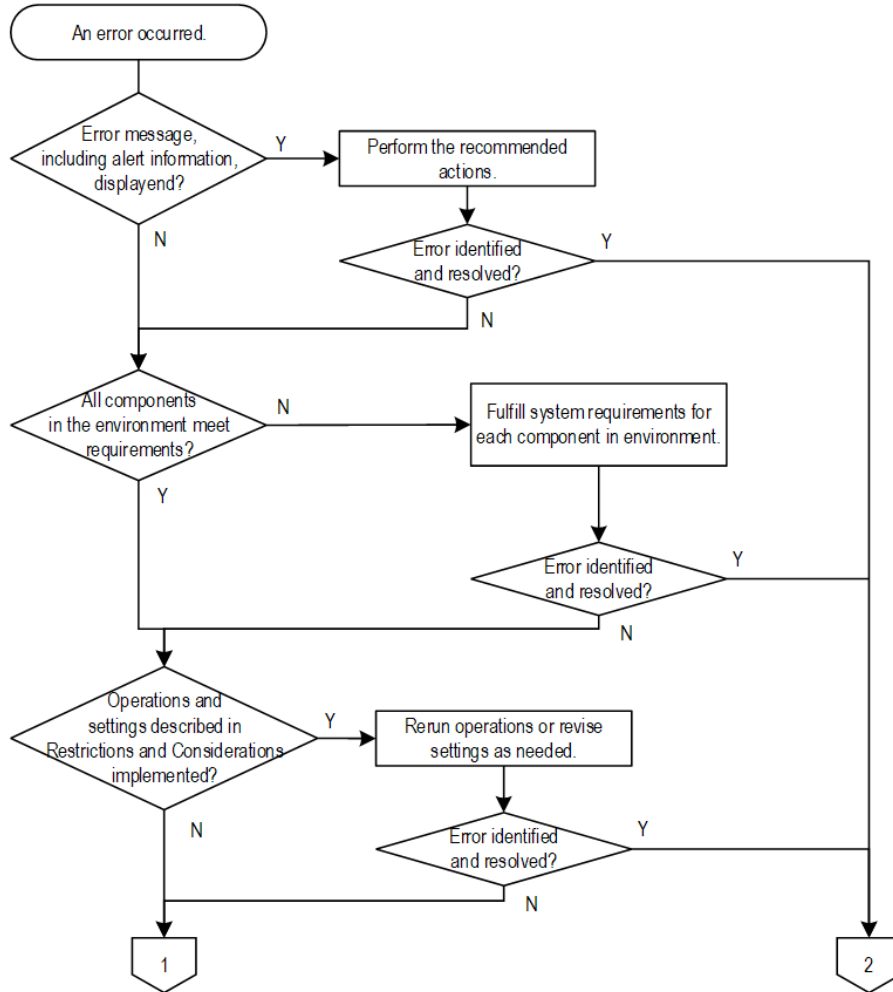
Troubleshooting errors that occur during Hitachi Infrastructure Management Pack installation

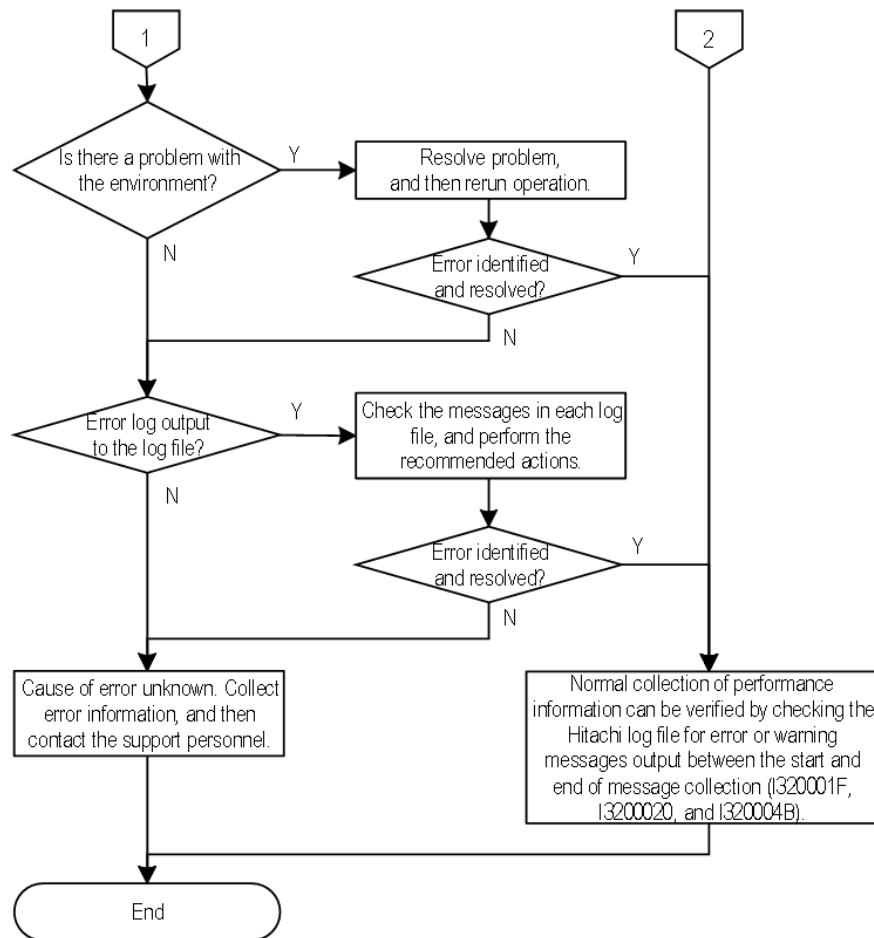
If an error occurs during the installation of Hitachi Infrastructure Management Pack, see the error information displayed in the Add Management Pack window of VMware Aria Operations, and then use the following flowchart to troubleshoot the issue. See [Error during the installation \(on page 155\)](#).



