



# **HiCommand® Provisioning Manager User's Guide**



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# Preface

This document describes and provides instructions for using the HiCommand® Provisioning Manager licensed software product.

This document is intended for those who use Provisioning Manager to operate and manage a system based on a storage subsystem. Specifically, this document is intended for:

- First time users of Provisioning Manager.
- Users who want an overview of Provisioning Manager before installing a system.

The readers of this document should have the following:

- Basic knowledge of storage-area networks (SANs)
- Knowledge of the following functions in HiCommand Device Manager: installation, user setting, resource group setting, volume creation, volume allocation, and logical group creation
- Basic knowledge of path control of HiCommand Dynamic Link Manager (HDLM)
- Basic knowledge of the operating system (OS) (e.g., Windows®, Solaris™, AIX®, or Linux®) for a host managed by Provisioning Manager
  - If the host OS is Windows, knowledge of basic disks, dynamic disks, and NTFS
  - If the host OS is Solaris, knowledge of VERITAS™ Volume Manager 3.5 and 4.0, VERITAS File System 3.5 and 4.0, and SDS/SVM (Solstice DiskSuite™ and Solaris Volume Manager)
  - If the host OS is AIX, knowledge of Logical Volume Manager and Journaled File System
  - If the host OS is Linux, knowledge of Logical Volume Manager, ext2 and ext3

**Note:** The use of HiCommand Provisioning 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 Provisioning Manager version 5.7 and higher.

## Conventions for Storage Capacity Values

This document uses the following convention for storage capacity values:

- 1 KB (kilobyte) = 1,024 bytes
- 1 MB (megabyte) = 1,024<sup>2</sup> bytes
- 1 GB (gigabyte) = 1,024<sup>3</sup> bytes
- 1 TB (terabyte) = 1,024<sup>4</sup> bytes

## Referenced Documents

- *HiCommand Provisioning Manager Server Installation and Configuration Guide (MK-93HC038)*
- *HiCommand Provisioning Manager Error Codes (MK-95HC117)*
- *HiCommand Device Manager Server Installation and Configuration Guide (MK-91HC002)*
- *HiCommand Device Manager Web Client User's Guide (MK-91HC001)*
- *HiCommand Device Manager CLI User's Guide (MK-91HC007)*
- *HiCommand Device Manager Agent Installation Guide (MK-92HC019)*
- *HiCommand Device Manager Error Codes (MK-92HC016)*
- *HiCommand Dynamic Link Manager User's Guide (for Windows) (MK-92DLM129)*
- *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 Tuning Manager User's Guide (MK-92HC022)*

## Readme and Release Notes Contents

These files can be found on the installation CD. They contain requirements that may not be fully described in this manual. Be sure to review these files before installation.

## 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.

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# Chapter 1 Overview of HiCommand Provisioning Manager

This chapter explains the features of HiCommand Provisioning Manager, its components, and its relationships to other programs. The chapter also summarizes what you can do with Provisioning Manager, and gives an overview of the procedures for installing and operating Provisioning Manager.

- The Provisioning Manager Mission (section 1.1)
- Provisioning Manager Components (section 1.2)
- Programs Related to Provisioning Manager (section 1.3)
- Installing Provisioning Manager (section 1.4)
- Provisioning Manager Operations (section 1.5)
- Manipulating Storage Subsystems (section 1.6)
- Using Provisioning Manager With Other Products (section 1.7)

## 1.1 The Provisioning Manager Mission

Storage subsystems and storage service providers (SSPs) have increased enormously in size and functionality to meet the evolving needs of corporate customers and continuing demands for increased capacity.

HiCommand Provisioning Manager is designed to simplify storage management and reduce its costs by providing seamless control through a single interface over a wide variety of storage subsystems.

### 1.1.1 Managing Various Storage Subsystems as a Storage Pool

An area of managed data memory that resides on a set of storage subsystems is called a *storage pool*. The storage pool is a collection of volumes (LUs). You can use Device Manager's All Storage (My Storage) functionality to divide the storage pool into hierarchies and manage those hierarchies for each resource group.

HiCommand Provisioning Manager enables you to integrate and manage various models and types of storage subsystems as a single, logical storage pool (see Figure 1.1).

By presenting the volumes associated with each resource group as a single logical volume, Provisioning Manager lets you manage those volumes without having to be concerned about where they actually reside. This reduces the workload required to understand the usage condition of each volume and to maintain the various volumes.

For details about All Storage (My Storage) and resource groups, see the *HiCommand Device Manager Web Client User's Guide*.

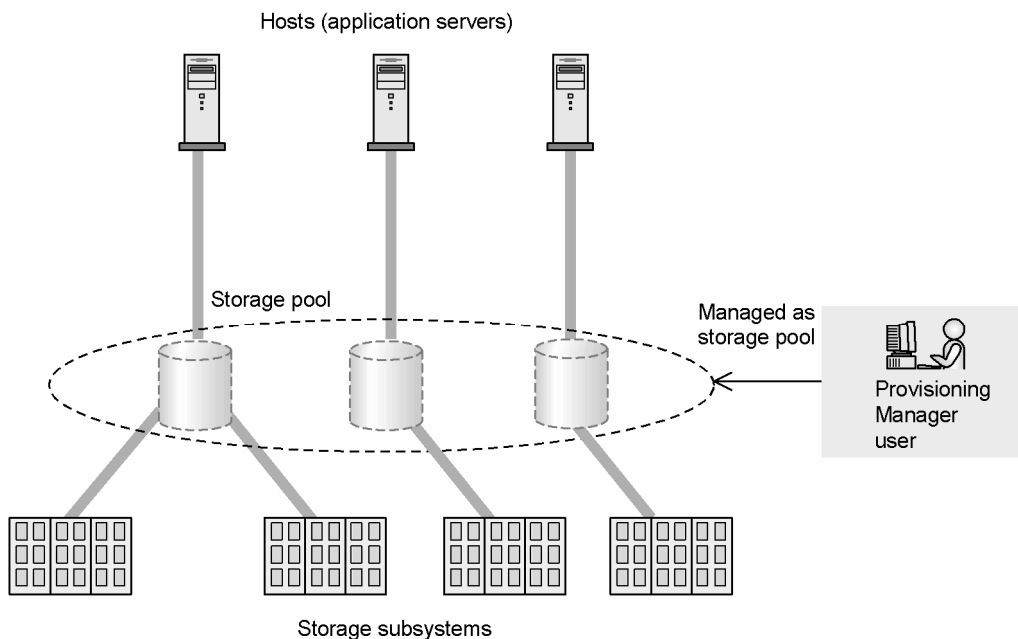


Figure 1.1 Example of a Storage Pool

As a way to locate volumes in a storage pool, you can use a *provisioning plan* to pre-define search conditions for volume allocation. Specifying a provisioning plan when you analyze a storage pool or display a list of volumes enables you to display only relevant items when searching from among a large number of volumes.

### 1.1.2 Managing Multiple Hosts from a Single Interface

Provisioning Manager provides the ability to manage different models of hosts using a single graphical user interface. This enables you to manage hosts efficiently without worrying about functional differences between them.

Using Provisioning Manager, you can view information required to manage storage subsystem operations, such as the host volume configuration of file systems and device files, and the data paths used by HBA WWNs, ports of the storage subsystem, and volumes of the storage subsystem. Moreover, by using volumes from the storage pool that are allocated to various hosts, you can also create and remove file systems and device files.

Figure 1.2 shows the settings for storage subsystems and hosts that use Provisioning Manager.

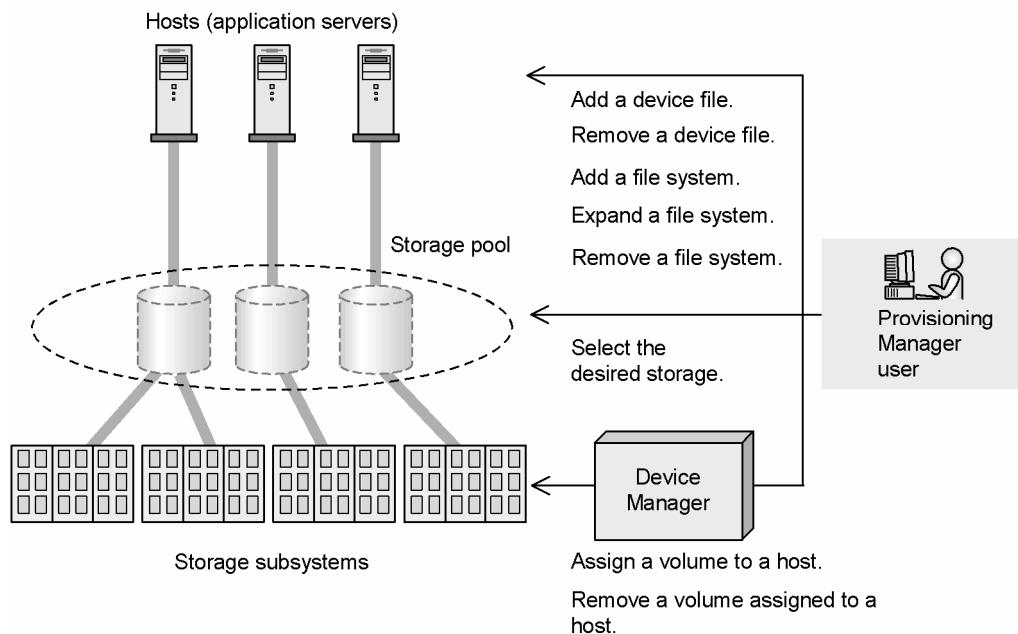


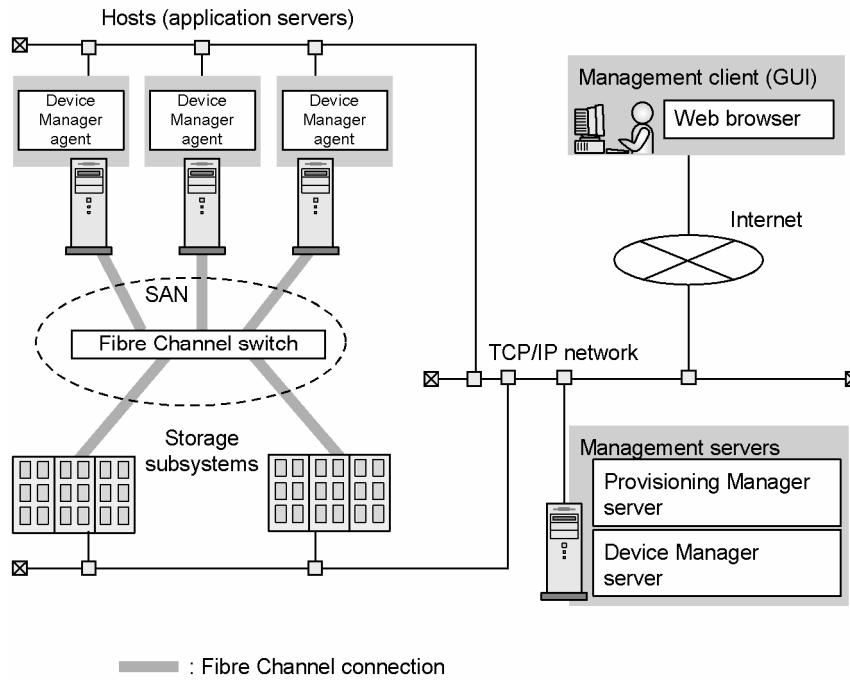
Figure 1.2 Setup of Storage Subsystems and Hosts

## 1.2 Provisioning Manager Components

Figure 1.3 shows the principal components of Provisioning Manager. Note that Provisioning Manager depends on, and can co-exist on the same server with, Device Manager:

- Provisioning Manager server (management server)  
The Provisioning Manager server controls storage pool management and host settings, based on instructions from the system administrator and the storage user at the host side.
- Provisioning Manager client (management client)  
The Provisioning Manager client is used by the system administrator and the storage user at the host side to pass instructions for storage subsystem and host operations to the Provisioning Manager server.
- Device Manager server  
This program is required in order to use Provisioning Manager. Device Manager server enables the setup and viewing of storage subsystem configuration information from Provisioning Manager.
- Device Manager agent  
Provisioning Manager uses Device Manager agent to enable the setup and viewing of host information. Device Manager controls volume managers, file systems, and other programs, and implements Provisioning Manager operations (device file addition, file system addition and expansion, etc.).

For more details about prerequisites for Provisioning Manager, related programs, and how to configure a system, see the *HiCommand Provisioning Manager Server Installation and Configuration Guide*.



**Figure 1.3** Principal Components of Provisioning Manager

## 1.3 Programs Related to Provisioning Manager

Hitachi Data Systems sells several products related to Provisioning Manager:

### HiCommand Dynamic Link Manager

Dynamic Link Manager is used to create a redundant configuration for the paths between host ports and storage subsystems.

Dynamic Link Manager is a program product that manages access paths to the storage.

For details about Dynamic Link Manager, see the manual for Dynamic Link Manager.

By using the Provisioning Manager's single sign-on functionality, you can start the following applications in the HiCommand series from Provisioning Manager. The initial screen of an activated application is displayed in a new window.

### HiCommand Device Manager

Device Manager operates and manages the systems that use various models of storage subsystems. Device Manager is a prerequisite program for Provisioning Manager.

For details about HiCommand Device Manager, see the Device Manager manuals.

### HiCommand Tuning Manager

Tuning Manager monitors the performance of the entire network including a SAN environment that is provided by Lightning/Thunder series storage subsystems.

For details about HiCommand Tuning Manager, see the Tuning Manager manuals.

## 1.4 Installing Provisioning Manager

To install Provisioning Manager, you perform the following general steps:

1. Install prerequisite and related programs.

Before installing Provisioning Manager, you must install and set up required and related programs. For details about installing required and related programs, see the documentation for the applicable programs.

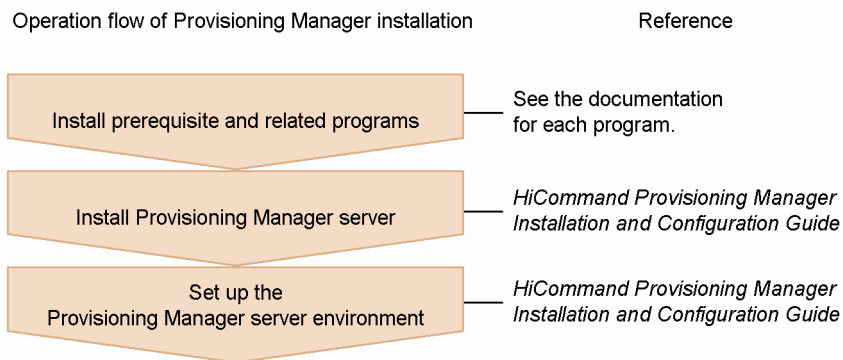
2. Install Provisioning Manager server.

For details on installing Provisioning Manager server, see the *HiCommand Provisioning Manager Server Installation and Configuration Guide*.

3. Set up the Provisioning Manager server environment.

This action completes installation of Provisioning Manager. Users are now able to use a Provisioning Manager client that provides communication with this Provisioning Manager server over the HTTP protocol to manage storage pools. For details about the browser versions that can be used to operate Provisioning Manager clients and how to work with the GUI, see Chapter 2.

Figure 1.4 provides an overview of the operation flow used for installing Provisioning Manager onto a management server.



**Figure 1.4** Operation Flow for Installing Provisioning Manager

## 1.5 Provisioning Manager Operations

Table 1.1 lists and describes operations that you can perform using Provisioning Manager.

**Table 1.1 Provisioning Manager Operations**

Managed Item	Operation	Section(s)
Storage pool	<ul style="list-style-type: none"><li>▪ View a storage pool. Enables you to view storage pool information from various perspectives, including all storage pool information, by RAID level, and by storage subsystem.</li><li>▪ View a list of volumes. Enables you to view a list of allocated and unallocated volumes.</li><li>▪ Allocate a volume.</li><li>▪ Unallocate a volume.</li><li>▪ Move a volume between storage pools.</li></ul>	3.1 3.2
Host	<ul style="list-style-type: none"><li>▪ View a host.</li><li>▪ Update host information.</li></ul>	3.3
File system	<ul style="list-style-type: none"><li>▪ View a file system.</li><li>▪ Create a file system.</li><li>▪ Expand a file system.</li><li>▪ Delete a file system.</li></ul>	3.4
Device file	<ul style="list-style-type: none"><li>▪ View a device file.</li><li>▪ Create a device file.</li><li>▪ Delete a device file.</li></ul>	3.5
Provisioning plan	<ul style="list-style-type: none"><li>▪ View a provisioning plan#.</li><li>▪ Work by using a provisioning plan#.</li></ul> <p># A provisioning plan includes conditions for locating volumes in a storage pool. It is used when creating file systems and device files.</p>	3.6
Operation log	<ul style="list-style-type: none"><li>▪ View transaction logs.</li><li>▪ Re-start operations that were interrupted.</li></ul>	3.7

Table 1.2 lists access permission levels for operations that you can perform using Provisioning Manager.

**Table 1.2 Access Permissions for Provisioning Manager Operations**

Operation	Admin permission	Modify permission	View permission
Viewing storage pools or listing volumes	Y	Y	Y
Allocating or unallocating volumes	Y	Y	--
Moving volumes	Y	--	--
Viewing hosts or updating information	Y	Y	Y
Viewing file systems	Y	Y	Y
Creating, expanding, or deleting file systems	Y	Y	--
Viewing device files	Y	Y	Y
Creating or deleting device files	Y	Y	--
Viewing provisioning plans	Y	Y	Y
Adding provisioning plans	Y	Y	--
Manipulating provisioning plans	Y#	Y#	--
Viewing transaction logs	Y	Y	Y
Restarting cancelled processes	Y	Y	--

Y: Permitted

--: Not permitted

#: For provisioning plans, you can set *Public* or *Private* as an attribute indicating the security level as well as the access permissions. The operation permission depends on the combination of the security level and the access permission. For details, see XXX chapter 8, *Managing Provisioning Plans*.

**Note:** For a user to whom a user-defined resource group has been allocated, the permission is applicable to the resource group to which the user belongs.

## 1.6 Manipulating Storage Subsystems

This section provides examples of storage subsystem and host management operations that you can perform after installing Provisioning Manager.

Figure 1.5 shows the operation flow as a result of using Provisioning Manager to manipulate storage subsystems.

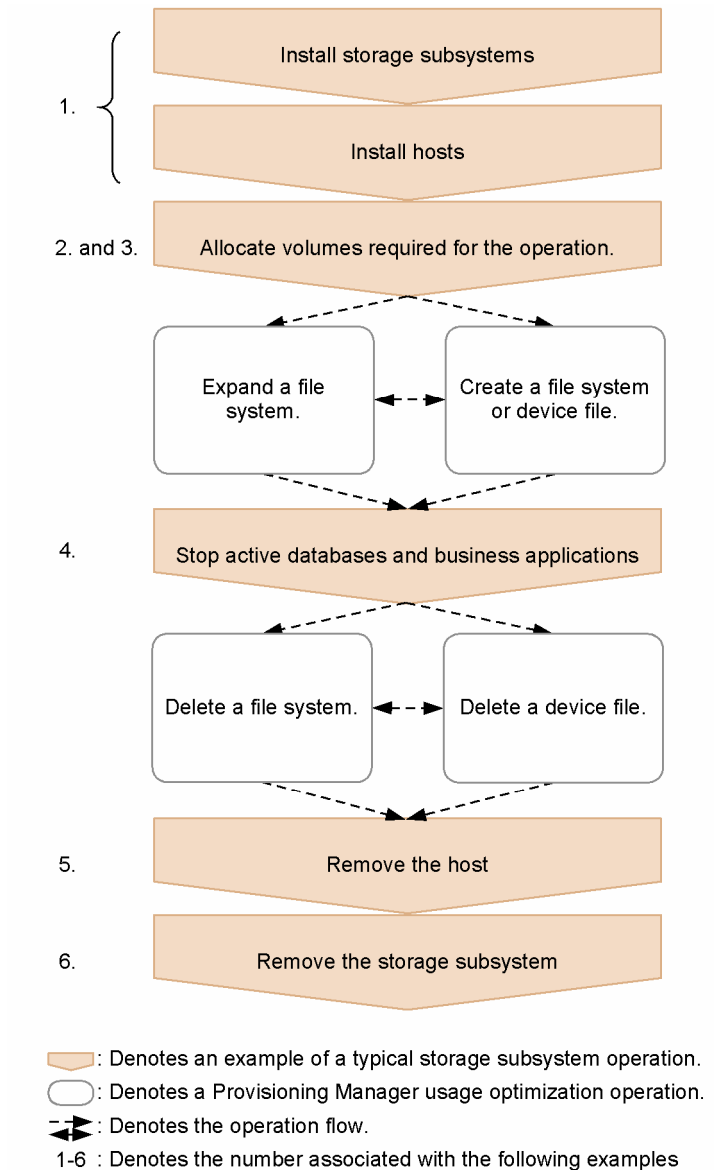


Figure 1.5 Using Provisioning Manager to Manipulate Storage Subsystems

The following explains the flow of operations on subsystems that use Provisioning Manager:

1. Install the storage subsystems and hosts. Use Device Manager to install. Installing storage subsystems by using Device Manager allows you to use Provisioning Manager to manage all the LDEVs and LUs defined in the storage subsystems. Also, installing Device Manager Agent on the installed host allows you to use Provisioning Manager to manage the file systems and device files on the host.
2. Allocate the LDEVs to resource groups created for each purpose so that you can manage storage pools by usage, such as by database or business application. Use Device Manager to define resource groups and the access scope for the volumes. Provisioning Manager recognizes the volume access scope defined in this manner as a *storage pool* that is a collection of volumes for each resource group.
3. Use Provisioning Manager to manage volumes used by databases and business applications. First, allocate a volume in a storage pool to a host on which the database or business application is running. Then, assign each host volume as a file system or device file for databases or business applications. Performing the above configuration enables databases or business applications to use the storage subsystems.
4. If you wish to detach an allocated volume when you have decided to stop a database or business application that is no longer needed, you can use Provisioning Manager to remove the file system or device file.
5. To remove a host that is no longer needed, use Provisioning Manager to detach the volume from the host to which it is allocated. Once you have confirmed that the volume is no longer allocated to the host you wish to remove, you can safely remove the host from the SAN. After you have removed it, use Device Manager to delete the host registration, which removes the host from under the control of Provisioning Manager.
6. When a storage subsystem is no longer needed, use Provisioning Manager to delete the file systems and device files for all hosts that use the storage subsystem you wish to remove. Once you have confirmed that no file system or device file that uses the storage subsystem you wish to remove exists, you can safely remove the storage subsystem from the SAN. After you have removed it, use Device Manager to delete the storage subsystem registration, which removes the storage subsystem from under the control of Provisioning Manager.

For details about using Device Manager, see the *HiCommand Device Manager Web Client User's Guide*.

## 1.6.1 When Data Assets Have Increased

To accommodate increases in data assets brought on by such occurrences as increases in the data handled by a database or enhancement of business applications, you need to add one or more additional volumes to the host. With Provisioning Manager, you can choose the way to add volumes, depending on the status of the storage pool.

- **Optimizing disparities in the usage ratio of storage pools**

With Provisioning Manager, you can allocate storage pools for each resource group and manage the volumes within that storage pool. However, if disparities arise in the usage ratio of storage pools, we recommend that you optimize disparities in their usage ratios to use limited resources efficiently. With Provisioning Manager, you can view usage information on storage pools and list information about unallocated volumes for each resource group. Based on this information, you can use Provisioning Manager to allocate surplus capacity to the storage pool where there is insufficient free capacity. This enables you to operate your limited storage subsystem assets with a minimum of waste.

- **Resolving a serious shortage of volumes**

When you cannot resolve the shortage of volumes even by optimizing the usage ratio of storage pools or reducing the amount of saved data, you must add one or more storage subsystems.

To add a volume to the host, you can use Device Manager to install a storage subsystem, and then use Provisioning Manager to move the volume between the storage subsystems.

To add a volume to the host:

1. Use Device Manager to install storage subsystems and define LDEVs or LUs. This operation adds the LDEVs or LUs to All Storage.

In Provisioning Manager, these volumes are added to the storage pool that is equivalent for All Storage. For details about All Storage, see the *HiCommand Device Manager Web Client User's Guide*.

2. Move the volume from the storage pool where the volumes were added to the desired storage pool by using Provisioning Manager.

## 1.6.2 When the Unit for Managing Storage Pools Has Been Changed

When the unit for managing storage pools has been changed in response to the establishment of a new department or office, or when the existing storage pools are divided or integrated, you must add a storage pool according to the unit.

To add a storage pool:

1. Define new resource groups or the access scope for volumes by using Device Manager. This operation adds a new storage pool in Provisioning Manager.
2. Move the desired volume to the added storage pool.

Volumes that are already allocated to the host must be allocated to resource groups separately by using Device Manager. For details, see the Device Manager manuals.

## 1.7 Using Provisioning Manager with Other Products

This section outlines the advantages of using Provisioning Manager with HiCommand Dynamic Link Manager (HDLM) and third-party Volume Managers.

### 1.7.1 Using Provisioning Manager with HDLM

Setting up more than one physical path between a host and a subsystem can enhance system reliability and availability. You achieve path redundancy by using the path management functionality of HiCommand Dynamic Link Manager (HDLM). You must install HDLM on each host in advance. Figure 1.6 provides an overview of the relationships between HDLM, the host, the storage subsystem, and the management servers when path redundancy is provided.

HDLM manages access paths from a host port to a port in the storage subsystem. Because HDLM provides functionality for switching to another path in the event of a failure and for distributing the workload among the paths, linking HDLM with Provisioning Manager provides the following advantages:

- **Failover**  
You can set up multiple paths between the host and logical units (LUs) in the subsystem. If a failure occurs on an active path, HDLM automatically switches to another normal path so that processing can continue.
- **Failback**  
When a failed path is recovered, HDLM can restore the recovered path to active status (the status in which I/Os can be issued normally).
- **Load distribution**  
You can set up multiple paths between the host and the LUs in the subsystem. Appropriate paths are used for I/O processing at the LUs. This prevents performance in the overall system from being degraded due to the workload being concentrated on a particular path.
- **Path health check**  
HDLM can automatically check the status of paths at regular intervals and is able to detect failures. This enables the user to recognize path errors and take appropriate action.

For more information on Dynamic Link Manager, please see the following documents:

- *HiCommand Dynamic Link Manager User's Guide for AIX Subsystems*
- *HiCommand Dynamic Link Manager User's Guide for HP-UX Subsystems*
- *HiCommand Dynamic Link Manager User's Guide for Linux Subsystems*
- *HiCommand Dynamic Link Manager User's Guide for Sun™ Solaris™ Subsystems*
- *HiCommand Dynamic Link Manager User's Guide for Windows NT® and Windows 2000 Subsystems*

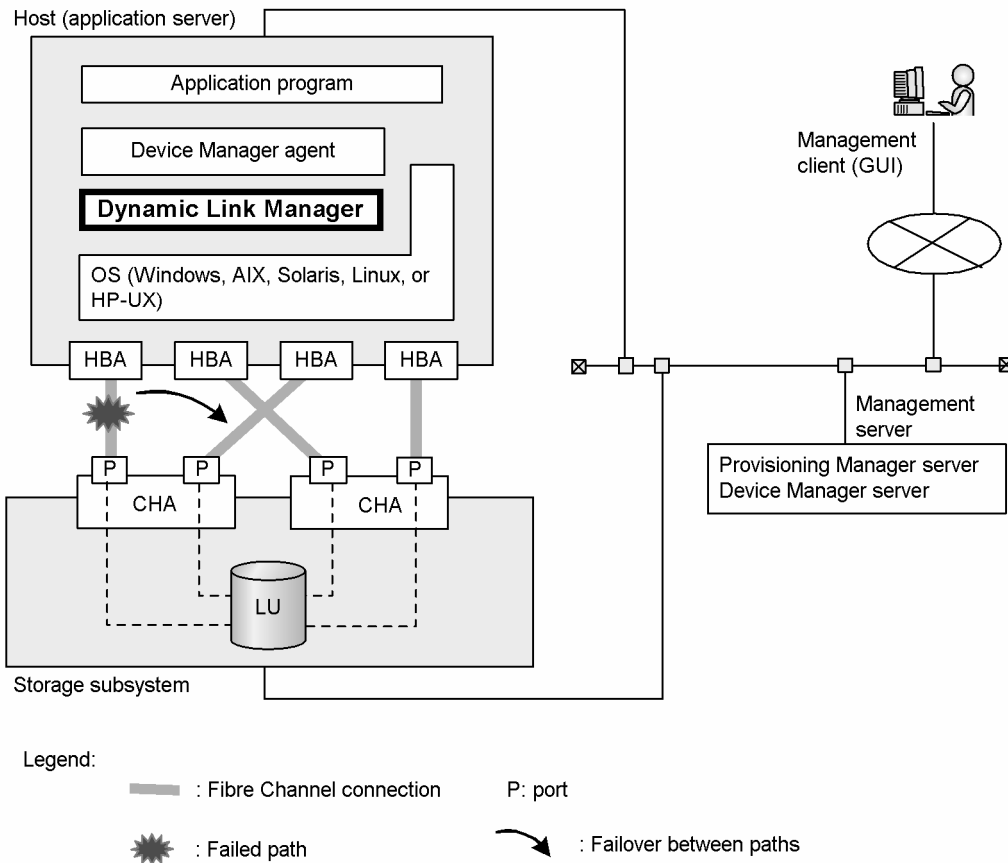


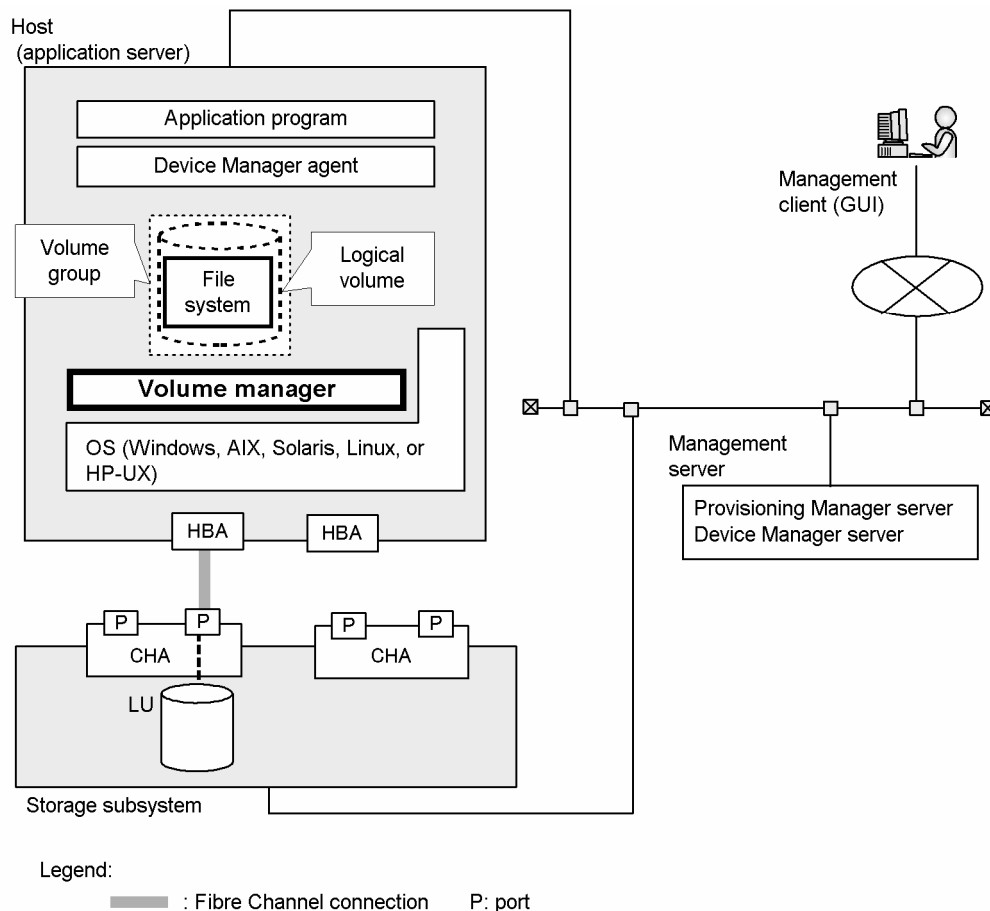
Figure 1.6 Path Redundancy Provided by HDLM

## 1.7.2 Using Provisioning Manager with Volume Managers

If you want to expand a file system that was created with Provisioning Manager, you can use third-party volume manager software. Expanding a file system means increasing the size of the file system whenever it becomes necessary to do so, without affecting the data in the existing files created in that file system.

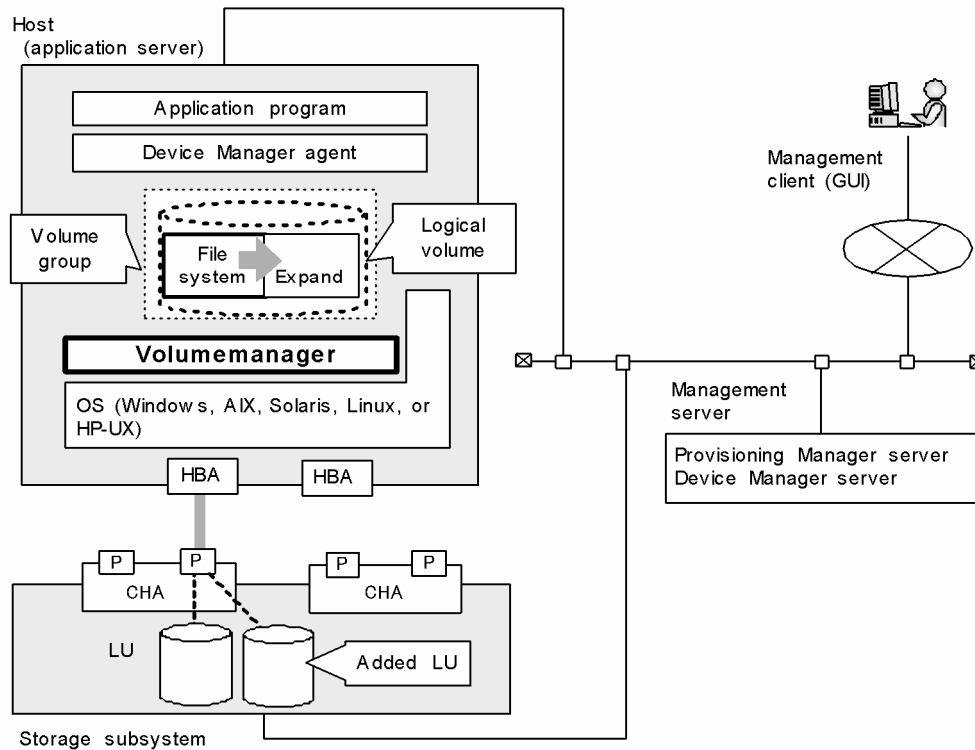
Volume manager products are installed on the host, and can be used either together with HDLM or separately. If a file system might be expanded after it is created, you must specify which volume manager was used to create the file system. Figure 1.7 shows a system configuration (without using Dynamic Link Manager) when a volume manager is linked. Figure 1.8 provides an overview of creating and expanding a file system.

To create a file system, the volume manager creates a volume (disk) group for each LU, and then creates one logical volume in the volume group as shown in Figure 1.7. The file system is then created in that logical volume.



**Figure 1.7** Linking with a Volume Manager (Creating a File System)

To expand a file system, the volume manager adds an LU into the volume (disk) group to expand the logical volume as shown in Figure 1.8, then the file system in the logical volume is expanded.



Legend:  
 — : Fibre Channel connection      P: port

Figure 1.8 Linking with a Volume Manager (Expanding a File System)

### 1.7.2.1 Types of Volume Managers

A Volume Manager is installed on the host. Some volume managers are provided by default with the host OS. Other volume managers might be available even if they are not provided by default.

### **1.7.2.2 Setting Up for Volume Managers**

You can link the volume managers of other manufacturers with Provisioning Manager. Some volume managers are provided by default with the host OS. Other volume managers might be available on some OSs even if they are not provided by default. You do not need to perform setup, other than installation of a volume manager that is not provided by default with the host OS on the host, in order to link a volume manager with Provisioning Manager. Even if a volume manager is installed on the host, each time you create a device file or file system, you must specify on the GUI window whether that volume manager is to be used. As a result, the storage subsystem might contain some device files and file systems created by using the volume manager, and some that were created without using the volume manager. Even if a volume manager is installed on the host and set up to link with Provisioning Manager, the user can use the volume manager directly to create, expand, and delete volume (disk) groups and logical volumes. If Provisioning Manager used the volume manager to create a file system or device file, the user can use the volume manager directly to expand or delete a target volume group or logical volume.

### **1.7.2.3 Specifying Use of the Volume Manager**

Even if a volume manager is installed on the host, you must specify through the Provisioning Manager GUI whether that volume manager is to be used each time you create a device file or file system. As a result, the storage subsystem might contain a mix of device files and file systems: some created by using the volume manager, and some created without using the volume manager.

### **1.7.2.4 Using the Volume Manager Directly**

You can use the volume manager directly to create, expand, and delete volume (disk) groups and logical volumes even if a volume manager is installed on the host and set up to link with Provisioning Manager.

If Provisioning Manager used the volume manager to create a file system or device file, you can use the volume manager directly to expand or delete a target volume group or logical volume.

### 1.7.3 About Single Sign-On Functionality

You can start HiCommand Suite products from Provisioning Manager's GUI. These products can be started from the **Dashboard** menu in the Provisioning Manager main window. For details about the **Dashboard** menu, see section 2.4.3.

When you start HiCommand Suite products, if you have logged in to Provisioning Manager and you have the user permissions for the products then, through the Single Sign-On functionality of HiCommand Suite Common Component, you can launch the products without having to re-enter your user ID and password.

Installing, uninstalling, starting, or stopping Device Manager also installs, uninstalls, starts, or stops the HiCommand Suite Common Component. When you restart Provisioning Manager to obtain database synchronization or recover a failure, you only need to operate Provisioning Manager.

## Chapter 2 Provisioning Manager Planning and Startup

This chapter describes the prerequisites for using Provisioning Manager, and the procedure for starting and logging into the program.

- Before logging in to Provisioning Manager (section 2.1)
- Logging in to Provisioning Manager (section 2.2)
- Viewing and Installing License Information (section 2.3)
- Using the Provisioning Manager Main Window (section 0)

## 2.1 Before Logging in to Provisioning Manager

Before starting Provisioning Manager, you must check the following:

- Check that Provisioning Manager has already been installed and configured for a Provisioning Manager environment and is ready for operation. Write down the IP address of the Provisioning Manager server.

For details on the Provisioning Manager server, see the *HiCommand Provisioning Manager Server Installation and Configuration Guide*.

- If any of the following tasks were being performed in Device Manager, make sure the tasks have finished:
  - Creating volumes
  - Registering users
  - Allocating a host and volume to a resource group

For details on the settings in Device Manager, see the *HiCommand Device Manager Web Client User's Guide*.

- Check what browser you are using and its version.

Table 2.1 lists the names and versions of the required OSs and browsers for the management client (GUI).

**Table 2.1 Required OS and Browser for Management Client (GUI)**

OS Name	OS Version	Browser
Windows 2000	Windows 2000 Server SP3 Windows 2000 Server SP4 Windows 2000 Advanced Server SP3 Windows 2000 Advanced Server SP4 Windows 2000 Datacenter Server SP3 Windows 2000 Datacenter Server SP4 Windows 2000 Professional SP3 Windows 2000 Professional SP4	Internet Explorer 6.0
Windows server™ 2003 (x86)	Windows server 2003 Standard Edition Windows server 2003 Enterprise Edition Windows server 2003 Datacenter Edition	Internet Explorer 6.0
	Windows Server 2003, Standard Edition SP1 Windows Server 2003, Standard Edition SP2 Windows Server 2003, Enterprise Edition SP1 Windows Server 2003, Enterprise Edition SP2 Windows Server 2003, Datacenter Edition SP1 Windows Server 2003, Datacenter Edition SP2	Internet Explorer 6.0 Internet Explorer 7.0
Windows Server 2003 R2 (x86)	Windows Server 2003 R2, Standard Edition Windows Server 2003 R2, Standard Edition SP2 Windows Server 2003 R2, Enterprise Edition Windows Server 2003 R2, Enterprise Edition SP2	Internet Explorer 6.0

OS Name	OS Version	Browser
	Windows Server 2003 R2, Datacenter Edition Windows Server 2003 R2, Datacenter Edition SP2	
Windows Vista™	Windows Vista Business Windows Vista Enterprise Windows Vista Ultimate	Internet Explorer 7.0
Windows XP	Windows XP Professional Windows XP Professional SP1	Internet Explorer 6.0
	Windows XP Professional SP2	Internet Explorer 6.0 Internet Explorer 7.0
Solaris (SPARC version)	Solaris 8	Mozilla 1.4
	Solaris 9	Mozilla 1.4 Mozilla 1.7
	Solaris 10	Mozilla 1.7
HP-UX	HP-UX 11i v1 (PA-RISC) HP-UX 11i v2 (IPF) HP-UX 11i v2 (PA-RISC)	Mozilla 1.7.8.00 Mozilla 1.7.12.01
	HP-UX 11i v3 (IPF)	Mozilla 1.7.13.01

**Caution:** When the browser is set as noted below, characters might be displayed on top of each other in the Provisioning Manager GUI.

- In Internet Explorer, the character size is set to **Largest**.
- In Internet Explorer version 7.0, the enlargement level is a value other than **100%** (default).
- In Mozilla, the character size is set to a value greater than 120%.A

**Caution:** When Internet Explorer 7.0 is used, in **When a pop-up is encountered**, you must select a radio button other than **Always open pop-ups in a new tab**. If **Always open pop-ups in a new tab** is selected, the window might be displayed behind another window.

- Check the configuration of a browser for which pop-up blocking is enabled.

When using Provisioning Manager on a browser for which pop-up blocking is enabled, configure the browser so that pop-ups of the Provisioning Manager server are not blocked.

When using Provisioning Manager on a browser which has pop-up blocking enabled, configure the browser so that pop-ups of the Device Manager server and the Provisioning Manager server are not blocked. For details on how to configure the browser so that pop-ups of the Device Manager server are not blocked, see the *HiCommand Device Manager Web Client User's Guide*.

Example: When using Internet Explorer for Windows XP (SP2), configure either of the following settings:

- Choose **Tools**, and then **Internet Options**. In the Internet Options dialog box, choose the **Security** tab, and then add the URL for the Provisioning Manager server to **Trusted Sites**.

Enter the URL in the following format:

```
http://Provisioning-Manager-server-address:port-number/ProvisioningManager/
```

In place of *Provisioning-Manager-server-address*, enter either the IP address of the Provisioning Manager server or the host name.

For *port-number*, enter the port number of the HBase Storage Mgmt Web Service of the HiCommand series. For details, see the *HiCommand Device Manager Server Installation and Configuration Guide*.

The following shows the example when specifying the default value for the port number:

For non-SSL

```
http://Provisioning-Manager-server-address:23015/ProvisioningManager/
```

For SSL

```
https://Provisioning-Manager-server-address:23016/ProvisioningManager/
```

- When a pop-up is blocked and a warning message is displayed, select **Always Allow Pop-Ups From This Site**.
- Check the security settings of Internet Explorer.

Make sure the following settings are configured on a browser that uses Provisioning Manager.

  - **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**.
  - For Internet Explorer 7.0, **Allow websites to prompt for information using scripted windows** is set to **Enable**.

**Important:** The language that is displayed in the Provisioning Manager GUI depends on the language setting in the browser being used. The date format also depends on the browser's language setting is displayed by default as shown below. Browser time is displayed in 24-hour clock format, regardless of the language setting.

- English: *MM/DD/YYYY*
- Japanese: *YYYY/MM/DD*

The language used in the **Browse** button in the Provisioning Manager Version Information dialog box and the license selection dialog box displayed by the **Browse** button depend on the version of the OS and browser being used. If you are using English versions of the OS and browser, text in these windows is displayed in English. If you are using a Japanese version of the OS and browser, text in these windows is displayed in Japanese.

When the OS for the client machine is Solaris, a character string in the title bar may not be displayed correctly when the language setting of the Web browser differs from that of X-terminal. Match the language setting of the Web browser to that of X-terminal.

**Caution:** Provisioning Manager operations may not return expected results if you perform any of the following actions:

- Clicking browser-provided buttons such as the **Next** button or the **Back** button
- Selecting an item in the menu that is displayed when you right-click in a window
- Using a shortcut key, such as the **Backspace** key or the **Tab** key
- Choosing a menu bar item in the browser window

None of these actions will damage the databases used internally by Provisioning Manager. If necessary, you can recover from any of the above actions as follows:

- In Internet Explorer, choose the **View** menu in the browser window, and then choose **Refresh**. The window that is displayed after you log in is displayed.
- In Mozilla, choose the **View** menu in the browser window, and then choose **Reload**. The window that is displayed after you log in is displayed.

## 2.2 Logging in to Provisioning Manager

When you finish the preparations described in section 2.1, you can start Provisioning Manager from the User Login dialog box.

To log in to Provisioning Manager:

1. Start the browser and enter the Provisioning Manager server URL. Enter the URL in the following format:

```
http://Provisioning-Manager-server-address:port-number/ProvisioningManager/
```

In place of *Provisioning-Manager-server-address*, enter either the IP address of the Provisioning Manager server or the host name.

For *port-number*, enter the port number of the HBase Storage Mgmt Web Service of the HiCommand series. For details, see the *HiCommand Device Manager Server Installation and Configuration Guide*.

**Example:** If the IP address is 172.16.45.1 and the default value of the port number is 23015, enter the address as shown below:

```
http://172.16.45.1:23015/ProvisioningManager/
```

The Provisioning Manager title dialog box is displayed.

2. Click the **Login** button. The User Login dialog box is displayed.

**Caution:** If you are accessing Provisioning Manager for the first time after installation, a message asking you to enter the license appears. In this case, install the Provisioning Manager license key, and then log in. For details on installing the license key, see section 2.3.

**Important:** If necessary, you can set a warning message for display in the User Login dialog box. For details on how to configure the setting, see the *HiCommand Device Manager Server Installation and Configuration Guide*.

3. Enter the **User ID** (user name defined with Device Manager) and **Password**.

**Note:** The default User ID is "system". The default password is "manager".

The **Password** is case sensitive. If you enter an invalid password, a User Login dialog box displays an error message. In such a case, enter the correct password.

**Caution:** If multiple successive login attempts fail, the user account may become locked. If this occurs, contact the system administrator.

4. Click the **Login** button.

The Provisioning Manager main (initial) window opens.

## 2.3 Viewing and Installing License Information

In dialog box for Provisioning Manager license information, you can view license information and install your Provisioning Manager license key.

**Caution:**

In the dialog box for Provisioning Manager license information, you cannot install license keys for other HiCommand Suite products. To install a license key for any other HiCommand Suite product, use the dialog box for license information for that specific product.

If you attempt to start any other HiCommand Suite product from the **Dashboard** menu without installing a license key, the User Login dialog box for the other product appears.

To view license information and install a license key for Provisioning Manager:

1. Open the dialog box for Provisioning Manager license information.

Perform one of the following operations:

- Before logging in to Provisioning Manager, click the **License** button on the User Login dialog box.
- After logging in to Provisioning Manager, in the global tasks bar area, select **Help** and then **About**.
- After logging in to Provisioning Manager, in the **Explorer** menu, select **Settings** and then **License Info**. To install a license key, in the License Info subwindow, click the **Edit License** button.

If you only want to view license information, go to step 4.

2. Enter the license key.

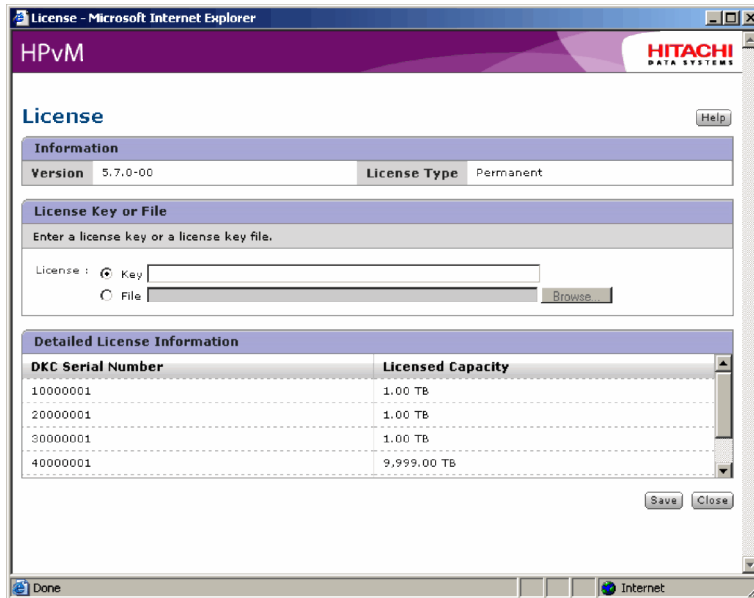
To directly enter the license key, select the **Key** radio button, and then enter the license key.

To use a license key file, select the **File** radio button, and use the **Browse** button to select a license key file.

3. To install the license key you specified in step 2, click the **Save** button.

A message states that the license key has been installed.

4. Click the **Close** button.



**Figure 2.1 License Dialog Box (When a License Key Has Been Installed)**

The dialog box for license information of Provisioning Manager (see Figure 2.1) displays the following information about Provisioning Manager:

- Version information
- License type information
  - The license types are **Permanent**, **Temporary**, **Emergency**, and **Unregistered**.
- Serial number of the storage subsystem that is associated with the license key
- Licensed capacity

**Important:** When a temporary license is used, the serial number of the storage subsystem and the license capacity that correspond to the license key are not displayed.

## 2.4 Using the Provisioning Manager Main Window

The Provisioning Manager main window (see Figure 2.2) provides access to all Provisioning Manager functions.

Note that the term Provisioning Manager main (initial) window refers to the main window that appears when you first log on. When you select something in this window, some parts of the window change. The resulting window is called a *Provisioning Manager main (work) window*. The generic term *Provisioning Manager main window* refers to both these windows.

