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Hitachi Command Suite

Command Director

Installation and Configuration Guide

Hitachi Data Systems

MK-90HCMD002-17

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Contents

Preface

This document describes how to install and configure Hitachi® Command Director (HCmD).

Intended audience

This document is intended for Hitachi Command Director (HCmD) users.

To use this document, you should have a working knowledge of the following:

- Hitachi Device Manager (HDvM), Tuning Manager (HTnM), Hitachi Tiered Storage Manager (HTSM), and Hitachi NAS Platform.
- Storage system and performance concepts.
- Service Level Objectives (SLOs) and Service Level Agreements (SLAs).

Product version

This document revision applies to Hitachi Command Director v8.1.1.

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 can be found on the documentation CD or on the Hitachi Data Systems Support Portal: https://portal.hds.com/

Referenced documents and additional resources

The following referenced documents can be found on the applicable documentation CD:

- *Hitachi Command Suite Command Director User Guide*, MK-90HCMD001
- *Hitachi Command Suite Command Director CLI Reference Guide*, MK-90HCMD004
- *Hitachi Command Suite Command Director API Reference Guide*, MK-90HCMD005
- *Hitachi Command Suite Command Director Release Notes*, RN-90HCMD003
- *Hitachi Command Suite System Requirements*, MK-92HC209
- *Hitachi Command Suite Administrator Guide*, MK-90HC175
- *Hitachi Command Suite documentation*
- *Hitachi Command Suite Tuning Manager documentation*

The referenced documents are available on the Hitachi Data Systems Support Portal: https://portal.HDS.com.

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click **OK**.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `copy` *`source-file target-file`* **Note:** Angled brackets (< >) are also used to indicate variables.
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `pairdisplay -g <group>` **Note:** Italic font is also used to indicate variables.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
⚠	Note	Calls attention to important or additional information.
💡	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
⚠	Caution	Warns the user of adverse conditions or consequences (for example, disruptive operations).
⚠	WARNING	Warns the user of severe conditions or consequences (for example, destructive operations).

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

Logical capacity unit	Value
1 block	512 bytes
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

Accessing product documentation

Product user documentation is available on the Hitachi Data Systems Portal: https://portal.hds.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

Hitachi Data Systems Support Portal is the destination for technical support of your current or previously-sold storage systems, midrange and enterprise servers, and combined solution offerings. The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: https://portal.hds.com

Hitachi Data Systems Community is a new global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is an open discussion among these groups about the HDS portfolio of products and services. It is the destination to get answers, discover insights, and make connections. The HDS Community complements our existing Support Portal and support services by providing an area where you can get answers to non-critical issues and questions. **Join the conversation today!** Go to community.hds.com, register, and complete your profile.

Comments

Please send us your comments on this document to doc.comments@hds.com. Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems Corporation.

Thank you!

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Overview of Hitachi Command Director

Review information about the Hitachi® Command Director installation infrastructure and requirements.

You can refer to the following topics:

Product overview

Hitachi Command Director (HCmD) centralizes storage management reporting across the Hitachi Command Suite (HCS) by providing custom business views of applications and reports about Hitachi storage usage. Command Director also provides a convenient way to align Hitachi storage assets with applications and the business functions that use them.

Command Director correlates data collected from the following sources:

- Storage system configuration data from Hitachi Device Manager (HDvM).
- Performance data from the Agent for RAID instances.
- Storage tier data from Hitachi Tiered Storage Manager (HTSM).
- Configuration data from supported third party storage systems through the HCmD Data Collector.
- Storage utilization data from hosts.

The data collected from the sources mentioned above is manipulated to provide reports to enable the following functions:

- Monitor application storage. Define corporate-wide standard Service Level Objectives (SLOs) for all your applications and issue proactive alerts when application SLOs are at risk.
- Monitor Hitachi enterprise storage health. Detect potential storage system performance issues. You can also outsource the function of keeping your storage systems running optimally and finding root causes of problems if they arise.
- Key performance indicator (KPI) reports. KPI reports provide consolidated storage allocation, performance, and trend data reporting by applications and business units.
- Host discovery. You can use the Command Director host discovery feature to discover hosts on your network and gather their file system and storage utilization information. This allows Command Director to provide end-to-end mapping of the path from the hosts to the storage system volumes.

What's new in Hitachi Command Director

Hitachi Command Director includes the following new or enhanced functionality:

- Support for creating and managing applications based on VMware datastores. Applications can be created automatically based on VMware datastores and then monitored in application reports. The applications can also be managed like any other application.
- Support for removing hosts, storage arrays, and related data. The CLI includes utilities for removing one host or array at a time, or you can remove a list of one or the other.

- Support for Command Director server on Red Hat Enterprise Linux v6.6 and v7.0, as well as on Oracle Enterprise Linux v6.6 and v7.0.
- Support for Agent for RAID Extension on Red Hat Enterprise Linux v5.11 and v7.0 and on Oracle Enterprise Linux v7.0.

Command Director installation components

To use Command Director, install and configure the following components:

- **Command Director (HCmD) server:** The HCmD server is the primary component that communicates with the various data collector components. HCmD server uses the collectors on Device Manager and Tuning Manager instances to retrieve storage system configuration and performance data, and correlates this data to generate reports. The HCmD server installer also installs a preconfigured Local Host Collector.
  - HCmD collects tier data from Hitachi Tiered Storage Manager.
  - Hitachi NAS Platform data collectors collect performance data from Hitachi NAS systems.
- **Host Collector:** The Host Collector component allows you to configure host probes. The probes discover all hosts on any network and provide end-to-end mapping of the path from the hosts to the storage system volumes. The Host Collector is installed by default, but use is optional.

  The default Host Collector discovers hosts on the HCmD server subnet and hosts on different subnets that you can access through a firewall. However, to access remote hosts on a different subnet and behind a firewall, install this component on a server in each subnet, and make sure your firewall settings allow communication between the Command Director server and this component.
- **HCmD Data Collector:** The HCmD Data Collector component enables you to collect configuration data from supported third party storage systems such as EMC Symmetrix®. This component is installed by default with the HCmD server.
- **Agent for RAID Extension:** The Agent for RAID Extension gathers storage system performance data from Agent for RAID instances in the environment where it is installed. This component is installed by default with Tuning Manager Agent for RAID. However, for HCmD to obtain performance data from the Agent for RAID Extension instance, you must enable this component’s service on Tuning Manager Agent for RAID server. For steps to enable the service, see Enabling performance data collection using Command Director Agent for RAID on page 40.

Supported storage systems

Command Director supports the following storage systems:

- Hitachi Virtual Storage Platform (VSP)
- Hitachi Virtual Storage Platform G1000

- Hitachi Universal Storage Platform (USP) series
    - Hitachi Tagmastore® Network Storage Controller Model NSC55
    - Hitachi Universal Storage Platform
    - Hitachi Universal Storage Platform V
    - Hitachi Universal Storage Platform VM
- Hitachi Adaptable Modular Storage (AMS), Hitachi Simple Modular Storage, and Hitachi Workgroup Modular Storage (WMS)
    - 700 series: Adaptable Modular Storage (AMS) 100, AMS 200, AMS 300, AMS 500, AMS 1000, Workgroup Modular Storage 1000, Simple Modular Storage 100
    - 800 series: AMS 2100, AMS 2300, AMS 2500
- Hitachi Unified Storage (HUS)
    - Hitachi Unified Storage 110, Hitachi Unified Storage 130, Hitachi Unified Storage 150
- Hitachi Unified Storage VM (HUS VM)
- EMC Symmetrix® VMAX-1SE, with support for SMI-S Provider v4.3

For more information, see the *Hitachi Command Suite System Requirements*.

Supported system configuration

This section describes the typical system configuration for installing Command Director and its components.

To ensure optimal performance and to avoid port conflicts, Hitachi recommends that you install the Command Director server and the HCmD components on separate servers.

Depending on how Hitachi Command Director is configured in your environment and the size of the configured environment, you can choose to deploy Command Director in one of the following ways:

- Deploying Command Director on a separate server, and HCS components, Agent for RAID, and Agent for RAID Extension on the same server on page 16
- Deploying HCmD server, HCS components, and Agent for RAID and Agent for RAID Extension on separate servers on page 17

Deploying Command Director on a separate server, and HCS components, Agent for RAID, and Agent for RAID Extension on the same server

In a small to medium sized environment, you can install the Hitachi Command Suite components, Agent for RAID, and Agent for RAID Extension on the same server as shown in the figure below.

In this deployment, the Command Director client is accessing the Command Director server, which is installed on a separate server and connected to a server on which Device Manager, Tuning manager, Hitachi Tiered Storage Manager, Agent for RAID, and Agent for RAID Extension are installed.

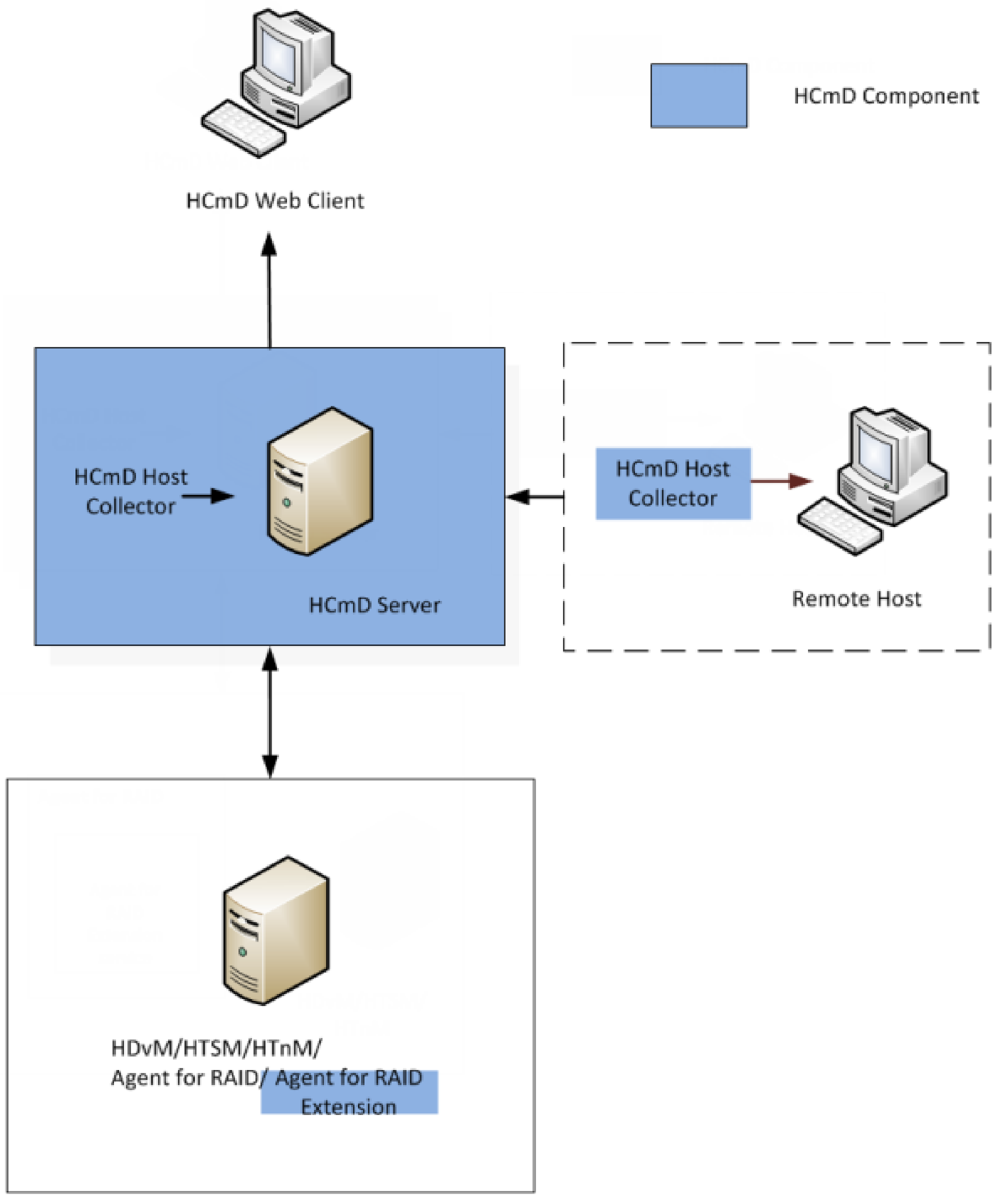

Figure 1-1 Deploying Command Director on a separate server, and HCmD components, Agent for RAID, and Agent for RAID Extension on the same server

Deploying HCmD server, HCS components, and Agent for RAID and Agent for RAID Extension on separate servers

In this deployment, the HCmD client is accessing the HCmD server, which is installed separately and connected to two separate servers - one on which Device Manager, Tuning Manager, and Tiered Storage Manager are installed and the other on which Agent for RAID and Agent for RAID Extension are installed.

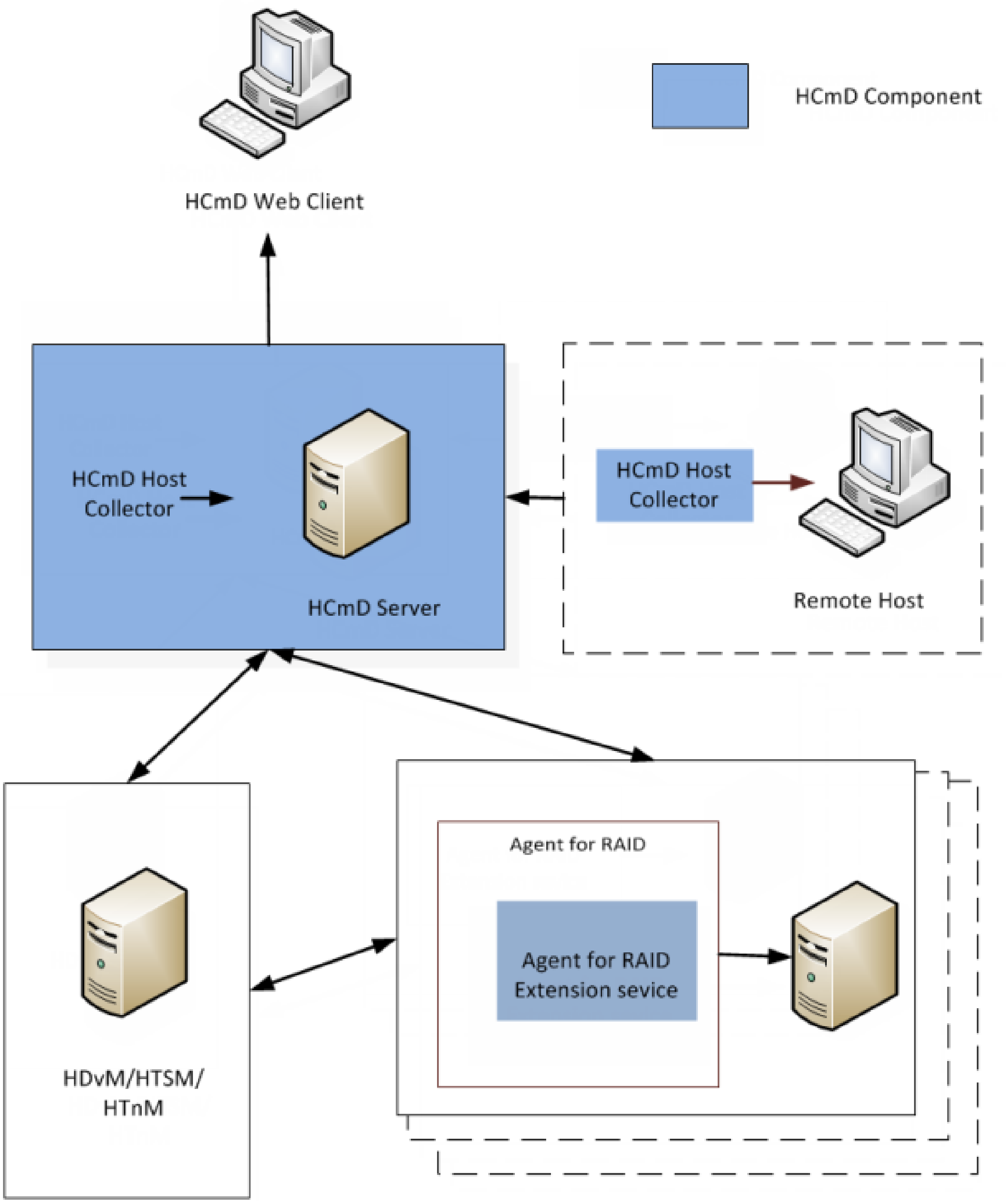

Figure 1-2 Deploying HCmD server, HCS components, and Agent for RAID and Agent for RAID Extension on separate servers

Recommended screen resolution

A minimum setting of 1024 by 768 pixels is recommended for your screen to display all reports and elements displayed on the Command Director web client.

Port usage by Command Director components

Command Director components use the ports listed in the following table.

Component	Server TCP port (default)	Shutdown TCP port (reserved)	My SQL (reserved)	Source IP	Target IP	Type of traffic	Register firewall exception
Agent for RAID Extension	25075 / 25076	25079	n/a	HCmD server	Agent for RAID Extension	Two directions	25075/25076 in and out
HCmD Data Collector	25065/ 25066	25069	n/a	HCmD server	HCmD Data Collector	One direction	n/a
HCmD Host Collector	25045/ 25046	25049	n/a	HCmD server	HCmD Host Collector server	One direction	25045/ 25046 in and out
HCmD server	25015 / 25016	25019	25020	Client browser	HCmD server	One direction	25015/ 25016 in and out
HNAS Data Collector	25055	25059	n/a	HCmD server	HNAS Data Collector	Two directions	25055 in and out

Data collection support

Command Director supports and is compatible with the multiple types and versions of Hitachi data collection products listed in the following table.

Product	Version
Hitachi Device Manager (HDvM)	8.0 and later.
Tiered Storage Manager (HTSM)	8.0 and later.
Tuning Manager (HTnM)	8.0 and later.
Agent for RAID	8.0 and later.

Command Director iPad app requirements

The Hitachi Command Suite for iPad® apps support the Command Director product functionality to provide a global management dashboard for business application service level monitoring across your Hitachi storage environment.

You can download the apps for free from the App Store at *iTunes.apple.com*.

Hitachi Command Suite 8 for iPad v3.1.0 supports Command Director v8.0.0 reports. It is compatible with iPad v1, 2, and 3, and iPad Air on iOS v6.0 or later.

Version 1.1 of the app supports HCmD v7.6.0 reports. It is compatible with iPad v1, 2, and 3, and iPad Air on iOS v7.0.

To use the app and perform storage management tasks, make sure the following prerequisites are met:

- You have licensed Hitachi Command Director.
- You can connect to HCmD server using HTTP or HTTPS with the server IP address and port information (25015 for HTTP and 25016 for HTTPS).

After the prerequisites are met, use your Command Director user ID and password to log on to the HCmD server using the app.