Troubleshooting errors that occur during Hitachi Infrastructure Management Pack operation

If an error occurs during the operation of Hitachi Infrastructure Management Pack, information about the error, including alert information related to the adapter instance, is displayed and output to the log file.





Error during the installation

If an error occurs during the installation of Hitachi Infrastructure Management Pack, error information is displayed in the Add Management Pack window of VMware Aria Operations.

Follow the instructions in the error message. If the error persists, check the amount of free space and the version of VMware Aria Operations.

Hitachi Infrastructure Management Pack log files

Accessing log files

You can access the Hitachi Infrastructure Management Pack log files from VMware Aria Operations.

Before you begin

You are logged into VMware Aria Operations.

Procedure

1. In the **Support Logs** window, select **Node** from the **Group by** list.
2. Click **<name-of-the-node-on-which-Aria Operations-is-running> > COLLECTOR > adapters** and then click **HitachiStorageAdapter** or **HitachiNetworkAdapter**.
3. Double-click the log file you want to view.

Log file name:

- HitachiStorageAdapterCollector.log
- HitachiStorageAdapterCollector.log.n
- HitachiNetworkAdapterCollector.log
- HitachiNetworkAdapterCollector.log.n

**Note:**

- You can also view the Hitachi Infrastructure Management Pack log files from the Hitachi Infrastructure Management Pack installation folder.

Log file folder:

```
/usr/lib/vmware-vcops/user/log/adapters/  
HitachiStorageAdapter/
```

```
/usr/lib/vmware-vcops/user/log/adapters/  
HitachiNetworkAdapter/
```

- If the log file size reaches the upper limit for the log file size, a number (*n*) is appended to the file name and the file is kept as a backup. In the maintenance configuration file, set the upper limit of the log file size, and specify how many generations of log files are to be backed up. We do not recommend modifying the default settings for the log file size and number of log generations. However, if necessary, you can modify them in the maintenance configuration file. For details, see [Modifying the maintenance configuration file \(on page 180\)](#).

Information messages in the Hitachi Infrastructure Management Pack log files

Information messages are output to the log files.

Message Code	Message	Description	Action
I320001F	The collection is started. (ID=<ID-of-Hitachi-Storage-Adapter-instance>)	Collection has started.	None
I3200020	The collection is completed. (<detailed-message-information>)	Collection is complete.	None

Message Code	Message	Description	Action
I3200028	Number of events reported by adapter instance <adapter-name>:<adapter-instance-ID> is <event-count>.	Maintenance information.	None
I320004B	The collection is completed. (<detailed-message-information>)	Collection is completed.	None

Warning messages in the Hitachi Infrastructure Management Pack log files

Warning messages are output to the log files.

Message Code	Message	Description	Action
W3200002	Property does not exist. Property=<property-file-name>, Configuration file=<configuration-file-name>	The property does not exist in the configuration file. The default value will be used.	Install Hitachi Infrastructure Management Pack again. Verify that the property name is correct.
W320000B	Retry because Hitachi Ops Center Analyzer is in a busy state. The number of retries=<number-of-retries>	Retry the operation, because HIAA/Ops Center Analyzer is in a busy state.	Check the configuration items for the adapter instance or the configuration of HIAA/Ops Center Analyzer.
W320000D	A storage system is not registered with Hitachi Ops Center Analyzer. Model=<model-name>, serial number=<serial-number>	A storage system that is not registered in HIAA/Ops Center Analyzer was specified.	Register an applicable storage system as a collection target of HIAA/Ops Center Analyzer.

Message Code	Message	Description	Action
W320000E	Record not found. Model=<model-name>, serial number=<serial-number>, record name=<record-name>	The record specified in HIAA/Ops Center Analyzer does not exist.	Make sure the applicable record is targeted for collection by HIAA/Ops Center Analyzer.
W320000F	Key value not found. Model=<model-name>, serial number=<serial-number>, record name=<record-name>, key name=<key-name>	A value corresponding to the record key specified in HIAA/Ops Center Analyzer does not exist.	For VSP family and VSP One B20 storage systems, make sure the applicable record is targeted for collection by HIAA/Ops Center Analyzer. Make sure that the following prerequisites are met. <ul style="list-style-type: none"> ▪ Version of HIAA/Ops Center Analyzer ▪ Microcode version or software version of the target storage system
W3200010	Key value found invalid. Model=<model-name>, serial number=<serial-number>, record name=<record-name>, key name=<key-name>, value=<value>	The HIAA/Ops Center Analyzer key value that was received is in an unexpected format.	Make sure that the following prerequisites are met. <ul style="list-style-type: none"> ▪ Version of HIAA/Ops Center Analyzer ▪ Microcode version or software version of the target storage system
W3200029	In vSphere environment monitoring, the target resource for the collection was not found.	In vSphere environment monitoring, the target resource for the collection was not found.	Make sure that the target resource for the collection exists in vSphere environment monitoring.

Message Code	Message	Description	Action
W320002A	Failed to collect information of the support target storage system which exists in vSphere environment monitoring.	An attempt to collect information of the supported target storage system that exists in vSphere environment monitoring failed.	Make sure that the collection-target storage system is registered with HIAA/Ops Center Analyzer. In addition, if W320000D was output before this message, verify the registration and configuration of the applicable storage system.
W320002B	Failed to read the configuration file. Configuration file=<configuration-file>	The configuration file might not exist or might be damaged. The default values will be used.	Install Hitachi Infrastructure Management Pack again. Make sure that the configuration file exists.
W3200043	Information of other volume to configure global active device pair was not found. (Model=<model-name>, SerialNo=<serial-number>, DevNum=<device-number>)	Information about one of the volumes that make up the global-active device pair was not found.	Make sure the global-active device pair is registered with HIAA/Ops Center Analyzer.
W3200044	Because multiple virtual volumes having the same name were found, datastore association failed. (Model=<model-name>, SerialNo=<serial-number>, DevNum=<device-number>, Count=<count>)	Datastore association failed, because multiple virtual volumes with the same name were found.	Change the name of the virtual volume assigned to the datastore.