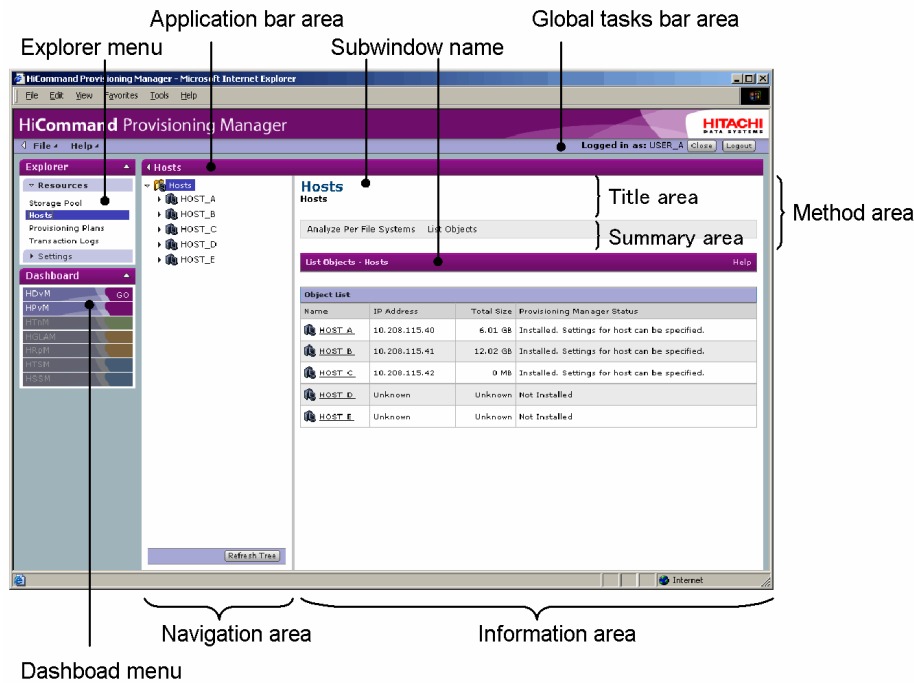


Figure 2.2 Organization of the Provisioning Manager Main (Work) Window

The Provisioning Manager main (work) window consists of the following components:

- **Global tasks bar area** (see section 2.4.1)
- **Explorers menu** (see section 2.4.2)
- **Dashboard** (see section 2.4.3)
- **Application bar area**  
Displays the menu item selected in the **Explorers** menu. If there are operations that can be performed for the object selected in the navigation area, the buttons for the operations are also displayed.
- **Navigation area** (see section 2.4.4).
- **Method area** (see section 2.4.5).  
In Provisioning Manager, an area consisting of the title area and the summary area is defined as a method area.

- **Information area** (see section 2.4.6).
- **Dialog box** (see section 2.4.7).

## 2.4.1 Global Tasks Bar Area

The global tasks bar area on the Provisioning Manager main window (see Figure 2.2) allows the logged-in user to perform global operations such as logging out and displaying the version information. This area also displays information about the user who is currently logged in.

The following describes the functions available in the global tasks bar area and the information displayed in the area.

- **File menu**
  - **Logout:** Allows you to log out of Provisioning Manager and other active HiCommand Suite products, and closes the Web browser.
  - **Close:** Closes the Web browser.
- **Go menu**
  - **Links:** Displays the link dialog box, from which user-registered applications can be launched.  
*Caution:* If no application has been registered, **Go** menu and **Links** are not displayed.
- **Help menu**
  - **Online manual:** Displays the online help manual for Provisioning Manager.
  - **About:** Displays the Provisioning Manager version and license information, and allows you to enter your license key when required.
- **Logged in as**

Displays the full name of the user who is currently logged in. When the full name has been omitted, the user ID is displayed.
- **Close button**

Closes the Web browser.
- **Logout button**

Allows you to log out of Provisioning Manager and other active HiCommand Suite products, and closes the Web browser.

## 2.4.2 Explorer Menu

The **Explorer** menu on the Provisioning Manager main window (see Figure 2.2) allows the logged-in user to select an operation available in Provisioning Manager. When an item is selected from the menu, the appropriate information is displayed in the application bar area, navigation area, method area, and information area.

You can switch whether the area, which contains the **Explorer** menu and **Dashboard** menu, is shown or hidden by clicking the leftmost button in the global tasks bar area.

The **Explorer** menu displays the following items:

### Resources

A submenu for using Provisioning Manager resources.

#### Storage Pool

Choosing this item displays the Storage Pool subwindow in the method area and the Show Properties - Storage Pool subwindow in the information area. From these subwindows, you can start managing storage pools.

#### Hosts

Choosing this item displays the host subwindow in the method area and the List Objects - Hosts subwindow in the information area. From these subwindows, you can start managing the host, file system, and device file.

#### Provisioning Plans

Choosing this item displays the Provisioning Plans subwindow in the method area and the List Objects - Provisioning Plans subwindow in the information area. From these subwindows, you can start managing provisioning plans.

#### Transaction Logs

Choosing this item displays the Transaction Logs subwindow in the method area and the List Objects - Transaction Logs subwindow in the information area. From these subwindows, you can view the transaction logs for the executed operations, as well as resume an interrupted operation.

### Settings

A submenu for setting necessary information for Provisioning Manager.

#### User Profile

Choosing this item displays the User Profile subwindow in the information area. This subwindow allows you to start viewing and editing of the profile of the logged-in user. For details about viewing and editing of the profile of the logged-in user, see the *HiCommand Device Manager Web Client User's Guide*.

#### License Info

Choosing this item displays the License Info subwindow in the information area. This subwindow allows you to start viewing and editing license information.

### 2.4.3 Dashboard Menu

The **Dashboard** menu on the Provisioning Manager main window (see Figure 2.2) displays a list of HiCommand Suite products, regardless of whether the product has been installed. The products that are installed are enabled; the products that are not installed are disabled (dimmed). An enabled product can be started by clicking **GO**. **GO** is not displayed for a product that has already started.

You can switch whether the area, which contains the **Explorer** menu and **Dashboard** menu, is shown or hidden by clicking the leftmost button in the global tasks bar area.

**Caution:** When linking with HSSM (HiCommand Storage Services Manager), you need to configure the Provisioning Manager settings so that HSSM can start from the **Dashboard** menu. For details about the configuration, see the *HiCommand Device Manager Server Installation and Configuration Guide*.

### 2.4.4 Navigation Area

The navigation area on some Provisioning Manager main (work) windows (see Figure 2.2) displays the object tree appropriate for the item selected in the **Explorer** menu. You can select the target object by using this tree. When an object is selected in the navigation area, the method area and information area display the information for the selected object.

You can switch whether the navigation area is shown or hidden by clicking the leftmost button in the application bar area.

Click the **Refresh Tree** button to refresh information in the window.

**Refresh Tree** button:

When you click the **Refresh Tree** button, the information displayed in the navigation area, method area, and information area is refreshed.

**Important:** The information set by using Device Manager is not automatically displayed in the Provisioning Manager window. When you set the information by using Device Manager, click the **Refresh Tree** button to display the latest information.

## 2.4.5 Method Area

The method area on the Provisioning Manager main window (see Figure 2.2) displays the methods that can be executed on the object selected in the navigation area. When a method is selected in the method area, the method execution dialog box is displayed or the execution results of the method are displayed in the information area.

The common items are described below:

- ***subwindow-name***

Displays the subwindow name. In this manual, a *subwindow* refers to a window displayed in the method area and information area.

- ***method-name***

Displays the method name. In this manual, a *method* refers to an item used to start an operation. When selected, either a new subwindow is displayed in the information area, or a popup dialog box is displayed.

When an object is selected in the navigation area, the method area also displays the location of the object in the object tree managed by Provisioning Manager. The location is displayed using greater-than signs (>) to separate the objects from the menu item selected in the **Explorer** menu down to the selected object. For example, when `host_0` is selected in the navigation area, the location displayed in the method area is as follows:

```
Hosts > host_0
```

When you click an object in the displayed location, the appropriate information for the object you clicked is displayed in the method area and information area.

## 2.4.6 Information Area

The information area in the Provisioning Manager main window (see Figure 2.2) displays details about the object selected in the navigation area, the buttons for operating the object, or the execution results of the method selected in the method area. When object details are displayed, the information area is called a subwindow and has the name *information-area -title-name*. Figure 2.3 shows the subwindow example displayed in the information area.

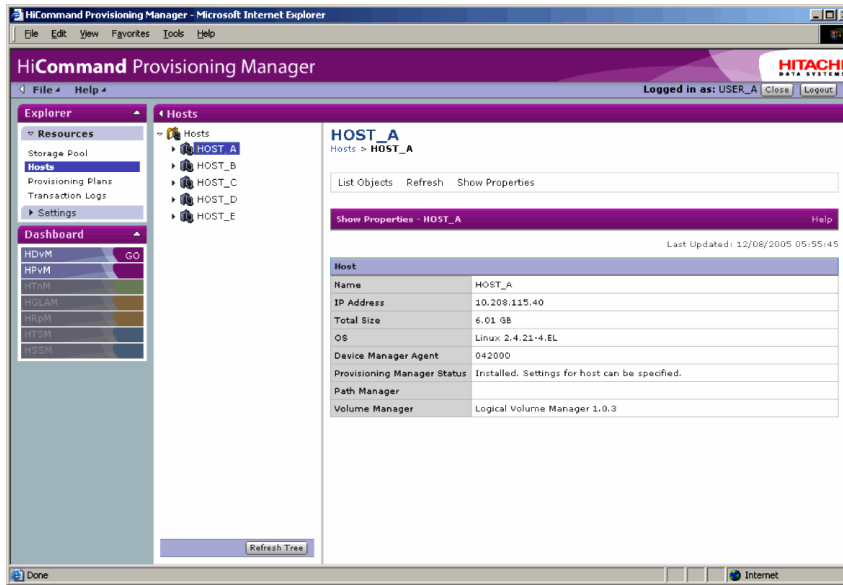


Figure 2.3 Subwindow Example Displayed in the Information Area

Items used in common among windows are described below:

- **subwindow-name**: Displays the subwindow name. In this manual, a *subwindow* refers to a window displayed in the method area and information area.
- **Help**: Displays details about items in the relevant subwindow.

## 2.4.7 Dialog Box

A dialog box is a pop-up window displayed when a method is selected in the method area or when an operation button is clicked in the information area. A dialog box displays the details of the selected operation, allowing you to set necessary conditions for the operation and to perform the operation. Figure 2.4 shows an example of a dialog box.

Allocation Plan	
Name *	PLAN_A
Owner Resource Group	All Resources
Description	
Security Level	Private
Subsystem	<input type="radio"/> Series Any <input type="radio"/> Model Any
RAID Level	Level: RAID5 Drive Configuration: 5D+1P
Create	Date/Time: 12/07/2005 11:42:43 Resource Group: All Resources User: System
Update	Date/Time: 12/08/2005 03:05:22 Resource Group: All Resources User: System

Figure 2.4 Sample Dialog Box

The common items are described below:

- **dialog-name**: Displays the name of the dialog box.
- **Help**: Displays details about items in the current dialog box.



## Chapter 3 Using Provisioning Manager

This chapter provides an overview of the main features of Provisioning Manager, with an emphasis on what you can do with the product and how it contributes to improved efficiency.

- Managing Storage Pools (section 3.1)
- Allocating and Unallocating Volumes (section 3.2)
- Managing Hosts (section 3.3)
- Creating, Expanding, and Deleting File Systems (section 3.4)
- Creating and Deleting Device Files (section 3.5)
- About Provisioning Plans (section 3.6)
- Managing Transaction Logs (section 3.7)

### 3.1 Managing Storage Pools

A storage pool is a collection of storage volumes (also called logical units or LUs). By organizing storage volumes into categories, you can manage storage pools by administrator, application, usage, or other purpose. This also allows you to manage storage logically by consolidating multiple storage subsystems consisting of the same or different physical storage devices into a single logical storage area. Figure 3.1 shows an example of storage pool organization.

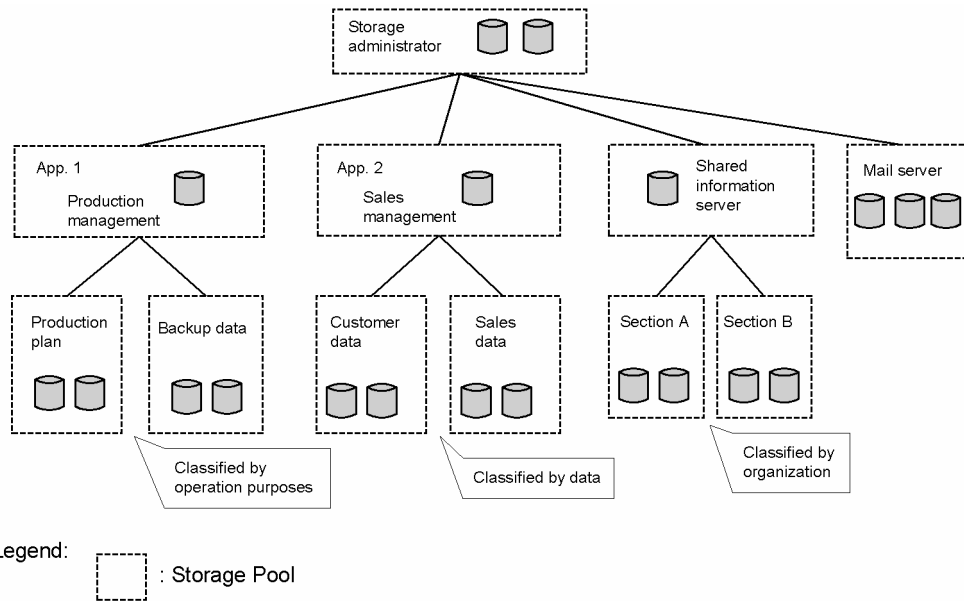


Figure 3.1 Organizing Storage Pools in Different Ways

### 3.1.1 Viewing Storage Pool Usage Status

You can display the allocation status (total capacity, allocated capacity, allocated ratio, and so on) of a storage pool. Storage systems can be viewed from various perspectives as part of a provisioning plan. This enables you to easily and efficiently manage massive storage volumes from a logical perspective, without having to be aware of the physical boundaries or detailed hardware configuration of the storage subsystems.

Figure 3.2 is a conceptualization of storage pool management. In the figure, the terms *allocated* and *unallocated* have the following meanings.

- **Allocated:** A state in which the relevant volume is assigned to a host (a path from the host to the storage volume is set)
- **Unallocated:** A state in which the relevant volume is not assigned to a host (no path from the host to the storage volume is set)

You can also view the allocation status of a storage pool in terms of the capacity base of each storage subsystem, by using a provisioning plan to define filtering conditions. This enables you to easily and efficiently monitor and perform the physical aspects of storage management, such as adding and removing storage subsystems and disks.

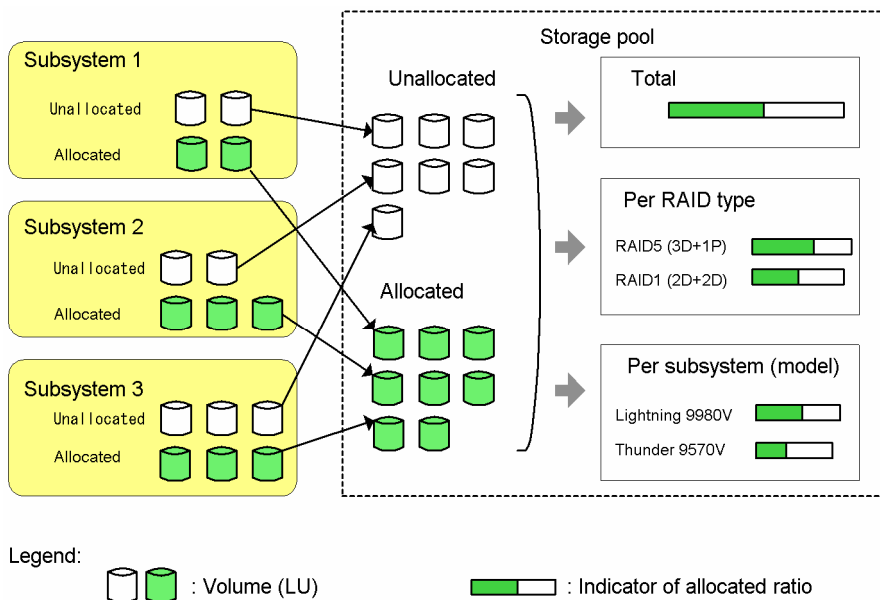


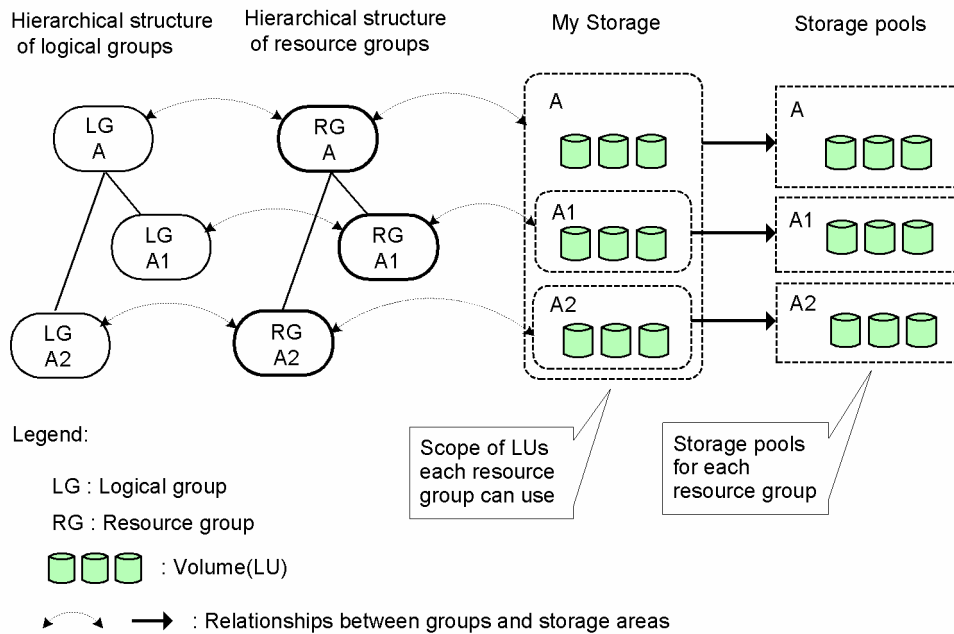
Figure 3.2 Storage Pool Management in Concept

### 3.1.2 Storage Pools and Storage Areas Provided by Device Manager

A Provisioning Manager storage pool is created by applying the My Storage mechanism provided by Device Manager.

- Each My Storage area corresponds one-to-one to a storage pool (when storage pools of resource groups at lower levels are included).
- The hierarchical structure of the logical groups enables hierarchical management of storage pools.

Figure 3.3 shows the relationships between logical groups, resource groups, My Storage areas, and storage pools. Figure 3.3 shows the relationships between logical groups, resource groups, My Storage areas, and storage pools when resource groups  $RG_{A1}$  and  $RG_{A2}$  exist under resource group  $RG_A$ .



**Figure 3.3 Relationships between Logical Groups, Resource Groups, My Storage Areas, and Storage Pools**

A storage pool is created for each resource group. For each group, the range of the storage pool that can be used (accessed and operated) contains the storage pool of the resource group to which the user belongs and the storage pools of any lower-order resource groups in the hierarchy of resource groups.

### 3.1.3 Creating a Storage Pool

This section outlines the procedure for creating a storage pool. You create a storage pool using Device Manager. Note that, for this procedure, you must have created storage volumes (LDEVs) of the required size and number in the storage subsystem.

Only users who have the following permissions are allowed to define resource groups and create logical groups.

- Creating a logical group

Users must have the `Modify` permission. If a user belongs to a user-defined resource group, the user can create a logical group under the logical group associated with this resource group.

- To define a resource group

Users must have the `Admin` permission. If a user belongs to a user-defined resource group, the user can create a resource group under this resource group.

To create a storage pool:

1. Create logical groups by administrator, application, usage, or other purpose.  
Create a hierarchical structure for the logical groups, taking into consideration your storage management system.
2. Define a resource group. At this point, you can optionally register users to the resource group.
3. Associate logical groups with resource groups. Configure the hierarchical structure of the resource groups to be the same as that of the logical groups.
4. Register the storage volumes (LDEVs) and the hosts that are to be managed under the resource group.

### 3.1.4 Linking Storage Pools with CLPR and SLPR Functions

Universal Storage Platform V, TagmaStore USP, and the TagmaStore AMS/WMS series provide a function (CLPR) for logically dividing caches. Universal Storage Platform V and TagmaStore USP also provide a function (SLPR) for logically dividing resources in storage subsystems. CLPR and SLPR functions enable you to assign a partitioned storage administrator to resources that have been partitioned by purpose and usage.

Provisioning Manager displays CLPR and SLPR numbers as logical unit attributes. You can use these CLPR and SLPR numbers to create a storage pool for each CLPR or SLPR by moving volumes and to search for the optimum logical unit for hosts.

Only a user who has the `Admin` permission and to whom the resource group `All Resources` has been allocated can create storage pools and allocate logical units by using the CLPR and SLPR numbers. Use Device Manager to establish correspondence between the storage subsystem administrator and partitioned storage administrator permissions and the Provisioning Manager permissions.

The following figures show how to create a storage pool and how to assign a volume by using the CLPR and SLPR functions:

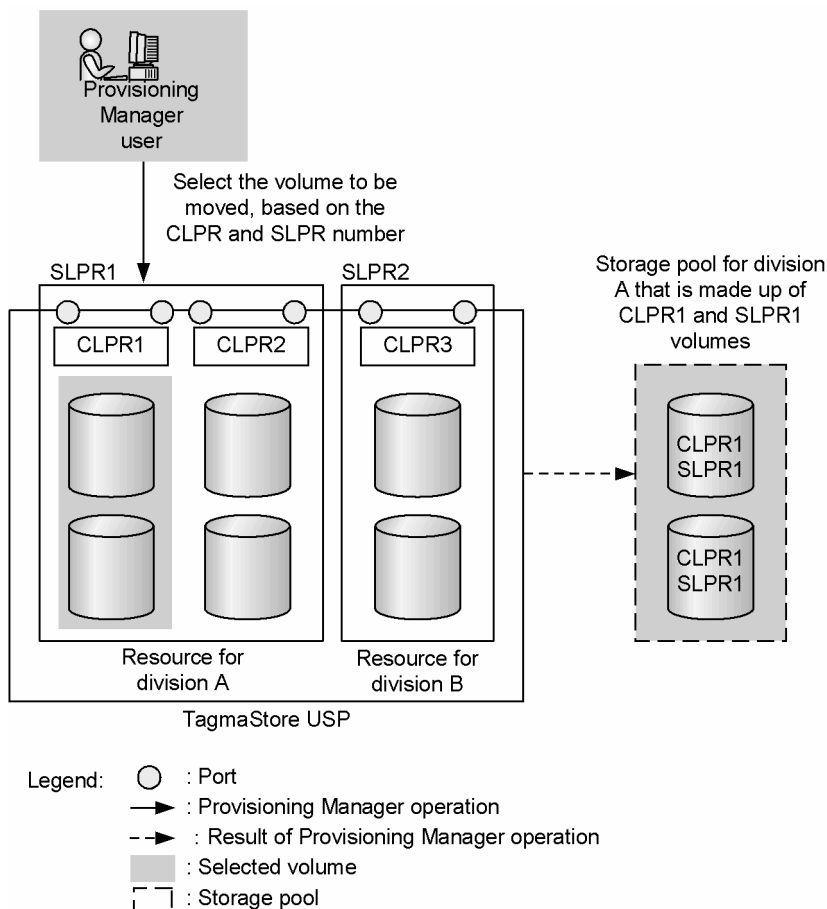
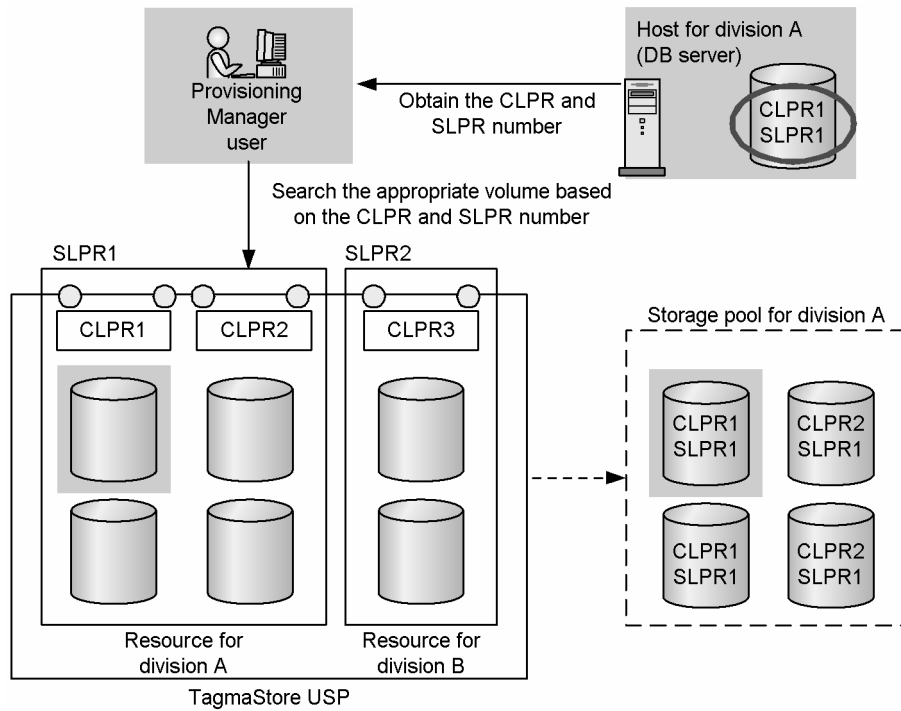
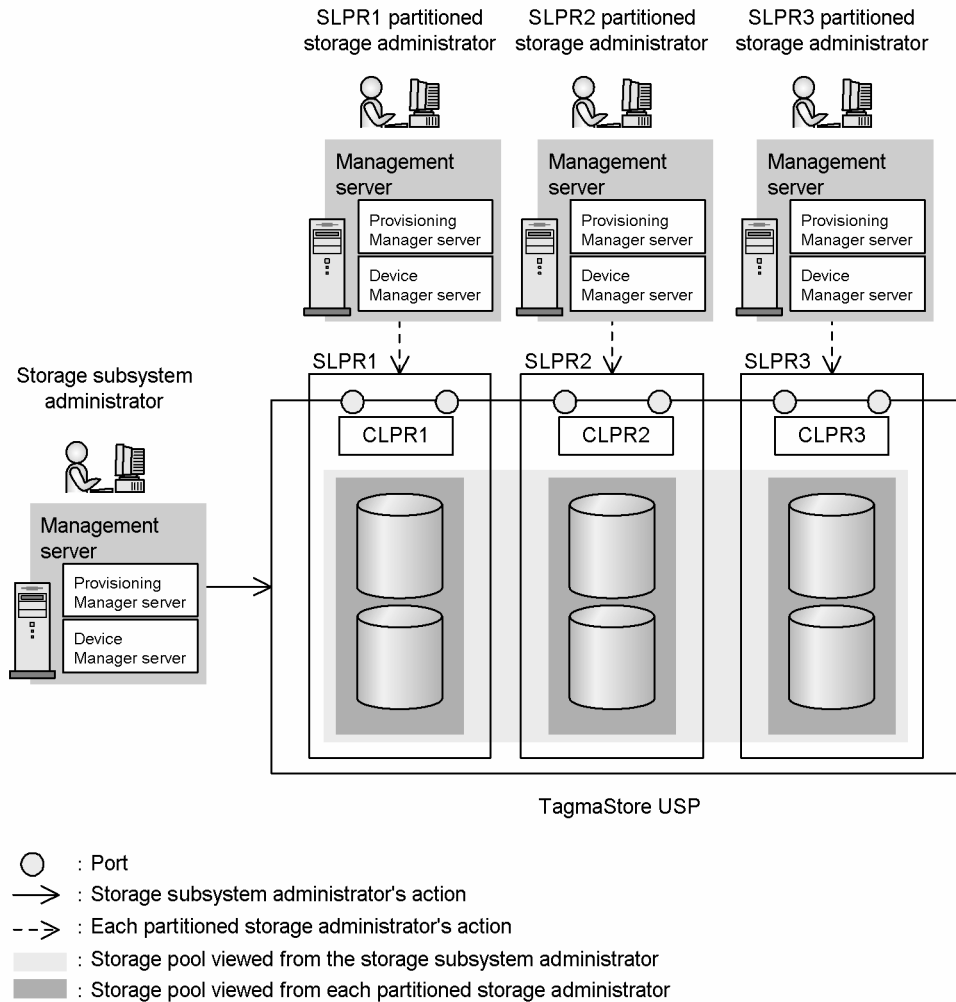


Figure 3.4 Creating a Storage Pool by Using the CLPR and SLPR Functions



- Legend:
- : Port
  - : Provisioning Manager operation
  - -> : Result of Provisioning Manager operation
  - : Selected volume
  - [ ] : Storage pool

**Figure 3.5 Assigning a Volume by Using the CLPR and SLPR Functions**



**Figure 3.6** Partitioned Resource Administration by Server for Each SLPR

**Note:** The configuration shown in Figure 3.8 is also supported for SSP, etc. By installing a server for each SLPR, you can manage resources in a specific SLPR from each server.

### 3.1.5 Moving Volumes between Storage Pools

You can move storage volumes that have not been allocated to a host into other storage pools. Use this function when you want to redistribute unallocated storage volumes, based on the results of a storage pool allocation status analysis obtained by displaying the storage pools in their entirety or from a particular perspective.

### **3.1.6 Viewing Usage Status for Storage Pools**

You can view the total capacity, allocated capacity, and the allocated ratio of a storage pool associated with a resource group. Summary and detailed views are available.

#### **3.1.6.1 Summary View**

If the specified resource group has any resource groups under it, calculated totals include storage pools of both the specified resource group and its lower-order resource groups.

By changing the resource group that is specified, you can move your perspective up or down within the resource group hierarchy (however, you cannot move your perspective to a resource group higher than the resource group of the logged-in user).

#### **3.1.6.2 Detailed View**

If the specified resource group has any resource groups under it, calculated totals do not include the storage pools of its lower-order resource groups. Instead, the total capacity, allocated capacity, and allocated ratio of the storage pool of the specified resource group, and of the storage groups of its lower-order resource groups, are displayed.

However, if there is any storage pools positioned two or more levels below the specified resource group, the figures for the storage pools of any resource groups two and more levels below are totaled and added to those for the storage groups of the resource groups directly below the specified one.

By changing the resource group that is specified, you can move your perspective up or down within the resource group hierarchy (however, you cannot move your perspective to a resource group higher than the resource group of the logged-in user).

### **3.1.7 Viewing Storage Pool Information from Different Perspectives**

You can view information about storage pools from different perspectives. You can view such information by classifying provisioning plan items into categories, or you can view information by storage subsystem. With either perspective, you can view summary or detailed information for resource groups.

#### **3.1.7.1 Using Perspective Based on Provisioning Plan Items**

By specifying provisioning plan items as a perspective, you can view total capacity, allocated capacity, allocated ratio, and other information about storage pools as classified by the perspective.

#### **3.1.7.2 Using Perspective Based on Storage Subsystems**

By specifying storage subsystems and filtering conditions (provisioning plan) as a perspective, you can view the total capacity, allocated capacity, allocated ratio, and other information about storage subsystems as classified by the perspective.

### **3.1.8 Viewing a List of Volumes**

You can narrow down and view a list of allocated and unallocated volumes included in a storage pool by specifying a capacity (minimum and maximum values) or filtering conditions (provisioning plan).

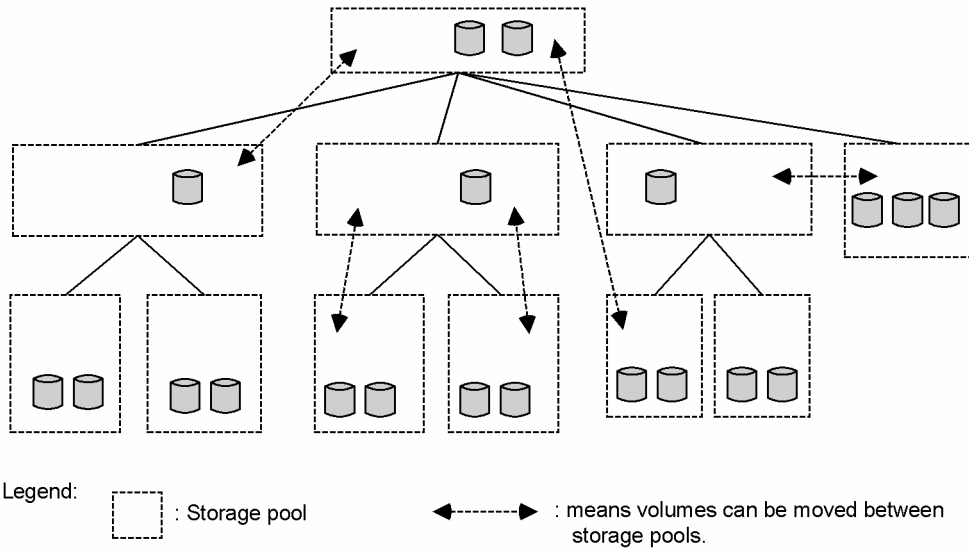
### **3.1.9 Moving Volumes between Storage Pools**

You can move storage volumes that have not been allocated to a host into other storage pools. Use this function when you have determined that you must redistribute unallocated storage volumes based on an analysis of a storage pool allocation.

Storage volumes can be moved by users with system administrator or local system administrator permissions.

Note, however, that the logged-in user cannot move storage pools to which he or she does not have access rights. In other words, the logged-in user cannot move storage pools higher than the storage pool associated with his or her resource group. You cannot move any storage volumes to the storage pools where sibling resource groups share a common area.

Figure 3.7 shows an example of the storage volumes that a user is allowed to move. Note that you may not be able to move storage volumes that have been allocated to a host using Device Manager.



**Figure 3.7** Example of Moving Volumes between Storage Pools

## 3.2 Allocating and Unallocating Volumes

You can allocate a storage volume included in a storage pool to any host managed by a resource group, and you can unallocate a storage volume from a host. You can also use a filtering facility defined in a provisioning plan to easily manipulate massive storage volumes that are displayed in a list of unallocated volumes or in a list of allocated volumes.

This facility provides settings for storage subsystems only; host settings are performed using functionality, described later, for managing hosts, and for creating file systems and device files.

### 3.2.1 Allocating a Volume to a Host

You can select one or more unallocated volumes that are listed and allocate them to a host. Allocating a volume means to set a path between the host and the volume that is routed via a subsystem port.

When you allocate a volume to a host, configure all the settings for the storage subsystem from the list of allocated volumes or the list of unallocated volumes displayed in Provisioning Manager.

Using Device Manager to allocate the volume to a host allows you to view host information in the Provisioning Manager Show Hosts window.

Before allocating a volume to a host, however, the host must be set up as part of the system. The procedure for setting up a host in a system differs depending on whether a Device Manager agent is used for the procedure. Both of these cases are explained in the following sections.

### 3.2.1.1 Setting Up a Host by Using a Device Manager Agent

To set up a host in a system:

1. Add the application server (host) to a network connected to a management server.
2. Install a Device Manager agent onto the host or restart the host if one is already installed. This step registers the host in the system.
3. Use the Provisioning Manager update (refresh) function to register the host (the WWN of the host port) to the system.
4. Use Device Manager to place the host under the management of the resource group that manages the storage pool.

In either of the two cases above, host registration into a system can be performed by users who have the `Admin` permission and to whom the resource group `All Resources` has been allocated. Placing a host under the management of a resource group can be performed only by users who have the `Admin` permission. However, users to whom a user-defined resource group has been allocated can place hosts only under a resource group that will be positioned below the resource group to which they belong.

### 3.2.1.2 Setting Up a Host Without by Using a Device Manager Agent

To set up a host in a system:

1. Use the Device Manager host registration function to manually register the host in a system (register the WWN of the host port).
2. Use Device Manager to place the host under the management of the resource group that manages the storage pool.

## 3.2.2 Unallocating a Volume

You can select one or more allocated volumes from among those listed to unallocate them from a host.

When you unallocate a volume from a host, you configure all the settings for the storage subsystem from the list of allocated volumes displayed in Provisioning Manager.

## 3.3 Managing Hosts

You can use Provisioning Manager to manage hosts to which storage volumes have been allocated. Provisioning Manager provides functions for displaying and updating (refreshing) host information.

### 3.3.1 Viewing Host Information

You can view the attributes of a selected host. Here, the term *attributes* refers to the information needed to operate Provisioning Manager, such as information for recognizing the host, a summary of the volume operation information, and information on prerequisite and related products that are installed. Examples of the information displayed in a Show Hosts window are listed below.

- Host recognizing information: Name and IP address of a host
- Summary of volume operation information: Total capacity of storage utilized by a host
- Information on prerequisite and related products: Operating systems, Device Manager agents, path management software, volume managers, and similar products

Note that information normally reported using Device Manager agents that are not installed, or Device Manager agents that are installed but are not active, cannot be displayed or configured as host information.

### 3.3.2 Updating Host Information

Provisioning Manager provides an update (refresh) function for host information. The Device Manager agent can report a variety of information about a host at the following times: when the Device Manager agent starts, when the HiScan command is executed, or when the Device Manager agent sends a periodical report. When the HiScan command is executed or when the Device Manager agent sends a periodical report, information from prerequisite and related products is not updated. If you are performing manual operations on a host, the configuration results are not updated to Provisioning Manager at that time.

You can use the update (refresh) function to update all host information displayed by Provisioning Manager to the latest information whenever needed. You can update host attributes, and you can also update detailed information on volume operation, such as file system information and device file information.

## 3.4 Creating, Expanding, and Deleting File Systems

Creating a file system on a volume (LU) allocated to a host, expanding a file system, and deleting a file system can all be performed from a management client in a single operation.

### 3.4.1 Creating a File System

Once you specify a host and select a volume (LU) from among the volumes allocated to that host, Provisioning Manager can automatically perform a series of operations to create a file system on that volume. The created file system is mounted on the file system that is on the host's OS.

To create a file system, specify the following:

- **File system type:** Select a file system type from among those that can be used by the host.
- **Mount point:** Specify the path name to indicate the location of the mount point for the file system. This path name is used later to recognize the file system.  
*Caution:* Double-byte code, such as a Japanese character, is not usable for the mount point name to be specified when adding a file system.
- **Volume manager:** To use a volume manager, select one from among the volume managers that are installed. You must specify a volume manager to create an expandable file system.

The process of creating a file system differs depending on whether the Dynamic Link Manager (HDLM) software is installed on the host, and on whether a volume manager is to be used to manage the file system being created.

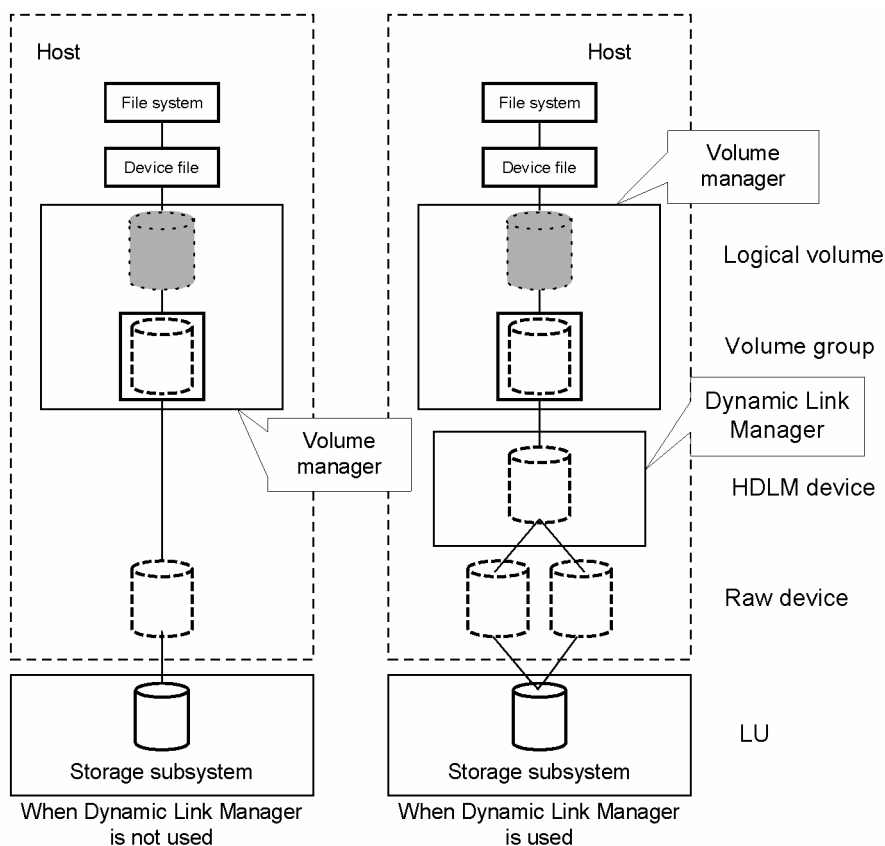
A subsystem volume (LU) allocated to a host is treated as a raw device by the host. When HDLM is not used, a single raw device is mapped to a single LU. If HDLM is used (when multiple paths exist between the host and the subsystem), the same number of raw devices as paths are created, and all of these raw devices are mapped to a single LU.

### 3.4.1.1 Creating a File System With a Volume Manager

If a volume manager is being used, the process of creating a file system is performed as described below.

The volume manager builds a single volume group from the single raw device or from the HDLM device as a single physical device. It then creates a single logical volume in that volume group. This logical volume is treated as a device file, and the file system is created for this device file.

Figure 3.8 shows the relationship between the file system and device file that can be seen from the host, and the LU in the subsystem. This figure assumes that there are two paths between the host and the subsystem LU for when HDLM is being used



Legend:



: A volume that has a **device file name** displayed in the GUI

Figure 3.8 Host File System/Device File and Subsystem LU (with Volume Manager)

### 3.4.1.2 Creating a File System Without a Volume Manager

If a volume manager is not being used, the process of creating a file system is performed as described below.

- When HDLM is not being used, the raw device corresponding to the specified LU is treated as a device file, and the file system is created for this device file.
- When HDLM is being used, a single HDLM device is created by consolidating the multiple raw devices associated with the specified LU. This HDLM device is treated as a device file, and the file system is created for this device file.

Figure 3.9 shows the relationship between the file system and device file that can be seen from the host, and the LU in the subsystem. This figure assumes that there are two paths between the host and the subsystem LU for when HDLM is being used.

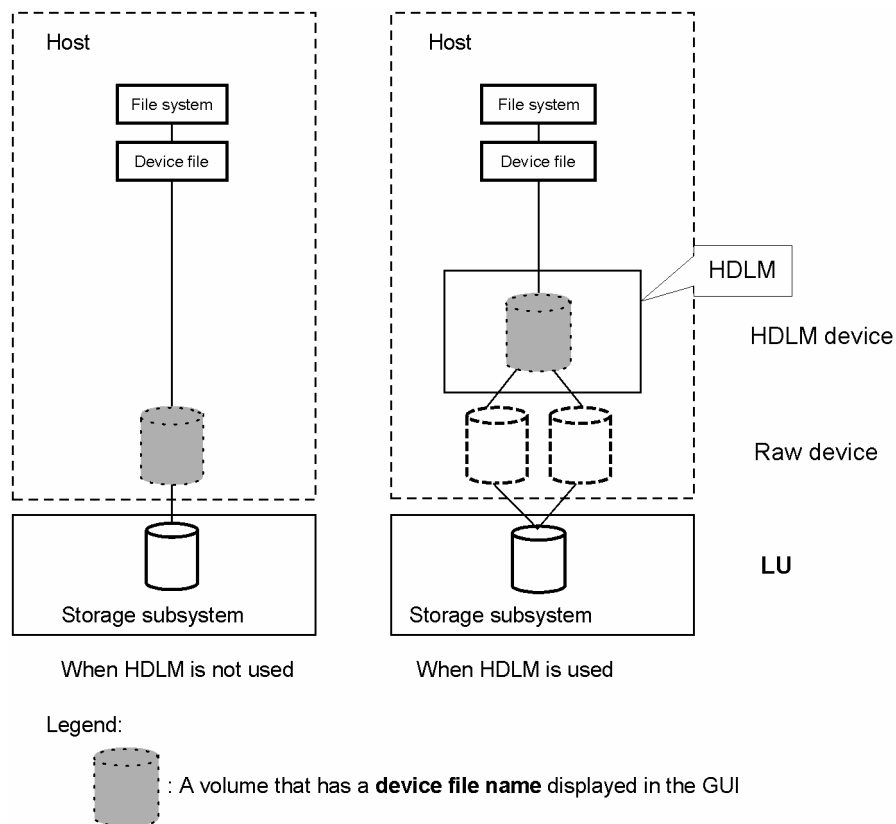


Figure 3.9 Host File System/Device File and Subsystem LU (without Volume Manager)

### 3.4.2 Expanding a File System

Once you specify the file system you wish to expand and select a volume (LU) to be added from among the volumes (LUs) allocated to the host, Provisioning Manager can automatically perform the process of expanding the file system. However, the file system must have been created using a volume manager.

The process of expanding the file system is performed as follows:

The volume specified to be added (a raw device or an HDLM device) is added to the volume group. Then, by using the unused area in the volume group, the logical volume is expanded (the file system is also expanded on this logical volume).

Figure 3.10 shows the relationship between the file system and device file that can be seen from the host, and the LU in the subsystem. This figure assumes that there are two paths between the host and the subsystem LU when HDLM is being used.

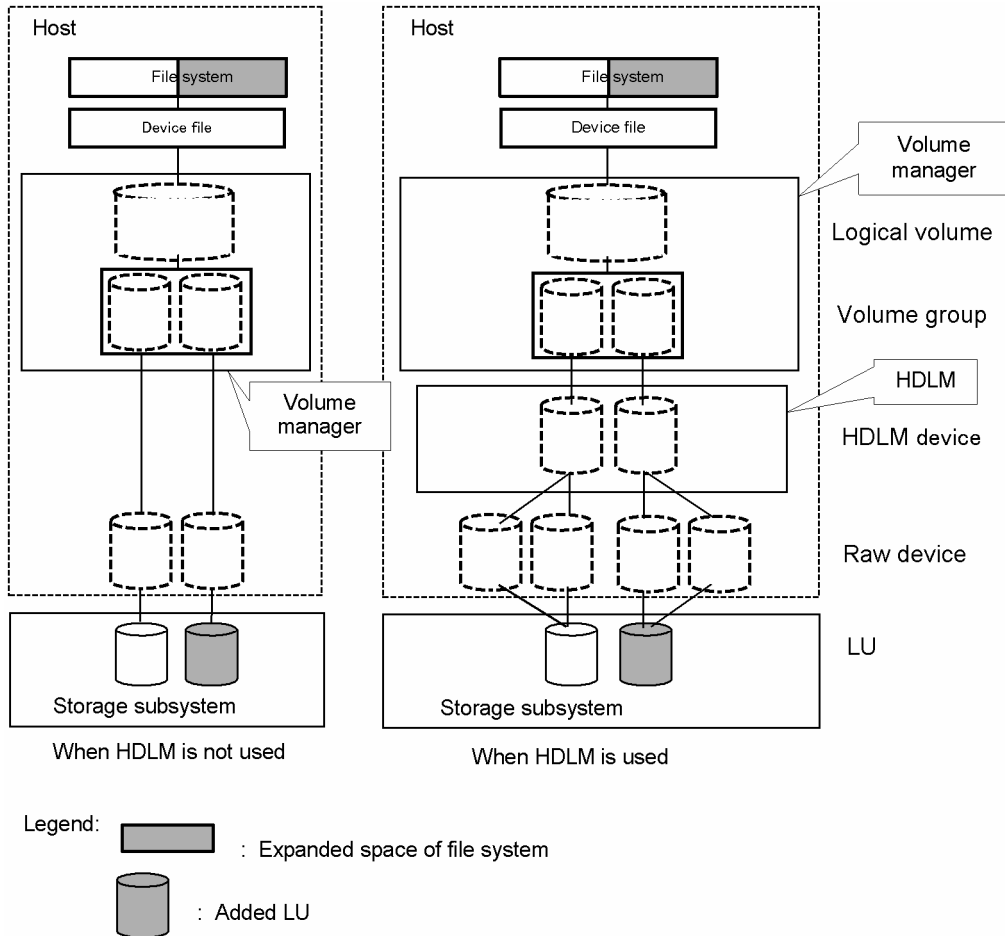


Figure 3.10 Relationship Between Host File System/Device File and Subsystem LU (Expanding a File System)

### 3.4.3 Deleting a File System

Once you specify the file system you wish to delete, Provisioning Manager can automatically perform the process of deleting the file system. The mount point specified by the user during the file system creation is not deleted.

Note that this operation performs only the host-side operations; it does not remove the paths on the subsystem side (it does not release LUNs), it does not release any LUSEs, nor does it release any volumes (LDEVs). Therefore, the user must manually delete (unallocate) the volumes from the list or modify the Device Manager security settings.

When you delete a file system, if a volume group has been created for the volume on which the file system being deleted resides, the logical volume being used is deleted. Further, if the logical volume being deleted is the last volume in the volume group, all of the physical volumes (LUs) configuring that volume group are removed from that volume group, and the volume group is deleted.

### 3.5 Creating and Deleting Device Files

Creating a device file on a volume (LU) allocated to a host and deleting that device file can each be performed from a management client in a single operation.

#### 3.5.1 Creating a Device File

Once you specify a host and select a volume (LU) from among the volumes allocated to that host, Provisioning Manager can automatically perform the process of creating a device file on that volume. This function is used when you need only to create a device file on the volume, such as when the volume is being used for a database, without having to create a file system.

As with the process of creating a file system, the process of creating a device file differs depending on whether HDLM path management software is installed on the host, and on whether a volume manager is to be used to manage the device file being created. Accordingly, whether to use HDLM and a volume manager differs depending on whether the volume underlying the device file is a raw device associated with an LU, a created HDLM device, or a created logical device.

Figure 3.11 shows the relationship between the device file that can be seen from the host and the LU in the subsystem when no volume manager is being used. This figure assumes that there are two paths between the host and the subsystem LU when HDLM is being used.