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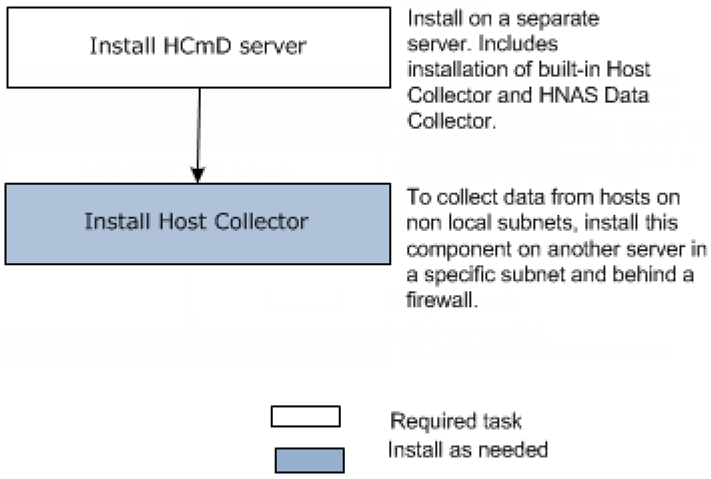
Installing Hitachi Command Director

Install Hitachi Command Director (HCmD) Server and associated components on Windows or on Linux.

Installation workflow

Follow this workflow to install HCmD server and its components:



Install HCmD server
Install on a separate server. Includes installation of built-in Host Collector and HNAS Data Collector.
Install Host Collector
To collect data from hosts on non local subnets, install this component on another server in a specific subnet and behind a firewall.
Required task
Install as needed

HCmD server installation

The HCmD server collects and correlates configuration and performance data, performs host discovery, and generates reports. You can install the HCmD server on the Windows and Linux operating systems.

The following components are installed by default when you install the HCmD server.

- Host Collector

  The Host Collector software allows Command Director to discover hosts on your network and obtain information about their mappings to a given storage system.
- HNAS Data Collector

  The HNAS Data Collector software allows Command Director to discover Hitachi NAS Platform hosts on your network and obtain their file system information.
- HCmD Data Collector

  The HCmD Data Collector software allows Command Director to collect configuration data from third party storage systems that support SNIA Storage Management Initiative Specification (SMI-S).

Installation prerequisites for HCmD server

HCmD server installation requires that you complete the following tasks:

- Verify that the HCmD server meets the minimum hardware requirements. For more information, see the *Hitachi Command Suite System Requirements*.

- Make sure that all Hitachi Device Manager instances from which you want to collect data are installed and configured.
- Ensure that all programs are closed.
- Disable any virus scanning utilities running on the server.

Before beginning installation, make sure that the following information is readily available:

Item	Description
HCmD host IP address	The IP address of the host where you want to install the HCmD server
Administrator or root ID and password of the HCmD server	Credentials to log on to the host to install the HCmD server
The following ports are available: 25015 for HCmD server 25045/25046 for Host Collector 25055 for HNAS Data Collector 25065 for HCmD Data Collector	Default port numbers for HCmD server, Host Collector, HNAS Data Collector, and HCmD Data Collector

Installing the HCmD server on Windows

Procedure

1. Insert the Command Director installation media in the host.

   If the installer does not start automatically, browse the media and open the `HCmD-Install-Server-`*`release`*`.exe` file.
2. In the **Welcome** window, click **Next**.
3. In the **License Agreement** window, accept the license agreement terms, and then click **Next**.
4. In the **Select Destination Directory** window, specify the folder where you want to install the Command Director, and then click **Next**.

   The default directory is:

   ```
   C:\Program Files\Hitachi\CommandDirector
   ```
5. In the **Port Setup** windows that follow (one for each component installed with the HCmD server), specify the port number, and then choose one of the following options:
   - If you want to retain the port number entered by default, click **Next**. The following table lists the default port numbers of the various components that are installed with the HCmD server.

Component	Default port number
HCmD server	25015

Component	Default port number
HCmD Host Collector	25046 (service port on the Host collector that communicates with the HCmD server).
HCmD HNAS Data Collector	25055 (service port on the HCmD HNAS Data Collector that communicates with the HCmD server).
HCmD Data Collector	25065 (service port on the HCmD Data Collector that communicates with the HCmD server).

- Otherwise, enter the new port number in the **Port** field. Make note of the number for later reference. You need this port number for Command Director configuration after installation.

6. To display a legal disclaimer during log on:
   a. Click **Yes** in the **Login Disclaimer** window.
   b. Enter the name of your company in the **Company Name** field, and then click **Next**.
7. In the **Select Start Menu Folder** window, select the Start Menu folder where you want to create the program's shortcuts, and then click **Next**. You can accept the default folder for Hitachi Command Director or specify some other location. As another option, you can choose a browser to have Hitachi Command Director automatically loaded from a given user's default browser. If you want the shortcuts to be available for all users, select the **Create shortcuts for all users** option.
8. In the **Information** window, review the summary to ensure the information is appropriate for your installation, then click **Install**.
9. When the installation is complete, click **Finish** in the **Completing Setup** window to exit Setup.

Result

After a successful installation, the following services are installed in your system:

- Hitachi Command Director
- Hitachi Command Director Database
- HCmD Host Collector
- HCmD HNAS Data Collector
- HCmD Data Collector

Installing the HCmD server on Linux

Procedure

1. Log on to Linux as the root user.
2. Insert the Command Director installation media in the host.
3. Run the command `wget Installation-media-directory/Linux/HCmD-Install-Server-release.tar`.
4. Run the command `tar -xf HCmD-Install-Server-release.tar`.

5. Run the command `cd HitachiCommandDirector`.
6. Run the command `./install.sh` and then follow the prompts in the steps below to install the server.

   The default directory is `/opt/Hitachi/CommandDirector/cli/linux/hcmdcli`.
7. Follow the prompts to review and accept the license agreement.
8. Follow the prompts to accept the default ports or specify the port number at the appropriate prompt.

   If you do not accept the default ports, make note of the port numbers for later reference. You need the port numbers for Command Director configuration after installation.

   - The following table lists the default port numbers of the various components that are installed with the HCmD server.

Component	Default port number
HCmD server	25015
HCmD Host Collector	25046 (service port on the Host collector that communicates with the HCmD server).
HCmD HNAS Data Collector	25055 (service port on the HCmD HNAS Data Collector that communicates with the HCmD server).
HCmD Data Collector	25065 (service port on the HCmD Data Collector that communicates with the HCmD server).

9. Follow the prompts to choose whether to display a legal disclaimer during log on and add a business name.
10. In the `Installation Summary`, review the summary to ensure the information is appropriate for your installation, and then press **Enter** to run the installation.
11. When the installation is complete, an `Installation Complete` message displays. Press **Enter** to exit the installation.

Result

After a successful installation, the following services are installed in your system:

- Hitachi Command Director
- Hitachi Command Director Database
- HCmD Host Collector
- HCmD HNAS Data Collector
- HCmD Data Collector

You can access the Command Director GUI by using a browser on Windows.

Host Collector installation

You can use the host discovery feature for agentless host discovery on your network and gather their file system and storage utilization information. Host discovery allows Command Director to map a complete end-to-end path from the host to the storage system volumes.

A default Host Collector is configured and available to discover hosts on the HCmD server subnet. If there are hosts on a different subnet and you can access them through a firewall, you can use the default host collector.

To access remote hosts on a different subnet and behind a firewall, install this component on a server in each subnet, and make sure your firewall settings allow communication between the Command Director server and this component. This installation is optional.

For information about activating the Host Collector, see "Administering HCmD" in the *Hitachi Command Director User Guide.*

The Host Collector server discovers Microsoft Windows, Linux, Solaris, HNAS, HP-UX, AIX®, ESX hosts using VMware vCenter® server, and Hyper-V® hosts. All data on discovered hosts is forwarded to the HCmD server when all Host Collectors are properly configured.

Installation prerequisites for Host Collector

Complete the following installation prerequisites for installing a Host Collector instance on a server in the subnet of interest before you proceed to install the Host Collector.

- Verify that the Host Collector server meets the minimum hardware requirements. For more information, see the *Hitachi Command Suite System Requirements*.
- Make sure HCmD server is installed and configured.
- Ensure that all programs are closed.
- Disable any virus scanning utilities running on the server.

Before beginning installation, make sure that the following information is readily available:

Item	Description
Host IP address	The IP address of the host where you want to install the Host Collector
Administrator or root ID and password	Credentials to log on to the host to install the Host Collector
The following ports are available: 25015 for HCmD server	Default port numbers for HCmD server and Host Collector

Item	Description
25045/25046 for Host Collector 25055 for HNAS Data Collector	

Installing Host Collector on Windows

Procedure

1. Insert the Command Director installation media in the host.

   If the installer does not start automatically, browse the installation media and open the `HCmD-Install-Host-Collector-`*`release`*`.exe` file.
2. In the **Welcome** window, click **Next**.
3. In the **License Agreement** window, accept the license agreement terms, and then click **Next**.
4. In the **Destination Directory** window, specify the folder where you want to install the Host Collector, and then click **Next**.

   The default directory is:

   ```
   C:\Program Files\Hitachi\CommandDirector\Host Collector
   ```
5. In the **HCmD Host Collector Port Setup** window, specify the port number on the Host Collector server that communicates with the HCmD server and choose one of the following options:
   - If you want to retain the default Host Collector server port number 25046, click **Next**.
   - Otherwise, specify the new number in the **Port** field. Make note of the number to refer to later. You need this number for Command Director configuration after installation. Click **Next**.
6. In the **HCmD HNAS Data Collector Port Setup** window, specify the port number and choose one of the following options:
   - If you want to retain the default HCmD HNAS Data Collector port number 25055, click **Next**.
   - Otherwise, specify the new number in the **Port** field. Make note of the number for later reference. You need this number for Command Director configuration after installation. Click **Next**.
7. In the **Select Start Menu Folder** window, select the Start Menu folder where you want to create the program’s shortcuts, and click **Next**. You can accept the default folder for Hitachi Command Director or specify some other location. As another option, you can choose a browser to have Hitachi Command Director automatically loaded from a given user’s default browser. If you want the shortcuts to be available for all users, check the **Create shortcuts for all users** option.
8. In the **Information** window, review the summary to ensure the information is correct, and click **Install**.

9. When the installation is completed, in the **Completing Setup** window, click **Finish** to exit Setup.
10. Repeat this installation procedure on a server in each subnet where you need to discover the hosts.

Result

After successfully installing the Host Collector, the following services run on the server where the Host Collector is installed:

- HCmD Host Collector
- HCmD HNAS Data Collector

Installing Host Collector on Linux

Procedure

1. Log on to Linux as the root user.
2. Insert the Command Director installation media in the host.
3. Run the command `wget Installation-media-directory/Linux/HCmD-Install-Host-Collector-release.tar`.
4. Run the command `tar -xf HCmD-Install-Host-Collector-release.tar`.
5. Run the command `cd HCmDHostCollector`.
6. Run the command `./install.sh` and then follow the prompts in the steps below to install Host Collector.
7. Follow the prompts to review and accept the license agreement.
8. Follow the prompts to accept the default ports or specify the port number at the appropriate prompt.

   I f you do not accept the default ports, make note of the port numbers for later reference. You need the port numbers for Command Director configuration after installation.

   - The following table lists the default port numbers of the various components that are installed with the HCmD server.

Component	Default port number
HCmD Host Collector	25046 (service port on the Host collector that communicates with the HCmD server).
HCmD HNAS Data Collector	25055 (service port on the HCmD HNAS Data Collector that communicates with the HCmD server).

9. Follow the prompts to choose whether to display a legal disclaimer during log on and add a business name.
10. In the `Installation Summary`, review the summary to ensure the information is appropriate for your installation, then press **Enter** to run the installation.

11. When the installation is complete, an `Installation Complete` message displays. Press **Enter** to exit the installation.

Result

After a successful installation, the following services are installed in your system:

- HCmD Host Collector
- HCmD HNAS Data Collector

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Setting up Command Director

Setting up Hitachi Command Director (HCmD), involves configuring host collectors, storage systems, performance data, status data timeout properties, and SSL based communication to and from the Command Director server.

You can refer to the following sections:

Initial setup tasks

After installation, you must perform the initial setup tasks to configure Command Director for use.

1. Verify the installation.
2. Register the license.
3. Specify email address for alerts and reports.

Verifying the installation

You can verify that the installation was successful by accessing the HCmD web interface from a browser. Before you access the web interface, make sure you have Adobe® Flash Player v10.1 or later installed on the client computer.

To access the Command Director web interface, enter the following URL in a web browser:

```
http://HCmD-server-address:port-number
```

HCmD-server-address: IP address or host name of the HCmD server.

port-number: Port number of the HCmD server. The default is 25015.

The login window appears.

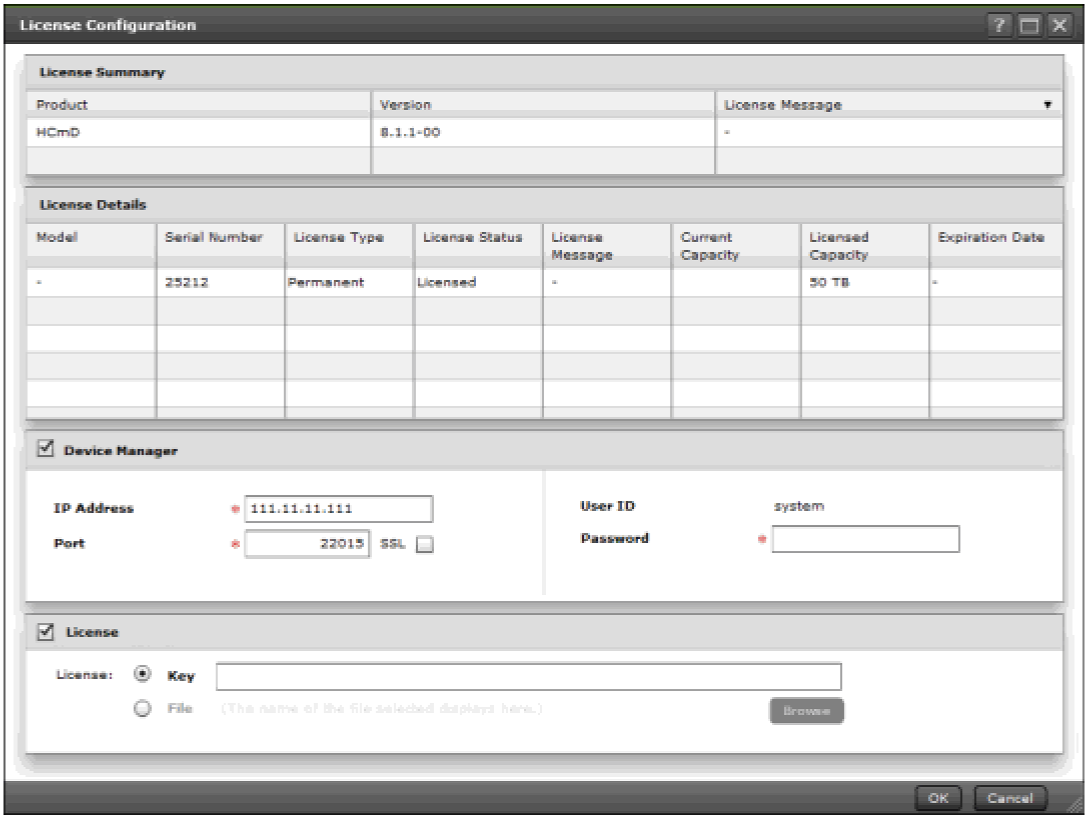
Registering the license

When you log on to Command Director initially, you must specify a valid license key. You can obtain your license key from the Hitachi Data Systems® representative. Follow the procedure described here to specify the license key:

Procedure

1. Log on to Command Director.

2. On the menu bar, click **License**.



License Configuration

License Summary

Product	Version	License Message
HCmD	8.1.1-00	-

License Details

Model	Serial Number	License Type	License Status	License Message	Current Capacity	Licensed Capacity	Expiration Date
-	25212	Permanent	Licensed	-		50 TB	-

☑ Device Manager

IP Address * 111.11.11.111

Port * 22015 SSL □

User ID system

Password *

☑ License

License: ● Key

○ File (The name of the file selected displays here.)

3. In the **License Configuration** window, specify the following Device Manager settings:
   - **IP Address**: enter the IP address of the Device Manager instance.
   - **Port**: enter the Device Manager HTTP or HTTPS port. The default port for HTTP is 22015 and 22016 for HTTPS.
   - **SSL**: select the check box to enable Secure Sockets Layer (SSL) communication between the Command Director server and Device Manager server (when selected, the port automatically changes to 22016).

   ⚠ **Note:** Before you select the **SSL** check box, make sure SSL is enabled on the Device Manager server. For information about enabling SSL on the Device Manager server, see the *Hitachi Command Suite Administrator Guide*.

   - **User ID**: this is the Device Manager instance user account used by the system, and the user ID is always **system** (you cannot change it).
   - **Password**: enter the password of the system user account in the Device Manager instance.
4. In the **License** pane, enter the Command Director license key in the **Key** field, or click **File** and click **Browse** to navigate to where the license file resides.
5. Click **OK**.

⚠ **Note:** When you register the license key for the first time, you are prompted to enter an email address after your license information is validated.

Viewing licensed capacity

After you register a license, the Licensed Capacity field in the License Details pane displays the storage capacity from the registered license. However, if you have registered an unlimited storage capacity license of any storage system, the Licensed Capacity field will display Unlimited only after you configure the storage system collectors in Command Director and refresh the gathered storage system configuration data.

Also, the model information for all storage systems is populated only after data refresh.

Specifying an email address when you first log in

The first time you log on, the User Email window appears and you are prompted for your email address. This address is associated with your user account and is used to send Service Level Objective (SLO) alerts and scheduled reports.

Prerequisites

The email server must be configured for you to receive alerts or reports. For the configuration procedure, see the *Hitachi Command Director User Guide.*

⚠ **Note:** If you are unable to receive alerts and reports by email, refer to Troubleshooting receiving email alerts and reports on page 101

Procedure

1. In the **User Email** window, enter your email address in the **Email** field.
2. Click **Save**.

Custom properties file

The `custom.properties` file, which is located in the Command Director installation folder, contains user entries from the Command Director installation wizard and Command Director applications.

In Windows, the default location of this file is `C:\Program Files\Hitachi\CommandDirector\conf`.

In Linux, the default location of this file is`/opt/Hitachi/CommandDirector/conf`.

Modifying the custom.properties file

You can modify the properties in the `custom.properties` file to set different values for timeout, data retention, and SSL settings, among others. If a property has an empty value or if you delete a property entirely from the file, the default value for that property is used.

Be careful when you modify the properties to avoid the potential negative effects on your enterprise following such a modification.

When you modify any property in the `custom.properties` file, you must restart the HCmD server for the changes to take effect. For information about restarting HCmD server, see Restarting the HCmD server on page 40.

Note: The directories and values that are listed in the examples are defaults.

Application by Capacity business view properties

You can access the Application by Capacity business view properties and view or modify their default values as needed. The following table describes the Application by Capacity properties in the `custom.properties` file. The settings in these properties control how applications are grouped and displayed under the Resources tab.

For more information about the `custom.properties` file, see Custom properties file on page 34.

Description	Property	Required modification
Threshold that identifies the high capacity applications (in TB)	`tags.app.capacity.high.threshold.in.tb=5` Default: 5 (TB)	Set the high capacity threshold for the applications listed in the Application by Capacity view under the Resources tab. The threshold setting you configure groups all large capacity applications that are equal to or greater than this value, and groups them as Large.
Threshold that identifies the low capacity applications (in TB)	`tags.app.capacity.low.threshold.in.tb=1` Default: 1 (TB)	Set the low capacity threshold for the applications listed in the Application by Capacity view under the Resources tab. The threshold setting you configure groups all low capacity applications that are equal to or less than this value, and groups them as Small. Note that all capacity applications that are greater than the Small

Description	Property	Required modification
		capacity threshold and less than the Large capacity threshold are grouped as Medium capacity applications.