Message Code	Message	Description	Action
W3200046	The program was unable to obtain the object name. If it is a new object, the object name is set to "<object-name>". (object type = <object-type>, primary key = <primary-key>, primary key value = <primary-key-value>)	An attempt to obtain the object name from HDCA/Analyzer Detail View failed.	Check the version of HDCA/Analyzer Detail View, and make sure that the network device from which information is collected meets the prerequisites.
W3200047	The program was unable to obtain the property value or the object relationships. (object type = <object-type>, primary key = <primary-key>, primary key value = <primary-key-value>, property key = <property-key>)	The value of the property key could not be obtained from HDCA/Analyzer Detail View.	Check the version of HDCA/Analyzer Detail View, and make sure that the network device from which information is collected meets the prerequisites.
W3200048	The program was unable to obtain the metric value. (object type = <object-type>, primary key = <primary-key>, primary key value = <primary-key-value>, metric key = <metric-key>, parameter = <parameter>)	The value of the metric key could not be obtained from HDCA/Analyzer Detail View.	Check the version of HDCA/Analyzer Detail View, and make sure that the network device from which information is collected meets the prerequisites.
W3200049	The program was unable to obtain any property values. (object type = <object-type>, primary key = <primary-key>, primary key value = <primary-key-value>)	No property values could be obtained from HDCA/Analyzer Detail View.	Check the version of HDCA/Analyzer Detail View, and make sure that the network device from which information is collected meets the prerequisites.
W320004A	The program was unable to collect network device information.	An attempt to collect network device information failed.	Make sure that the network device from which information is collected is registered in the probe of HIAA/Ops Center Analyzer.

Message Code	Message	Description	Action
W3200054	There are no resources. (resource type = <resource-type>)	There are no applicable resources in HDCA/Analyzer Detail View.	Make sure that resources are set as collection targets in HDCA/Analyzer Detail View.
W3200056	Retry because the target storage is busy in Hitachi Ops Center Analyzer. Model=<model-name>, serial number=<serial-number>, The number of retries=<number-of-retries>	Processing was attempted, but there was a response from HIAA/Ops Center Analyzer that the storage system is in a busy state. As a result, the processing will now be retried.	None
W3201008	Failed to open the property file (<property-file>).	An attempt to open the property file failed, because the environment is invalid.	Check whether the property file exists. If not, perform the installation again.
W320100C	HTTP connection failed. (Response Code=<response-code>, Message=<message>)	The connection-destination server returned a response code (404 Not Found) that indicates an error.	Contact the server administrator to confirm that the services at the connection destination are operating normally and that there is no problem with the communication path to the destination.
W3201106	The specified record does not exist. (Response Code=<response-code-(number)>(<response-code-(message)>), Message ID=<message-ID>, Message=<message>, Actions=<actions>, Error Source=<error-source>)	The HIAA/Ops Center Analyzer API request failed, because the specified record does not exist.	Take action according to the HIAA/Ops Center Analyzer message, which provides additional information.

Message Code	Message	Description	Action
W320110B	VSP family storage or VSP One Block storage was found, but it has been excluded as it is not a supported storage. (Model=<model-name>, SerialNo=<serial-number>)	A VSP family or VSP One B20 storage system was found, but it was excluded because the storage system is not supported.	None
W320110C	Hitachi Virtual Storage Platform One SDS Block was found, but it has been excluded as it is not a supported storage. (Model=<model-name>, SerialNo=<serial-number>)	A VSP One SDS Block storage system was found, but it was excluded because the storage system is not supported.	None
W320110D	Key value found invalid. Model =<model-name>, serial number=<serial-number>, record name=<record-name>, key name=<key-name>, value=<value>	The retrieved key value of HIAA/Ops Center Analyzer is in an unexpected format.	None
W3204001	Property does not exist. Property=<property-file-name>, Configuration file=<configuration-file-name>	The property does not exist in the configuration file. The default value will be used.	Install Hitachi Infrastructure Management Pack again. Make sure that the property name is correct.
W3204002	Failed to read the configuration file. Configuration file=<file-name>	The configuration file does not exist or is corrupted.	Install Hitachi Infrastructure Management Pack again.

Message Code	Message	Description	Action
W3206007	The program was unable to stop an asynchronous job of Hitachi Ops Center Analyzer Detail View. (response code = <a-response-code-of-HTTP-(numerical-value)><a-response-code-of-HTTP-(character-string)>), error code = <the-error-code-that-received-from-HDCA/Analyzer-Detail-View>, error message = <the-error-message-which-received-from-HDCA/Analyzer-Detail-View>)	An attempt to stop an asynchronous job of HDCA/Analyzer Detail View failed.	Take action according to the HDCA/Analyzer Detail View message, which provides additional information.

Error messages in the Hitachi Infrastructure Management Pack log files

Error messages are output to the log files.

Message code	Message	Description	Action
E3200001	Failed to read the configuration file. Configuration file=<file-name>	The configuration file does not exist or has been corrupted.	Install Hitachi Infrastructure Management Pack again.
E3200003	Failed to retrieve the datastore or virtual machine information.	An attempt to retrieve information about the datastore or virtual machine failed.	Make sure that VMware Aria Operations is operating normally.