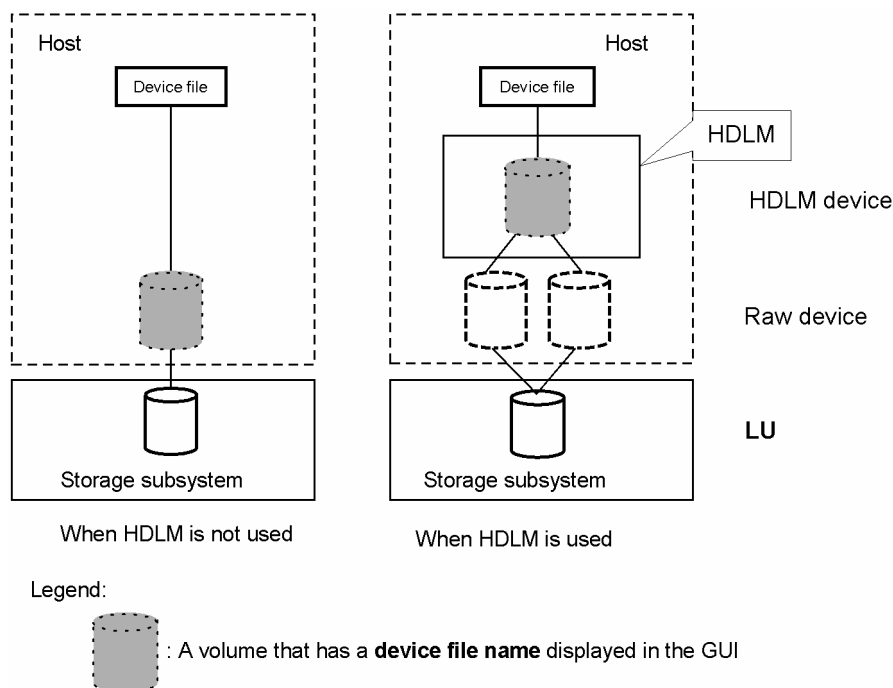
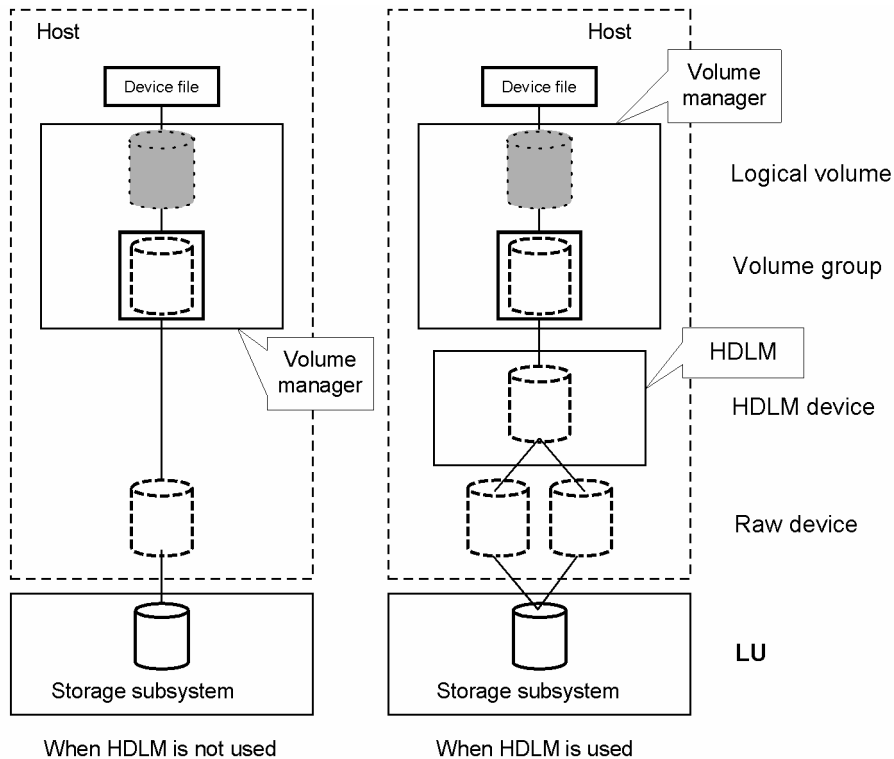


Figure 3.11 Relationship between Host Device File and Subsystem LU (without Volume Manager)

Figure 3.12 shows the relationship between the device file that can be seen from the host and the LU in the subsystem when a volume manager is being used. This figure assumes that there are two paths between the host and the subsystem LU when HDLM is being used.



Legend:



: A volume that has a **device file name** displayed in the GUI

Figure 3.12 Relationship between Host Device File and Subsystem LU (with Volume Manager)

### 3.5.2 Deleting a Device File

Once you specify the device file you wish to delete, Provisioning Manager can automatically perform the process of deleting the device file. Note, however, that this operation performs only the host-side operations; it does not remove the paths on the subsystem side (it does not release LUNs), it does not release any LUSEs, nor does it release any volumes (LDEVs). Therefore, the user must manually delete (unallocate) the volumes from the list or modify the Device Manager security settings.

When deleting a device file, if a volume group has been created for the device file being deleted, the logical volume being used is deleted. Further, if the logical volume being deleted is the last volume in the volume group, all of the physical volumes (LUs) configuring that volume group are removed from that volume group, and the volume group is deleted.

## 3.6 About Provisioning Plans

A provisioning plan (allocation plan) is a collection of common items (parameters) that are specified when a storage volume is operating. By predefining a provisioning plan, you can improve the operating efficiency of the storage volumes.

You can apply a provisioning plan when performing the following operations:

- Viewing a storage pool by perspective (by subsystem)
- Viewing a list of allocated or unallocated volumes
- Moving a volume between storage pools

### 3.6.1 Creating a Provisioning Plan

You can specify the following items when creating a provisioning plan (allocation plan):

- Plan name
- Description (you can specify the purpose of the plan or other desired information)
- Series name of the storage subsystem
- Model name of the storage subsystem
- RAID level of the storage volume (RAID 0, RAID 1, RAID 5, or other)
- Drive configuration of the storage volume (3D+1P, 2D+2D, or other)

You create a provisioning plan (allocation plan) in either of two ways:

- Create an entirely new provisioning plan
- Use an existing plan as a template, change some of its parameters, and then save this changed plan under a different name.

In the **Add Allocation Plan** dialog box, you can add an allocation plan.

**Caution:** A user with guest or local guest access permission cannot add an allocation plan.

**To add an allocation plan:**

1. From the navigation frame, click **Provisioning Plans**.
2. Click **Allocation Plans**, located in the navigation frame immediately below **Provisioning Plans**.

The method frame displays the Allocation Plans subwindow

3. In the Allocation Plans subwindow, click **Add Allocation Plan**.

The Add Allocation Plan dialog box is displayed (see Figure 3.13).

4. Specify settings for an allocation plan.

For details about the settings items and restrictions, see Help for the window.

5. When you finish specifying the settings, click the **OK** button.  
A confirmation dialog box is displayed for confirming that the allocation plan is to be added.
6. Click the **OK** button.  
The Add Allocation Plan - Result dialog box is displayed.
7. In the Add Allocation Plan - Result dialog box, check the information for the allocation plan that you just added.  
**Important:** The security level of the created allocation plan is configured as a private plan owned by the resource group to which the user who created the plan belongs.
8. Click the **Close** button.  
The dialog box closes, which completes the addition of the allocation plan.

Figure 3.13 Add Allocation Plan Dialog Box

### 3.6.2 Deleting a Provisioning Plan

In the **Delete Allocation Plan -plan-name** dialog box, a user can delete an allocation plan. You can also delete allocation plans whose security level is public.

**Caution:**

- A user with guest or local guest access permission cannot edit an allocation plan.

- Even for an allocation plan whose security level is public, if the login user's access permission is Local Administrator or Local Storage Administrator, the user cannot delete the following plans:
  - An allocation plan that is owned by a resource group positioned above the resource group to which the login user belongs
  - An allocation plan that is owned by a resource group positioned in a different hierarchy from the resource group to which the login user belongs

**To delete an allocation plan:**

1. From the navigation frame, click **Provisioning Plans**.
2. Click **Allocation Plans**, located in the navigation frame immediately below **Provisioning Plans**.

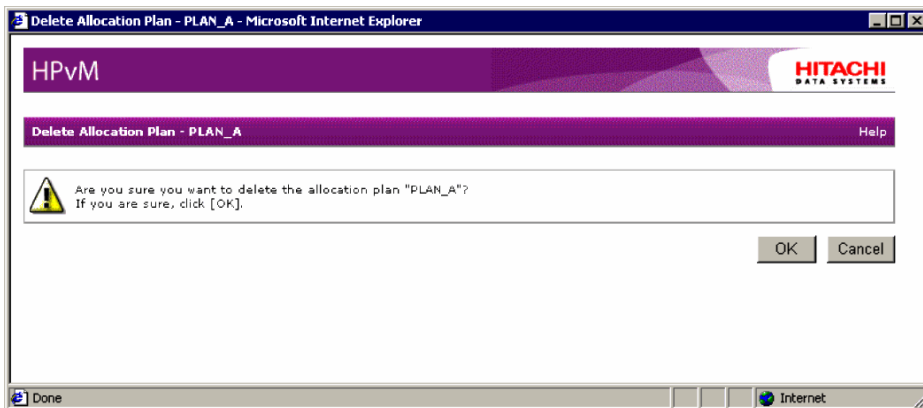
The method frame displays the Allocation Plans subwindow. The information frame displays the List Objects - Allocation Plans subwindow.
3. In the List Objects - Allocation Plans subwindow, click the plan name.

The method frame displays the *plan-name* subwindow.
4. In the *plan-name* subwindow, click **Delete Allocation Plan**.

The Delete Allocation Plan - *plan-name* dialog box is displayed (see Figure 3.14).
5. Click the **OK** button.

A dialog box for confirming that you wish to delete the allocation plan is displayed.
6. If you still wish to delete the allocation plan, click the **OK** button.
7. Make sure that the target allocation plan is deleted in the Delete Allocation Plan - Result dialog box.
8. Click the **Close** button.

The dialog box closes. This action completes deletion of the allocation plan.



**Figure 3.14** Delete Allocation Plan - *plan-name* Dialog Box

### 3.7 Managing Transaction Logs

A transaction log is a recording of the state and result of each operation performed by the user on a host and the states and results of the sequence of configuration steps requested by Provisioning Manager to the host (Device Manager agent) that is generated by these operations.

The following paragraphs explain some uses of a transaction log.

- **Isolating an error**

Because the state and result of each step are recorded, you can use the transaction log to isolate errors, regardless of whether or not the operation executed successfully. Provisioning Manager expands a single configuration operation specified by a user into multiple steps. This is helpful for isolating an error because, in addition to the step at which the error occurred, you might also have to check the states and results of the steps immediately preceding the step at which the error occurred.

- **Checking the progress of a configuration operation**

Because the state and result of each configuration step included in a configuration operation are immediately recorded, you can use them to check the progress of an operation. Provisioning Manager expands a single configuration operation specified by a user into multiple steps. This is helpful for checking the progress of an operation, because an operation may take some time to complete, depending on the environment.

- **Restarting a configuration operation**

Because the intermediate states of the configuration steps in a configuration operation are recorded, a transaction log can be used to restart the configuration operation after user intervention has ended. This is helpful because, although Provisioning Manager can be used to perform many configuration operations centrally from a management client, in some environments you may not be able to avoid user intervention, such as restarting the host.

There are two levels by which you can view transaction logs. You can view a list of transaction logs or you can view a detailed display of each transaction log in the list. In list view, by specifying the search conditions such as time range, processing status, and user operation's range, you can narrow down the range that you want to view. For the operation that is being suspended, you can restart the operation from the list view window after user intervention has ended.



## Chapter 4 Working With OS-Based Constraints

The following sections describe restrictions and notes on managing a host by using Provisioning Manager. The restrictions and notes are given separately for each OS.

- General restrictions on Host Management (section 4.1)
- Restrictions When the Host OS is Windows (section 4.2)
- Restrictions When the Host OS is Solaris (section 4.3)
- Restrictions When the Host OS is AIX (section 4.4)
- Restrictions When the Host OS is Linux (section 4.5)
- Restrictions When the Host OS is HP-UX (section 4.6)
- Maximum Setting Values (section 4.7)

## 4.1 General restrictions on Host Management

Some restrictions on host management apply regardless of the operating system involved, while others are OS-specific.

When adding a device file, or adding or expanding a file system for a host that is not recognizing any LUs, use Device Manager to register the port WWN of the HBA for the host in advance. If no WWN is registered, no volume will become selectable in the wizard step for selecting a volume, and you will be unable to continue operations.

### 4.1.1 Configuring Cluster Software

When you use the host management functionality to add, expand, or delete a file system, or add or delete a device file, Provisioning Manager does not perform configuration of the cluster software. You must manually configure the cluster software.

VERITAS Cluster Server is cluster software that can use file systems and device files created by the host management functionality.

The cluster software that can use the file systems and device files created by the host management functionality is as follows (note that it changes according to operating system):

- Windows host OS: Microsoft® Cluster Server (MSCS)
- Solaris host OS: VERITAS™ Cluster Server
- AIX host OS: HACMP
- Linux host OS: cluster software not supported

### 4.1.2 Limitations Related to Storage Subsystems

When the mapping mode is set to OFF for the Thunder 9200™, Thunder 9500™V,, or the TagmaStore AMS/WMS series, you can release LUNs to change the volume status from the status in which the volumes are reserved by a host (the reservation status is Reserve or Persistent Reserve) to the status in which the volumes are unallocated. For such volumes, however, Provisioning Manager cannot add a device file, or add or expand a file system. Make sure that you set the mapping mode to ON.

## 4.2 Restrictions When the Host OS is Windows

The following sections apply when the host OS is Windows. For details about the maximum setting values for manual configuration, see section 4.7.

**WARNING:** Make sure that you specify a unique port address for each port of storage devices in the same zone. If the same port addresses exist in the same zone, the OS cannot identify the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

### 4.2.1 Prerequisites for the Host

- The Device Manager agent

You need to install a Device Manager agent on a host managed by Provisioning Manager. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

- `diskpart.exe` command line utility

Provisioning Manager contains functionality that requires the `diskpart.exe` command line utility provided by Microsoft. When the OS of the host managed by Provisioning Manager is Windows 2000, you must obtain the `diskpart.exe` command line utility separately. You can download this utility from the Microsoft web site. Install `diskpart.exe` in the Windows-system-installation-directory `\system32`

When the OS is Windows 2003, the `diskpart.exe` command line utility will be started in the background during host setting operation. Regardless of whether or not the host setting operation is performed, do not stop the process of the `diskpart.exe` command line utility running in the background.

#### 4.2.1.1 Prerequisites When the Host in Use Has Not Recognized any Logical Unit

When adding a device file, or adding or expanding a file system for a host that is not recognizing any LUs, use Device Manager to register the port WWN of the HBA for the host in advance. If no WWN is registered, no volume will become selectable in the wizard step for selecting a volume, and you will be unable to continue operation.

## 4.2.2 Notes on Displaying Host Information

### About Dynamic Link Manager

In any of the following environments, if the version of the Device Manager agent installed on the host is 04-00-05 or later, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can be used to specify settings for the managed LUs:

- An LU has been removed manually from the Dynamic Link Manager's management range
- A path manager other than Dynamic Link Manager is also used

However for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

To specify LU settings in the above environment, check the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.0.0-05 or later
- That the target LU is managed by Dynamic Link Manager

**Note:** When file systems or device files are added or expanded, Provisioning Manager assumes that all LUs to be added are managed by Dynamic Link Manager.

### About Logical Disk Manager

Provisioning Manager virtually creates a volume group that has the same name as the logical volume. The corresponding volume group does not exist on the host.

## 4.2.3 Restrictions on Expansion and Deletion

### Limits on expanding a logical volume

Provisioning Manager cannot expand the following logical volumes:

- A basic disk
- A volume other than a simple volume and span volume
- A mirror volume (see **Note**)
- A simple volume upgraded from a Windows 2000 basic disk partition (see **Note**)
- A span volume upgraded from a Windows 2000 basic disk volume set (see **Note**)
- A volume whose physical volume contains more than one logical volume (see **Note**)

**Note:** Although the volume is displayed in the selection of the operation targets, selecting the volume results in an error at execution of the operation.

## Limits on deleting a logical volume

Provisioning Manager cannot delete the following logical volumes:

- A volume other than a simple volume, span volume, or basic disk partition
- A mirror volume (see **Note**)
- A volume whose physical volume contains more than one logical volume (see **Note**)

**Note:** Although this volume is displayed in the selection of the operation targets, selecting the volume results in an error at execution of the operation.

## Limits on expanding a file system

Provisioning Manager cannot expand or add file systems in the following cases:

- The file system is of a type other than NTFS
- The volume manager used in the file system is neither a basic disk nor a dynamic disk
- The file system to be expanded is a type other than NTFS
- The specified mount point is already in use by another file system
- RAID software has been configured in the file system.

Volumes cannot be used for file system expansion if any of the following applies:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- Volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume is being used as a Differential Management LU<sup>□</sup>

A mount point that is already being used for another file system cannot be used to add a file system.

You cannot use the volume manager to expand the file system where the software RAID has been configured. To configure RAID, use the functionality of the storage subsystem, not the volume manager.

If the version of the Device Manager agent installed on the host is version 4.0 or later, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can specify settings for the managed LUs. However, for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

### **Limits on deleting a file system**

Provisioning Manager cannot delete the following file systems:

- A file system whose type is other than NTFS
- A file system whose mount point hierarchy includes other mount points
- A file system that contains more than one mount point
- A file system that is being used by a process

Even if a file system is deleted, the mount point directory remains. Use the OS command to manually delete the folder if it is no longer needed.

### **Cluster software**

When you use the host management functionality to add, expand, or delete a file system, or add or delete a device file, Provisioning Manager does not perform configuration of the cluster software. You must manually configure the cluster software. For details about this configuration, see the documentation for the cluster software. For details about the cluster software supported by hosts, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

Cluster software that can use the file systems and device files created by the host management functionality is Microsoft Cluster Service (MSCS).

### **Software that cannot be used with Provisioning Manager**

Provisioning Manager cannot be used on a host where VERITAS Volume Manager has been installed.

#### **4.2.3.1 Notes on Removing a File System That Is Being Used**

When you attempt to delete a file system that is being used, the logical volume cannot be deleted and an error occurs. The file system is usable until the host is restarted; however, it will be unmounted when the host restarts. To continue using that file system, use a Windows command to manually mount it or assign a drive letter.

### 4.2.3.2 Notes on Restarting the System

When a volume (LU) is deleted or added, the disk number and drive letter managed by the OS may change at the time the OS is restarted. Because of this, if you perform an operation on a basic disk partition before the host information in Provisioning Manager synchronizes the changed information, the operation may not be performed properly.

Immediately after the OS or Provisioning Manager is restarted, check the date and time when the host information was last refreshed, and make sure that the changes made in the host configuration before the host is restarted have been applied. Then, add or delete a volume.

Also for other host settings, if the information about actual configuration and the information in Provisioning Manager are not synchronized, an error occurs. Before performing an operation, make sure that the information is synchronized.

### 4.2.3.3 Notes on Changing the Software Configuration

For a host for which a host-setting operation has not finished (that is, for a host for which a suspended operation exists in the operation log), do not change any of the software listed below by installing or uninstalling them, or by changing the software version.

- OS
- File system
- Program prerequisite for Provisioning Manager
- Program related to Provisioning Manager

For specific software names, see system requirements, prerequisite programs and related programs described in the manual *HiCommand Provisioning Manager Installation and Configuration Guide*.

If you change any of the above software for a host for which a host-setting operation has not finished, that host-setting operation cannot be guaranteed when it resumes from the operation log. Before you change any software, see the operation log and make sure that all host-setting operations have finished.

### 4.2.3.4 Notes on Changing a Host Name

When you change the host name of a host machine, match the host name of the host machine with the host management information of Device Manager, and then use Provisioning Manager.

If you update host information when the host name of the host machine and the host management information of Device Manager do not match, both the host name that existed from before the change and the one created after the change are displayed in the host management window. In such a case, you might be unable to use Provisioning Manager correctly.

## 4.2.4 Improving Windows Host Performance

Provisioning Manager uses the Windows default settings for all settings that configure the host performance. When you want to improve host performance by specifying the parameters for the file systems and device files, change the appropriate settings manually.

### 4.2.4.1 Notes on Mounting a Folder in Windows 2000

When you assign multiple LUs to one host in Windows 2000, make sure that the folders you want to mount do not have a parent-child relationship. If the folders have a parent-child relationship, you cannot correctly operate a file system using Provisioning Manager. For example, if you mount the two folders `H:\HPvM01` and `H:\HPvM01\HPvM02`, you cannot operate the file system correctly. Instead, mount two folders such as, for example, `H:\HPvM01` and `H:\HPvM02`, which do not have a parent-child relationship.

The following describes how the program runs and what actions you should take if you mount folders that have a parent-child relationship and attempt to operate a file system.

#### **If a file system is added or expanded:**

In the GUI window, an error (`KARF62014-E`) appears indicating that the file system does not exist. However, the file system is added or expanded properly.

When the host information is updated, the file system information will be applied to the GUI window.

#### **If a file system is deleted:**

In the GUI window, an error (`KARF62014-E`) appears indicating that the file system does not exist, and the file system is not deleted.

Delete the file system manually. Then, update the host information, and make sure that the file system has been deleted.

## 4.2.5 Using Volume Manager RAID Functionality

When you want to use the RAID functionality provided by the volume manager, such as a stripe volume, mirror volume, or RAID5 volume, manually execute the volume manager command.

**Note:** The use of the volume manager is limited to the online expansion for a newly-created volume (for a span volume only).

You cannot configure RAID by using Provisioning Manager. Use either of the following methods to configure RAID:

- Configure RAID by using the functionality of the storage subsystem.
- Configure such RAID software as stripe volume and mirror volume software by manually executing commands such as the ones for the volume manager.

## 4.2.6 Deleting a Mount Point Directory

File system mount points remain even after file systems themselves have been deleted. Use the OS command to manually delete the mount point folder if it is no longer necessary.

## 4.2.7 About File System and Device File Sizing Discrepancies

In Windows, when the file systems or device files are created, their sizes are smaller than the size of the volume (LU). The reasons are as follows:

- For a Windows basic disk  
Because this type of disk reserves 1 MB for the conversion of the disk to a dynamic disk, the total size of the file systems or the device files is 1 MB smaller than the volume (LU).
- For a Windows dynamic disk  
Because this type of disk reserves 1 MB for management, the total size of the file systems or the device files is 1 MB smaller than the volume (LU).

### 4.2.7.1 Notes on Using Provisioning Manager together with Protection Manager

While operations for establishing or refreshing the host are being carried out, and for the first 10 minutes after the normal termination of these operations, do not carry out backup or restore operations for the host. If these operations are carried out, the backup or restore command will terminate with an error.

If the command terminates with an error, wait for more than 10 minutes after the operations for establishing or refreshing the host finish, and then carry out the backup or restore operations.

## 4.2.8 Preventing Out-of-Sync Disk Number and Drive Letter

When a volume (LU) is deleted or added, the disk number and drive letter managed by the OS may change at the time the OS is restarted. Because of this, if you perform an operation on a basic disk partition before the host information in Provisioning Manager synchronizes the changed information, the operation may not be performed properly.

Immediately after the OS or Provisioning Manager is restarted, verify the date and time when the host information was last refreshed, and make sure that the changes made in the host configuration before the host is restarted have been applied. Then, add or delete a volume.

Also for other host settings, if the information about actual configuration and the information in Provisioning Manager are not synchronized, an error occurs. Before performing an operation, make sure that the information is synchronized.

## 4.2.9 When a File System In Use is Removed

When you attempt to delete a file system being used, the logical volume cannot be deleted and an error occurs.

Even if a file system being used is removed, it can be used until the host is restarted; however, it will be unmounted when the host restarts. To continue using that file system, use a Windows command to manually mount it or assign a drive letter to it.

## 4.2.10 Notes on Using VMware ESX Server

When you use Provisioning Manager to manage virtual hosts on VMware ESX Server, follow the operation procedure of the Device Manager agent. For details about the operation procedure, see the manual *HiCommand Device Manager Agent Installation Guide*.

When you use Provisioning Manager to perform a host-setting operation for a virtual host on VMware ESX Server, you need to define the target volume as `Mapped Raw LUN`. For details about how to define the target volume as `Mapped Raw LUN`, see the *manual HiCommand Device Manager Agent Installation Guide*.

For a volume that is not defined as `Mapped Raw LUN`, if you add or expand a file system, or add a device file, the operation will be interrupted. In such a case, define the volume as `Mapped Raw LUN`, and then resume the operation.

## 4.3 Restrictions When the Host OS is Solaris

The following sections describe restrictions that apply when the host OS is Solaris. For details about the maximum setting values for manual configuration, see Table 4.1.

**WARNING:** Make sure that you specify a unique port address for each port of storage devices in the same zone. If the same port addresses exist in the same zone, the OS cannot identify the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

When the mapping mode is set to OFF for the Thunder 9200, Thunder 9500V, or the TagmaStore AMS/WMS series, you can release LUNs to change the volume status from the status in which the volumes are reserved by a host (the reservation status is Reserve or Persistent Reserve) to the status in which the volumes are unallocated. For such volumes, however, Provisioning Manager cannot add a device file, or add or expand a file system. Make sure that you set the mapping mode to ON.

### 4.3.1 Prerequisites for the Host

- The Device Manager agent  
You need to install a Device Manager agent on a host managed by Provisioning Manager. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.
- VERITAS File System and VERITAS Volume Manager  
To install VERITAS File System and VERITAS Volume Manager on the same host, use the same version. If their versions are different, operations cannot be guaranteed.
- About unsupported volumes  
Provisioning Manager cannot use any of the following volumes for addition, expansion, or deletion of file systems or device files:
  - Volumes that use extensible firmware interface (EFI) disk labels
  - Volumes with no slice 2 that indicates the entire diskFor these volumes, use OS commands to manually specify settings, if necessary.

#### 4.3.1.1 Notes on Installing a Storage Subsystem

Make sure that you specify a unique port address for each port of storage devices in the same zone. If the same port addresses exist in the same zone, the OS cannot recognize the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

### 4.3.1.2 Notes on Displaying Host Information

#### About Dynamic Link Manager

In any of the following environments, if the version of the Device Manager agent installed on the host is 04-00-05 or later, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can be used to specify settings for the managed LUs:

- LU has been removed manually from the Dynamic Link Manager's management range
- A path manager other than Dynamic Link Manager is also used

However for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

To specify LU settings in the above environment, check the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.0.0-05 or later
- That the target LU is managed by Dynamic Link Manager

**Note:** When file systems or device files are added or expanded, Provisioning Manager assumes that all LUs to be added are managed by Dynamic Link Manager.

#### About SDS/SVM

If the volume manager in use is SDS/SVM, Provisioning Manager can only view host information.

Only volumes created under the following conditions can be displayed:

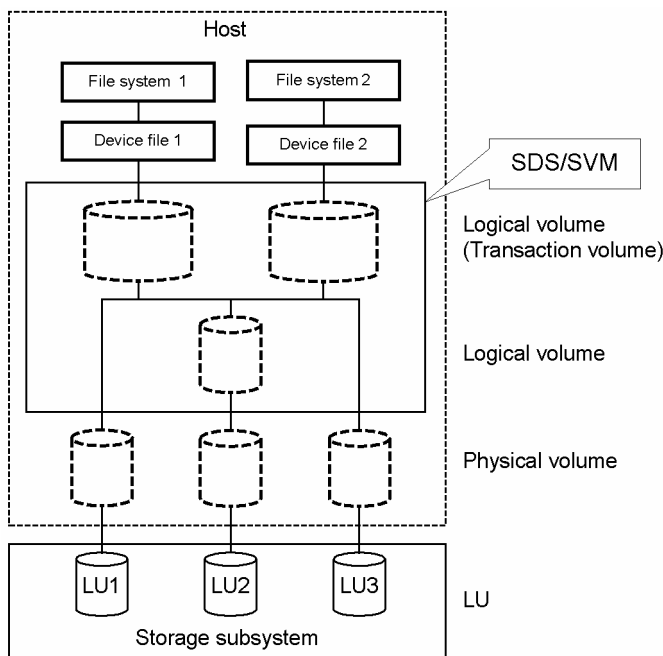
- When the logical volume attribute is one of the following:
  - Stripe/concatenated volume (stripe/concatenated metadvice)
  - Mirror volume (mirror metadvice)
  - RAID5 volume (RAID5 metadvice)
  - Transaction (logging) volume (trans metadvice)
  - Soft partition

However, the displayed information is limited on the logical volumes that meet any of the following conditions:


- When a logical volume exists on another logical volume, only the top-level logical volume is displayed. The lower logical volume information is not displayed.
- If the slice constituting one file system or device file is shared by another file system or device file, the shared volume information is displayed only as one component among those file systems or device files.
- If the slice constituting one file system or device file is shared by another file system or device file and the whole shared-volume information is displayed as one component among those file systems or device files, Provisioning Manager does not display other file systems or device files.

**Note:** Provisioning Manager virtually creates a volume group that has the same name as the logical volume. The corresponding volume group does not exist on the host.

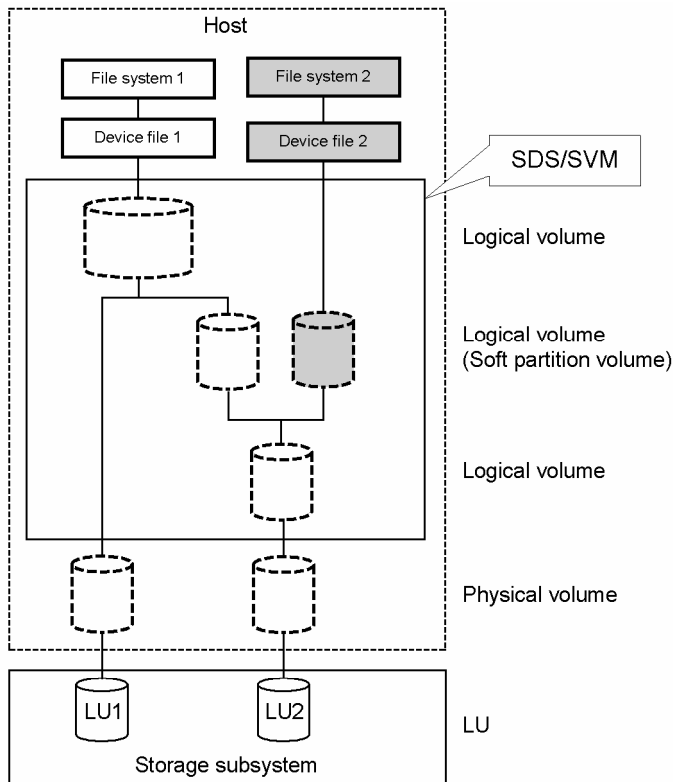
The following figures illustrate the scope of displayed information when the logical volume is shared.



(Legend)

 : The LU that is displayed as a component of one of the file systems for the logical volume to be shared

**Figure 4.1** Scope of LU Information To Be Displayed When Using SDS/SVM



(Legend)



: The LU that is displayed as a component of one of the file systems for the logical volume to be shared



: Information that is not displayed in Provisioning Manager when the information about LU2 is displayed in the file system 1

**Figure 4.2** Scope of File System, Device File, and Logical Volume Information To Be Displayed When Using SDS/SVM

## 4.3.2 Restrictions on Expansion and Deletion

### About volumes

Provisioning Manager only supports volumes that use the VTOC disk label.

Provisioning Manager cannot use any of the following volumes for addition, expansion, or deletion of file systems or device files:

- Volumes that use extensible firmware interface (EFI) disk labels
- Volumes with no slice 2 that indicates the entire disk

For these volumes, use OS commands to manually specify settings, if necessary.

### Limits on expanding and deleting a logical volume

Provisioning Manager cannot expand or delete a volume group whose target volume group is other than VERITAS Volume Manager.

### Limits on expanding a file system

Provisioning Manager cannot expand the following file system a file system whose type is other than VERITAS File System.

Volumes to which one of the following conditions applies cannot be used for file system expansion:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume

In any of the following environments, if Device Manager agent version 3.5 is installed on the host, the file system cannot be expanded:

- The volume manager<sup>#</sup> used in the file system is other than VERITAS Volume Manager 3.5
- The file system in use by the host is other than VERITAS File System 3.5

In any of the following environments, if Device Manager agent version 4.0 is installed on the host, the file system cannot be expanded:

- The type of volume manager used in the applicable file system is neither VERITAS Volume Manager 3.5 nor VERITAS Volume Manager 4.0
- The file system to be expanded is a type other than VERITAS File System 3.5 or VERITAS File System 4.0

You cannot use the volume manager to expand the file system where the software RAID has been configured. To configure RAID, use the functionality of the storage subsystem, not the volume manager.

#### **Limits on deleting a file system**

Provisioning Manager cannot delete the following file systems:

- A file system whose type is other than UFS or VERITAS File System
- A file system whose mount point hierarchy includes other mount points.
- A file system currently used for processing

Even if a file system is deleted, the mount point directory remains. To delete unneeded directories, use an OS command to delete them manually.

#### **Using cluster software**

When you use the host management functionality to add, expand, or delete a file system, or add or delete a device file, Provisioning Manager does not perform configuration of the cluster software. You must manually configure the cluster software. For details about this configuration, see the documentation for the cluster software. For details about the cluster software supported by hosts, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

VERITAS Cluster Server is cluster software that can use file systems and device files created by the host management functionality.

### 4.3.3 Notes on Changing the Software Configuration

For a host for which a host-setting operation has not finished (that is, for a host for which a suspended operation exists in the operation log), do not change any of the software listed below by installing or uninstalling them, or by changing the software version.

- OS
- File system
- Program prerequisite for Provisioning Manager
- Program related to Provisioning Manager

For specific software names, see system requirements, prerequisite programs and related programs described in the *HiCommand Provisioning Manager Installation and Configuration Guide*.

If you change any of the above software for a host for which a host-setting operation has not finished, that host-setting operation cannot be guaranteed when it resumes from the operation log. Before you change any software, see the operation log and make sure that all host-setting operations have finished.

#### 4.3.3.1 Notes on Changing a Host Name

When you change the host name of a host machine, match the host name of the host machine with the host management information of Device Manager, and then use Provisioning Manager.

If you update host information when the host name of the host machine and the host management information of Device Manager do not match, both the host name that existed from before the change and the one created after the change are displayed in the host management window. In such a case, you might be unable to use Provisioning Manager correctly.

### 4.3.4 Restrictions on Creating a File System

When using Provisioning Manager, if abnormal termination occurs while a file system was being created, that file system must be checked to find whether it has a problem at system startup.

To enable this check process, you change a setting in one parameter for the command utility.

- To manually specify the setting, change `/etc/vfstab`. When entering a value, follow the input format appropriate for each OS.
- Specify the setting value so that the file system is checked at system startup:  
Setting value: 1 (Checks the file system at startup)  
Default value: - (Does not check the file system at startup)

Depending on the cluster management software, if a standby configuration is used and this setting is specified so that the file system is checked at startup, it may take time to switch the server when an error occurs. To avoid this, the setting must be changed so that the file system check is not performed at startup. For details, see the documentation for the relevant cluster management software.

### 4.3.5 About Using a Shared Volume Group

If you want to allow concurrent access to a volume by using the cluster management software, convert the volume to a shared volume group: For example, execute the `vxdg export` command, and then use `-s import` of the `vxdg` command.

Note, however, that you may not need to create a special volume group for concurrent access, depending on the cluster management software. For details, see the documentation for the relevant cluster management software.

### 4.3.6 Setting the Unit of Volume Management

In Provisioning Manager, the unit of volume management is an LU or a volume group. If you need to manage volumes in smaller units, use an OS command or volume manager command to manually create, expand, or delete a file system or device file.

There is a one-to-one correspondence between volume groups and volumes. The volume group is used only for online expansion of a newly created volume. When adding a volume (LU) to a volume group, or deleting a logical volume, make sure that you specify the volumes and physical partitions, and also specify the priority in the order they are to be used. In this case, all the command options must be set to the default setting values.

### 4.3.7 Improving Solaris Host Performance

Provisioning Manager uses the Solaris default settings for the settings except for the ones described in *A.2 (2) Restrictions on creating a file system*. When you want to improve host performance, manually adjust the settings.

### 4.3.8 Using Volume Manager RAID Functionality

You cannot configure RAID by using Provisioning Manager. Use either of the following methods to configure RAID:

- Configure RAID by using the functionality of the storage subsystem.
- Configure such RAID software as stripe volume and mirror volume software by manually executing commands such as the ones for the volume manager.

### 4.3.9 About Fragment and Data Compression (Saving Disk Space)

When creating many small size files (for example, files of several tens of kilobytes), reducing the fragment size of the file system can save disk space but the duration of file system operations might increase.

The following value is specified by default as the file system fragment size:

- UFS: 1,024 bytes
- VERITAS File System: 1,024 bytes

When you want to create a file system with a fragment size different from the default, manually change the setting for the fragment size, and then create the file system.

### 4.3.10 Using a Log and Specifying Log Size Using a File System

If you want to collect logs of the execution results when using VERITAS File System or UFS, manually mount the file system by specifying the logging option, or perform the setup of the file system (`/etc/vfstab`).

The default setting value of the log size for VERITAS File System is 16 MB. Change this value as necessary. In UFS, the log size is automatically determined. The maximum log size is approximately 1 MB for each 1-GB file system, and total size is up to 64 MB.

### 4.3.11 Changing the File System Check at Startup Setting

Provisioning Manager specifies that the file system is to be checked at system startup after a file system is created. To change this setting, manually change the setting specified in the information file for the file system, such as `/etc/filesystems` or `/etc/vfstab`.

Depending on the cluster management software, if a standby configuration is used and this setting is specified so that the file system is checked at startup, it may take time to switch the server when an error occurs. To avoid this, the setting must be changed so that the file system check is not performed at startup. For details, see the documentation for the relevant cluster management software.

### 4.3.12 Ensuring Dynamic Link Manager Operations

Provisioning Manager does not guarantee the Dynamic Link Manager operations in the following cases:

- When the LU is manually excluded from the Dynamic Link Manager management
- When multi-path management software other than Dynamic Link Manager is used together

Provisioning Manager specifies that all LUs added while creating or expanding a file system or device file are to be managed by Dynamic Link Manager. In a multi-path configuration, Provisioning Manager assumes that LUs are managed by Dynamic Link Manager alone.

### 4.3.13 Deleting a Mount Point Directory

Even if a file system is deleted, the mount point remains. Use the OS command to manually delete the folder when you no longer need it.

## 4.4 Restrictions When the Host OS is AIX

The following sections describe restrictions and notes when the host OS is AIX.

**NOTE:** When the host OS is AIX5.3, install the Device Manager agent version 4.0 or later on the host. If the Device Manager agent installed on the host is earlier than version 4.0, Provisioning Manager cannot manage the host (cannot display host information or add, expand, or delete file systems or device files).

You need to install a Device Manager agent on a host managed by Provisioning Manager. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

When the mapping mode is set to OFF for the Thunder 9200, Thunder 9500V, or the TagmaStore AMS/WMS series, you can release LUNs to change the volume status from the status in which the volumes are reserved by a host (the reservation status is Reserve or Persistent Reserve) to the status in which the volumes are unallocated. For such volumes, however, Provisioning Manager cannot add a device file, or add or expand a file system. Make sure that you set the mapping mode to ON.

For details about the maximum setting values for manual configuration, see Table 4.1.

### Cluster software

When you use the host management functionality to add, expand, or delete a file system, or add or delete a device file, Provisioning Manager does not perform configuration of the cluster software. You must manually configure the cluster software. For details about this configuration, see the documentation for the cluster software. For details about the cluster software supported by hosts, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

Cluster software that can use the file systems and device files created by the host management functionality is HACMP.

## 4.4.1 Notes on Displaying Host Information

### About Dynamic Link Manager

In any of the following environments, if the version of the Device Manager agent installed on the host is 04-00-05 or later, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can be used to specify settings for the managed LUs.

- LU has been removed manually from the Dynamic Link Manager's management range
- A path manager other than Dynamic Link Manager is also used

However for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

To specify LU settings in the above environment, check the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.0.0-05 or later
- That the target LU is managed by Dynamic Link Manager

**Note:** When file systems or device files are added or expanded, Provisioning Manager assumes that all LUs to be added are managed by Dynamic Link Manager.

## 4.4.2 Prerequisites When the Host in Use Has Not Recognized any Logical Unit

When adding a device file, or adding or expanding a file system for a host that is not recognizing any LUs, use Device Manager to register the port WWN of the HBA for the host in advance. If no WWN is registered, no volume will become selectable in the wizard step for selecting a volume, and you will be unable to continue operation.

### 4.4.2.1 Restrictions on Adding File Systems

A file system that meets either of the following conditions cannot be added:

- The type of volume manager is other than Logical Volume Manager
- A file system is a type other than JFS

Volumes that meet any of the following conditions cannot be used for file system addition:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume is being used as a Differential Management LU

A mount point that is already being used for another file system cannot be used to add a file system.

#### 4.4.2.2 Notes on Expanding File Systems

In the following cases, file systems cannot be expanded:

- The volume manager used in the file system is other than Logical Volume Manager
- The file system to be expanded is a type other than JFS
- RAID software has been configured in the file system.

Volumes that meet any of the following conditions cannot be used for file system expansion:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume is being used as a Differential Management LU
- RAID software has been configured in the file system (However, on a Linux AS/ES 3 host, if Dynamic Link Manager is being used to manage LUs, software RAID functionality (md devices) must be used due to the limitations of Logical Volume Manager.)

### 4.4.3 Restrictions on Expansion and Deletion

#### Limits on expanding a file system

Provisioning Manager cannot expand a file system whose type is other than JFS.

#### Limits on deleting a file system

- A file system whose type is other than JFS
- A file system whose mount point hierarchy includes other mount points
- A file system that is being used by a process

Even if a file system is deleted, the mount point directory remains. To delete unneeded directories, use an OS command to delete them manually.

### 4.4.4 Notes on Deleting File Systems or Device Files

On an AIX host in which Dynamic Link Manager is installed, while the processing of the host is being suspended due to the operation of deleting file systems or device files, if you have disconnected all the data paths of the volume and restarted the host, perform the following procedure:

To complete the operation of deleting file systems or device files:

1. Restore the necessary data paths.
2. Search for the defined HDLM device (`dlnmfdrvX` (*X* indicates a number)) and `hdiskY` (*Y* indicates a number) by using the `lsdev` command, and then manually delete these files.
3. Refresh the host.
4. Resume the operation that you want to perform.

**Note:** When all the data paths allocated to the HDLM device are disconnected, all the devices indicating the disks on the SAN are to be defined.

**Note:** When the error checking functionality of the `hdisk` command for Dynamic Link Manager is enabled, if you resume the operation without performing step 1 to step 3, an error occurs during the execution of the `/usr/sbin/rmdev` command and the operation to be resumed also terminates with an error. In this case, after the error message is displayed, follow step 1 to step 4.

## 4.4.5 Restrictions on Adding a File System and Device File

To unify interfaces for creating a file system or a device file, Provisioning Manager changes the following command utility parameters from the default settings. When manually changing a value, follow the input format appropriate for each OS.

### Restrictions on creating a file system

- Size of a physical partition is specified so that a file system with the maximum size (128 GB) designated by Provisioning Manager can be created on a single disk.

Setting value: 128 MB

Default value: automatically specified as 4 MB for AIX 5.1, as a value from 1 to 1,024 MB for AIX 5.2, and as a value from 1 to 131,072 MB for AIX 5.3.

- The maximum number of physical partitions to be allocated to a logical volume is specified so that a file system with the maximum size (128 GB) designated by Provisioning Manager can be created.

Setting value: 1,024

Default value: 512

**Note:** 128 GB = 128 MB (size of a physical partition) x 1,024

- NBPI value (number of bytes per i-node) is specified so that a file system with the maximum size (128 GB) designated by Provisioning Manager can be created.

Setting value: 8,192 bytes

Default value: 4,096 bytes

- Because the maximum size of the file to be created is 2 GB by default, and the size is not changeable once the file is created, the option to enable use of a larger file is specified at file creation<sup>#</sup>.

Setting value: true

Default value: false

**Note:** To create a large (128 KB) disk block, even if there is sufficient disk space for file creation, when a required number of 32-consecutive disk blocks (4 KB x 32) does not exist, file creation fails. If consecutive disk blocks do not exist, perform defragmentation (`defragfs` command) to ensure consecutive disk space.

- The setting is specified so that the file system is checked at startup to make sure that the file system does not have a problem after the system terminated abnormally<sup>#</sup>.

Setting value: `check=true`

Default value: `check=false`

**Note:** Depending on the cluster management software, if a standby configuration is used and this setting is specified so that the file system is checked at startup, it may take time to switch the server when an error occurs. To avoid this, the setting must be changed so that the file system check is not performed at startup. For details, see the documentation for the cluster management software.

## Restrictions on adding a device file

The size of a physical partition is specified in order to create a file system of the size addable by Provisioning Manager (128 GB) on a single disk.

Setting value: 128 MB

Default value: Automatically specified as 4 MB for AIX 5.1, as a value from 1 to 1,024 MB for AIX 5.2, and as a value from 1 to 131,072 MB for AIX 5.3

The maximum number of logical partitions to be allocated to a logical volume is specified in order to achieve the file system size (128 GB <sup>Note</sup>) that can be added by Provisioning Manager.

Setting value: 1,024

Default value: 512

**Note:** 128 GB = 128 MB (size of a physical partition) x 1,024

### 4.4.6 Using Volume Manager RAID Functionality

You cannot configure RAID by using Provisioning Manager. Use either of the following methods to configure RAID:

- Configure RAID by using the functionality of the storage subsystem.
- Configure such RAID software as stripe volume and mirror volume software by manually executing commands such as the ones for the volume manager.

### 4.4.7 About Creating a Logical Volume for the JFS Log

In Provisioning Manager, log files are created in the same volume group using the file system creation command. To create a logical volume for the JFS log, manually perform configuration.

### 4.4.8 Changing the Size of the Logical Volume for the JFS Log

In Provisioning Manager, the log size for one logical partition is 128 MB by default. Change the log size of the logical volume for the JFS log as necessary.

### 4.4.9 AIX File System and Device File Sizes

In AIX, when the file systems or device files are created, their sizes are smaller than the size of the volume (LU). The reasons are as follows:

- Because one physical partition is reserved for the JFS log, the total size of the file systems or the device files is smaller than the volume (LU) for the size of one physical partition.
- Because of a limit on the number of physical partitions within an LU (up to 1,016 physical partitions), the maximum size of the file system and device file that can be created is 128 GB.

## 4.5 Restrictions When the Host OS is Linux

The following sections describe restrictions and notes when the host OS is Linux.

For details about the maximum setting values for manual configuration, see Table 4.1.

When the mapping mode is set to OFF for the Thunder 9200, Thunder 9500V, or the TagmaStore AMS/WMS series, you can release LUNs to change the volume status from the status in which the volumes are reserved by a host (the reservation status is Reserve or Persistent Reserve) to the status in which the volumes are unallocated. For such volumes, however, Provisioning Manager cannot add a device file, or add or expand a file system. Make sure that you set the mapping mode to ON.

### 4.5.1 Prerequisites for the Host

- The Device Manager agent

You need to install a Device Manager agent on a host managed by Provisioning Manager. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

- When the host in use has not recognized any logical unit

When adding a device file, or adding or expanding a file system for a host that is not recognizing any LUs, use Device Manager to register the port WWN of the HBA for the host in advance. If no WWN is registered, no volume will become selectable in the wizard step for selecting a volume, and you will be unable to continue operation.

## 4.5.2 Restrictions on Expansion and Deletion

About OSs on a Linux host

The following limitations apply when you use Linux AS/ES 3 Update 0, Update 3, or Update 4:

- Do not perform the following operations while performing a host setting operation (creating or deleting a device file; or creating, expanding, or deleting a file system) by using the Provisioning Manager client:

Updating host information in the Provisioning Manager client

Updating host information in the Device Manager client

Starting the Device Manager agent

Executing the Device Manager agent `HiScan` command or `hldutil` command

Executing disk control-related commands (such as `blockdev`)

- Do not perform the following operations while updating host information in the Provisioning Manager client:

Setting up a host by using the Provisioning Manager client

Executing the Dynamic Link Manager `dlmcfgmgr` command

Executing disk control-related commands (such as `blockdev`)

- Do not perform the following operations while starting the Device Manager agent:

Setting up a host by using the Provisioning Manager client

Executing the Dynamic Link Manager `dlmcfgmgr` command

Executing disk control-related commands (such as `blockdev`)

- Do not perform the following operations concurrently with the Device Manager agent `HiScan` command or `hldutil` command:

Setting up a host by using the Provisioning Manager client.

Executing the Dynamic Link Manager `dlmcfgmgr` command

Executing disk control-related commands (such as `blockdev`)

- Do not perform automatic execution of the Device Manager agent `HiScan` command.

If automatic execution of the `HiScan` command has been specified, clear the setting. For details about how to do this, see the *HiCommand Device Manager Agent Installation Guide*.

If the `HiScan` command needs to be automatically executed for system-operational reasons, do not perform any operation in the host during automatic execution of the `HiScan` command.

About md devices on a Linux AS/ES 3 host

- On a Linux AS/ES 3 host, if Dynamic Link Manager is being used to manage LUs, md devices must be used. In a Linux AS/ES 3 host (in the default setting), the upper limit for the number of usable md devices is 32. First edit the `/etc/makedev.d/linux-2.4.X` file, and then execute the `/dev/MAKEDEV md` command to create md devices: from `md0` to `md255`.
- If the `/etc/raidtab` file does not exist on the Linux AS/ES 3 host, create that file before using Provisioning Manager to create md devices.

**Note:** If you want to create md devices without using Provisioning Manager, write the definition for those md devices in the `/etc/raidtab` file.

### 4.5.3 About Host Management in Linux Environments

This section provides information about using Provisioning Manager to manipulate file systems and device files.

#### 4.5.3.1 When a Storage Subsystem is Installed

##### About Dynamic Link Manager

In any of the following environments, if a Device Manager agent version 4.1.0-01 or later is installed on the host, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can be used to specify settings for the managed LUs:

- When an LU has been removed manually from the Dynamic Link Manager's management range
- When a path manager other than Dynamic Link Manager is also used

However, for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

To specify LU settings in the above environment, check the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.0.0-05 or later
- That the target LU is managed by Dynamic Link Manager

**Note:** Provisioning Manager treats all LUs that are added when file systems or device files are added or expanded as being under the management of Dynamic Link Manager.

##### About Logical Disk Manager

Provisioning Manager virtually creates a volume group that has the same name as the logical volume. The corresponding volume group does not exist on the host.

### 4.5.3.2 Dynamic Link Manager Considerations

In the Dynamic Link Manager environment, LDEVs used by the HDLM devices that meet either of the following conditions cannot be used for file system addition:

- An HDLM device that already comprises another md device on a Linux AS/ES 3 host
- An HDLM device in which a path exists whose status is other than online

A mount point that is already being used for another file system cannot be used to add a file system:

- A mount point that has a name that includes two-byte characters
- A mount point that is already being used for another file system

**WARNING:** Provisioning Manager does not support HDLM devices on Linux AS/ES 3 hosts managed by Dynamic Link Manager, when the HDLM devices meet either of the conditions described below.:

- An HDLM device corresponding to a SCSI device that already comprises another md device.
- An HDLM device with a partition that already comprises another md device

Make sure that you eliminate LDEVs that are used by these HDLM devices from the storage pool for the logged-in user. Also, make sure that you do not use these LDEVs for adding a file system. If you use them, the data might be damaged.

When adding file systems or device files to a host where Dynamic Link Manager exists, if there is no LU recognized by Dynamic Link Manager, configure Dynamic Link Manager to recognize LUs and then add the file system or device file.

### 4.5.3.3 Limits on Adding File Systems

A file system cannot be added by using a volume manager other than Logical Volume Manager.

- Logical Volume Manager has not been installed

Volumes to which any of the following conditions applies cannot be used for file system expansion:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device

- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume is being used as a Differential Management LU
- The volume exceeds the upper limit for the number of md devices (256) on a Linux AS/ES 3 host managed by Dynamic Link Manager

In the Dynamic Link Manager environment, LDEVs used by the HDLM devices that meet either of the following conditions cannot be used for file system addition:

- An HDLM device that already comprises another md device on a Linux AS/ES 3 host
- An HDLM device in which a path exists whose status is other than online

If a volume whose size is more than 1.2 TB is specified, a file system operation command might time out. Therefore, set a value larger than the default value for the `server.agent.fs.moduleTimeOut` property in advance by referring to the manual *HiCommand Provisioning Manager Installation and Configuration Guide*. For the timeout value, consider the value calculated by the following formula: *the-specified-volume-size* (in-TB) x 1,000.

A mount point that is already being used for another file system cannot be used to add a file system.

#### 4.5.3.4 Constraints on Expanding File Systems

In the following cases, file systems cannot be expanded:

- The type of file system that is to be expanded is neither ext2 nor ext3
- Logical Volume Manager is not being used
- A process is using the file system to be expanded.
- The logical volume that is mounted at the specified mount point is a snapshot volume
- There is a snapshot volume for the logical volume that is mounted at the specified mount point on a Linux AS/ES 4 host
- The logical volume has been created using a SCSI device in the Dynamic Link Manager environment
- There is more than one mount point for the file system to be expanded
- Multiple file systems have been mounted on the same directory
- Any of the components of the file system to be expanded contain more than one partition.

