HITACHI
DATA SYSTEMS

HiCommand® Global Link Availability Manager User's Guide

MK-95HC106-00

Trademarks

HiCommand Global Link Availability Manager includes the RSA BSAFE software of RSA Security Inc. BSAFE is a registered trademark of RSA Security Inc.

This product includes software developed by the Apache Software Foundation (http://www.apache.org/).

This product includes software developed by Ben Laurie for use in the Apache-SSL HTTP server project.

This product includes software developed by Ralf S. Engelschall <rse@engelschall.com> for use in the mod_ssl project (http://www.modssl.org/).

This product includes software developed by Greg Stein <gstein@lyra.org> for use in the mod_dav module for Apache (http://www.webdav.org/mod_dav/).

This product includes software developed by the JDOM Project (http://www.jdom.org/).

All other brand or product names are or may be trademarks or service marks of and are used to identify products or services of their respective owners.

Notice of Export Controls

Export of technical data contained in this document may require an export license from the United States government and/or the government of Japan. Please contact the Hitachi Data Systems Legal Department for any export compliance questions.

Document Revision Level

Revision	Date	Description
MK-95HC106-00	April 2006	Initial Release

Preface

This manual provides an overview of HiCommand® Global Link Availability Manager (abbreviated hereafter as HGLAM), and describes how to use its graphical user interface.

This manual is intended for system administrators who use HGLAM to perform the integrated management of hosts on which HiCommand Dynamic Link Manager has been installed, for the operation and management of storage subsystems. It is assumed that the reader is familiar with the following functions:

- HiCommand Dynamic Link Manager management functions
- Storage subsystem management functions

Note: The use of the HiCommand® Global Link Availability Manager and all other Hitachi Data Systems products is governed by the terms of your agreement(s) with Hitachi Data Systems.

Software Version

This document revision applies to HiCommand® Global Link Availability Manager version 5.0 and higher.

Convention for Storage Capacity Values

Storage capacity values displayed by HiCommand® Global Link Availability Manager are calculated based on the following values:

1 KB (kilobyte) = 1,024 bytes
1 MB (megabyte) = $1,024^2$ bytes
1 GB (gigabyte) = $1,024^3$ bytes
1 TB (terabyte) = $1,024^4$ bytes

Referenced Documents

- *HiCommand® Global Link Availability Manager Installation and Administration Guide*, MK-95HC107
- *HiCommand® Global Link Availability Manager Messages*, MK-95HC108
- *HiCommand® Tuning Manager Server Administration Guide*, MK-92HC021
- *HiCommand® Tuning Manager User's Guide*, MK-92HC022

When HDLM version 5.8 or later is installed on the host:

- *HiCommand® Dynamic Link Manager User's Guide for AIX®*, MK-92DLM111
- *HiCommand® Dynamic Link Manager User's Guide for Solaris™*, MK-92DLM114
- *HiCommand® Dynamic Link Manager User's Guide for HP-UX®*, MK-92DLM112
- *HiCommand® Dynamic Link Manager User's Guide for Linux®*, MK-92DLM113
- *HiCommand® Dynamic Link Manager User's Guide for Windows®*, MK-92DLM129

When the version of HDLM installed on the host is earlier than 5.8, titles of the documents above start with "Hitachi" rather than "HiCommand," but the document numbers are unchanged.

Readme and Release Notes Contents

These files can be found on the installation CD. They contain requirements and notes for use of HiCommand® Global Link Availability Manager that may not be fully described in the manual. Be sure to review these files before installing HiCommand® Global Link Availability Manager.

Comments

Please send us your comments on this document. Make sure to include the document title, number, and revision. Please refer to specific section(s) and paragraph(s) whenever possible.

- **E-mail:** doc.comments@hds.com
- **Fax:** 858-695-1186
- **Mail:**
  Technical Writing, M/S 35-10
  Hitachi Data Systems
  10277 Scripps Ranch Blvd.
  San Diego, CA 92131

Thank you! (All comments become the property of Hitachi Data Systems Corporation.)

Contents

List of Figures

List of Tables

Chapter 1 HGLAM Overview

This chapter provides information you need to understand before using HGLAM: for example, the chapter provides an overview of the HGLAM system and explains key terms. Read this chapter before operating HGLAM.

- About HGLAM (section 1.1)
- Introduction to HGLAM Functions (section 1.2)
- Definition of HGLAM Terms (section 1.3)

1.1 About HGLAM

HGLAM uses HDLM path control functionality to provide integrated path management for large-sized system configurations. Using HGLAM you can collectively manage hosts managed individually by HDLM.

When you use a large-sized system configuration containing many hosts, the workload for managing paths from each host grows in proportion to the size of the system. HGLAM enables you to reduce the workload by providing unified management of the path information for multiple hosts. HGLAM also helps you to improve system reliability, by switching path statuses while taking into account the balancing of workloads in the whole system, by enabling the reporting of error information (alerts) from each host, and by enabling you to quickly solve problems.

HGLAM collects information about paths from multiple HDLM-installed hosts, and the HGLAM server collectively manages this information. Collected information can be viewed or controlled by multiple users who manage the hosts from client machines. The following figure shows an example of an HGLAM system configuration:

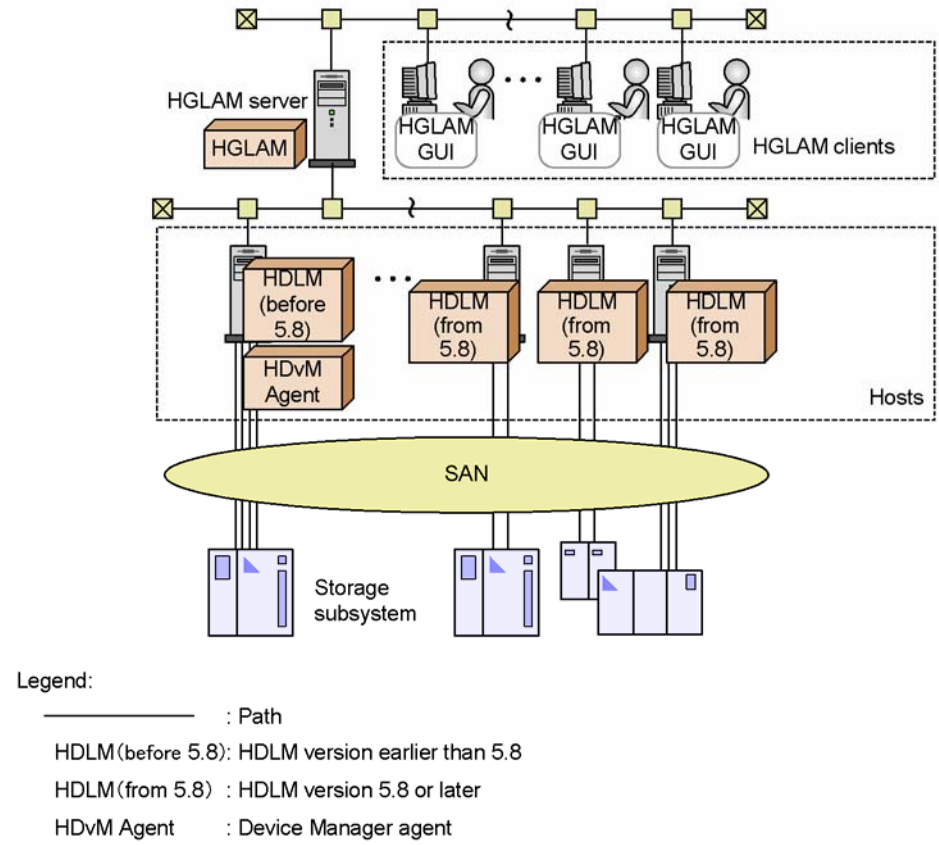


Figure 1.1 Example of an HGLAM System Configuration

The following table lists the components that make up the HGLAM system.

Table 1.1 HGLAM System Components

Component	Description
HGLAM server	A management server on which HGLAM has been installed.
HGLAM client	A client used to run HGLAM. The HGLAM GUI is used via a Web browser to run an HGLAM client.
Host	A host on which HDLM is installed and that is managed by HGLAM. Functions are executed by operating a remote HDLM from HGLAM. For HDLM versions earlier than 5.8, a Device Manager agent is required to operate HDLM from HGLAM.

For details about the system requirements, such as supported OSs on the HGLAM servers and the HGLAM clients, and prerequisite programs on the hosts, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

1.2 Introduction to HGLAM Functions

This section describes the functions of HGLAM.

Collectively Manages Path Information of Multiple Hosts

By remote operations using the HGLAM GUI, you can collectively set up multiple hosts and collect information from HDLM on multiple hosts. Operations can be managed from one console without having to log in to each host.

Since multiple hosts can be managed collectively, the user can view the path information for hosts, HBA ports, storage subsystems, CHA ports, or by path status.

Summarizes the Path Statuses for the Whole System

HGLAM can also display a summary of path statuses (the number of paths in each status).

The user can easily check path statuses for the whole system without having to check the status of each host.

Supports Path Bandwidth Control

HGLAM enables you to specify the format for viewing path information, such as by storage subsystem or by CHA port. You can also use HGLAM to adjust the bandwidth of paths (the actual number of online paths) among multiple user applications or hosts.

Collectively Manages the Error Information from Multiple Hosts

To quickly detect errors that occur on many hosts and take appropriate action, you need to set up the environment so that it informs you of the error cause and location. You can set up HGLAM to send an alert when the HDLM on any host detects an error, thereby facilitating central management of error information.

1.3 Definition of HGLAM Terms

This section defines terms that the user must be familiar with to run HGLAM.

Resource

Indicates hosts managed by HGLAM or storage subsystems connected to the hosts. When you use the HGLAM GUI to add a host, you can view information about that host's paths and connected storage subsystems from HGLAM.

Resource Group

Indicates a group of resources that are grouped by task or other criteria and associated with users to limit the range of resources accessed by users. A user can be associated with multiple resource groups, but a resource cannot belong to multiple resource groups.

User Types and Permissions

Two different types of users operate HGLAM are described in the following table.

Table 1.2 User Types

User Type	Description
User management	A user who manages all users common to all HiCommand products. This type of user can specify settings for user IDs and specify permissions for HGLAM users.
HGLAM management	A user who manages HGLAM resources and information that belongs to those resources, such as paths.

The following table describes the permissions for each user type.

Table 1.3 User Permissions

User Type	Permission	Description
User management	Admin	This permission enables a user to log in to all HiCommand products and to set up the users common to all HiCommand products.
HGLAM management	Admin	This permission enables a user to access to all HGLAM resources and execute all tasks other than those for user management.
	Modify	This permission enables a user to manage resources and paths within the resource set by a user who has the Admin (HGLAM management) permission.
	View	This permission enables a user to view resources and paths within the resource set by a user who has the Admin (HGLAM management) permission.

In the initial status, a built-in account, which can manage all users and products, is prepared. The user ID for a built-in account is always `System`, and this user ID (and permissions) cannot be deleted or changed.

By default, a user who has the Admin (user management) permission (other than the built-in account with the user ID `System`), cannot perform any HGLAM operations other than those for user management. Only the built-in account user `System` can perform such operations. To use HGLAM, the user must specify the desired HGLAM management permission.

Access Control by Using Resource Groups and User Permissions

HGLAM controls user access by using user permissions to limit user operations, and by using resource groups to limit the range of operations.

After a user who has the Admin (user management) permission sets up users who use HGLAM, users who have the Admin (HGLAM management) permission (which allows access to all resources) manage the resource groups. A user who has permissions other than the Admin (HGLAM management) permission can use the GUI provided to view only the hosts within an associated resource group, as well as the paths belonging to them and the connected storage subsystems, and operate them according to their user permissions.

The following figure shows an example of the relationship between resource groups and user permissions.

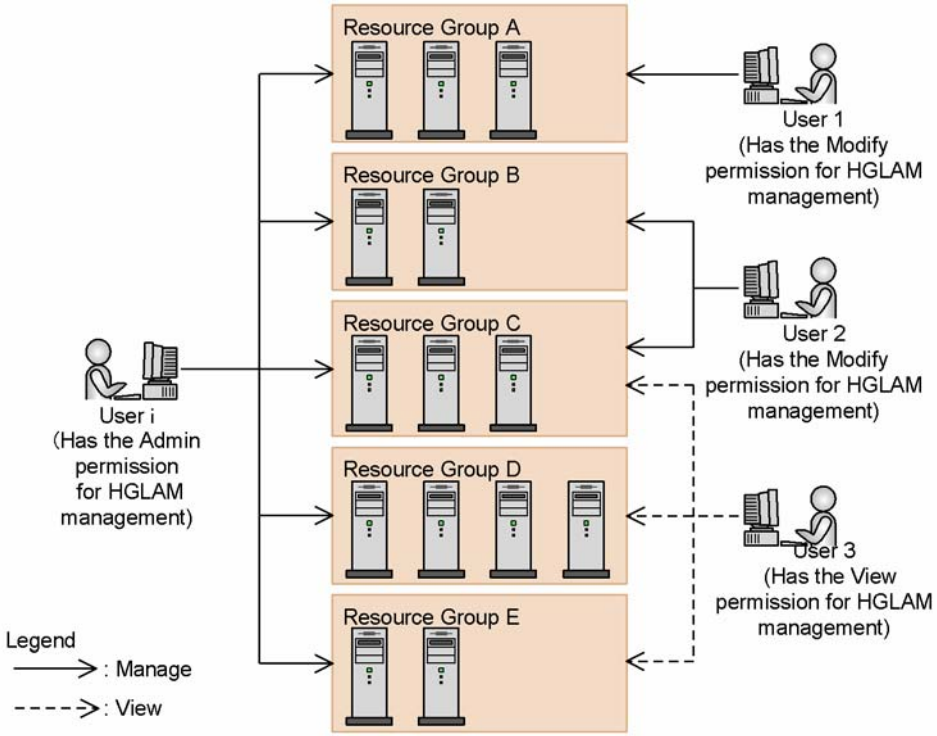


Figure 1.2 Relationship between Resource Groups and User Permissions

Host Group

A host group is a group of HGLAM-managed hosts that is created according to the user's goals and desired tasks. To simplify management of multiple hosts and paths, each user classifies the managed hosts into the desired groups and performs user-specific management.

All users who can perform HGLAM management can set up host groups for hosts in the resource group that they are associated with, regardless of their permissions. Also, host groups can be layered in a hierarchical structure, and a single host can belong to multiple host groups.

The following figure shows an overview of host groups.