Message code	Message	Description	Action
E3200009	Could not connect to Hitachi Ops Center Analyzer. Check a host name or IP and port number. In addition, confirm security settings about the communication of Hitachi Ops Center Analyzer.	A connection error occurred in HIAA/Ops Center Analyzer.	<ul style="list-style-type: none"> ▪ Specify a valid IP address or host name and a valid port number, and then try the operation again. ▪ Check the communication security settings of HIAA/Ops Center Analyzer. ▪ Confirm with the server administrator that the HIAA/Ops Center Analyzer services are operating normally, and that there is no problem with the communication channel with HIAA/Ops Center Analyzer.
E320000A	Received an authentication error from Hitachi Ops Center Analyzer. Check a user ID and a password.	An authentication error occurred in HIAA/Ops Center Analyzer.	<ul style="list-style-type: none"> ▪ Check the adapter instance settings. ▪ Check whether Admin or Modify permissions have been granted to the HIAA/Ops Center Analyzer user account. If you are using the Single Sign-On function, check whether HIAA/Ops Center Analyzer Admin or Modify permissions have been assigned to the opscenter-users group to which the Single Sign-On user belongs.

Message code	Message	Description	Action
E320000C	Hitachi Ops Center Analyzer is in a busy state.	The operation was retried because the HIAA/Ops Center Analyzer server was busy. However, the retry attempt failed and the operation was terminated.	HIAA/Ops Center Analyzer is in a busy state. To register the Hitachi Storage Adapter instance, wait a while, and then try the operation again.
E3200011	An internal error occurred.	An internal error occurred during the collection of the resources.	Contact customer support.
E3200017	An error occurred in Hitachi Ops Center Analyzer. Message=<message>	An error occurred in HIAA/Ops Center Analyzer.	Check the HIAA/Ops Center Analyzer message. Confirm with the administrator of HIAA/Ops Center Analyzer.
E320001A	A stack trace. <stack-trace>	This message provides maintenance information.	None
E320001B	An error occurred by processing for Hitachi Ops Center Analyzer.	An error occurred in the processing for HIAA/Ops Center Analyzer.	Contact customer support.
E320001C	Invalid input value. Invalid character is used for <invalid-input-value>.	An invalid character was entered.	Revise the item that contains an invalid character, and retry the test.
E320001D	Invalid input value. For <invalid-input-value>, specify 256 or less characters.	The number of characters entered exceeds 256.	Revise the length of the character string, and retry the test.
E320001E	Invalid input value. For <invalid-input-value>, specify 65535 or less numerical value.	Numerical value more than or equal to 65536 has been entered.	Revise the value of the character string, and retry the test.

Message code	Message	Description	Action
E3200036	Received an authentication error from VMware Aria Operations.	An authentication error occurred in VMware Aria Operations.	Wait a while, and then try the operation again.
E3200039	vCenter Server information is not entered definitely. (vCenter for vVols number)	vCenter Server information was not entered correctly.	Enter vCenter Server information.
E320003B	Hitachi Ops Center Common Services information is not entered definitely.	Hitachi Ops Center Common Services information was not entered correctly.	Enter the Hitachi Ops Center Common Services information correctly.
E3200040	Could not connect to vCenter Server. Host=<host>	An attempt to connect to the vCenter Server host failed.	Contact the vCenter Server administrator to confirm that the services at the connection destination are operating normally, that the destination name is correct, and that there is no problem with the communication path to the destination.
E3200041	Received an authentication error from vCenter Server. Host=<host>, Message=<message>	An authentication error was received from vCenter Server.	Make sure that the authentication information of the vCenter Server is correct. Alternatively, because the vCenter Server might be in a busy state, retry the operation later. If a message is output, take action according to the message.
E3200042	An unexpected error occurred in vCenter Server. Host=<host>, Message=<message>	An unexpected error occurred in vCenter Server.	If a message is output, take action according to the message. If the problem persists, contact customer support.

Message code	Message	Description	Action
E3200045	An error occurred by processing of information collection from Hitachi Ops Center Analyzer. (Message=<message>)	An error occurred in the processing to collect information from HIAA/Ops Center Analyzer.	Wait a while, and try the operation again.
E3200050	The program was unable to connect to Hitachi Ops Center Analyzer Detail View. Check the host name or IP address, the port number, and the protocol value. Also, check the SSL communication settings for Hitachi Ops Center Analyzer Detail View.	A connection error occurred in HDCA/ Analyzer Detail View.	<ul style="list-style-type: none"> ▪ Make sure that the specified IP address or host name, port number, and protocol are correct, and then retry the operation. ▪ Check the SSL communication settings for HDCA/ Analyzer Detail View. ▪ Confirm with the server administrator that the HDCA/ Analyzer Detail View services are operating normally, and that there is no problem with the communication channel with HDCA/ Analyzer Detail View.
E3200051	An authentication error or a license error occurred in Hitachi Ops Center Analyzer Detail View. Check the user ID, password, and license.	An authentication error or a license error occurred in HDCA/ Analyzer Detail View.	<ul style="list-style-type: none"> ▪ Check the user ID and password set for Hitachi Network Adapter instance. ▪ Check the HDCA/ Analyzer Detail View license.

Message code	Message	Description	Action
E3200052	An error occurred in Hitachi Ops Center Analyzer Detail View. (message = <message>)	An error occurred in HDCA/Analyzer Detail View.	<ul style="list-style-type: none"> ▪ Check the HDCA/Analyzer Detail View message. ▪ Check with the administrator of HDCA/Analyzer Detail View.
E3200053	An error occurred in the processing for Hitachi Ops Center Analyzer Detail View.	An error occurred in the processing for HDCA/Analyzer Detail View.	Contact customer support.
E3200055	The target storage error occurred in Hitachi Ops Center Analyzer. Model=<model-name>, serial number=<serial-number>, Message=<message>	HIAA/Ops Center Analyzer detected the occurrence of an error in a storage system.	<ul style="list-style-type: none"> ▪ Check the HIAA/Ops Center Analyzer message. ▪ Confirm with the storage system administrator.
E3200057	The target storage is busy in Hitachi Ops Center Analyzer. Model=<model-name>, serial number=<serial-number>	Processing was retried but the attempts failed.	Wait a while, and then try the operation again.