- A file system that contains a device file other than an md device on a Linux AS/ES 3 host managed by Dynamic Link Manager
- A file system containing an md device that is comprised of multiple HDLM devices on a Linux AS/ES 3 host managed by Dynamic Link Manager

Volumes that meet any of the following conditions cannot be used for file system expansion:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume is being used as a Differential Management LU
- The volume exceeds the upper limit for the number of md devices (256) on a Linux AS/ES 3 host managed by Dynamic Link Manager

In the Dynamic Link Manager environment, LDEVs used by the HDLM devices that meet any of the following conditions cannot be used for file system expansion:

- An HDLM device that already comprises another md device on a Linux AS/ES 3 host managed by Dynamic Link Manager
- An HDLM device in which a path exists whose status is other than online

If a volume whose size is more than 1.2 TB is specified, a file system operation command might time out. Therefore, set a value larger than the default value for the `server.agent.fs.moduleTimeOut` property in advance by referring to the manual *HiCommand Provisioning Manager Installation and Configuration Guide*. For the timeout value, consider the value calculated by the following formula: *the-specified-volume-size* (in-TB) x 1,000.

### 4.5.3.5 Constraints on Deleting File Systems

Provisioning Manager cannot delete the following file systems:

- The type of file system that is to be deleted is neither ext2 nor ext3
- Logical Volume Manager is not being used
- The logical volume that is mounted at the specified mount point is a snapshot volume
- There is a snapshot volume for the logical volume that is mounted at the specified mount point
- The absolute path for the logical volume that is mounted at the specified mount point on a Linux AS/ES 4 Update 1 (IPF) host exceeds 32 characters in length.
- A process is using the file system to be deleted.
- The logical volume has been created using a SCSI device in the Dynamic Link Manager environment

There is more than one mount point for the file system to be deleted

- Multiple file systems have been mounted on the same directory
- Any of the components of the file system to be deleted contain more than one partition.
- A file system that contains a device file other than an md device on a Linux AS/ES 3 host managed by Dynamic Link Manager
- A file system containing an md device that is comprised of multiple devices on a Linux AS/ES 3 host managed by Dynamic Link Manager

### 4.5.3.6 Constraints on Adding Device Files

A device file cannot be added by using a volume manager other than Logical Volume Manager.

Volumes that meet any of the following conditions cannot be used for device file addition:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set

- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume
- The volume exceeds the upper limit for the number of md devices (256) on a Linux AS/ES 3 host managed by Dynamic Link Manager

#### 4.5.3.7 Notes on Deleting Device Files

If any of the components of the device file contain more than one partition, you cannot delete the device file. You also cannot delete a device file that is made up of logical volumes whose path length exceeds 32 characters on a Linux AS/ES 4 Update 1 (IPF) host.

You cannot delete a device file that is made up of logical volumes in which the following conditions exist:

- The logical volume is a snapshot volume
- There is a snapshot volume for the logical volume
- The logical volume that contains a device file other than an md device on a Linux AS/ES 3 host managed by Dynamic Link Manager
- The logical volume that has an md device that is made up of multiple devices on a Linux AS/ES 3 host managed by Dynamic Link Manager

#### 4.5.3.8 Notes on Changing the Software Configuration

For a host for which a host-setting operation has not finished (that is, for a host for which a suspended operation exists in the operation log), do not change any of the software listed below by installing or uninstalling them, or by changing the software version.

- OS
- File system
- Program prerequisite for Provisioning Manager
- Program related to Provisioning Manager
- For specific software names, see system requirements, prerequisite programs and related programs described in the Hitachi *HiCommand Provisioning Manager Installation and Configuration Guide*.

If you change any of the above software for a host for which a host-setting operation has not finished, that host-setting operation cannot be guaranteed when it resumes from the operation log. Before you change any software, see the operation log and make sure that all host-setting operations have finished.

### 4.5.3.9 Notes on Changing a Host Name

When you change the host name of a host machine, match the host name of the host machine with the host management information of Device Manager, and then use Provisioning Manager.

If you update host information when the host name of the host machine and the host management information of Device Manager do not match, both the host name that existed from before the change and the one created after the change are displayed in the host management window. In such a case, you might be unable to use Provisioning Manager correctly.

### 4.5.3.10 About Displayed Host Information

When the host OS is Linux AS/ES 3

- Configure the volumes and devices in accordance with 4.5.4. If the volumes and devices are configured in a different pattern, the host information might not be displayed correctly.
- Provisioning Manager can display only md devices that are composed of HDLM devices on Linux AS/ES 3 hosts. For notes on using md devices, see section 4.5.5.
- When you use a Linux AS/ES 3 host that is not managed by Dynamic Link Manager, Provisioning Manager cannot display information about file systems, logical volumes, or volume groups that are created by using software RAID functionality.

When the host OS is Linux AS/ES 4

- Provisioning Manager cannot display information about file systems, logical volumes, or volume groups that are created by using software RAID functionality.

## 4.5.4 Volume Configurations Displayed by Provisioning Manager for Linux AS/ES 3 Hosts

This section describes the volume configurations for which Provisioning Manager can correctly display information about file systems and devices on Linux AS/ES 3 hosts. The configurations for which Provisioning Manager can display information differ depending on the following conditions:

- Whether Dynamic Link Manager manages the LU
- Whether any partition exists on the physical volumes

### 4.5.4.1 When Dynamic Link Manager Does Not Manage the LU

When Dynamic Link Manager does not manage the LU, Provisioning Manager can display information about configuration components in the configuration patterns shown in Figure 4.3.

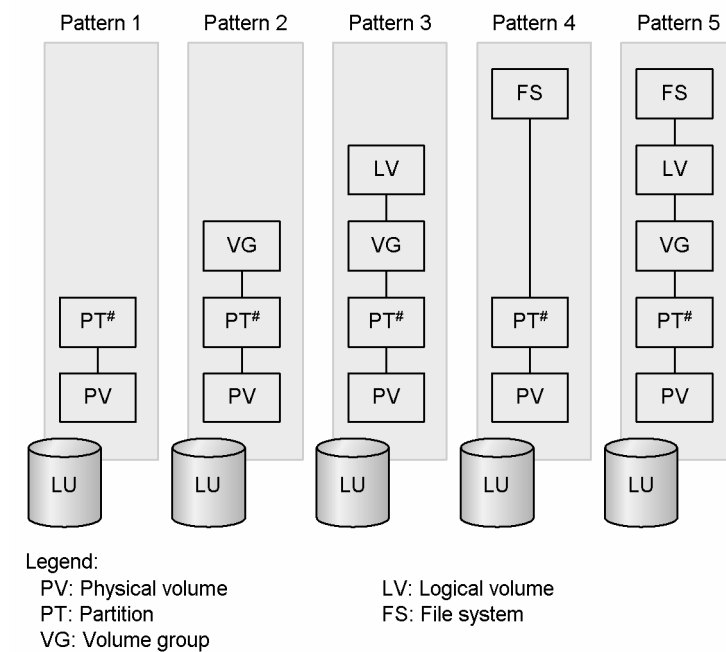


Figure 4.3 Configurations Displayed When DLM Does Not Manage the LU

Figure 4.3 shows examples of configuration components, such as physical and logical volumes, created in one-to-one configuration. However, Provisioning Manager can also display information when these configuration components are created, in the following one-to-many configurations:

- When multiple partitions exist in one physical volume.
- When multiple physical volumes or partitions create one volume group.
- When multiple logical volumes exist in one volume group.
- When one file system is mounted on multiple mount points.

Provisioning Manager can also display snapshot volumes, which look like logical volumes.

**Note:** Provisioning Manager cannot display information about volume groups or file systems created in md devices.

#### 4.5.4.2 When Dynamic Link Manager Manages the LU (No Partitions)

When Dynamic Link Manager manages the LU, Provisioning Manager can display information about configuration components in the configuration patterns shown in Figure 4.4.

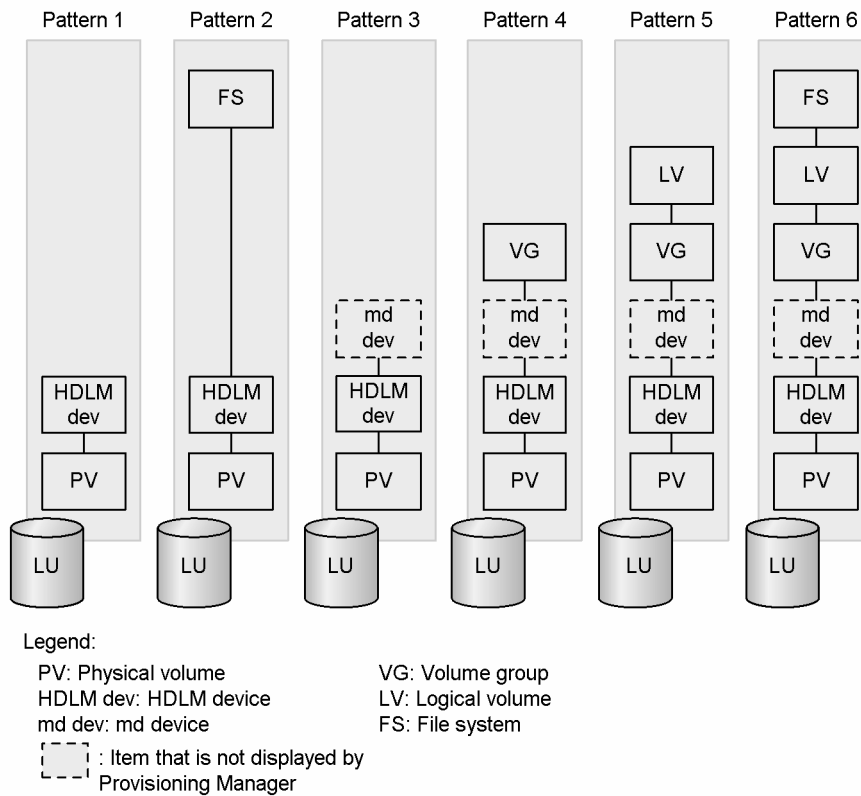


Figure 4.4 Configurations Displayed When DLM Manages the LU and No Partitions Exist

Figure 4.4 shows examples of configuration components, such as physical and logical volumes, created in one-to-one configuration. However, Provisioning Manager can also display information when these configuration components are created, in the following one-to-many configurations:

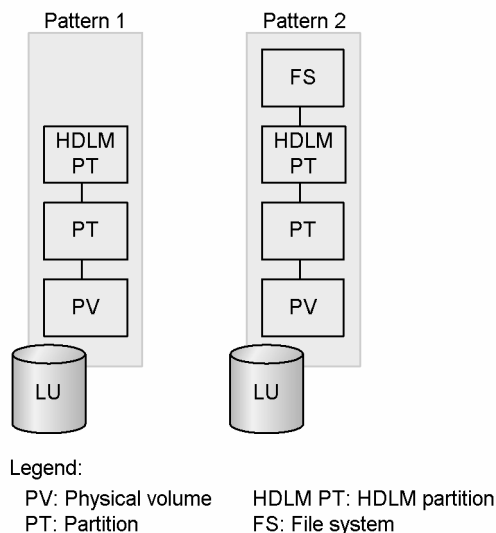
- When multiple HDLM devices create one md device.
- When multiple md devices create one volume group.
- When multiple logical volumes exist in one volume group.
- When one file system is mounted on multiple mount points.

Provisioning Manager can also display snapshot volumes, which look like logical volumes.

**Note:** If an md device containing non-HDLM devices is created, Provisioning Manager displays the LDEVs corresponding to each of these devices as unused LDEVs. To avoid operational errors, these LDEVs must be excluded from logged-in users' storage pools.

#### 4.5.4.3 When Dynamic Link Manager Manages the LU (With Partition)

When Dynamic Link Manager manages the LU, Provisioning Manager can display information about configuration components in the configuration patterns shown in Figure 4.5.



**Figure 4.5** Configurations Displayed When DLM Manages the LU and a Partition Exists

Figure 4.5 shows examples of configuration components created in one-to-one configuration. However, Provisioning Manager can also display information when multiple partitions exist in one physical volume. Provisioning Manager can also display information when one file system is mounted on multiple mount points.

**Note:** Provisioning Manager cannot display information about volume groups or file systems created in md devices.

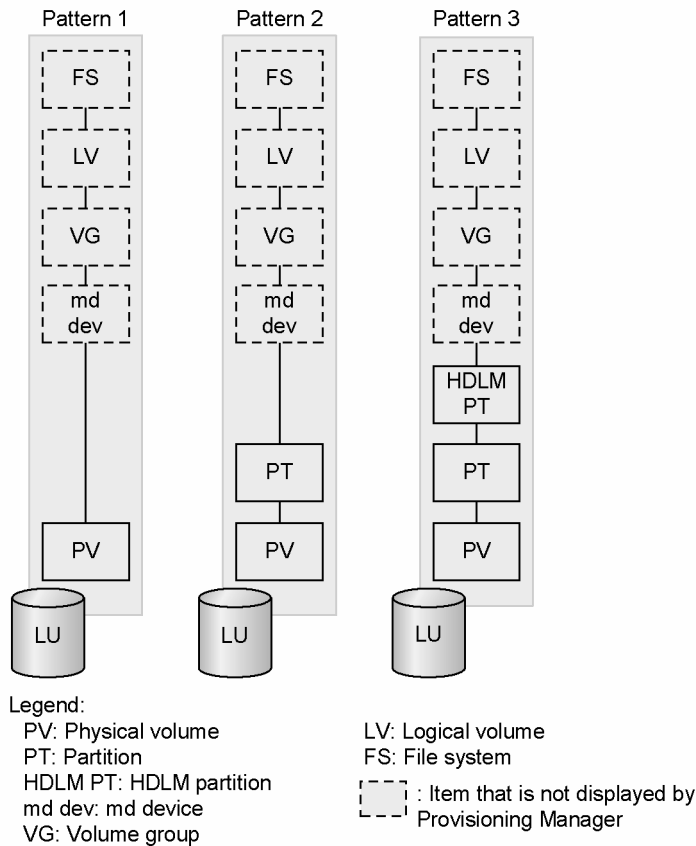
### 4.5.5 Notes on Md Devices

Provisioning Manager can correctly display the configuration, such as for volume groups and file systems, on an md device only when the md device is composed of HDLM devices. An HDLM device does not contain partitions in an HDLM device (HDLM partitions).

If an md device containing non-HDLM devices is created, Provisioning Manager displays the LDEVs corresponding to each of these non-HDLM devices as unused LDEVs. To avoid operational errors, the LDEVs corresponding to these non-HDLM devices must be excluded from the storage pools of logged-in users.

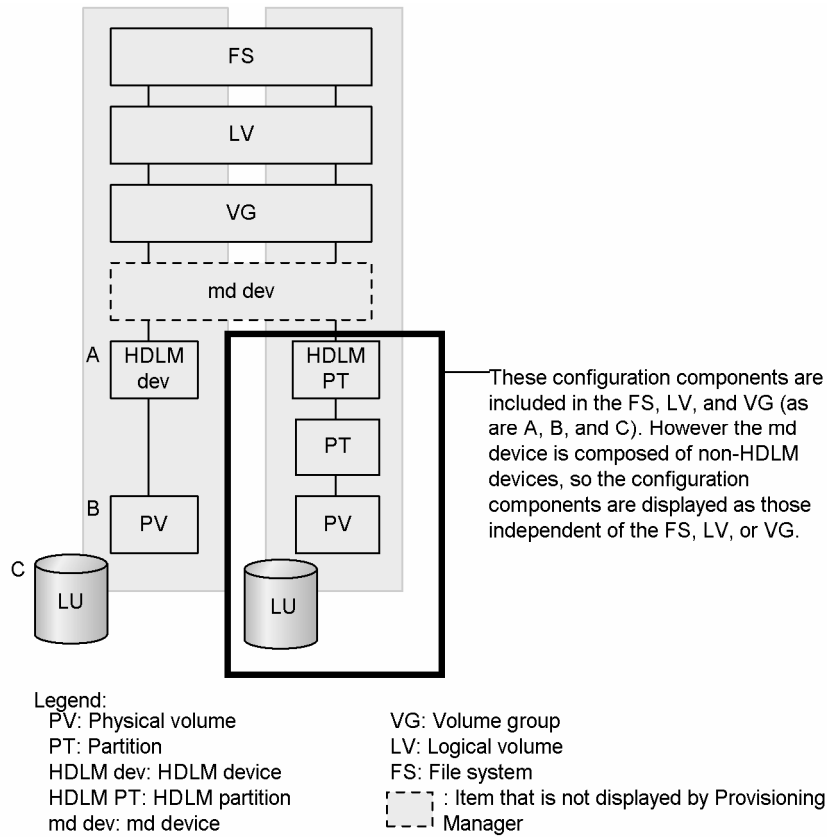
Figure 4.6 and Figure 4.7 explain the configurations in which information on an md device is not correctly displayed.

Figure 4.6 shows examples in which md devices are composed of non-HDLM devices. In this configuration, information about volume groups and file systems in an md device is not displayed. Note that an md device is not displayed in any of the configurations.



**Figure 4.6** Configurations Yielding Incorrect Display of MD Device Information

Figure 4.7 shows examples in which md devices are composed of HDLM devices and partitions. If an md device is composed of HDLM devices and non-HDLM devices (including HDLM partitions), the non-HDLM devices are displayed as independent devices unrelated to a volume group or file system in the md device. Note that an md device is not displayed in any of the configurations.



**Figure 4.7 Incorrect Configuration (MD Device Composed of HDLM and Partitions)**

## 4.5.6 Improving Linux Host Performance

Provisioning Manager functionality can be used to ensure more flexible operations within existing systems.

### 4.5.6.1 Using Linux Command Utility Parameters

During system startup, Provisioning Manager checks file systems for errors as a countermeasure for events such as abnormal system termination that may occur when file systems are being added. For this reason, the command utility parameters shown below are changed from their initial settings.

Settings for the attribute for file system checking during system startup:

Setting value: 2 (checks file systems during system startup)

Initial setting: Not specified (does not check file systems during system startup)

Other than the above setting, Provisioning Manager uses the default performance-related settings in Linux. To improve performance, adjust the settings manually.

### 4.5.6.2 Notes on Using Volume Manager RAID Functions

You cannot configure RAID by using Provisioning Manager. Use either of the following methods to configure RAID:

- Configure RAID by using the functionality of the storage subsystem.
- Configure such RAID software as stripe volume and mirror volume software by manually executing commands such as the ones for the volume manager.

### 4.5.6.3 Notes on Creating and Expanding File Systems in Partitions

Provisioning Manager 4.1.0-01 uses the entire disk to create and expand file systems. If you specify a disk that already has partitions, Provisioning Manager creates a new label. If you want to create or expand a file system in partitions, you must specify the settings manually.

#### 4.5.6.4 Notes on Recognizing the Device After Deleting an LU

For a host running on Linux, if an LU is deleted, the OS-managed device name might be changed. If you have deleted an LU, make sure that you perform the following actions:

1. If the device name is directly specified in `/etc/fstab`, change it to the new device name.
2. Update the host information.

#### 4.5.6.5 Reason for Unmatched Volume and LU Sizes

In Linux, when an ext2 or ext3 file system is created, the size of the file system is smaller than that of the volume (LU).

In an ext2 or ext3 file system, 5 percent of the whole area is reserved for use of the superuser only. Therefore, the created file system is smaller than the volume (LU).

## 4.6 Restrictions When the Host OS is HP-UX

This section describes various conditions that apply when the host OS is HP-UX. For details about the maximum values supported by Provisioning Manager, see Table 4.1

### 4.6.1 Before Starting Host Management

This section describes the prerequisites for using Provisioning Manager to manage file systems and device files.

#### 4.6.1.1 Limitations Related to Storage Subsystems

When the mapping mode is set to OFF for the Thunder 9200, Thunder 9500V, or the TagmaStore AMS/WMS series, you can release LUNs to change the volume status from the status in which the volumes are reserved by a host (the reservation status is Reserve or Persistent Reserve) to the status in which the volumes are unallocated. For such volumes, however, Provisioning Manager cannot add a device file, or add or expand a file system. Make sure that you set the mapping mode to ON.

#### 4.6.1.2 Prerequisites for the Host

The Device Manager agent

You need to install a Device Manager agent on a host managed by Provisioning Manager. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

Version of VERITAS File System

Provisioning Manager supports the following versions of VERITAS File System:

- For HP-UX 11i v1:  
VERITAS File System for UNIX (HP-UX) 3.5 is supported. To enable VERITAS File System 3.5, install a version of Software Pack (Optional HP-UX 11i v1 Core Enhancements) that was released in or after December 2002.
- For versions released before the December 2005 version of HP-UX 11i v2:  
VERITAS File System for UNIX (HP-UX) 3.5, which comes standard with the OS, is supported.
- For the December 2005 and later versions of HP-UX 11i v2:  
VERITAS File System for UNIX (HP-UX) 4.1, which comes standard with the OS, is supported.
- For HP-UX 11i v3:  
VERITAS File System for UNIX (HP-UX) 4.1, which comes standard with the OS, is supported.

### 4.6.1.3 Limitations Related to the Host OS and Related Products

#### Expanding and deleting logical volumes

Provisioning Manager cannot expand or delete the following logical volumes:

- A logical volume of a volume group other than a Logical Volume Manager volume group
- A logical volume whose component contains partitions

(Note that partitions can be created in HP-UX 11i v2 or later versions (IPF).)

#### Cluster software

When you use the host management functionality to add, expand, or delete a file system, or add or delete a device file, Provisioning Manager does not perform configuration of the cluster software. You must manually configure the cluster software. For details about this configuration, see the documentation for the cluster software. For details about the cluster software supported by hosts, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

Cluster software that can use the file systems and device files created by the host management functionality is Serviceguard.

#### Software that cannot be used with Provisioning Manager

Provisioning Manager does not support an environment in which a mirror volume exists or can exist.

- When the host is running HP-UX 11i v2 or earlier:

If MirrorDisk/UX is installed on the host, you cannot use the Provisioning Manager functionality to view the host information and configure the host.

- When the host is running HP-UX 11i v3:

MirrorDisk/UX is installed on the host during a standard OS installation. You can use the Provisioning Manager functionality to view the host information and configure the host. However, RAID software that uses MirrorDisk/UX is not supported.

### 4.6.1.4 Prerequisites When the Host in Use Has Not Recognized any Logical Unit

When adding a device file, or adding or expanding a file system for a host that is not recognizing any LUs, use Device Manager to register the port WWN of the HBA for the host in advance. If no WWN is registered, no volume will become selectable in the wizard step for selecting a volume, and you will be unable to continue operation.

### 4.6.1.5 Notes on the Device Files for a Host Running HP-UX 11i v3

On an HP-UX 11i v3 host, device files used for Provisioning Manager host settings vary depending on the value of the `agent.util.hpux.displayDsf` property in the properties file (`hldutil.properties`). For details on how to set the properties, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

There are three types of property values, `disk`, `ctd`, and `mix`, and two types of device files, disk device file and ctd device file.

The following describes which display format will be used for the device files when different property values are set:

- When the property value is `disk`, disk device files will be displayed.  
Example: `/dev/rdisk/disk0`
- When the property value is `ctd`, ctd device files will be displayed.  
Example: `/dev/rdisk/c0t0d0`
- When the property value is `mix`, disk device files and ctd device files will be displayed.  
Example: `/dev/rdisk/disk0, /dev/rdisk/c0t0d0`

**Important:** The maximum allowable number of ctd device files is 32,000. If you want to connect 32,001 or more LUs to an HP-UX 11i v3 host, specify `disk` or `mix` for the value of the `agent.util.hpux.displayDsf` property.

The following describes which device files will be used for the host settings when different property values are set:

- When the property value is `disk`, disk device files will be used.
- When the property value is `ctd`, ctd device files will be used.
- When the property value is `mix`, disk device files will be used. However, if a disk device file is not found, ctd device files will be used instead.

The following describes which device files will be deleted by the host settings when different property values are set:

- When the property value is `disk`, only the target disk device files will be deleted.
- When the property value is `ctd`, only the target ctd device files will be deleted.
- When the property value is `mix`, both the target disk device files and ctd device files will be deleted.

**Important:** If the value of the `agent.util.hpux.displayDsf` property is changed while the deletion operation for a file system or device file is being suspended, after the deletion operation finishes, the device file information that has already been deleted might still be displayed according to the new value of the `agent.util.hpux.displayDsf` property. If this happens, perform a host refresh operation.

## 4.6.2 Notes on Host Management

This section provides important information about using Provisioning Manager to manipulate file systems and device files.

### 4.6.2.1 Notes on Installing a Storage Subsystem

Make sure that you specify a unique port address for each port of storage devices in the same zone. If the same port addresses exist in the same zone, the OS cannot recognize the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

### 4.6.2.2 Notes on Displaying Host Information

#### About Dynamic Link Manager

In any of the following environments, if a Device Manager agent version 4.3.0-01 or later is installed on the host, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can be used to specify settings for the managed LUs:

- When an LU has been removed manually from the Dynamic Link Manager's management range
- When a path manager other than Dynamic Link Manager is also used

If Dynamic Link Manager is installed on the host, for an LU managed by a path manager other than Dynamic Link Manager (not including PV-link), Provisioning Manager cannot display information (such as the number of paths and data paths) managed by the path manager, and cannot be used to specify settings for the managed LUs. For an LU managed by PV-link, Provisioning Manager can display information, but cannot be used to specify settings.

To specify LU settings in the above environment, check the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.3.0-01 or later
- That the target LU is managed by Dynamic Link Manager

If Dynamic Link Manager is not installed on the host, Provisioning Manager can display information and can be used to specify settings for LUs that are managed by PV-link or are not managed by any path manager.

**Note:** If Dynamic Link Manager is installed on the host, Provisioning Manager treats all LUs that are added when file systems or device files are added or expanded, as being under the management of Dynamic Link Manager.

### 4.6.2.3 Notes on Adding File Systems

A file system that meets any of the following conditions cannot be added:

- The type of volume manager is a type other than Logical Volume Manager
- A file system that is a type other than VERITAS File System
- A file system that has a configuration containing partitions

Volumes that meet any of the following conditions cannot be used for file system addition:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Multiple paths are assigned to the volume without using Dynamic Link Manager or PV-link
- Dynamic Link Manager is installed on the host, and multiple paths are assigned to the volume using PV-link  
When Dynamic Link Manager is installed on the host, for the volume to which multiple paths have been assigned using PV-link, Provisioning Manager can view information only.
- The volume is being used as a Differential Management LU
- The volume size is greater than 1 TB

A mount point that is already being used for another file system cannot be used to add a file system.

#### 4.6.2.4 Notes on Expanding File Systems

In the following cases, file systems cannot be expanded:

- The file system uses a volume manager other than Logical Volume Manager
- The file system is a type other than VERITAS File System
- RAID software has been configured in the file system
- The file system contains partitions
- The file system contains a snapshot file system

In the following cases, if the version of the Device Manager agent installed on the host is earlier than 5.1, file systems cannot be expanded.

- A file system whose mount point hierarchy includes other mount points
- A file system that is being used by a process

In the following cases, if the version of the Device Manager agent installed on the host is 5.1 or later, and HP OnlineJFS is not installed on the host, file systems cannot be expanded.

- A file system whose mount point hierarchy includes other mount points
- A file system that is being used by a process

Volumes that meet any of the following conditions cannot be used for expanding a file system:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Multiple paths are assigned to the volume without using Dynamic Link Manager or PV-link
- Dynamic Link Manager is installed on the host, and multiple paths are assigned to the volume using PV-link
- The volume is being used as a Differential Management LU

#### 4.6.2.5 Notes on Deleting File Systems

Provisioning Manager cannot delete the following file systems:

- A file system that uses a volume manager other than Logical Volume Manager
- A file system whose type is not VERITAS File System
- A file system whose mount point hierarchy includes other mount points
- A file system that is being used by a process
- A file system that contains partitions
- A file system that is made up of volumes that meet the following conditions:
  - Multiple paths are assigned to the volume without using Dynamic Link Manager or PV-link
  - Dynamic Link Manager is installed on the host, and multiple paths are assigned to the volume using PV-link
- A file system that is a snapshot file system
- A file system that contains a snapshot file system

Even if a file system is deleted, the mount point directory remains. To delete unneeded directories, use an OS command to delete them manually.

#### 4.6.2.6 Notes on Adding Device Files

A file system that meets any of the following conditions cannot be added:

- A device file that has a configuration containing partitions

Volumes that meet any of the following conditions cannot be used for device file addition:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow or Copy-on-Write Snapshot
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume emulation type is not one of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
- The volume size is less than 512 MB
- Multiple paths are assigned to the volume without using Dynamic Link Manager or PV-link
- Dynamic Link Manager is installed on the host, and multiple paths are assigned to the volume using PV-link
- The volume size is greater than 1 TB

A device file cannot be added by using a volume manager other than Logical Volume Manager.

#### 4.6.2.7 Notes on Deleting Device Files

A device file that contains partitions cannot be deleted. Also, a device file that is made up of volumes that meet the following conditions cannot be deleted:

- Multiple paths are assigned to the volume without using Dynamic Link Manager or PV-link
- Dynamic Link Manager is installed on the host, and multiple paths are assigned to the volume using PV-link

#### 4.6.2.8 Notes on Partitions

Provisioning Manager does not support the following operations related to partitions (note that partitions can be created in HP-UX 11i v2 or later versions (IPF)):

- Adding and deleting partitions
- Adding, expanding, and deleting file systems that contain partitions
- Adding and deleting device files that contain partitions

If it is necessary to perform the above operations, perform them manually, using OS commands.

#### 4.6.2.9 Notes on Setting PV-link

Provisioning Manager cannot specify the following settings related to PV-link:

- Specifying the type of link (primary link or alternate link) when adding each link to a volume group
- Changing the number of physical volume links for created volume groups
- Switching a primary link to an alternate link

If it is necessary to specify the above settings, specify them manually, using OS commands.

#### 4.6.2.10 Notes on Changing the Software Configuration

For a host for which a host-setting operation has not finished (that is, for a host for which a suspended operation exists in the operation log), do not change any of the software listed below by installing or uninstalling them, or by changing the software version.

- OS
- File system
- Program prerequisite for Provisioning Manager
- Program related to Provisioning Manager

For specific software names, see system requirements, prerequisite programs and related programs described in the manual *HiCommand Provisioning Manager Installation and Configuration Guide*.

If you change any of the above software for a host for which a host-setting operation has not finished, that host-setting operation cannot be guaranteed when it resumes from the operation log. Before you change any software, see the operation log and make sure that all host-setting operations have finished.

#### 4.6.2.11 Notes on Changing a Host Name

When you change the host name of a host machine, match the host name of the host machine with the host management information of Device Manager, and then use Provisioning Manager.

If you update host information when the host name of the host machine and the host management information of Device Manager do not match, both the host name that existed from before the change and the one created after the change are displayed in the host management window. In such a case, you might be unable to use Provisioning Manager correctly.

### 4.6.3 Notes About Linkage with Other Products

This section describes conditions for achieving more flexible operation with the existing system.

#### 4.6.3.1 Notes About the Parameters of Command Utilities

To unify interfaces for creating a file system or a device file, Provisioning Manager changes the following command utility parameters from the default settings. When manually changing a value, follow the input format appropriate for each OS. For performance-related settings, Provisioning Manager uses the HP-UX default settings except for those described below. When you want to improve host performance, manually adjust the settings.

The size of a physical partition is specified so that the maximum size of a physical volume that Logical Volume Manager can recognize is 1 TB.

Setting value: 256 MB

Default value: 4 MB

The maximum number of physical partitions for a physical volume is specified so that the maximum size of a physical volume that Logical Volume Manager can recognize is 1 TB.

Setting value: 4,096

Default value: 1,016

The maximum number of physical volumes is specified for a volume group according to the maximum value that can be specified using Provisioning Manager.

Setting value: 32

Default value: 16

The setting is specified so that the file system is checked at startup to make sure that the file system will not have problems after the system terminated abnormally.

Setting value: 2

Default value: 0 (Do not check the file system at startup)

**Note:** Depending on the cluster management software, if a standby configuration is used and this setting is specified so that the file system is checked at startup, it may take time to switch the server when an error occurs. To avoid this situation, the setting must be changed so that the file system check is not performed at startup. For details, see the documentation for the relevant cluster management software.

**Reference:** Provisioning Manager uses the default setting (*forever*) as the timeout value for logical volumes. If necessary, see the OS documentation to set the timeout value manually.

## Notes on Manipulating File Systems and Device Files Used as Cluster Resources

When you delete or expand a file system or device file used as a cluster resource, perform the following operations before and after deletion or expansion. For operation details, see the documentation for the relevant OS.

### When deleting a file system or device file

Before you start deletion, perform the following on the host:

- a) Stop the cluster.

If you continue operation without stopping the cluster, the cluster environment might become damaged. You must stop the cluster before proceeding further.

Execute the `vgchange` command to remove the high availability cluster mark from the volume group.

From the cluster configuration file, delete the volume group that contains the file system or device file to be deleted.

Reconfigure the cluster.

Execute the `vgchange` command to enable the volume group.

If you want to delete the file system, execute the `mount` command to mount the file system.

Use the GUI to update host information.

### When expanding a file system

Before you start expansion, on the host, perform the operations described in *When deleting a file system or device file* above.

Then, perform the expansion.

After you finish the expansion normally, perform the following on the host:

- a) Execute the `umount` command to unmount the file system.

Execute the `vgchange` command to disable the volume group.

Add the volume group containing the expanded file system to the cluster configuration file.

Reconfigure the cluster.

Start the cluster.

Execute the `vgchange` command to add a high availability cluster mark to the volume group.

### 4.6.3.2 Notes on Using the RAID Function

You cannot configure RAID by using Provisioning Manager. Use either of the following methods to configure RAID:

- Configure RAID by using the functionality of the storage subsystem.
- Configure such RAID software as stripe volume and mirror volume software by manually executing commands such as the ones for the volume manager.

### 4.6.3.3 Reason for Unmatched Volume and LU Sizes

In HP-UX Logical Volume Manager, when the file systems or device files are created, their sizes may be smaller than the size of the volume (LU). The reasons are as follows:

- When HP-UX Logical Volume Manager creates file systems or device files, approximately 1% (normally, as large as one physical partition) of the physical volume is used for reserved areas (PVRA and VGRA). As a result, the total size of the file systems or the device files is smaller than the volume (LU) by one percent (generally, the size of one physical partition).
- If the size of the volume (LU) specified when expanding a file system or device file exceeds the maximum size of a physical volume that Logical Volume Manager can recognize, Logical Volume Manager cannot recognize some areas in the volume (LU). Such areas are not used as a file system or as a device file.
- When creating a file system or device file, do not specify a LU larger than the size that Logical Volume Manager can recognize. If you specify such an LU, an error occurs.

## 4.7 Maximum Setting Values

Table 4.1 lists the maximum setting values for the functions for creating a device file and file system.

**Table 4.1 Maximum Setting Values for Functions Creating a Device File and File System**

Item	Windows OS	Solaris OS	AIX OS	Linux AS/ES 3	Linux AS/ES 4	HP-UX
Number of volume (disk) groups in a system	--	255	255	99	255	255 ( <i>Note 1</i> )
Number of logical volumes per volume group	--	1	1 ( <i>Note 2</i> )	1	1	1
Number of logical volumes in a system	255	255	255	255	255	255
Number of physical volumes per volume group	--	32	32	32	32	32
Number of physical volumes per logical volume	32	32	32	32	32	32
Logical volume size	2 TB	1 TB	128 GB	1 TB	1 TB	2 TB
File system size	2 TB	1 TB	128 GB ( <i>Note 3</i> )	1 TB	1 TB	2 TB
Length of mount point path name (characters)	244 ( <i>Note 4</i> )	244	244 ( <i>Note 5</i> )	244	244	244
Maximum size of a physical volume available for a volume group	--	--	--	--	--	1 TB

**Note 1:** The default value is 10. If you want to increase the number of volume groups, manually change the value of the `maxvgs` kernel parameter according to the relevant OS documentation.

**Note 2:** Not including logical volumes for the JFS log.

**Note 3:** The actual size is smaller than 128 GB. The maximum size of a file system or a device file to be created on a single disk (LU) is as follows: 128 MB x 1,016 (the maximum number of physical partitions within a single disk) = 127 GB.

**Note 4:** In Windows, this includes the number of the drive letter characters.

**Note 5:** In the Logical Volume Manager for AIX, the information about a logical volume (LVCB) stores up to 128 characters. If the size exceeds this value, the accurate mount point cannot be obtained when a volume group of that file system is imported. To avoid this, manually change `/etc/filesystems`.

## Chapter 5 Managing Storage Pools

This chapter explains how to manage storage pools using Provisioning Manager. The chapter also gives an overview of how to display and work with Device Manager windows.

- Managing a Storage Pool (section 5.1)
- Viewing a Storage Pool Overview (section 5.2)
- Viewing Storage Pool Usage Status for Each Storage Subsystem Model (section 5.3)
- Viewing Storage Pool Usage Status for Each RAID Level (section 5.4)
- Viewing Storage Pool Usage Status for Each Storage Subsystem Series (section 5.5)
- Viewing Storage Pool Usage Status for Each Storage Subsystem (section 5.6)
- Viewing a List of Allocated Volumes on a Host (section 5.7)
- Allocating a Volume on a Host from a List of Allocated Volumes (section 5.8)
- Viewing a List of Unallocated Volumes on a Host (section 5.9)
- Allocating a Volume on a Host From a List of Unallocated Volumes (section 5.10)
- Releasing a Volume Allocated on a Host from a List of Allocated Volumes (section 5.9)
- Moving Volumes between Storage Pools (section 5.12)

**Note:** This manual focuses more on operations than on descriptions of items displayed in windows. For details about items displayed in windows, see Help for each window.

## 5.1 Managing a Storage Pool

Provisioning Manager manages volumes that exist in multiple storage subsystems as a single logical storage area (a *storage pool*). Provisioning Manager enables you to do the following to manage storage pools.

- View a storage pool from the following perspectives:
  - Storage subsystem for each model
  - Storage subsystem for each RAID level
  - Storage subsystem for each series
  - Each storage subsystem
- View a list of volumes allocated to the host
- View a list of volumes not allocated to the host
- Allocate and release volumes in the storage pool
- Move volumes between storage pools

A storage pool is associated with a resource group. Resource groups can have a hierarchical relationship with other resource groups. The users who belong to a resource group can access the storage pools associated with lower-level resource groups. For example, suppose that the parent group `P_Group` has child groups `C_Group01` and `C_Group02`, and the child resource group `C_Group01` has the grandchild group `GC_Group`. Figure 5.1 illustrates these relationships.

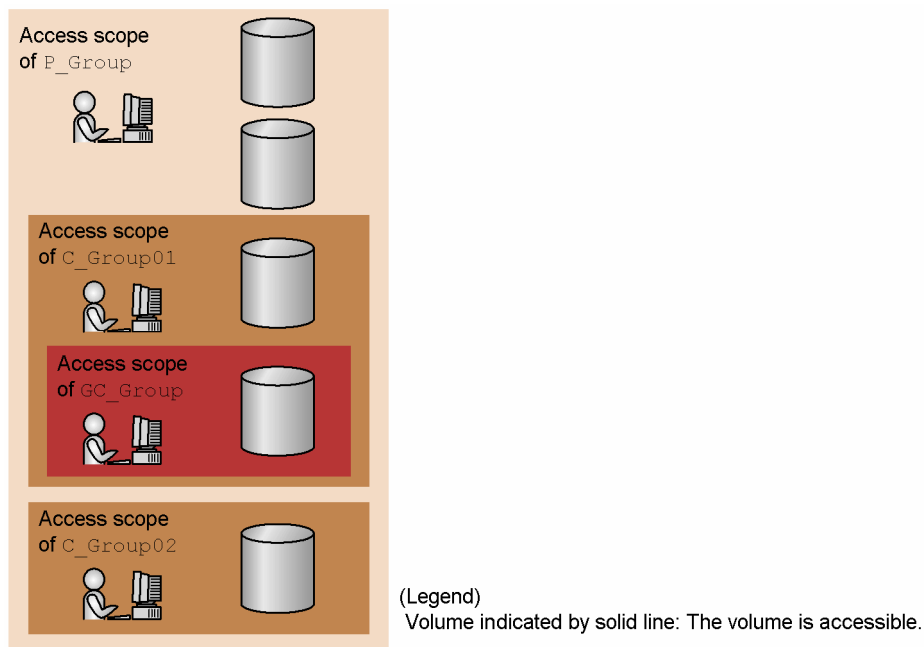


Figure 5.1 Resource Groups and Access Scopes

In this case, the users who belong to the resource group `P_Group` can view the storage pool usage status from the following perspectives:

- From `P_Group` down to its subordinate groups
- From `C_Group01` down to its subordinate groups
- From `C_Group02` down to its subordinate groups
- From `GC_Group` down to its subordinate groups

**Note:** The storage pools and volume contents are displayed in the windows according to the following rules:

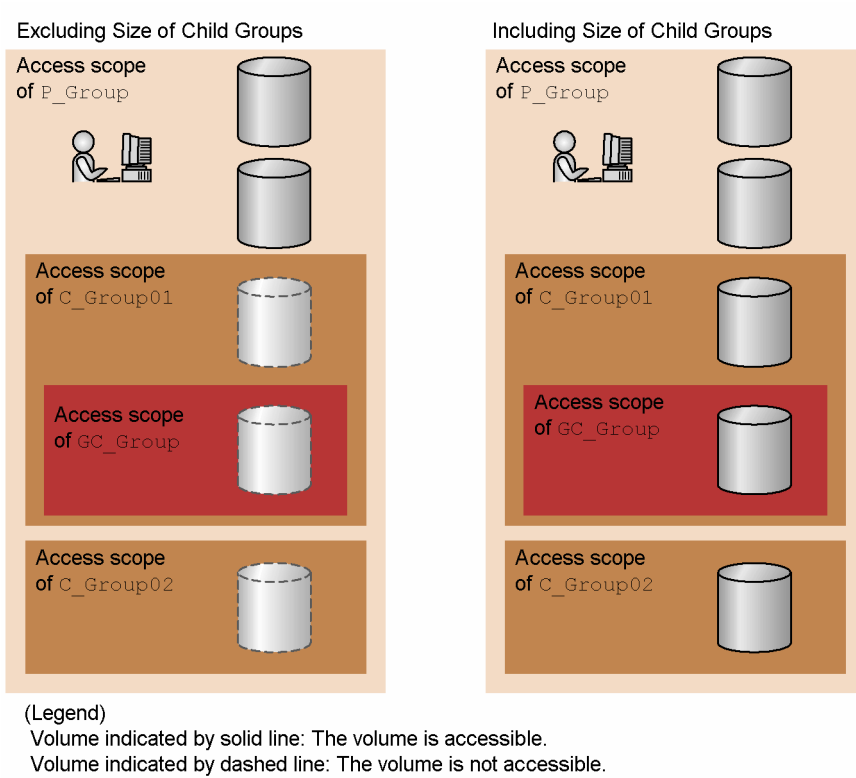
- For megabytes (MB), only integers are used and digits after the decimal point are truncated.
- For gigabytes (GB) or above, a number is truncated to two decimal places. The thousandth and the following digits are truncated.
- The usage ratio uses only integers (digits after the decimal point are truncated).

### 5.1.1 Perspective from a Parent Group to Subordinate Groups

From the perspective of `P_Group`, storage pool usage status is displayed in the following categories:

- **Excluding Size of Child Groups:** displays the storage pool usage status for the access scope of `P_Group` excluding the access scopes of `C_Group01` (`GC_Group` is fully contained in `C_Group01`) and `C_Group02`.
- **Including Size of Child Groups:** displays the storage pool usage status for the access scope of `P_Group`.

Figure 5.2 shows for each item the scopes displayed as the storage pool usage status for `P_Group`.



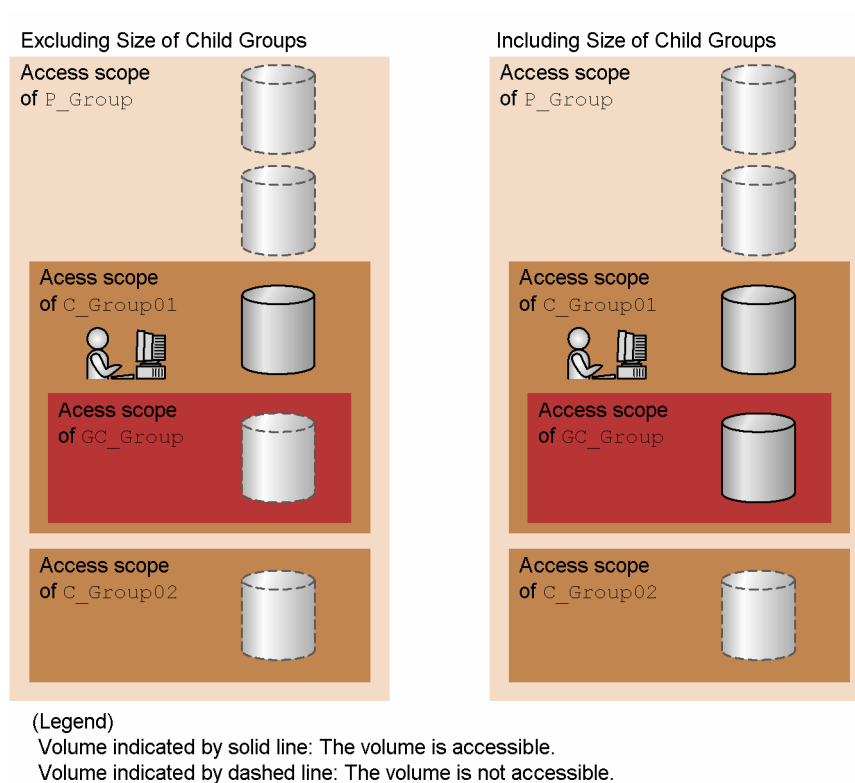
**Figure 5.2** Scopes Displayed as the Storage Pool Usage Status for P\_Group

## 5.1.2 Perspective from a Child Group to Its Subordinate Groups

From the perspective of C\_Group01, the storage pool usage status is displayed in the following categories:

- **Excluding Size of Child Groups:** displays the storage pool usage status for the access scope of C\_Group01 excluding the access scope of GC\_Group.
- **Including Size of Child Groups:** displays the storage pool usage status for the access scope of C\_Group01.

Figure 5.3 shows for each item the scope displayed as the storage pool usage status for C\_Group01.



**Figure 5.3** Scopes Displayed as the Storage Pool Usage Status for C\_Group01

- **Important:** As shown in Figure 5.4, when the scope of C\_Group01 overlaps the scope of C\_Group02, the capacity of the overlapped part is counted in both C\_Group01 and C\_Group02.

In Figure 5.4, the volume contents that can be viewed by each resource group are as follows:

- P\_Group including its child groups = 1 + 2 + 3 + 4 = 100 GB
- P\_Group not including its child groups = 1 = 50 GB
- C\_Group01 including its child groups = 2 + 3 = 30 GB
- C\_Group02 not including its child groups = 3 + 4 = 30 GB

Therefore, the total capacity of P\_Group not including its child groups, C\_Group01 including its child groups, and C\_Group02 not including its child groups is larger than the capacity of P\_Group including its child groups.

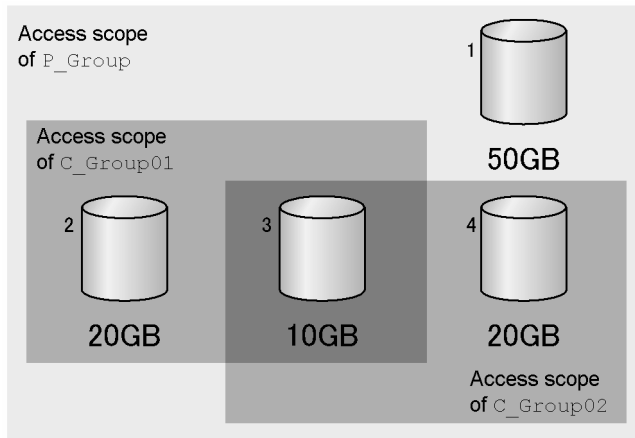


Figure 5.4 Volume Contents: Scope of C\_Group01 Overlaps Scope of C\_Group02

### 5.1.3 Number of Volumes That Can Be Displayed

A maximum of 16,384 volumes can be displayed in the list of volumes (LDEVs). When the number of volumes in the resource group reaches 16,384, a warning message is displayed in the list window.

When the number of volumes in the resource group exceeds 16,384, create a new child group, and then move the excess volumes to this group to display them. The moved volumes can be displayed by selecting the created child group in the list window.

- You can use Device Manager to create a child group or move volumes. For details on using Device Manager to perform these procedures, see the description about user management in the Hitachi *HiCommand Device Manager Web Client User's Guide*. For volumes that are not allocated to a host, you can also use Provisioning Manager to move them. For details on using Provisioning Manager to perform this procedure, see section 5.12.

## 5.2 Viewing a Storage Pool Overview

In the Show Properties - Storage Pool subwindow, you can view an overview of the accessible storage pool, including total amount, allocated amount, unallocated amount, and usage rate of a storage pool.

**Note:** Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then re-execute the `View` operation.

To view a storage pool overview:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

The Storage Pool subwindow is displayed in the method area. The Show Properties - Storage Pool subwindow is displayed in the information area. The information displayed in the information area at this point is the same as the information displayed when **Show Properties** is selected in the Storage Pool subwindow.

2. In the Show Properties - Storage Pool subwindow, specify the following items according to the information you want to view.

**View:** This item lets you select either of the following items:

- **Summary:** Displays information on storage pools of the resource group, including its child groups, to which the logged-in user belongs. This is the initial screen of the Show Properties - Storage Pool subwindow.
- **Details:** Displays information on storage pools of the groups under the resource group to which the logged-in user belongs. Different from **Summary** in that you can view only the parent group information or the child group information rather than both at the same time.

When **Details** is selected, the **Resource Group** button used to specify a resource group and the **Show Information** button used to show information are displayed.

3. When **Details** is selected, set the Resource Group according to the contents that you want to display.

You can view information on storage pools of the specified resource group, including the groups belonging to the resource group. Select a desired resource group from the pull-down list.

4. After specifying **Resource Group**, click the **Show Information** button.

The storage pool information is displayed according to the following scope (see Figure 5.5):

- Storage pool information for the child groups of the resource groups selected in **Resource Group**
- Storage pool information for the resource groups set in **Resource Group**
- Child group storage pool information, including grandchild groups

**Important:** The sum of the storage sizes of new groups and child groups that include the contents of grandchild groups equals the sum of new groups that include child groups. However, if there are multiple child groups, and if the access scopes of the child groups overlap, the contents of new groups and child groups that include the contents of grandchild groups are larger than that of new groups that include child groups. For details, see section 5.1.

**Note:** When you click the **Show Information** button of the **Storage Pool (Including Size of Child Groups)** - *child-group-name* table, the Show Properties - Storage Pool subwindow switches, allowing you to view the child group storage pool information including the grandchild group contents, and the child group storage pool information not including the grandchild group contents, as well as all the storage pool information for the grandchild groups.