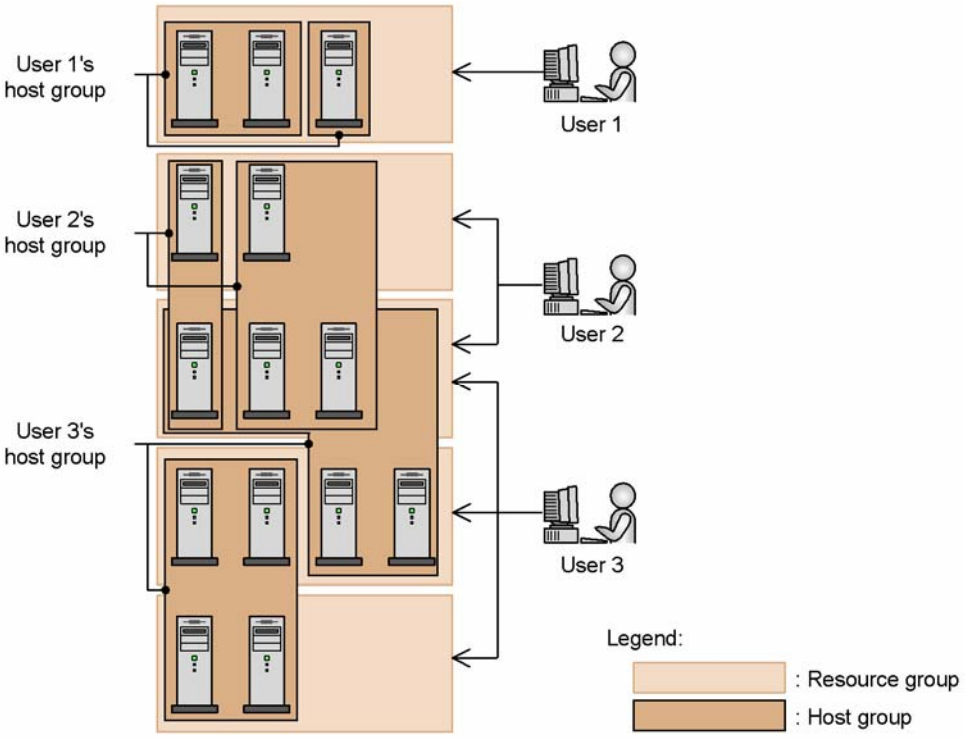


Figure 1.3 Overview of Host Groups

Path status

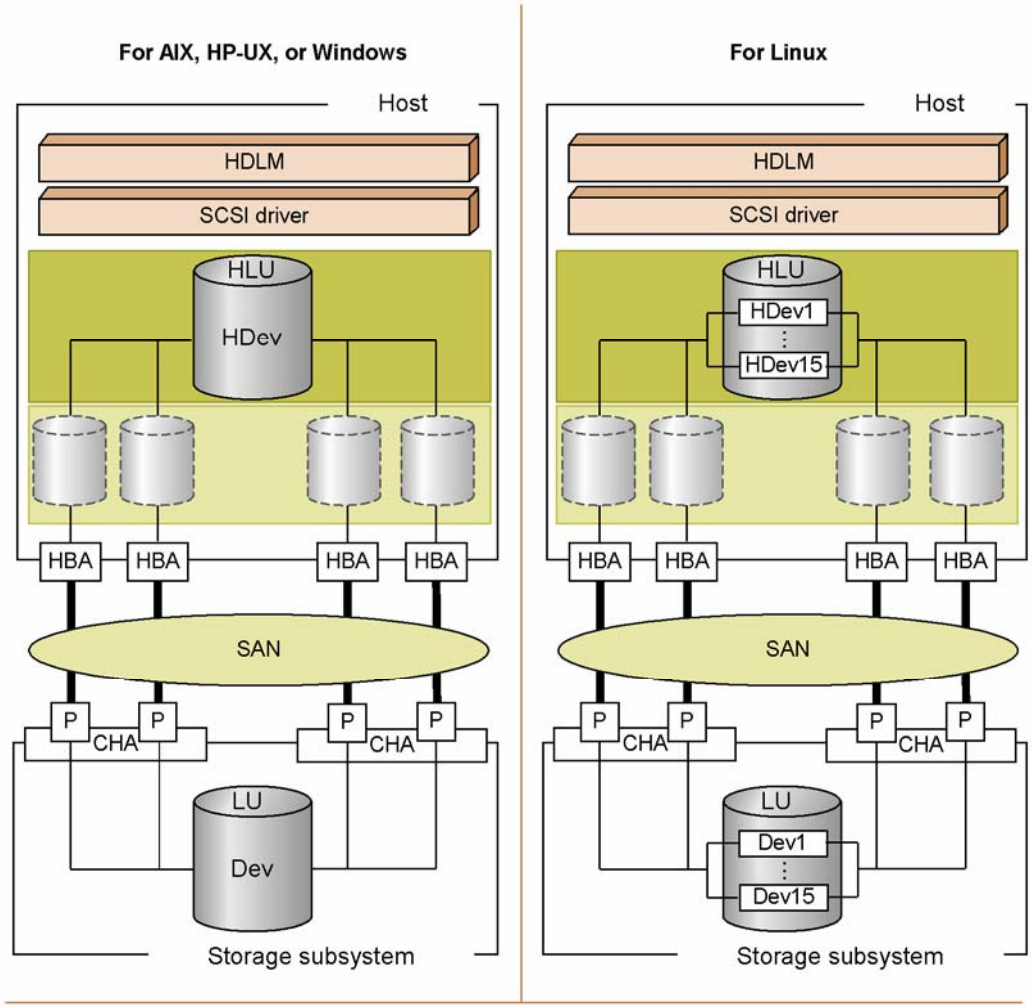
The following table describes the types of path statuses managed by HGLAM.

Table 1.4 Types of Path Statuses

Path Status	Description
Online	This status enables I/Os to be issued normally. Users can perform offline operations on a path that has the Online status. When the host OS is Windows and the host is in a cluster configuration, this status includes paths that have the Online(P) status (a path connected to an LU in reserve processing, and waiting for execution of offline processing).
Offline(C)	A path that is in an offline state due to an offline operation on the path. Users can perform online operations on a path that has the Offline(C) status.
Offline(E)	A path that is in an offline state because the host's HDLM has detected an error. Users can perform offline operations or (after error recovery) online operations on a path that has the Offline(E) status. If HDLM's automatic failback function is enabled, the path automatically returns to the Online status after error recovery is confirmed. When the host OS is Windows and the host is in a cluster configuration, this status includes paths that have the Offline(P) status (a path connected to an LU in reserve processing, and waiting for execution of offline processing).
Online(E)	A path is in an offline state because the host's HDLM has detected an error on all paths for the same logical unit (LU). In this case, one of the paths is assigned the Online(E) status, and the other paths are assigned the Offline(E) status. While an error continues to occur, the status for paths accessing the same LU change between Online(E) and Offline(E), always keeping only one path in the Online(E) status (a path is not fixed to the Online(E) status for paths accessing the same LU). After error recovery, the user can perform online operations on the path that has the Online(E) status. If the automatic failback function of HDLM is enabled, the path automatically returns to the Online status after error recovery is confirmed. When the host OS is Windows and the host is in a cluster configuration, this status includes paths that have the Online(EP) status (a path connected to an LU in reserve processing, and waiting for execution of offline processing).

HDLM System Components

Figure 1.4 shows the HDLM system components installed on a host for each host OS.



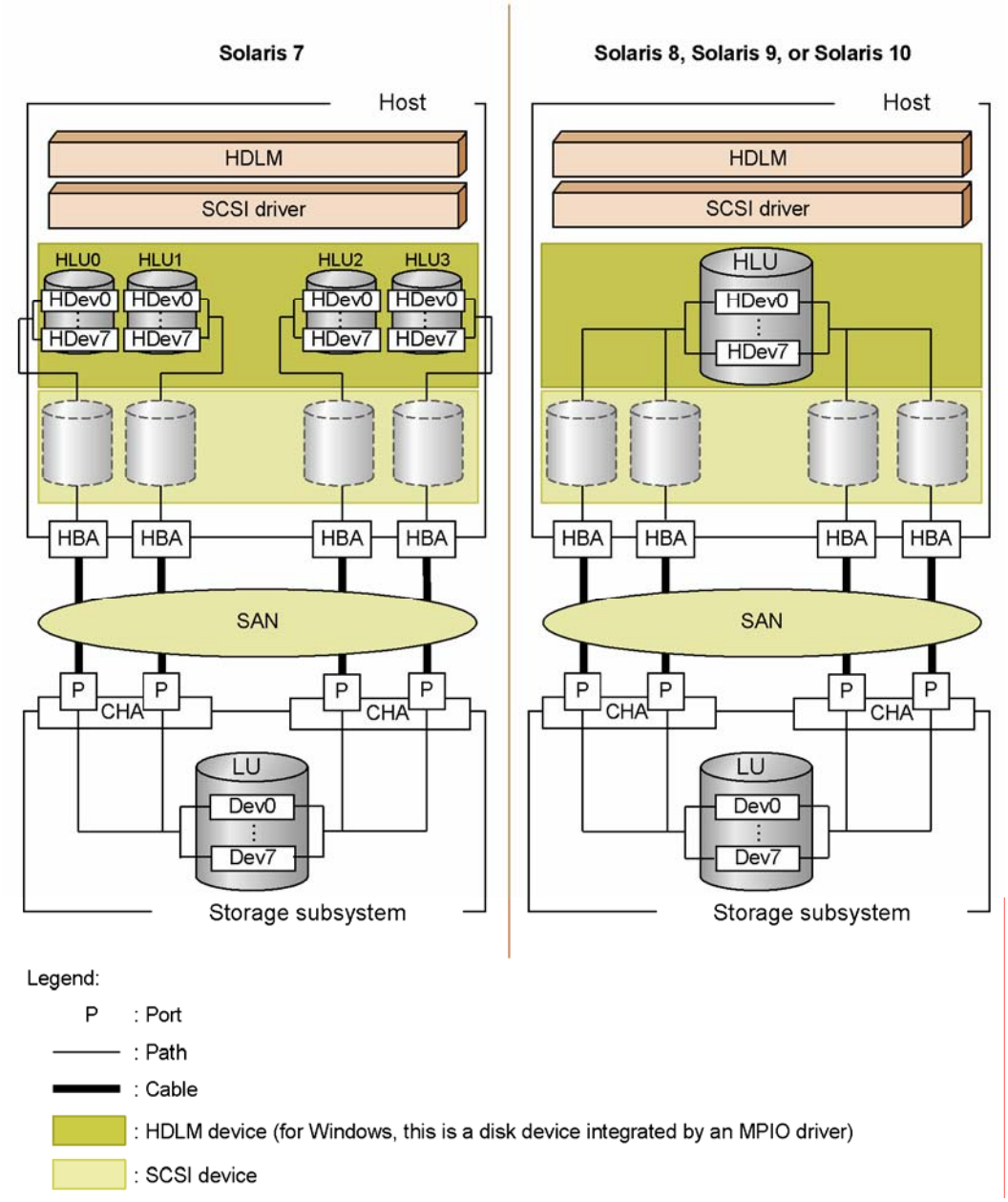


Figure 1.4 HDLM System Components (for Each Host OS)

The following table describes the components that make up the HDLM system.

Table 1.5 HDLM System Components

Component	Description
HLU	An LU recognized by the host via HDLM. One HLU is recognized for each LU on the storage subsystem. If the host OS is Solaris 7, multiple HLUs are recognized because an HDLM device that has a 1-to-1 correspondence with the SCSI device is created.
HDev	A Dev in the LU that is recognized by the host via HDLM. If the host OS is Linux or Solaris, HDev is the division unit for each partition (slice). However, if the host OS is Linux, Solaris 8, Solaris 9, or Solaris10, partition (slice) numbers are removed from the HDev names, so only one HDev is displayed for an HLU in the list of HDevs in the HGLAM GUI. If the host OS is Solaris 7, the name of the HDev that has an owner path and has the smallest instance number is displayed without the slice number, among the multiple hosts corresponding to the same LU. Therefore, regardless of the specifications for each host OS, one HDev is displayed for each LU in the list of HDevs in the HGLAM GUI.
HBA	An interface device that connects a host to external devices. When a host and storage device are connected by SCSI or Fibre Channel, the HBA is the interface card installed on the host. In this manual, the term HBA is also used to refer to an iSCSI HBA and network interface card, which are used when the host OS is Windows and the host is in an IP-SAN configuration.
SAN	A dedicated network used for data transfer by the host machine and storage subsystem.
CHA	An adapter for controlling a storage subsystem channel.
LU	A logical unit (logical volume defined by the storage subsystem). An LU is the target of a host's I/O operations.
Dev	An area in the LU. If the host OS is Linux or Solaris, this is the division unit for each partition (slice).
Path	A path that connects a host to a storage subsystem for data I/Os. If the host OS is Linux or Solaris, there are as many paths as partitions (slices). However, if the host OS is Linux, Solaris 8, Solaris 9, or Solaris 10, path IDs are assigned only to as many physical paths as LUs recognized by a SCSI driver. In Error! Reference source not found., four paths are displayed for each HGLAM GUI. If the host OS is Solaris 7, although path IDs are assigned for each slice, only the minimum required path information (as many paths as physical paths) is displayed in the HGLAM GUI. In Error! Reference source not found., four paths are displayed.

Chapter 2 Using HGLAM

This chapter describes the flow for the management of paths set between hosts and storage subsystems. This chapter also describes the HGLAM GUI functions used for running HGLAM and how to use those functions. For details about each item displayed in the HGLAM GUI, see HGLAM Help.

- HGLAM Operation Overview (section 2.1)
- Viewing Path Information Using HGLAM (section 2.2)
- Managing Paths for Optimal I/O Performance Using HGLAM (section 2.3)
- Handling Path Errors Using HGLAM (section 2.4)
- Managing HGLAM User Profiles (section 2.5)
- Managing Hosts Using HGLAM (section 2.6)
- Managing Host Groups Using HGLAM (section 2.7)
- Managing Paths Using HGLAM (section 2.8)
- Managing Alerts Using HGLAM (section 2.9)
- Exporting Managing Information to CSV (section 2.10)

2.1 HGLAM Operation Overview

This section describes the overall flow of tasks for HGLAM, from setup to operations. Also, the settings necessary to start the operations and the procedures for logging in HGLAM are described.

The following figure shows the flow of tasks for operating HGLAM.

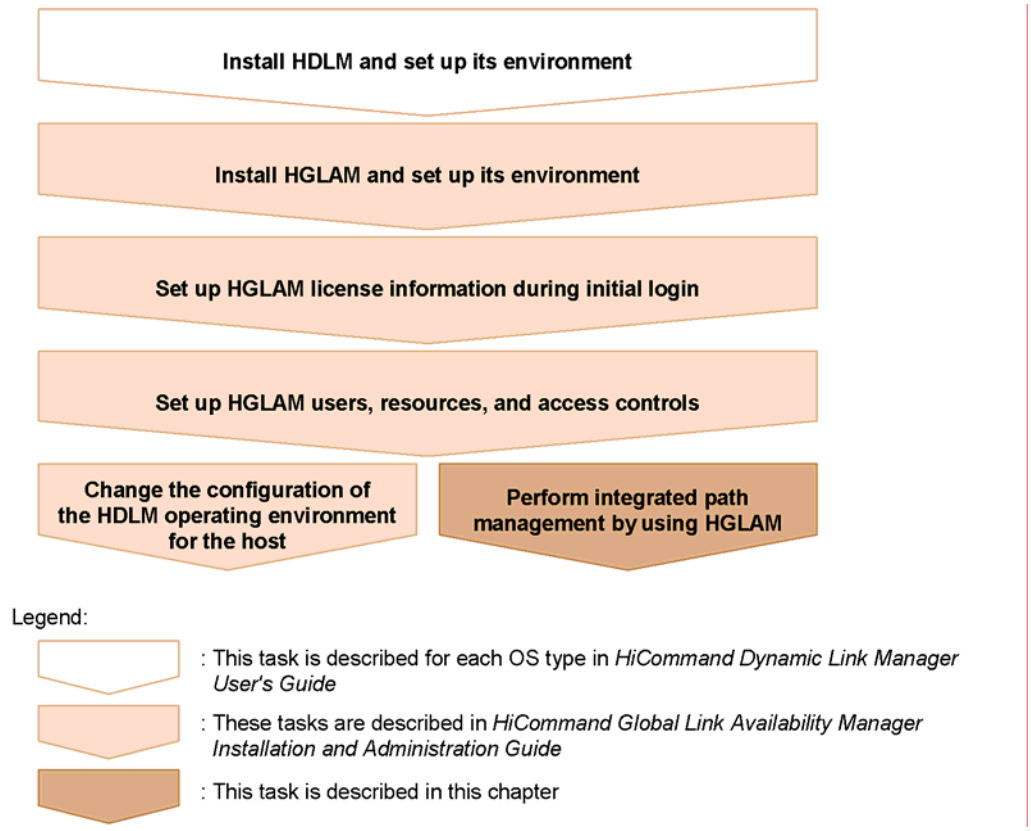


Figure 2.1 Flow of HGLAM Tasks

Installing HDLM and setting up its environment

Set up HDLM on all hosts that are managed, in an integrated way, by HGLAM. To use HGLAM to manage a host on which an HDLM version earlier than 5.8 is installed, a Device Manager agent is required. To manage an HDLM version 5.8 or later, you have to configure the settings for linking with HGLAM on all hosts.

For details about the procedures for installation and environment setup of HDLM at each host, see the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS. For details about the procedure for installing a Device Manager agent, see the manual HiCommand Device Manager Agent Installation Guide.

For details about the requirements for installing HDLM and the Device Manager agent on a host, and the settings for a Device Manager agent and HDLM 5.8 or later, see the manual HiCommand Global Link Availability Manager Installation and Administration Guide.

Note: If you install the Device Manager agent or HDLM version 5.8 or later on a host whose OS is Windows Server 2003 (IPF) for which SP1 has not been installed, operations might become unstable while linking with HGLAM. To avoid this, we recommend that you first install SP1, and then install the Device Manager agent or HDLM version 5.8 or later.

Installing HGLAM and setting up its environment

Set up HGLAM and start the HGLAM server. For details about the installation and environment setup of the HGLAM server, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

Setting up HGLAM license information during initial login

After setting up HGLAM, in the HGLAM GUI specify the initial license. For details about how to specify the initial license, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

Setting up HGLAM users, resources, and access controls

To run HGLAM, you must first specify its users and resources. For details about initial HGLAM settings, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

Changing the configuration of the HDLM operating environment for a host

If necessary, upgrade the HDLM version on the host and change the LU configuration of the storage subsystem. For details about the procedure on how to change the configuration of the HDLM operating environment, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

Performing integrated path management by using HGLAM

Perform integrated management of paths set between the host and storage subsystem. Using HGLAM, you can perform the following operations:

- View paths from a desired viewpoint
- Use load distribution to optimize path I/O
- Handle path errors

For details about the procedure for each of the above operations, see 2.2, 2.3, and 2.4 respectively.

2.1.1 Configuring a Web Browser to Use the HGLAM GUI

You can operate HGLAM through the HGLAM GUI by using a Web browser. To use the HGLAM GUI, the following setup is required for the Web browser:

Configuring a browser when pop-up blocking is enabled

When pop-up blocking is enabled for a Web browser, configure the browser so that pop-ups of the HGLAM server are not blocked.

You can configure this in either of the following ways:

- In Internet Explorer, choose **Tools**, and then **Internet Options**. In the Internet Options dialog box, choose the **Security** tabbed-page, and then add the URL for the HGLAM server to **Trusted Sites**.

  Enter the URL in the following format:

  ```
  http://IP-address-of-the-HGLAM-server:port-number-for-HBase
  Storage-Mgmt-Web-Service-of-the-HGLAM-server/GlobalLinkAvailabilityManager/
  ```

  Example for non-SSL:

  ```
  http://127.0.0.1:23015/GlobalLinkAvailabilityManager/
  ```

  Example for SSL:

  ```
  https://127.0.0.1:23016/GlobalLinkAvailabilityManager/
  ```

- When a pop-up is blocked and a warning message is displayed, select **Always Allow Pop-Ups From This Site**.