Application Consumed Capacity property

You can access the Application Consumed Capacity property in the `custom.properties` file and view or modify its default value as needed. The property stores the aggregated capacity consumed by HDT tier data in an application. This data is used in the following reports:

- Pool usage by application
- Pool tier utilization trend
- Pool tier utilization forecast trend

The following table describes the Application Consumed Capacity property. The value set is the aggregated retention period (in years) that represents application consumed capacity by HDT tier data during this period.

Note: Changing the default value will increase or decrease the report response and the space required to store this data.

Description	Property	Required modification
Retention period (in years) that represents the capacity consumed by HDT tiers	`app.capacity.rollup.by.hdt.tier.retention.in.years=7` Default: 7	Set the number of years of capacity consumed by tier data to use when calculating trend and forecast reports.

For more information about the `custom.properties` file, see Custom properties file on page 34.

Host Collector timeout and data retention properties

The `custom.properties` file contains the following timeout and data retention properties related to the host collector. You can modify the properties listed in the following table based on your requirements.

Description	Property
Host data gather (Host collector timeout property) This timeout property limit is specified in seconds and controls the data refresh frequency for gathering data before timing out. This value	`host.data.collector.process.timeout.sec=21600` Default: 21600 seconds (6 hours)

Description	Property
should always be lower than or equal to the default.	
Storage system scan (Storage system collector timeout property) This scanning task timeout property limit is in minutes and controls the time in which HDvM can perform a storage system scan before timing out.	`hdvm.task.timeout.minutes=5` Default: 5 minutes
SLO status data retention (SLO status data retention property) This data retention property limit is in days and controls the amount of time that SLO status data is retained before it is overwritten with new status data.	`slo.status.data.retention.days=30` Default: 30 days

For more information about the `custom.properties` file, see Custom properties file on page 34.

SLO Recommendation related properties

You can access the Service Level Objectives (SLO) Recommendation related properties and view or modify their default values as needed. The following table describes the SLO Recommendation related properties, which are in the `custom.properties` file.

Description	Property	Required modification

Thresholds that identify random, sequential, and mixed workloads	`sre.random.workload.identification.threshold.percent=60.0`
	`sre.mixed.workload.identification.threshold.percent=40.0`
	Defaults: 60.0 (random) and 40.0 (mixed)
		Set the random and mixed threshold property values to a percentage value other than the defaults.
		These property values represent a percentage of random IOs (input-output) out of the total percentage of IOs.
		Random should always be greater than the mixed workload value, and should not exceed 100 percent.

Standard recommended deviation value	`sre.recommendation.standard.deviations=1.0` Default: 1.0	Set a standard deviation value that is added to the mean to derive a volume representative value.
Borderline threshold value multiplied by the missed threshold value	`sre.recommendation.borderline.ratio=0.8` Default: 0.8	Set a borderline threshold value that then is multiplied by a missed threshold value to derive a borderline ratio value.

Description	Property	Required modification
The total number of input data days minus a selected time span of data input days	`sre.recommendation.input.data.time.span.in.days=28` Default: 28	Set a selected time span (number of days) of data input that is subtracted from the total number of input data days. This value is read and used during an SLO recommendation evaluation (floating point numbers are not supported in this calculation).
The location of the LDEV IO data archive	`sre.recommendation.archive.home.dir=C:\...\HCmD-Installation-Folder\data\ldevioarchive` Default: The location is in the following Windows folder: HCmD-Installation-Folder\data\ldevioarchive	Set a path location for the LDEV IO data archive on your system.

For more information about the `custom.properties` file, see Custom properties file on page 34.

HCmD server SSL properties

You can access the HCmD server SSL properties in the `custom.properties` file and modify their default values as needed. The following table describes the properties.

Description	Property	Required modification
Enabling or disabling SSL	`hcmd.is.secure.connection=false` Default: false	Set this property to `true` to enable secure communication between the Command Director server and client (web interface).
Trustallservers	`hscp.https.trustallservers=true` Default: true	Set this property to `true` to accept all certificates and enable secure communication between the Command Director server and Host Collector server or Device Manager server. Setting this property to `false` configures Command Director to only trust other target servers that are identified in the truststore list, and if set to `false`, Command Director is able to communicate with the Host Collector server only if its public key is imported into the truststore.
Truststore file name	`hscp.https.truststore.file=` Default: none	Modify this property only if you have set the `trustallservers` property to `false`.
Truststore password	`hscp.https.truststore.pass=` Default: none	Modify this property only if you have set the `trustallservers` property to `false`.

⚠ **Note:** If you set the `trustallservers` property to `false`, make sure you specify the correct values for the truststore file name and truststore password properties.

For more information about the `custom.properties` file, see Custom properties file on page 34.

Modifying HCmD server settings

You can modify the `custom.properties` file to change some of the HCmD server settings according to your requirements. You can modify the following properties.

- Modifying default ports on page 39
- Modifying login window legal disclaimer text on page 39
- Hiding or showing the legal disclaimer in the login window on page 39
- Changing the Command Director email address on page 40

Modifying default port settings

You can modify default port settings in the `custom.properties` file. The best practice is to retain the default settings.

Port usage	Default setting
Command Director proxy port for connecting to HTnM	`htnm.proxy.http.port=25015`
Tomcat SSL port	`hcmd.https.port=25016`
Local host data collector port	`alps.local.port=25046`
Command Director Data Collector port	`apollo.local.port=25065`

For more information about the `custom.properties` file, see Custom properties file on page 34,

Modifying login window legal disclaimer text

To change the legal disclaimer text, edit the `LICENSE.txt` file, which is located by default in one of the following:

- In Windows: `\HCmD-Installation-Folder\conf`
- In Linux: `HCmD-installation-folder/conf`

Hiding or showing the legal disclaimer in the login window

By default, the legal disclaimer appears when you log on.

- To hide the legal disclaimer, set the `show.license.agreement` property to `false`.
- To show the legal disclaimer, set the `show.license.agreement` property to `true`.

The property is located in the `custom.properties` file.

For more information about the `custom.properties` file, see Custom properties file on page 34.

Changing the Command Director email address

When alerts or scheduled reports are sent, the default email address that appears in the From field of the Command Director email messages is `noreply@hcmd.tcc`. This setting is stored in the `custom.properties` file.

To change the email address that appears in the From field of the Command Director email messages, modify the `hscp.email.from.address` property.

For more information about the `custom.properties` file, see Custom properties file on page 34.

Restarting the HCmD server

Any changes you make in the Command Director settings take effect only when you restart the HCmD server. You must restart these component services from the services panel in the following order:

1. Hitachi Command Director Database
2. Hitachi Command Director
3. HCmD Data Collector
4. HCmD Host Collector
5. HCmD HNAS Data Collector

Enabling performance data collection using Agent for RAID Extension

The Agent for RAID Extension component gathers storage system performance data from the Agent for RAID instances installed in your environment. This component is installed by default when you install the Tuning Manager Agent for RAID. For Command Director to begin gathering performance data, the Agent for RAID Extension service must be enabled.

Enabling performance data collection on Windows

In the Services panel of the Agent for RAID server, select Agent for RAID Extension, right-click, and then select Start to start the service.

Alternately, to start this service automatically the next time you start the system, right-click, select Properties, and then set the Startup type of the service to Automatic.

Enabling performance data collection on Linux

Procedure

1. Navigate to the `AgentforRAIDExtension/bin` folder in the *`Agent-for-RAID-installation-folder`*, and then copy the script `AgentforRAIDExtension` to the `/etc/init.d` folder.
2. Modify permission of the executable to grant execute permission to the root user. Then, run the following command to start the Agent for RAID Extension service:

   ```
   # /etc/init.d/AgentforRAIDExtension start.
   ```
3. Run the following command to confirm that the Agent for RAID Extension service is running:

   ```
   # ps aux | grep AgentforRAIDExtension/process-name.
   ```

Configuring Command Director in secure mode

After installation, Command Director works in non-secure mode by default. The following steps describe how to configure Command Director to work in secure mode using Secure Sockets Layer (SSL) v3:

- Enabling SSL communications on page 41
- Enabling secure connection between the Command Director server and web clients on page 42
- Enabling secure connection between HCmD and HDvM servers on page 45
- Enabling secure connection between HCmD server and Host Collector server on page 48
- Enabling secure connection between HCmD server and Agent for RAID Extension on page 50
- Disabling SSL for Command Director on page 53

Enabling SSL communications

You can enable Command Director for SSL-based authentication for secure data transmission to and from the Command Director server. SSL-based communication lets you to verify identities of connecting applications and encrypt data that is transferred between the server and client. The same SSL port supports both GUI and REST API communications with the Command Director server.

You can enable SSL for the following types of communication in the Command Director environment:

- Communication between the Command Director server and the web client.
- Communication between the Command Director server and Device Manager server.

- Communication between the Command Director server and Host Collector server installed on a remote host.
- Communication between the Command Director server and Agent for RAID Extension installed on the Agent for RAID server.

When enabling SSL communications, note that:

- Communication between the Command Director server and HNAS Data Collector is unsecured. However, all data from the HNAS Data Collector is encrypted.
- Communication between the Command Director server and the HCmD Data Collector is secured by default.
- The Command Director CLI supports an unsecure connection only (using the HTTP protocol) to the Command Director server. For more information about the Command Director CLI, see the *Hitachi Command Director CLI Reference Guide.*

SSL certificates

To enhance security on the Command Director server, SSL certificates are used to verify the user’s identity. Command Director supports the following security certificates:

- Self-signed, which is a certificate that is self-signed by the issuer of the certificate. You can use Command Director to create this certificate.
- Signed and trusted, which is a certificate that is signed by a trusted certificate authority (CA). To obtain a signed certificate, generate a certificate signing request (CSR), send it to the CA, and have it returned from the CA.

  For details about generating a certificate signing request (CSR) see Generating a CSR and importing signed certificate to Command Director on page 45.

Keytool command

The procedures to enable SSL communication use the Java® `keytool` command, which is a key and certificate management tool. For information about this command, refer to Oracle documentation.

To run the `keytool` command, set the `PATH` environment variable to include the Java installation directory.

Enabling secure connection between HCmD server and web clients

You can configure SSL-based communication between the Command Director server and a client (web interface) by creating a self-signed SSL server certificate using Command Director, or by using a digitally-signed certificate from a certificate authority (CA). The following procedure describes how to create an SSL certificate:

Procedure

1. From the **Services** panel, stop the **Hitachi Command Director** service.
2. Create a server key store:

   a. Make sure to set the `PATH` environment variable to point to the *`HCmD-installation-folder`*`\jre\bin` folder in Windows or *`HCmD-installation-folder`*`/jre/bin` in Linux.

   b. Open a console window and navigate in Windows to the *`HCmD-installation-folder`*`\jre\lib\security` folder or in Linux to *`HCmD-installation-folder`*`/jre/lib/security`.

   In Windows, the default Command Director server installation folder is `C:\Program Files\Hitachi\CommandDirector`.

   In Linux, the default Command Director server installation folder is `/opt/Hitachi/CommandDirector`.

   c. Run the following command:

   ```
   keytool -genkey -alias HCmD-server-keystore-alias -dname
   "CN=common-name, O=organization-name,
   OU=organization-unit-name, L=locality-name, S=state,
   C=country" -keyalg RSA -keypass HCmD-server-private-key-
   password -storepass HCmD-server-keystore-password -
   validity number-of-days-to-expire -keystore keystore-file-
   name
   ```

   For example, to generate a keystore named `HCmDServer.ks`, enter:

   ```
   keytool -genkey -alias HCmDServer -dname "CN=HCmDServer,
   O=ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg RSA
   -keypass hcmdserver -storepass hcmdserver -validity 30
   -keystore HCmDServer.ks
   ```

Note: If the trustallservers property is set to false, you must add the storetype to the end of the command in Step 2.c, as follows:

```
-storetype jks
```

An example using storetype follows:

```
keytool -genkey -alias HCmDServer -dname "CN=HCmDServer,
O= ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg
RSA -keypass hcmdserver -storepass hcmdserver
-validity 30 -keystore HCmDServer.ks –storetype jks
```

Note: The location of the keytool is:

- in Windows, *`HCmD-installation-folder`*`\jre\bin\keytool`.
- in Linux: *`HCmD-installation-folder`*`/jre/bin/keytool`.

3. Generate the Command Director server certificate:

   a. For a self-signed certificate, run the following command:

   ```
   keytool -export -alias HCmD-server-keystore-alias -
   storepass HCmD-server-keystore-password -file HCmD-server-
   certificate-file-name -keystore keystore-file-name
   ```

For example, to generate a Command Director server certificate named `HCmDServer.cer` using the keystore file `HCmDServer.ks`, run:

```
keytool -export -alias HCmDServer -storepass hcmdserver -
file HCmDServer.cer -keystore HCmDServer.ks
```

In Windows, the generated certificate is placed in the *`HCmD-installation-folder`*`\jre\lib\security` folder, or in Linux at *`HCmD-installation-folder`*`/jre/lib/security`.

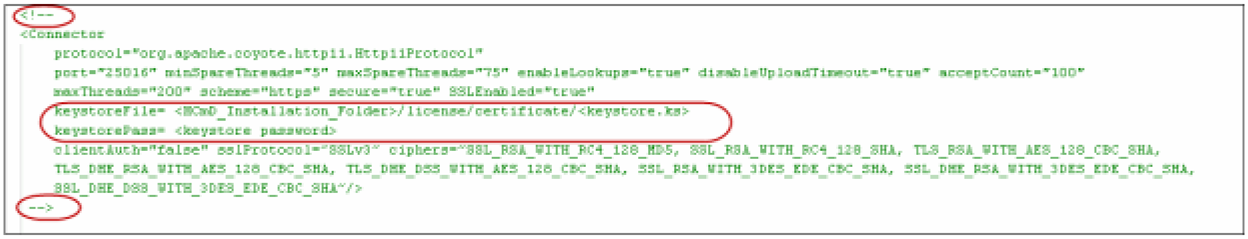
b. For a digitally-signed certificate, follow the procedure described in Generating a CSR and importing a signed certificate to Command Director on page 45.

4. In Windows, delete the comment marks from `Connector` section of the *`HCmD-installation-folder`*`\tomcat\conf\server.xml` or in Linux from *`HCmD-installation-folder`*`/tomcat/conf/server.xml`. Add the `keystoreFile` and `keystorePass` properties and replace the SSL protocol and cipher values as shown here:

- `keystoreFile = "HCmDserver.ks"`
- `keystorePass ="hcmdserver"`

-
  ```
  sslprotocol = "SSLv3" ciphers="SSL_RSA_WITH_RC4_128_MD5,
  SSL_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_AES_128_CBC_SHA,
  TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
  TLS_DHE_DSS_WITH_AES_128_CBC_SHA,
  SSL_RSA_WITH_3DES_EDE_CBC_SHA,
  SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,
  SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA"
  ```

The following screen shot highlights the section where you replace the SSL protocol and the cipher values.



```
<!--
<Connector
   protocol="org.apache.coyote.http11.Http11Protocol"
   port="25016" minSpareThreads="5" maxSpareThreads="75" enableLookups="true" disableUploadTimeout="true" acceptCount="100"
   maxThreads="200" scheme="https" secure="true" SSLEnabled="true"
   keystoreFile= <HCmD_Installation_Folder>/license/certificate/<keystore.ks>
   keystorePass= <keystore password>
   clientAuth="false" sslProtocol="SSLv3" ciphers="SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_AES_128_CBC_SHA,
   TLS_DHE_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,
   SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA"/>
-->
```

Figure 3-1 Modifying SSL properties

5. Save and close the file.

6. Set the `hcmd.is.secure.connection` property to `true` in the `custom.properties` file located as follows and then save and close the file.

- In Linux at *`HCmD-installation-folder`*`/conf/custom.properties`.
- In Windows at *`HCmD-installation-folder`*`\conf\custom.properties`.

7. From the **Services** panel, start the **Hitachi Command Director** service.

8. Access the web interface in secure mode by entering `https://HCmD-server-address:25016` in a web browser.

   HCmD server address is the IP address or the host name of the server.
9. Accept the certificate at the security alert that indicates that the Command Director certificate is untrusted.
10. Verify that the Command Director client is enabled in secure mode by logging in and verifying that a lock icon appears in the bottom right pane of your browser window.

Generating a CSR and importing a signed certificate to Command Director

You can get a digitally-signed SSL certificate from a trusted certificate authority (CA) by sending them a certificate signing request (CSR). After you obtain the signed certificate, you can import it to the Command Director server truststore.

Procedure

1. Open the Command Prompt and run the following command:

   ```
   keytool -certreq -alias HCmD-server-keystore-alias
   -keystore keystore-file-name -storepass
   keystore-password -file csr-file-name
   ```

   For example, to generate a request named `HCmDServer.csr` enter:

   ```
   keytool -certreq -alias HCmDServer -keystore HCmDServer.ks
   -storepass hcmdserver -file HCmDServer.csr
   ```
2. Send the CSR file to the certificate authority. The CA sends you a digitally-signed certificate with a `.cer` extension.
3. Import the signed certificate to the HCmD truststore using the following command:

   ```
   keytool -import -v -trustcacerts -alias HCmD-server-keystore
   alias -file signed-certificate-obtained-from-CA -keystore
   HCmD- truststore-file -storepass trust-store-password
   ```

Enabling secure connection between HCmD and HDvM servers

You can configure SSL-based communication between the Command Director server and Device Manager server by creating a Command Director truststore and importing the Device Manager certificate to that truststore. You also need to import the Common Component certificate to the truststore.

Procedure

1. From the **Services** panel, stop the **Hitachi Command Director** service.
2. Create the Command Director truststore:

   a. Make sure to set the `PATH` environment variable to point to the *`HCmD-installation-folder`*`\jre\bin` folder in Windows or *`HCmD-installation-folder`*`/jre/bin` in Linux.

b. Open a console window and navigate to the *HCmD-installation-folder*\jre\lib\security folder in Windows or to *HCmD-installation-folder*/jre/lib/security in Linux .

In Windows, the default Command Director server installation folder is C:\Program Files\Hitachi\CommandDirector.

In Linux, the default Command Director server installation folder is /opt/Hitachi/CommandDirector.

c. Run the following command:

```
keytool -genkey -alias HCmD-server-keystore-alias -dname
"CN=common-name, O=organization-name, OU=organization-unit
name, L=locality-name, S=state, C=country" -keyalg RSA -
keypass HCmD-server-private-key-password -storepass HCmD-
server-keystore-password -validity number-of-days-to-
expire -keystore keystore-file-name
```

For example, to create a truststore called HCmDTrustStore.ks, enter:

```
keytool -genkey -alias HCmDTrustStore -dname
"CN=HCmDTrustStore, O=ABC Corp, OU=SCC, L=Santa Clara,
S=CA, C=US" -keyalg RSA -keypass hcmdadmin -storepass
hcmdadmin -validity 360 -keystore HCmDTrustStore.ks
```

3. Enable SSL in the Device Manager server and in Common Component by following the procedure in the *Hitachi Command Suite Administrator Guide*.