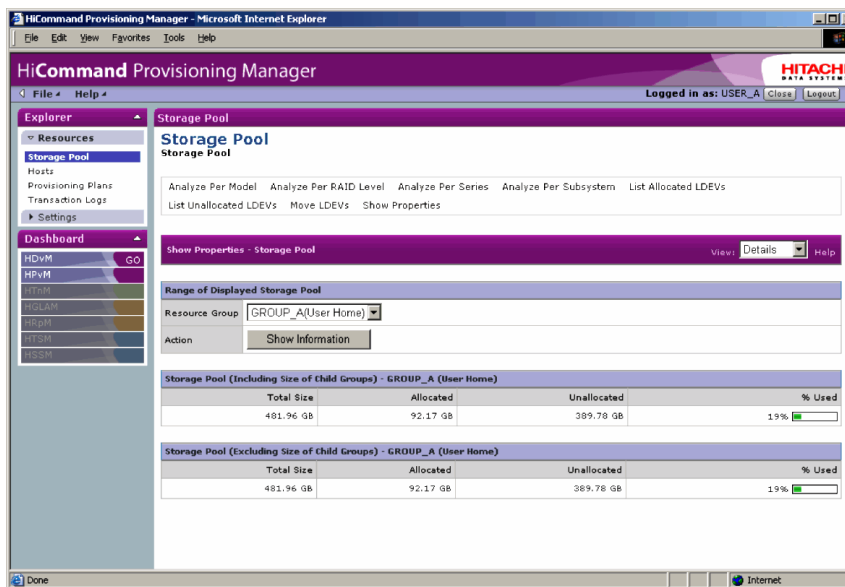


Figure 5.5 Show Properties - Storage Pool Subwindow when the Show Information Button is Clicked

### 5.3 Viewing Storage Pool Usage Status for Each Storage Subsystem Model

In the Analyze Per Model - Storage Pool subwindow, you can view the storage pool usage status (total amount, allocated amount, unallocated amount, and usage rate) for each storage subsystem model.

**Note:** Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message appears, so wait a while and then re-execute the view operation.

To view the storage pool usage status for each storage subsystem model:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

The Storage Pool subwindow is displayed in the method area. The Show Properties - Storage Pool subwindow is displayed in the information area.

2. In the Storage Pool subwindow, choose **Analyze Per Model**.

The Analyze Per Model - Storage Pool subwindow is displayed in the information area.

3. In the Analyze Per Model - Storage Pool subwindow, specify the following items according to the information you want to view.

**View:** This item lets you select either of the following items:

**Summary:** Displays information on storage group of the resource group, including its child groups, to which the logged-in user belongs. This is the initial screen of the Analyze Per Model - Storage Pool subwindow.

**Details:** Displays information on storage pools of the groups under the resource group to which the logged-in user belongs. Different from **Summary** in that you can view only the parent group information or the child group information rather than both at the same time.

When **Details** is selected, the **Resource Group** button used to specify a resource group and the **Show Information** button used to show information are displayed.

4. When **Details** is selected, set the **Resource Group** according to the contents that you want to view.

You can view information on storage pools of the specified resource group, including the groups belonging to the resource group. Select a desired resource group from the pull-down list.

5. After specifying **Resource Group**, click the **Show Information** button (see Figure 5.6).

The storage pool information for each storage subsystem model is displayed according to the following scope:

- Storage pool information for the child groups of the resource groups selected in **Resource Group**
- Storage pool information of the resource groups set in **Resource Group**
- Storage pool information of the child groups, including the grandchild groups

**Important:** The sum of the storage sizes of new groups and child groups, including the contents of grandchild groups, equals the sum of new groups, including child groups. However, if there are multiple child groups, and if the access scope of the child groups overlaps, the contents of new groups and child groups, including the contents of grandchild groups, are larger than that of new groups, including child groups. For details, see section 5.1.

**Note:** When you click the **Show Information** button of **Storage Pool Per Model (Including Size of Child Groups) - child-group-name**, the **Analyze Per Model - Storage Pool** subwindow switches, allowing you to view the child group storage pool information including the grandchild group contents, and the storage pool information not including the grandchild group contents, as well as all the storage pool information for the grandchild groups.

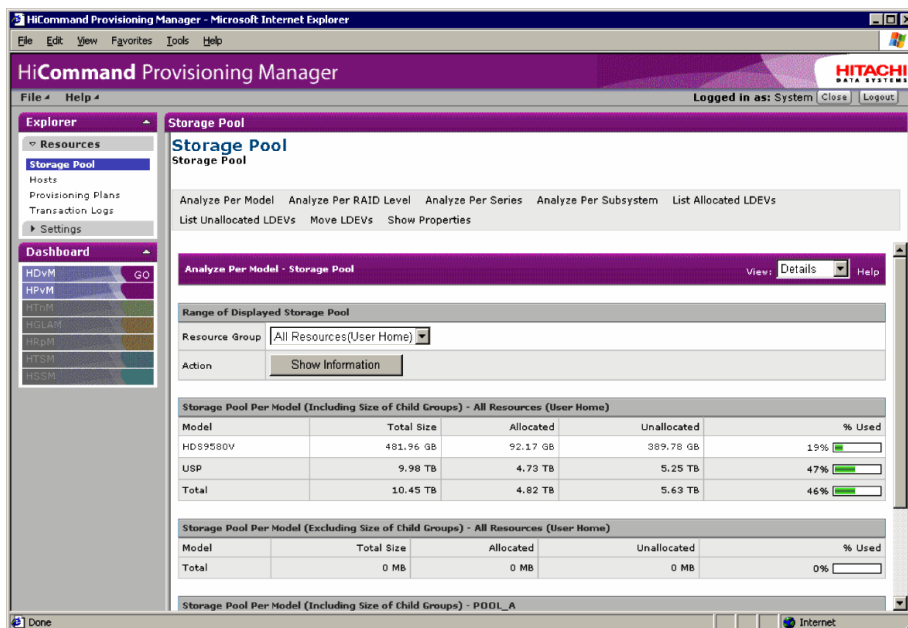


Figure 5.6 Analyze Per Model - Storage Pool Subwindow, when the Show Information Button is Clicked

## 5.4 Viewing Storage Pool Usage Status for Each RAID Level

In the Analyze Per RAID Level - Storage Pool subwindow, you can view the storage pool usage status (total amount, allocated amount, unallocated amount, and usage rate) for each RAID level.

**Note:** Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message appears, so wait a while and then re-execute the view operation.

To view the storage pool usage status for each RAID level:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

The Storage Pool subwindow is displayed in the method area. The Show Properties - Storage Pool subwindow is displayed in the information area.

2. In the Storage Pool subwindow, choose **Analyze Per RAID Level**.

The Analyze Per RAID Level - Storage Pool subwindow is displayed in the information area.

3. In the Analyze Per RAID Level - Storage Pool subwindow, specify the following items according to the information you want to view.

**View:** This item lets you select either of the following items:

- **Summary:** Displays information on storage pools of the resource group, including its child groups, to which the logged-in user belongs. This is the initial screen of the Analyze Per RAID Level - Storage Pool subwindow.
- **Details:** Displays information on storage pools of the groups under the resource group to which the logged-in user belongs. Different from **Summary** in that you can view only the parent group information or the child group information rather than both at the same time.

When **Details** is selected, the **Resource Group** button used to specify a resource group and the **Show Information** button used to show information are displayed.

4. When **Details** is selected, set the **Resource Group** according to the contents that you want to display.

You can view information on storage pools of the specified resource group, including the groups belonging to the resource group. Select a desired resource group from the pull-down list.

5. After specifying **Resource Group**, click the **Show Information** button (see Figure 5.7).

The storage pool information for each RAID level is displayed according to the following scope:

- Storage pool information for the child group contents of the resource groups set by **Resource Group**
- Storage pool information set by **Resource Group**
- Storage information for child groups, including grandchild group content

**Important:** In most cases, the sum of the storage sizes of parent, child, and grandchild groups equals the sum of parent and child groups. Grandchild groups only affect storage size calculations if there are multiple child groups with overlapping scopes of access. For details, see section 5.1.

**Note:** When you click the **Show Information** button of **Storage Pool Per RAID Level (Including Size of Child Groups) - child-group-name**, the Analyze Per RAID Level - Storage Pool subwindow toggles between the child group storage pool information with and without grandchild group contents.

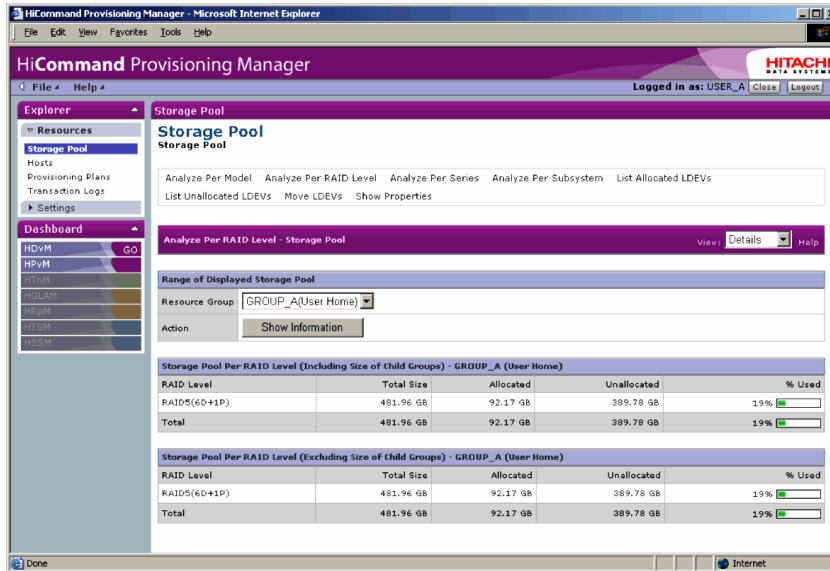


Figure 5.7 Analyze Per RAID Level - Storage Pool Subwindow when the Show Information Button is Clicked

## 5.5 Viewing Storage Pool Usage Status for Each Storage Subsystem Series

In the Analyze Per Series - Storage Pool subwindow, you can view the storage pool usage status (total amount, allocated amount, unallocated amount, and usage rate) for each storage subsystem series.

**Note:** Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message appears, so wait a while and then re-execute the view operation.

To view the storage pool usage status for each storage subsystem series:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

The Storage Pool subwindow is displayed in the method area. The Show Properties - Storage Pool subwindow is displayed in the information area.

2. In the Storage Pool subwindow, choose **Analyze Per Series**.

The Analyze Per Series - Storage Pool subwindow is displayed in the information area.

3. In the Analyze Per Series - Storage Pool subwindow, specify the following items according to the information you want to view.

**View:** This item lets you select either of the following items:

- **Summary:** Displays information on storage pools of the resource group, including its child groups, to which the logged-in user belongs. This is the initial screen of the Analyze Per Series - Storage Pool subwindow.
- **Details:** Displays information on storage pools of the groups under the resource group to which the logged-in user belongs. Different from **Summary** in that you can view only the parent group information or the child group information rather than both at the same time.

When **Details** is selected, the **Resource Group** button used to specify a resource group and the **Show Information** button used to show information are displayed.

4. When **Details** is selected, set the **Resource Group** according to the contents that you want to display.

You can view information on storage pools of the specified resource group, including the groups belonging to the resource group. Select a desired resource group from the pull-down list.

5. After specifying **Resource Group**, click the **Show Information** button (see Figure 5.8).

The storage pool information for each storage subsystem series is displayed according to the following scope:

- Storage pool information for the child group contents of the resource groups set by **Resource Group**
- Storage pool information set by **Resource Group**
- Storage information for child groups, including grandchild group content

**Important:** The sum of the storage sizes of new groups and child groups, including the contents of grandchild groups, equals the sum of new groups, including child groups. However, if there are multiple child groups, and if the access scope of the child groups overlaps, the contents of new groups and child groups, including the contents of grandchild groups, is larger than that of new groups, including child groups. For details, see section 5.1.

**Note:** When you click the **Show Information** button of **Storage Pool Per Series (Including Size of Child Groups) - child-group-name**, the **Analyze Per Series - Storage Pool** subwindow toggles between the child group storage pool information with and without the grandchild group contents.

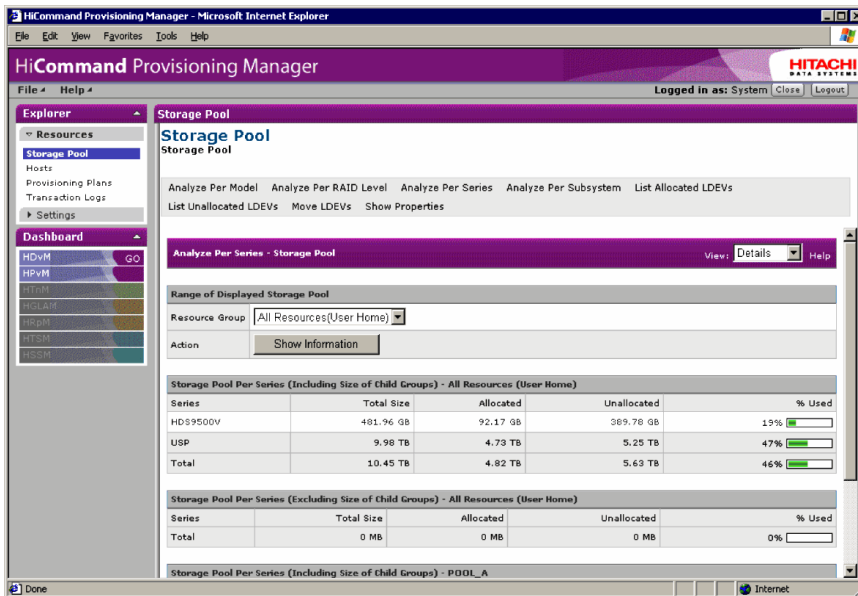


Figure 5.8 Analyze Per Series - Storage Pool Subwindow, when the Show Information Button is Clicked

## 5.6 Viewing Storage Pool Usage Status for Each Storage Subsystem

In the Analyze Per Subsystem - Storage Pool subwindow, you can view the storage pool usage status (total amount, allocated amount, unallocated amount, and usage rate) for each storage subsystem.

**Note:** Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message appears, so wait a while and then re-execute the view operation.

To view the storage pool usage status for each storage subsystem:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

The Storage Pool subwindow is displayed in the method area. The Show Properties - Storage Pool subwindow is displayed in the information area.

2. In the Storage Pool subwindow, choose **Analyze Per SubSystem**.

The Analyze Per Subsystem - Storage Pool subwindow is displayed in the information area.

3. In the Analyze Per Subsystem - Storage Pool subwindow, specify the following items according to the information you want to view.

**View:** This item lets you select either of the following items:

- **Summary:** Displays information on storage group of the resource group, including its child groups, to which the logged-in user belongs. This is the initial screen of the Analyze Per Subsystem - Storage Pool subwindow.
- **Details:** Displays information on storage pools of the groups under the resource group to which the logged-in user belongs. Different from **Summary** in that you can view only the parent group information or the child group information rather than both at the same time.

When **Details** is selected, the **Resource Group** button used to specify a resource group, the **Plan** button used to specify an allocation plan, and the **Show Information** button used to show information are displayed.

4. When **Details** is selected, set the **Resource Group** according to the contents that you want to display.

- **Resource Group:** You can view information on storage pools of the specified resource group, including the groups belonging to the resource group. Select a desired resource group from the pull-down list.
- **Plan:** You can view information on storage pools applicable to the specified allocation plan. Select a desired allocation plan from the pull-down list. For details about allocation plans, see section 3.2.

**Note:** When the **Details** button is clicked in **Plan**, the detailed information on the allocation plan specified in **Plan** is displayed.

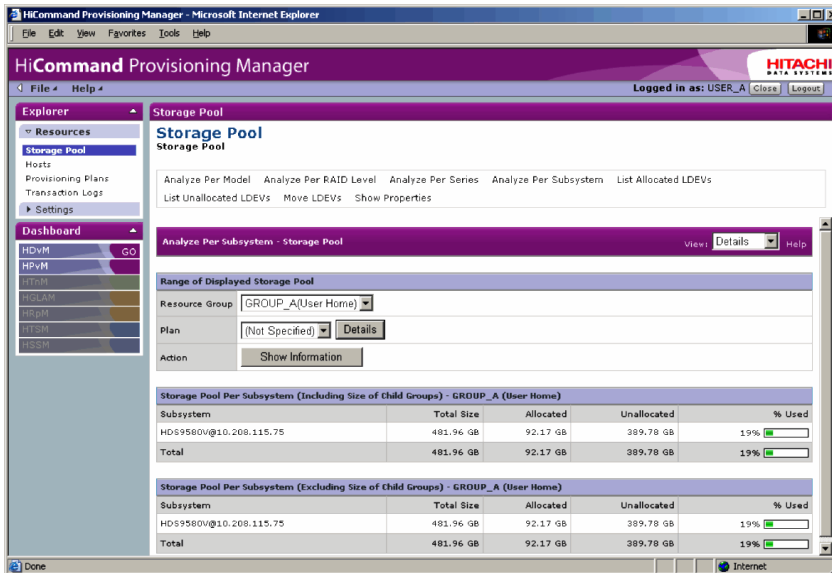
5. After specifying **Resource Group** and **Plan**, click the **Show Information** button (see Figure 5.9).

The storage pool information for each storage subsystem is displayed according to the following scope:

- Storage pool information for the child group contents of the resource groups set by **Resource Group**
- Storage pool information set by **Resource Group**
- Storage information for child groups, including grandchild group content

**Important:** The sum of the storage sizes of new groups and child groups, including the contents of grandchild groups, equals the sum of new groups, including child groups. However, if there are multiple child groups, and if the access scope of the child groups overlaps, the contents of new groups and child groups, including the contents of grandchild groups, are larger than that of new groups, including child groups. For details, see section 5.1.

**Note:** When you click the **Show Information** button of **Storage Pool Per Subsystem (Including Size of Child Groups) - child-group-name**, the **Analyze Per Subsystem - Storage Pool** subwindow toggles between the child group storage pool information with and without grandchild group contents.



**Figure 5.9** Analyze Per Subsystem - Storage Pool Subwindow when the Show Information Button is Clicked

## 5.7 Viewing a List of Allocated Volumes on a Host

In the List Allocated LDEVs - Storage Pool subwindow, you can view the following information for each volume allocated on a host: size, subsystem name, host, type, array group, RAID level, emulation type, attributes, copy type, copy role, default controller, and external subsystem.

A maximum of 16,384 volumes can be displayed in the list of volumes. If you want to display information for 16,385 or more volumes, specify storage pool settings by following the procedure in section 5.1.3.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then re-execute the view operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

To view the volumes:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.  
In the method area, the Storage Pool subwindow is displayed. In the information area, the Show Properties - Storage Pool subwindow is displayed.
2. In the Storage Pool subwindow, select **List Allocated LDEVs**.  
In the information area, the List Allocated LDEVs - Storage Pool subwindow is displayed.
3. In the List Allocated LDEVs - Storage Pool subwindow, specify the following items according to the information about the volumes you want to view.
  - **Resource Group:** You can view the volumes allocated to the specified resource group. Select a desired resource group from the pull-down list.
  - **Plan:** You can view the volumes applicable to the specified application plan. Select a desired allocation plan from the pull-down list. For details about allocation plans, see section 3.2.  
**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.
  - **Size:** You can view the volumes that meet the specified size. Enter the minimum and maximum values for the volume size, and select the units from the pull-down list. You can omit the minimum and maximum values. If you omit the minimum and maximum values, the minimum and maximum values are not taken into account. For details, see Help for the window.  
**Note:** When the **Show Pool Information** button is clicked, the Show Pool Information - Storage Pool dialog box is displayed for the volumes that satisfy the conditions specified in **Resource Group** and **Plan**.
4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.10):

- **Allocate Storage** button
- **Unallocate Storage** button
- A list of the volumes that are in the storage pools of the resource group selected in **Resource Group**, and meet the conditions specified in **Plan** and **Size**

**Note:** The **Allocate Storage** and **Unallocate Storage** buttons are displayed when any volume in the storage pool accessible for the logged-in user satisfies the specified conditions. These buttons are not displayed when the logged-in user has only the `View` permission.

For details on the **Allocate Storage** button, see section 5.8 or 5.10.

For details on the **Unallocate Storage** button, see section 5.11.

When you select a subsystem from the **Subsystem** pull-down list, the volumes only in the specified subsystem are displayed. For details about the displayed items, see Help for the window.

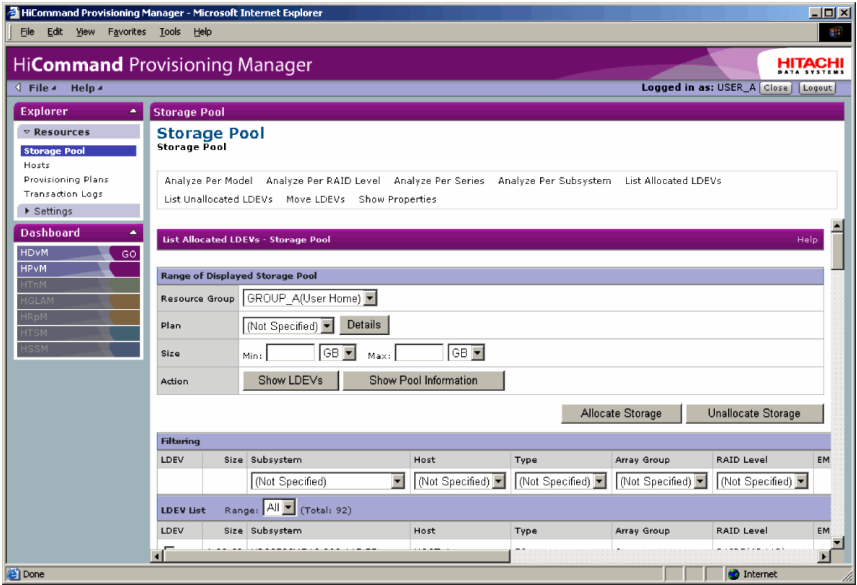


Figure 5.10 List Allocated LDEVs - Storage Pool Subwindow when the Show LDEVs is Button Clicked

## 5.8 Allocating a Volume on a Host from a List of Allocated Volumes

In the List Allocated LDEVs - Storage Pool subwindow, you can allocate volumes on a host from a list of volumes allocated on that host. The allocation destination of the volume can be on the same or different host.

A maximum of 16,384 volumes can be displayed in the list of volumes. If you want to display information for 16,385 or more volumes, specify storage pool settings by following the procedure in section 5.1.3.

When an allocated volume is allocated to a host, more than one data path (consisting of an HBA WWN, storage subsystem port, and storage subsystem volume) is specified. If multiple data paths are set for a volume, the volume is shared by multiple hosts, such that if an error occurs in the data path, the volume can still be used from another data path.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then re-execute the view operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

The settings of the selected volume are performed using Device Manager functionality. For details about settings, see the *HiCommand Device Manager Web Client User's Guide*.

To allocate the volumes:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.  
In the method area, the Storage Pool subwindow is displayed. In the information area, the Show Properties - Storage Pool subwindow is displayed.
2. In the Storage Pool subwindow, select **List Allocated LDEVs**.  
In the information area, the List Allocated LDEVs - Storage Pool subwindow is displayed.
3. In the List Allocated LDEVs - Storage Pool subwindow, specify the following items according to the information about the volumes you want to allocate.
  - **Resource Group:** You can view the volumes allocated to the specified resource group. Select a desired resource group from the pull-down list.
  - **Plan:** You can view the volumes applicable to the specified application plan. Select a desired allocation plan from the pull-down list. For details about allocation plan, see section 3.2.

**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.

- **Size:** You can view the volumes that meet the specified size. Enter the minimum and maximum values for the volume size, and select the units from the pull-down list. You can omit the minimum and maximum values. If you omit the minimum and maximum values, the minimum and maximum values are not taken into account. For details, see Help for the window.

**Note:** When the **Show Pool Information** button is clicked, the Show Pool Information - Storage Pool dialog box is displayed for the volumes that satisfy the conditions specified in **Resource Group** and **Plan**.

4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.11):

- **Allocate Storage** button
- **Unallocate Storage** button
- A list of the volumes that are in the storage pools of the resource group selected in **Resource Group**, and meet the conditions specified in **Plan** and **Size**

**Note:** The **Unallocate Storage** button is displayed when any volume in the storage pool accessible for the logged-in user satisfies the specified conditions. This button is not displayed when the logged-in user has only the `View` permission.

For details on the **Unallocate Storage** button, see section 5.11.

5. To further narrow down the volumes, use filtering.

In the list of volumes, from the pull-down list for an item, select the value that corresponds to the desired volumes. The volumes that meet the selected value are selected from the displayed volumes.

6. Select the allocated volume check box.

**Note:** You can select a maximum of 200 volumes at any one time. If you want to select more than 200 volumes, select them in multiple operations. For example, if you want to select 240 volumes, select 200 volumes in one operation, and the remaining 40 in another operation. Also, if a volume is related to more than one volume path, the total number of selectable volumes decreases according to the number of related paths. For example, if every volume is related to two volume paths, the number of selectable volumes decreases to approximately 100.

7. Click the **Allocate Storage** button.

The Device Manager's Add Storage (Step: Define Host/Port Connections) dialog box is displayed.

8. Allocate volumes using the Add Storage (Step: Define Host/Port Connections) dialog box.

Set the following items in this dialog box:

- Specify the path between the host WWN and the port of the storage subsystem
- Allocate the volume LUN

For details, see the *HiCommand Device Manager Web Client User's Guide*.

9. Check the processing result on the List Allocated LDEVs - Storage Pool subwindow.

When you select **List Allocated LDEVs** in the Storage Pool subwindow, the latest information reflecting the processing result is displayed. For details, see section 5.7.

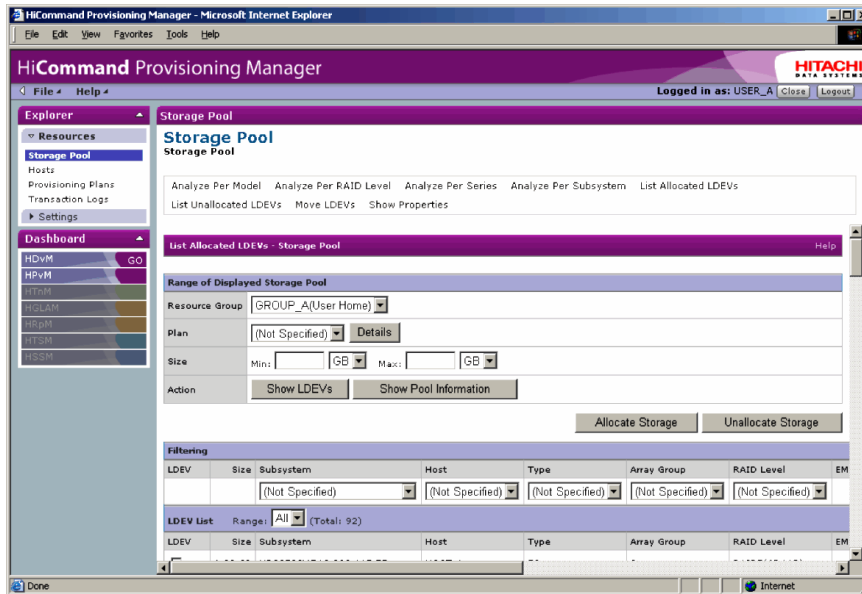


Figure 5.11 List Allocated LDEVs - Storage Pool Subwindow when the Show LDEVs Button is Clicked

## 5.9 Viewing a List of Unallocated Volumes on a Host

In the List Unallocated LDEVs - Storage Pool subwindow, you can view the volumes not allocated on the host. You can view the size, subsystem name, host, type, array group, RAID level, emulation type, attributes, copy type, copy role, default controller, and external subsystem for each volume. When you select a subsystem from the **Subsystem** pull-down list, only the volumes in the specified subsystems are displayed. For details about the displayed items, see Help for the window.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then re-execute the reference operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

To view the volumes:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

In the method area, the Storage Pool subwindow is displayed. In the information area, the Show Properties - Storage Pool subwindow is displayed.

2. In the Storage Pool subwindow, select **List Unallocated LDEVs**.

In the information area, the List Unallocated LDEVs - Storage Pool subwindow is displayed.

3. In the List Unallocated LDEVs - Storage Pool subwindow, specify the following items according to the information about the volumes you want to view.

- **Resource Group:** You can view the volumes available for the specified resource group. Select a desired resource group from the pull-down list.
- **Plan:** You can view the volumes applicable to the specified application plan. Select a desired allocation plan from the pull-down list. For details about allocation plans, see section 3.2.

**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.

- **Size:** You can view the volumes that meet the specified size. Enter the minimum and maximum values for the volume size, and select the units from the pull-down list. You can omit the minimum and maximum values. If you omit the minimum and maximum values, the minimum and maximum values are not taken into account. For details, see Help for the window.

**Note:** When the **Show Pool Information** button is clicked, the Show Pool Information - Storage Pool dialog box is displayed for the volumes that satisfy the conditions specified in **Resource Group** and **Plan**.

4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.12):

- **Allocate Storage** button
- A list of the volumes that are in the storage pools of the resource group selected in **Resource Group**, and meet the conditions specified in **Plan** and **Size**

**Note:** The **Allocate Storage** button is displayed when any volume in the storage pool accessible for the logged-in user satisfies the specified conditions. This button is not displayed when the logged-in user has only the `View` permission. For details on the **Allocate Storage** button, see section 5.8 or 5.10.

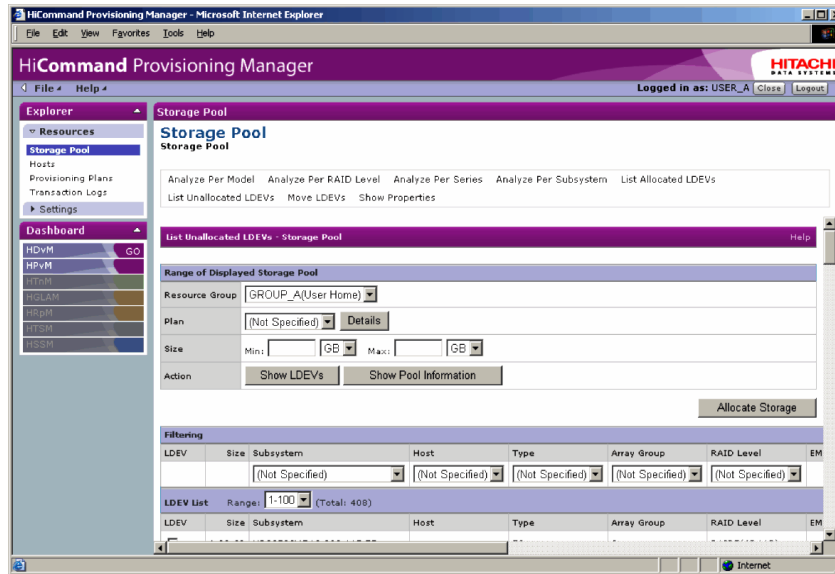


Figure 5.12 List Unallocated LDEVs - Storage Pool Subwindow, when the Show LDEVs Button is Clicked

## 5.10 Allocating a Volume on a Host from a List of Unallocated Volumes

In the List Unallocated LDEVs - Storage Pool subwindow, from a list of volumes not allocated on the host, you can allocate volumes on a host. By selecting multiple volumes, you can also create a LUSE. The settings for the selected volume are performed using Device Manager functionality. For details, see the *Hitachi HiCommand Device Manager Web Client User's Guide*.

A maximum of 16,384 volumes can be displayed in the list of volumes. If you want to display information for 16,385 or more volumes, specify storage pool settings by following the procedure in section 5.1.3.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then retry the view operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

To allocate the volumes:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

In the method area, the Storage Pool subwindow is displayed. In the information area, the Show Properties - Storage Pool subwindow is displayed.

2. In the Storage Pool subwindow, select **List Unallocated LDEVs**.

In the information area, the List Unallocated LDEVs - Storage Pool subwindow is displayed.

3. In the List Unallocated LDEVs - Storage Pool subwindow, specify the following items according to the information about the volumes you want to allocate.

- **Resource Group:** You can view the volumes available for the specified resource group. Select a desired resource group from the pull-down list.
- **Plan:** You can view the volumes applicable to the specified application plan. Select a desired allocation plan from the pull-down list. For details about allocation plans, see section 3.2.

**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.

- **Size:** You can view the volumes that meet the specified size. Enter the minimum and maximum values for the volume size, and select the units from the pull-down list. You can omit the minimum and maximum values. If you omit the minimum and maximum values, the minimum and maximum values are not taken into account. For details, see Help for the window.

**Note:** When the **Show Pool Information** button is clicked, the Show Pool Information - Storage Pool dialog box is displayed for the volumes that satisfy the conditions specified in **Resource Group** and **Plan**.

4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.13):

- **Allocate Storage** button
- A list of the volumes that are in the storage pools of the resource group selected in **Resource Group**, and meet the conditions specified in **Plan and Size**

5. To further narrow down the volumes, use filtering.

In the list of volumes, from the pull-down list for an item, select the value that corresponds to the desired volumes. The volumes that meet the selected value are selected from the displayed volumes.

6. Select the unallocated volume check box.

Multiple volumes can be selected.

▪**Note:** You can select a maximum of 200 volumes at any one time. If you want to select more than 200 volumes, select them in multiple operations. For example, if you want to select 240 volumes, select 200 volumes in one operation, and the remaining 40 in another operation. Also, if a volume is related to more than one volume path, the total number of selectable volumes decreases according to the number of related paths. For example, if every volume is related to two volume paths, the number of selectable volumes decreases to approximately 100.

7. Click the **Allocate Storage** button.

The Device Manager's Add Storage (Step: Define Host/Port Connections) dialog box is displayed.

8. Allocate volumes using the Add Storage (Step: Define Host/Port Connections) dialog box.

Set the following items in this dialog box (for details, see the *HiCommand Device Manager Web Client User's Guide*):

- Specify the path between the host WWN and the port of the storage subsystem
- Allocate the volume LUN

- Check the processing result in the List Allocated LDEVs - Storage Pool subwindow. When you select **List Allocated LDEVs** in the Storage Pool subwindow, the latest information reflecting the processing result is displayed. For details, see section 5.7.

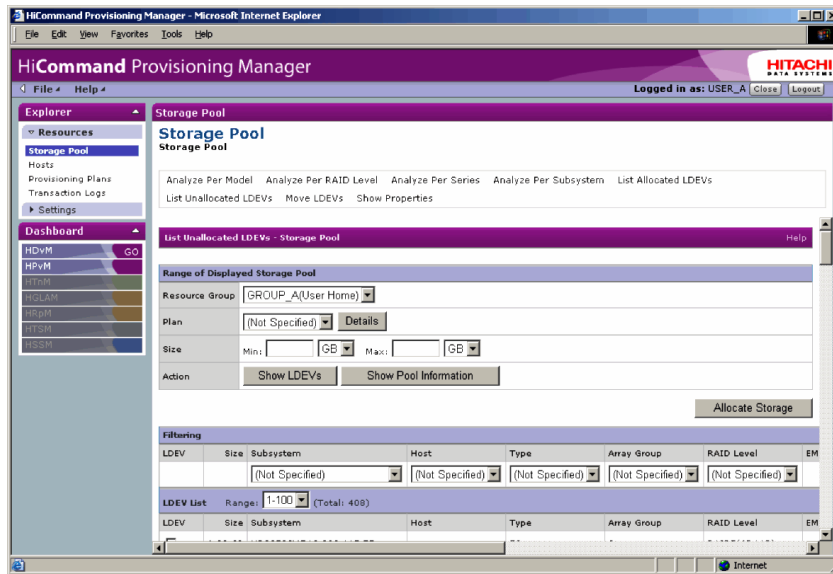


Figure 5.13 List Unallocated LDEVs - Storage Pool Subwindow, when the Show LDEVs Button is Clicked

## 5.11 Releasing a Volume Allocated on a Host from a List of Allocated Volumes

In the List Allocated LDEVs - Storage Pool subwindow, from a list of volumes allocated on a host, you can release volumes allocated on that host. The settings of the selected volume are performed using Device Manager functionality. For details about settings, see the *HiCommand Device Manager Web Client User's Guide*.

A maximum of 16,384 volumes can be displayed in the list of volumes. If you want to display information for 16,385 or more volumes, specify storage pool settings by following the procedure in section 5.1.3.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message appears, so wait a while and then re-execute the view operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

To release allocation of volumes:

- In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.

In the method area, the Storage Pool subwindow is displayed. In the information area, the Show Properties - Storage Pool subwindow is displayed.

2. In the Storage Pool subwindow, select **List Allocated LDEVs**.

In the information area, the List Allocated LDEVs - Storage Pool subwindow is displayed.

3. In the List Allocated LDEVs - Storage Pool subwindow, specify the following items according to the information about the volume you want to unallocate.
  - **Resource Group:** You can view the volumes allocated to the specified resource group. Select a desired resource group from the pull-down list.
  - **Plan:** You can view the volumes applicable to the specified application plan. Select a desired allocation plan from the pull-down list. For details about allocation plan, see section 3.2.

**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.

- **Size:** You can view the volumes that meet the specified size. Enter the minimum and maximum values for the volume size, and select the units from the pull-down list. You can omit the minimum and maximum values. If you omit the minimum and maximum values, the minimum and maximum values are not taken into account. For details, see Help for the window.

**Note:** When the **Show Pool Information** button is clicked, the Show Pool Information - Storage Pool dialog box is displayed for the volumes that satisfy the conditions specified in **Resource Group** and **Plan**.

4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.14):

- **Allocate Storage** button
- **Unallocate Storage** button
- A list of the volumes that are in the storage pools of the resource group selected in **Resource Group**, and meet the conditions specified in **Plan** and **Size**

**Note:** The **Allocate Storage** button is displayed when any volume in the storage pool accessible for the logged-in user satisfies the specified conditions. This button is not displayed when the logged-in user has only the `View` permission.

For details on the **Allocate Storage** button, see section 5.8 or 5.10.

5. To further narrow down the volumes, use filtering.

In the list of volumes, from the pull-down list for an item, select the value that corresponds to the desired volumes. The volumes that meet the selected value are selected from the displayed volumes.

6. Select the check box for the volume for which allocation is to be released.

**Note:** You can select a maximum of 200 volumes at any one time. If you want to select more than 200 volumes, select them in multiple operations. For example, if you want to select 240 volumes, select 200 volumes in one operation, and the remaining 40 in another operation. Also, if a volume is related to more than one volume path, the total number of selectable volumes decreases according to the number of related paths. For example, if every volume is related to two volume paths, the number of selectable volumes decreases to approximately 100.

7. Click the **Unallocate Storage** button.

The Device Manager's Unallocated Storage - Confirmation dialog box is displayed. If multiple data paths are set, the Device Manager's Select Paths dialog box is displayed.

8. In the Unallocate Storage - Confirmation dialog box, make sure the selected path, and then perform the release.

For details about operation, see the *HiCommand Device Manager Web Client User's Guide*.

9. Check the processing result on the List Unallocated LDEVs - Storage Pool subwindow.

When you select **List Unallocated LDEVs** in the Storage Pool subwindow, the latest information reflecting the processing result is displayed. For details, see section 5.9.

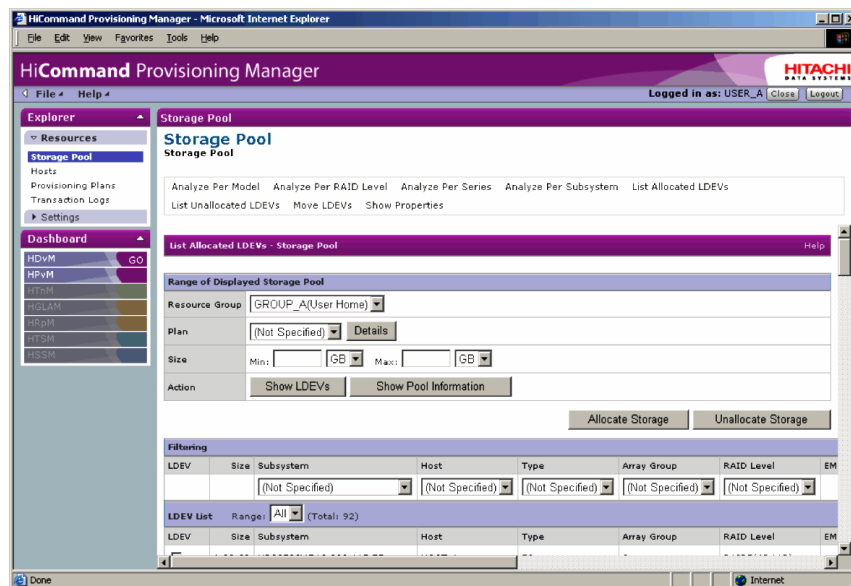


Figure 5.14 List Allocated LDEVs - Storage Pool Subwindow, when the Show LDEVs Button is Clicked

## 5.12 Moving Volumes between Storage Pools

Using the Move LDEVs dialog box, you can move volumes among storage pools by performing the following operations; from a list of volumes found according to a resource group or provisioning plan, select LDEVs that you want to move, and then select a resource group that is associated with the destination storage pool.

A maximum of 16,384 volumes can be displayed in the list of volumes. If you want to display information for 16,385 or more volumes, specify storage pool settings by following the procedure in section 5.1.3.

Information not reflecting the latest status might be displayed when the storage subsystem information is being updated. In such a case, a warning message is displayed, so wait a while and then re-execute the view operation.

If the volume is operated using partitioned storage administrator permissions, and different SLPRs or CLPRs are set for the LDEV that configures the selected volume, or the SLPR for the selected volume is different from the one for the assigned port, an error message is displayed indicating that the operation cannot be performed by the partitioned storage administrator. In such a case, use Device Manager to check which LDEV is inconsistent, and then reset the SLPR and CLPR information for the storage subsystem.

### **Caution:**

- Only users with the `Admin` permission can move volumes between storage pools.
- A volume that has been assigned to the host cannot be moved.
- If a volume is shared with another resource group and that volume is moved, access permissions to that volume for the resource group that has been sharing the volume are canceled.

To move the volumes:

1. In the **Explorer** menu, choose **Resources**, and then **Storage Pool**.  
In the method area, the Storage Pool subwindow is displayed.

2. In the Storage Pool subwindow, select **Move LDEVs** to open the Move LDEVs dialog box (see Figure 5.15).

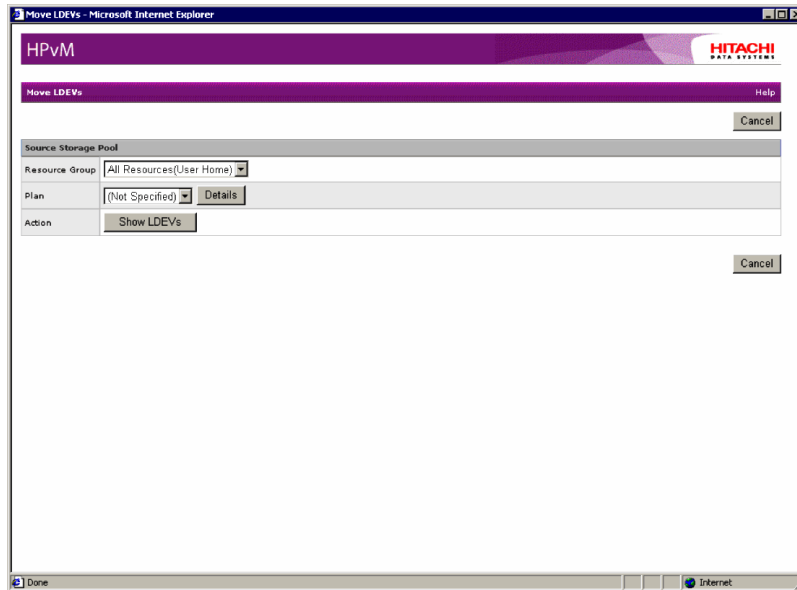


Figure 5.15 Move LDEVs Dialog Box

3. Set the following items according to the volumes that you want to move.
  - **Resource Group:** You can view the volumes available for the specified resource group. From the pull-down list, select a resource group to which the volume that you want to move is related.
  - **Plan:** You can view the volumes applicable to the specified application plan. From the pull-down list, select an allocation plan for the volume that you want to move.  
**Note:** When the **Details** button is clicked, the detailed information about the allocation plan specified in **Plan** is displayed in another window.
4. Click the **Show LDEVs** button.

The following items are displayed (see Figure 5.16):

  - **Resource Group** used to specify destination
  - A list of the volumes that satisfy the conditions specified in **Resource Group** and **Plan** in step 3

- From **Resource Group** displayed in step 4, select the resource group associated as the destination storage pool from an item in a pull-down list.

For details about setting items and limitations, see Help for the window.

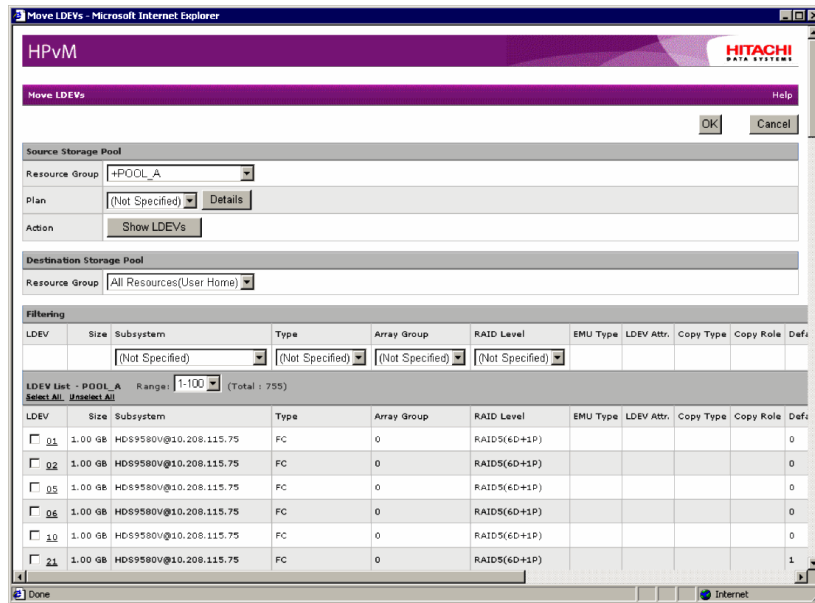


Figure 5.16 Move LDEVs Dialog Box when Show LDEVs Button is Clicked

- To further narrow down the volumes, use filtering.

In the list of volumes, from the pull-down list for an item, select the value that corresponds to the desired volumes. The volumes that meet the selected value are selected from the displayed volumes.

- From LDEV List, select the check box of the volume to be allocated.
- Click the **OK** button.

When the dialog box to confirm volume move is displayed, click the **OK** button, and a dialog box is displayed. Click the **OK** button again. A dialog box appears indicating processing is in progress, followed by a dialog box that shows the processing result.

- Click the **Close** button.

The Processing Result dialog box closes. Processing to move the volumes ends. The processing result can be confirmed from the List Unallocated LDEVs - Storage Pool subwindow. For details, see section 5.9.

**Important:** Clicking the **Continue** button displays the Move LDEVs dialog box, which allows you to continue moving volumes.

## Chapter 6 Viewing Host Information

This chapter describes how to use Provisioning Manager to view a list of hosts, host detail information, and the list of file systems mounted on the host and to update host information.

- Preparing to View Host Information (section 6.1)
- Displaying Host Information (section 6.2)
- Viewing a List of Accessible Hosts (section 6.3)
- Viewing a List of File Systems Mounted on Hosts (section 6.4)
- Viewing Detailed Host Information (section 6.5)
- Updating Host Information (section 6.6)

## 6.1 Preparing to View Host Information

The navigation area of Provisioning Manager displays a list of hosts that logged-in users can access. To begin viewing the host information, in the **Explorer** menu choose **Resources, Hosts**, and then in the navigation area, choose **Hosts**.

By referencing host information, you can do the following:

- View basic host information, such as the host name.
- View information on file systems mounted on the host, such as file system mount points.
- View detailed information on each host, such as the programs that are installed on the host.
- Update information on hosts registered with Provisioning Manager.
- Device Manager manages information about user-accessible hosts. The Provisioning Manager administrator must register user-accessible hosts in Device Manager. Device Manager manages the hosts that can be accessed by users for each resource group. Users who belong to the same resource group can access the same host. For details about setting up a resource group in Device Manager, see the *HiCommand Device Manager Web Client User's Guide*.

**Caution:** This manual mainly describes operations. It does not provide details about items displayed in the windows. For details on the items displayed in the windows, see Help for each window.

When a storage subsystem is removed from Device Manager, the mount point and device file path name for the volume of the removed storage subsystem remains in the navigation area of Provisioning Manager. When this happens, update the host information, and then the mount point and device file path name for the volume of the removed storage subsystem will no longer be displayed.

**Important:** You must install Device Manager agent on a host managed by Provisioning Manager. If the Device Manager agent is not installed on a host, that host is not operable. For details about the required programs, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

**Note:** The amount of disk space is displayed in the window according to the following rules:

- For megabytes (MB), only integers are used and digits after the decimal point are truncated.
- For gigabytes (GB) or above, a number is truncated to two decimal places. The thousandth and the following digits are truncated.
- The usage ratio uses only integers (digits after the decimal point are truncated).

## 6.2 Displaying Host Information

### About VERITAS File System and VERITAS Volume Manager

If Device Manager agent version 3.5 is installed on the host, do not use VERITAS File System 4.0 or VERITAS Volume Manager 4.0. If VERITAS File System 4.0 or VERITAS Volume Manager 4.0 is used, Provisioning Manager cannot display host information.

### About Dynamic Link Manager

In either of the following environments, operations cannot be guaranteed if Device Manager agent version 3.5 is installed on the host:

- LU has been removed manually from the Dynamic Link Manager's management range
- A path manager other than Dynamic Link Manager is also used

In such environments, if the version of the Device Manager agent installed on the host is version 4.0 or later, Provisioning Manager can display a list of volumes, including the unmanaged LUs, and can specify settings for the managed LUs. However for an LU managed by a path manager other than Dynamic Link Manager, Provisioning Manager cannot acquire the information managed by the path manager, such as the number of paths and data paths.

To specify LU settings in the above environment, verify the following items:

- That the version of the Device Manager agent installed on the host that manages the target LU is version 4.0 or later
- That the target LU is managed by Dynamic Link Manager

# When file systems or device files are added or expanded, Provisioning Manager assumes that all LUs to be added are managed by Dynamic Link Manager.

### About SDS/SVM

If the volume manager in use is SDS/SVM, Provisioning Manager can only view host information. The following limitations also apply, depending on the version of Device Manager agent: If Device Manager agent version 3.5 is installed on the host, Provisioning Manager can display only those volumes that are created under the following conditions:

- When the logical volume attribute is one of the following:
  - Stripe/concatenated volume (stripe/concatenated metadvice)
  - Mirror volume (mirror metadvice)
  - RAID5 volume (RAID5 metadvice)
  - Transaction (logging) volume (trans metadvice)
- Only one logical volume has been created for a single disk.
- A file system has been created on the logical volume and mounted on the directory.
- The disk added to a disk set has been used to create a stripe/concatenated volume.
- A stripe/concatenated volume has been used to create a mirror volume, RAID5 volume, or transaction (logging) volume.