Message code	Message	Description	Action
E3200060	The program was unable to connect to Hitachi Ops Center Common Services. Check the host name or IP address, the port number value. Also, check the SSL communication settings for Hitachi Ops Center Common Services.	A connection error occurred in Hitachi Ops Center Common Services.	<ul style="list-style-type: none"> ▪ Specify the correct IP address, host name, and port number, and then retry the operation. ▪ Check the SSL communication settings for Hitachi Ops Center Common Services. ▪ Confirm with the storage system administrator that Hitachi Ops Center Common Services is running normally, and that there is no problem with the communication path to Hitachi Ops Center Common Services.
E3200061	Received an authentication error from Hitachi Ops Center Common Services. Check a user id and a password.	An authentication error occurred in Hitachi Ops Center Common Services.	Check the user ID and password set for the Adapter Instance.
E3200062	An error occurred in Hitachi Ops Center Common Services. Message=<message>	An error occurred in Hitachi Ops Center Common Services.	Check the message from Hitachi Ops Center Common Services. Confirm with the Hitachi Ops Center Common Services administrator.
E3200063	An error occurred by processing for Hitachi Ops Center Common Services.	An error occurred by processing for Hitachi Ops Center Common Services.	Contact customer support.

Message code	Message	Description	Action
E3201001	An error occurred because invalid algorithm was specified. (Type=<type>, Message=<message>)	An error occurred while processing to initialize the SSL contexts.	Contact customer support.
E3201002	Initialization of SSL context failed.	An error occurred while processing to initialize the SSL contexts.	Contact customer support.
E3201003	The given URL format is invalid. (Message=<message>)	An attempt to create a URL failed.	Contact customer support.
E3201004	HTTP connection failed. (Response Code=<response-code>, Message=<message>)	The connection destination server returned a response code indicating an error.	Contact the server administrator to confirm that the services at the connection destination are operating normally and that there is no problem with the communication path to the destination.
E3201005	An I/O error occurred during HTTP request execution. (Message=<message>)	An I/O error occurred during communication with the connection destination server.	Contact the server administrator to confirm that the services at the connection destination are operating normally, that the connection destination name is correct and that there is no problem with the communication path to the connection destination.
E3201006	An exception occurred. (Message=<message>)	An error occurred in an internal process.	Contact customer support.
E3201007	A stack trace. <stack-trace>	This message provides maintenance information.	None

Message code	Message	Description	Action
E3201100	Received the response in invalid format from Hitachi Ops Center Analyzer. (Info=<information>, Offset=<offset>, Data=<data>)	The format of the response data from HIAA/Ops Center Analyzer is invalid.	Contact customer support.
E3201101	Received an error response from Hitachi Ops Center Analyzer. (Response Code=<response-code-ID><response-code-description>), Message ID=<message-ID>, Message=<message>, Actions=<actions>, Error Source=<URI>)	The HIAA/Ops Center Analyzer API returned an error.	Take appropriate action according to the HIAA/Ops Center Analyzer message, which provides additional information.
E3201102	Internal error occurred.	An unexpected error occurred.	Contact customer support.
E3201103	An argument is invalid. (Argument Name=<argument-name>, Reason=<reason>)	An invalid argument was set in the internal processing.	Contact customer support.
E3201104	Response in invalid format. (Response Code=<response-code-ID><response-code-description>), Body=<body>)	The contents of the response from HIAA/Ops Center Analyzer are invalid.	Make sure that the following settings are correct: <ul style="list-style-type: none"> ▪ A supported version of HIAA/Ops Center Analyzer is specified for the connection. ▪ The connection-destination instance of HIAA/Ops Center Analyzer is in a normal state.

Message code	Message	Description	Action
E3201105	Data size is too big. (Received Size=<size>)	The size of the reply data from HIAA/Ops Center Analyzer is too big.	Contact customer support.
E3201107	A value for <item> is too long.	The length of the specified value exceeds the upper limit.	Revise the specified value.
E3203006	A stack trace. <stack-trace>	This message provides maintenance information.	None
E3203007	An argument is invalid. (Argument Name=<argument-name>, Reason=<reason>)	An invalid argument was set in the internal processing.	Contact customer support.
E3205003	An I/O error occurred during HTTP request execution. (Message=<message>)	An I/O error occurred during communication with the vCenter Server.	Confirm with the vCenter Server administrator that the connection service is operating normally, that the connection name is correct, and that the connection channel is functioning normally.
E3205004	An error occurred by processing of information collection from vCenter Server. (Message=<message>)	An error occurred in the internal processing.	Take action according to the error message. If the problem persists, contact customer support.
E3205005	A stack trace. <stack-trace>	This message provides maintenance information.	None
E3205006	An argument is invalid. (Argument Name=<argument-name>, Reason=<reason>)	An invalid argument is set in the internal processing.	Contact customer support.

Message code	Message	Description	Action
E3205007	Received an error from vCenter Server. (Error Message=<error-message>)	An error was received from the vCenter Server.	Confirm that the authentication information for the vCenter Server is correct. Or, if the vCenter Server is busy, retry the operation later. If an error message is output, take action according to the message.
E3206003	A stack trace. \n<stack-trace>	This message provides maintenance information.	None
E3206004	Internal error occurred.	An unexpected exception occurred.	Contact customer support.
E3206005	Received the response in invalid format from Hitachi Ops Center Analyzer Detail View. (Info=<info>, Offset=<offset>, Data=<data>)	The format of the response data received from HDCA/Analyzer Detail View was invalid.	Contact customer support.
E3206006	Received an error response from Hitachi Ops Center Analyzer Detail View.(Response Code=<HTTP-response-code-(numerical-value)>(<HTTP-response-code-(character-string)>), ErrorCode=<error-code-received-from-HDCA/Analyzer-Detail-View>, ErrorMessage=<error-message-received-from-HDCA/Analyzer-Detail-View>)	An HDCA/Analyzer Detail View API request was returned as an error.	Take action according to the HDCA/Analyzer Detail View message, which provides additional information.