Configuring Internet Explorer security

For communication with the HGLAM server, check the security settings for the Web browser.

In Internet Explorer, choose **Tools**, and then **Internet Options**. In the Internet Options dialog box, choose **Custom Level** in the **Security** tabbed-page. In the Security Settings dialog box, make sure the following settings are configured:

- **Run ActiveX controls and plug-ins** is set to **Enable**.
- **Script ActiveX controls marked safe for scripting** is set to **Enable**.
- **Active scripting** is set to **Enable**.
- **Launching programs and files in an IFRAME** is set to **Prompt** or **Enable**.
- **Submit non-encrypted form data** is set to **Prompt** or **Enable**.

2.1.2 Logging In and Logging Out of HGLAM

For a user to log in to HGLAM, license setup and user registration for that user must have been performed after HGLAM server setup. For details about how to set up licenses and users, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

To log in:

1. In the Web browser's address bar, enter the login URL (`http://`*`IP-address-of-the-HGLAM-server`*`:`*`port-number-for-HBase Storage-Mgmt-Web-Service-of-the-HGLAM-server`*`/GlobalLinkAvailabilityManager/`).

   Example:

   `http://127.0.0.1:23015/GlobalLinkAvailabilityManager/`

   The Back To Login window appears.

2. Click the **Login** button.

   The User Login window appears.

3. Enter the user ID and password, and then click the **Login** button.

   The initial HGLAM GUI window appears.

To log out:

1. Click the **Logout** button, which is displayed in the HGLAM GUI window.

   The HGLAM GUI terminates, and you are logged out.

2.1.3 HGLAM GUI Overview

This section describes the organization of GUI windows used in HGLAM, and the functions of each component.

The following figure shows the organization of the HGLAM GUI window.

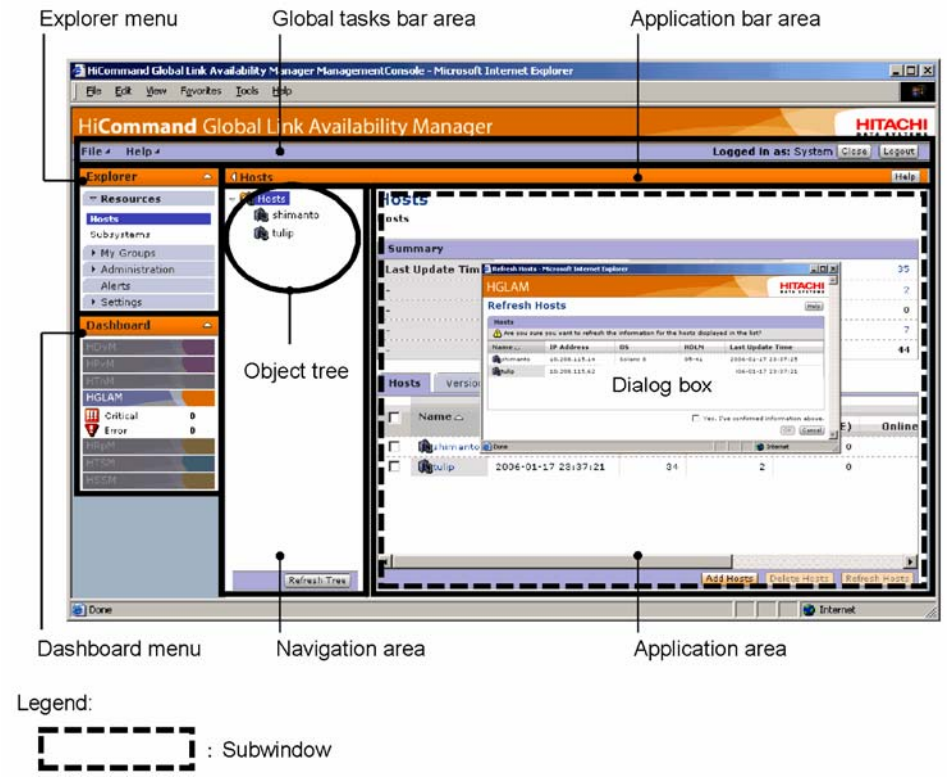


Figure 2.2 HGLAM GUI Window Organization

Global tasks bar area

Displays the function menus and action buttons used in HGLAM as well as information about the user who is logged in. In the global tasks bar area, the user can perform the following operations:

- Output the HGLAM management information to a CSV file
- Close a window
- Log out of HGLAM
- Launch an application from the registered link
- View Help
- View the version and license information

Explorer menu

Displays HGLAM task menu items. Choosing a menu item displays the corresponding information in the navigation and application areas.

Dashboard menu

Displays a list of HiCommand products. A product displayed in the active mode can be started by using the **Go** link. The number of unconfirmed alerts from among the alerts reported from the host being managed is displayed under HGLAM.

The refresh interval for the display in the Dashboard menu is specified by the gui.indicator.auto_refresh_interval property in the server.properties file of the HGLAM server. For details about this property, see the manual HiCommand Global Link Availability Manager Installation and Administration Guide.

Application bar area

Displays the name of the item selected in the **Explorer** menu and corresponding action buttons. You can use the application bar to change the navigation area's view/hide setting.

Navigation area

Displays, in a tree format, the objects that belong to the item selected in the **Explorer** menu. Clicking the **Refresh Tree** button refreshes the information in the navigation area and the application area.

Object tree

Displays objects in the navigation area, in a tree format. Expanding the object tree and choosing a desired object displays information about *object-name* in the application area.

Application area

Displays information corresponding to the object chosen from the object tree or the **Explorer** menu.

Subwindow

In this manual, a window displayed within the application area is called an *object-name* subwindow.

Dialog box

In this manual, a popup window displayed by clicking an action button is called an *action-name* dialog box.

Note: When you use the HGLAM GUI, note the following:

- In a dialog box that has tabbed-pages, the contents you entered in a tabbed-page are cleared when you change tabs. Complete an operation in a tabbed-page before changing tabs.
- When you close a dialog box, use the **Close** button in the HGLAM GUI. If you close a dialog box by another browser-operation, the results of operations performed in that dialog box will not be applied to the navigation area and application area at the time the dialog box is closed.
- When you are using a dialog box to import a file and have already specified the file name, be sure to clear the file name before you perform any other operation besides clicking the **OK** button in the dialog box. If you do not clear the file name before you perform any other operation besides clicking the **OK** button, the specified import file information is sent to the server one time and is then deleted.

2.2 Viewing Path Information Using HGLAM

HGLAM enables you to display (at once) all of the paths set between the hosts and storage subsystems, without having to log in to each HDLM-installed host. You can effectively manage the paths for multiple hosts from a single console, and reference paths from that console from various viewpoints (such as grouping information in units of hosts, HBA ports, storage subsystems, or CHA ports). The following figure shows an example of path management.

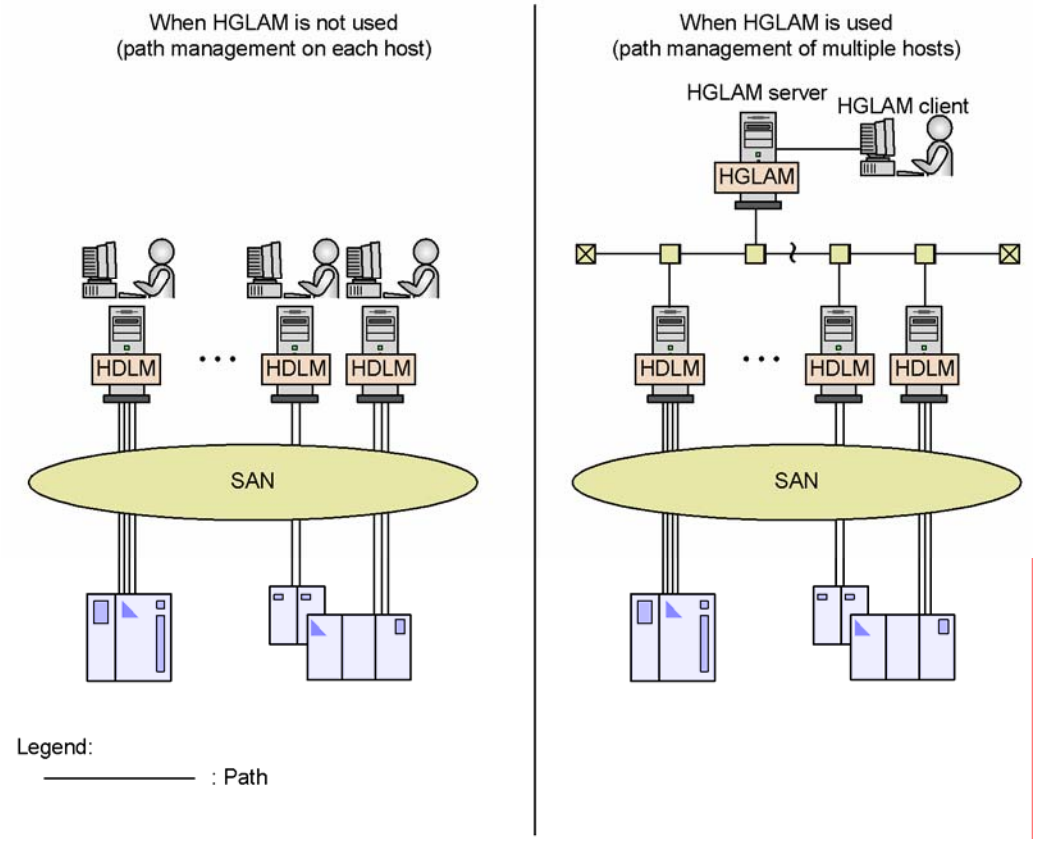


Figure 2.3 Path Management When HGLAM Is Used or Not Used

The following figure shows the flow of operations for viewing paths from a desired viewpoint.

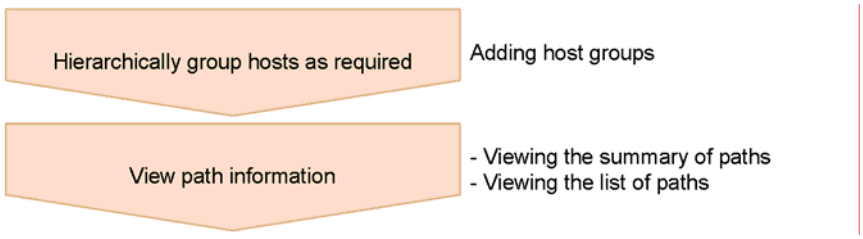


Figure 2.4 Flow of Operations for Viewing Paths from a Desired Viewpoint

Hierarchically grouping hosts as required

Management of hosts becomes easier when host groups are created to facilitate specific tasks and purposes. The hosts managed by each user can be grouped, and the host groups can be hierarchically organized. For details about how to create host groups, see 2.7.

Viewing path information

Paths can be displayed as a list of paths for all the hosts or summarized into their path statuses. Paths can be displayed in specific units (such as host units or HBA port units) so that the relevant paths can be placed offline and online when an error occurs or during hardware maintenance. For details about how to view paths, see 2.8.

2.3 Managing Paths for Optimal I/O Performance Using HGLAM

Typically, when paths connecting hosts and storage subsystems are managed, multiple paths are set for a single logical unit to distribute the workload, and the bandwidth is adjusted by pooling offline paths.

This section describes the procedure for controlling the path bandwidth, and describes load balancing for distributing the workload of paths.

2.3.1 Identifying I/O Bottlenecks and Controlling Path Bandwidth

The path bandwidth is controlled by setting up an available path by first making it redundant, switching the path to online or offline, and then increasing or reducing the path bandwidth. The following figure shows an example of controlling the path bandwidth.

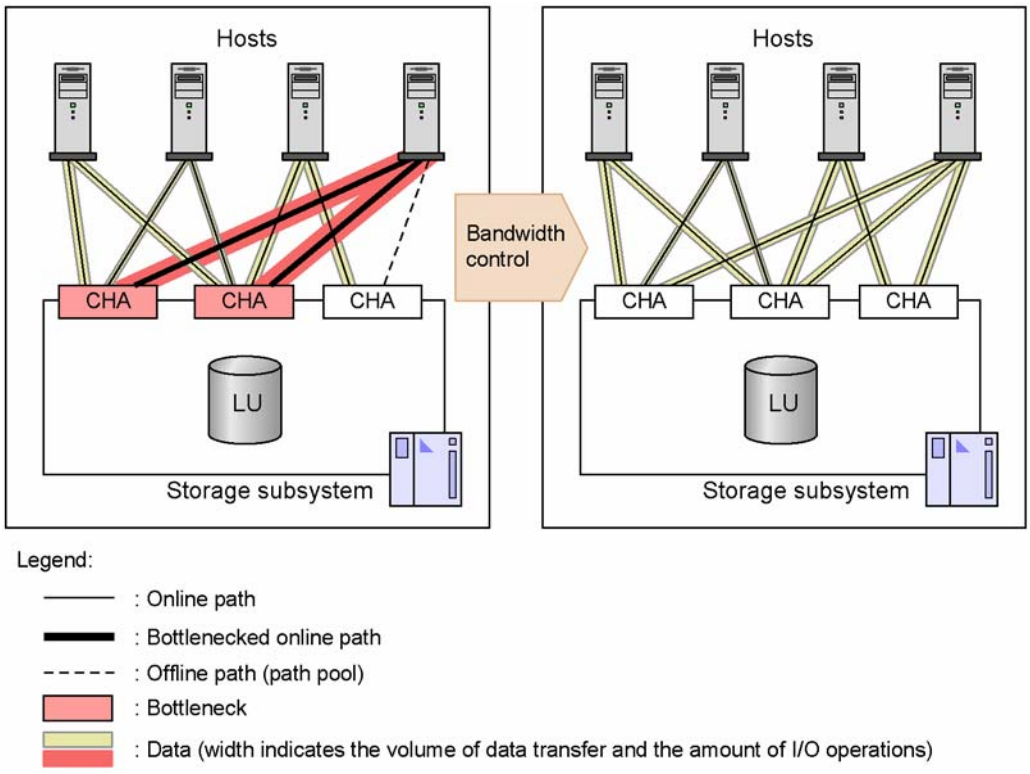


Figure 2.5 Example of Controlling the Path Bandwidth

The following figure shows the flow of operations for finding bottlenecks and controlling the path bandwidth.

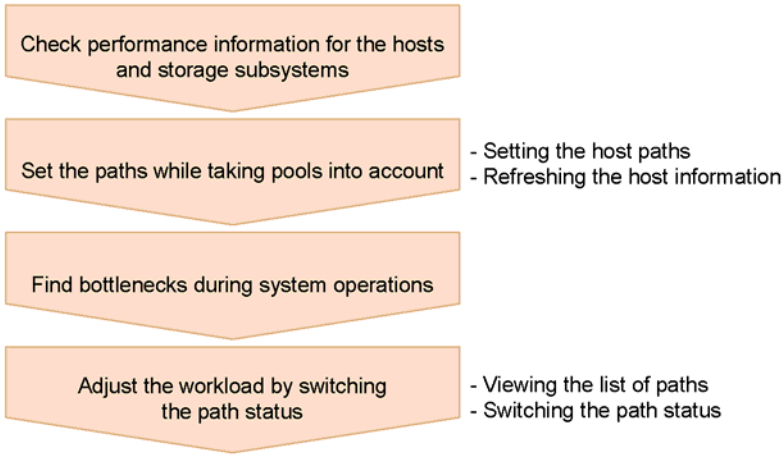


Figure 2.6 Flow of Operations for Finding Bottlenecks and Controlling Path Bandwidth

To explain how to determine whether bottlenecks exist during system operations, and how to locate them, this section introduces an example using Tuning Manager. Tuning Manager provides resource performance and capacity data so that the user can optimize use of various resources. You can use Tuning Manager to locate problems as well as prevent problems by executing the forecast function. For details about how to use Tuning Manager, see the manuals *HiCommand Tuning Manager Server Administration Guide* and *HiCommand Tuning Manager User's Guide*.

Checking performance information for hosts and storage subsystems

Using Tuning Manager, check the performance and capacity information, such as for hosts, file systems, and storage subsystem LUs.

Setting paths (while taking pools into account)

On the basis of the performance and capacity information for the connected storage subsystem and hosts, set up the paths, while taking the pools into account, so that the bandwidth can be adjusted.

To use HGLAM to manage paths, first you must use the host's HDLM to set LUs and their paths as management targets. For details about how to set these items using HDLM, see the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS.

To view the information set by HDLM in the HGLAM GUI, you must refresh the host information. For details about how to do this, see 2.6.3.

Finding bottlenecks during system operations

Use Tuning Manager to check information, such as the number of I/O operations at each storage subsystem port, and the transmission rate for read and write operations, and to find the location where the workload has increased (such as on paths and CHAs).

Adjusting the workload by switching the path status

To distribute the workloads of paths and eliminate bottlenecks, place paths online or offline as required. Use the HGLAM GUI to summarize the paths into an appropriately sorted list, such as in units of CHA ports or storage subsystems, and then switch the any desired path statuses. For details about how to view a list of paths, see 2.8.2; for details about how to switch a Path status, see 2.8.3.

To check the effect of switching the path status, use Tuning Manager again to view applicable information, such as the number of I/O operations and the transmission rate.