Additionally, if Device Manager agent version 4.0 or later is installed on the host, only the volumes created under the following conditions can be displayed:

- Stripe/concatenated volume (stripe/concatenated metadvice)
- Mirror volume (mirror metadvice)
- RAID5 volume (RAID5 metadvice)
- Transaction (logging) volume (trans metadvice)
- Soft partition

However, the displayed information is limited on the logical volumes that satisfy one of the following conditions:

- When a logical volume exists on another logical volume, only the top-level logical volume is displayed. The lower logical volume information is not displayed.
- If the slice constituting one file system or device file is shared by another file system or device file, the shared volume information is displayed only as one component among those file systems or device files.
- If the slice constituting one file system or device file is shared by another file system or device file and the whole shared-volume information is displayed as one component among those file systems or device files, Provisioning Manager does not display other file systems or device files.

The following figures illustrate the scope of displayed information when the logical volume is shared.

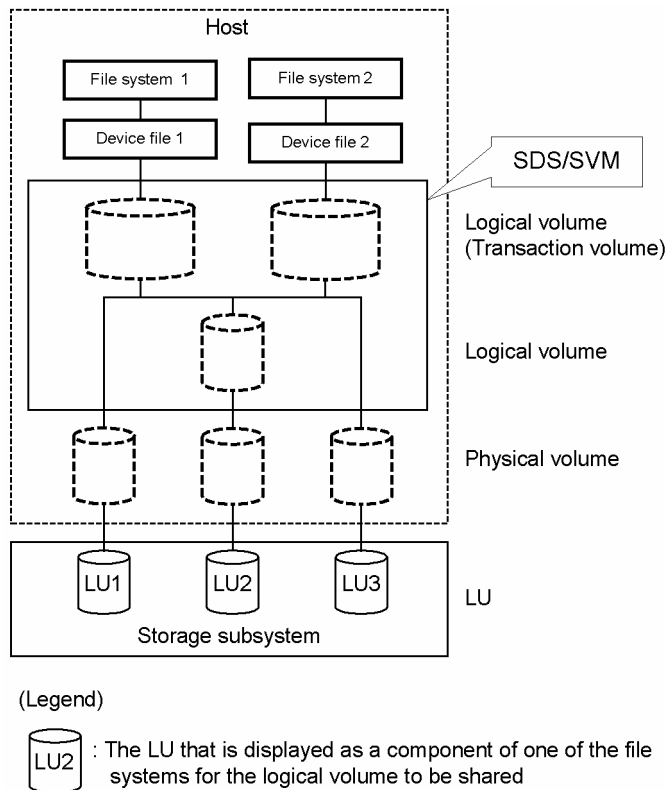
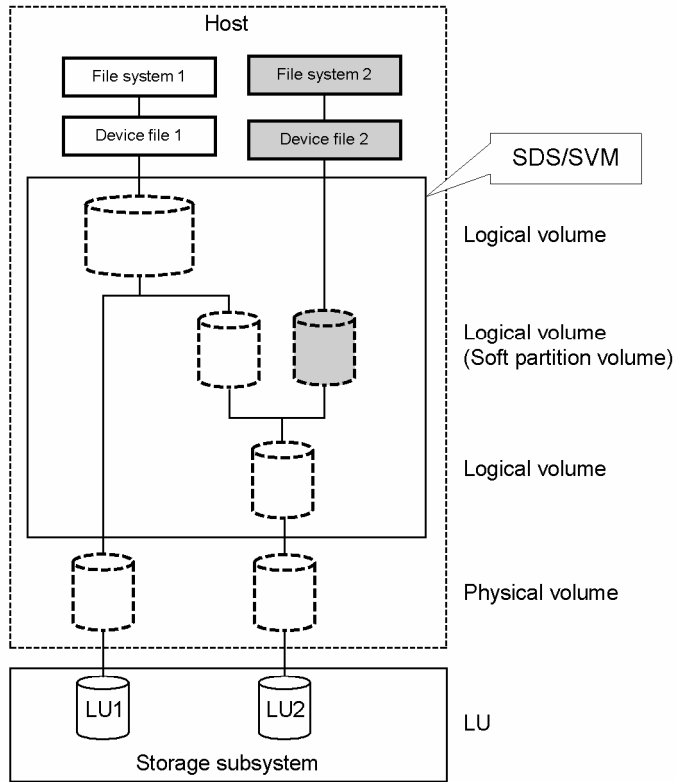




Figure 6.1 Scope of LU Information Displayed When Using SDS/SVM



(Legend)

 : The LU that is displayed as a component of one of the file systems for the logical volume to be shared

 : Information that is not displayed in Provisioning Manager when the information about LU2 is displayed in the file system 1

**Figure 6.2 File System, Device File, and Logical Volume Information Displayed Using SDS/SVM**

## 6.3 Viewing a List of Accessible Hosts

When you log in to Provisioning Manager, Provisioning Manager's navigation area displays the hosts for which you have access permission. These hosts can be viewed from the List Objects-Hosts subwindow.

To view a list of hosts:

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

**Hosts** is displayed in the navigation area.

2. In the navigation area, choose **Hosts**.

The method area displays the Hosts subwindow. The information area displays the List Objects-Hosts subwindow (see Figure 6.3.) This subwindow is the same as the subwindow displayed when **List Objects** is selected in the Storage Pool subwindow.

3. In the host list, you can view the host name, whether or not the Provisioning Manager support functionality for Device Manager agent is installed, and whether or not Provisioning Manager can update the host settings.

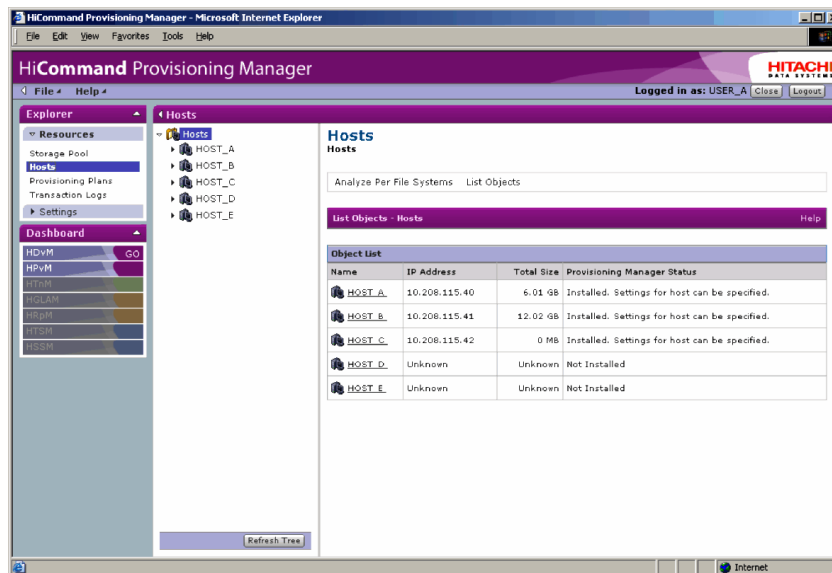


Figure 6.3 Hosts Subwindow and List Objects - Hosts Subwindow

**Note:** If Device Manager agent is not installed on the host that is being viewed, some items are displayed as **Unknown**.

**Important:** Provisioning Manager contains functionality that requires the **diskpart.exe** command line utility provided by Microsoft. When the OS of the host managed by Provisioning Manager is Windows 2000, you must obtain the **diskpart.exe** command line utility separately. You can download this utility from the Microsoft website. Install **diskpart.exe** in the following

location: `Windows-system-installation-directory\system32`.

## 6.4 Viewing a List of File Systems Mounted on the Hosts

The **Analyze Per File Systems - Hosts** subwindow allows you to view a list of file systems.

Note that a file system can be viewed only when it satisfies both of the following conditions:

- The file system is made up only of volumes that the logged-in user can access.
- The file system is mounted on the host.

To view a list of file systems:

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

**Hosts** is displayed in the navigation area.

2. In the navigation area, choose **Hosts**.

The method area displays the **Hosts** subwindow.

3. In the **Hosts** subwindow, choose **Analyze Per File Systems**.

The information area displays the **Analyze Per File Systems - Hosts** subwindow (see Figure 6.4).

**Note:** The window shows the hosts, beginning from the one with the highest usage of the volumes allocated to the file systems. If the usages are the same, the hosts are sorted in ascending order of the host names and mount point names and displayed.

4. In the **Analyze Per File Systems - Hosts** subwindow, view information about the file systems mounted on the hosts.

You can view the mount points, and the type, size, and usage rate of the mounted file systems and so on.

**Note:** If the Provisioning Manager support functionality for Device Manager agent is not installed on a host, no information is displayed. If there is no file system on all the hosts that users can access, a `No file system exists` message is displayed.

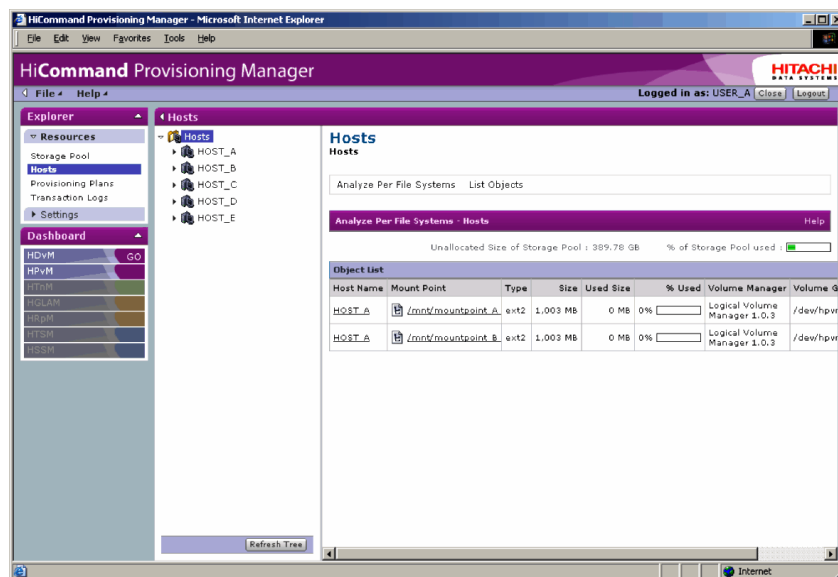


Figure 6.4 Hosts Subwindow and Analyze Per File Systems - Hosts Subwindow

## 6.5 Viewing Detailed Host Information

The Show Properties - *host-name* subwindow allows you to view detailed information about hosts.

To view detailed information about a host:

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

**Hosts** is displayed in the navigation area.

2. In the navigation area, choose **Hosts**.

The information area displays the List Objects - Hosts subwindow.

3. In the List Objects - Hosts subwindow, select the host whose detailed information you want to view.

The method area displays the *host-name* subwindow. The information area displays the Show Properties - *host-name* subwindow (see Figure 6.5).

4. In the Show Properties - *host-name* subwindow, view the detailed information about the host.

You can view the OS, the version of the Device Manager agent installed on the host, whether or not the Provisioning Manager support functionality for Device Manager agent is installed, and whether or not Provisioning Manager can update the host settings.

**Note:** If Device Manager agent is not installed on a host that is being viewed, some items display **Unknown**.

Even if Device Manager agent is installed, if Provisioning Manager does not support that agent (when Provisioning Manager support functionality for Device Manager agent is not installed), some items display nothing. For details on supported situations, see the sections on required and related products, in the *HiCommand Provisioning Manager Server Installation and Configuration Guide*.

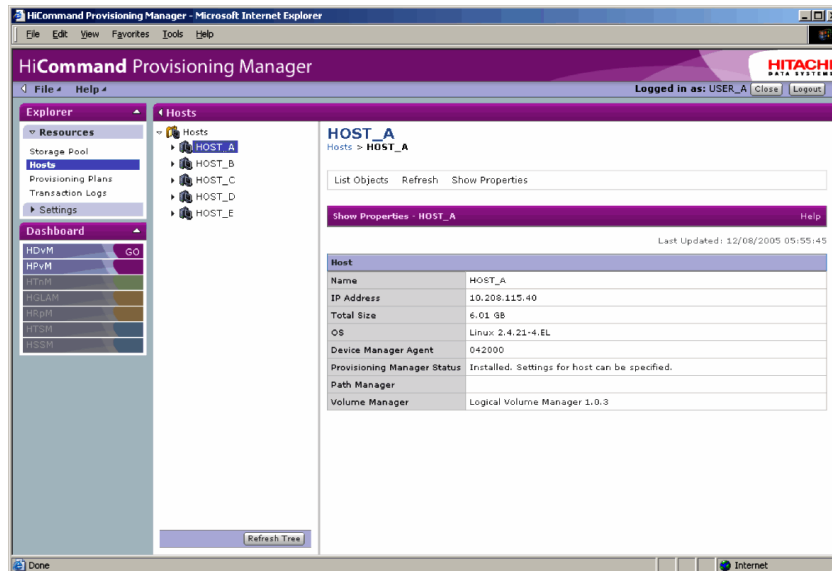


Figure 6.5 *Host-name* Subwindow and Show Properties – *host-name* Subwindow

## 6.6 Updating Host Information

The *host-name* subwindow enables you to update information about the hosts registered in Provisioning Manager.

To update host information:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, choose **Hosts**.  
The information area displays the List Objects - Hosts subwindow.
3. In the List Objects - Hosts subwindow, select the host whose information you want to update.  
The method area shows the *host-name* subwindow. The information area displays the Show Properties - *host-name* subwindow.
4. In the *host-name* subwindow, choose **Refresh**.  
A dialog box is displayed, asking whether to start refreshing the host information.
5. Click the **OK** button.  
When refreshing finishes, a dialog box notifies you of the completion of the process.
6. Click the **Close** button to close the dialog box.  
The dialog box closes.

The time displayed in **Last Updated:** in the Show Properties - *host-name* subwindow also is updated. However, if the host does not recognize any of the volumes in the storage subsystem (when Device Manager is not installed), **Unknown** is displayed as the value in **Last Updated**.

If this happens, make sure of the following and then restart the host:

- Device Manager is installed on the host.
- There are storage subsystem volumes that are available to the host.

If an error occurs when you update information about the host where the following processing is being performed, **Failed** is displayed.

- Addition, expansion and deletion of a file system
- Addition and deletion of a device file
- Resumption of the above processing

If **Failed** is displayed, perform the above procedure to update the host information again.

**Important:** If the HiScan command is executed on the same host where the host information is being updated, the command will end before the host information update finishes. If you want to know whether a host information update executed by the HiScan command finishes properly, specify the `-t` option when executing the command. A log file containing the command execution result is output.

**Important:** In the log file, if `COMPLETED` is output for the status of `SetHostVolume`, the update has finished properly. If `FAILED` is output and a message that indicates that the host information is being updated is output in `description`, the HiScan command has ended without finishing the update of the host information. In this case, wait a while and re-execute the HiScan command.

For details about the syntax of the HiScan command, see the *Hitachi HiCommand Device Manager Agent Installation Guide*.

## Chapter 7 Managing File Systems

This chapter describes how to use Provisioning Manager to manage file systems.

- Overview of Managing File Systems (section 7.1)
- Viewing File System Information (section 7.2)
- Adding a File System (section 7.3)
- Viewing File System Information for a Mount Point (section 7.4)
- Expanding a File System (section 7.5)
- Deleting a File System (section 7.6)
- Viewing the Data Path for a Mount Point (section 7.7)

## 7.1 Overview of Managing File Systems

You can use Provisioning Manager to view information about existing file systems, to add file systems, to expand file systems, and to delete file systems. Provisioning Manager provides the following facilities for file system management:

- View file systems
- Add file systems
- View file system information for each mount point
- Expand file systems
- Delete file systems
- View the path (data path) consisting of an HBA WWN, storage subsystem port, and storage subsystem volume

The operation to delete a file system works only for file systems on a given host. The volume used by the file system remains allocated to the host. To enable this volume to be used by another host, the allocation of the volume must be released from the storage pool management screen, and then the delete operation must be resumed from the Transaction Logs subwindow. For how to release a volume, see section 5.9.

Also, when adding or expanding a file system, if you specify physical volumes in the following statuses, the data is not guaranteed and the operation might not be performed correctly:

- Physical volumes (including HDLM devices) that are being accessed directly by a program.
- Physical volumes (including HDLM devices) whose links are being accessed by a program.
- Physical volumes (including HDLM devices) that correspond to character devices that are being accessed by a program.

To avoid mistakenly specifying such physical volumes, the LDEVs corresponding to these physical volumes need to be excluded from the storage pool that the logged-in user can access.

To exclude LDEVs from a storage pool, use the resource group management functionality of Device Manager to make those LDEVs inaccessible to the resource group that corresponds to the storage pool. For details, see the *Hitachi HiCommand Device Manager Web Client User's Guide*.

**Note:** The storage pool and amount of disk space are displayed in the window according to the following rules:

- For megabytes (MB), only integers are used, and digits after the decimal point are truncated.
- For gigabytes (GB) or above, a number is truncated to two decimal places.
- The usage ratio uses integers only (digits after the decimal place are truncated).

**Caution:** In the location where a volume group or logical group is created, do not create a file or directory whose name starts with `pvmvg` or `pvm1v`.

**Caution:** When using Provisioning Manager to add, expand, or delete a file system, you cannot specify a file system containing logical volumes that satisfy either of the following conditions:

- The volume group name includes any character other than the following:

A-Z a-z 0-9 \_

- The logical volume name includes any character other than the following:

A-Z a-z 0-9 \_

**Caution:** When using Provisioning Manager to add, expand, or delete a file system, specify an absolute path name with a maximum length of 244 bytes for the mount point. A directory name contained in the mount point can consist of the following characters:

A-Z a-z 0-9 \_ ( )

Note that neither ( nor ) can be used in AIX.

A directory that satisfies any of the following conditions cannot be specified as the mount point:

In Windows:

- A directory name beginning with a:, b:, A:, or B:
- A directory on a network drive
- A directory ending with \

Example: To specify the root directory of drive D (D:\), specify D:.

- A directory containing multiple consecutive backslashes (\)

In UNIX:

- A directory ending with a forward slash (/)
- A directory containing multiple consecutive forward slashes (/)

## 7.2 Viewing File System Information

From the List Objects - File Systems subwindow, you can view file system information for each selected host.

Note that file system information can be viewed only when the file system satisfies both of the following conditions:

- The file system is made up only of volumes that the logged-in user can access.
- The file system is mounted on the host.

To view information about file systems:

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

**Hosts** is displayed in the navigation area.

2. In the navigation area, expand the **Hosts** tree.

A list is displayed of all hosts that are within the access scope of the user.

3. Expand the tree of the desired host.

The navigation area displays **File Systems** and **Device Files**.

4. Choose **File Systems**.

The method area displays the File Systems subwindow, and the information area displays the List Objects - File Systems subwindow (see Figure 7.1).

5. In the List Objects - File Systems subwindow, view information about the file systems.

**General Information** displays information about the file system as a whole. This displays information about the file system at each mount point on the List Objects - File Systems subwindow.

**Note:** When a mount point is selected, the List Objects - File Systems subwindow switches to the Show Properties - *mount-point* subwindow where the detailed information about the mount point is displayed.

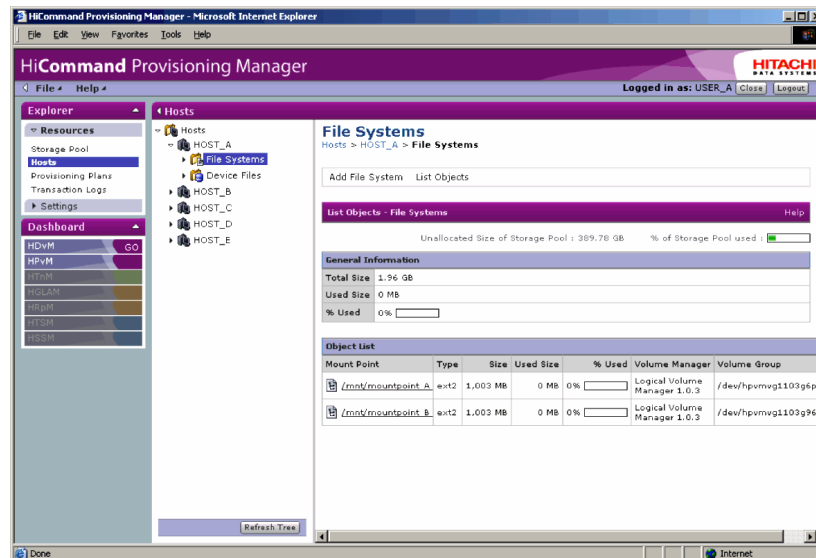


Figure 7.1 File Systems and List Objects - File Systems Subwindow

### 7.3 Adding a File System

You add a file system by using Provisioning Manager dialog boxes to perform the following three steps:

- Add File System - Step 1 of 3 (Select Volume) dialog box
- Add File System - Step 2 of 3 (Specify Parameters) dialog box
- Add File System - Step 3 of 3 (Summary of Changes) dialog box

You specify the volume to be used for the file system, the file system type, the mount point, and the volume manager. Provisioning Manager executes the following processing according to the user-specified information and adds the new file system to the host:

- Adds the file system by using the selected volume.
- Mounts the file system at the user-specified mount point.

**WARNING:** Make sure that you specify a unique address for each port of storage devices in the same zone. If port addresses in the same zone are not unique, the OS cannot identify the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

Supported volume emulation types are OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, and OPEN-V.

The following volume managers are supported:

- Windows: Basic disk, Dynamic disk
- Solaris: VERITAS Volume Manager 3.5, VERITAS Volume Manager 4.0, or VERITAS Volume Manager 5.0
- AIX: Logical Volume Manager
- Linux: Logical Volume Manager
- HP-UX: Logical Volume Manager, VERITAS Volume Manager 3.5, or VERITAS Volume Manager 4.1

For details, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

The following file system types are supported for use by the host:

- Windows: NTFS
- Solaris: UFS, VERITAS File System 3.5, VERITAS File System 4.0, or VERITAS File System 5.0
- AIX: JFS
- Linux: ext2 or ext3
- HP-UX: VERITAS File System 3.5 or VERITAS File System 4.1

For details, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

Conversely, a file system is not added if any of the following applies:

- The access privilege for the logged-in user is Guest or Local Guest
- An unsupported the volume manager is used in the file system
- An unsupported file system is used by the host
- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device
- The volume is being used as an S-VOL for TrueCopy
- The volume is being used as an S-VOL or SP-VOL for ShadowImage
- The volume is being used as a V-VOL or POOL for QuickShadow
- The volume is being used as a system volume for NAS
- The volume is being used as an on-demand device
- The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function
- The HIHSM attribute (Volume Migration, CruiseControl) has been set
- The volume size is less than 512 MB
- Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume

A mount point that is already being used for another file system cannot be used to add a file system:

- The mount point has a name that includes two-byte characters
- The mount point begins with `a:`, `b:`, `A:`, or `B:`
- The mount point exists on a network drive

To add a file system, perform the following steps:

1. Select Volume (see section 7.3.1). All volumes that the user can choose from are displayed.

**Caution:** A volume cannot be used to add a file system if the volume manager is using that volume on a host where Device Manager Agent has been installed, or any of the following conditions applies:

- The volume is mounted on a host where Device Manager Agent has been installed.
- The volume is being used as a command device.
- The volume is being used as an S-VOL for TrueCopy.
- The volume is being used as an S-VOL or SP-VOL for ShadowImage.

- The volume is being used as a V-VOL or POOL for QuickShadow.
  - The volume is being used as a system volume for NAS.
  - The volume is being used as an on-demand device.
  - The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function.
  - The HIHSM attribute (Volume Migration, CruiseControl) has been set.
  - The volume emulation type is unsupported.
  - The volume size is less than 512 MB.
  - Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume.
2. Choose a volume from among those displayed.

3. Specify Parameters (see section 7.3.2). The following items are set:
  - File system type
  - Mount point
  - Volume manager
  - If necessary, set the volume group name and logical volume name.
4. Confirm the settings in Summary of Changes (see section 7.3.3).

To start the add file system process:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, expand the **Hosts** tree.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. Choose **File Systems**.  
The File Systems subwindow is displayed.
5. Select **Add File System** from the File Systems subwindow.  
The Add File System - Step 1 of 3 dialog box is displayed.

The following sections show the Add File System dialog boxes and describe the settings to be specified at each step.

**Important:** To verify that the correct content was included in each step, you can click the **Back** button to return to the previous step. However, if you return to the previous step and then go to the next step, the selected volume may change, as Provisioning Manager selects the appropriate volume.

### 7.3.1 Selecting a Volume

In this step, the volume to be used for file system creation is viewed and selected. Figure 7.2 shows the Add File System dialog box for selecting the volume (step 1 of 3).

**Important:** The Add File System - Step 1 of 3 dialog box displays only those volumes for which LUN security is set for the host. Volumes used by hosts for which security is switched off or storage subsystems that do not have the security facility are not displayed.

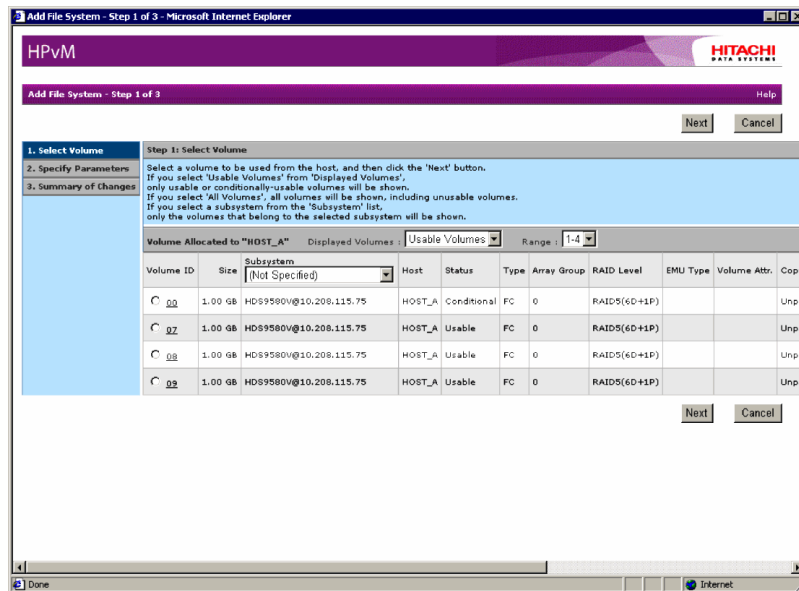


Figure 7.2 Add File System - Step 1 of 3 (Select Volume)

To select the volume (step 1 of 3 in Add File System):

1. Depending on the contents you want to display, set the following item on the Add File System - Step 1 of 3 dialog box (refer to Figure 7.2):

**Displayed Volumes:** Select the volume display range.

- **Usable Volumes:** Of the volumes that the host can use with LUN security, a list is displayed of the usable volumes and volumes usable under certain conditions.
- **All Volumes:** A list is displayed of all volumes that are set to use LUN security with that host.

A maximum of 10 volumes are displayed at a time. When there are 11 or more volumes to be displayed, the eleventh and subsequent volumes can be viewed by selecting another range in **RANGE**:

A maximum of 16,384 volumes can be displayed by switching pages.

2. Select the desired volume from the displayed volume list.  
 Select the radio button of the volume to be used to create the file system by Volume ID.  
**Note:** From **Subsystem**, select the storage subsystem from a pull-down list to display a dialog box with only the volumes from the selected subsystem.  
 Click the **Show Data Path** button to display a dialog box with the following path information: HBA WWN, storage subsystem port, storage subsystem volume.
3. If you select a volume that is usable under certain conditions, a dialog box is displayed that indicates the conditions and asks you to confirm the volume.  
**Caution:** If you use a volume usable under certain conditions, some data may be lost or other hosts may lose the access privileges to the volume. Before using such a volume, check the warning message and make sure that there are no problems.
4. If there are no problems, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.  
**Caution:** If you click the **OK** button without selecting the check box, an error occurs.
5. Click the **Next** button.  
 The Add File System - Step 2 of 3 dialog box is displayed. The next section shows this dialog box and describes the settings to be specified at this step.

### 7.3.2 Setting Parameters

In this step, you set the parameters used in creation of the file system. Figure 7.3 shows the Add File System dialog box for setting the parameters (step 2 of 3).

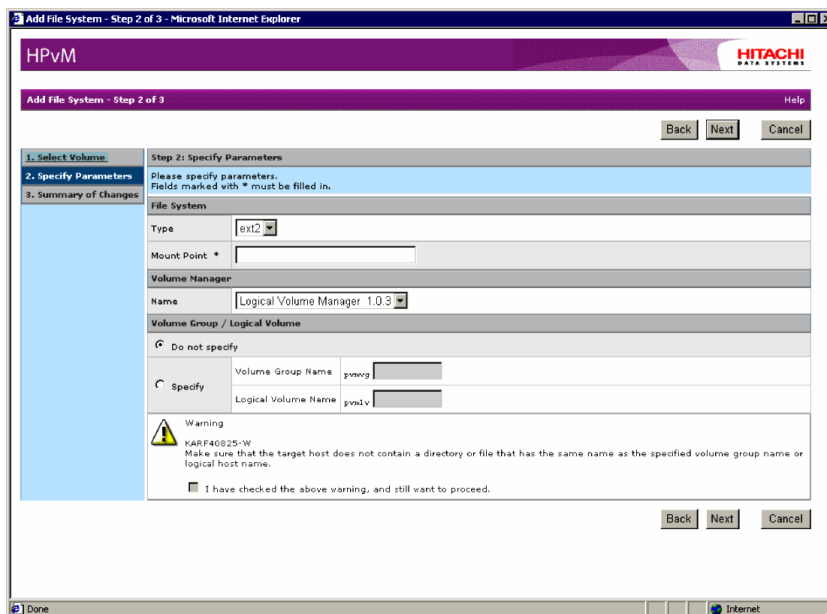


Figure 7.3 Add File System - Step 2 of 3 (Specify Parameters)

To set the parameters (step 2 of 3 in Add File System):

1. Set the following items on the Add File System - Step 2 of 3 dialog box (refer to Figure 7.3):

**File System:** Set the following file system items:

- **Type:** Select the file system type from the pull-down list.
- **Mount Point:** Enter the mount point. For details on restrictions on the value to be entered, see Help for the window.

**Volume Manager:** Set the following volume manager item:

- **Name:** Select the volume manager name from the pull-down list.

2. Select whether you will specify the volume group name and logical volume name.

#### **Volume Group/Logical Volume**

If you do not want to specify the volume group name and logical volume name, select **Do not specify** and then proceed to step 5.

If you do want to specify the volume group name and logical volume name, select **Specify** and then proceed to step 3.

**Caution:** If the host is Windows, or no Volume Manager has been specified, **Volume Group/Logical Volume** is disabled and cannot be selected. Proceed to step 5.

3. Specify the volume group name and logical volume name.

#### **Volume Group Name**

Specify the volume group name that follows `pvmvg`.

For details about the limits for the entered values, see Help for the window.

#### **Logical Volume Name**

Specify the logical volume name that follows `pvm1v`.

For details about the limits for the entered values, see Help for the window.

**Note:** You can omit specifying either of the names (either the volume group name or the logical volume name). If you omit either of these names, Provisioning Manager assigns a name.

**Caution:** If **Specify** is selected, the system displays a message asking whether the target host contains a directory or file with the same name as the specified volume group name and logical volume name. Before specifying these names, make sure that there is no conflict.

4. If there is no conflict, select the **I have checked the above warning, and still want to proceed** check box under the message.

**Caution:** Clicking the **Next** button without selecting this check box results in an error.

5. After completing the settings, click the **Next** button.

The Add File System - Step 3 of 3 dialog box is displayed. The next section shows this dialog box and describes the settings to be specified at this step.

### 7.3.3 Confirming the Settings

In this step, you confirm the contents of your settings. Figure 7.4 shows the Add File System dialog box for confirming the settings (step 3 of 3).

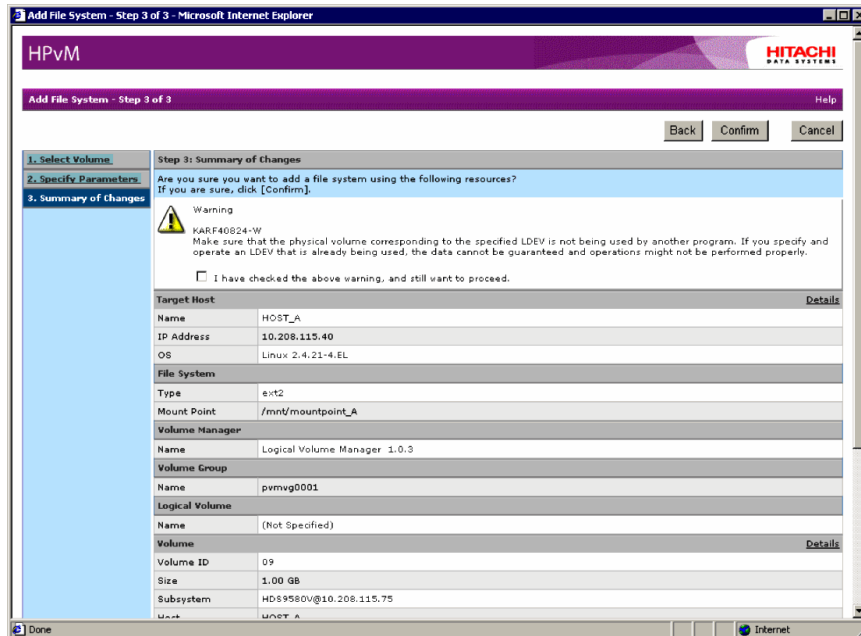


Figure 7.4 Add File System - Step 3 of 3 (Summary of Changes)

The procedure for confirming the settings is described below. The device file might have to be recognized in the middle of operations. The operation related to recognizing the device file differs depending on the system components. For details on the required operation, see section 11.2, *Troubleshooting Information*, and then see the manuals for the hardware and software that are being used (HBA, volume manager, operating system documentation, etc.).

The following explains how to confirm the settings when the device file needs to be recognized and when the device file does not need to be identified.

To confirm the settings when the device file does not need to be recognized on the host side:

1. Check the contents of the Add File System - Step 3 of 3 dialog box.
2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:** Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.

Also, if you click the **Confirm** button without selecting the check box, an error occurs.

3. Click the **Confirm** button.

A message appears indicating that file system addition processing is underway.

**Important:** To check the execution status of the processing, check the transaction logs. For details about transaction logs, see Chapter 1.

When the processing finishes, the Add File System - Result dialog box appears, displaying the processing results.

4. In the Add File System - Result dialog box, check the displayed information.
5. Click the **Close** button.

The window closes. This finishes file system addition processing.

To confirm the settings when the device file needs to be recognized on the host side:

1. Check the contents of the Add File System - Step 3 of 3 dialog box (see Figure 7.4).
2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:** Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.

Also, if you click the **Confirm** button without selecting the check box, an error occurs.

3. Click the **Confirm** button. If a message appears during file system addition processing, the Add File System - Suspended dialog box is displayed. A message appears indicating that the device file needs to be recognized.
4. Manually check the device files as described in the manuals for the hardware and software that are being used.
5. In the navigation area, expand the **Device Files** tree directly under **Hosts**, and make sure that the desired device file is displayed.
6. In the navigation area, expand the tree, and then choose **Transaction Logs**.  
The information area displays the List Objects - Transaction Logs subwindow.
7. Check the contents of the operation where the **Resume** button is displayed in the **Action** field, and identify the desired operation.

The **Resume** button is displayed for the processing that was interrupted. Check the contents of the operation where the **Resume** button is displayed, and make sure that the operation is appropriate.

8. In the List Objects - Transaction Logs subwindow, click the **Resume** button.

The creation processing that was interrupted is resumed.

When the processing has been completed, the Add File System - Result dialog box is displayed to show the result of the file system creation.

9. Check the contents of the Add File System - Result dialog box.

10. In the Add File System - Result dialog box, click the **Close** button.

The dialog box closes. The add file system process has been completed.

**Important:** For details on the contents of the processing, see the transaction logs. For details on transaction logs, see section 10.2.

When the host OS is AIX, if a file system (JFS) is newly added, the logical volume for the journal log is automatically created. However, information about that volume is not displayed in the navigation area. Therefore, after a file system is newly added, refresh the host to display information about the logical volume for the journal log.

## 7.4 Viewing the File System Information for a Mount Point

In the Show Properties - *mount-point* subwindow, you can view the file system information, device file information, and volume information for each mount point. When planning the expansion or deletion of a file system, consider the options based on the information obtained here.

To view the file system information for a mount point:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, expand the **Hosts** tree.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. Select *mount-point* under **File Systems** in the navigation area.  
In the method area, the *mount-point* subwindow is displayed. In the information area, the Show Properties - *mount-point* subwindow is displayed (see Figure 7.5).
5. In the Show Properties - *mount-point* subwindow, view the file system information for the mount point.
  - The file system information is displayed in **File System**.
  - The device file information is displayed in **Device File**.
  - Information on the volumes allocated to the host is displayed in **Volume Information**.

**Note:** When a link to **Volume ID** is selected in the **Volume Information** table, the Device Manager's Detailed Information - *LDEV-number* dialog box is displayed. For details on the screen items, see Help for the window.

When the **Show Data Path** button is clicked in the **Volume Information** table, a dialog box is displayed with the following path information: HBA WWN, storage subsystem port, and storage subsystem volume.

**Note:** The device file types (logical volumes, volume groups, HDLM devices, and raw devices) are displayed as follows:

- Logical volumes: **LogicalVolume**
- Volume groups: **VolumeGroup**
- HDLM devices: **RawDevice (HDLM)** or **RawDevice (HDLM, Partitioned)**
- Raw devices: **RawDevice** or **RawDevice (Partitioned)**

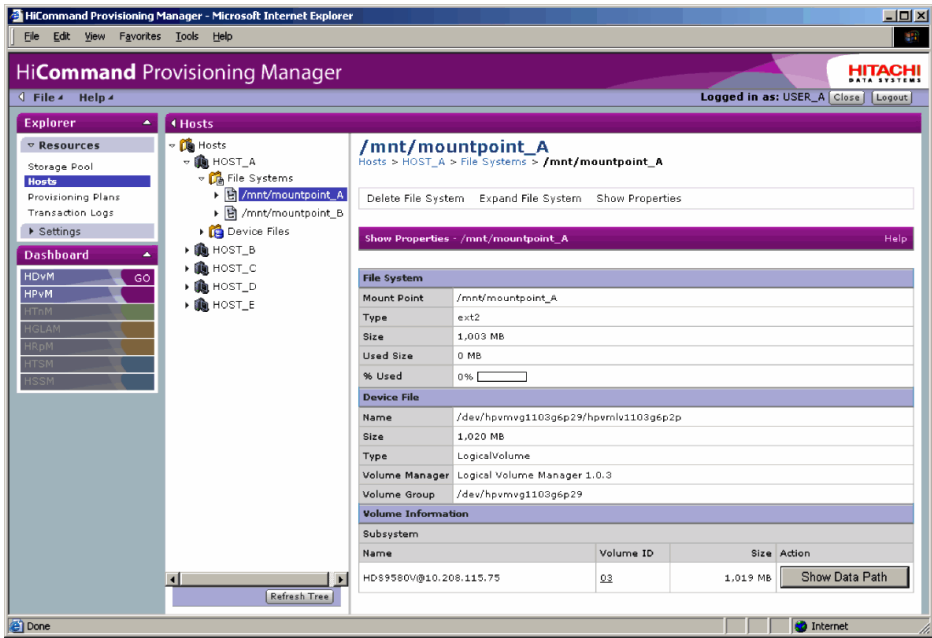


Figure 7.5 Mount-point and Show Properties - mount-point Subwindows

## 7.5 Expanding a File System

A file system can be expanded by using the Expand File System dialog boxes, which include Step 1 of 2 (Select Volume) and Step 2 of 2 (Summary of Changes). Once a file system has been added, a new volume can be added and the file system can be expanded.

**Caution:** On a host where one of the following conditions exists, the file system is unmounted during expansion processing. Therefore, before expanding a file system, stop any jobs that are running.

-A Linux host

-An HP-UX host where the version of the Device Manager agent is earlier than 5.1 is installed.

-An HP-UX host where the Device Manager agent version is 5.1 or later is installed and HP OnlineJFS is not installed.

In HP-UX, there are operations you must perform before and after you expand file systems used as cluster resources. These operations are described in section 4.6.3.2.

To start the expand file system process:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, expand the **Hosts** tree.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. Select *mount-point* under **File Systems** in the navigation area.  
The *mount-point* subwindow is displayed.
5. From the *mount-point* subwindow, select **Expand File System**.  
The Expand File System - Step 1 of 2 dialog box is displayed.

The following sections show the Expand File System dialog boxes and describes the settings to be specified at each step.

**Important:** To verify that the correct content was included in each step, you can click the **Back** button to return to the previous step. However, if you return to the previous step and then go to the next step, the selected volume may change, as Provisioning Manager selects the appropriate volume.

## 7.5.1 Selecting a Volume

In this step, you select a newly allocated volume to be used to expand the file system. Figure 7.6 shows the Expand File System dialog box for selecting the volume (step 1 of 2).

**Important:** The Expand File System - Step 1 of 2 dialog box is displayed only for volumes for which LUN security is set for the host. Volumes used by hosts for which security is switched off or storage subsystems that do not have the security facility are not displayed.

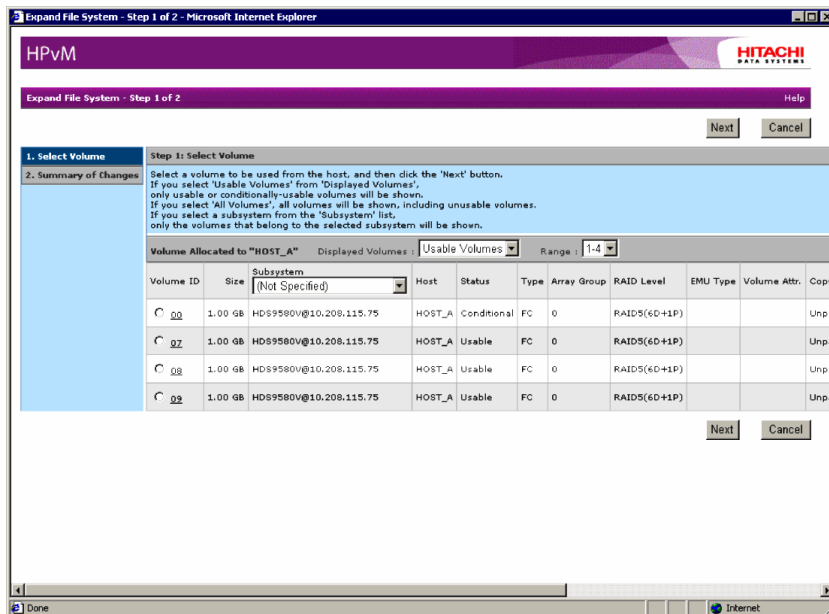


Figure 7.6 Expand File System - Step 1 of 2 (Select Volume)

To select the volume (step 1 of 2 in Expand File System):

1. Depending on the contents you want to display, set the following item on the Expand File System - Step 1 of 2 dialog box (refer to Figure 7.6):

**Displayed Volumes:** Select the volume display range.

- **Usable Volumes:** Of the volumes that the host can use with LUN security, a list is displayed of the usable volumes and volumes usable under certain conditions.
- **All Volumes:** A list is displayed of all volumes that are set to use LUN security with that host.

A maximum of 10 volumes are displayed at a time. When there are 11 or more volumes to be displayed, the eleventh and subsequent volumes can be viewed by selecting another range in **RANGE**:

A maximum of 16,384 volumes can be displayed by switching pages.

2. Select the desired volume from the displayed volume list.

Select the radio button of the volume to be used to expand the file system by **Volume ID**.

**Note:** From **Subsystem**, select the storage subsystem from a pull-down list to display a dialog box with only the volumes from the selected subsystem.

Click the **Show Data Path** button to display a dialog box with the following path information: HBA WWN, storage subsystem port, and storage subsystem volume.

3. If you select a volume that is only usable under certain conditions, a dialog box is displayed that indicates the reason for those conditions and asks for confirmation of your intent to select this volume.

**Caution:** If you use a volume that is only usable under certain conditions, some data may be lost or other hosts may lose the access privileges to the volume. Before using such a volume, check the warning message and make sure that there are no problems.

4. If there are no problems, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**Caution:** If you click the **OK** button without selecting the check box, an error occurs.

5. Click the **Next** button.

The Expand File System - Step 2 of 2 dialog box is displayed. The next section shows this dialog box and describes the settings to be specified at this step.

## 7.5.2 Confirming the Settings

In this step, you confirm your setting selections. Figure 7.7 shows the Expand File System dialog box for confirming your settings (step 2 of 2).

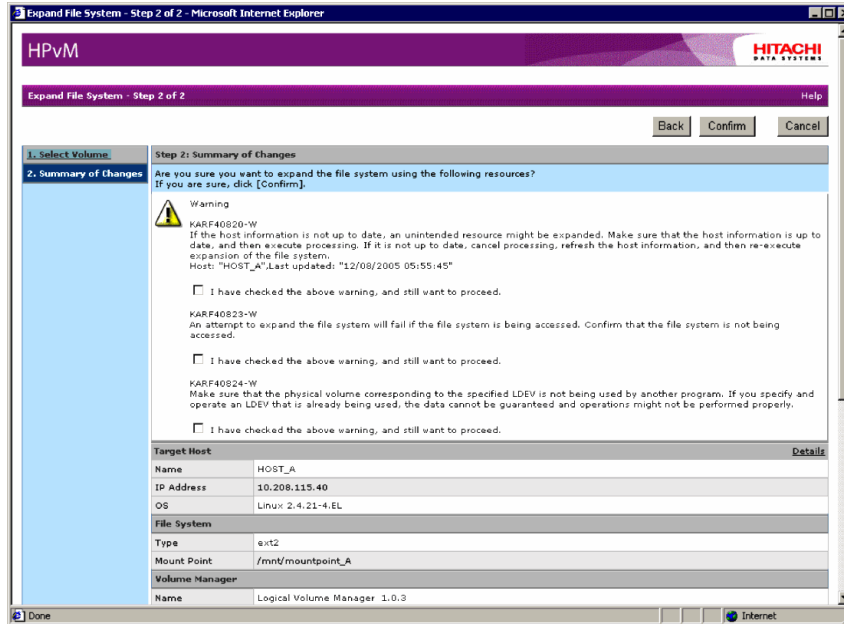


Figure 7.7 Expand File System - Step 2 of 2 (Summary of Changes)

The procedure for confirming the setting selections is described below. The device file might have to be recognized in the middle of operations. The operation related to recognizing the device file differs depending on the system components. For details on the required operation, see section 11.2, and then see the manuals for the hardware and software that are being used (HBA, volume manager, operating system manual, etc.).

The following explains how to confirm the settings when the device file needs to be identified and when the device file does not need to be identified.

To confirm the settings when the device file does not need to be identified on the host side (step 2 of 2 in Expand File System):

1. Confirm the setting selections in the Expand File System - Step 2 of 2 dialog box (refer to Figure 7.7).

2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:**

Make sure that the information about the selected host is up-to-date. If the file system is manually operated from the host and the host information is not updated, an unintended file system expansion might be performed. If the host information is not up to date, cancel processing, update the host information, and then retry the operation from the beginning.

Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.

Also, an error occurs if you click the **Confirm** button without selecting the check box. Check the warning message and then select the check box.

3. Click the **Confirm** button.

A message is displayed indicating that file system expansion processing is underway.

**Important:** To check the execution status of the processing, view the transaction logs. For details on transaction logs, see section 10.2.

When processing has been completed, the result is displayed in the Expand File System-Result dialog box.

4. Check the contents of the Expand File System - Result dialog box.
5. If there is no problem, click the **Close** button in the Expand File System - Result dialog box.

To confirm the settings when the device file needs to be identified on the host side (step 2 of 2 in Expand File System):

1. Check the settings in the Expand File System - Step 2 of 2 dialog box (refer to Figure 7.7).
2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:**

- Make sure that the information about the selected host is up to date. If the file system is manually operated from the host and the host information is not updated, an unintended file system expansion might be performed. If the host information is not up to date, cancel processing, update the host information, and then retry the operation from the beginning.
- Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.
- An error occurs if you click the **Confirm** button without selecting the check box. Check the warning message and then select the check box.

3. Click the **Confirm** button.  
If a message appears during file system expansion processing, the Expand File System - Suspended dialog box is displayed. A message appears indicating that the device file needs to be recognized.
4. Manually check the device files as described in the manuals for the hardware and software that are being used.
5. In the navigation area, expand the **Device Files** tree directly under **Hosts**, and make sure that the desired device file is displayed.
6. In the navigation area, expand the tree, and then choose **Transaction Logs**.  
The information area displays the List Objects - Transaction Logs subwindow.
7. Check the contents of the operation where the **Resume** button is displayed in the **Action** field, and recognize the desired operation.  
The **Resume** button is displayed for the processing that was interrupted. Check the contents of the operation where the **Resume** Button is displayed, and make sure that the operation is appropriate.
8. In the List Objects - Transaction Logs subwindow, click the **Resume** button.  
The expansion processing that was interrupted is resumed.  
When the processing has been completed, the Expand File System - Result dialog box is displayed to show the result of the file system expansion.
9. Check the contents of the Expand File System - Result dialog box.
10. In the Expand File System - Result dialog box, click the **Close** button. The window closes.  
The expand file system process has been completed.  
**Important:** For details on the contents of the processing, see the transaction logs. For details on transaction logs, see section 10.2.

In HP-UX, there are operations you must perform before and after you expand file systems used as cluster resources. These operations are described in section 4.6.3.2.

## 7.6 Deleting a File System

The selected file system can be deleted using the Delete File System - *mount-point* dialog box. The operations listed here can only be used to delete a file system on the host. To release the volume allocation on a subsystem, release the volume from the List Allocated LDEVs - Storage Pool subwindow. For details on releasing a volume, see section 5.9.

**Caution:** If the access privilege for the logged-in user is Guest or Local Guest, the user cannot delete file systems.

In HP-UX, there are operations you must perform before and after you delete file systems used as cluster resources. These operations are described in section 4.6.3.2.

The following shows the procedure to delete file systems. The allocated volume might have to be released in the middle of operations. The operation related to releasing the allocated volume differs depending on the system components. For details on releasing volume allocation, see section 11.2 first, and then see section 5.9 and the manuals for the hardware and software that are being used (HBA, volume manager, operating system manual, etc.).

The following explains how to delete a file system when the host side does not need to release an allocated volume and when the host side needs to release an allocated volume.

To delete a file system when the host side does not need to release an allocated volume:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, expand the **Hosts** tree.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select the *mount-point*, immediately below **File Systems**.  
On the method area, the *mount-point* subwindow is displayed.
5. In the *mount-point* subwindow, select **Delete File System**.  
The Delete File System - *mount-point* dialog box is displayed (see Figure 7.8).
6. Check the settings of the Delete File System - *mount-point* dialog box.
7. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.  
**WARNING:** Make sure that the selected file system is the one that you intend to delete. Once deleted, if you re-create a file system by using the same volumes, you cannot recover data of the deleted file system.

Make sure that the information about the selected host is up-to-date. If the file system is manually operated from the host and the host information is not updated, an unintended file system deletion might be performed. If the host information is not up to date, cancel processing, update the host information, and then retry the operation from the beginning.

If you click the **OK** button without selecting the check box, an error occurs. Check the warning message and then select the check box.

8. Click **OK**.

A message is displayed indicating that the delete file system process is underway.

**Important:** To check the execution status of the processing, check the transaction logs. For details on transaction logs, see section 10.2.