Message code	Message	Description	Action
E3206008	An argument is invalid. (Argument Name=< <i>argument-name</i> >, Reason=< <i>reason</i> >)	An invalid argument was set in the internal processing.	Contact customer support.
E3206009	An I/O error occurred during HTTP request execution. (Message=< <i>message</i> >)	An I/O error occurred during communication with HDCA/Analyzer Detail View.	Confirm with a server administrator that the connection service is operating normally, that the connection name is correct, and that there is no problem with the communication path to the connection destination.
E320600A	Response in invalid format. (Response Code=< <i>response-code-ID</i> >(< <i>response-code-description</i> >), Body=< <i>body</i> >)	The contents of response data from HDCA/Analyzer Detail View are invalid.	Make sure that the following settings are correct: <ul style="list-style-type: none"> ▪ A supported version of HIAA/Ops Center Analyzer is specified for the connection. ▪ The connection-destination instance of HIAA/Ops Center Analyzer is in a normal state.
E3207100	Received the response in invalid format from Hitachi Ops Center Common Services. (Info=< <i>information</i> >, Offset=< <i>offset</i> >, Data=< <i>data</i> >)	The format of the response data from Hitachi Ops Center Common Services is invalid.	Contact customer support.

Message code	Message	Description	Action
E3207101	Received an error response from Hitachi Ops Center Common Services. (Response Code=<response-code-(ID)><response-code-(description)>), Message=<message>, AdditionalInfo=<additional-information>)	Hitachi Ops Center Common Services API returned an error.	Take action according to the detailed information contained in the error message received from Hitachi Ops Center Common Services.
E3207102	Response in invalid format. (Response Code=<response-code-(ID)><response-code-(description)>), Body=<body>)	The content of the response data from Hitachi Ops Center Common Services is invalid.	Check the following: <ul style="list-style-type: none"> ▪ A supported version of Hitachi Ops Center Common Services is specified for the connection destination. ▪ The connection-destination instance of Hitachi Ops Center Common Services is in a normal state.

Confirmation points in the operating environment

VMware Aria Operations server environment

If any problem or error occurs when you are using VMware Aria Operations, a problem might have occurred in the VMware Aria Operations server environment. Check the items in the following table, and if a problem is found, take appropriate action.

If you cannot resolve a failure in VMware Aria Operations even after reconfirming the VMware Aria Operations server environment, follow the above mentioned troubleshooting flowchart.

Item	Action
Check the VMware Aria Operations server environment	Confirm that the VMware Aria Operations server has started normally. Also, confirm that the VMware Aria Operations service is not stopped.
Check the network environment	Confirm that the LAN cable is connected to the network interface card of VMware Aria Operations and that linkage is in place.
Check the IP address or host name	Confirm that the IP address and host name of VMware Aria Operations have not been changed.
Check the firewall settings	Confirm that communications with VMware Aria Operations are not blocked by the firewall. If communications are blocked, change the firewall settings to allow communication with VMware Aria Operations.
Check the VMware Aria Operations user account	<ul style="list-style-type: none"> ▪ If the user account you are trying to use does not exist, ask the administrator of VMware Aria Operations for a usable account. ▪ If the user account you are trying to use is invalid, ask the administrator of VMware Aria Operations to enable the account.
Check the vCenter Server adapter	Confirm that the vCenter adapter was created and that the datastores configured for the storage system are managed by the vCenter adapter.

HIAA/Ops Center Analyzer server environment

If a problem or error occurs when you are using VMware Aria Operations, a problem might have occurred in the HIAA/Ops Center Analyzer server environment. Check the items in the table below, and if a problem is found, take appropriate action. If the problem persists, follow the troubleshooting flowchart.

Item	Action
Check the HIAA/Ops Center Analyzer server environment	Confirm that the HIAA/Ops Center Analyzer server started normally and that the HIAA/Ops Center Analyzer service is running.
Check the network environment	Confirm that the LAN cable is connected to the HIAA/Ops Center Analyzer network interface card and that they are linked.

Item	Action
Check the IP address or host name	Confirm that the HIAA/Ops Center Analyzer IP address or host name has not changed.
Check the communication protocol and port number	Confirm that the communication protocol and port number being used to connect to the HIAA/Ops Center Analyzer server have not changed. If they have been changed, update the communication protocol and port number to the HIAA/Ops Center Analyzer server for the storage adapter instance. See Editing an adapter instance (on page 49) .
Check the firewall settings	Confirm that the communication protocol and port number to the HIAA/Ops Center Analyzer server that were specified when the storage adapter instance was created are not blocked by the firewall between VMware Aria Operations and the HIAA/Ops Center Analyzer server. If the communication protocol and port number are blocked, change the firewall settings to allow communication.
HIAA/Ops Center Analyzer Management objects	<ul style="list-style-type: none"> ▪ If the server system that is used for the management object of the HIAA/Ops Center Analyzer server has not been registered, register the server system (see your HIAA/Ops Center Analyzer documentation). ▪ Confirm that the server system information can be retrieved from HIAA/Ops Center Analyzer.
Check the HIAA/Ops Center Analyzer user account	<ul style="list-style-type: none"> ▪ If no usable user account exists, ask the HIAA/Ops Center Analyzer environment administrator for a usable account, and then try the operation again. ▪ If the user account that you are trying to use is invalid, ask the HIAA/Ops Center Analyzer environment administrator to enable the account, and then try the operation again. ▪ If the user password you are trying to use is incorrect, enter the correct password, and then try the operation again. ▪ If the user account you are trying to use does not belong to a user group with Admin, StorageOps, or Modify permissions, either use an existing user account that belongs to one of these user groups, or create a new user account in one of these user groups.