2.3.2 Distributing I/O Across Multiple Paths Using the Load Balancing Function

Use HDLM's load balancing function to automatically distribute the workload and use paths efficiently. Load balancing prevents performance degradation of the entire system, caused by the excessive concentration of the workload on a single path. The following figure shows an overview of the load balancing function.

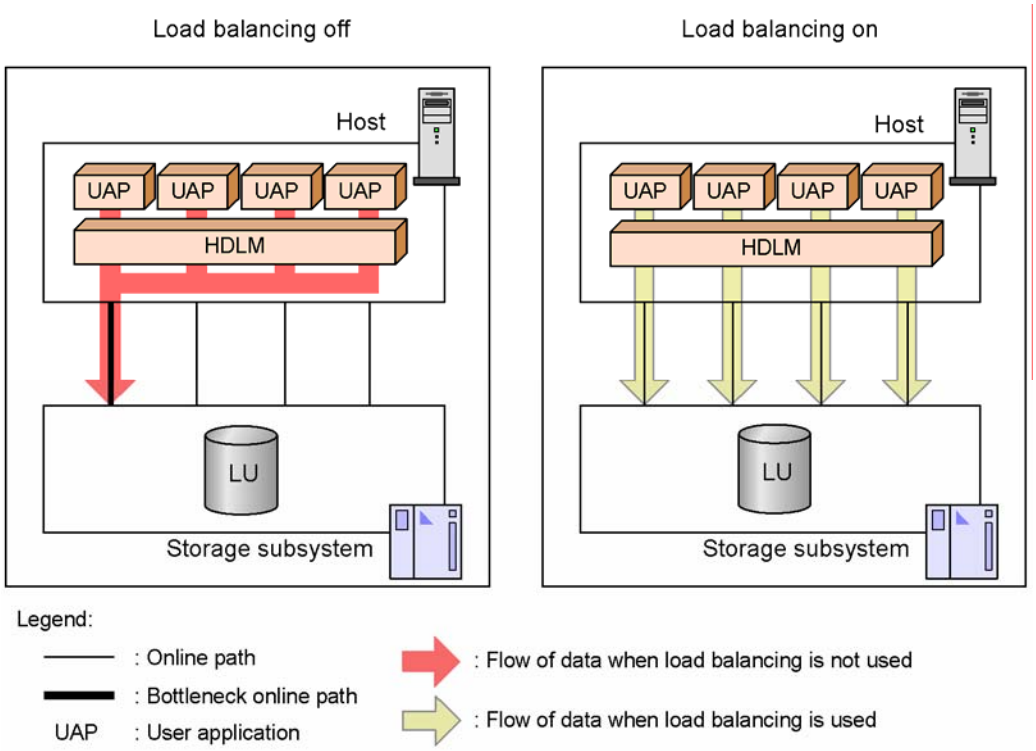


Figure 2.7 Overview of Load Balancing

For details about the requirements and processing method of load balancing, see *HDLM Functions* in the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS.

HGLAM enables you to configure the load balancing of paths in units of storage subsystem LUs as well in units of hosts. To use the HGLAM GUI to configure the load balancing for each host, see 2.6.5. To set the load balance for each LU, see 2.6.4.

2.4 Handling Path Errors Using HGLAM

If an error occurs on a path managed by HGLAM, SNMP Trap reports, as an alert to the HGLAM server, the information for the error detected by HDLM on each host. HGLAM can identify the host where the error occurred without having to check each host because HGLAM collectively manages error information for multiple hosts.

This section describes the flow of operations for handling path errors, and the functionality for automatically handling errors.

2.4.1 Identifying and Correcting Path Errors

The following figure shows the flow of operations for finding and handling errors on path managed by multiple hosts.

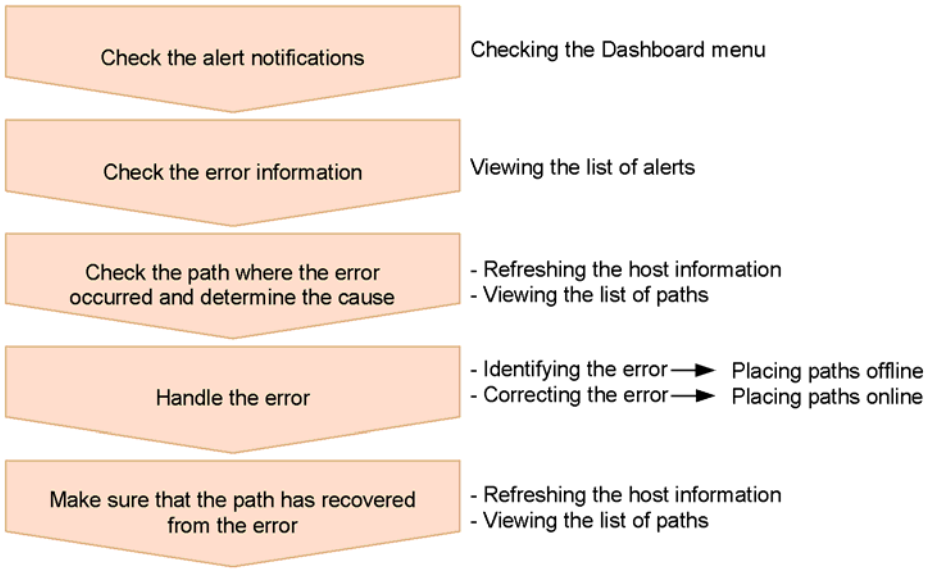


Figure 2.8 Flow of Operations for Finding and Handling Path Errors

Checking the alert notifications

In the **Dashboard** menu of the HGLAM GUI, make sure that the number of alerts displayed under **HGLAM** has been updated.

Checking the error information

Check the list of alerts for the reported error information to identify the host or path where the error occurred. For details about how to check alerts, see 2.9.

Checking the path where the error occurred and determining the cause

After updating the information for the host where the error was detected, determine the cause of the error by viewing the displayed path errors and corresponding error information in the list of paths. If intermittent error monitoring is enabled, a path that is believed to have caused an intermittent error is indicated by a blinking path icon in the list of paths. For details about the how to update host information, see 2.6.3. For details about how to view a list of paths, see 2.8.2.

Handling the error

Use a tool such as an OS or hardware management tool to locate the error and take appropriate action. For details about hardware maintenance, contact your hardware distributor or maintenance company if there is a maintenance contract.

To handle the error, place the paths offline as required. For example, if the cause of the error is a faulty HBA, place all paths to that HBA offline so the HBA can be replaced. After the error is corrected, place online all of the paths that were placed offline. For details about how to switch a Path status, see 2.8.3.

If error recovery requires replacement of a hardware component, you must reconfigure the HDLM operating environment after the replacement. For details about how to reconfigure the HDLM operating environment, see *Reconfiguring the HDLM Operating Environment* in the *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS.

Making sure that a path has recovered from an error

Refresh the information for the host for which the error was handled to make sure that the path is running normally. For details about how to refresh host information, see 2.6.3.

2.4.2 Path Failover

The failover function of HDLM places offline the path where an error occurs and automatically switches to a normal path, this allows data I/O operations to continue. If HDLM detects a Critical-level or Error-level path error, a failover is performed. The following figure shows an overview of the failover function.

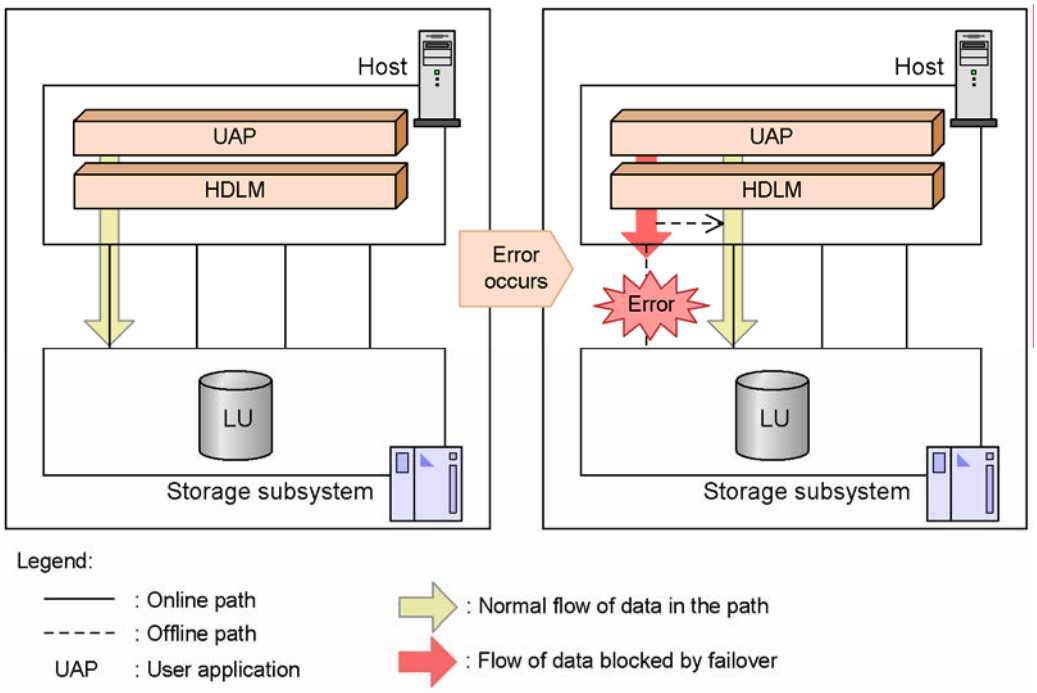


Figure 2.9 Overview of the Failover Function

For details about the requirements for the failover function and target path priorities, see *HDLM Functions* in the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS.

2.4.3 Path Failback

When the automatic failback function of HDLM is enabled and the recovery of a path for which a failover was performed due to an error is detected, the path is automatically returned to an online state. If the automatic failback function is not enabled, the path must be manually returned to online. The following figure shows an overview of the automatic failback function.

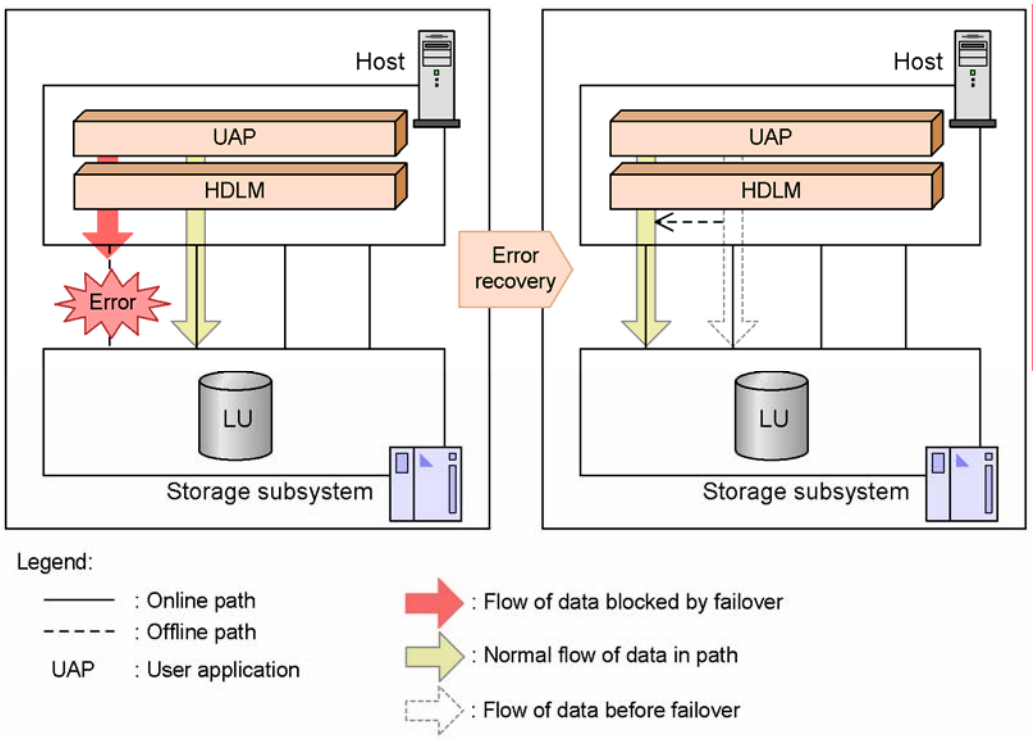


Figure 2.10 Overview of the Automatic Failback Function

For details about the requirements for the automatic failback function and target path priorities, see *HDLM Functions* in the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS. To use the HGLAM GUI to configure the automatic failback settings, see 2.6.5.

2.4.4 Path Health Check

When the path health checking function of HDLM is enabled, path statuses are checked at fixed intervals to detect errors, and then the path where an error occurs is placed offline. Normally, an error cannot be detected unless an I/O is issued because the path status is checked when the I/O is issued. However, when the path health checking function is enabled, the path statuses that are online are checked at fixed intervals regardless of whether I/Os are issued. The following figure shows an overview of the path health checking function.

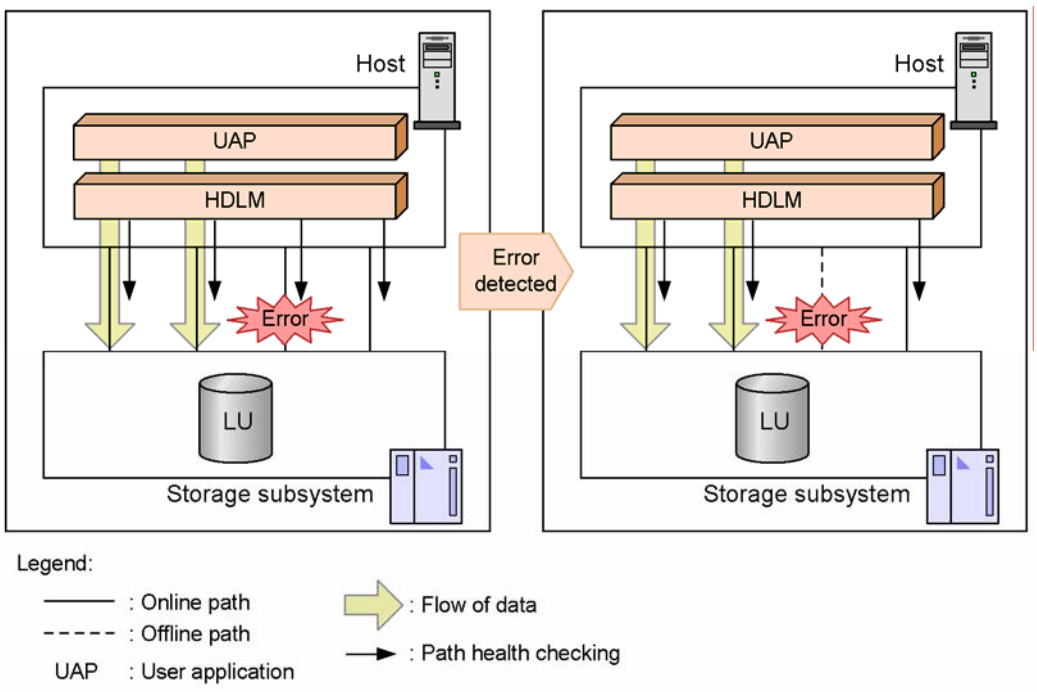


Figure 2.11 Overview of the Path Health Checking Function

For details about the requirements for the path health checking function, see *HDLM Functions* in the manual *HiCommand Dynamic Link Manager User's Guide* for the applicable host OS. To use the HGLAM GUI to configure the path health checking settings, see 2.6.5.

2.5 Managing HGLAM User Profiles

You can manage information about logged-in users.

This section describes the functions used for changing passwords and user information (other than user IDs) such as full names and email addresses for each user, and the procedures for such operations.

Explorer Menu Items for Managing User Profiles

The following table shows the **Explorer** menu items used for managing user profiles, and which HGLAM management permissions are required for operating these items.

Table 2.1 Explorer Menu Items Used for Managing User Profiles

Explorer Menu		Permissions		
Submenu	Command	Admin	Modify	View
Settings	User Profile	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding command

Functions for Managing User Profiles

The following table shows the functions for managing user profiles, and which HGLAM management permissions are required for operating these functions.

Table 2.2 List of Functions for Managing User Profiles

Functions	Permissions		
	Admin	Modify	View
Viewing a user profile	Y	Y	Y
Editing a user profile	Y	Y	Y
Changing a user's password	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding function

2.5.1 Viewing a User Profile

You can view information about logged-in users. This information includes:

- User information, such as their user ID and full name
- Information about permissions set for a user for each product

To view a user profile, in the **Explorer** menu, choose **Settings**, and then **User Profile**.

The User Profile subwindow appears. This subwindow displays information about the logged-in user.

2.5.2 Editing a User Profile

You can edit user information (except the user ID).

You can change the email address and add user descriptions. Only the logged-in user's own summarized information can be changed. Permission changes can be made from the **Explorer** menu only by users who have the user-management Admin permission.

To edit a user profile:

1. In the **Explorer** menu, choose **Settings**, and then **User Profile**.

   The User Profile subwindow appears.

2. Click the **Edit Profile** button.

   The Edit Profile - *user-ID* dialog box appears.

3. Edit the user information and apply the changes.

   Check the User Profile subwindow to make sure that the user information has been updated.

2.5.3 Changing a User's Password

You can change the login password.

The logged-in user can change their initial password that was set by a user who had the user-management Admin permission.