4. Export the Device Manager certificate from the keystore file (available in the *HDvM-installation-folder*\HiCommandServer\ folder) using the following command:

```
keytool -export -alias HDvM-keystore-alias -storepass DvM-
server-keystore-password -file DvM-certificate-file-name -
keystore HDvM-keystore-file-name
```

For example, to export the Device Manager certificate, hdvm_certificate.cer enter:

```
keytool -export -alias hdvmcert -storepass 123456 -file
hdvm_certificate.cer -keystore keystore
```

5. Copy the generated Device Manager certificate file to the Command Director server in one of the following folders:

- In Windows, the *HCmD-installation-folder*\jre\lib\security
- In Linux, the *HCmD-installation-folder*/jre/lib/security

6. Import the Device Manager certificate into the Command Director truststore using the following command:

```
keytool -import -v -trustcacerts -alias HDvM-keystore-alias -
file HDvM-certificate-file-name -keystore HCmD-truststore-
file-name -storepass HCmD-truststore-password
```

For example, to import a certificate named hdvm_certificate.cer into HCmDTrustStore.ks, enter:

```
keytool -import -v -trustcacerts -alias hdvmcert -file
hdvm_certificate.cer -keystore HCmDTrustStore.ks -storepass
hcmdadmin
```

7. Export the Common Component certificate from the keystore file (available in the *HDvM-installation-folder*\HiCommand\Base64\uCPSB\jdk\jre\lib\security\jssecacert folder) using the following command:

   ```
   keytool -export -alias Common-Component-keystore-alias -
   storepass Common-Component-server-keystore-password -file
   Common-Component-certificate-file-name -keystore Common-
   Component-keystore-file-name
   ```

   For example, to export the Common Component certificate, CommonComponent_certificate.cer enter:

   ```
   keytool -export -alias common_componentcert -storepass
   123456 -file common_component_certificate.cer -keystore
   keystore
   ```
8. Copy the generated Common Component certificate file to the Command Director server in one of the following locations:
   - In Windows, the *HCmD-installation-folder*\jre\lib\security
   - In Linux, the *HCmD-installation-folder*/jre/lib/security
9. Import the Common Component certificate into the Command Director truststore using the following command:

   ```
   keytool -import -v -trustcacerts -alias Common-Component-
   keystore-alias -file Common-Component-certificate-file-name -
   keystore HCmD-truststore-file-name -storepass HCmD-
   truststore-password
   ```

   For example, to import a certificate named CommonComponent_certificate.cer into HCmDTrustStore.ks, enter:

   ```
   keytool -import -v -trustcacerts -alias common_componentcert
   -file common_component_certificate.cer -keystore
   HCmDTrustStore.ks -storepass hcmdadmin
   ```
10. Modify the *HCmD-installation-folder*\conf\custom.properties file (or in Linux, the *HCmD-installation-folder*/conf/custom.properties file) for certificate information.

Property	Value to set
hcmd.is.secure.connection	true
hscp.https.trustallservers	false
hscp.https.truststore.file	Location of the Command Director truststore file.
hscp.https.truststore.pass	truststore password

11. Save and close the file.
12. From the **Services** panel, start the **Hitachi Command Director** service.

Enabling secure connection between HCmD server and Host Collector server

You can configure SSL-based communication between the Command Director server and the Host Collector server to gather data securely from the remote host.

Procedure

1. From the Command Director server Services panel, stop the **Hitachi Command Director** service, and then the **HCmD Host Collector** service.
2. Set up SSL on the Host Collector server:
   - **a.** Make sure to set the `PATH` environment variable to point to the *`HCmD-installation-folder`*`\jre\bin` folder in Windows or *`HCmD-installation-folder`*`/jre/bin` in Linux.
   - **b.** In the Host Collector is not local, open a console window and navigate to the *`Host-Collector-installation-folder`*`\jre\bin` folder or in Linux to the *`Host-Collector-installation-folder`*`/jre/bin` folder. If the Host Collector is local, navigate to *`HCmD-installation-folder`*`\jre\bin` in Windows or *`Host-Collector-installation-folder`*`/jre/bin` in Linux.

     In Windows, the default Host Collector installation folder is

     `C:\Program Files\Hitachi\CommandDirector\Host Collector`.

     In Linux, the default Host Collector server installation folder is `/opt/Hitachi/CommandDirector/HostCollector`.
   - **c.** Create the Host Collector keystore using the following command:

     ```
     keytool -genkey -alias Host-Collector-keystore-alias -
     dname "CN=common-name, O=organization-name,
     OU=organization unit-name,
     L=locality-name, S=state, C=country" -keyalg RSA -keypass
     Host-Collector-private-key-password -storepass Host-
     Collector-keystore-password -keystore Host-Collector
     keystore-file-name
     ```

     For example, to generate a Host Collector keystore named `hdcServer.ks`, enter:

     ```
     keytool -genkey -alias hdcServer -dname "CN=hdcServer,
     O=ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg RSA
     -keypass hdcproject -storepass hdcproject -keystore
     hdcServer.ks
     ```
   - **d.** Generate the Host Collector certificate using the following command:

     ```
     keytool -export -alias Host-Collector-keystore-alias -
     storepass Host-Collector-keystore-password -file Host-
     Collector-certificate-file-name -keystore Host-Collector-
     keystore-file-name
     ```

For example, to generate a Host Collector certificate named `hdcServer.cer`, enter:

```
keytool -export -alias hdcServer -storepass hdcproject -
file hdcServer.cer -keystore hdcServer.ks
```

e. In Windows, copy the Host Collector keystore and certificate files you created to the *Host-Collector-installation-folder*`\license\certificate` folder, or in Linux to the *Host-Collector-installation-folder*`/license/certificate` folder.

f. Open the server.xml file located in Windows at *Host-Collector-installation-folder*`\tomcat\conf\server.xml` or in Linux at *Host-Collector-installation-folder*`/tomcat/conf/server.xml` and delete the comment marks in the `Connector protocol` section.

g. Add the keystoreFile and keystorePass properties and replace the SSL protocol and cipher values as shown here:

```
keystoreFile = "hdcServer.ks" keystorePass = "hdcproject"
ssl protocol = "SSLv3" ciphers= "SSL_RSA_WITH_RC4_128_MD5,
SSL_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_DSS_WITH_AES_128_CBC_SHA,
SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA"
```

h. Save and close the file.

See Enabling secure connection between the Command Director server and web clients on page 42, for an example on how to modify the SSL properties in the `server.xml` file.

i. From the Services panel, start the **HCmD Host Collector** service.

3. Set up SSL on the Command Director server:

- In Windows, copy the Host Collector certificate created in Step 2 to *HCmD-installation-folder*`\jre\bin`.
- In Linux, copy the Host Collector certificate created in Step 2 to *HCmD-installation-folder*`/jre/bin`.

a. Create the Command Director keystore using the following command:

```
keytool -genkey -alias HCmD-server-keystore-alias -dname
"CN=common-name, O=organization-name, OU=organization-unit
name, L=locality-name, S=state, C=country" -keyalg RSA -
keypass HCmD-server-private-key-password -storepass CmD-
server-keystore-password -keystore HCmD-server-keystore-
file
```

For example, to create a Command Director keystore called `hdcClient.ks`, enter:

```
keytool -genkey -alias hdcClient -dname "CN=hdcClient,
O=ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg RSA
-keypass hdcproject -storepass hdcproject -keystore
hdcClient.ks
```

b. Import the Host Collector certificate to the Command Director keystore using the following command:

```
keytool -import -v -trustcacerts -alias Host-Collector-
certificate-alias -file Host-Collector-certificate-file
name -keystore HCmD-server-keystore-file-name -keypass
HCmD-server-private-key-password -storepass HCmD-server-
keystore-password
```

For example, to import the Host Collector certificate `hdcServer.cer`, to the Command Director keystore `hdcClient.ks`, enter:

```
keytool -import -v -trustcacerts -alias hdcServer -file
hdcServer.cer -keystore hdcClient.ks -keypass hdcproject -
storepass hdcproject
```

c. Modify the `custom.properties` file in Windows at *`HCmD-installation-folder`*`\conf\custom.properties` or in Linux at *`HCmD-installation-folder`*`/conf/custom.properties` for certificate information as described in Step 7 in Enabling secure connection between Command Director and HDvM servers on page 45.

d. From the Services panel of the Command Director server, restart the **Hitachi Command Director** service.

Enabling secure connection between HCmD server and Agent for RAID Extension

You can configure SSL-based communication between the Command Director server and the server where the Agent for RAID Extension is installed to securely gather performance data.

Procedure

1. From the Command Director server **Services** panel, stop the **Hitachi Command Director** service and from the Agent for RAID server **Services** panel, stop the **Agent for RAID Extension** service.
2. Set up SSL on the Agent for RAID Extension server:

   a. Open a console window and navigate in Windows to the *`Agent-for-RAID-Extension-installation-folder`*`\jre\bin` folder or in Linux to the *`Agent-for-RAID-Extension-installation-folder`*`/jre/bin` folder.

   The default Agent for RAID Extension installation folder on Windows is `C:\Program Files(x86)\HiCommand\TuningManager\jp1pc\agtd\AgentforRAIDExtension`

   The default installation directory on Linux is `/opt/jp1pc/agtd/AgentforRAIDExtension.`

   b. Make sure to set the `PATH` environment variable in Windows to the *`Agent-for-RAID-Extension-installation-folder`*`\jre\bin` folder or in Linux to the *`Agent-for-RAID-Extension-installation-folder`*`/jre/bin` folder.

c. Create the Agent for RAID Extension keystore using the following command:

```
keytool -genkey -alias Agent-for-RAID-Extension-keystore-
alias -dname "CN=common-name, O=organization-name,
OU=organization-unit-name, L=locality-name, S=state,
C=country" -keyalg RSA -keypass gent-for-RAID-Extension
private-key-password -storepass Agent-for-RAID-Extension
keystore-password -keystore Agent-for-RAID-Extension-
keystore-file-name
```

For example, to generate an Agent for RAID Extension keystore named `agentServer.ks`, enter:

```
keytool -genkey -alias agentServer -dname "CN=agentServer,
O=ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg RSA
-keypass agentproject -storepass agentproject -keystore
agentServer.ks
```

d. Generate the Agent for RAID Extension certificate using the following command:

```
keytool -export -alias Agent-for-RAID-Extension-keystore
alias -storepass Agent-for-RAID-Extension-keystore-
password -file Agent-for-RAID-Extension-certificate-file-
name -keystore Agent-for-RAID-Extension-keystore-file-name
```

For example, to generate an Agent for RAID Extension certificate named `agentServer.cer`, enter:

```
keytool -export -alias agentServer -storepass agentproject
-file agentServer.cer -keystore agentServer.ks
```

e. Copy the Agent for RAID Extension keystore and certificate files you created in Windows to the `Agent-for-RAID-Extension installation-folder\license\certificate` or in Linux to `Agent-for-RAID-Extension-installation-folder/license/certificate`.

f. Open the `Agent-for-RAID-Extension-installation-folder\tomcat\conf\server.xml` file (or the `Agent-for-RAID-Extension-installation-folder/tomcat/conf/server.xml` file) and delete the comment marks in the `Connector` section.

g. Add the keystoreFile and keystorePass properties and replace the SSL protocol and the cipher values as shown here:

```
keystoreFile =
"Agent-for-RAID-Extension-installation-folder\license
\certificate\agentServer.ks"
keystorePass= "agentproject"
SSLprotocol = "SSLv3" ciphers="SSL_RSA_WITH_RC4_128_MD5,
SSL_RSA_WITH_RC4_128_SHA,TLS_RSA_WITH_AES_128_CBC_SHA,
TLS_DHE_RSA_WITH_AES_128_CBC_SHA,TLS_DHE_DSS_WITH_AES_128_C
BC_SHA,SSL_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,
SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA"
```

h. Save and close the file.

See Enabling secure connection between the Command Director server and web clients on page 42, for an example on how to modify the SSL properties in the `server.xml` file.

i. Modify the *HCmD-installation-folder*`\conf\system.properties` file in Windows or the *HCmD-installation-folder*`/conf/system.properties` in Linux for certificate information as shown in the following table:

Property	Value to set
`rae.is.secure.connection`	`true`
`rae.https.trustallservers`	`false`
`rae.https.truststore.file`	Location of the Agent for RAID Extension truststore file
`rae.https.truststore.pass`	truststore password

j. Save and close the file.

k. From the **Services** panel, start the **Agent for RAID Extension** service.

3. Set up SSL on the Command Director server:

a. Copy the Agent for RAID Extension certificate created in Step 2 to the Windows folder:*HCmD-installation-folder*`\jre\bin` or to the Linux folder: *HCmD-installation-folder*`/jre/bin`.

b. Create the Command Director keystore using the following command:

```
keytool -genkey -alias HCmD-server-keystore-alias -dname
"CN=common-name, O=organization-name, OU=organization-unit-
name, L=locality-name, S=state, C=country" -keyalg RSA -
keypass HCmD-server-private-key-password -storepass HCmD-
server-keystore-password -keystore HCmD-server-keystore-
file
```

For example, to create a Command Director keystore called `agentClient.ks`, enter:

```
keytool -genkey -alias agentClient -dname "CN=agentClient,
O=ABC Corp, OU=SSC, L=Santa Clara, S=CA, C=US" -keyalg RSA
-keypass agentproject -storepass agentproject -keystore
agentClient.ks
```

c. Import the Agent for RAID Extension certificate to the Command Director keystore using the following command:

```
keytool -import -v -trustcacerts -alias Agent-for-RAID
Extension-certificate-alias -file Agent-for-RAID-Extension
certificate-file-name -keystore HCmD-server-keystore-file-
name -keypass HCmD-server-private-key-password -storepass
HCmD-server-keystore-password
```

For example, to import the Agent for RAID Extension certificate `agentServer.cer`, to the Command Director keystore `agentClient.ks`, enter:

```
keytool -import -v -trustcacerts -alias agentServer -file
agentServer.cer -keystore agentClient.ks -keypass
agentproject -storepass agentproject
```

d. From the **Services** panel of the Command Director server, restart the **Hitachi Command Director** service.

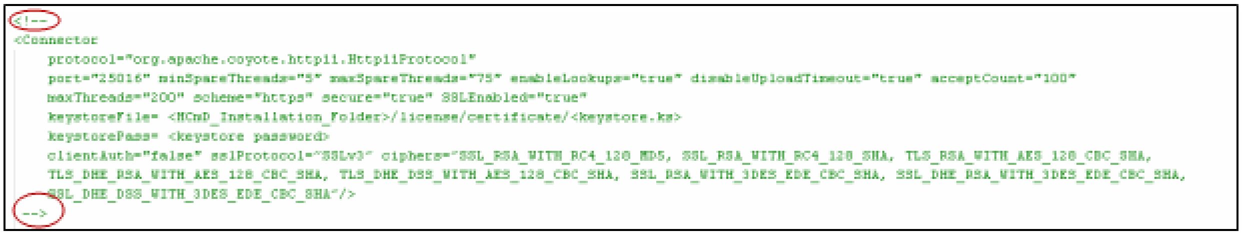
Note: The Agent for RAID Extension component is installed on the same server as the Agent for RAID.

Disabling SSL for Command Director

If SSL is enabled for any communication from the Command Director server, you can disable it anytime.

Procedure

1. From the **Services** panel, stop the **Hitachi Command Director** service.
2. Set the `hcmd.is.secure.connection` property in the custom.properties file to false in one of the following locations, and then save the file.
   - In Windows at `*HCmD-installation-folder*\conf\custom.properties`.
   - In Linux at `*HCmD-installation-folder*/conf/custom.properties`.
3. Comment out the `Connector` section of the server.xml file in one of the following locations:
   - In Windows at `*HCmD-installation-folder*\tomcat\conf\server.xml`.
   - In Linux at `*HCmD-installation-folder*/tomcat/conf/server.xml`.



```
<!--
<Connector
    protocol="org.apache.coyote.http11.Http11Protocol"
    port="25016" minSpareThreads="5" maxSpareThreads="75" enableLookups="true" disableUploadTimeout="true" acceptCount="100"
    maxThreads="200" scheme="https" secure="true" SSLEnabled="true"
    keystoreFile= <HCmD_Installation_Folder>/license/certificate/<keystore.ks>
    keystorePass= <keystore password>
    clientAuth="false" sslProtocol="SSLv3" ciphers="SSL_RSA_WITH_RC4_128_MD5, SSL_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_AES_128_CBC_SHA,
    TLS_DHE_RSA_WITH_AES_128_CBC_SHA, TLS_DHE_DSS_WITH_AES_128_CBC_SHA, SSL_RSA_WITH_3DES_EDE_CBC_SHA, SSL_DHE_RSA_WITH_3DES_EDE_CBC_SHA,
    SSL_DHE_DSS_WITH_3DES_EDE_CBC_SHA"/>
-->
```

4. Save and close the file.
5. From the **Services** panel, start the **Hitachi Command Director** service.

Viewing logs

Every basic user action is logged so that you can view changes made in the Command Director. For example, you can view when a user logged in, when the data collection started, and who modified business views, folders, applications, and reports.

Note the following:

- Logs capture only Command Director actions. You cannot view changes made to Device Manager instances.
- A new log file is started once an existing log file exceeds 10 MB in size, and HCmD only supports up to a maximum of 10 log files at any given time.

To view Command Director logs, open the `hcmd_audit.log` file available in the following folder:

`HCmD-installation-folder\logs\` or `HCmD-installation-folder/logs/`

Setting up Command Director CLI

Command Director provides command line interface commands you can use to generate reports (tabular only) and manage applications in bulk.

The Command Director CLI package comes in a .zip file located as listed below. Open the .zip file and extract all files to a local directory.

- In Windows: `HCmD-installation-folder\cli`
- In Linux: `HCmD-installation-folder/cli`

You can also extract the CLI package to a remote client (your computer) and connect to the HCmD server (using the HTTP protocol) for generating reports and extracting report data.

The Command Director CLI is also supported on Linux. You can refer to the *Hitachi Command Suite System Requirements* for version information.

For more information on setting up Command Director CLI and using the commands, see the *Hitachi Command Director CLI Reference Guide*.

Starting and stopping services in Linux

If you have Command Director installed on Linux, you can start and stop services by using the hitachiCommandDirector script.

Usage:

```
sh
hitachiCommandDirector {start | stop} {hcmd  | database  |
host_collector | hnas_collector | data_collector | all}
```

Example; to stop the database:

```
sh hitachiCommandDirector stop database
```

4

Configuring data collectors

Configure storage system collectors to retrieve configuration data from Hitachi Device Manager and performance data from Agent for RAID. Host collectors must be configured in order to discover hosts and their connectivity to the storage system.