Item	Action
Check the environment settings for the RAID Agent instance	<p>Use the <code>jpctdchkinst</code> command to confirm that the <code>Unassigned Open Volume Monitoring</code> setting for the RAID Agent instance that is monitoring storage systems is set to <code>[Y]</code>. If this setting is <code>[N]</code>, change it by using the <code>jpcinssetup</code> command.</p> <p>For details, see the HIAA/Ops Center Analyzer documentation.</p>
Check environments that are not in a global-active device configuration	<p>If multiple virtual volumes having the same storage system model name, serial number, and volume name exist in an environment (except for global-active device configurations), Hitachi Infrastructure Management Pack does not collect the information of all of the virtual volumes.</p>

Providing error information

If you are unable resolve an error by troubleshooting, collect the relevant error information and send it to customer support.

System component	Required information	Collection method
VMware Aria Operations	VMware Aria Operations version	<ol style="list-style-type: none"> In the main title bar of VMware Aria Operations Home window, click About. Note the version information.
	All log files (including the Hitachi Infrastructure Management Pack logs) and environment information	<ol style="list-style-type: none"> In the Support Bundles window, click ADD. In the Generate Support Bundle window, select Full support bundle - includes full log and charts as a type of bundle. In Select nodes to include in bundle, select all nodes, and then click OK. A .zip file of the support bundle is created. Download the support bundle file. Select the newly created support bundle, and then click Download.

System component	Required information	Collection method
HIAA/Ops Center Analyzer	Log file	<p>See the troubleshooting chapters in the relevant documents (listed below) for details about collecting maintenance information.</p> <ul style="list-style-type: none"> ▪ <i>Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide</i> ▪ <i>Hitachi Infrastructure Analytics Advisor REST API Reference Guide</i> ▪ <i>Hitachi Infrastructure Analytics Advisor User's Guide</i> ▪ <i>Hitachi Ops Center Analyzer Installation and Configuration Guide</i> ▪ <i>Hitachi Ops Center Analyzer REST API Reference Guide</i> ▪ <i>Hitachi Ops Center Analyzer User Guide</i>

Appendix A: Modifying the maintenance configuration file

When Hitachi Infrastructure Management Pack is installed, a maintenance configuration file (`hilogger.config`) is created in the installation folder. You can modify the behavior of the log output generated by the adapter by modifying the settings in this file. The following table lists the settings in this file. To modify the file, save it with a text editor using single-byte alphanumeric characters (the Shift JIS code set), and end each line with a linefeed character. If the maintenance configuration file does not exist, Hitachi Infrastructure Management Pack uses the default values.

Configuration file location

`<installation-folder>/hitachi_storage_adapter/conf/`

For details about installation folder, see [Environment configuration \(on page 32\)](#).

Item	Description	Syntax	Remarks
Log file size	Specify the log file size. (Default value: 10)	<code>[MaxFileSize=<size>]</code>	<p>You can specify the size of the output log file in megabytes by changing the value of <code><size></code>. Specify a value between 1 and 100.</p> <ul style="list-style-type: none">Specify <code><size></code> as a decimal value, by using single-byte characters.Enclose <code>MaxFileSize=<size></code> in single-byte square brackets (<code>[]</code>).

Item	Description	Syntax	Remarks
			<ul style="list-style-type: none"> ▪ Insert a linefeed character after [MaxFileSize=<size>]. ▪ If the log file size value is omitted or if a non-permitted value (a value outside the specifiable range or a value containing characters other than single-byte characters) is specified, the default value is used.
Number of log generations	<p>When the size of a log file exceeds the value specified in <code>MaxFileSize</code>, a new log file is created and the output of log data is rotated to the new log file. The old log file is stored as a backup file. Specify the value for the number of log generations of these backup files.</p> <p>(Default value: 5)</p>	[MaxBackupIndex=<number-of-generations>]	<ul style="list-style-type: none"> ▪ You can specify the number of backup file generations by changing the value of <number-of-generations>. Specify between 1 and 255. ▪ Specify the value of <number-of-generations> as a decimal value, by using single-byte characters. ▪ Enclose <code>MaxBackupIndex=<number-of-generations></code> in single-byte square brackets ([]). ▪ Insert a linefeed character after [MaxBackupIndex=<number-of-generations>]. ▪ If the value for the number of log generations is omitted or a non-permitted value (a value outside the specifiable range or a value containing characters other than single-byte characters) is specified, the default value is used.

Notation examples for the maintenance configuration file are shown below.

- You can enter comments on a line beginning with the # symbol.
- Always insert a linefeed character at the end of the last line.

```
#####  
# [MaxFileSize=1~100] - default is 10(MB)  
# [MaxBackupIndex=1~255] - default is 5  
#####  
  
[MaxFileSize=10]  
[MaxBackupIndex=5]
```

Appendix B: Modifying the adapter configuration file

When Hitachi Infrastructure Management Pack is installed, an adapter configuration file (`hiconfig.properties`) is created in the installation folder of each adapter. You can modify the configuration of the adapter by modifying the settings in this file. The following table lists the details about the configuration file. If the configuration file does not exist, the adapter uses the default values.

Configuration file location

`<installation folder>/hitachi_storage_adapter/conf/`

For details about the installation folder, see [Environment configuration \(on page 32\)](#).

Item	Description	Syntax	Remarks
Threshold of the alert	Set the maximum number of object collection failure alerts that can be added per collection. Default value: 50.	<ul style="list-style-type: none">▪ Hitachi Storage Adapter: <code>storage.event.add.max=<value></code>▪ Hitachi Network Adapter: <code>network.event.add.max=<value></code>	<ul style="list-style-type: none">▪ You can change the maximum number of object collection failure alerts that can be added per collection by changing the value of <code><value></code>. The range of specifiable values is from 1 to 100.▪ Specify <code><value></code> as a decimal value in single-byte characters, with no leading zeros.▪ If you omit this item or enter an invalid value (a value outside the permitted range or value containing characters other than single-byte characters), the default value is used.