To change the password:

1. In the **Explorer** menu, choose **Settings**, and then **User Profile**.

   The User Profile subwindow appears.

2. Click the **Change Password** button.

   The Change Password - *user-ID* dialog box appears.

3. Change the password and apply the change.

   Next time you log in, use the new password.

2.6 Managing Hosts Using HGLAM

HGLAM provides integrated management of hosts, to control the paths between multiple hosts and storage subsystems.

This section explains the functions, and corresponding procedures, for managing hosts for the following purposes:

- Managing information for multiple hosts
- Determining which hosts are running an older version of HDLM, in order to upgrade the HDLM version installed on the hosts
- Configuring the host execution environment (HDevs configuration, HDLM environment configuration, alert configuration)

The following figure shows an overview of managing hosts.

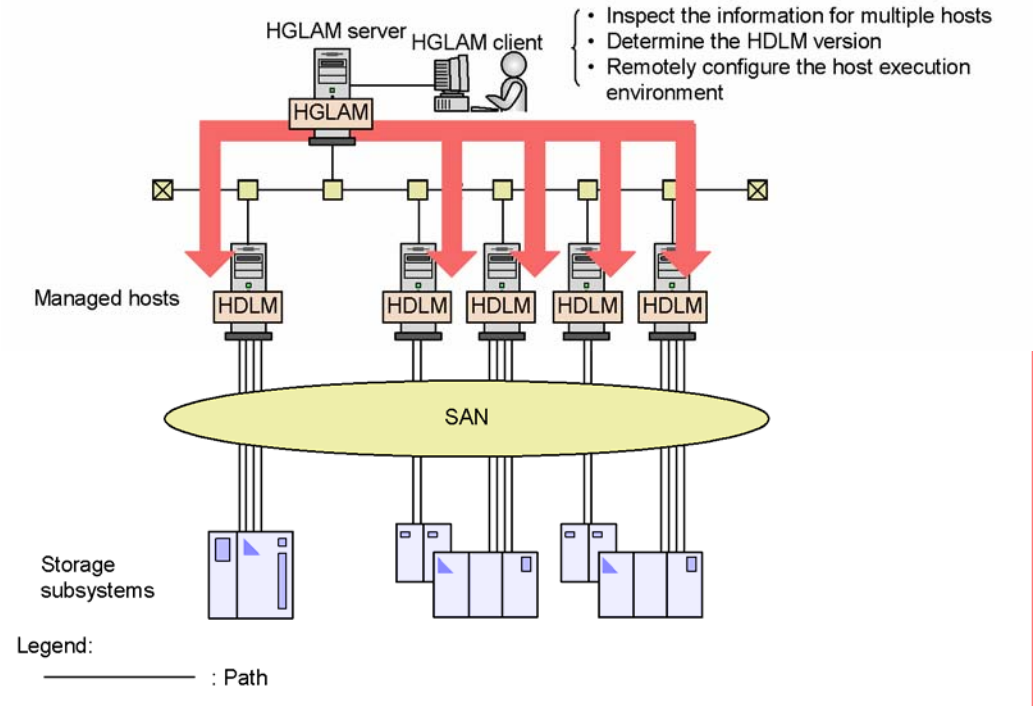


Figure 2.12 Overview of Managing Hosts

Explorer Menu Items for Managing Hosts

The following table shows the **Explorer** menu items used for managing hosts, and which HGLAM management permissions are required for operating these items.

Table 2.3 Explorer Menu Items Used for Managing Hosts

Explorer Menu		Permissions		
Submenu	Command	Admin	Modify	View
Resources	Hosts	Y	Y	Y
My Groups	Host Groups	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding command

Functions for Managing Hosts

The following table shows the functions for managing hosts, and which HGLAM management permissions are required for operating these functions.

Table 2.4 List of Functions for Managing Hosts

Functions	Permissions		
	Admin	Modify*	View*
Viewing a list of hosts	Y	Y	Y
Viewing individual host information	Y	Y	Y
Refreshing host information	Y	Y	—
Configuring load balancing at the LU (HDev configuration)	Y	Y	—
Configuring the HDLM operating environment for a host	Y	Y	—
Configuring alerts for a host	Y	Y	—

Legend:

Y: This permission allows execution of the corresponding function

—: This permission does not allow execution of the corresponding function

* Users who have the Modify or View permission can execute this function only for hosts in resource groups affiliated with that user.

2.6.1 Viewing a List of Hosts

You can view a list of information for all hosts for which you have access permissions. This information includes:

- Summarized information for all hosts (summarized information about the last update time and the number of paths in each path status)
- A list of hosts
- A summary of HDLM versions* (the number of hosts for each OS or kernel version)

* If the HDLM version of a host is 5.6 or later, the service pack version is also displayed. If the HDLM version of a host is earlier than 5.6, the service pack version is not displayed.

Viewing the information for multiple hosts enables understanding of the status of all managed hosts.

Furthermore, all hosts for which an HDLM version upgrade is to be performed can be identified. The HDLM version and OS or kernel version of all managed hosts can be browsed in table format to determine the number of hosts to be upgraded.

To view a list of hosts, in the **Explorer** menu, click **Resources**, and then choose **Hosts**.

The Hosts subwindow appears. This subwindow displays a list of hosts and corresponding information.

2.6.2 Viewing Individual Host Information

You can view information for each host. This information includes:

- Summarized information for the host (summarized information for the host, such as the host name and OS, HDLM version*, IP address, and the number of paths in each path status)
- A list of paths
- A list of HDevs
- A list of HBA ports
- HDLM environment configuration information
- Alert configuration information

* If the HDLM version of a host is 5.6 or later, the service pack version is also displayed. If the HDLM version of a host is earlier than 5.6, the service pack version is not displayed.

You can view host information from the **Resources** submenu or **My Groups** submenu. In cases such as when many hosts are to be managed, create host groups and allocate the hosts into appropriate groups. The **My Groups** submenu can then be used to easily find desired hosts.

To view host information:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears. This subwindow displays host information.

2.6.3 Refreshing Host Information

You can refresh information about a specified host. The configuration information for each host is collected, and the most recent information is displayed on the HGLAM GUI.

In HGLAM, the HGLAM GUI operability can be maintained even in an environment where many hosts are connected. This is accomplished by maintaining the configuration information collected when the hosts were registered or when the configuration was refreshed in the HGLAM server database. This information can be viewed by using the HGLAM client via a Web browser. The following figure shows the flow of processing during a refresh of host information.

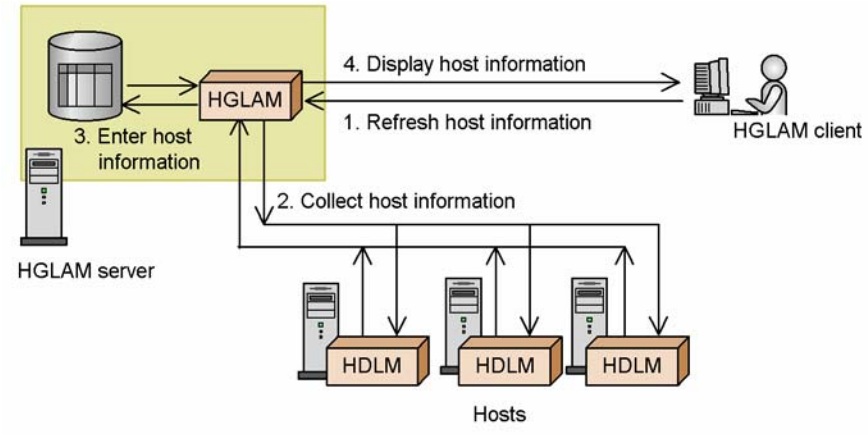


Figure 2.13 Flow of Processing During a Refresh of Host Information

When referencing host information, such as when collecting alert information, make sure that you refresh the host information first. The host information is re-collected, and the database information is overwritten using the most recent information.

When refreshing host information, you can refresh the information for only displayed hosts or host groups, or for multiple hosts and host groups from the list.

2.6.3.1 Refreshing Host Information for a Single Host

To refresh host information for a single host:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears.

3. Click the **Refresh Hosts** button.

   The Refresh Hosts - *host-name* dialog box appears.

4. Confirm the host to be refreshed, and then execute the refresh.

   Check the *host-name* subwindow to make sure that the host information has been refreshed.

2.6.3.2 Refreshing Host Information for Multiple Hosts At Once

To refresh host information for multiple hosts at once:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. If the Host Groups subwindow is displayed, expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. In the **Hosts** tabbed-page, select the hosts to be refreshed, and then click the **Refresh Hosts** button.

   The Refresh Hosts dialog box appears.

4. Confirm the hosts to be refreshed, and then execute the refresh.

   Check the Hosts subwindow or Host Groups subwindow to make sure that the host information has been refreshed.

2.6.3.3 Refreshing Host Information for a Single Host Group

To refresh host information for a single host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. Click the **Refresh Groups** button.

   The Refresh Groups - *host-group-name* dialog box appears.

4. Confirm the host group to be refreshed, and then execute the refresh.

   Check the *host-group-name* subwindow to make sure that the host information has been refreshed.

2.6.3.4 Refreshing Host Information for Multiple Host Groups At Once

To refresh host information for multiple host groups at once:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. In the **Groups** tabbed-page, select the host groups to be refreshed, and then click the **Refresh Groups** button.

   The Refresh Groups dialog box appears.

3. Confirm the hosts that belong to the selected host groups, and then execute the refresh.

   Check the Host Groups subwindow to make sure that the host group information has been refreshed.

2.6.4 Setting Up Load Balancing for an Individual LU

In the HDLM environment settings of the HGLAM GUI, or on HDLM on the host, you can configure load balancing for individual hosts.

In HGLAM, you can configure load balancing for individual LUs in cases such as the following:

- When you want to set whether to use load balancing for certain LUs from among those connected to a host.
- When you want to configure the load balancing algorithm for individual LUs.

The following figure is an example of configuring load balancing for individual LUs.

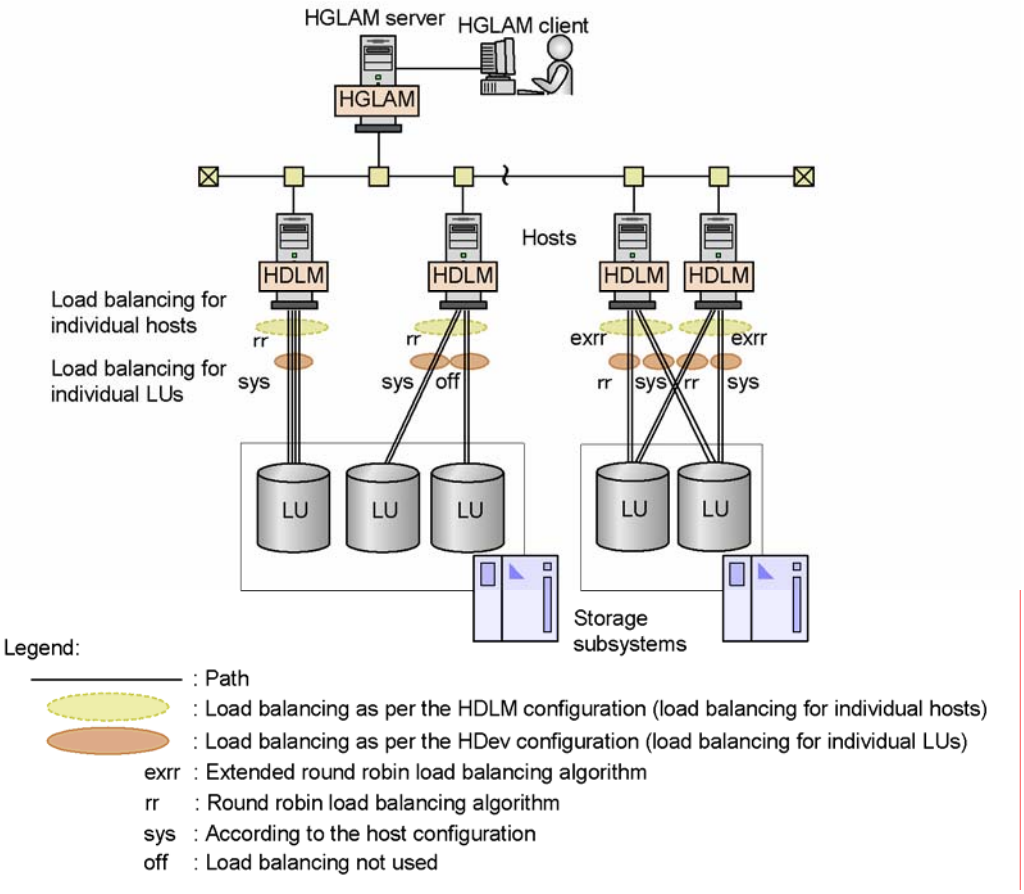


Figure 2.14 Example of Configuring Load Balancing for Individual LUs

In a system that uses HGLAM, the load balancing configuration for individual LUs (**Configure HDevs**) cannot be configured from HDLM on a particular host because these settings must take into account the total I/O load distribution for the entire system (to manage multiple hosts). Therefore, when new hosts are newly added as HGLAM resources, the load balancing settings that are specified for each host are inherited by the LUs.

The load balancing configuration for individual LUs is performed for the HDevs corresponding to the LUs. Regardless of the number of paths, the list of HDevs sorts the HDevs by individual LUs, so one HDev can be selected and set up for each LU. If the host OS is Solaris 7, and multiple HDevs correspond to the same LU, only the HDev that has the smallest instance number and has an owner path is displayed. This HDev is displayed as the HDev name with the slice number omitted. The following figure shows an example of HDev configuration for each host OS.

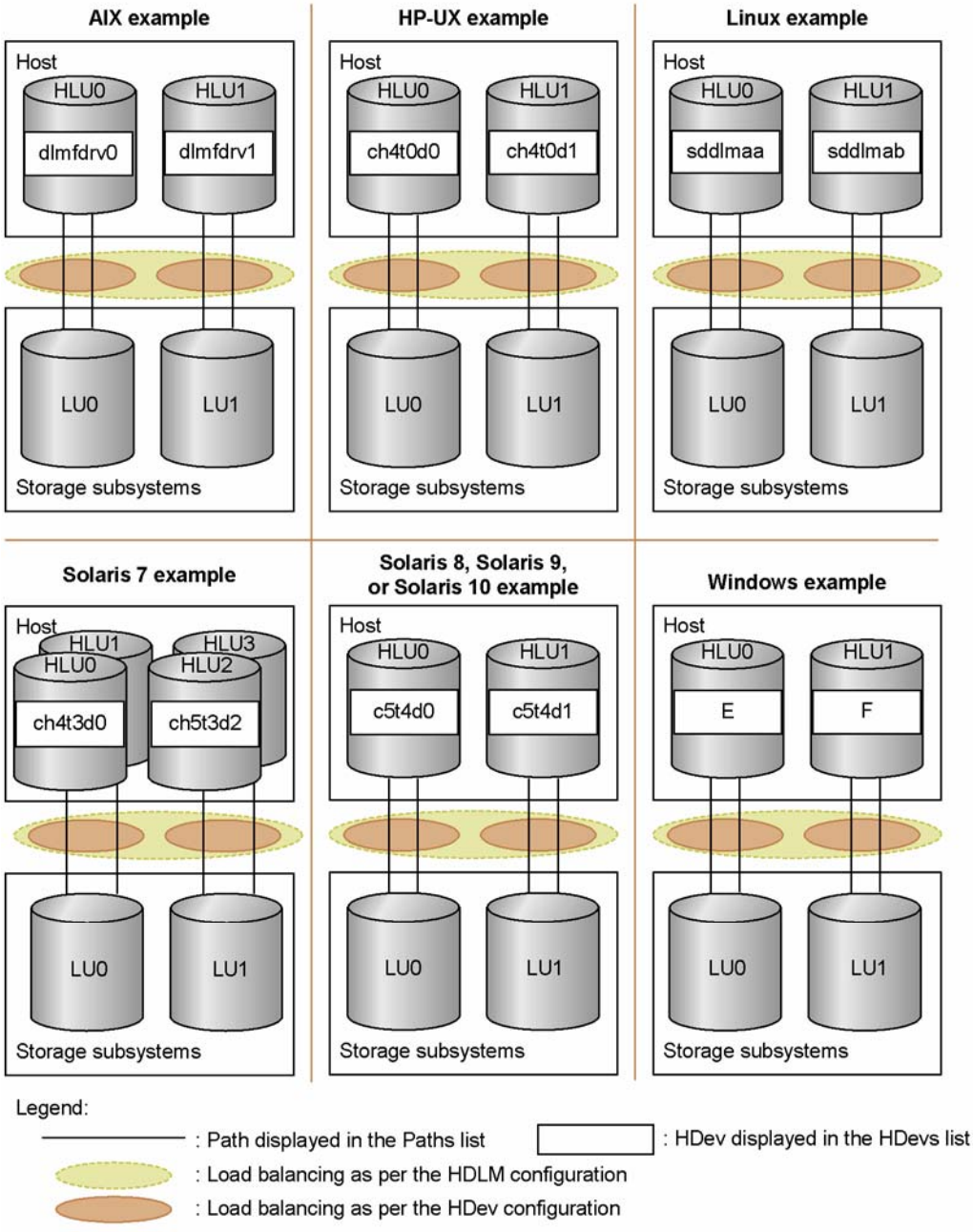


Figure 2.15 Overview of HDev Configuration (Example for each Host OS)

The HDev configuration can be set up to view a list of HDevs in units of hosts, host groups, or storage subsystems. Set the same unit that is set for the configuration of the host used by the user application. If you are using HDLM in a cluster configuration, set this unit for all hosts that make up the cluster.