Overview

After installing Command Director, you must configure these data collectors:

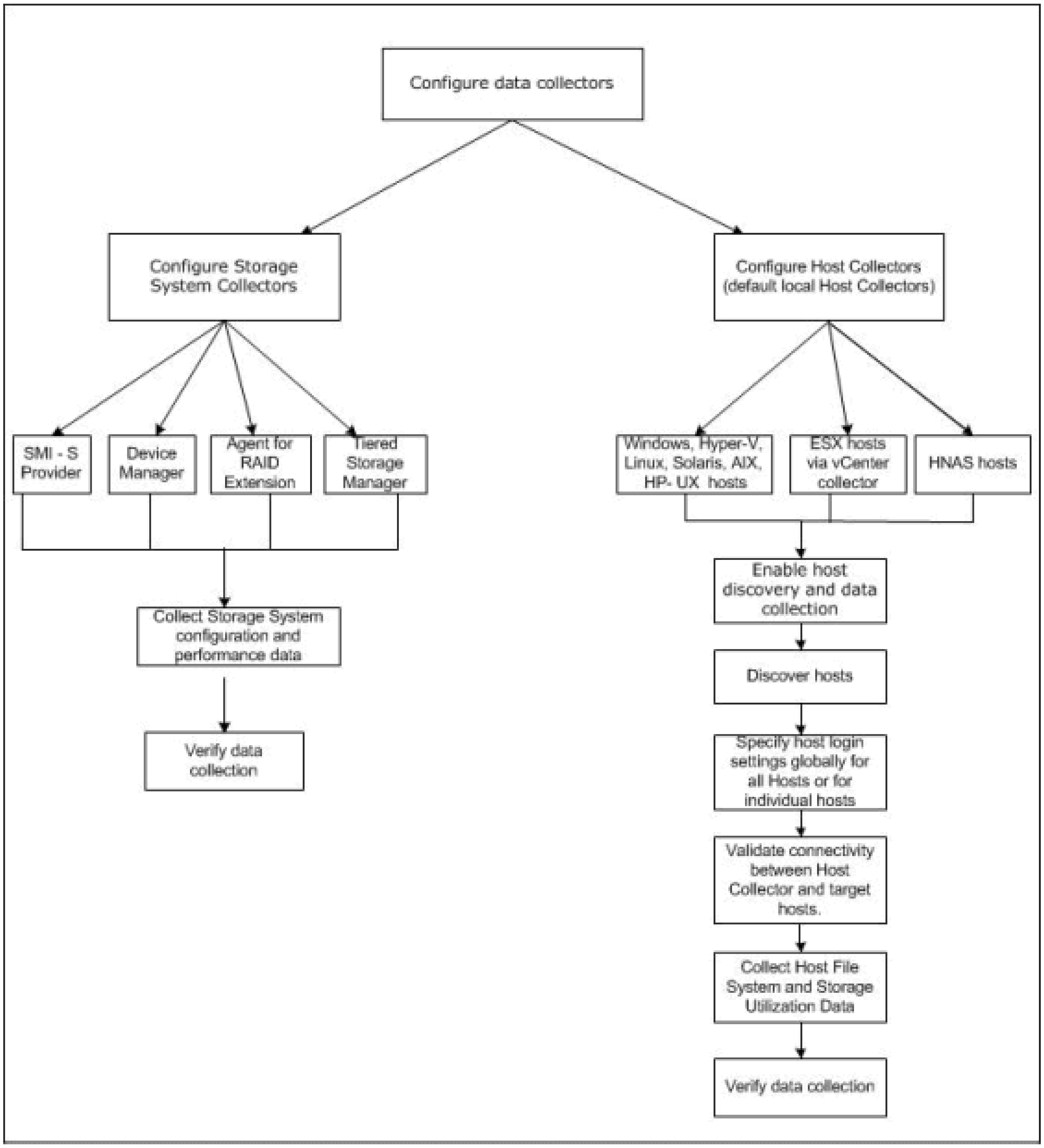
- Storage System Collectors on these components:
  - Device Manager (HDvM) instances for gathering storage system configuration data.
  - Agent for RAID Extension instances for gathering storage system performance data.
  - (Optional) Tiered Storage Manager (HTSM) for storage system tier information. Configure this data collector to view tier information in your reports.
  - HCmD Data Collector to communicate with the SMI-S Provider to collect configuration data from third-party storage systems, if available in your environment.
- Host Collectors
  - The Host Collectors enable agentless hosts discovery on your network and gather their file system and storage utilization information.

    The Command Director server installation comes with a default Host Collector that is configured and available for use on the current subnet.

    This module provides instructions for enabling and configuring host discovery and data collection for hosts on the local subnet using the default Host Collector. For host discovery and data collection on other subnets, see the topic regarding "Administering HCmD" in the *Hitachi Command Director User Guide.*
  - The HNAS Data Collector is installed by default when you install the HCmD server. This data collector allows Command Director to discover Hitachi NAS Platform hosts on your network and obtain their file system information.

Data configuration workflow

Follow this workflow to configure the data collectors in Command Director to obtain storage system information from Command Director components and host information from hosts discovered in your environment:


Configure data collectors
Configure Storage System Collectors
Configure Host Collectors (default local Host Collectors)
SMI - S Provider
Device Manager
Agent for RAID Extension
Tiered Storage Manager
Windows, Hyper-V, Linux, Solaris, AIX, HP- UX hosts
ESX hosts via vCenter collector
HNAS hosts
Collect Storage System configuration and performance data
Verify data collection
Enable host discovery and data collection
Discover hosts
Specify host login settings globally for all Hosts or for individual hosts
Validate connectivity between Host Collector and target hosts.
Collect Host File System and Storage Utilization Data
Verify data collection

Accessing data collector configuration settings

You can access data collection configuration settings from the Administration tab in the Command Director user interface.

If you are accessing the Command Director user interface for the first time, make sure you have performed these initial setup tasks:

- Verify that you can access the Command Director web interface from a browser. For the verification procedure, see Verifying the installation on page 32.
- Register the license keys. For the license registration procedure, see Registering the license on page 32.

- Register your email address to obtain alerts and reports. For the email registration procedure, see Specifying an email address when you first log in on page 34.

Configuring storage system collectors

After installing Command Director, you must configure the various storage system collectors to start data collection from the following sources:

- Hitachi Device Manager (HDvM) (for collecting configuration data)
- Agent for RAID Extension (for collecting storage system performance data)
- Tiered Storage Manager (for collecting tier information data)
- HCmD Data Collector (for collecting configuration data from third-party storage systems registered with Storage Management Initiative Specification (SMI-S) provider)

Command Director aggregates and manipulates the data collected from the storage system collectors and reports on the storage system performance and efficiency based on your requirements and business views.

Prerequisites for configuring storage system collectors

Configuring the storage system collectors requires that your environment meets the necessary prerequisites. Complete the following before you configure the collectors:

- Verify that the relevant services are running on their corresponding servers before adding or configuring the storage system collectors. The following table lists the Command Director data collection components, their service names, and the servers the components run on.

HCmD data collection component	Service name	Server
Hitachi Device Manager	HiCommand® Server	Hitachi Device Manager server
Agent for RAID Extension	Agent for RAID Extension	Tuning Manager Agent for RAID server
Tiered Storage Manager	Tiered Storage Manager	Hitachi Device Manager server
HCmD Data Collector	HCmD Data Collector	HCmD server

- Verify that all relevant Device Manager instances are running. Keep the IP address, port number, user name, and password for every Device Manager instance readily available. You must have administrator privileges for every Device Manager resource.
- Make sure that an Agent for RAID Extension is installed on every host on which Agent for RAID is installed. Have the IP address and port number of every Agent for RAID installed in your environment readily available.
- Verify that the Agent for RAID instances are configured to run in Storage Logical Partition (SLPR) unrestricted mode. Failing to do so will result in

partial data collection for that instance. For details about how to set up the Agent for RAID for this functionality, see the *Hitachi Command Suite Tuning Manager Software Installation Guide*.

- Enable the Agent for RAID Extension service using the steps listed in Enabling performance data collection using Agent for RAID Extension on page 40.

Storage system collector settings

The tables in this topic list the settings and details for configuring various storage system collectors in Command Director.

The following table lists the Device Manager collector settings.

HDvM collector settings	Description
IP address	Enter the IP address of the host using the Device Manager Data Collector.
Name	Enter the name associated with the Device Manager Data Collector.
Port	If during the installation you specified a port other than the default, enter it here. The default port number is 2001 (2443, if SSL is enabled). Note that Hitachi does not recommend that you change the default port number.
SSL	Select the check box to enable SSL communication between the Command Director server and Device Manager server. **Note:** Before you select the SSL check box, make sure SSL is enabled on the Device Manager server. For more information about enabling SSL on the Device Manager server, see the *Hitachi Command Suite Administrator Guide*.
User ID	Enter the user ID for Device Manager. The user ID must have access to all the storage systems registered in the Device Manager server.
Password	Enter the password for Device Manager.

The following table lists the Agent for RAID Extension settings.

Agent for RAID Extension settings	Description
Name	Enter the name associated with Agent for RAID Extension.
IP address	Enter the IP address of the Agent for RAID host where Agent for RAID Extension is installed.
Port	If during the installation you specified a port other than the default (25075), enter it here. Note that Hitachi does not recommend that you change the default port number.
SSL	Select the check box to enable SSL communication between the Command Director server and Agent for RAID Extension (Agent for RAID host).

Agent for RAID Extension settings	Description
	Note: Before you select the SSL check box, make sure SSL is enabled on the Device Manager server. For more information about enabling SSL on the Device Manager server, see the *Hitachi Command Suite Administrator Guide*.
HTnM IP Address	Enter the IP address of the Tuning Manager server that connects to the Agent for RAID host where Agent for RAID Extension is installed. This information is required to support the link and launch capability to display the Tuning Manager Performance Reporter from Command Director.
HTnM Port	Enter the port number of the Tuning Manager server. This information is required to support the link and launch capability to display the Tuning Manager Performance Reporter from Command Director.
HCmD server IP address	Specify the IP address of the HCmD Server used by Agent for RAID Extension

The following table lists the HTSM collector settings.

HTSM collector settings	Description
IP Address	Select the IP address of the host using the Device Manager and Tiered Storage Manager Data Collector.
Name	Enter the name associated with the Tiered Storage Manager Data Collector.
Port	Enter the port number published for the remote HTSM CLI client. The default port number is 20352. If during the installation you specified a port other than the default, enter it here. Note that Hitachi does not recommend that you change the default port number.
User ID	Enter the user name registered in HTSM. The User ID must have reference and modify permission.
Password	Enter the password for the user registered in HTSM.

The following table lists the SMI-S provider collector settings.

SMI-S provider collector settings	Description
IP Address	Enter the IP Address of the SMI-S provider connected to the third party storage system. For example, the IP address of the supported EMC SMI-S provider v4.2 or v4.3.
Name	Enter the name associated with the SMI-S Provider.
Port	If during the installation you specified a port other than the default, enter it here. Note that Hitachi does not recommend that you change the default port number.
SSL	By default, the SSL communication between the Command Director server and SMI-S Provider is enabled.

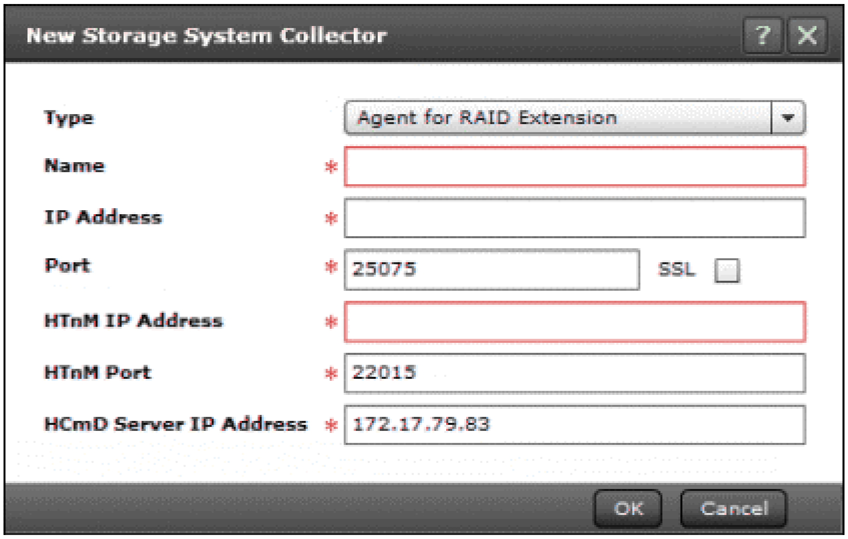
SMI-S provider collector settings	Description
	Click the check box to disable SSL communication.
User ID	Enter the user ID registered in the SMI-S Provider. The User ID could be for any of the following roles: • Administrator • Manager • Monitor • Security administrator
Password	Enter the password for the user registered in SMI-S Provider.

Adding a storage system collector

Data collection from various storage system collectors begins only after you add or configure the collectors in Command Director. Configuring a storage system collector requires that you add the necessary information for each collector in the corresponding **New Storage System Collector** window.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Storage System Collectors**.
3. Click **New**.



New Storage System Collector

Type	Agent for RAID Extension
Name *	
IP Address *	
Port *	25075 SSL □
HTnM IP Address *	
HTnM Port *	22015
HCmD Server IP Address *	172.17.79.83

4. Use the information in the tables in Storage system collector settings on page 59 to configure the storage system collectors.
5. When you are finished specifying the data collector settings, click **OK**.

Result

After you configure the Device Manager and HTSM Data Collectors, Agent for RAID Extension, and the SMI-S Provider (if applicable in your environment), Command Director starts to retrieve your storage information. This can take some time.

Manually refreshing storage system data

By default, performance data is collected every 5 minutes, and the configuration data is collected every 4 hours. You can manually refresh the storage system data before the next scheduled collection to verify that the storage system collectors are configured properly.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Storage System Collectors**.
3. Select the **Storage System Collectors** tab, **Storage Systems** tab, or the **Storage Domains** tab.
4. Click **Refresh**.

Verifying storage system data collection

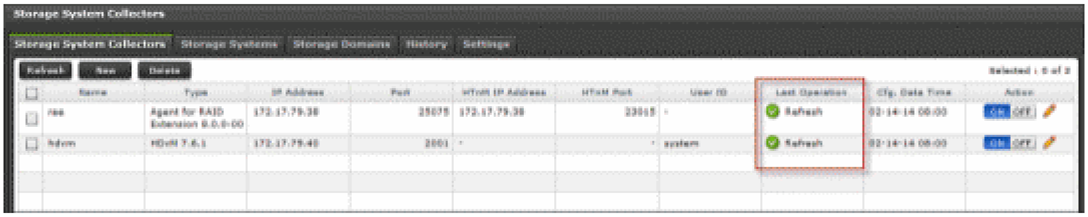
After configuring storage system data collection, you can monitor whether the data was retrieved successfully by displaying storage system information, which includes:

- Storage information by storage system
- Storage domain information that includes tier information (for Hitachi storage systems only)

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Storage System Collectors** tab.

   The **Storage System Collectors** window is displayed.

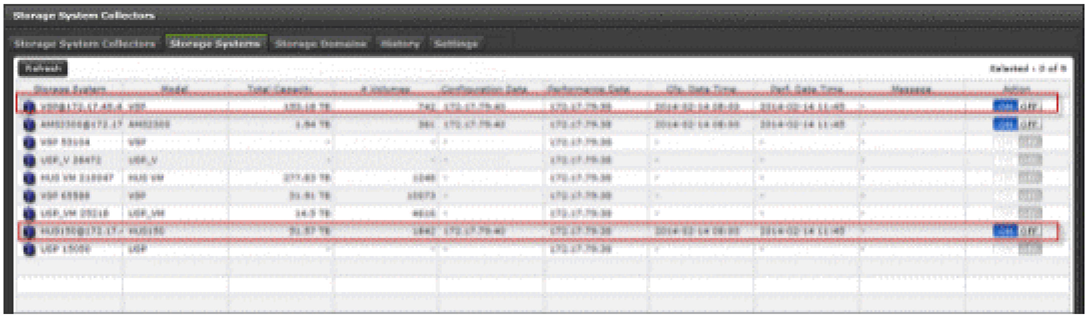
   

□	Name	Type	IP Address	Port	HTnM IP Address	HTnM Port	User ID	Last Operation	Cfg. Data Time	Action
□	raa	Agent for RAID Extension 8.0.0-00	172.17.79.38	25075	172.17.79.38	23015	-	✓ Refresh	02-14-14 08:00	ON OFF
□	hdvm	HDvM 7.6.1	172.17.79.40	2001	-	-	system	✓ Refresh	02-14-14 08:00	ON OFF

3. In the **Storage System Collectors** window, review the list of your configured **Storage System Collectors** and verify the **Last Operation** status and **Cfg. Data Time** (Configuration Data Time) against each configured Storage System collector to check which operation (data scan or refresh) was performed, and whether it was successful.

4. View the storage information by storage system. In the **Storage System Collectors** window, select the **Storage Systems** tab.

   The **Storage Systems** window is displayed.

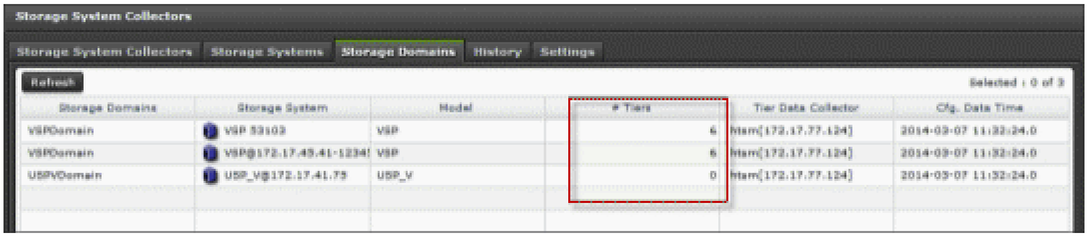


Storage System	Model	Total Capacity	# Volumes	Configuration Data	Performance Data	Cfg. Data Time	Perf. Data Time	Message	Action
VSP@172.17.45.4	VSP	155.18 TB	741	172.17.79.40	172.17.79.38	2014-02-14 08:00	2014-02-14 11:45	-	ON OFF
AMS2300@172.17	AMS2300	1.84 TB	361	172.17.79.40	172.17.79.38	2014-02-14 08:00	2014-02-14 11:45	-	ON OFF
VSP 53104	VSP	-	-	-	172.17.79.38	-	-	-	
USP_V 28471	USP_V	-	-	-	172.17.79.38	-	-	-	
HUS VM 210047	HUS VM	277.83 TB	1048	-	172.17.79.38	-	-	-	
VSP 65588	VSP	31.81 TB	10073	-	172.17.79.38	-	-	-	
USP_VM 25218	USP_VM	14.5 TB	4616	-	172.17.79.38	-	-	-	
HUS150@172.17.-	HUS150	31.57 TB	1842	172.17.79.40	172.17.79.38	2014-02-14 08:00	2014-02-14 11:45	-	ON OFF
USP 15050	USP	-	-	-	172.17.79.38	-	-	-	

   In the **Storage Systems** window, check the following fields for each storage system:

   - Verify that, for Hitachi storage systems, the appropriate Device Manager and Agent for RAID Extension are registered in the **Configuration Data Collector** and **Performance Data Collector** fields, respectively. For third-party storage systems, verify that the appropriate HCmD Data collector has been registered in the **Configuration Data Collector** field. In the preceding figure, the circled entries identify the storage systems that have their appropriate data collectors registered.
   - After you perform a data refresh (when you click **Refresh** on the selected storage system), make sure the **Total Capacity** and **# Volumes** fields are populated with the appropriate information.

5. If you added HTSM Data Collector, click the **Storage Domains** tab in the **Storage System Collectors** window, then view the storage domain information to verify that the tier information collection is successful.



Storage Domains	Storage System	Model	# Tiers	Tier Data Collector	Cfg. Data Time
VSPDomain	VSP 53103	VSP	6	htsm(172.17.77.124)	2014-03-07 11:32:24.0
VSPDomain	VSP@172.17.45.41-1234!	VSP	6	htsm(172.17.77.124)	2014-03-07 11:32:24.0
USPVDomain	USP_V@172.17.41.75	USP_V	0	htsm(172.17.77.124)	2014-03-07 11:32:24.0

Note: Tier information is displayed only for Hitachi storage systems.

6. In the **Storage Domains** window, check that the tier information is populated in the **#Tiers** field. This field displays the number of tiers defined in a storage domain.

Configuring host collectors

Configure host collectors to discover hosts on the network.

You must configure host collectors to discover hosts on your network and gather their file system and storage utilization information. Command Director uses this information to provide end-to-end mapping of the path from the host to the storage system volumes.