Notation examples for the Hitachi Storage Adapter configuration file are shown below.

- You can enter comments on a line beginning with a hash mark (#).
- Always insert a linefeed character at the end of the last line.

```
#Adapter configuration properties.  
#The number of events upper limit in a single collection.  
storage.event.add.max=50
```

Glossary

Active flash

In addition to Dynamic Tiering (HDT), active flash relocates to Tier 1 the most recent lower tier page experiencing an unexpected increase in I/O loads and relocates a low load page from Tier 1 to a lower tier.

Adaptive data reduction

Adaptive data reduction includes both controller-based capacity saving and hardware-based accelerated compression functions. Capacity saving and accelerated compression are functions that can be combined to streamline the available capacity of data volumes.

Analytics probe server/Analyzer probe server

This is configured with RAID Agent or Hitachi Ops Center Analyzer Virtual Storage Software Agent, and collects performance data and configuration data from targets.

Analyzer Detail View

Hitachi Ops Center Analyzer Detail View. Software that processes performance and configuration data collected from software probes connected to monitored devices and enables analysis, troubleshooting, and reporting by the Ops Center Analyzer server.

CLPR

Cache Logical Partition. The function to divide the cache on the entire storage system logically.

Datastore

Virtual area used to store a virtual machine image on ESXi. The actual area is created on a local disk or external storage system.

DP Pool

Dynamic Provisioning Pool. It consists of more than one exclusive RAID group. Dynamic Provisioning Pool is the area that manages data written in the virtual volume.

DP Volume

Dynamic Provisioning Volume. A virtual volume that is created from a DP Pool.

DRS-VOL

A data reduction shared volume. A virtual volume created using adaptive data reduction.

ESXi

VMware ESXi. A bare-metal hypervisor (a virtualization OS) of VMware, Inc.

GAD

Global-active device. The function synchronously copies data in the volumes between storage systems.

Global storage virtualization

Global storage virtualization enables virtualization, allowing the server to recognize multiple storage systems as a single virtual machine by responding to the server with virtual information (responding to the SCSI Inquiry command).

HDCA

Hitachi Data Center Analytics. Software that processes performance and configuration data collected from software probes connected to monitored devices and enables analysis, troubleshooting, and reporting by the Infrastructure Analytics Advisor server.

HDP

Dynamic Provisioning. The function to assign a virtual volume to a host and use the required physical capacity according to the data writing request. It provides the virtualization of the volume capacity.

HDT

Dynamic Tiering. In addition to the HDP function, it relocates data based on the I/O load: High I/O load data areas are relocated to the higher speed hardware hierarchy and low I/O load data areas are relocated to the lower speed hardware hierarchy.

HIAA

Hitachi Infrastructure Analytics Advisor. Data center management software that provides end-to-end performance monitoring and reporting from monitored target hosts to shared storage resources.

HIAA/Ops Center Analyzer REST API

REST interface API for collecting HIAA/Ops Center Analyzer information (records) from external applications.

Hitachi Ops Center Analyzer Virtual Storage Software Agent

Hitachi Ops Center Analyzer Virtual Storage Software Agent is software that runs on the Analytics probe server. This agent collects information from VSP One SDS Block.

Host group

A group of hosts connected to the same port on a storage system and running on the same platform.

Journal group

A group of journals used by Universal Replicator to temporarily store data to be copied from the primary site to the secondary site.

LDEV

Logical Device. The logical volume unit consisting of multiple physical drives.

Metric

Indicates a performance index collected by VMware Aria Operations.

MP

Management Processor.

MPB

Management Processor Blade. MPB is equipped with four Management Processors (MP) and each MP distributes processing loads.

Namespace

Logical volume space that organizes the range of multiple LBAs (logical block addresses). A namespace is equivalent to a SCSI LU.

NVM

An abbreviation for Non-Volatile Memory.

NVM subsystem

NVM device control system. The NVM subsystem consists of the controller group that shares NVM and NVM/namespaces, and the NVM subsystem ports.

NVMe

An abbreviation of Non-Volatile Memory Express. NVMe is a connection interface and communication protocol for SSDs that use PCI Express.

NVMe over FC

Communication protocol used to map NVMe over Fabrics to Fibre Channel.

NVMe/TCP

An abbreviation for NVMe over TCP. This technology uses the TCP protocol to implement the NVMe communication protocol.

Ops Center Analyzer

Hitachi Ops Center Analyzer. Data center management software that provides end-to-end performance monitoring and reporting from monitored target hosts to shared storage resources.

Parity Group

The group of physical drives comprised of RAIDs in the storage system.

Port

The port for a channel adapter or port controller on a storage system.

RAID

Redundant Arrays of Independent Disks.

RAID Agent

RAID agent for the Analytics probe server/Analyzer probe server.

Supermetric

Indicates a numerical formula including one or more metrics defined in VMware Aria Operations.

TrueCopy

A function for synchronously copying the data in volumes between a storage system at the primary site and a storage system at the secondary site.

Universal Replicator

A function for asynchronously copying the data in volumes between a storage system at the primary site and a storage system at the secondary site.

vCenter Server

VMware vCenter Server. vCenter Server is management software from VMware Inc. It is used to control the virtual environment. Centralized control is available by collecting multiple ESXi servers in a unit called a data center.

Virtual Volumes (vVols)

VMware vSphere Virtual Volumes. Administrative units of individual virtual machines and their disks as part of a management framework for virtualizing storage systems.

VM

Virtual Machine

VSP One SDS Block

VSP One SDS Block is a software product that integrates multiple servers and provides them as a storage function (software-defined storage).

vSphere API

An API for operating and monitoring vCenter Server/ESXi from an external application.

Hitachi Vantara

Corporate Headquarters
2535 Augustine Drive
Santa Clara, CA 95054 USA



HitachiVantara.com/contact