When the process has been completed, the processing result is displayed in the Delete File System - Result dialog box.

9. Check the settings of the Delete File System - Result dialog box.

10. Click the **Close** button on the Delete File System - Result dialog box.

The dialog box closes. The delete file system process has completed.

**Important:** For details on the contents of the processing, check the transaction logs. For details on transaction logs, see section 10.2.

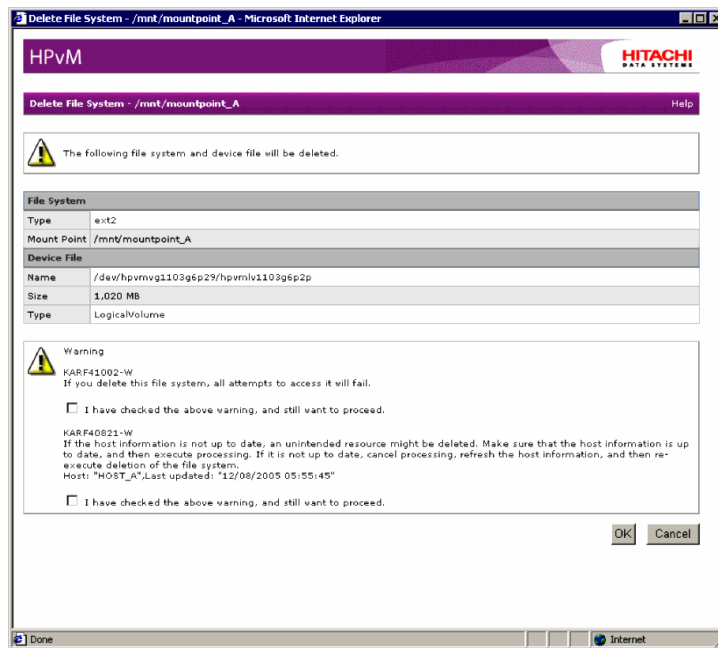


Figure 7.8 Delete File System - *mount-point* Dialog Box

To delete a file system when the host side needs to release an allocated volume:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. In the navigation area, expand the **Hosts** tree.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select the *mount-point*, immediately below **File Systems**.

In the method area, the *mount-point* subwindow is displayed. In the information area, the Show Properties - *mount-point* dialog box is displayed.

5. From the *mount-point* subwindow, select **Delete File System**.

The Delete File System - *mount-point* dialog box is displayed (refer to Figure 7.8).

6. From the Delete File System - *mount-point* dialog box, check the dialog box settings.
7. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box.

**WARNING:** Make sure that the selected file system is the one that you intend to delete. Once deleted, if you re-create a file system by using the same volumes, you cannot recover data of the deleted file system.

If the **OK** button is clicked without selecting the check box, an error occurs. Check the warning message and then select the check box.

8. Click the **OK** button.

If a message is displayed during the delete file system process, the Delete File System - Suspended dialog box is displayed. When the process has been completed, the processing result is displayed in the Delete File System - Result dialog box.

9. Release the allocated volume from the List Allocated LDEVs - Storage Pool subwindow.
10. If necessary, manually make the system recognize that the volume allocation has been released according to the manuals for the hardware and software that are being used.
11. In the navigation area, expand the **Device Files** tree directly under **Hosts**, and make sure that the desired device file is not displayed.

12. From the navigation area, expand the tree, and select the **Transaction Logs**.

On the information area, the List Objects - Transaction Logs subwindow is displayed.

13. Check the contents of the operation where the **Resume** button is displayed in the **Action** field, and recognize the desired operation.

The **Resume** button is displayed for the process that was interrupted. Check the contents of the operation where the **Resume** button is displayed, and make sure that the operation is appropriate. For details on transaction logs, see section 10.2.

14. From the List Objects - Transaction Logs subwindow, click **Resume**.

The interrupted delete file system process is restarted.

When the process has been completed, the result of the delete file system process is displayed in the Delete File System - Result dialog box.

15. Check the contents of the Delete File System - Result dialog box.

16. From the Delete File System - Result dialog box, click the **Close** button.

The dialog box closes. The delete file system process has been completed.

**Important:** For details on the contents of the processing, check the transaction logs. For details on transaction logs, see section 10.2.

## 7.7 Viewing the Data Path for a Mount Point

From the Show Data Path dialog box, you can view the following path (data path) information: HBA WWN, storage subsystem port, and storage subsystem volume.

To view the data path:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select a *mount-point*, immediately below **File Systems**.  
In the method area, the *mount-point* subwindow is displayed. In the information area, the Show Properties - *mount-point* subwindow is displayed.
5. From the Show Properties - *mount-point* subwindow, click the **Show Data Path** button in the **Volume Information** table.

The Show Data Path dialog box is displayed (see Figure 7.9).

**Important:** What is displayed here is a combination of HBA and WWN on the selected host WWN, which is set as the selected host volume with LUN security set.

**Important:** For the following hosts, if there are redundant paths between a host port and a storage subsystem port, only the representative data path is displayed:

- The host OS is Windows, and Dynamic Link Manager is used.
- The host OS is Solaris, and Dynamic Link Manager is used.
- The host OS is AIX, and Dynamic Link Manager 5.7 is used.
- The host OS is HP-UX 11i v3.

For details on Dynamic Link manager, see the HiCommand Dynamic Link Manager *User's Guide*.

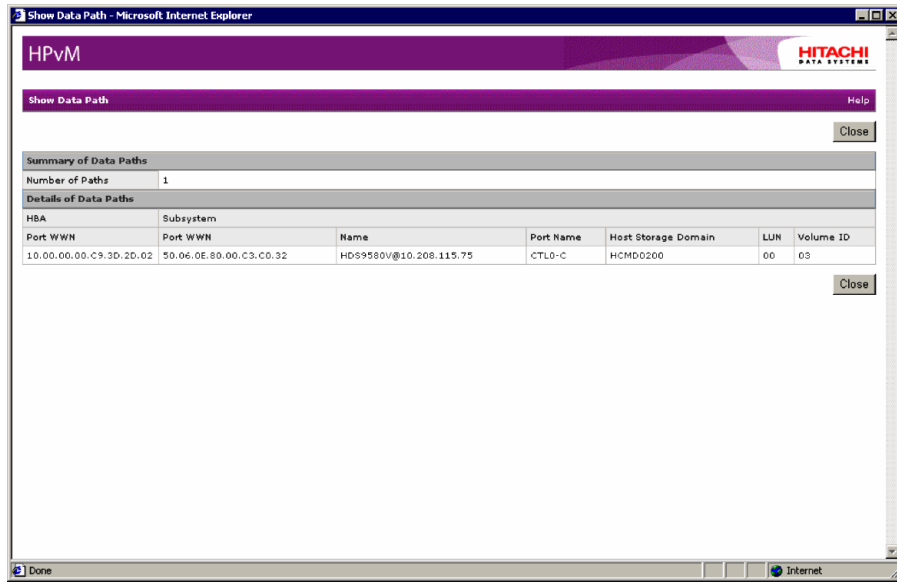


Figure 7.9 Show Data Path Dialog Box (File System)



## Chapter 8 Managing Device Files

This chapter explains how to use Provisioning Manager to manage device files.

- Overview of Managing Device Files (section 8.1)
- Viewing Device File Information (section 8.2)
- Adding a Device File (section 8.3)
- Viewing Information About Device File Paths (section 8.4)
- Deleting a Device File (section 8.5)
- Viewing the Data Path for Each Path Name (section 8.6)

## 8.1 Overview of Managing Device Files

You can use Provisioning Manager to view information about device files, to add device files, and to delete device files. Provisioning Manager provides the following facilities for the management of device files:

- View a list of device files
- Add a device file
- View the device file information for each path name
- Delete a device file
- View a path (data path) consisting of an HBA WWN, storage subsystem port, and storage subsystem volume

In this chapter, the operation described for deleting device files can also delete device files on the host. To completely delete a device file, allocation of the volume being used must be released from the storage pool management window, and then the delete operation must be resumed from the Transaction Logs subwindow.

Device file deletion enables deletion only of the device files on the host. The volume used by the device file remains allocated to the host. To enable other hosts to use this volume, allocation of the volume must be released from the storage pool management screen. For details on releasing a volume, see section 5.9.

Also, if you specify physical volumes in the following statuses when adding a device file, the data is not guaranteed and the operation might not be performed correctly.

- Physical volumes (including HDLM Device) that are being accessed directly by a program.
- Physical volumes (including HDLM Device) whose links are being accessed by a program.
- Physical volumes (including HDLM Device) that correspond to character devices that are being accessed by a program.

To avoid mistakenly specifying such physical volumes, the LDEVs corresponding to those volumes need to be excluded from the storage pool that the logged-in user can access.

To exclude LDEVs from a storage pool, use the resource group management functionality of Device Manager to make those LDEVs inaccessible to the resource group that corresponds to the storage pool. For details, see the *Hitachi HiCommand® Device Manager Web Client User's Guide*.

**Note:** The storage pool and amount of disk space are displayed in the window according to the following rules:

- For megabytes (MB), only integers are used and digits after the decimal point are truncated.
- For gigabytes (GB) or above, a number is truncated to two decimal places. The thousandth and the following digits are truncated.
- The usage ratio uses only integers (digits after the decimal point are truncated).

**Caution:** In the location where a volume group or logical group is created, do not create a folder or directory whose name starts with `pvmvg` or `pvm1v`.

**Caution:** When using Provisioning Manager to add or delete a device file, you cannot specify a logical volume that satisfies either of the following conditions:

- The volume group name includes any character other than the following:  
A-Z a-z 0-9 \_
- The logical volume name includes any character other than the following:  
A-Z a-z 0-9 \_

## 8.2 Viewing Device File Information

From the List Objects - Device Files subwindow, you can view device file information for each selected host.

**Important:** Note that device file information can be viewed only when the device file is made up only of volumes that the logged-in user can access.

To view information about device files:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. Choose **Device Files**.  
The method area displays the Device Files subwindow, and the information area displays the List Objects - Device Files subwindow (see Figure 8.1).
5. View information about the device files in the List Objects - Device Files subwindow.  
**General Information** displays the total size of the device files. **Object List** displays device file information for each device file path name.  
**Note:** When a device file path name is selected, the List Objects - Device Files subwindow switches to the Show Properties - *path-name* subwindow where the detailed information on the device file is displayed.

**Note:** The device file types (logical volumes, volume groups, HDLM devices, and raw devices) are displayed as follows:

- Logical volumes: **LogicalVolume**
- Volume groups: **VolumeGroup**
- HDLM devices: **RawDevice(HDLM)** or **RawDevice(HDLM, Partitioned)**
- Raw devices: **RawDevice** or **RawDevice(Partitioned)**

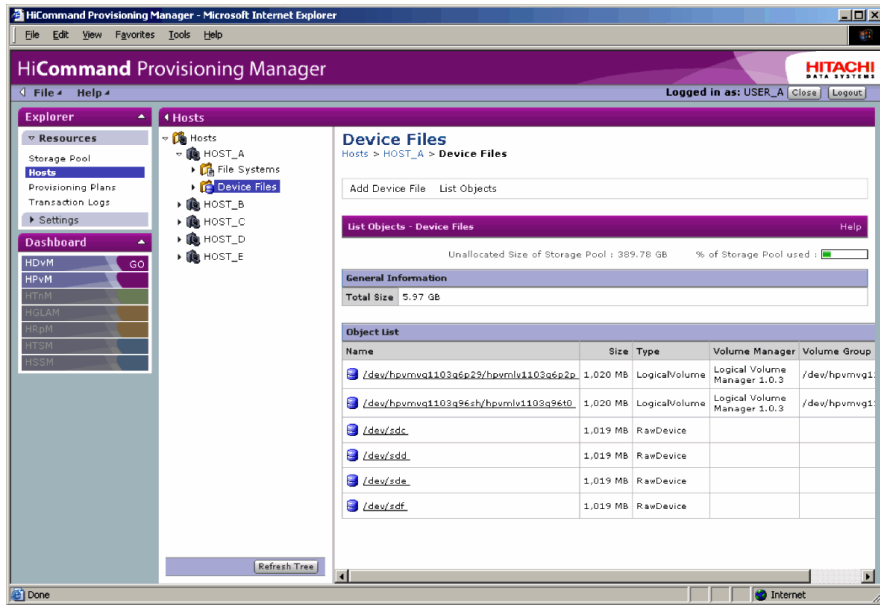


Figure 8.1 Device Files and List Objects - Device Files Subwindows

## 8.3 Adding a Device File

You can add a device file by performing three steps using the following Provisioning Manager dialog boxes.

- Add Device File - Step 1 of 3 (Select Volume) dialog box
- Add Device File - Step 2 of 3 (Specify Parameters) dialog box
- Add Device File - Step 3 of 3 (Summary of Changes) dialog box

You can specify the volume and volume manager to be associated with a device file. Based on your specification, Provisioning Manager uses the selected volume to add a device file.

**WARNING:** Make sure that you specify a unique port address for each port of storage devices in the same zone. If the same port addresses exist in the same zone, the OS cannot identify the ports and may not recognize the device files. In such a state, if you add a device file, add a file system, or expand a file system from Provisioning Manager, the device file cannot be recognized and an error occurs.

A device file cannot be added:

- If your access privilege is Guest or Local Guest
- If your host uses an unsupported volume manager.

The following volume managers are supported:

- Windows: Basic disk, Dynamic disk
- Solaris: VERITAS Volume Manager 3.5, VERITAS Volume Manager 4.0, or VERITAS Volume Manager 5.0
- AIX: Logical Volume Manager
- Linux: Logical Volume Manager
- HP-UX: Logical Volume Manager, VERITAS Volume Manager 3.5, or VERITAS Volume Manager 4.1

For details, see the *HiCommand Provisioning Manager Installation and Configuration Guide*.

To add a device file, perform the following steps:

1. Select Volume (see section 8.3.1). Select a volume from the candidates. All volumes that you can use are displayed. Select an appropriate volume.

**Caution:** A volume cannot be used to add a device file when any of the following conditions hold:

- The volume is being used by a volume manager
- The volume has already been mounted
- The volume is being used as a command device.
- The volume is being used as an S-VOL for TrueCopy.
- The volume is being used as an S-VOL or SP-VOL for ShadowImage.
- The volume is being used as a V-VOL or POOL for QuickShadow.

- The HIHSM attribute (Volume Migration, CruiseControl) has been set for the volume.
  - The volume is being used as a system volume for NAS.
  - The volume is being used as an on-demand device.
  - The Read/Write permissions have not been set in the Data Retention Utility (Open LDEV Guard) function.
  - The volume emulation type is none of the following: OPEN-3, OPEN-8, OPEN-9, OPEN-K, OPEN-E, OPEN-L, OPEN-M, OPEN-V
  - The volume size is less than 512 MB.
  - Dynamic Link Manager does not exist on the host, and multiple paths are assigned to the volume.
2. Specify Parameters (see section 8.3.2). Specify the volume manager. If necessary, specify the volume group name and logical volume name.
  3. Summary of Changes (see section 8.3.3). Confirm the settings.

To start the add device file process:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. Choose **Device Files**.  
The Device Files subwindow is displayed.
5. Select **Add Device File** from the Device File subwindow.  
The Add Device File - Step 1 of 3 dialog box is displayed.

The following sections show the Add Device File dialog boxes and describe the settings to be specified at each step.

**Important:** To verify that the correct content was included in each step, you can click the **Back** button to return to the previous step. However, if you return to the previous step and then go to the next step, the selected volume may change, as Provisioning Manager selects the appropriate volume.

### 8.3.1 Selecting a Volume

In this step, you can view and select the volume used to create a device file. Figure 8.2 shows the Add Device File dialog box for selecting the volume (step 1 of 3).

**Important:** The Add Device File - Step 1 of 3 dialog box is displayed only for volumes for which LUN security is set for the host. Volumes used by hosts for which security is switched off or storage subsystems that do not have the security facility are not displayed.

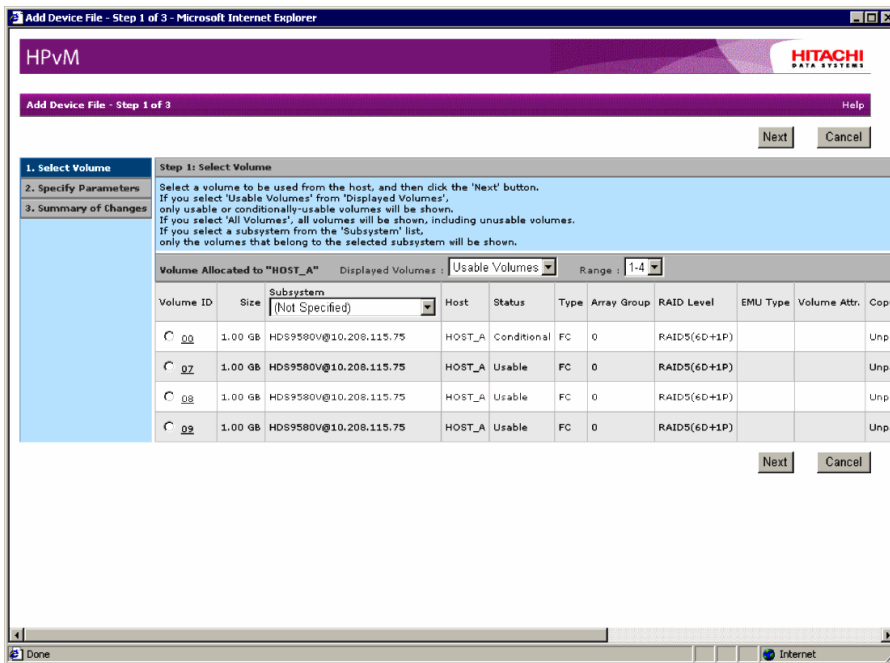


Figure 8.2 Add Device File - Step 1 of 3 (Select Volume)

To select the volume (step 1 of 3 in Add Device File):

1. Depending on the contents you want to display, set the following item on the Add Device File - Step 1 of 3 dialog box (refer to Figure 8.2):

**Displayed Volumes:** Select the volume display range.

- **Usable Volumes:** Of the volumes that the host can use with LUN security, a list is displayed of the usable volumes and volumes usable under certain conditions.
- **All volumes:** A list is displayed of all volumes that are set to use LUN security with that host.

A maximum of 10 volumes are displayed at a time. When there are 11 or more volumes to be displayed, the eleventh and subsequent volumes can be viewed by selecting another range in **RANGE**:

A maximum of 16,384 volumes can be displayed by switching pages.

2. Select the desired volume from the displayed volume list.

Select the radio button of the volume to be used to create the device file by **Volume ID**.

**Note:** From **Subsystem**, select the storage subsystem from a pull-down list to display a dialog box with only the volumes from the selected subsystem.

Click the **Show Data Path** button, to display a dialog box with the following path information: HBA WWN, storage subsystem port, and storage subsystem volume.

3. If you select a volume that is only usable under certain conditions, a dialog box is displayed that indicates the conditions and asks you to confirm the volume.

**Caution:** If you use a volume usable under certain conditions, some data may be lost or other hosts may lose the access privileges to the volume. Before using such a volume, read the warning message and make sure that there are no problems.

4. If there are no problems, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**Caution:** If you click the **OK** button without selecting the check box, an error occurs.

5. Click the **Next** button.

The Add Device File - Step 2 of 3 dialog box is displayed. The next section shows this dialog box and describes the settings to be specified at this step.

## 8.3.2 Setting Parameters

In this step, you set the parameters used in adding the device file. Figure 8.2 shows the Add Device File dialog box for selecting the volume (step 2 of 3).

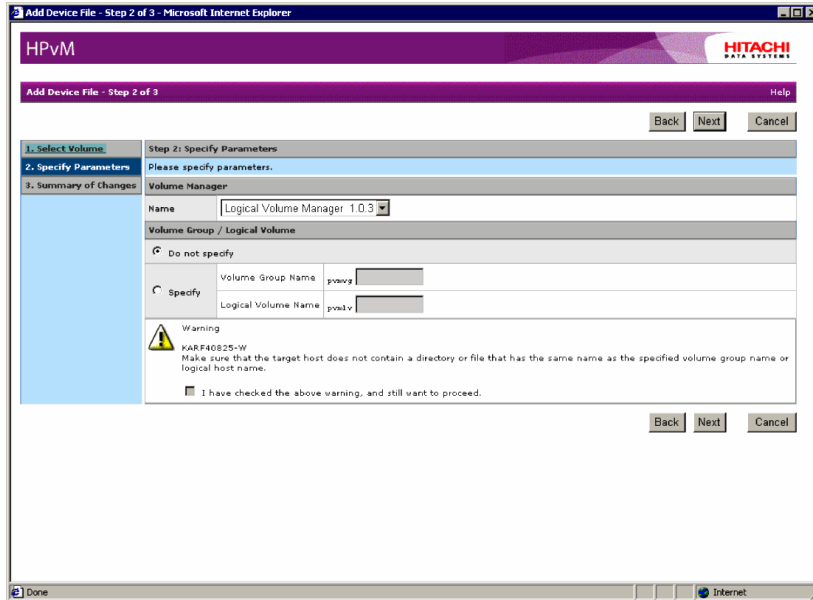


Figure 8.3 Add Device File - Step 2 of 3 (Specify Parameters)

To set the parameters (step 2 of 3 in Add Device File):

1. Set the **Volume Manager**.  
Select the volume manager from a pull-down list.
2. Select whether you want to specify the volume group name and logical volume name.

### Volume Group/Logical Volume

If you do not want to specify the volume group name and logical volume name, select **Do not specify** and then proceed to step 5.

If you do want to specify the volume group name and logical volume name, select **Specify** and then proceed to step 3.

**Caution:** If the host is Windows, or no Volume Manager has been specified, **Volume Group/Logical Volume** is disabled and cannot be selected. Proceed to step 5.

3. Specify the volume group name and logical volume name.

#### **Volume Group Name**

Specify the volume group name that follows `pvmvg`.

For details about the limits for the entered values, see Help for the window.

#### **Logical Volume Name**

Specify the logical volume name that follows `pvm1v`.

For details about the limits for the entered values, see Help for the window.

**Note:** You can omit specifying either of the names (either the volume group name or the logical volume name). If you omit either of these names, Provisioning Manager assigns a name.

**Caution:** If **Specify** is selected, the system displays a message asking whether the target host contains a directory or file with the same name as the specified volume group name and logical volume name. Before specifying these names, make sure that there is no conflict.

4. If there is no conflict, select the **I have checked the above warning, and still want to proceed** check box under the message.

**Caution:** Clicking the **Next** button without selecting this check box results in an error.

5. After completing the settings, click the **Next** button.

The Add Device File - Step 3 of 3 dialog box is displayed. The next section shows this dialog box and describes the settings to be specified at this step.

### 8.3.3 Confirming the Settings

In this step, you confirm the contents of your settings. Figure 8.3 shows the Add Device File dialog box for confirming the settings (step 3 of 3).

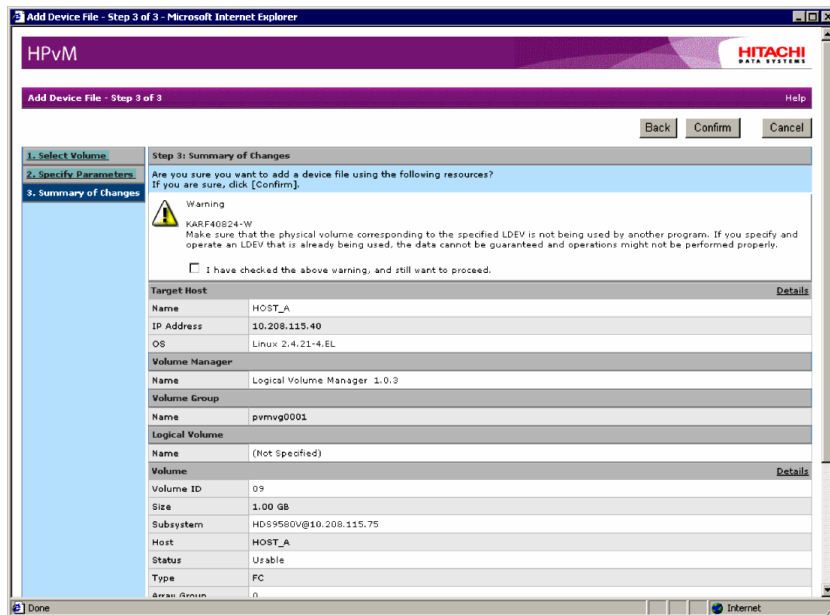


Figure 8.4 Add Device File - Step 3 of 3 (Summary of Changes)

The procedure for confirming the settings is described below. The device file might have to be recognized in the middle of operations. The procedure related to recognizing the device file differs depending on the system components. For details on the required operations, see section 11.2, and then see the manuals for the hardware and software that are being used (HBA, volume manager, operating system manual, etc.).

The following explains how to confirm the settings when the device file needs to be identified and when the device file does not need to be identified.

To confirm the settings when the device file does not need to be identified on the host side:

1. Check the contents of the Add Device File - Step 3 of 3 dialog box (refer to Figure 8.3).
2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:** Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.

Also, if you click the **Confirm** button without selecting the check box, an error occurs.

3. Click the **Confirm** button.

A message appears indicating that device file addition processing is underway.

**Important:** To check the execution status of the processing, check the transaction logs. For details about transaction logs, see Chapter 1 .

When the processing finishes, the Add Device File - Result dialog box appears, displaying the processing results.

4. In the Add Device File - Result dialog box, check the displayed information.
5. If there is no problem, click the **Close** button.

The window closes. The add device file process has been completed.

To confirm the settings when the device file needs to be identified on the host side:

1. Check the contents of the Add Device File - Step 3 of 3 dialog box (refer to Figure 8.3).
2. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:**

Make sure that the physical volume corresponding to the specified LDEV is not being used by another program. If you specify and operate an LDEV that is already being used, the data cannot be guaranteed and operations might not be performed properly.

Also, if you click the **Confirm** button without selecting the check box, an error occurs.

3. Click the **Confirm** button.

If a message appears during device file addition processing, the Add Device File - Suspended dialog box is displayed. A message appears indicating that the device file needs to be recognized.

4. Manually check the device files as described in the manuals for the hardware and software that are being used.
5. In the navigation area, expand the **Device Files** tree directly under **Hosts**, and make sure that the desired device file is displayed.

6. In the navigation area, expand the tree, and then choose **Transaction Logs**.

The information area displays the List Objects - Transaction Logs subwindow.

7. Check the contents of the operation where the **Resume** button is displayed in the **Action** field, and identify the desired operation.

The **Resume** button is displayed for the processing that was interrupted. Check the contents of the operation where the **Resume** button is displayed, and make sure that the operation is appropriate. For details on transaction logs, see section 10.2.

8. In the List Objects - Transaction Logs subwindow, click the **Resume** button.

The add device file process that was interrupted is restarted.

When the processing has been completed, the Add Device File - Result dialog box is displayed to show the result of the device file addition.

9. Check the contents of the Add Device File - Result dialog box.

10. In the Add Device File - Result dialog box, click the **Close** button.

The window closes. The add device file process has been completed.

**Important:** For details on the contents of the processing, see the transaction logs. For details on transaction logs, see section 10.2.

## 8.4 Viewing Information about Device File Paths

In the Show Properties - *path-name* subwindow, you can view file information and volume information about device files for each path name. You can also view device files without using Provisioning Manager.

To view the path of a device file:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. In the navigation area, select *path-name* under **Device Files**.  
In the method area, the *path-name* subwindow is displayed. In the information area, the Show Properties - *path-name* subwindow is displayed (see Figure 8.5).
5. In the Show Properties - *path-name* subwindow, you can view information about the path of a device file.
  - You can view device file information in **Device File**.
  - Information about all volumes allocated to a host is displayed in **Volume Information**.  
**Note:** When a link to **Volume ID** is selected from the **Volume Information** table, you can view the detailed information about the volume. The Device Manager's Detailed Information - *LDEV-number* dialog box is displayed. For details about the screen items, see Help for the window.

When you click the **Show Data Path** button in the **Volume Information** table, a dialog box is displayed to show the following path information: HBA WWN, storage subsystem port, and storage subsystem volume.

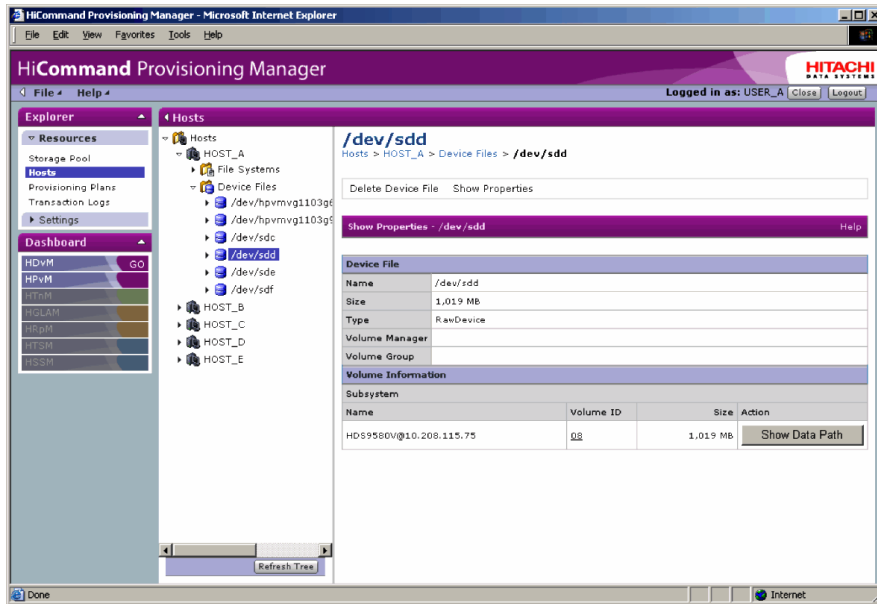


Figure 8.5 Path-name and Show Properties - path-name Subwindows

## 8.5 Deleting a Device File

The selected device file can be deleted using the Delete Device File - *path-name* dialog box. The operations listed here can only be used to delete a device file on the host. To release the volume allocation on a subsystem, release the volume from the List Allocated LDEVs - Storage Pool subwindow. For details on releasing a volume, see section 5.9.

To delete device files used as cluster resources in HP-UX, perform the operations described in section 4.6.3.2 and then delete the device files.

**Caution:** Users with an access privilege of Guest or Local Guest cannot delete device files.

The following shows the procedure to delete device files. The allocated volume might have to be released in the middle of operations. The procedure related to releasing the allocated volume differs depending on the system components. For details on releasing volume allocation, see section 11.2 first, and then see section 5.9 and the manuals for the hardware and software that are being used (HBA, volume manager, operating system manual, etc.).

The following explains how to delete a device file when the host side does not need to release an allocated volume and when the host side needs to release an allocated volume.

To delete a device file when the host side does not need to release an allocated volume:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select *path-name*, immediately below **Device Files**.  
In the method area, the *path-name* subwindow is displayed.
5. In the *path-name* dialog box, select **Delete Device File**.  
The Delete Device File - *path-name* subwindow is displayed (see Figure 8.6).
6. Check the settings of the Delete Device File - *path-name* dialog box.
7. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.  
**WARNING:** Make sure that the selected device file is the one that you intend to delete. Once deleted, if you re-create a device file by using the same volumes, you cannot recover data of the deleted device file.

Make sure that the information about the selected host is up to date. If the device file is manually operated from the host and the host information is not updated, an unintended device file might be deleted. If the host information is not up to date, cancel processing, update the host information, and then perform the operation from the start.

If **OK** is clicked without selecting a check box, an error occurs. Check the warning message and then select the check box.

8. Click the **OK** button.

A message is displayed indicating that device file deletion processing is underway.

**Important:** To check the execution status of the processing, check the transaction logs. For details on transaction logs, see section 10.2.

9. Check the settings of the Delete Device File - Result dialog box.

10. Click the **Close** button in the Delete Device File - Result dialog box.

The dialog box closes. The delete file system process has completed.

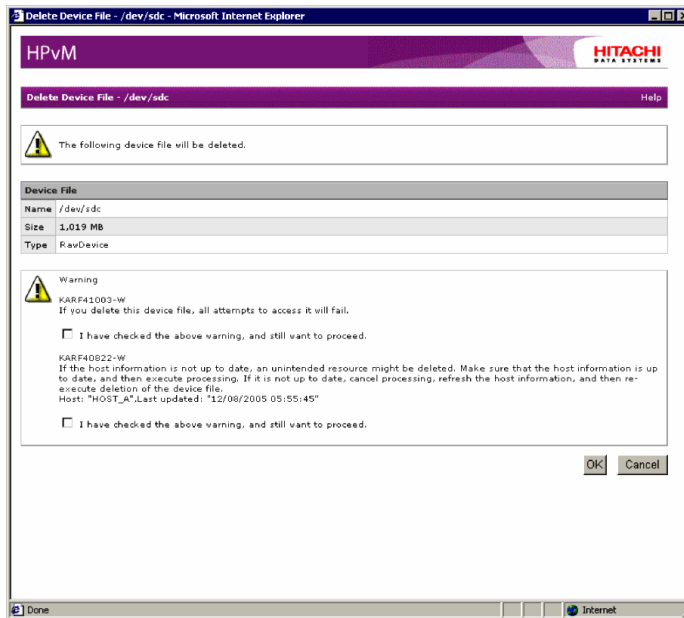


Figure 8.6 Delete Device File - *path-name* Dialog Box

To delete a device file when the host side needs to release an allocated volume:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select ***path-name***, immediately below **Device Files**.  
In the method area, the ***path-name*** subwindow is displayed. In the information area, the Show Properties - ***path-name*** dialog box is displayed.
5. From the ***path-name*** subwindow, select **Delete Device File**.  
The Delete Device File - ***path-name*** dialog box is displayed (refer to Figure 8.6).

6. From the Delete Device File - *path-name* dialog box, check the dialog box settings.
7. If there is no problem, select the **I have checked the above warning, and still want to proceed** check box located below the warning message.

**WARNING:** Make sure that the selected device file is the one that you intend to delete. Once deleted, if you re-create a device file by using the same volumes, you cannot recover data of the deleted device file.

If **OK** is clicked without selecting a check box, an error occurs. Check the warning message and then select the check box.
8. Click the **OK** button.

If a message is displayed during the delete device file process, the Delete Device File - Suspended dialog box is displayed. A message is displayed indicating that the allocated volume must be released on the host side.
9. Release the allocated volume from the List Allocated LDEVs - Storage Pool subwindow.
10. If necessary, manually make the system recognize that the volume allocation has been released, according to the manuals for the hardware and software that are being used.
11. In the navigation area, expand the **Device Files** tree directly under **Hosts**, and make sure that the desired device file is not displayed.
12. From the navigation area, expand tree, and select **Transaction Logs**.

In the information area, the List Objects - Transaction Logs subwindow is displayed.
13. Check the contents of the operation where the **Resume** button is displayed in the **Action** field, and identify the desired operation.

The **Resume** button is displayed for the process that was interrupted. Check the contents of the operation where the **Resume** button is displayed, and make sure that the operation is appropriate.
14. From the List Objects - Transaction Logs subwindow, click **Resume**.

The interrupted delete device file process is restarted.

When the process has been completed, the result of the delete device file process is displayed in the Delete Device File - Result dialog box.
15. Check the contents of the Delete Device File - Result dialog box.
16. From the Delete Device File - Result dialog box, click the **Close** button.

The dialog box closes. The delete device file process has been completed.

**Important:** For details on the contents of the processing, check the transaction logs. For details on transaction logs, see section 10.2.

## 8.6 Viewing the Data Path for Each Path Name

In the Show Data Path dialog box, you can view the following path (data path) information: HBA WWN, storage subsystem port, and storage subsystem volume.

To view the data path:

1. In the **Explorer** menu, choose **Resources**, and then **Hosts**.  
**Hosts** is displayed in the navigation area.
2. Expand the **Hosts** tree in the navigation area.  
A list is displayed of all hosts that are within the access scope of the user.
3. Expand the tree of the desired host.  
The navigation area displays **File Systems** and **Device Files**.
4. From the navigation area, select *path-name*, immediately below **Device Files**.  
In the method area, the *path-name* subwindow is displayed. In the information area, the Show Properties - *path-name* subwindow is displayed.
5. From the Show Properties - *path-name* subwindow, click the **Show Data Path** button in the **Volume Information** table.  
The Show Data Path dialog box is displayed.
6. In the Show Data Path dialog box, view the data path.

**Important:** The information displayed here is a combination of HBA and WWN on the selected host WWN, which is set as the selected host volume with LUN security set.

**Important:** For the following hosts, if there are redundant paths between a host port and a storage subsystem port, only the representative data path is displayed:

- The host OS is Windows, and Dynamic Link Manager is used.
- The host OS is Solaris, and Dynamic Link Manager is used.
- The host OS is AIX, and Dynamic Link Manager 5.7 is used.

The host OS is HP-UX 11i v3.

For details on Dynamic Link Manager, see the HiCommand Dynamic Link Manager *User's Guide*.

## Chapter 9 Managing Provisioning Plans

This chapter explains how to manage provisioning plans. For information on how to create a provisioning plan, see section 3.6.1.

- About Managing Provisioning Plans (section 9.1)
- Viewing an allocation plan (section 9.2)
- Setting an allocation plan to be public or private (section 9.3)
- Editing an allocation plan (section 9.4)

## 9.1 About Managing Provisioning Plans

You can define a provisioning plan as a way to locate volumes in a storage pool. A provisioning plan includes an allocation plan. By specifying an allocation plan when adding a file system or device file, you can narrow down the target volumes from a large number of volumes.

Provisioning Manager provides the following capabilities for managing provisioning plans:

- Viewing a provisioning plan
- Configuring the security level of a provisioning plan

You can set the security level of a provisioning plan to public or private. If you set the security level of a provisioning plan to public, all users can view the provisioning plan. If you set the security level of a provisioning plan to private, only those users who have the appropriate access permissions can view the plan. The permissions to use, add, delete, edit, and save (under a different name) the provisioning plan are also restricted by this security level.

- Adding a provisioning plan
- Deleting a provisioning plan
- Editing and saving a provisioning plan under a different name

You can edit an existing provisioning plan. You can then save the edited provisioning plan as a different provisioning plan with a new name.

**Important:** An allocation plan is owned by the resource group that creates it. If the resource group is deleted by Device Manager, the parent resource group of the deleted resource group inherits the plan. If the deleted resource group has no parent resource group, the allocation plan is inherited by the user who has the `Admin` permission in Device Manager and to whom `All Resources` has been allocated as a resource group.

Provisioning plans can be viewed in either of two ways:

- As a list of all plans. In list view, the plan name, the resource group that owns the plan, a description of the plan, and its security level as described below are displayed.
- As a detailed display of the items specified in a particular plan. In detailed view, all of the items defined for the selected plan are displayed.

As an access right, you can assign a public or private attribute to each plan. By changing this security level (by toggling the attribute), you can allow access to it from another resource group if needed, or you can make it private (disallow access from other resource groups). Any plan that a user creates is owned by the resource group to which that user belongs.

The following shows the meanings of public and private in terms of the security level and the resource groups that are allowed and not allowed access in each case:

### **Public**

- Public plans can be viewed and applied by all resource groups.
- These plans can be updated, deleted, and have their security level modified by the resource group to which the user who created the plan belongs and by all resource groups above that group. Users who have the `View` permission for these resource groups can only view and apply these plans.

### **Private**

- Private plans can be viewed, applied, updated, deleted, and have their security level modified by the resource group to which the user who created the plan belongs and by all resource groups above that group. Users who have the `View` permission for these resource groups can only view and apply these plans.
- These plans cannot be viewed or applied by any of the resource groups under the resource group to which the user who created the plan belongs or any of their sibling resource groups.

## 9.2 Viewing an Allocation Plan

In the Show Properties - *plan-name* subwindow, you can view an allocation plan.

To view an allocation plan:

1. In the **Explorer** menu, choose **Resources**, and then **Provisioning Plans**. **Provisioning Plans** is displayed in the navigation area.
2. From the navigation area, click **Provisioning Plans**.
3. Click **Allocation Plans**, located in the navigation area immediately below **Provisioning Plans**.

The method area displays the Allocation Plans subwindow. The information area displays the List Objects - Allocation Plans subwindow (see Figure 9.1).

4. In the List Objects - Allocation Plans subwindow, choose a plan name in the **Name** column. The method area displays the *plan-name* subwindow. The information area displays the Show Properties - *plan-name* subwindow (see Figure 9.2).

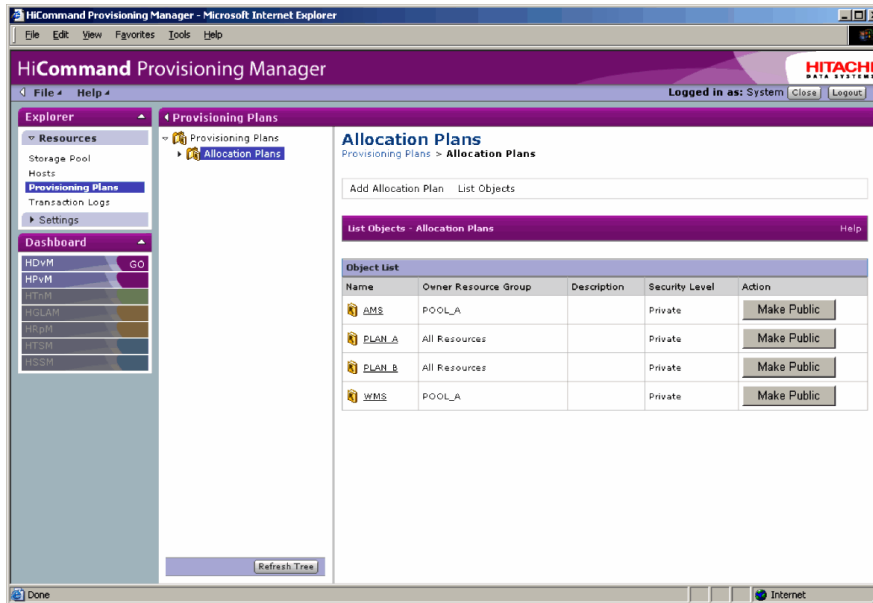


Figure 9.1 Allocation Plans and List Objects - Allocation Plans Subwindows

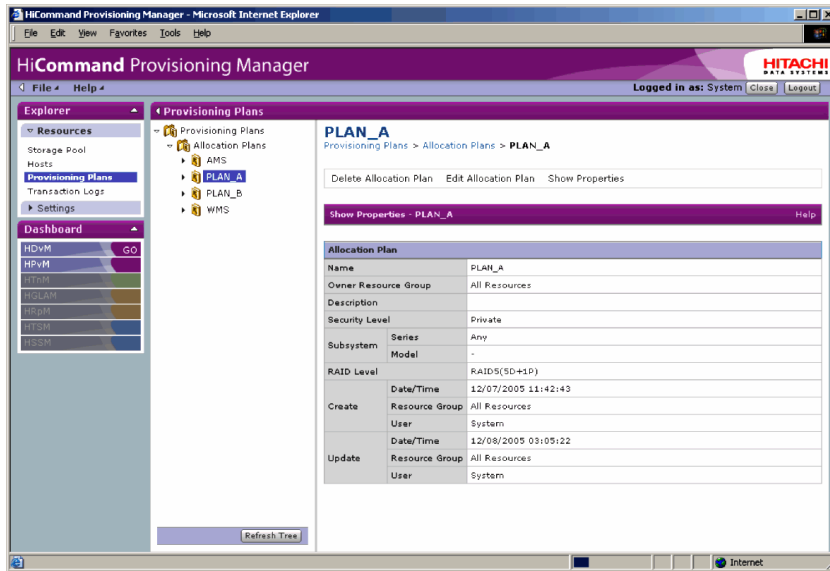


Figure 9.2 Plan-name and Show Properties - plan-name Subwindows

### 9.3 Changing Allocation Plan Security Levels

In the List Objects - Allocation Plans subwindow, you can change the security level for allocation plans. Two types of security levels are available:

- **Public:** An allocation plan that is available to all resource groups. All resource groups can view and use a public allocation plan, but only the resource group to which the user who created the allocation plan belongs and its higher-level resource groups can update or delete the allocation plan or change the security level.
- **Private:** An allocation plan that is available only to the resource group to which the user who created the allocation plan belongs and the higher-level resource groups. Only the resource group to which the user who created the allocation plan belongs and the higher-level resource groups can view, use, update, and delete such an allocation plan or change its security level.

**Caution:** A user who has the `Modify` permission and to whom a user-defined resource group has been allocated cannot modify the security level of the following allocation plans even if the security level of such an allocation plan is public:

- An allocation plan that is owned by a resource group positioned above the resource group to which the user belongs
- An allocation plan that is owned by a resource group positioned in a different hierarchy from the resource group to which the user belongs

To change the security level:

1. In the **Explorer** menu, choose **Resources**, and then **Provisioning Plans**.  
**Provisioning Plans** is displayed in the navigation area.
2. From the navigation area, click **Provisioning Plans**.
3. Click **Allocation Plans**, located in the navigation area immediately below **Provisioning Plans**.  
The method area displays the Allocation Plans subwindow. The information area displays the List Objects - Allocation Plans subwindow.
4. In the List Objects - Allocation Plans subwindow, click the **Make Public** or **Make Private** button for the desired allocation plan.  
A confirmation dialog box is displayed for confirming that the security level of the allocation plan is to be changed to public or private.
5. Click the **OK** button.  
The security level of the allocation plan is changed to public or private.

## 9.4 Editing an Allocation Plan

In the Edit Allocation Plan - *plan-name* dialog box, you can edit an allocation plan (For instructions how to create an allocation or provisioning plan, see section 3.6.1). You can also save an existing allocation plan under a different name. Both procedures are described below.

**Caution:** A user who has the `Modify` permission and to whom a user-defined resource group has been allocated cannot modify the security level of the following allocation plans even if the security level of such an allocation plan is public:

- An allocation plan that is owned by a resource group positioned above the resource group to which the login user belongs
- An allocation plan that is owned by a resource group positioned in a different hierarchy from the resource group to which the login user belongs

To edit an allocation plan:

1. In the **Explorer** menu, choose **Resources**, and then **Provisioning Plans**.

**Provisioning Plans** is displayed in the navigation area.

2. From the navigation area, click **Provisioning Plans**.

3. Click **Allocation Plans**, located in the navigation area immediately below **Provisioning Plans**.

The method area displays the Allocation Plans subwindow. The information area displays the List Objects - Allocation Plans subwindow.

4. In the List Objects - Allocation Plans subwindow, click *name*.

The method area displays the *plan-name* subwindow.

5. In the *plan-name* subwindow, click **Edit Allocation Plan**.

The Edit Allocation Plan - *plan-name* dialog box is displayed (see Figure 9.3).

**Figure 9.3** Edit Allocation Plan - *plan-name* Dialog Box

6. Edit settings for the allocation plan.

For details about the input restrictions, see Help for the window.

7. When you finish editing, click the **OK** button.

A confirmation dialog box is displayed for confirming that the allocation plan is to be edited.

8. Click the **OK** button.

The Edit Allocation Plan dialog box is displayed.

9. Click the **Close** button.

The dialog box closes. This action completes editing of the allocation plan.

To edit an existing allocation plan and save it under a different name:

1. Create an allocation plan by executing steps 1 through 5 for editing an allocation plan.
2. When you finish specifying all the settings you need for the new allocation plan, click the **Save As** button.

The Save As - *plan-name* dialog box is displayed (see Figure 9.4).

3. Enter a name for the new allocation plan.
4. Click the **OK** button.

The Edit Allocation Plan dialog box is displayed.

5. Click the **Close** button.

The window closes. This action completes saving the allocation plan under a different name.

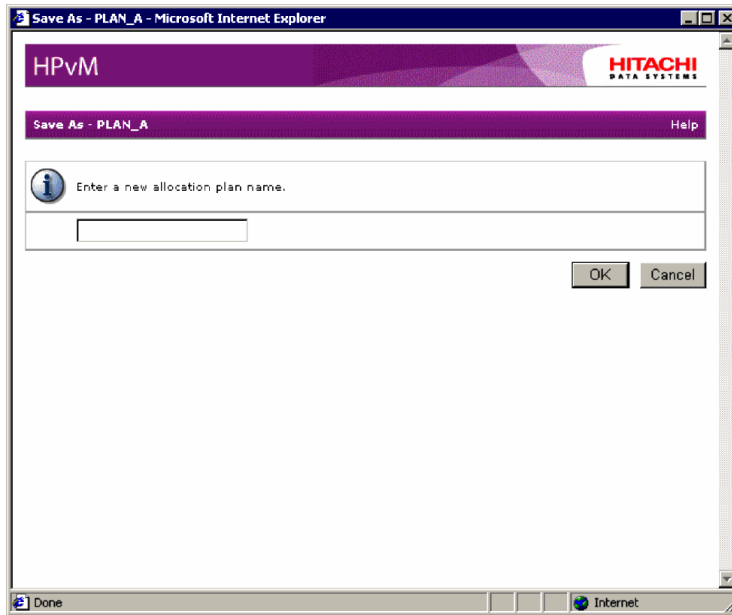


Figure 9.4 Save As - *plan-name* Dialog Box



## Chapter 10 Viewing Transaction Logs

This chapter describes how to view transaction logs for Provisioning Manager.

- General comments on viewing transaction logs (section 10.1)
- Viewing transaction logs (section 10.2)
- Resuming operation after processing is interrupted (section 10.3)

## 10.1 About Viewing Transaction Logs

HiCommand Provisioning Manager records the operations of users who logged in to Provisioning Manager. You can view the logs of operations performed with Provisioning Manager by you, by members of the same group as you, or by members of a lower-level group.

In addition to operations that have completed processing in Provisioning Manager, the Transaction Logs subwindow displays operations that are in progress, operations that have failed, and operations that have been interrupted.

You can check the progress of a series of processes by checking which of the processes is currently executing. If one of these processes fails or is interrupted, you can also check which process failed or was interrupted.

By checking the transaction log, you can check which part of the processing in a series is in progress. Also, if some of the processing has failed or has been interrupted, you can identify the failed part from the transaction log, enabling you to take appropriate action.

**Important:** If the processing in a series has failed, you need to perform one of the following:

- Manually continue the part of the procedure that is still to be done, after the processing failed, and complete the series of processes.
  - Manually cancel the part of the procedure that was done before the failed processing, to undo all processing.

**Important:** When you add, expand, or delete a file system, or add or delete a device file, Provisioning Manager processing may be interrupted if such an action is performed while Provisioning Manager is processing a series of operations.

If this occurs, you must manually set the host and restart, and then use the Transaction Log window to resume the operation that you were performing when processing was interrupted.

## 10.2 Viewing Transaction Logs

In the List Objects - Transaction Logs subwindow, you can view the transaction logs for Provisioning Manager.

To view the transaction logs:

1. In the **Explorer** menu, choose **Resources**, and then choose **Transaction Logs**. The method area displays the Transaction Logs subwindow. The information area displays the List Objects - Transaction Logs subwindow (see Figure 10.1).

**Note:** A page shows ten transaction logs in order of operation start dates: (newest first).

2. Set the search conditions.

You can specify the following items to search for the logs to be displayed on the List Objects - Transaction Logs subwindow:

- **Status:** Specifies the search status. You can select an operation that is in progress, that completed, that failed, or that was interrupted.
- **Date:** Use dates (*MM DD YYYY* format) to specify the search range.
- **Range:** Specify which users' operation you want to search.