Notes:

Initializing the HDev configuration information

When either of the following conditions is true, the HDev configuration information set by the HGLAM GUI is initialized:

- The HDLM interface (HDLM GUI, HDLM Web GUI, or HDLM command) of the host is used for configuring load balancing:

  HDLM sets the environment configuration for all hosts. LUs cannot be individually configured within a host. Therefore, if the HDLM user interface is used for configuring load balancing, the configuration settings apply to individual hosts, and each HDev configuration is initialized.

- The host OS is Windows and an LU is dynamically reconfigured (when the function that dynamically removes LUs is used in a Windows version of HDLM):

  When all paths that are connected to an LU become disconnected, the LU is automatically removed from the HDLM management targets. After this, when the LU is restored, the HDev configuration set for that LU is initialized.

Results for HDLM commands executed during HDev configuration

When the load balancing settings for individual LUs are different from the settings for each host, if the HDLM command is executed by specifying the `-sys -sfunc` parameter for the `view` operation, an asterisk (*) is output to the `Load Balance` value as shown in the following example:

Example: When `Round Robin` is specified in the HDLM configuration, and, in the HDev configuration, `Extended Round Robin` is specified for individual LUs or the load balancing function is set as invalid:

```
HDLM Version                : 05-80
Service Pack Version        :
Load Balance                : on(rr)*
Support Cluster             :
Elog Level                  : 3
Elog File Size(KB)          : 9900
Number Of Elog Files        : 2
Trace Level                 : 0
Trace File Size(KB)         : 1000
Number Of Trace Files       : 4
Path Health Checking        : on(30)
Auto Failback               : off
Intermittent Error Monitor  : off
```

2.6.4.1 Configuring HDevs for Individual Hosts

Load balancing can be set for individual LUs only when the HDLM version of the host is 5.8 or later. If the HDLM version of the host is earlier than 5.8, the **Configure HDevs** button is not displayed in the *host-name* subwindow selected in the HGLAM GUI.

To configure HDevs for individual hosts:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears.

3. In the **HDevs** tabbed-page, select the HDevs that are to be configured using the same load balancing algorithm, and then click the **Configure HDevs** button.

   The Configure HDevs dialog box appears.

4. Set the load balancing algorithm for the selected HDevs.

   Check the *host-name* subwindow to make sure that the HDev information has been refreshed.

   To configure multiple algorithms, repeat steps 3 and 4.

2.6.4.2 Configuring HDevs for an Individual Host Group

Load balancing can be set for individual LUs only when the HDLM version of the host is 5.8 or later.

To configure HDevs for an individual host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. In the **HDevs** tabbed-page, select the HDevs that are to be configured using the same load balancing algorithm, and then click the **Configure HDevs** button.

   The Configure HDevs dialog box appears.

4. Set the load balancing algorithm for the selected HDevs.

   Check the *host-group-name* subwindow to make sure that the HDev information has been refreshed.

   To configure multiple algorithms, repeat steps 3 and 4.

2.6.4.3 Configuring HDevs for an Individual Storage Subsystem

Load balancing can be set for individual LUs only when the HDLM version of the host is 5.8 or later.

To configure HDevs for an individual storage subsystem:

1. In the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

   The Subsystems subwindow appears.

2. Expand the object tree, and then select the target storage subsystem.

   The *subsystem-name* subwindow appears.

3. In the **HDevs** tabbed-page, select the HDevs that are to be configured using the same load balancing algorithm, and then click the **Configure HDevs** button.

   The Configure HDevs dialog box appears.

4. Set the load balancing algorithm for the selected HDevs.

   Check the *subsystem-name* subwindow to make sure that the HDev information has been refreshed.

   To configure multiple algorithms, repeat steps 3 and 4.

2.6.5 About Configuring the HDLM Operating Environment for a Host

You can configure the HDLM execution environment for each host. HGLAM can be used for configuring each host remotely without logging on to each host.

If a host is newly added as an HGLAM resource, the HDLM environment configuration information already configured by the HDLM of each host is inherited by HGLAM. If necessary, change the HDLM configuration in the HGLAM GUI. If you are using HDLM in a cluster configuration, set this configuration for all hosts that make up the cluster.

The ability to configure an HDLM environment depends on the host OS and HDLM version. From among the configuration items displayed in the following table, the items that can be configured are those that can be viewed in the HGLAM GUI.

Table 2.5 HDLM Environment Configuration Items

HDLM Environment Configuration Item	Description
Load Balancing	In a configuration where multiple paths are connected to an LU, the path load is distributed when multiple paths are used for issuing I/Os. You can set whether to enable load balancing, and set the processing format and check interval.
Path Health Checking	Normally, path statuses are checked when I/Os are issued, but this item checks online paths at regular intervals regardless of whether an I/O has been issued. You can set whether to enable the path health checking function, and set the check interval.
Auto Failback	If there are multiple paths connected to an LU and a critical-level or error-level error is detected for a path in use, the HDLM failover function switches such paths offline and uses a path that has an online status to continue system operations. After error recovery, the automatic failback function automatically returns the paths, which were made offline by the failover function, to an online state. You can set whether to enable the automatic failback function, and set the check interval.
Intermittent Error Monitor	Intermittent errors are random errors that occur due to causes such as a poor cable connection. If an intermittent error occurs when automatic failback is enabled, automatic failback occurs repeatedly, which may cause a drop in I/O performance. To avoid such a situation, for paths where an intermittent error has occurred, intermittent error monitoring automatically removes these paths from being subject to automatic failback. You can set whether to enable the intermittent error monitoring function, and set the error monitoring time and error frequency.
Reservation Level	If you wish to grant a given host exclusive use of an LU, you can make an exclusive use declaration from that host to the LU. This function protects such an LU from access by other hosts. You can set whether to enable the reservation level function, whether reservation requests are to be ignored, and whether paths to the LU can be reserved for exclusive access.

HDLM Environment Configuration Item	Description
Remove LU	If the host OS is Windows, the Windows plug-and-play functionality can be used for adding and deleting LUs and paths while an HDLM-installed host is operating (dynamic reconfiguration). When the remove LU function is enabled and all paths that are connected to an LU become disconnected, the LU is automatically removed from the managed objects. You can set whether to enable the remove LU function, and whether removal is to occur when there are paths that have the `Offline(C)` status.
Logging Level	Errors detected by HDLM are divided into levels. Logs are collected corresponding to the error levels and are stored on each host. You can set whether to perform log collection, and set the error level to be used as the filtering standard when collecting logs.
Trace Level	Traces output by HDLM are divided into levels. Depending on the trace level, traces are output and stored on each host. You can set whether to perform trace output, and the trace level to be used as the filtering standard for output.
Error Log File Size	If error log collection is set for an error log level, you can set the size of the log files to be collected.
Number of Error Log Files	If error log collection is set for an error log level, you can set the number of log files to be collected.
Trace Log File Size	If trace output is set for a trace level, you can set the size of the trace files to be output.
Number of Trace Log Files	If trace output is set for a trace level, you can set the number of trace files to be output.

2.6.5.1 Configuring the HDLM Operating Environment for a Host

You can configure the HDLM environment for a host by selecting the host from the **Resources** submenu or **My Groups** submenu.

To configure the HDLM environment for a host:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears.

3. In the **HDLM** tabbed-page, click the **HDLM Configuration** button.

   The HDLM Configuration - *host-name* dialog box appears.

4. Set each of the environment configuration items for the host.

   Check the *host-name* subwindow to make sure that the HDLM environment configuration information has been refreshed.

2.6.6 Using SNMP Traps to Configure Alerts for a Host

You can set whether to perform alert notification from each host to HGLAM. SNMP traps are used for alert notification and reception.

When using HGLAM to manage multiple hosts, individual hosts of HDLM cannot be configured due to the alert information reception function that is being used to detect path errors that occur on each host. If the `server.snmp.auto_set` property is set to `true` (default value) in the `server.properties` file of the HGLAM server, alerts are configured to be reported automatically when a host is newly added as an HGLAM resource, or when the host information is refreshed.

To modify the alert configurations for each host individually, you need to set the `server.snmp.auto_set` property to `false`. Then, select hosts and configure alerts for them separately. If HDLM is used in a cluster configuration, each host in the cluster must be configured.

For details about the server.snmp.auto_set property, see the *HiCommand Global Link Availability Manager Installation and Administration Guide*.

Note: The alerts reported by each host of HDLM contain error log information that is output when an error occurs in a path, and information that indicates changing the alert setup has finished. The following message ID information is reported regardless of the filtering level set in the collection level for error logs in the HDLM environment settings.

- `KAPL08022-E`
- `KAPL08026-E`
- `KAPL08027-E`
- `KAPL04042-I`

For details about the error information collected (in relation to the value specified for the collection level of error logs), see the log for each host.

2.6.6.1 Configuring Alerts for a Host

Alert notification can be configured only when the host HDLM version is 5.8 or later. If the HDLM version is earlier than 5.8, the **Alert** tab is not displayed in the *host-name* subwindow selected in the HGLAM GUI.

If you want to configure whether alerts are reported for each host individually, set the `server.snmp.auto_set` property to `false` in the `server.properties` file, which is used to change the HGLAM server settings. Even if you set the alert notification function to **Off** in the Configure Alerts dialog box, if you specify the value of the `server.snmp.auto_set` property to `true` (**On**) in the `server.properties` file, the alert notification setting will automatically be changed to **On** when host information is refreshed.

You can configure alerts for a host by selecting the host from the **Resources** submenu or **My Groups** submenu.

To configure alerts for a host:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears.

3. In the **Alert** tabbed-page, click the **Configure Alerts** button.

   The Configure Alerts - *host-name* dialog box appears.

4. Set whether to report alerts from the host.

   Check the *host-name* subwindow to make sure that the alert configuration information has been refreshed.

5. If alerts are configured to be reported, confirm that the alerts are being reported normally.

   An alert (message ID: `KAPL04042-I`) that indicates changing the alert setup has finished is reported from configured hosts. In the **Explorer** menu, click the **Alerts** submenu, and then check the alert list to confirm that the alert has been reported.

2.7 Managing Host Groups Using HGLAM

You can divide hosts managed by HGLAM into multiple groups and arrange those groups in a hierarchical structure as required. Each user can create groups for the hosts to be managed to achieve independent user management.

This section explains the functions, and corresponding procedures, for managing host groups for the following purposes:

- Grouping many managed hosts to make finding a particular host easy
- Managing hosts by hierarchal organization
- Viewing host or path information and performing operations for individual groups

The following figure shows an overview of managing host groups.

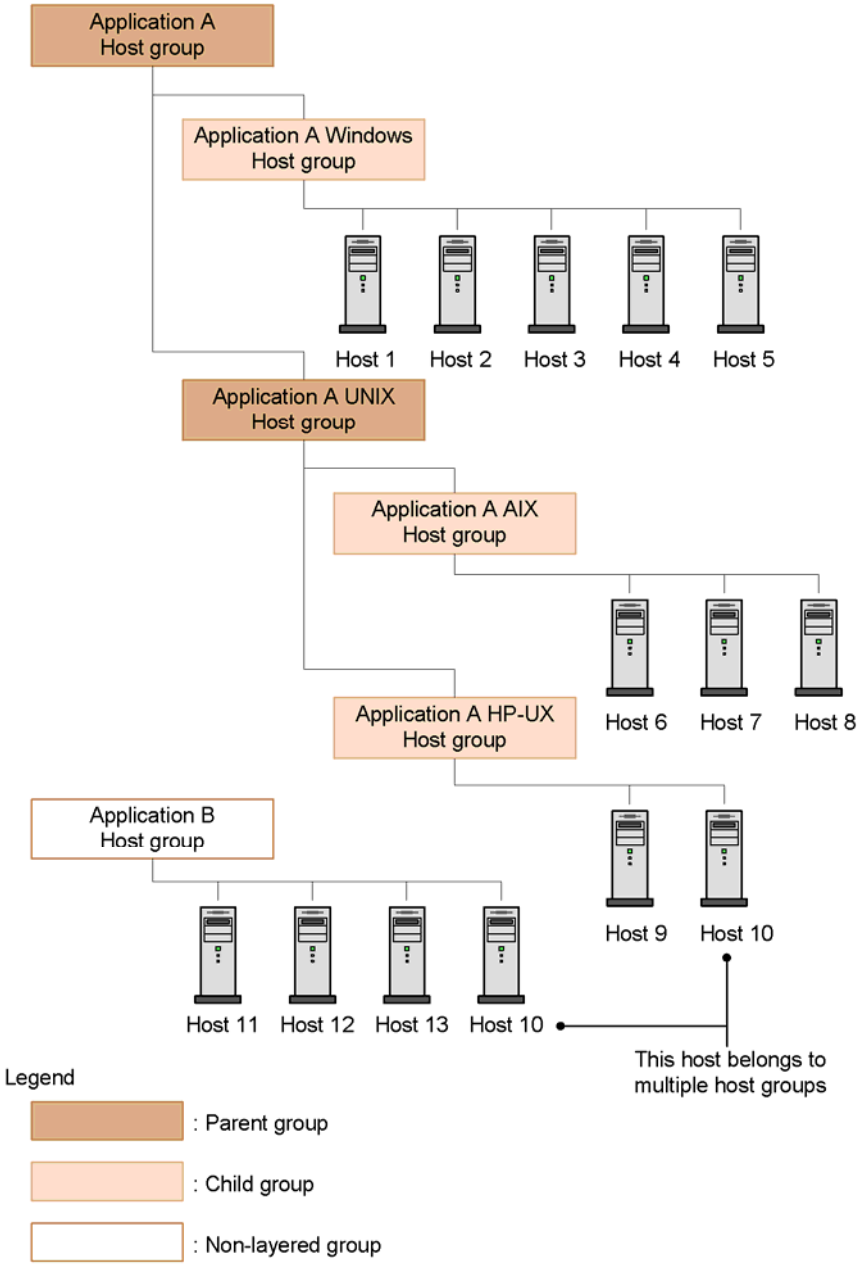


Figure 2.16 Overview of Managing Host Groups

The following conditions apply when configuring host groups:

- Multiple hosts can be configured into one host group.
- One host can be configured into multiple host groups.
- Host groups can be layered into a maximum of 256 layers.
- When host groups are layered in a hierarchal structure, host groups cannot be mixed with hosts under a host group.

Explorer Menu Items for Managing Host Groups

The following table shows the **Explorer** menu items used for managing host groups, and which HGLAM management permissions are required for operating these items.

Table 2.6 Explorer Menu Items Used for Managing Host Groups

Explorer Menu		Permissions		
Submenu	Command	Admin	Modify	View
My Groups	Host Group	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding command

Functions for Managing Host Groups

The following table shows the functions used for managing host groups, and which HGLAM management permissions are required for operating these functions.

Table 2.7 List of Functions for Managing Host Groups

Functions	Permissions		
	Admin	Modify	View
Viewing a list of host groups	Y	Y	Y
Viewing individual host group information	Y	Y	Y
Adding a host group	Y	Y	Y
Editing a host group	Y	Y	Y
Deleting a host group	Y	Y	Y
Viewing host information for host groups	Y	Y	Y
Adding hosts to a host group	Y	Y	Y
Deleting hosts from a host group	Y	Y	Y
Refreshing host information for host groups	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding function

2.7.1 Viewing a List of Host Groups

You can view a list of host groups for all user-created host groups. This information includes:

- Summarized information for all host groups (summarized information for the last update time and the number of paths in each path status)
- A list of host groups
- A list of paths for all host groups
- A list of HDevs for all host groups

To view a list of host groups, in the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

The Host Groups subwindow appears. This subwindow displays a list of host groups.

2.7.2 Viewing Individual Host Group Information

You can view information for each host group.

When the host group to be displayed is a parent group, you can view the following information:

- Summarized information for host groups under that parent group (summarized information for the last update time and the number of paths in each path status)
- A list of child groups
- A list of paths under that parent group
- List of HDevs under that parent group

When the host group to be displayed is not layered in a hierarchal structure or the host group is a child group, you can view the following information:

- Summarized information for host groups (summarized information for the last update time and the number of paths in each path status)
- A list of hosts belonging to that host group
- A list of paths belonging to that host group
- A list of HDevs belonging to that host group

To view host group information:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears. This subwindow displays host group information.

2.7.3 Adding, Editing, and Deleting Host Groups

This section explains adding, editing, and deleting host groups. For details on configuring the hosts that belong to a host group, see 2.7.5.

When creating new host groups, you must consider the organization and application when determining the group hierarchy and host group divisions.

2.7.3.1 Adding a Host Group

To add a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. If the host groups are not layered in a hierarchal structure, or if you are creating a parent group, proceed to step 3. If you are creating a child group, expand the object tree and select the target parent group.

   The *host-group-name* subwindow appears.

3. From the **Groups** tabbed-page, click the **Add Groups** button.

   The Add Groups dialog box appears.

4. Register the information for the host group to be added.

   Check the Host Groups subwindow or the *host-group-name* subwindow to make sure that the information for the registered host group is displayed.

2.7.3.2 Editing a Host Group

To edit a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. Click the **Edit Groups** button.