Command Director provides a default Host Collector that is configured and available to discover hosts and data collection on the local subnet. Command Director also supports host discovery on other subnets, but you must install a host collector separately on each subnet on which you want to discover hosts.

In addition to the host collector, a HNAS Data Collector is also installed by default when you install the HCmD server. This data collector allows Command Director to discover Hitachi NAS Platform hosts on your network and obtain their file system information. You do not need to configure the HNAS Data Collector. HNAS hosts are discovered automatically when the Local Host Collector is launched.

The procedure to perform host discovery and data collection on the local subnet using Host Collector is described subsequently. For host discovery and data collection on other subnets, see the *Hitachi Command Director User Guide.*

Prerequisites for configuring host collectors

Complete the following prerequisites before you configure the host collectors in Command Director:

- Make sure that the HCmD Host Collector and HCmD HNAS Data Collector services are running before configuring the host collector.
- Make sure you understand what privileges are used to perform data gathering operations on remote hosts. For more information, see Appendix A, “Using Host Collector in a secure environment,” in the *Hitachi Command Director User Guide.*
- If you plan to use sudo (“superuser do”) to collect data from Linux or UNIX®-based servers, make sure you know the commands that are enabled for sudo. See Appendix B, “Setting up configuration gathering operation using sudo,” in the *Hitachi Command Director User Guide.*
- Make sure you know the type of hosts you can discover and those supported by Command Director. For support information, see Host Collector support information on page 91.
- Make sure to configure a vCenter Collector to use vCenters available on your network and to gather information about the ESX servers associated with the vCenter.

  For information about configuring a vCenter Collector, see the topic regarding “Configuring vCenter Collector” section in the *Hitachi Command Director User Guide.*

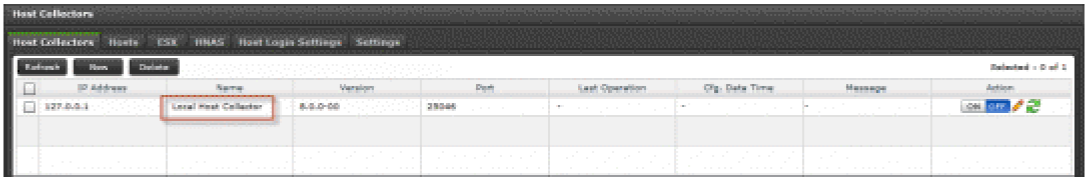
Enabling host discovery and data collection

The default Host Collector that is preconfigured and available for the current subnet is disabled by default.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select the **Host Collectors** tab.

   The **Host Collectors** window is displayed.



☐	IP Address	Name	Version	Port	Last Operation	Cfg. Data Time	Message	Action
☐	127.0.0.1	Local Host Collector	8.0.0-00	25046	-	-	-	ON OFF

   The **Action** column displays the Host Collector status (ON and OFF). The figure shows that the local Host Collector is disabled (OFF).

3. To enable the local Host Collector, click the **ON/OFF** button.

   The status changes to ON, which indicates that the Local Host Collector is enabled.

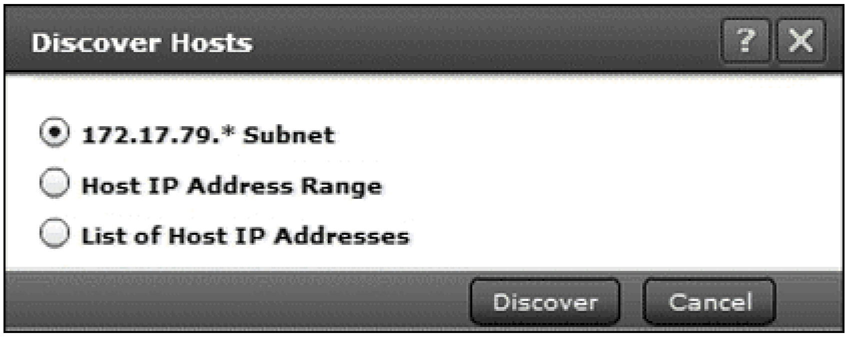
Launching local Host Collector to discover hosts

You can discover hosts by launching the Local Host Collector and selecting one of several discovery options.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Host Collectors**.
3. In the **Host Collectors** window, select **Local Host Collector**.
4. In the **Action** column, click the **Click to discover hosts** icon.

   The **Discover Hosts** window appears.



5. Specify how you want Host Collector to locate the hosts of interest by selecting one of the following options, and clicking **Discover**.

- Discover the hosts on the local subnet.
- Specify a range of host IP addresses.
- Specify a list of host IP addresses.

For more information about any of these options, see the *Hitachi Command Director User Guide.*

Specifying host logon settings

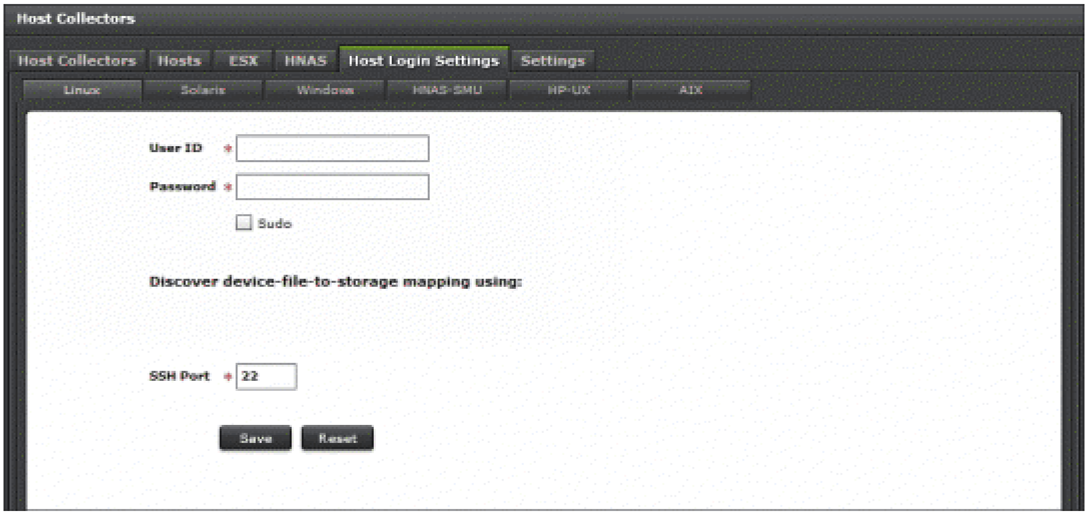
To ensure proper communication between the Host Collector and the remote hosts, you must specify the host logon settings, which include the user name and password for the target hosts. You must also specify the protocol settings for the host to allow the device-file-to-storage mapping discovery process.

The host logon settings (also called Global OS Settings) are applied by default to each host of the selected operating system type that is added to the system. The host logon settings set for Windows systems are the same as those for Hyper-V hosts.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Host Collectors**.
3. In the **Host Collectors** window, select the **Host Login Settings** tab.

   The **Host Login Settings** window is displayed.



User ID *

Password *

☐ Sudo

Discover device-file-to-storage mapping using:

SSH Port * 22

4. Enter host logon information from the tables in Host logon settings details on page 67 in this window for each discovered host type.
5. When you are finished specifying the host logon parameters for each tab, click **Save**.
6. In the information dialog that appears confirming successful update of the Global OS Settings for the selected host, click **OK**.

Postrequisites

You do not need to specify host logon settings for ESX hosts because the information is obtained from the vCenter server. The vCenter credentials you provide when you add a vCenter Collector are used to connect to the ESX hosts. For more information about configuring the vCenter collector, see the *Hitachi Command Director User Guide.*

Host logon settings details

The host logon settings are applied by default to each host of the selected OS type that is added to the system. The following tables list information you need to specify for each discovered host type.

The logon settings for Linux, Solaris, HP-UX, and AIX hosts are listed in the following table. Specify the appropriate logon details in the respective tabs in the **Host Login Settings** window.

Setting	Description
User ID	Enter the user name to use to log on to the hosts.
Password	Enter the password to use to log on to the hosts.
sudo	When you select the sudo (“superuser do”) option, Command Director does not require the user ID to be root to collect data from Linux or UNIX-based servers. Sudo allows a system administrator to work using his own account and change to root or another user identity on the system for commands that need it. Operations performed when the sudo option is enabled are logged.
SSH Port	Specify the port number, if it is different from the default, for the secure shell protocol used to communicate to the hosts. The default port number 22 is displayed.

The logon settings for Windows and Hyper-V hosts are listed in the following table. Specify the logon details under the **Windows** tab in the **Host Login Settings** window.

Setting	Description
User ID	Enter the user name to use to log on to the Windows or Hyper-V hosts.
Password	Enter the password to use to log on to the Windows or Hyper-V hosts.
Windows Service	Specify the appropriate Windows service: • **Windows Service Management:** Uses the Windows Service Manager (also known as Service Control Manager), which is responsible for creating, deleting, and running the service. • **Windows Management Instrumentation:** A Windows service running on the remote server that also allows Command Director to create a task and run an application remotely on that system. When you select one of these Windows Services, Command Director creates the service and runs the required task on the remote server using the specified Windows facility.

The logon settings for the HNAS-SMU are listed in the following table. Specify the logon details under the **HNAS-SMU** tab in the **Host Login Settings** window.

Setting	Description
User ID	Enter the user name to log on to the HNAS SMU using SSH. **Note:** Do not use the HNAS GUI login credentials to log in to the SMU.
Password	Enter the password to use to log on to the HNAS hosts.
SSH Port	Specify the port number, if it is different from the default, for the secure shell protocol used to communicate to the hosts. The default port number 22 is displayed.

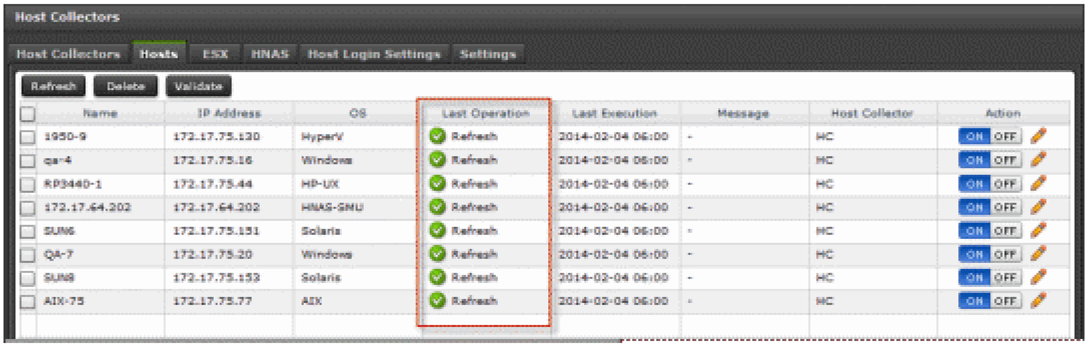
Validating host connectivity

You can validate connectivity between the Local Host Collector and the target hosts. The system can validate the host connectivity information for all the selected hosts simultaneously. Validation error information is displayed in the Message column for the relevant hosts.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Host Collectors**.
3. Select the **Hosts** tab.
4. In the **Discovered Hosts** window, select the host whose connection you want to validate, and click **Validate**.

Result



□	Name	IP Address	OS	Last Operation	Last Execution	Message	Host Collector	Action
□	1950-9	172.17.75.130	HyperV	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	qa-4	172.17.75.16	Windows	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	RP3440-1	172.17.75.44	HP-UX	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	172.17.64.202	172.17.64.202	HNAS-SMU	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	SUN6	172.17.75.151	Solaris	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	QA-7	172.17.75.20	Windows	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	SUN8	172.17.75.153	Solaris	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	AIX-75	172.17.75.77	AIX	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF

In the preceding example, a host failed to validate because of wrong login credentials. If the host connectivity is valid, the Last Operation field displays Refresh and the message field is empty.

Refreshing host file system and storage utilization data

You can refresh the Host Collector data at specific intervals (in the Settings tab) or on demand, to obtain host file system information and storage mapping information.

Procedure

1. Select the **Administration** tab.
2. Under **Data Collection**, select **Host Collectors**.
3. In the **Host Collectors** window, select the **Local Host Collector**.
4. Click **Refresh**.

Result

Command Director initiates data collection for the local Host Collector.

Verifying host data collection

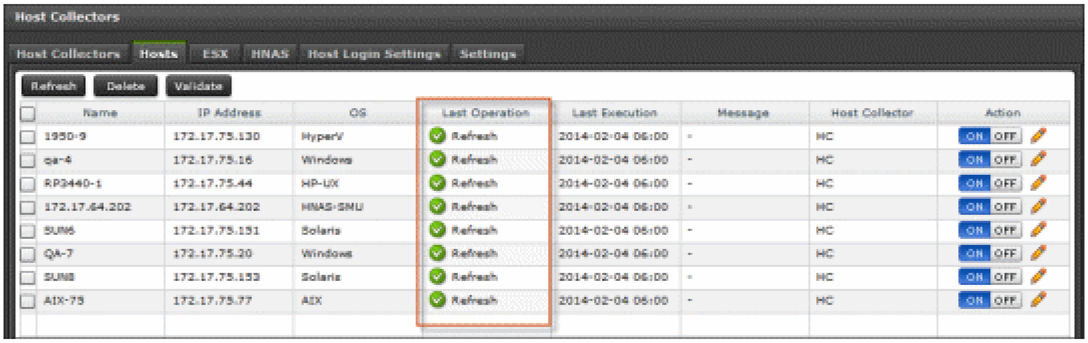
After you configure the data collectors, the **Host Collectors** window displays the following information about the discovered hosts in your environment:

- Hosts tab: Displays information about the discovered Windows, Solaris, Linux, HP-UX, and AIX hosts.
- HNAS tab: Displays information about the discovered HNAS hosts.
- ESX tab: Displays information about the ESX hosts discovered using the vCenter server.

You can use this procedure to verify that the data was successfully retrieved.

Procedure

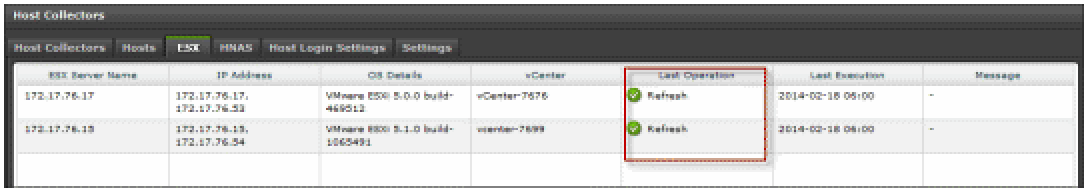
1. Select the **Administration** tab.
2. Under **Data Collection**, select **Host Collectors**.
3. In the **Host Collectors** window, select the **Hosts** tab.



□	Name	IP Address	OS	Last Operation	Last Execution	Message	Host Collector	Action
□	1950-9	172.17.75.130	HyperV	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	qa-4	172.17.75.16	Windows	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	RP3440-1	172.17.75.44	HP-UX	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	172.17.64.202	172.17.64.202	HNAS-SMU	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	SUN6	172.17.75.151	Solaris	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	QA-7	172.17.75.20	Windows	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	SUN8	172.17.75.153	Solaris	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF
□	AIX-75	172.17.75.77	AIX	✓ Refresh	2014-02-04 06:00	-	HC	ON OFF

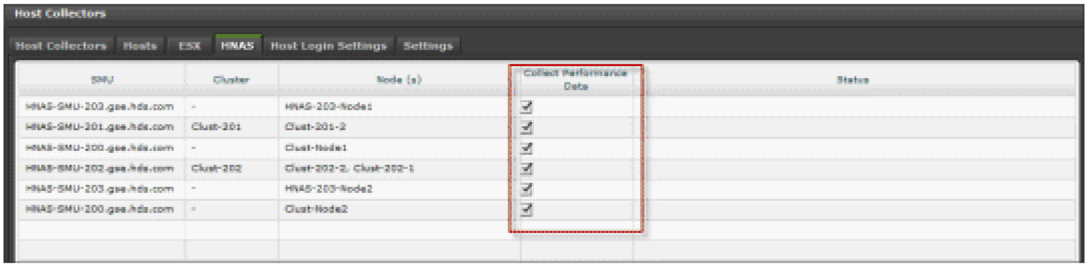
4. In the **Hosts** tab, review the list of the discovered hosts and verify the **Last Operation** status against the local **Host Collector** to check which operation (data scan or refresh) was performed and whether it was successful.

5. Verify that you have configured vCenter Collector successfully and that you can view information about ESX hosts discovered by vCenter collectors. To do so, select the **ESX** tab in the **Host Collectors** window.



ESX Server Name	IP Address	OS Details	vCenter	Last Operation	Last Execution	Message
172.17.76.17	172.17.76.17, 172.17.76.53	VMware ESXi 5.0.0 build-469512	vCenter-7676	✓ Refresh	2014-02-18 06:00	-
172.17.76.15	172.17.76.15, 172.17.76.54	VMware ESXi 5.1.0 build-1065491	vcenter-7699	✓ Refresh	2014-02-18 06:00	-

6. In the **ESX** tab, verify the **Last Operation** status against each configured vCenter collector to check which operation (data scan or refresh) was performed and whether it was successful.
7. Select the **HNAS** tab to view information about the discovered HNAS hosts.



SMU	Cluster	Node (s)	Collect Performance Data	Status
HNAS-SMU-203.gse.hds.com	-	HNAS-203-Node1	☑	
HNAS-SMU-201.gse.hds.com	Clust-201	Clust-201-2	☑	
HNAS-SMU-200.gse.hds.com	-	Clust-Node1	☑	
HNAS-SMU-202.gse.hds.com	Clust-202	Clust-202-2, Clust-202-1	☑	
HNAS-SMU-203.gse.hds.com	-	HNAS-203-Node2	☑	
HNAS-SMU-200.gse.hds.com	-	Clust-Node2	☑	

8. In the **HNAS** tab, check whether the HNAS Data Collector is collecting performance data. A check mark in the **Collect Performance Data** column indicates that the HNAS Data Collector is collecting performance data.

5

Upgrading Command Director

Upgrade Hitachi Command Director (HCmD) by upgrading the HCmD server and optionally, the Host Collector.

Refer to the following topics:

□ Preparing to upgrade Command Director

□ Disk space requirements

□ Upgrading HCmD server on Windows

□ Upgrading HCmD server on Linux

□ Upgrading Host Collector on Windows

□ Upgrading Host Collector on Linux

□ Post-upgrade tasks

Preparing to upgrade Command Director

Upgrading to Command Director v8.1.1 requires that you upgrade these components individually. The following is a best practice sequence of tasks for upgrading to v8.1.1:

- Upgrade HCmD server.
- Upgrade Host Collector (optional). Upgrade this component only if you have an existing installation of Host Collector on another subnet or host.

Review the following notes before you begin upgrading Command Director.

- Before upgrade, make sure that you disable scripts that automatically start the HCmD services that are stopped during the upgrade. If these services are not stopped, your upgrade installation can fail or be incomplete. After a successful upgrade, you can re-enable the scripts.
- You must upgrade all components of your Command Director installation individually and make sure that they remain in the same version.
- Make sure that Device Manager, Tuning Manager, Tiered Storage Manager, and Agent for RAID to which HCmD connects, are v8.1.1.
  - To upgrade to the appropriate Device Manager and Tiered Storage Manager version, see the Hitachi Command Suite documentation.
  - To upgrade to the appropriate Tuning Manager and Agent for RAID version, see the Hitachi Command Suite Tuning Manager documentation.
  - The Agent for RAID Extension is automatically upgraded to the same version as the Tuning Manager Agent for RAID server when you install Agent for RAID. HCmD supports Agent for RAID Extension v8.1.1.
- You must manually configure HTnM and HDvM to use port 22015 as the default port following an HCmD server upgrade from an earlier version to v8.1.1.

The following table lists the various upgrade scenarios and the steps involved in upgrading to HCmD v8.1.1:

Upgrading from HCmD	Steps involved in upgrade
v7.6.0 and later	Upgrade to v8.1.1 using the upgrade procedures provided in this guide.
Earlier than v7.6.0	Upgrade is not supported.

Disk space requirements

Upgrading your installation of Command Director may require more available disk space than a new installation. This is due to the accumulation of production data during normal operation of Command Director. Before upgrading, the installer creates a backup of data available in some folders.

You may therefore require up to twice the amount of disk space used by the data in the backed up folders.

Upgrading HCmD server on Windows

Prerequisites

Upgrading the HCmD server requires that you meet the prerequisites before proceeding to the upgrade installation.

Before you upgrade the HCmD server, complete the following:
- Close all Command Director application windows, log files, text editors that access Command Director files, browser windows that access the Command Director UI client, Windows Services window, and the Command Director database connections.
- Disable virus scanning utilities running on the server.
- Disable all scripts that automatically start the HCmD services that are stopped during the upgrade installation.

Procedure

1. Run the following executable to upgrade the HCmD server:

   `HCmD-Install-Server-`*`release`*`.exe`

   The installer provides the following options to complete your upgrade installation:
   - **Install**: Upgrade your existing version of HCmD server to the most recent version.
   - **Cancel**: Cancel the upgrade installation.

   Depending on the version you upgrade from (version v7.6.0 or later), the installer displays the following messages:
   - Information needed to continue upgrading to the most recent version.
   - Click **Next** in the installation setup screen to upgrade your current version of HCmD server to the most recent version.
2. Review the upgrade installation summary, and then click **Install**.
3. Click **Finish** to exit the installer.

Result

Following an HCmD server upgrade from a version earlier than v8.0, you must manually configure the default port for HTnM and HDvM to use port 22015.

Removing Command Director

Removing or uninstalling Command Director requires that you back up the Command Director database (optional), uninstall the existing version of

Command Director, and then perform a fresh installation of Command Director to the most recent version.

For more information about backing up the database, see the *Hitachi Command Director Release Notes*.

Note: When removing Command Director, make sure that you also remove any other remote host collectors associated with it.

Procedure

1. Click **Uninstall** in the installer to remove the existing version of Command Director.
2. Follow the prompts to uninstall the existing version of HCmD server.

   For information about removing HCmD server, see Removing Command Director server on page 78.
3. After the current version is successfully uninstalled, the fresh installation of HCmD server v8.1.1 is started automatically. Follow the prompts to install HCmD server.

   For information about installing HCmD server, see Installing the HCmD server on page 22.

Upgrading HCmD server on Linux

Prerequisites

Upgrading the HCmD server requires that you meet the prerequisites before proceeding to the upgrade installation.

Before you upgrade the HCmD server, complete the following:
- Close all Command Director application windows, log files, text editors that access Command Director files, browser windows that access the Command Director UI client, and the Command Director database connections.
- Disable virus scanning utilities running on the server.
- Disable all scripts that automatically start the HCmD services that are stopped during the upgrade installation.
- Disable all Host Collectors and Storage System Collectors.

Procedure

1. Log on to Linux as the root user.
2. Insert the Command Director installation media in the host.
3. Run the following command: `cp Installation-media-directory/Linux/HCmD-Install-Server-release.tar`

4. Run the following command: `tar -xf HCmD-Install-Server-release.tar`
5. Run the following command: `cd HitachiCommandDirector`
6. Run the following command: `./install.sh`
7. At the prompt, accept the upgrade and respond to all prompts to proceed. The upgrade creates a backup folder that can be used to restore the earlier version if necessary.
8. In the `Upgrade Summary`, review the summary to ensure the information is appropriate for your upgrade, and then press **Enter** to run the upgrade.
9. When the upgrade is complete, an `Upgrade Complete` message displays. Press **Enter** to exit the upgrade.

Result

Command Director is upgraded.

Upgrading Host Collector on Windows

The upgrade process requires only that you run the executable for that component and follow the on-screen prompts. The following procedure provides upgrade instructions for the Host Collector.

Procedure

1. Close all application windows and log files related to Command Director.
2. Disable all scripts that automatically start the HCmD services that are stopped during the upgrade installation.
3. Disable virus scanning utilities running on the server.
4. Run the executable `HCmD-Install-Host-Collector-`*`release`*`.exe` for Host Collector and follow the prompts to upgrade.

   The Host Collector component is upgraded directly.

Upgrading Host Collector on Linux

The upgrade process requires only that you run the executable for that component and follow the on-screen prompts. The following procedure provides upgrade instructions for the Host Collector.

Procedure

1. Close all application windows and log files related to Command Director.
2. Disable all scripts that automatically start the HCmD services that are stopped during the upgrade installation.
3. Disable virus scanning utilities running on the server.

4. Run the following command: `cp Installation-media-directory/Linux/HCmD-Install_Host_Collector-release.tar`
5. Run the following command: `tar -xf HCmD-Install_Host_Collector-release.tar`
6. Run the following command: `cd HCmDHostCollector`
7. Run the following command: `./install.sh` and follow the prompts to upgrade.

   The Host Collector component is upgraded directly.

Post-upgrade tasks

To use Command Director after an upgrade installation, you must perform the following checks to ensure that all required services are running, the relevant collectors are enabled, and Command Director is refreshed. Complete the following before you use Command Director after an upgrade:

- Make sure to manually configure HTnM and HDvM to use port 22015 as the default port following an HCmD server upgrade from an earlier version to v8.1.1.
- Make sure the following services are running:
  - Hitachi Command Director Database
  - Hitachi Command Director
  - HCmD Host Collector
  - Agent for RAID Extension (on Agent for RAID server)
  - HCmD Data Collector
  - HCmD HNAS Data Collector
- Perform a data refresh to begin populating data in Command Director reports.

Caution: You must refresh all collectors in Command Director. Failure to do so could leave Command Director in an unstable state.

For information about refreshing data collectors, see Configuring data collectors on page 55.

Note: Certain EMC report data does not display until after the data refresh is complete.

- In the Physical Capacity by Storage System report in the Reports tab, EMC array data will re-appear after refresh.
- In the Storage System Capacity Overview report in the Dashboard, capacity will be reduced until after refresh.
- In the Storage System Capacity Overview report in the Storage Systems Business View, capacity will be reduced until after refresh.

6

Removing Command Director

Removing the Command Director server software (HCmD Server) and its components also deletes the corresponding logs and database files. To preserve this information, back up your data before you remove Command Director.

For more information about backing up the logs and database files, see the *Hitachi Command Director Release Notes*.

⚠ **Note:** On Microsoft Windows, you can remove all Command Director components using Start > All Programs > *HCmD-component* > Uninstall.

To uninstall Agent for RAID Extension, you must uninstall the Tuning Manager Agent for RAID.

Removing Command Director server on Windows

Procedure

1. On the **Start** menu, select **Control Panel**.
2. Open **Programs and Features** and select **Hitachi Command Director.**
3. Click **Uninstall/Change** to remove the component. When you remove Command Director server, the Host Collector and HNAS Data Collectors are uninstalled automatically.

⚠ **Note:** If the HCmD CLI has been extracted, the foregoing procedure will not remove it. You can remove it by deleting it. For more information, see the *Hitachi Command Director CLI Reference Guide.*

Result

Alternately, you can remove Command Director by running the **`uninstall.exe`** from the following Windows folder: `\HCmD-Installation-Folder\`

Removing Command Director server on Linux

Follow the steps in this procedure to uninstall Command Directorserver on Linux:

Procedure

1. Log in as the root user.
2. Run the following command: `cd opt/Hitachi/CommandDirector/`
3. Run the following command:`./uninstall.sh`
4. Respond to each prompt in the uninstallation procedure.
5. Press **Enter** to uninstall Command Director.
   A confirmation message displays when the uninstallation is complete.
6. Press **Enter** to exit the uninstaller.

Removing Command Director Host Collector on Linux

Procedure

1. Log in as the root user.
2. Run the following command: `cd opt/Hitachi/CommandDirector/HostCollector/`

3. Run the following command: `./uninstall.sh`
4. Press **Enter** at the prompt to begin the uninstall.

   The uninstall may take few minutes. A message displays to confirm that uninstallation is complete.
5. Press **Enter** to exit the uninstaller.

7

Removing hosts and storage systems from Command Director

Command Director provides a CLI utility that you can use to remove hosts, storage systems, or both. The utility also removes related data.

Usage and prerequisites

Usage

The removal utility is located in the bin folder at: `<Command Director Installation directory>/CommandDirector/utils/bin` folder.

Usage is as follows:
`hcmd-utils` [`RemoveHost` *host-name* | *ESX-name* | *HNAS-SMU-name*] | [`RemoveStorageSystem` *storage-system-name*] | [`RemoveUsingConf`]

Prerequisites for removal of a storage system

1. Remove the storage system from Device Manager, Tuning Manager, and its Agent for RAID instance.
2. Stop the Hitachi Command Director service.
3. Back up the Command Director database.
   For more information, see the *Hitachi Command Director Release Notes*.

Prerequisites for removal of a host, HNAS, or ESX server

1. Before removing an ESX server from Command Director, remove it from its vCenter that is registered in Command Director. This is required because Command Director collects ESX server data through the registered vCenter collector.
2. Stop the Hitachi Command Director service.
3. Back up the Command Director database.
   For more information, see the *Hitachi Command Director Release Notes*.

RemoveUsingConf

Use the RemoveUsingConf command when you want to remove more than one resource at a time.

Use the following procedure to decommission more than one resource at a time and remove all related data from reports.

1. Perform the required prerequisites.
   For more information, see Usage and prerequisites on page 82.
2. Navigate to `[Command Director]\utils\conf` and add the names of the resources to the `remove-util.conf` file.
   Enter the names of hosts under `#Hosts` and the names of storage systems under `#Storage Systems`.
3. Run the command as follows: `[Command Director]\utils\bin>hcmd-utils.bat` **`RemoveUsingConf`**
   The output messages confirm clean up of the resources with a message for each resource name.

4. Start the Hitachi Command Director service.
5. Refresh the Storage Collectors and Host Collectors.
6. If you have removed hosts (including ESX servers or HNAS SMUs) refresh the Host Collectors.

Example

You want to remove an ESX server "187.12.17.32", a host "R7-L9", and a storage system "VSP G1000@187.12.19.76".

1. Remove the ESX server from the vCenter that is registered in Command Director.
2. Remove the storage system from Device Manager and from Tuning Manager and its Agent for RAID instance.
3. Stop the Hitachi Command Director service.
4. In `remove-util.conf`, add the ESX server name and the hosts name under `#Hosts`. Add the storage system name under `#Storage Systems`.
5. Run the command as follows:
   - In Windows: `[Command Director]\utils\bin>hcmd-utils.bat` **`RemoveUsingConf`**
   - In Linux: `[Command Director]\utils\bin>hcmd-utils.sh` **`RemoveUsingConf`**

   The output messages confirm clean up with a message for each resource name:
   "Clean up completed for Host: 187.12.17.32"
   "Clean up completed for Host: R7-L9"
   "Clean up completed for Storage System: VSP G1000@187.12.19.76"
6. Start the Hitachi Command Director service.
7. Refresh the Host Collectors and Storage System Collectors.

RemoveHost

Use the RemoveHost command to delete a single host.

Use the following procedure to remove one host at a time and remove all related data from reports.

1. Perform the required prerequisites.
   For more information, see Usage and prerequisites on page 82.
2. Run the command as follows, using the name of a host, (including ESXs and HNAS-SMUs):
   `[Command Director]\utils\bin>hcmd-utils.bat` **`RemoveHost`** *host-name*
   The output includes a message confirming that cleanup is complete.
3. Restart the Hitachi Command Director Service.
4. Refresh the Host Collectors and Storage System Collectors.

For more information about the results of removing a host, see Results of removing hosts and storage systems on page 84.

RemoveStorageSystem

Use the RemoveStorageSystem command to remove a single storage system.

Use the following procedure to remove one storage system at a time and remove all related data from reports.

1. Perform the required prerequisites.
   For more information, see Usage and prerequisites on page 82.
2. Run the command as follows: `[Command Director]\utils\bin>hcmd-utils.bat` **`RemoveStorageSystem`** *storage-system-name*
   The output includes a message confirming that cleanup of the storage system is complete.
3. Restart the Hitachi Command Director service.
4. Refresh the Storage Collectors and Host Collectors.

For more information about the results of removing a host, see Results of removing hosts and storage systems on page 84.

Results of removing hosts and storage systems

Removal of a Storage System

Removal of a storage system by using the utility has the following effects:

- Any applications that have no storage as a result of the removal of the storage system are also removed.
- In the case of an application having allocated storage from multiple storage systems, when one storage system is removed, the associated LDEVs of the storage system are removed from the application and the overall application capacity goes down.
- The removed storage system and its related removed application entities no longer display in the following business views in the Resources tab:
  - Storage Systems
  - Applications By Capacity
  - Applications By Pool
  - All Applications
  - Any user-defined business view
- The removed storage system and its related removed application entities no longer display in capacity reports and performance reports for applications and for storage systems.

Removal of a Host, HNAS server, or ESX server

Removal of a Host, HNAS server, or ESX server by using the utility has the following effects:

- Any auto-created host applications are removed.
- In the case of a manually created application with multiple hosts assigned, the associated LDEVs of the removed host or ESX server are removed from the application and the overall application capacity goes down.
- The Hosts view in the Resources tab no longer displays the removed host or ESX server.
- Any datastores and datastores applications in a removed ESX are deleted.
- The File Server view in the Resources tab no longer displays the removed HNAS server.
- All other business views display only applications of hosts that have not been removed.
- Capacity and performance reports display only applications of hosts that have not been removed.

Impact on Capacity Trend and Forecast Trend reports

Upon removal of a Storage System or Host or ESX server, the storage capacity associated with them will also be removed in Command Director. This result will be visible in the following as a decline in overall capacity:

- Storage System Capacity Trend report (available in the Dashboard the Resources tab).
- Storage System Capacity Forecast Trend report (available in the Dashboard and the Resources tab).
- Pool Detailed Capacity Trend report in the Reports tab under Utilization.

A

Command Director files

This appendix lists the location of important files for running and maintaining Hitachi Command Director (HCmD).

Command Director Installation folder

The default Command Director Windows installation folder is `C:\Program Files\Hitachi\CommandDirector`.

The default Command Director Linux installation folder is `/opt/Hitachi/CommandDirector`.

Log files

In Windows, the Command Director log files are in the following folder:

HCmD-installation-folder`\logs`.

In Linux, the Command Director log files are in the following folder:

HCmD-installation-folder`/logs`.

The Command Director log files are:

- `hscp.log`
- `hscp_audit.log`

Data files

In Windows, the Command Director data files are in the following folder:

HCmD-installation-folder`\data`.

In Linux, the Command Director data files are in the following folder:

HCmD-installation-folder`/data`.

HCmD data files are organized into the following subfolders:

- `backup`
- `activemq`
- `collector`
- `db`
- `perf-data`

Configuration files

In Windows, the Command Director configuration files are in the following folder:

HCmD-installation-folder`\conf`.

In Linux, the Command Director configuration files are in the following folder:

HCmD-installation-folder/conf.

B

Host Collector support information

This appendix provides the Host Collector support information for the following network elements:

- □ Host Collector server support
- □ Host bus adapter support for Host Collector
- □ Storage system support for Host Collector
- □ Network-attached storage support for Host Collector
- □ Volume Manager support for Host Collector

Host Collector server support

The Host Collector supports servers running on different operating systems.

The following table lists information about servers supported by the Host Collector on Microsoft Windows.

Operating system	Server version	Service pack	Architecture
Microsoft Windows 2008	• Standard Edition • Enterprise Edition • Datacenter Edition • Standard Edition without Hyper-V • Enterprise Edition without Hyper-V • Datacenter Edition without Hyper-V	SP2	none
	• R2 Standard Edition • R2 Enterprise Edition • R2 Datacenter Edition	SP1	x64
Microsoft Windows 2012	• Standard Edition • Datacenter Edition	none	none

The following table lists information about servers supported by the Host Collector for Solaris platform.

Server version	Architecture
5.10	• SPARC 32-bit, 64-bit • x86 32-bit
5.11	• SPARC 32-bit, 64-bit • x86 32-bit

The following table lists information about servers supported by the Host Collector for HP-UX platform.

Server version	Architecture
11iv2	IPF, PA-RISC 64-bit
11iv3	IPF, PA-RISC 64-bit

The following table lists information about servers supported by the Host Collector on IBM-AIX.

Server version	Technology level	Architecture
6.1	04	POWER 64-bit

Server version	Technology level	Architecture
7.1	-	POWER 64-bit

The following table lists information about servers supported by the Host Collector on Linux.

Operating system	Server version	Architecture
Red Hat EL or ELAP	5.6	x86, x64
	5.7	x86, x64
	5.8	x86, x64
	5.9	x86, x64
	6.3	x86, x64
	6.4	x86, x64
	6.5	x86, x64

The following table lists information about servers supported by the Host Collector on VMware.

Operating system	Server version
vCenter	4.0, 4.1, 5.0, 5.1
ESX	3.5, 4.0, 4.1, 5.0
ESXi	5.1.0
	5.5

The following table lists information about servers supported by the Host Collector on SUSE LES.

Operating system	Server version	Service pack	Architecture
SUSE LES	10	SP3	x86, x64
	11	No SP, SP1, SP3	x86, x64

Host bus adapter support for Host Collector

For host bus adapter (HBA) information gathering operations, the HBA vendor must provide an HBA library that is SNIA-compliant.

The following table lists information about Host Collector HBA support for Solaris systems.

Host bus adapter	Additional information
JNI FCI-1063	When you use JNI HBAs, the API library accompanying the driver is required. The HBA API library (JNI SNIA Fibre Channel HBA LIBRARY v1.0.0.0.0.b.011205-15 or later) provided by the HBA vendor is required.
JNI FC64-1063	
JNI FCE-6410	
JNI FCE-6460	When you use QLogic HBAs, the API library accompanying the driver is required. The HBA API library (QLogic SDM Library 1.25 or later) provided by the HBA vendor is required.
QLogic QLA2200	

Host bus adapter	Additional information
JNI FCI-1063	When you use JNI HBAs, the API library accompanying the driver is required. The HBA API library (JNI SNIA Fibre Channel HBA LIBRARY v1.0.0.0.0.b.011205-15 or later) provided by the HBA vendor is required.
JNI FC64-1063	
JNI FCE-6410	
JNI FCE-6460	
QLogic QLA2200	When you use QLogic HBAs, the API library accompanying the driver is required. The HBA API library (QLogic SDM Library 1.25 or later) provided by the HBA vendor is required.

The following table lists information about Host Collector HBA support for Linux systems.

Host bus adapter	Additional information
QLogic QLA2200F	When you use QLogic HBAs, the API library accompanying the driver is required. The HBA API library provided by the HBA vendor is also required.
QLogic QLA23xx	
QLogic QLA24xx	
Hitachi GV-CC62G1	

The following table lists information about Host Collector HBA support for Microsoft Windows systems.