   The Edit Groups - *host-group-name* dialog box appears.

4. Edit and then refresh the host group information.

   Check the *host-group-name* subwindow to make sure that the host group information has been refreshed.

2.7.3.3 Deleting a Host Group

To delete a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. If the host group is not layered in a hierarchal structure or if you are deleting a parent group, proceed to step 3. If you are deleting a child group, expand the object tree and select the target parent group.

   The *host-group-name* subwindow appears.

3. From the **Groups** tabbed-page, select the host groups to be deleted, and then click the **Delete Groups** button.

   The Delete Groups dialog box appears.

4. Confirm the host groups to be deleted, and then execute the deletion.

   Check the Host Groups subwindow or the *host-group-name* subwindow to make sure that the host groups have been deleted.

2.7.4 Viewing Host Information for a Host Group

You can view the following information for each host:

- Summarized information for a host (including such information as the host name, OS, HDLM version*, IP address, and the number of paths in each path status)
- A list of paths
- A list of HDevs
- A list of HBA ports
- HDLM environment configuration information
- Alert configuration information

* If the HDLM version of a host is 5.6 or later, the service pack version is also displayed. If the HDLM version of a host is earlier than 5.6, the service pack version is not displayed.

To view host information for a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears. This subwindow displays host information for the host group.

2.7.5 About Adding and Deleting Hosts in a Host Group

You can add hosts to or delete hosts from previously created host groups.

You can set a single host into multiple host groups. If the host groups are layered in a hierarchal structure, only child groups can be configured under host groups that are to become parent groups. Hosts cannot be configured under parent groups.

2.7.5.1 Adding Hosts to a Host Group

To add hosts to a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. From the **Hosts** tabbed-page (if no hosts are registered, the **Objects** tabbed-page), click the **Add Hosts** button.

   The Add Hosts dialog box appears.

4. Select the hosts to be added to the host group, and then execute the addition.

   Check the *host-group-name* subwindow to make sure that the hosts added to the host group are displayed.

2.7.5.2 Deleting Hosts from a Host Group

To delete hosts from a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. From the **Hosts** tabbed-page, select the hosts to be deleted, and then click the **Delete Hosts** button.

   The Delete Hosts dialog box appears.

4. Confirm the hosts to be deleted, and then execute the deletion.

   Check the *host-group-name* subwindow to make sure that the hosts have been deleted from the host group.

2.7.6 About Refreshing Host Information for a Host Group

You can refresh information about hosts that belong to a specified host group. The configuration information for each host is collected, and the most recent information is displayed on the HGLAM GUI. For details on how to refresh host information, see 2.6.3.

The host information can be refreshed for hosts in only the displayed host groups, or in multiple host groups selected from the list.

2.7.6.1 Refreshing Host Information for a Single Host Group

To refresh host information for a single host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears.

3. Click the **Refresh Groups** button.

   The Refresh Groups - *host-group-name* dialog box appears.

4. Confirm the host group to be refreshed, and then execute the refresh.

   Check the *host-group-name* subwindow to make sure that the host information has been refreshed.

2.7.6.2 Refreshing Host Information for Multiple Host Groups At Once

To refresh host information for multiple host groups:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. From the **Groups** tabbed-page, select the host groups to be refreshed, and then click the **Refresh Groups** button.

   The Refresh Groups dialog box appears.

3. Confirm the host groups to be refreshed, and then execute the refresh.

   Check the *host-group* subwindow to make sure that the host group information has been refreshed.

2.8 Managing Paths Using HGLAM

Paths can be consolidated using HDLM, which controls the paths between the hosts and storage subsystems.

This section explains the functions, and corresponding procedures, for managing paths for the following purposes:

- Understanding the path information for multiple hosts
- Viewing paths by their status to determine the locations of path errors
- Controlling the bandwidth by browsing paths and switching their statuses (to online or offline) as necessary for items such as storage subsystems and LUs
- Handling errors by switching path statuses for CHA or HBA ports

The following figure shows an overview of managing paths.

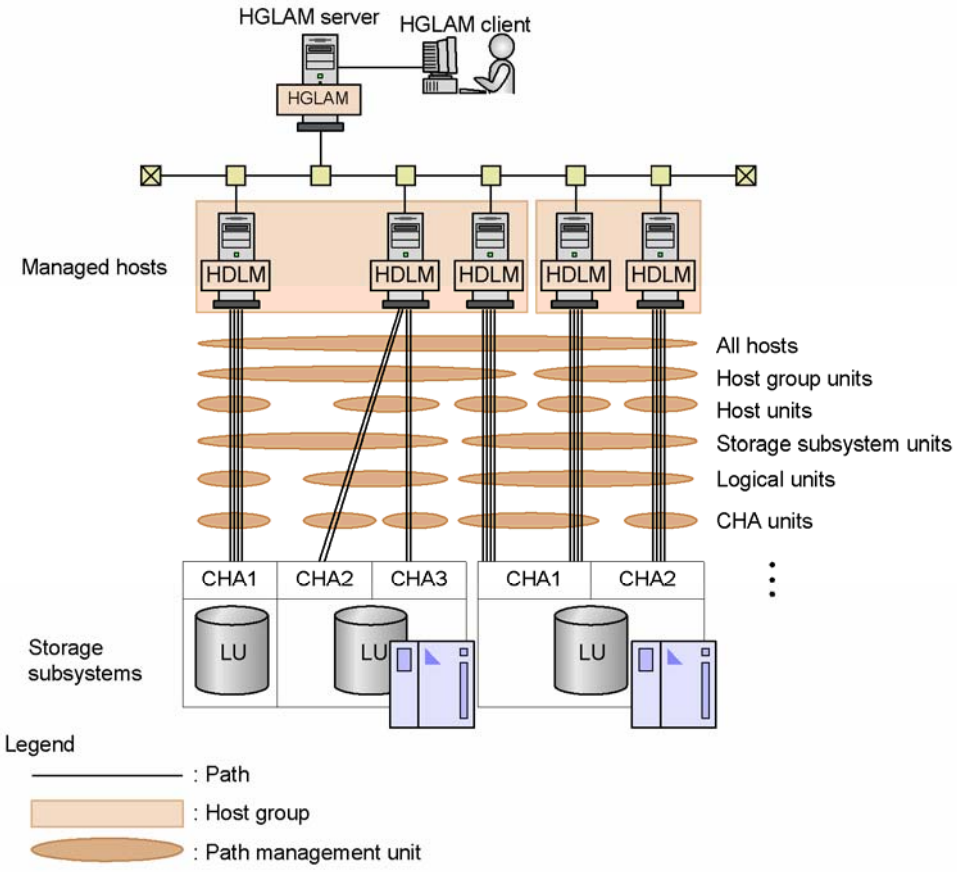


Figure 2.17 Overview of Managing Paths

Explorer Menu Items for Managing Paths

The following table shows the **Explorer** menu items used for managing paths, and which HGLAM management permissions are required for operating these items.

Table 2.8 Explorer Menu Items Used for Managing Paths

Explorer Menu		Permissions		
Submenu	Command	Admin	Modify	View
Resources	Hosts	Y	Y	Y
	Subsystems	Y	Y	Y
My Groups	Host Groups	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding command

Functions for Managing Paths

The following table shows the functions used for managing paths, and which HGLAM management permissions are required for operating these functions.

Table 2.9 List of Functions for Managing Paths

Functions	Permissions		
	Admin	Modify*	View*
Viewing a summary of paths	Y	Y	Y
Viewing a list of paths	Y	Y	Y
Switching a path status	Y	Y	—
Viewing a list of storage subsystems	Y	Y	Y
Viewing individual storage subsystem information	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding function

—: This permission does not allow execution of the corresponding function

* Users who have the Modify or View permission can execute this function only for objects (such as paths, HBA ports, and storage subsystems) that belong to hosts in resource groups affiliated with that user.

2.8.1 Viewing a Summary of Paths

You can view summarized information for the number of paths in each path status for paths that belong to all hosts for which you have access permissions. Path summaries can be displayed using the following categories:

- All paths
- Individual hosts
- Host groups
- Storage subsystems

2.8.1.1 Viewing a Summary of Paths for All Paths

To view a path summary for all paths, in the **Explorer** menu, click **Resources**, and then choose **Hosts**.

The Hosts subwindow appears. This subwindow displays a summary of paths that belong to all hosts.

2.8.1.2 Viewing a Summary of Paths for a Single Host

To view a path summary for a single host:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears. This subwindow displays a summary of paths for the host.

2.8.1.3 Viewing a Summary of Paths for a Host Group

To view a path summary for a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears. This subwindow displays a summary of paths for the host group.

2.8.1.4 Viewing a Summary of Paths for a Storage Subsystem

To view a path summary for a storage subsystem:

1. In the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

   The Subsystems subwindow appears.

2. Expand the object tree, and then select the target storage subsystem.

   The *subsystem-name* subwindow appears. This subwindow displays a summary of paths for the storage subsystem.

2.8.2 Viewing a List of Paths

You can view information on paths that belong to all hosts for which you have access permissions. A list of paths can be displayed using the following categories:

- Individual hosts
- Host HBA ports
- Host groups
- Storage subsystems
- Storage subsystem CHA ports
- HDevs
- Path statuses

2.8.2.1 Viewing a List of Paths for a Single Host

To view a list of paths for a single host:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears. In the *host-name* subwindow, the **Paths** tabbed-page displays a list of paths categorized by host.

2.8.2.2 Viewing a List of Paths for a Host HBA Port

To view a list of paths for a host HBA port:

1. In the **Explorer** menu, click **Resources**, and then choose **Hosts**. Alternatively, click **My Groups**, and then choose **Host Groups**.

   The Hosts subwindow or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host.

   The *host-name* subwindow appears.

3. Select the HBA port from the **HBA Ports** tabbed-page, and then click the **Show Paths** button.

   The Show Paths - *host-name* dialog box appears. This dialog box displays a list of paths for the selected HBA port.

2.8.2.3 Viewing a List of Paths for a Host Group

To view a list of paths for a host group:

1. In the **Explorer** menu, click **My Groups**, and then choose **Host Groups**.

   The Host Groups subwindow appears.

2. Expand the object tree, and then select the target host group.

   The *host-group-name* subwindow appears. In this subwindow, the **Paths** tabbed-page displays a list of paths for the host group.

2.8.2.4 Viewing a List of Paths for a Storage Subsystem

To view a list of paths for a storage subsystem:

1. In the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

   The Subsystems subwindow appears.

2. Expand the object tree, and then select the target storage subsystem.

   The *subsystem-name* subwindow appears. In this window, the **Paths** tabbed-page displays a list of paths for the storage subsystem.

2.8.2.5 Viewing a List of Paths for a CHA Port of a Storage Subsystem

To view a list of paths for a CHA port of a storage subsystem:

1. In the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

   The Subsystem subwindow appears.

2. Expand the object tree, and then select the target storage subsystem.

   The *subsystem-name* subwindow appears.

3. Select the CHA port from the **CHA Ports** tabbed-page, and then click the **Show Paths** button.

   The Show Paths - *subsystem-name* dialog box appears. This dialog box displays a list of paths for the selected CHA port.

2.8.2.6 Viewing a List of Paths for a HDev

Viewing a list of HDev paths enables you to view and select a list of HDevs categorized by hosts, host groups, or storage subsystems.

To view a list of HDev paths:

1. In the **Explorer** menu, click **Resources** and then choose **Hosts**, or click **Resources** and then choose **Subsystems**, or click **My Groups** and then choose **Host Groups**.

   The Hosts subwindow, Subsystems subwindow, or Host Groups subwindow appears.

2. Expand the object tree, and then select the target host, storage subsystem, or host group.

   The *host-name* subwindow, *subsystem-name* subwindow, or *host-group-name* subwindow appears.

3. Select the HDev from the **HDevs** tabbed-page, and then click the **Show Paths** button.

   One of the following dialog box appears: the Show Paths - *host-name* dialog box, the Show Paths - *subsystem-name* dialog box, or the Show Paths - *host-group-name* dialog box. This dialog box displays a list of paths for the selected HDev.

2.8.2.7 Viewing a List of Paths That Have a Specific Status

To view a list of paths that have a specific status

1. Display a path summary.

   Display a path summary categorized by hosts or storage subsystems. For details on how to display a path summary, see 2.8.1.

2. Click the link for the number of paths of each path status shown in the path summary.

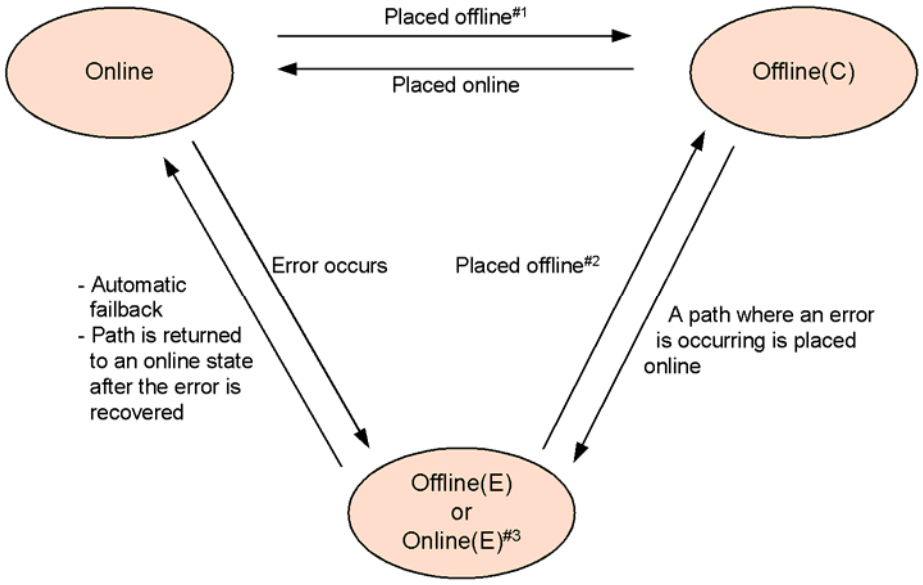
   The Show Paths dialog box, or the Show Paths - *object-name* dialog box appears. This dialog box displays a list of paths categorized by the selected path status.

2.8.3 Switching Path Status

You can check the statuses of paths for multiple hosts by confirming the statuses in a list of paths, and switch the status of a path by executing an online or offline operation.

To control the bandwidth, paths can be switched online or offline to increase or decrease the number of paths that perform I/Os. Paths can also be temporarily switched offline when an error occurs or when replacing hardware, and then returned to the online state.

The following figure shows the status transition of paths due to the user switching statuses as well as the automatic detection of errors and recovery.



#1:
When only one Online path exists among the paths accessing a single LU, that path cannot be placed offline.

#2:
Only paths that have an Offline(E) status can be placed offline. Paths that have an Online(E) status cannot be placed offline.

#3:
When no Online paths exist among the paths accessing a single LU, one of the paths becomes Online(E), and the others become Offline(E).

Figure 2.18 Transition of Path Statuses

Paths can be collectively placed online and offline for a displayed category in the list of paths. Select the category for viewing paths depending on the purpose of an operation, such as viewing paths in their HBA port categories when you want to switch HBA ports, or viewing only paths that have an `Offline(E)` status when you want to return paths to online after recovering a certain port error.

2.8.3.1 Switching Paths Online

To switch paths online:

1. Display a list of paths.

   Display the paths for a host or storage subsystem. For details on how to do this, see 2.8.2.

2. From the path list, select the paths to be placed `Online` status, and then click the **Set Online** button.

   The Set Online dialog box appears.

3. Confirm the paths to be placed in the `Online` status, and then execute the operation.

   Check the path list to make sure that the path statuses have changed.

Note: After selecting the check box **Yes, I've confirmed information above.** in the Set Online dialog box, if you sort or switch pages, the selection is turned off. In such a case, re-select the check box and then re-execute the process.

2.8.3.2 Switching Paths Offline

To switch paths offline:

1. Display a list of paths.

   Display the paths for a host or storage subsystem. For details on how to do this, see 2.8.2.

2. From the path list, select the paths to be placed in the `Offline(C)` status, and then click the **Set Offline** button.

   The Set Offline dialog box appears.

3. Confirm the paths to be placed in the `Offline(C)` status, and then execute the operation.

   Check the path list to make sure that the path statuses have changed.

Note: After selecting the check box **Yes, I've confirmed information above.** in the Set Offline dialog box, if you sort or switch pages, the selection is turned off. In such a case, re-select the check box and then re-execute the process.

2.8.4 Viewing a List of Storage Subsystems

You can view the following information about the storage subsystems connected to all hosts for which you have access permissions.

- Summarized information for paths that belong to all storage subsystems (summarized information for the number of paths in each path status)
- A list of storage subsystems

To view a list of storage subsystems, in the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

The Subsystems subwindow appears. This subwindow displays a list of storage subsystem information.

2.8.5 Viewing Individual Storage Subsystem Information

You can view the following information for each storage subsystem:

- Summarized information for paths (summarized information for the number of paths in each path status)
- A list of paths
- A list of CHA ports
- A list of HDevs

You can view storage subsystem information to check which paths, hosts, or user applications are connected to a storage subsystem. This information is required when you need to know which path statuses to switch for operations such as replacing hardware related to a storage subsystem or controlling the bandwidth for paths to an individual CHA port.

To view storage subsystem information:

1. In the **Explorer** menu, click **Resources**, and then choose **Subsystems**.

   The Subsystems subwindow appears.

2. Expand the object tree, and then select the target storage subsystem.

   The *subsystem-name* subwindow appears. This subwindow displays storage subsystem information.

2.9 Managing Alerts Using HGLAM

When a path error occurs in a host managed by HGLAM, HGLAM uses SNMP traps to receive error information through alerts reported by the hosts, and collectively manages the hosts.

This section explains the functions, and corresponding procedures, for managing alerts for the following purposes:

- Managing errors that occur on multiple managed hosts
- Managing error information history
- Managing whether error handling has been completed

The following figure shows an overview of managing alerts.

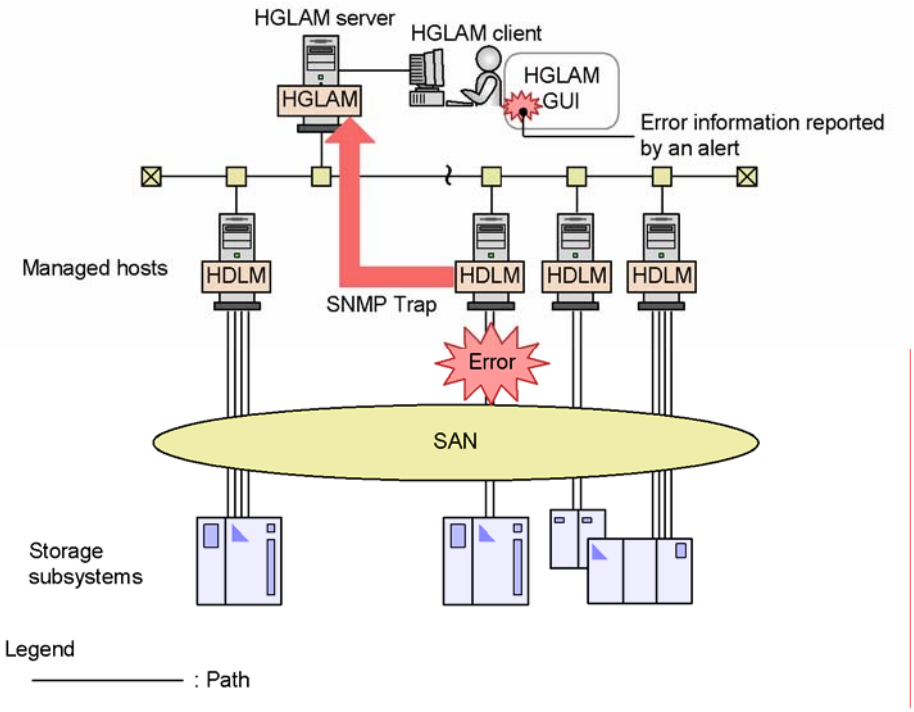


Figure 2.19 Overview of Managing Alerts

For details on setting alert notifications from hosts, see 2.6.6.

To configure the settings for receiving alerts and the number of alerts that HGLAM retains, use the server.properties file of the HGLAM server. For details on this property file, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

The following table describes the severity of alerts sent from hosts, and message IDs.

Table 2.10 Severity of Alerts and Message IDs

Severity	Message ID	Description
Critical	KAPL08026-E*	Sent when errors occur on all the paths for an LU.
Error	KAPL08022-E	Sent when a path error occurs.
	KAPL08027-E	Sent when an intermittent path error occurs.
Information	KAPL04042-I	Sent when the alert settings on the host are changed.

* The message ID shows that the severity of this message is Error. However, the icon displayed in the **Dashboard** menu and the icon for **Severity** in the Alerts subwindow show that the severity of this message is Critical.

Explorer Menu Item for Managing Alerts

The following table shows the **Explorer** menu item used for managing alerts, and which HGLAM management permissions are required for operating these items.

Table 2.11 Explorer Menu Item Used for Managing Alerts

Explorer Menu	Permissions		
Menu Command	Admin	Modify	View
Alert	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding command

Functions for Managing Alerts

The following table shows the functions used for managing alerts, and which HGLAM management permissions are required for operating these functions.

Table 2.12 List of Functions for Managing Alerts

Functions	Permissions		
	Admin	Modify*	View*
Viewing a list of alerts	Y	Y	Y
Marking alerts	Y	Y	—
Deleting alert marks	Y	Y	—
Deleting alerts	Y	Y	—

Legend:

Y: This permission allows execution of the corresponding function

—: This permission does not allow execution of the corresponding function

* Users who have the Modify or View permission can execute this function only for alerts reported by hosts within resource groups affiliated with that user.

2.9.1 Viewing a List of Alerts

You can view a list of alert information that has been reported by a host.

When an alert is reported from a host, the number of unconfirmed alerts displayed in the **Dashboard** menu is updated. When there are unconfirmed alerts, you can view the alert list and check the error contents.

Notes:

When deleting a managed host:

When you delete a host, all alerts that have been reported from the host will be deleted. Therefore, before you delete a host, make sure that you have checked all alerts that are reported.

When changing the name of a managed host:

When a host name is displayed in the alert list and the name is changed but the IP address remains the same, and then the host information is updated, the changed host name is displayed even for the alert information that was reported before the change. Therefore, before you change a host name, or start a host as a different host name in the case of a multi boot environment, make sure that you have checked all alerts that have been reported.

To view a list of alerts, In the **Explorer** menu, click **Alerts**.

The Alerts subwindow appears. This subwindow displays a list of alerts. For details on what actions to take for reported errors, check the message ID of the alert and see the manual *HiCommand Dynamic Link Manager User's Guide* for the relevant OS.

2.9.2 About Marking Alerts

You can manage alerts by applying a mark to alerts once they have been checked or the related error has been recovered.

Alert marks are common to all HGLAM users. If one user marks an alert, all users see that alert as marked.

2.9.2.1 Marking Alerts

To mark alerts:

1. In the **Explorer** menu, click **Alerts**.

   The Alerts subwindow appears.

2. Select the alerts to be marked, and then click the **Mark** button.

   The alerts are marked.

2.9.2.2 Deleting Alert Marks

To delete alert marks:

1. In the **Explorer** menu, click **Alerts**.

   The Alerts subwindow appears.

2. Select the alerts to be unmarked, and then click the **Unmark** button.

   The alerts become unmarked.

2.9.3 Deleting Alerts

Deleting unnecessary alerts makes it easy to manage an alerts list. If the maximum number of alerts configured for an HGLAM server is exceeded, the oldest alerts are automatically deleted.

To delete alerts:

1. In the **Explorer** menu, click **Alerts**.

   The Alerts subwindow appears.

2. Select the alerts to be deleted, and then click the **Delete Selected Alerts** button.

   The Delete Alerts dialog box appears.

3. Confirm the alerts to be deleted, and then execute the deletion.

   Check the Alerts subwindow to make sure that the alerts have been deleted.

2.10 Exporting Management Information to CSV

Information about all managed paths can be output to a CSV file, where other tools can be used to examine that information. The last update time for the following information is output:

- List of hosts
- List of paths
- List of alerts

Function for Exporting Information to a CSV File

The following table shows the function used for exporting information to a CSV file, and which HGLAM management permissions are required for performing this operation.

Table 2.13 Function for Exporting Information to a CSV File

Function	Permissions		
	Admin	Modify*	View*
Exporting management information to a CSV file	Y	Y	Y

Legend:

Y: This permission allows execution of the corresponding function

* Users who have the Modify or View permission can execute this function only for objects that belong to hosts in resource groups affiliated with that user.

CSV File Format

The following table describes the format of the output CSV file.

Table 2.14 CSV File Format

Category	Description	Output Item
[ExportCSV]	Creation time of the CSV file is output.	Time
[Hosts]	List of hosts displayed in the Hosts subwindow is output.	Name
		Last Update Time
		Online
		Offline(C)
		Offline(E)
		Online(E)
		OS
		HDLM
		IP Address

Category	Description	Output Item
[Paths]	List of paths displayed in the Show Paths dialog box is output. All of the paths managed by the user are included in the list.	Status
		Intermittent Error
		Host Name
		HDev Name
		HBA Port
		Path ID
		Path Name
		Path Type
		Subsystem Name
		LDev
		SLPR
		CHA Port
		CLPR
[Alerts]	List of alerts displayed in the Alerts subwindow is output.	Severity
		Mark
		Date
		Host Name
		Category
		Component
		Message ID
		Description
[END]	This is output when the CSV output ends normally.	—
[Error]	This is output with an error message if the CSV output ends abnormally.	—

Legend:

—: Not applicable

To export path information to a CSV file, in the global tasks bar area, click **File**, and then choose **Export** to specify the output destination.

The data is exported to the CSV file of the specified destination. Make sure that `[END]` is output at the end of the CSV file.

Note: If an error occurred during the output processing of the CSV file, an error message is not displayed in the Export dialog box. At the end of the CSV file, `[Error]` and an error message are output.

Chapter 3 Troubleshooting HGLAM

This chapter explains how to troubleshoot problems that might occur during HGLAM GUI operation.

- Procedure for Troubleshooting HGLAM (section 3.1)
- HGLAM Troubleshooting Examples (section 3.2)

3.1 Procedure for Troubleshooting HGLAM

To troubleshoot when an error occurs during an HGLAM GUI operation:

1. Check the output messages.

   If no messages have been output, check for similar errors in the examples provided in 3.2.

2. If you cannot determine the cause of the error after checking the output messages and checking for similar errors in the troubleshooting examples, collect the diagnostic information.

   For details on how to collect diagnostic information, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

3. Check the contents of the log files you collected in step 2.

   For details on how to check the contents of log files, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.

4. If you cannot determine the cause of the error after checking the contents of the log files, contact the Support Center.

   When contacting the Support Center, provide the diagnostic information you collected in step 2.

3.2 HGLAM Troubleshooting Examples

This section provides examples of problems that might occur during HGLAM GUI operation. This section also describes the causes of such problems and the corrective actions you should take.

3.2.1 Troubleshooting Problems While Using the HGLAM GUI

Table 3.1 Troubleshooting Examples (During HGLAM GUI Operation)

Problem	Cause	Action
The HGLAM pages cannot be displayed using a Web browser.	HiCommand Suite Common Component is not running.	Start HiCommand Suite Common Component. For details on how to do this, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.
	An attempt to start HiCommand Suite Common Component has failed because there is insufficient disk space on the HGLAM server.	Ensure that there is enough disk space on the HGLAM server, and then start HiCommand Suite Common Component. For details on how to start HiCommand Suite Common Component, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.
In the Back To Login window, the **Login** button is inactive.	HGLAM is running.	Close the Back To Login window, wait for a while, and then log in again.
The host information cannot be updated.	One or more of the HDLM components installed on the host are not running.	Start any HDLM components that are not running on the host. For details on how to do this, see the manual *HiCommand Dynamic Link Manager User's Guide*.
	The settings of one or more HDLM components installed on the host are invalid.	Correct the settings for the HDLM components installed on the host. For details on how to specify the settings, see the manual *HiCommand Dynamic Link Manager User's Guide*.
	The HDLM version installed on the host is not supported by HGLAM.	Install an HDLM version that is supported by HGLAM. For details on the system requirements for HGLAM, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.
	An error may have occurred during communication between the HGLAM server and HDLM.	Correct the network error.

Problem	Cause	Action
The host information cannot be updated. *(continued)*	The settings for the Device Manager agent are incorrect because the version of HDLM on the host has been updated from a version earlier than 5.8 to version 5.8 or later.	Temporarily delete the host, and then add it again. If you do not have permissions for adding and deleting hosts, ask a user who has the required permissions. For details on how to add and delete hosts, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.
	In the `server.properties` file of the Device Manager agent on the host, the port number for the port specified in one of the following properties has been changed: ▪ `server.agent.port` property (agent service port) ▪ `server.http.port` property (remote port)	Temporarily delete the host, and then add it again. If you do not have permissions for adding and deleting hosts, ask a user who has the required permissions. For details on how to add and delete hosts, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide.*
	In the `server.properties` file of HiCommand Suite Common Agent Component on the host, the port number for the port specified in the `server.agent.port` property (agent service port) has been changed.	Temporarily delete the host, and then add it again. If you do not have permissions for adding and deleting hosts, ask a user who has the required permissions. For details on how to add and delete hosts, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide.*
	The settings for the Device Manager agent are incorrect because the version of HDLM on the host has been updated to a version earlier than 5.8.	Restart the Device Manager agent service (or daemon process). For details on how to do this, see the manual *HiCommand Device Manager Agent Installation Guide*.
	The settings for the Device Manger agent installed on the host are incorrect.	Execute the `hdvmagt_account` command of the Device Manager agent to set up the Device Manager server information or host information. For details on how to do this, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide*.
	On an AIX host, no paths have been set.	Check the operating environment of HDLM on the host, add necessary paths, and then perform the operation again. For details about changing the configuration of the HDLM operating environment, see the manual *HiCommand Dynamic Link Manager User's Guide*.
	HiCommand Suite Common Agent Component is not running.	Start HiCommand Suite Agent Common Component. For details on how to do this, see the manual *HiCommand Global Link Availability Manager Installation and Administration Guide.*

Problem	Cause	Action
In message KAIF22102-E, The header information is invalid. is displayed as the detailed information.	The Device Manager agent is currently stopping its service (or daemon process), or is executing other application processing.	Check the status of the Device Manager agent service (or daemon process). If it is stopped, start it. If it is running, wait a while, and then retry the operation. For details on how to start the service (or daemon process), see the manual HiCommand Device Manager Agent Installation Guide.
Host information is not displayed.	The logged-in user does not have access permissions for the host.	Change the access permissions for the logged-in user.
Storage information is not displayed.	The logged-in user does not have access permissions for the storage subsystem.	Change the access permissions for the logged-in user.

Appendix A Acronyms and Abbreviations

CHA	channel adapter
CLPR	cache logical partition
CSV	comma separated value
Dev	device
Device Manager	HiCommand Device Manager
GUI	graphical user interface
HBA	host bus adapter
HDev	host device
HDLM	A generic term for HiCommand Dynamic Link Manager, and Hitachi Dynamic Link Manager
HDLM 5.2	Hitachi Dynamic Link Manager 05-02
HiCommand Dynamic Link Manager User's Guide	A generic term for HiCommand Dynamic Link Manager User's Guide (for AIX), HiCommand Dynamic Link Manager User's Guide (for HP-UX), HiCommand Dynamic Link Manager User's Guide (for Linux), HiCommand Dynamic Link Manager User's Guide (for Solaris), HiCommand Dynamic Link Manager User's Guide (for Windows), Hitachi Dynamic Link Manager User's Guide (for AIX), Hitachi Dynamic Link Manager User's Guide (for HP-UX), Hitachi Dynamic Link Manager User's Guide (for Linux), Hitachi Dynamic Link Manager User's Guide (for Solaris), and Hitachi Dynamic Link Manager User's Guide (for Windows)
HLU	host logical unit
I/O	input/output
IP	internet protocol
IPF	itanium processor family
iSCSI	internet small computer system interface
LAN	local area network
LU	logical unit
MPIO	multipath I/O
OS	operating system
SAN	storage area network
SCSI	small computer system interface
SLPR	storage logical partition
SNMP	simple network management protocol
SP	service pack
Tuning Manager	HiCommand Tuning Manager
UNIX	A generic term for AIX, HP-UX, Linux, and Solaris
URL	uniform resource locator

Windows	A generic term for Windows 2000, Windows Server 2003, and Windows XP
Windows 2000	A generic term for Microsoft Windows 2000 Professional Operating System, Microsoft Windows 2000 Server Operating System, Microsoft Windows 2000 Advanced Server Operating System, and Microsoft Windows 2000 Datacenter Server Operating System
Windows Server 2003	A generic term for Microsoft Windows Server 2003, Standard Edition, Microsoft Windows Server 2003, Enterprise Edition, and Microsoft Windows Server 2003, Datacenter Edition. In descriptions of OSs supported by HDLM, this additionally refers to Microsoft(R) Windows Server(TM) 2003, Web Edition, Microsoft(R) Windows Server(TM) 2003, Enterprise Edition for Itanium-based Systems, Microsoft(R) Windows Server(TM) 2003, Datacenter Edition for Itanium-based Systems, Microsoft(R) Windows Server(TM) 2003, Standard x64 Edition, Microsoft(R) Windows Server(TM) 2003, Enterprise x64 Edition, Microsoft(R) Windows Server(TM) 2003, Datacenter x64 Edition, Microsoft(R) Windows Storage Server 2003, Standard Edition, Microsoft(R) Windows Storage Server 2003, Enterprise Edition, Microsoft(R) Windows Storage Server 2003 Standard x64 Edition, Microsoft(R) Windows Storage Server 2003 Enterprise x64 Edition
Windows Server 2003 (IPF)	A generic term for Microsoft Windows Server 2003, Enterprise Edition for Itanium-based Systems, and Microsoft Windows Server 2003, Datacenter Edition for Itanium-based Systems
Windows Server 2003 (x64)	A generic term for Microsoft Windows Server 2003, Standard x64 Edition, Microsoft Windows Server 2003, Enterprise x64 Edition, Microsoft Windows Server 2003, Datacenter x64 Edition, Microsoft Windows Storage Server 2003 Standard x64 Edition, Microsoft Windows Storage Server 2003 Enterprise x64 Edition
Windows XP	Microsoft Windows XP Professional

Index