Host bus adapter	Additional information
Emulex LP8000	When you use Emulex HBAs, the API library accompanying the driver is required. The HBA API library provided by the HBA vendor is also required
Emulex LP9002L	
Emulex LP9002DC	
Emulex LP9802	
QLogic QLA23xx	Download the Fibre Channel Information Tool from the following site to acquire WWN information about the HBA, and then perform the installation. Refer to the following URL for the supported HBAs: www.microsoft.com/downloads/details.aspx?
QLogic QLA24xx	

Host bus adapter	Additional information
Hitachi GV-CC62G1	none

Note: The preceding tables do not include version-specific operating system information because the HBA gather utility is based on an SNIA-compliant API.

Storage system support for Host Collector

Host Collector can collect data on devices coming from various Hitachi storage systems. For information about the supported storage systems, see Supported storage systems on page 15.

Note: Host Collector does not support configuration gathering operations on the storage systems themselves.

Network-attached storage support for Host Collector

The following table lists information about HNAS support for Host Collector.

Network attached storage	Model	SMU code
Hitachi NAS Platform	3080 3090 3100 3200	7.0, 8.0
	3080 3090	10.2, 11.0, 11.1
	4060 4080 4100	11.1, 11.2, 11.3, 12.0

Volume Manager support for Host Collector

The following table lists information about Volume Manager support for Host Collector on Microsoft Windows 2008.

Microsoft Windows 2008 version	Service pack	Architecture	Volume manager
• Standard 32-bit Edition • Enterprise 32-bit Edition • Datacenter 32-bit Edition • Standard without Hyper-V 32-bit Edition • Enterprise without Hyper-V 32-bit Edition • Datacenter without Hyper-V 32-bit Edition	SP2	x86	• Basic • Dynamic
• Standard Edition • Enterprise Edition • Datacenter Edition • Standard without Hyper-V Edition • Enterprise without Hyper-V Edition • Datacenter without Hyper-V Edition	SP2	x64	• Basic • Dynamic
• R2 Standard Edition • R2 Enterprise Edition • R2 Datacenter Edition	none	x64	• Basic • Dynamic
• R2 Standard Edition • R2 Enterprise Edition • R2 Datacenter Edition	SP1	x64	• Basic • Dynamic

The following table lists information about Volume Manager support for Host Collector on Solaris.

Solaris version	Architecture	Volume manager	Volume manager version
10	SPARC	none	none
	Kernel mode; 32-bit or 64-bit	SVM VxVM	1.0 5.0MP1
	AMD64	none	none
	Kernel mode; 64-bit	SVM	1.0
11	SPARC	none	none
	Kernel mode; 32-bit or 64-bit	SVM VxVM	1.0 5.0MP1
	AMD64	none	none
	Kernel mode; 64-bit	SVM	1.0

The following table lists information about Volume Manager support for Host Collector on Linux Red Hat EL or Red Hat ELAP.

OS version	Architecture	Volume manager	Volume manager version
5.6	x86, x64	none	none
		LVM2	Independent
5.7	x86, x64	none	none
		LVM2	Independent
5.8	x86, x64	none	none
		LVM2	Independent
5.9	x86, x64	none	none
		LVM2	Independent
6.3	x86, x64	none	none
		LVM2	Independent
6.4	x86, x64	none	none
		LVM2	Independent

The following table lists information about Volume Manager support for Host Collector on HP-UX.

HP-UX version	Service pack	Architecture	Volume manager	Volume manager version
11iv2	PA-RISC	64-bit	none	none
			LVM	Independent
11iv3	PA-RISC	64-bit	none	none
			LVM2.1	Independent

The following table lists information about Volume Manager support for Host Collector on IBM-AIX.

IBM AIX version	Technology level (TL)	Architecture	Volume manager	Volume manager version
6.1	4	POWER 64-bit	LVM	Independent
7.1	none	POWER 64-bit	LVM	Independent

The following table lists information about Volume Manager support for Host Collector on SUSE LES.

SUSE LES version	Service pack	Architecture	Volume manager	Volume manager version
10	SP3	x86, x64	none	none
			LVM2	Independent

SUSE LES version	Service pack	Architecture	Volume manager	Volume manager version
11	none	x86, x64	none	none
			LVM2	Independent
	SP1	x86, x64	none	none
			LVM2	Independent
	SP3	x86, x64	none	none
			LVM2	Independent

C

Troubleshooting Command Director

This appendix describes how to troubleshoot Hitachi Command Director.

Troubleshooting Agent for RAID Extension connections

If your connection to Agent for RAID Extension does not go through, a firewall might be blocking IP traffic to the ports on which Agent for RAID Extension listens. Check for the following to resolve connection issues:

Procedure

1. Make sure the Agent for RAID Extension service (on the Agent for RAID) is running.
2. Make sure that your firewall settings allow communication with Agent for RAID Extension services.
   - For Agent for RAID Extension, make sure your firewall allows communication on the port for Agent for RAID Extension (default: 25075) and the port for HCmD server (default: 25015) you configured during installation, using the TCP protocol.

Troubleshooting Host Collector connections

If you have an issue connecting to a Host Collector, a firewall might be blocking IP traffic to the port on which the Host Collector or the HCmD server listens. Check for the following to resolve the connection issue:

Procedure

1. Make sure that the HCmD Host Collector service is running.

   In the Services Control Panel, check that the `HCmD Host Collector` service is running.
2. Make sure that your firewall settings allow communication between the HCmD server and the Host Collector server.
   - For the HCmD server, make sure the server firewall allows communication on the port you configured during installation (default: 25015) using the TCP protocol.
   - For the Host Collector, make sure the server firewall allows communication on the port you configured during installation (default: 25046) using the TCP protocol.

Troubleshooting host discovery timeout issues

The host discovery process starts with an instruction from the HCmD server to the Host Collector to discover the information for a particular host. The Host Collector then performs four operations, each of which by default has a set amount of time to finish before timing out:

Procedure

- Discovering the presence of the target host on the network
- Logging on to the target host
- Gathering the target host’s file system and storage utilization configuration data
- Sending the target host’s discovery data to the HCmD server

Setting Host discovery timeout properties

If the host discovery or data collection process times out, you can increase its default timeout property setting. However, doing so might extend the time the Host Collector requires to gather from the hosts of interest on the network.

When you modify any timeout property, restart the Hitachi Command Director service from the Services panel for the changes to take effect.

Adjust the timeout settings by editing the properties listed in the following table:

Description	Property Settings
Gather the target host’s file system and storage utilization configuration data.	Name of the property: `host.data.collector.process.timeout.sec` Default: 21600 seconds Location: *HCmD-installation-folder*\conf\custom.properties file ⚠ **Note:** If you increase the timeout value for `host.data.collector.process.timeout.sec`, you must also increase the timeout value for the `process.timeout.limit.sec` property.
Send the target host’s discovery data to HCmD server.	Name of the property: `process.timeout.limit.sec` Default: 900 seconds Location: *HCmD-installation-folder*\Host Collector\conf\alps.properties file

Troubleshooting receiving email alerts and reports

If you are unable to receive alerts or reports via email, check your virus scanner software. It may include a property that is set to prevent mailings. In that case, you will need to disable the property or modify it to allow the local server to send emails.

Troubleshooting HNAS database message logging using NoLog property

You can use this property to avoid messages being logged into and filling up the HCmD HNAS dblog each time that an HNAS CLI command collects performance or configuration information.

This property file setting enables you to control whether messages are generated and sent to the HNAS dblog each time that HNAS CLI commands are executed on an HNAS SMU or node. The location of the Command Director files are in the following Windows folder: `\HCmD-Installation-Folder\conf`. The following table lists the `hnas.nolog.enabled=` property, which is in the `alps.properties` file. The property settings are listed in the following table.

Description	Property	Required modification
Setting controls messages sent to HNAS dblog when HNAS CLI command executes on HNAS SMU or node	`hnas.nolog.enabled=true` Default: true	When set to `true`, then `nolog` is prefixed with each CLI command that is executed on an HNAS SMU or node, and none of these messages are logged in the HNAS dblog. When set to `false`, then each CLI command that is executed on an HNAS SMU or node, and its corresponding message, is logged in the HNAS dblog. This property allows you to control when to allow or limit messages being logged in the HNAS dblog.

Troubleshooting a Command Director database in an unstable state on a VM

The HCmD database on a virtual machine (VM) system can enter an unstable state if the VM encounters an unexpected or unscheduled loss of power.

This is rare occurrence that is only caused by an unexpected or unscheduled loss of power. As a result of this condition, you can experience problems starting or being able to access the HCmD database on a VM. The unexpected or unscheduled loss of power can cause the HCmD database to become unstable and remain in a state that prevents you from using it.

Procedure

1. Login to the VM system with the HCmD database.
2. Check the status of the HCmD service.

3. If you cannot start or access the HCmD database because it is in an unstable state, then you need to contact customer support for assistance.

Troubleshooting "bad ELF interpreter" error when using Command Director on 64 bit Linux

After installing Command Director on 64 bit Linux, you may encounter an error when attempting to validate a host on Windows.

The cause is indicated as follows:

Cause: /opt/Hitachi/CommandDirector/HostCollector/lib/native/unix/ WinDelUtil.sh: /opt/Hitachi/CommandDirector/HostCollector/lib/native/unix/ winexe.x86.SUSE: /lib/ld-linux.so.2: bad ELF interpreter: No such file or directory)"

This error results from missing 32 bit libraries. To resolve it, install "glibc.i686".

Troubleshooting inability to discover a Linux host

If the Host Collector does not discover a Linux host, the cause may be that port 902 is open in the host. To resolve this issue, end the process that is using port 902. Add the Linux host again.

Troubleshooting ERR_1330: Required dependent library is missing to communicate with Windows target machine

The message "ERR_1330: Required dependent library is missing to communicate with Windows Target machine" can display when Command Director is installed on a Linux server and you attempt to validate Windows hosts.

Resolve the error by installing "smbclient".

Troubleshooting a lack of performance data for HNAS nodes that are accessed through an incorrect IP address

Command Director may be unable to collect HNAS performance data. This can occur when the HNAS-SMU accesses the node using a public IP address instead of through the private IP address. The HNAS-SMU must have access to the private IP address that is configured through the VLAN.

To resolve the issue, reconfigure the node so that it is accessed by the HNAS-SMU through the private IP address.

Glossary

A

alert

An event that is generated when an SLO is violated. You can also set up email notifications with the event details.

application

In Hitachi Command Director, applications represent groups of storage volumes used by an actual application. An application can be defined by volumes belonging to a host group or by storage consumed by a physical host discovered by the Command Director agentless host collector.

B

business view

A business hierarchy that organizes hosts, applications, and other folders for reporting purposes. Storage capacity and storage type utilization, I/O operations per second (IOPS), and SLO status are summarized for the application and for every folder in the hierarchy. The same applications can be organized according to multiple hierarchies.

C

CA

See certificate authority.

capacity

The amount of data storage space available on a physical storage device, generally measured in bytes (MB, GB, TB, and so on).

certificate

Refers to a digital certificate used with SSL. The browser examines the certificate and determines whether it is authentic before allowing communication.

certificate signing request

A message that is sent from an applicant to a certification authority to apply for a digital identity certificate.

certification authority

The authority and organization responsible for issuing and revoking user certificates, and ensuring compliance with policies and procedures for secure creation and management of digital certificates.

CLI

Command Line Interface. A method of interacting with software using a command line interpreter. The Command Director CLI is used to generate and save reports, and perform application management operations.

CSR

See certificate signing request.

D

data collection

A method of discovering and gathering information from the storage system collectors on the Hitachi Device Manager and Agent for RAID servers and the host collectors installed on hosts in the network.

data refresh

Collecting information from the data collectors on the Hitachi Device Manager and Agent for RAID servers, and updating the information displayed in the Hitachi Command Director GUI.

DB

database

device

Refers to the name of a computer, storage, IP switch, or FC switch in Hitachi IT Operations Analyzer.

G

GUI

graphical user interface

H

HBA

See host bus adapter.

HCmD

Hitachi Command Director. For v7.0 and later, new name for Hitachi Storage Command Portal (HSCP).

HCS

Hitachi Command Suite. For v7.0 and later, new name for Hitachi Device Manager. See HDvM.

HDvM

Hitachi Device Manager. For version v7.0 and later, this name has changed to Hitachi Command Suite. Allows you to consolidate storage operations and management functionality in a system that contains multiple Hitachi storage systems. Device Manager quickly discovers the key configuration attributes of storage systems, and allows your organization to begin managing complex and heterogeneous storage environments using a browser-based GUI.

Hitachi NAS Platform

A storage system that provides high-performance read/write access to data through multiple protocols, such as CIFS, NFS, iSCSI, and FTP. It is a highly scalable and modular Network Attached Storage (NAS) server, with multigigabit throughput from network to disk.

host

One or more host bus adapter (HBA) world wide names (WWN).

host bus adapter (HBA)

One or more dedicated adapter cards that are installed in a host, have unique WWN addresses, and provide Fibre Channel I/O connectivity to storage systems, typically through Fibre Channel switches. Unlike general-purpose Ethernet adapters, which handle a multitude of network protocols, host bus adapters are dedicated to high-speed block transfers for optimized I/O performance.

HTnM

Tuning Manager. A real-time software monitor that can view the current state of the host, file system, database, storage area network, and storage resources. In Tuning Manager, a resource indicates any object that is used by an application. You can compare this information with the normal behavior or the baseline performance stored in the database. The ability to query a historical database for performance and capacity trend analysis on each component of the storage area network lets you correlate the current changes in performance with recent changes to the physical configuration, software, workload, or other environmental changes that may be causing changes in an application's performance.

The Tuning Manager series consists of Agents that collect the performance data for each monitored resource and the Tuning Manager program that manages all the Agents.

HTSM

Hitachi Tiered Storage Manager. Software that is used to perform migration. The term migration refers to moving the data stored on one volume to another volume. Tiered Storage Manager moves the data on a predefined set of volumes to another set of volumes that have the same characteristics.

I

I/O

input/output

Internet protocol (IP)

The protocol that governs the breakup of data messages into packets (units of data), the routing scheme for transmitting them, and the reassembly of the packets into the original data messages at the destination. Most networks combine IP with a higher-level protocol called Transmission Control Protocol (TCP), which establishes a virtual connection between a source and a destination.

IP

See Internet protocol.

K

key performance indicator (KPI)

A measurement used to help an organization define and measure progress toward organizational goals. KPIs are used in business intelligence to assess the present state of the business and to prescribe a course of action. KPIs are typically tied to an organization's strategy.

L

logical unit (LU)

A volume, or LDEV, created in an open storage system, or configured for use by an open-systems host, for example, OPEN-V.

logical unit number (LUN)

A unique management number that identifies a logical unit (LU) in a storage system. A logical unit can be an end user, a file, a disk drive, a port, a host group that is assigned to a port, an application, or virtual partitions (or volumes) of a RAID set.

Logical unit numbers (LUNs) are used in SCSI protocols to differentiate disk drives in a common SCSI target device, such as a storage system. An open-systems host uses a LUN to access a particular LU.

logical volume

An area on a disk consisting of device files that are logically integrated using a volume manager. Also referred to as an LDEV.

LUN

See logical unit number.

N

NAS

Network attached storage

node

A monitored computer, switch, or storage system in Hitachi IT Operations Analyzer.

P

parity

In computers, parity refers to a technique of checking whether data has been lost or written over when it is moved from one place in storage to another or when transmitted between computers.

Parity computations are used in RAID drive arrays for fault tolerance by calculating the data in two drives and storing the results on a third. The parity is computed by XOR'ing a bit from drive 1 with a bit from drive 2 and storing the result on drive 3. After a failed drive is replaced, the RAID controller rebuilds the lost data from the other two drives. RAID systems often have a "hot" spare drive ready and waiting to replace a drive that fails.

parity group

RAID groups can contain one or more parity groups. You can think of the RAID group as the actual RAID container for data protection, and the parity group as a partition of that container. Using parity groups, multiple logical units can be created from each RAID group, and ported out to the same or different servers. This allows granularity in logical unit sizes being obtained from the RAID group.

If each partition (parity group) is assigned to the same server, there should be no contention for the RAID group's disk resources. You can use the entire RAID group as one parity group and create one large logical unit.

pool

A set of volumes that is reserved for storing Copy-on-Write Snapshot data or Dynamic Thin Provisioning write data.

R

RAID

redundant array of independent disks

A collection of two or more disk drives that presents the image of a single logical disk drive to the system. Part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. In the event of a single device failure, the data can be read or regenerated from the other disk drives.

RAID employs the technique of disk striping, which involves partitioning each drive's storage space into units ranging from a sector (512 bytes) up to several megabytes. The stripes of all the disks are interleaved and addressed in order.

S

Secure Sockets Layer (SSL)

A common protocol for managing the security of message transmission over the Internet.

Two SSL-enabled peers use their private and public keys to establish a secure communication session, with each peer encrypting transmitted data with a randomly generated and agreed-upon symmetric key.

self-signed certificate

A digital identity certificate signed by the person who created it, rather than a trusted certificate authority.

service level agreement

An agreement that specifies what service is provided and how it is supported, and the responsibilities of the parties involved. These parties may be storage administrators (who provide storage) and their clients (application administrators who request storage).

service level objective

A stated level of availability, serviceability, performance, operation, or other attributes of a service (for example, billing and penalties for violations).

SLOs are intended as operational guidelines for the implementation of the service negotiated under a service level agreement (SLA). SLOs comprise SLAs containing service parameters and goals.

SLA

See service level agreement.

SLO

See service level objective.

SMI-S

Storage Networking Industry Association (SNIA)’s Storage Management Initiative Specification.

SNIA

Storage Networking Industry Association

SPARC

Scalable Processor Architecture. A reduced instruction set computer (RISC) architecture developed by Sun Microsystems and used in the Sun workstation family.

SQL

Structured Query Language used to communicate with a database.

SSL

See Secure Sockets Layer.

storage system

The Hitachi enterprise storage box for the Hitachi Universal Storage Platform (USP, USP-V, USP-VM), Hitachi Unified Storage and the Network Storage Controller (NSC).

T

tier

A user-friendly descriptor that summarizes the type of storage hardware on which a logical volume resides. Typical storage hardware characteristics that are referred to by a tier are: disk speed, disk capacity, disk type (for example, FC, SCSI), RAID level, storage system model, virtualization level (for example, internal vs. external), and pool type (if relevant). All volumes that share the characteristics summarized by the tier are annotated with that tier's name.

V

virtual machine

One instance of an operating system along with one or more applications running in an isolated partition within the computer. A VM enables different operating systems to run in the same computer at the same time as well as prevents applications from interfering with each other. All virtual machines run simultaneously.

VM

See virtual machine.

volume (vol or VOL)

A name for the logical device (LDEV), or logical unit (LU), or concatenated LDEVs, that are created in a storage system that have been defined to one or more hosts as a single data storage unit.

W

WWN

World wide name. A unique identifier for an open systems host. It is typically a node name that is a 64-bit address assigned to HBAs (host bus adapters) or storage system ports that define the endpoints of a Fibre Channel connection between storage and hosts for purposes of volume input/output.

WWN is essential for defining the SANtinel™ parameters because it determines whether the open systems host is to be allowed or denied access to a specified logical unit or a group of logical units.

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Hitachi Data Systems

Corporate Headquarters
2845 Lafayette Street
Santa Clara, California 95050-2639
U.S.A.
www.hds.com

Regional Contact Information

Americas
+1 408 970 1000
info@hds.com

Europe, Middle East, and Africa
+44 (0) 1753 618000
info.emea@hds.com

Asia Pacific
+852 3189 7900
hds.marketing.apac@hds.com

Hitachi Data Systems

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