To search the operations performed by you, select **Myself**.

To search the operations performed by the users belonging to the same resource group as you, select **MyGroup**.

To search the operations performed by the users belonging to the resource groups at the lower level than the resource group to which you belong, select **All**.

3. Click the **Search** button.

The search results are displayed under **Transaction Logs**.

4. Select the message link displayed in **Summary of Operation**.

The Details - Transaction Log dialog box is displayed (see Figure 10.2).

5. Check the contents of the operations.

For operations in progress, you can check how far the processing has completed. For failed or interrupted operations, you can check which process failed or was interrupted.

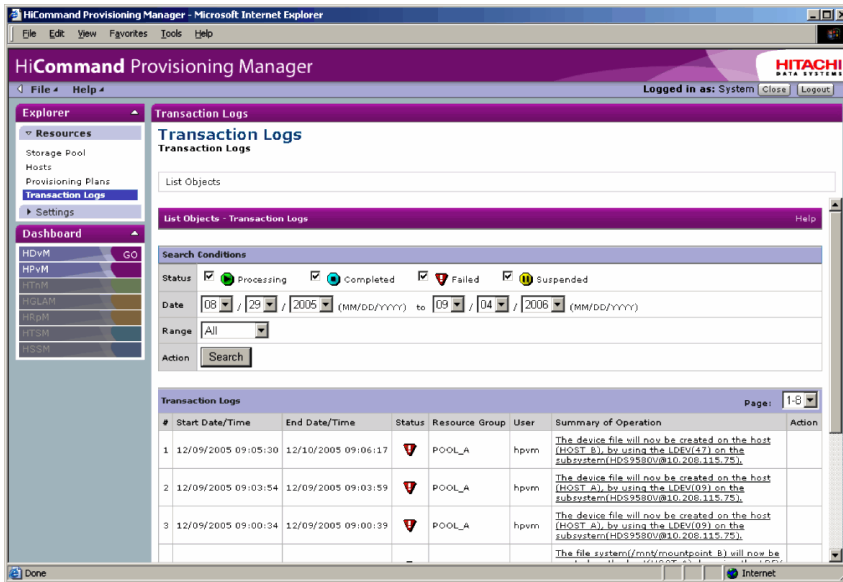


Figure 10.1 Transaction Logs Subwindow and List Objects - Transaction Logs Subwindow

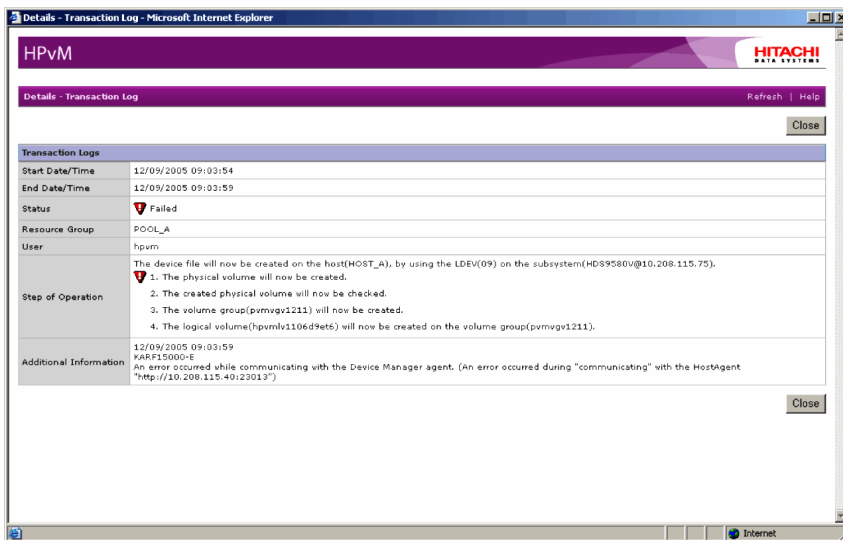


Figure 10.2 Details - Transaction Logs Dialog Box

### 10.3 Resuming Operation after Processing is Interrupted

When you add, expand, or delete a file system, or when you add or delete a device file, you may need to interrupt Processing Manager processing.

If the Processing Manager processing is interrupted, the identification operation of the device file is required. This operation varies depending on the system component. For details on the summary of the necessary operation, see section 11.2, and then see your hardware or software documentation (for example, HBA, volume manager, and OS manuals).

After the necessary operation is performed, check the transaction log in the List Objects - Transaction Logs subwindow. You can now resume the host.

However, if you restart Provisioning Manager while the processing is interrupted, all the interrupted operations will result in error and cannot be resumed.

To resume operations after processing is interrupted:

1. In the **Explorer** menu, choose **Resources**, and then choose **Transaction Logs**.  
The information area displays the List Objects - Transaction Logs subwindow.
2. Check the contents of the operation where the **Resume** button in **Action** is displayed in the **Summary of Operation** column.  
***Important:*** The **Resume** button is displayed for the operation for which processing was interrupted.
3. In the List Objects - Transaction Logs subwindow, click the **Resume** button.  
The interrupted processing resumes, and a window that indicates the progress is displayed.



# Chapter 11 Troubleshooting

This chapter describes how to handle problems that may occur while you are using Provisioning Manager.

- Troubleshooting procedures during host-setting operations (section 11.1)
- Function-specific troubleshooting steps (section 11.2)
- Troubleshooting method (section 11.3)
- Contacting the Hitachi Data Systems Support Center (section 11.4)

## 11.1 Troubleshooting Procedures During Host-setting Operations

If a problem occurs while you are creating a file system or performing some other host-setting operation, host-setting processing may stop abruptly. This section explains the troubleshooting procedures that can be applied when you are using GUI operations to perform host-setting operations.

- When host-setting fails (section 11.1.1)
- When host-setting is interrupted (section 11.1.2)

### 11.1.1 When Host-Setting Fails

If a failure occurs during host-setting, you must check the progress of the host-setting processing that was interrupted and determine the cause of the error. You must then manually perform a recovery operation. The following manual recovery operations are provided:

- Manually perform the processing that follows the failed processing (section 11.1.1.1).  
Manually execute the remaining steps in the failed operation. This method can be effective when most of the steps in a series of host-setting operations have been completed and only a few remain.
- Manually cancel the processing that preceded the failed processing (section 11.1.1.2).  
Manually cancel the processing that preceded the failed processing, and then re-execute all the steps from the start by using *Provisioning Manager*. This method is appropriate when only a few steps in a series of host-setting operations have been completed, so that only a few steps have to be canceled.

The troubleshooting procedure for each of these methods is explained below.

### 11.1.1.1 Recovering Manually from Failed Processing

To recover manually from failed processing:

1. In the **Explorer** menu, choose **Resources**, and then **Transaction Logs**.  
The information area displays the List Objects - Transaction Logs subwindow. View the list of operation logs, and then confirm that the host-setting operation status is Failed.
2. Select the **Summary of Operation** of the host-setting operation.  
The Details - Transaction Log dialog box is displayed.
3. View the detailed information in the operation log, and then check the item in which the failure occurred and also check the error message.
4. From the error message and the product status, check the error cause and the status of the setting item in which the failure occurred. Remove the error cause if necessary.
5. Manually complete any host-setting operation that was interrupted by the error.
6. In the Details - Transaction Log dialog box, check the items that have not been executed.
7. Manually perform setup of the target product.

### 11.1.1.2 Manual Cleanup after Failed Processing

If processing fails, manually cancel the operation that was interrupted by failure as follows:

1. In the **Explorer** menu, choose **Resources**, and then **Transaction Logs**.
2. From the navigation area, open the tree and select **Transaction Logs**.  
The information area displays the List Objects - Transaction Logs subwindow. View the list of operation logs, and then confirm that the host-setting operation status is Failed.
3. Select the **Summary of Operation** of the host-setting operation.  
The Details - Transaction Log dialog box is displayed.
4. View the detailed information in the operation log, and then check the item in which the failure occurred and also check the error message.
5. From the error message and the product status, check the error cause and the status of the setting item in which the failure occurred. Remove the error cause if necessary.
6. Manually cancel any host-setting operation that was interrupted by the error.
7. In the Details - Transaction Logs dialog box, check the items that have been executed.
8. Manually cancel host-setting processing of the target product. For canceling, reverse the operating procedure.
9. Use Provisioning Manager to perform the series of host-setting operations again from the start.

### 11.1.2 When Host-Setting is Interrupted

When a user adds, expands, or deletes a file system, or adds or deletes a device file, Provisioning Manager operations might be interrupted during a processing sequence. In this case, perform the necessary operation, and then use the operation log window to resume processing. The operation following the interruption differs depending on the system component.

For details on resuming processing, see section 10.3.

## 11.2 Function-Specific Summary of Troubleshooting Steps

The tables in this section list the troubleshooting information for each Provisioning Manager function:

- Window display (Table 11.1)
- Provisioning Manager functions (Table 11.2)
- Logging in (Table 11.3)
- Host information collection (Table 11.4)
- Host information display (Table 11.5)
- General host settings (Table 11.6)
- Host settings related to volume creation (Table 11.7)
- Host settings related to volume expansion (Table 11.8)
- Host settings related to volume deletion (Table 11.9)
- Storage pool information display (Table 11.10)
- Transaction log deletion (Table 11.11)
- Transaction log status (Table 11.12)

**Table 11.1 Troubleshooting Information: Window Display**

No.	Problem	Cause	Recommended Action
1	A Japanese message is displayed in the English language environment.	The Japanese locale is set for the management server.	Set English locale for the management server.
2	After a database has been restored, the windows in the navigation area do not match those in the information area.	Repository of the HiCommand Suite common component database is not synchronized with the repository of the Device Manager.	Change <code>server.base.initialsynchro</code> of the Device Manager server.properties to <code>true</code> and restart the server. Then reset the value to <code>false</code> .  For details, see the <i>HiCommand Device Manager Server Installation and Configuration Guide</i> .
3	During the daylight saving time, the operation start and end times displayed in the Transaction Logs information window do not reflect daylight saving time.	The start and end times maintained by transaction log management are the times that were set by the management server. The time setting in the client machine does not match that in the management server.	Match the time setting in the client machine to daylight saving time.

**Table 11.2 Troubleshooting Information: Provisioning Manager Functions**

No .	Problem	Cause	Recommended Action
1	Concurrent access as a shared volume group failed.	The provisioning support facility of the Device Manager agent supports the creation and activation (varyon) of an ordinary volume group.	Concurrent access using cluster management software may require the creation and activation of a special volume group in some cases.  See the manual for the cluster management software and determine whether the creation and activation of a special volume group are required, and convert or shift from an ordinary volume group if necessary.
2	A file that is 2 GB or larger cannot be created.	The current setting does not allow the use of 2 GB or larger files.	If Solaris or HP-UX VERITAS File System is being used, a setting for using files that are 2 GB or larger is required. Refer to the file system documentation and enable the use of large files by a method such as executing the <code>fsadm</code> command with the <code>-F vxfs -o largefiles</code> option specified.
3		The file size exceeds the resources allocated to the user.	Refer to a section in the OS documentation, such as the <code>ulimit</code> command reference, and check whether file sizes are limited by the allocated user resource limits.  To create a file that exceeds the allocated limit, increase the allocated limit.
4	Provisioning Manager cannot be started from other HiCommand products.	The URL for Provisioning Manager is not properly registered in HiCommand Suite Common Component.	Change the URL for Provisioning Manager by using the <code>hcmdschgurl</code> command of HiCommand Suite Common Component. For details on the <code>hcmdschgurl</code> command, see the <i>Hitachi HiCommand Device Manager Server Installation and Configuration Guide</i> .

**Table 11.3 Troubleshooting Information (Logging In)**

No .	Problem	Cause	Recommended Action
1	The following message is displayed in the GUI window: "A connection with the Provisioning Manager server could not be established"	Processing to start the Provisioning Manager server is being performed.	Wait a while, and then retry the operation.
2		An attempt to start the Provisioning Manager server failed because the Device Manager version does not match the prerequisite version for Provisioning Manager.	Install the Provisioning Manager that starts the installed Device Manager version.  For details about prerequisite program products, see the <i>HiCommand Provisioning Manager Installation and Configuration Guide</i>
3		The Provisioning Manager server is not running.	Starting the Device Manager server by using the <code>suitesrvctl</code> command will start the Provisioning Manager server. For details on this command, see the <i>HiCommand Device Manager Server Installation and Configuration Guide</i> .

**Table 11.4 Troubleshooting Information: Host Information Collection**

No .	Problem	Cause	Recommended Action
1	Host information cannot be collected.	Device Manager has not been started on the target host.	Use the <code>hbasrv</code> command to start the Device Manager agent on the target host. For details on this command, see the <i>HiCommand Device Manager Agent Installation Guide</i> .
2		Device Manager agent setting is invalid.	Check the setting by referring to the Device Manager manual.
3	The following message is displayed in the GUI window: "An error occurred during communication with the Device Manager agent. (Device-Manager-error-message)" or "An error was detected in communication processing with the Device Manager agent. (Device-Manager-error-message)"	An error may have occurred in the communication area of the Device Manager agent or Provisioning Manager server.	<ul style="list-style-type: none"> <li>▪ Installation may not have been terminated normally. If not, perform re-installation by following the procedure described in the installation manual.</li> <li>▪ Definitions related to communication may be invalid. Check the settings of the local port, server IP address, port, and password by referring to the Device Manager manual.</li> </ul>
4	When performing host refresh operations on the Windows host, the following message is displayed in the GUI window: "An attempt to get program product information on host "host-name" has failed. Error detail: "error-detail". Host Agent Error Message : "The number of beams of an item exceeds the maximum. Check the input item.""	To check whether the volume manager is installed, a user needs to edit the file managed by the Device Manager agent.  When the file is edited, the version information about VERITAS Volume Manager might be entered incorrectly.	Check the setting value for the <code>veritas.volume.manager.version</code> property (version information about VERITAS Volume Manager), and enter the correct value if necessary. For details on entering the correct value, see the <i>HiCommand Device Manager Agent Installation Guide</i> .

**Table 11.5 Troubleshooting Information: Host Information Display**

No .	Problem	Cause	Recommended Action
1	The host list is not displayed.	The Windows host does not contain the <code>diskpart.exe</code> command line utility.	Execute the <code>diskpart.exe</code> command line utility provided by Microsoft to expand a data volume. Install <code>diskpart.exe</code> in <code>Windows-system-installation-director\system32</code> .
2		If Dynamic Link Manager is being used, its revision or version is not supported by Provisioning Manager.	Change Dynamic Link Manager to the revision or version that is supported by Provisioning Manager.
3		VERITAS Volume Manager is installed on the Windows host.	If VERITAS Volume Manager is installed in Windows, the prerequisite software for the provisioning support facility provided by the Device Manager agent cannot be used, and consequently, the host setting function cannot be used. If the host setting function is to be used in Windows, do not install VERITAS Volume Manager.
4	After a path to a logical unit has been deleted by Device Manager, the file systems and device files corresponding to that path are still displayed in Provisioning Manager.	The host has not been updated since the path to the logical unit was deleted.	In the Host Name subwindow, update the host to bring the host information up to date. For details on the operation, see section 6.6.
5	Operations such as file system and device file creation that were terminated normally in Provisioning Manager are not reflected in the GUI window.	Mismatch may have occurred between the host information held by the server and the host status.	If mismatch has occurred, eliminate the information mismatch by updating the host from the Host Name subwindow. For details on the operation, see section 6.6. If the problem persists, specify the file properties again by referring to the <i>Provisioning Manager Server Installation and Configuration Guide</i> .
6		A file system or device file that was set up by unsupported software is present in the host.	Information related to a file system or device file that was set up by unsupported software may not be correctly displayed.
7		Software that is not supported by Provisioning Manager is used in the related product such as volume manager.	If software that is not supported by Provisioning Manager is used in the related product such as volume manager, an error might occur. Use only software that is supported by Provisioning Manager.

No .	Problem	Cause	Recommended Action
8	Information about a volume that constitutes a file system or device file is not displayed.	In an SDS/SVM environment, a transaction volume or soft partition is used.	If the target volume is a transaction volume's log device or soft partition and the disk is shared by multiple file systems or device files, the volume is treated as belonging to only one of them.
9		The volume group contains a disk that is not supported by Provisioning Manager.	None. Provisioning Manager does not display information about unsupported disks.
10		On a Linux AS/ES 3 host managed by Dynamic Link Manager, an md device constituting the file system or device file might include the following files: <ul style="list-style-type: none"> <li>▪ SCSI device</li> <li>▪ A device file that represents a partition of the HDLM device and SCSI device.</li> </ul>	If the target volume constitutes an md device as a non-HDLM device, information about the volume is not displayed.
11		On a Linux AS/ES 3 host that is not managed by Dynamic Link Manager, the physical volume constituting the file system or device might contain an md device.	If the target volume constitutes an md device that is not managed by Dynamic Link Manager, information about the volume is not displayed.
12	A file system or device file that exists on the host does not show up on the GUI.	In an SDS/SVM environment, a soft partition is used.	If all the volumes constituting a file system or device file are shared by another file system or device file and are not displayed on the GUI, the corresponding file system or device file itself is not displayed.
13		None of the disks constituting the volume group is supported by Provisioning Manager.	None. Provisioning Manager does not display file systems or device files that consist of unsupported disks.
14		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the md device constituting the file system or device file might include the following files: <ul style="list-style-type: none"> <li>▪ SCSI device</li> </ul> A device file that represents a partition of the HDLM device and SCSI device.	Provisioning Manager does not display this type of file system or device file.
15		On a Linux AS/ES 3 host that is not managed by Dynamic Link Manager, the file system or device file may consist of an md device.	Provisioning Manager does not display this type of file system or device file.
16	An error occurs when performing host refresh operations on a host.	The <code>hldutil</code> command executed during the host refresh operations timed out.	Change the <code>server.util.processTimeOut</code> value in the <code>installation-directory/agent/config/server.properties</code> file as required.

No .	Problem	Cause	Recommended Action
17	When a file system that was created in Solaris with VERITAS Volume Manager is viewed, some device names are not displayed in the device file list.	If a file system is created with VERITAS Volume Manager, the second slice of the disk is a raw device that constitutes a volume group and is thus not displayed.	No action is required.
18	The same error message occurs repeatedly even though the host information is updated using troubleshooting for the error message displayed in the host subwindow.	There might be inconsistency between the host information retained by Provisioning Manager server and the actual host status.	From the <i>host-name</i> subwindow, click the <b>Refresh</b> link to update the host information to the latest.
19	An incorrect number of paths is displayed in the Show Data Path dialog box.	This volume is not managed by Dynamic Link Manager.	Check the Dynamic Link Manager manual to determine whether the volume has been removed from the management scope due to the use of a path manager other than Dynamic Link Manager. If possible, place the volume under the management of Dynamic Link Manager.
20	Dynamic Link Manager and VERITAS Volume Manager are not displayed in the Show Properties - <i>host-name</i> subwindow, even though they have been installed.	The Device Manager agent might not recognize that Dynamic Link Manager and VERITAS Volume Manager have been installed.	Use the <code>hbaseriv</code> command to restart the Device Manager agent. For details on this command, see the <i>HiCommand Device Manager Agent Installation Guide</i> .

No .	Problem	Cause	Recommended Action
21	After the host name of the host machine is changed, both the host name that existed from before the change and the one created after the change are displayed in the host management window.	The host name of the host machine and the host management information of Device Manager do not match.	<p>Carry out the following operations:</p> <ol style="list-style-type: none"> <li>1. In the host management window of Device Manager, of the host information that existed from before the change and the host information created after the change, delete the information for which a value is not entered in World Wide Names. For details on how to perform operations on the host management window of Device Manager, see the <i>HiCommand Device Manager Web Client User's Guide</i>.</li> </ol> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>- If the host information for which a value is entered in World Wide Names is deleted, LUN security set in the volume is cancelled. Do not delete the host information for which a value is entered.</li> <li>- When a value is not entered in World Wide Names in either set of host information, delete the host information that existed before the change.</li> </ul> <ol style="list-style-type: none"> <li>2. In the host management window of Device Manager, change, to the desired host name, the name of the host for which a value is entered in World Wide Names.</li> <li>3. Match the host name of the host machine with the host name changed in step 2.</li> <li>4. Restart the Device Manager agent.</li> <li>5. In the host management window, make sure that only the correct host name is displayed.</li> </ol>
22	Even if the HiScan command is executed, the host information is not updated.	<p>One of the following processes was performed before the HiScan command was executed and is not finished:</p> <ul style="list-style-type: none"> <li>▪ An update of the host information</li> <li>▪ Processing for the HiScan command where the command was executed by another user</li> </ul>	<p>If the HiScan command was executed with the <code>-t</code> option specified, check the output log file.</p> <p>Wait a while, and then re-execute the HiScan command with the <code>-t</code> option specified.</p> <p>Then, check the log file. For details on how to check log files, see "Important" in 6.6</p> <p>If the update of the information has not finished, wait a while, and then repeat the above operations.</p>

No .	Problem	Cause	Recommended Action
23	On a Linux host, the device file name of the volume on which the partition has been created is not displayed in the device file list.	On a Linux host, if the partition has been created on a LU, only the device file representing the partition is displayed. The device file representing the entire LU is not displayed in the device file list.	Provisioning Manager does not display this type of device file.
24	The name of a volume group, logical volume, or mount point displayed in the GUI is different from the actual name.	The name of a volume group, logical volume, or mount point exceeds the maximum number of characters that can be displayed in Provisioning Manager.	If the maximum number of characters that can be displayed in Provisioning Manager is exceeded, displayed character strings are changed. You cannot operate a file system and device file that are made up of the volume group, logical volume, and mount point by using a name exceeding the maximum number of characters that can be displayed.

**Table 11.6 Troubleshooting Information: General Host Settings**

No.	Problem	Cause	Recommended Action
1	The following message is displayed in the GUI window: "An error was detected in communication processing with the Device Manager agent. (Device-Manager-error-message)"	An error may have occurred in the provisioning support facility provided by the Device Manager agent.	If you cannot identify the cause of the error from the error message, analyze the part of the agent log that is related to Provisioning Manager. For details, see section 11.3.
2		An error may have occurred with the command.	<p>View the Device Manager agent error log (<code>error.log</code>) to check whether message KARF70031-E was output immediately before the message <code>Command execution error</code>. The message for the command which caused the error is output to KARF70031-E.</p> <ul style="list-style-type: none"> <li>▪ If you can determine the cause of the error from the message contents, remove the cause and then re-execute the command.</li> <li>▪ If you cannot determine the cause of the error from the message contents, use the error information batch collection tool (TIC: Trouble Information Collector) of the Device Manager agent to collect the error information, and then contact maintenance personnel. For details on TIC, see section 11.3.2.</li> </ul>
3		A timeout might have occurred for the Device Manager agent because a command such as an OS command took a long time to execute.	<p>View the Device Manager agent error log (<code>error.log</code>) to check whether a command execution error has occurred. Also, view the information output in the log to check whether a timeout (Java <code>IllegalStateException</code>) has occurred.</p> <ul style="list-style-type: none"> <li>▪ If a device configuration command, such as the AIX command <code>cfgmgr</code>, the Solaris command <code>cfgadm</code>, or the HP-UX command <code>ioscan</code>, that usually takes only a few seconds to complete takes a long time, there might be a problem in the settings for host, OS, or HBA. Alternatively, many invalid device files might exist due to a reason such as many paths have been disconnected. View the OS log or OS documentation to remove the cause, and then try again.</li> </ul>

No .	Problem	Cause	Recommended Action
	<p>The message "An error occurred in the Device Manager agent. (<i>Device-Manager-Agent-error-message</i>)." or "An error was detected in communication processing with the Device Manager agent. (<i>error-message</i>)" is displayed in the GUI window.</p>	<p>A timeout might have occurred for the Device Manager agent due to a command such as an OS command taking a long time to execute.</p>	<ul style="list-style-type: none"> <li>▪ If a timeout occurs when a command is executed, re-set the timeout value. Use the <code>time</code> command to calculate how long the command execution took, and then set the timeout value so that it is about twice the calculated time, for the property related to the HTTP communication function of the Device Manager agent (<code>server.agent.fs.moduleTimeout</code>, <code>server.agent.vm.moduleTimeout</code>, or <code>server.agent.os.moduleTimeout</code>). For details on the property, see the <i>HiCommand Provisioning Manager Installation and Configuration Guide</i>.</li> <li>▪ If a timeout occurs because the <code>hldutil</code> command took a long time to execute, re-set the value for the property of the Device Manager agent (<code>server.util.processTimeout</code>). For details on the property, see the <i>HiCommand Device Manager Agent Installation Guide</i>.</li> <li>▪ The system workload on the host may have increased because multiple processes or applications were executed. Stop any unnecessary processes and applications, and then re-execute.</li> <li>▪ On a Linux host, if the size of the volume to be specified for the file system creation and expansion is more than 1.2 TB, a file system operation command might time out. Therefore, set a value larger than the default value for the <code>server.agent.fs.moduleTimeout</code> property in advance by referring to the manual <i>HiCommand Provisioning Manager Installation and Configuration Guide</i>. For the timeout value, consider the value calculated by the following formula:  <math display="block">\text{the-specified-volume-size (in-TB)} \times 1,000.</math> </li> </ul>

No .	Problem	Cause	Recommended Action
			<ul style="list-style-type: none"> <li>▪ A configuration of a larger-scale than Provisioning Manager performance may have been set up. A timeout is more likely to occur when the above causes occur concurrently. See <i>HiCommand Provisioning Manager Installation and Configuration Guide</i>, set the timeout value to a larger value than the initial value, and re-execute.</li> </ul>
4	The setup confirmation window shows an error for a setup operation, and setup cannot be executed.	The volume specified in the confirmation window was being used by another user before the setup operation started.	Select a different volume in the setup window.
5	An error occurs during the addition, deletion, or expansion of a file system or device file.	Software that is not supported by Provisioning Manager is used in the related product such as volume manager.	If software that is not supported by Provisioning Manager is used in the related product such as volume manager, an error might occur. Use only software that is supported by Provisioning Manager.
6		A version that is not supported by Provisioning Manager is used in the related product such as volume manager.	If the version that is not supported by Provisioning Manager is used in the related product such as volume manager, an error might occur. Use only a version that is supported by Provisioning Manager.
7		A language that is not supported by Provisioning Manager on the Windows platform might have been set.	Check whether the language setting of the host OS has been changed. Also, refer to the <i>HiCommand Provisioning Manager Server Installation and Configuration Guide</i> to check whether Provisioning Manager supports this host OS version.
8		When the file system or device file was copied on the AIX host using ShadowImage, TrueCopy, or the <code>dd</code> command, the volume may have been recognized incorrectly due to multiple identical PVID physical volumes existing on a single host.	Use an OS command such as the <code>lspv</code> command to check whether the same PVID physical volume as the physical volume comprising the target file system or device file exists. If the same PVID physical volume exists, change the PVID by using a command such as the <code>recreatevg</code> command, and then re-execute. For details on necessary operations, see the storage subsystem manual or OS documentation, or manually operate the target file system or device file.

No .	Problem	Cause	Recommended Action
9		On a Solaris platform, a volume that is not supported by Provisioning Manager may be being used.	Make sure that none of the following types of volumes are used: <ul style="list-style-type: none"> <li>▪ Volumes using EFI disk labels supported by Solaris 9 4/03 or later</li> <li>▪ Volumes with no slice 2 that represents the entire disk</li> </ul>
10		On a Windows host, if the error message Digital signature not found is displayed, the driver file may have been damaged.	Use the Windows Recovery Console to replace the damaged driver file. For details about the procedure, see the Microsoft support documentation.  Use the OS Disk Management window to delete the invalid partition or volume that was created when the error occurred, and then update the host information from the GUI window of Provisioning Manager.
11	It takes a period of time from a few minutes to 10 minutes or more to create or expand a small file system or a small device file.	If the host OS is Windows, the <code>diskpart</code> command script is executed several times, possibly 10 times or more.  Each time this script is executed, it takes 10 seconds or more. Therefore, this process takes from a few minutes to 10 minutes or more.	You do not need to take any action.
12	When a file system or a device file is created or expanded, the following error message is displayed:  "The host information is inconsistent with that of the Device Manager agent."  Even if you carry out the appropriate actions for the error message and update the host information, this same error message is displayed.	On an AIX host, Dynamic Link Manager might not have correctly recognized an LDEV because the suspended deletion operation has not finished.	Check the disk name of the LDEV in which the error occurred, by executing the Device Manager agent's <code>hldutil</code> command or the Dynamic Link Manager's <code>dlmkmgr</code> command. For details on the <code>hldutil</code> command, see the <i>HiCommand Device Manager Agent Installation Guide</i> .  Compare the disk names: if the disk names are different, perform the following procedure: <ol style="list-style-type: none"> <li>1. Delete the path that has been assigned to the LDEV in question.</li> <li>2. Execute the <code>rmdev</code> command to delete the Dynamic Link Manager driver, and the disk that corresponds to the LDEV in question, from among the Dynamic Link Manager drivers and disks that Dynamic Link Manager recognizes.</li> <li>3. Execute the <code>cfgmgr</code> command to configure the disk and Dynamic Link Manager driver.</li> <li>4. Update the host information.</li> </ol>

No .	Problem	Cause	Recommended Action
13	<p>If you create or expand a file system or device file, the following message is displayed: "The specified physical volume is already in use."</p> <p>Even if you update the host information in accordance with the correct action for this error message and then retry the operation, the same error message is displayed again.</p>	The specified volume might constitute an inactivated volume group.	Make sure that no volume that constitutes an inactivated group is used for the configuration.
14	<p>On a Linux AS/ES 3 host managed by Dynamic Link Manager, an error occurs during addition or expansion of a file system or device file.</p>	The maximum number of md devices may have exceeded the system limit.	Due to OS specifications, the maximum number of md devices that can be created is 256. Check and, if necessary, revise the system environment, delete unneeded md devices, then re-execute again.
15		The volume to be used for addition or expansion may have been registered in the /etc/raidtab file.	<p>This type of volume cannot be used to add or expand file systems or device files.</p> <p>Specify a volume that corresponds to a raw device not used as an md device, and then try again.</p>
16		The file system or device file to be added or expanded is used by an md device when the partition label of the volume to be used is changed.	<p>When an entire volume or a volume on which partitions constitute md devices is used, neither addition nor expansion can be executed.</p> <p>Specify a volume that corresponds to a raw device not used as an md device, and then try again.</p>
17	<p>On an HP-UX host, the following message may be displayed: The cluster configuration of the host is invalid.</p>	There is an inconsistency between the cluster configuration of the host and the cluster configuration file.	See the Serviceguard documentation, and check the cluster configuration file contents. If necessary, check the status of the cluster system, remove the inconsistency between the cluster configuration of the host and the cluster configuration file, and then re-execute the setup operation.
18		A volume group containing invalid HDLM device files exists on the HP-UX host managed by Dynamic Link Manager.	See the Dynamic Link Manager manual to execute the utility <code>/opt/DynamicLinkManager/bin/dlmdefpath -a</code> , which sets Dynamic Link Manager path information, and then re-execute the setup operation.

No .	Problem	Cause	Recommended Action
19	The host setting function cannot be executed.	<p>The following conditions might exist on the HP-UX host:</p> <ul style="list-style-type: none"> <li>▪ A Device Manager agent version 04-30-01 is installed.</li> <li>▪ One of the following OSs is installed: <ul style="list-style-type: none"> <li>- HP-UX 11i v2 Enterprise OE (HPUX11i-OE-ENT)</li> <li>- HP-UX 11i v2 Mission Critical OE(HPUX11i-OE-MC)</li> <li>- An OS that Provisioning Manager does not support.</li> </ul> </li> </ul>	<p>If one of the conditions exist on the HP-UX host, perform one of the following:</p> <ul style="list-style-type: none"> <li>▪ Upgrade the Device Manager agent (version 04-30-02 or later).</li> <li>▪ Install the following OS (released: September/2004 or later): <ul style="list-style-type: none"> <li>- HP-UX 11i v2 Foundation OE (HPUX11i-OE)</li> </ul> </li> </ul>
20	A Java Script error occurs in a GUI window on a Web browser without performing any operation.	The environment of the server machine might not be fully operational (for example, memory is insufficient).	See the <i>HiCommand Provisioning Manager Installation and Configuration Guide</i> , and then check the environment of the server machine.
21	<p>A GUI window on a browser of a client machine displays one of the following conditions, or the management information is not displayed, or both:</p> <ul style="list-style-type: none"> <li>▪ The GUI window becomes white.</li> <li>▪ Although the GUI window does not become white, the management information is not displayed correctly.</li> </ul>	The environment of the server machine might not be fully operational (for example, memory is insufficient).	<p>Press the <b>F5</b> key to refresh the information displayed on the browser.</p> <p>If the management information is not displayed even after refreshing the browser, display the User Login dialog box, and then log in again.</p> <p>If this problem occurs again even after refreshing the browser, the environment of the server machine might not be fully operational (for example, memory is insufficient). In such a case, see the <i>HiCommand Provisioning Manager Installation and Configuration Guide</i>, and then check the environment of the server machine.</p>

**Table 11.7 Troubleshooting Information: Host Settings Related to Volume Creation**

No.	Problem	Cause	Recommended Action
1	When Device Manager is used to delete a path to a logical unit, and a file system or device file is added under the same condition from Provisioning Manager, an error occurs.	After the path to the logical unit was deleted, the host was not updated.	In the Host Name subwindow, update the host to bring the host information up to date. For details, see section 6.6.
2	The size of a file system or device file added using the host setup facility is displayed as smaller than the logical unit size.	<p>In the following cases, the OS specification requires that the size of the file system or device file created be smaller than the logical unit size:</p> <ul style="list-style-type: none"> <li>▪ A Windows basic disk partition is created in a small 1 MB size for conversion into a Windows dynamic disk.</li> <li>▪ A Windows dynamic disk volume is created in a small 1 MB size for the management area.</li> <li>▪ An AIX Logical Volume Manager volume is created in a size that is one physical sector smaller for the JFS log.</li> <li>▪ The maximum size of AIX Logical Volume Manager is 127 GB because the number of physical sectors inside a single disk (LU) is limited to 1,016.</li> <li>▪ An HP-UX Logical Volume Manager volume is created in a reserved area (PVRA or VGRA) that is about one percent smaller (normally one physical sector smaller) than the physical volume.</li> </ul>	No action is required.
3	When you create a file system on a Windows host, the following message is displayed: "The disk in drive X is not formatted. Do you want to format it now?"	Sometimes this message is displayed if automatic mount processing executes when Windows creates a logical volume.	A file system has been created normally. Select <b>No</b> in the message dialog box.
4	When you create a file system for a basic disk partition on a Windows host in a Dynamic Link Manager environment, an error occurs when the <code>diskpart</code> command is executed by the Device Manager agent.	The basic disk partition status is not Healthy.	Restart the OS so that the basic disk partition status becomes Healthy.

No .	Problem	Cause	Recommended Action
5	An error occurs during file system or device file creation.	The permitted maximum size of the file system or device file was exceeded.	<p>See the OS or file system manual and check the permitted maximum file system size. If the maximum value is exceeded, the file system cannot be created.</p> <p>When Provisioning Manager is used, the maximum value is as follows:</p> <ul style="list-style-type: none"> <li>▪ If the host OS is AIX and uses Journaled File System: 128 GB</li> <li>▪ If the host OS is Linux and ext2 or ext3 is being used: 1 TB</li> </ul> <p>If an EFI disk label supported by Solaris 9 4/03 or later is used, it is possible to create a file system whose size exceeds 1 TB; however, Provisioning Manager does not support such file systems.</p>
6		The Device Manager agent might not have recognized that Dynamic Link Manager has been installed, or the volume is not managed by Dynamic Link Manager.	<p>Make sure that the information for Dynamic Link Manager is displayed in the Show Properties - <i>host-name</i> subwindow.</p> <ul style="list-style-type: none"> <li>▪ If the information is not displayed, restart the Device Manager agent by using the <code>hbasrv</code> command. For details on this command, see the <i>HiCommand Device Manager Agent Installation Guide</i>.</li> <li>▪ If the information is displayed, refer to the manual for Dynamic Link Manager and check whether the volume has been removed from the scope of Dynamic Link Manager management. If possible, place the volume under Dynamic Link Manager management.</li> </ul>

No .	Problem	Cause	Recommended Action
7	An error occurs during file system or device file creation.	The specified LU might be being used by another volume group (including a disabled one).	The host information might not be up to date. Update the host information, specify an LU that is not being used by any other volume groups, and then re-execute the addition operation.
8		On an HP-UX host, the minor number of the volume group for Logical Volume Manager exceeds the value for the maxvgs kernel parameter.	Change the value of <code>maxvgs</code> to be more than the current value. The maximum specifiable value is 256.  If the maximum value (256) has already been specified, delete any unnecessary volume groups (including group files), and then re-execute the addition operation.
9		The number of volume groups that can be created on a system was exceeded.	See the documentation for the OS and Volume Manager and check the number of volume groups that can be created in the system. If the created number has reached the maximum, no more volume groups can be created. Delete any unnecessary volume groups (including group files in HP-UX), and then re-execute the addition operation.
10		If the file system or device file was created, the following volume group name or logical volume name may have been specified: <ul style="list-style-type: none"> <li>▪ Name of an existing volume group, logical volume, file, or directory at the host</li> <li>▪ Name containing a reserved word of the host OS or installed software</li> </ul>	If it was the volume group creation that caused the error, specify another name and then re-execute the creation processing.  If logical volume creation resulted in the error, delete the volume group manually, specify another name, and then re-execute the creation processing.
11	When Provisioning Manager version 4.2 or earlier is installed on a Linux host managed by Dynamic Link Manager, the <code>dlnmcfmgr</code> command results resulted in an error during addition of a file system or device file.	The target LU for the Dynamic Link Manager may not exist.	Execute the following command or restart the system so that the LU being added to the host is recognized as the target LU for Dynamic Link Manager:  <pre>echo "scsi add-single-device a b c d" &gt; /proc/scsi/scsi</pre> <p>a: Host ID (host port number) b: Channel number (bus number) c: Target ID d: LUN (host LU number)</p> Or, see the Dynamic Link Manager manual, eliminate the cause of the error, then re-execute the addition processing.

No .	Problem	Cause	Recommended Action
12	A file system or device file cannot be created.	The host's system time was reset before the file system or device file could be created by Provisioning Manager.	Uninstall the Device Manager agent while the host is reset to the current system time, and then install the Device Manager agent. Then, re-execute the creation deletion process. For details on how to uninstall and install the Device Manager agent, see the <i>HiCommand Device Manager Agent Installation Guide</i> .

**Table 11.8 Troubleshooting Information: Host Settings Related to Volume Expansion**

No.	Problem	Cause	Recommended Action
1	Cannot shift to the expansion operation dialog box.	The file system is in a volume group that uses a volume manager not supported by Provisioning Manager or a volume manager that cannot be expanded.	Display the file system information to check the volume manager. The following types of volume managers can be expanded: <ul style="list-style-type: none"> <li>▪ Windows: Dynamic disk</li> <li>▪ Solaris: VERITAS Volume Manager</li> <li>▪ Linux: Logical Volume Manager</li> <li>▪ AIX: Logical Volume Manager</li> <li>▪ HP-UX: Logical Volume Manager</li> </ul>
2		The file system is not an expandable file system supported by Provisioning Manager.	Display the file system information to check the file system type. The following types of file systems can be expanded: <ul style="list-style-type: none"> <li>▪ Windows: NTFS</li> <li>▪ Solaris: VERITAS File System</li> <li>▪ AIX: JFS</li> <li>▪ Linux: ext2, ext3</li> <li>▪ HP-UX: VERITAS File System</li> </ul>
3		The file system was created on a Windows host in a logical volume other than a simple volume or span volume.	Provisioning Manager cannot expand logical volumes such as stripe volumes or RAID5 volumes.
4		Volume group contains a disk not supported by Provisioning Manager.	Provisioning Manager cannot expand file systems or device files containing a disk not supported by Provisioning Manager.
5		The host OS is Linux and the specified file system is a snapshot.	Provisioning Manager cannot be used to expand the file system.
6		The host OS is Linux or HP-UX, and the specified file system does not use the volume manager.	Provisioning Manager cannot be used to expand the file system.
7		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the file system may contain a device file that is not for an md device.	Provisioning Manager cannot expand a file system that contains a device file for a non-md device.
8		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the file system may contain an md device that consists of multiple HDLM devices.	Provisioning Manager cannot expand a file system that contains an md device consisting of multiple HDLM devices.
9		On a Linux host, the file system contains two or more partitions.	Provisioning Manager cannot be used to expand a file system that contains two or more partitions. It can be used to expand a file system that contains no partitions or only one.

No .	Problem	Cause	Recommended Action
10		On a Linux host, more than one file system is mounted at the mount points for the file system to be expanded.	Provisioning Manager cannot be used to expand the file system.
11		On a Windows or Linux host, an attempt was made to expand a file system that was mounted at more than one mount point.	Provisioning Manager cannot be used to expand a file system that is mounted at more than one mount point.
12		On an HP-UX host, a file system contains partitions.	Provisioning Manager cannot be used to expand a file system that contains partitions.
13		The name of the volume group, logical volume, or mount point exceeds the maximum number of characters that can be displayed in Provisioning Manager.	You cannot operate a file system and device file that are made up of a volume group, logical volume, and mount point by using a name exceeding the maximum number of characters that can be displayed.
14		On a Linux AS/ES 4 host, an attempt was made to expand a file system from which a snapshot was created.	Provisioning Manager cannot be used to expand a file system from which a snapshot is created.
15	An error occurs during file system expansion.	The number of physical volumes per volume group has exceeded its upper limit.	See the OS or volume group manager manual and check the number of disks that can be accommodated in a volume group. If the upper limit has been exceeded, the file system cannot be expanded.
16		The size before or after expansion exceeds the upper limit of the number of files that can be created.	See the OS or file system manager manual and check the upper limit of the number of files that can be created. If the upper limit has been exceeded, the file system cannot be expanded.  When Provisioning Manager is used, the maximum value is as follows: <ul style="list-style-type: none"> <li>▪ If the host OS is AIX and uses Journaled File System: 128 GB</li> <li>▪ If the host OS is Linux and ext2 or ext3 is being used: 1 TB</li> </ul>
17		The file system is one of the following: <ul style="list-style-type: none"> <li>▪ A simple volume that was upgraded from a Windows 2000 basic disk partition</li> <li>▪ A span volume that was upgraded from a Windows 2000 basic disk volume set</li> </ul>	The OS specification dictates that the following types of volumes cannot be expanded: <ul style="list-style-type: none"> <li>▪ Volumes that are using a version older than Windows 2000, such as Windows NT, and that has migrated to Windows 2000 while retaining the data</li> <li>▪ Volumes that are being used as a basic disk and has migrated to a dynamic disk while retaining the data</li> </ul>

No .	Problem	Cause	Recommended Action
18		In a file system created on a Windows host, you are trying to expand a file system in which two or more logical volumes exist in a physical volume containing logical volumes.	Provisioning Manager specifications. Such a file system cannot be expanded by Provisioning Manager.
19		On a Linux host, an attempt was made to expand a file system on which multiple logical volumes were mounted.	Provisioning Manager cannot be used to expand a file system on which multiple logical volumes are mounted.
20		The host OS is Linux or HP-UX, and a process is using the file system.	Use a command such as fuser to determine whether a process is using the file system to be expanded.  Once the file system has been made to attain a state in which no one is using it, manually expand the file system using a method such as an OS command. Then, update the host.
21		On a Linux host, an attempt was made to expand a file system that was mounted at more than one mount point.	Provisioning Manager cannot be used to expand a file system that is mounted at more than one mount point.
22		Possible causes are as follows: <ul style="list-style-type: none"> <li>▪ The file system to be expanded might be unmounted.</li> <li>▪ The file system to be expanded might not exist.</li> <li>▪ The file system to be expanded might have already been deleted.</li> </ul>	The host information might not be up to date. Check the status of the file system to be expanded on the corresponding hosts.  If the file system is unmounted, check whether it can be mounted again. If there is a problem, update the host information without mounting it. If there is no problem, manually mount it using a command such as an OS command, update the host information, and then re-execute the expansion operation.  If the file system does not exist or has been deleted, update the host information.
23		The specified LU might be being used by another volume group (including a disabled one).	The host information might not be up to date. Update the host information, specify an LU that is not being used by any other volume groups, and then re-execute the expansion process.
24		On an HP-UX host, an attempt was made to expand a snapshot file system.	If you want to create a larger snapshot file system, see the documentation for the OS and file system, create it manually, and then re-execute a backup to refresh the host.  The OS does not support expansion of snapshot file systems.

No .	Problem	Cause	Recommended Action
25		On an HP-UX host, an attempt was made to expand a file system from which a snapshot was created.	If you want to expand a file system from which a snapshot was created, see the documentation for the OS and file system to manually perform the following operation, and then refresh the host. <ol style="list-style-type: none"> <li>1. Unmount the snapshot file system.</li> <li>2. Expand the file system from which a snapshot was created.</li> <li>3. Mount the snapshot file system.</li> <li>4. Execute the backup.</li> </ol>
26		On a Linux AS/ES 4 host, an attempt was made to expand a file system from which a snapshot was created.	Provisioning Manager cannot be used to expand a file system from which a snapshot is created.
27		On an HP-UX host on which HP OnlineJFS has been installed, the HP OnlineJFS functions are invalid.	See the HP OnlineJFS documentation and enable the HP OnlineJFS functions. Then use a method such as OS commands to manually expand the file system and execute a host refresh.
28	When a file system is expanded, even though an error occurs, the volume that was used for expansion operations is displayed in the Show Properties - <i>mount-point</i> subwindow.	Multiple users might expand the same file system concurrently.	Expanding the file system finishes successfully. You do not need to take an action.
29	On a Linux host, when an error occurs during expansion of a file system, the file system is not displayed in the GUI window after the host information is updated.	On a Linux host, when a file system is being expanded, the file system is initially unmounted. Then, before it is remounted, the following commands are automatically executed. <ul style="list-style-type: none"> <li>▪ <code>/sbin/e2fsck -f -p &lt;device-file-name&gt;</code></li> <li>▪ <code>/sbin/resize2fs &lt;device-file-name&gt;&lt;size&gt;</code></li> </ul> If execution of one of these commands fails, the file system expansion terminates with the file system unmounted.	Provisioning Manager cannot display a file system that is not mounted. If an error occurs while the two automatic commands are executing, use the error information batch collection tool (TIC) of the Device Manager agent to collect error information, and then contact maintenance personnel. <p>For details about the error information batch collection tool (TIC), see the <i>HiCommand Device Manager Agent Installation Guide</i>.</p>
30	The size of the file system extended by the host setup function is displayed as being smaller than the specified LU size.	The LU size specified at the HP-UX host may be greater than the maximum volume size recognizable by Provisioning Manager (1 TB). An excess area has not been recognized as a volume.	No action is required.
31	A file system cannot be expanded.	After Provisioning Manager was used to create a file system, the host's system time was reset.	Uninstall the Device Manager agent while the host is reset to the current system time, and then install the Device Manager agent. Then, re-execute the expansion process. For details on how to uninstall and install the Device Manager agent, see the <i>HiCommand Device Manager Agent Installation Guide</i> .

**Table 11.9 Troubleshooting Information: Host Settings Related to Volume Deletion**

No.	Problem	Cause	Recommended Action
1	You cannot move to the deletion dialog box.	You are trying to delete a file system not supported by Provisioning Manager.	<p>Display the file system information to check the file system type. The following types of file systems can be deleted:</p> <ul style="list-style-type: none"> <li>▪ Windows: NTFS</li> <li>▪ Solaris: VERITAS File System, UFS</li> <li>▪ AIX: JFS</li> <li>▪ Linux: ext2, ext3</li> <li>▪ HP-UX: VERITAS File System</li> </ul>
2		You are trying to delete a file system or device file that was created on a Windows host in a logical volume such as a stripe volume or a RAID-5 volume.	Logical volumes not supported by Provisioning Manager, such as a stripe volume and a RAID-5 volume, cannot be deleted.
3		Another mount point exists below the mount point that is to be deleted.	Delete the mount point below the mount point that is to be deleted, and then perform delete processing.
4		The host OS is Linux or HP-UX, and the file system does not use a volume manager.	Provisioning Manager cannot be used to delete the file system.
5		The volume group contains unsupported disks.	Provisioning Manager cannot be used to delete the volume group.
6		The host OS is Linux and the specified file system or device file is a snapshot.	Provisioning Manager cannot be used to delete the file system.
7		The host OS is Linux and an attempt was made to delete the file system or device file that contains the corresponding snapshot.	Provisioning Manager cannot be used to delete the file system or device file.
8	Cannot move to the deletion dialog box. (continued)	The file system has been created on a volume group that does not belong to a deletable volume manager supported by Provisioning Manager.	<p>Display the file system information and check the volume manager. The following types of volume managers can be deleted:</p> <ul style="list-style-type: none"> <li>▪ Windows: Dynamic</li> <li>▪ Solaris: VERITAS Volume Manager</li> <li>▪ AIX: Logical Volume Manager</li> <li>▪ Linux: Logical Volume Manager</li> </ul>
9		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the file system or device file might contain a device file that is not of an md device.	Provisioning Manager cannot be used to delete this type of file system or device file.

No .	Problem	Cause	Recommended Action
10		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the md device associated with the file system or device file might consist of multiple HDLM devices.	Provisioning Manager cannot be used to delete this type of file system or device file.
11		On a Linux host, the file system or device file contains two or more partitions.	Provisioning Manager cannot be used to delete this type of file system or device file. It can be used to delete a file system or device file that contains no partitions, or contains only one.
12		On a Linux host, an attempt was made to delete a device file that represents a partition.	Provisioning Manager cannot be used to delete a device file representing a partition. To delete the partition, see the OS manual and delete it manually. Then execute a host refresh.
13		On a Linux host, more than one file system is mounted at the mount points for the file system to be deleted.	Provisioning Manager cannot be used to delete the file system.
14		On either a Windows or Linux host, an attempt was made to delete a file system that was mounted at more than one mount point.	Provisioning Manager cannot be used to delete a file system that is mounted at more than one mount point.
15		On an HP-UX host, the file system or device file contains partitions.	Provisioning Manager cannot be used to delete a file system or device file that contains partitions.
16		The name of the volume group, logical volume, or mount point exceeds the maximum number of characters that can be displayed in Provisioning Manager.	You cannot operate a file system and device file that are made up of a volume group, logical volume, and mount point by using a name exceeding the maximum number of characters that can be displayed.
17	An error occurs during file system or device file deletion.	In a file system created on a Windows host, you are trying to delete a file system in which two or more logical volumes exist in a physical volume containing logical volumes.	Provisioning Manager cannot be used to delete the file system.
18		On either a Windows or Linux host, an attempt was made to delete a file system that was mounted at more than one mount point.	Provisioning Manager cannot be used to delete a file system that is mounted at more than one mount point.
19		A process exists that is using the file system that is to be deleted.	Use a command such as the <code>fuser</code> command to delete all processes that are using the file system to be deleted, and then perform the delete processing.
20		On a Linux host, a partition that was not being used by the file system or device file to be deleted might exist in the volume.	Provisioning Manager cannot be used to delete the file system or device file.

No .	Problem	Cause	Recommended Action
21		On a Linux host, the entire volume (HDLM device or SCSI device), or a partition existing in the volume, might be bring used by another file system or md device.	Provisioning Manager cannot be used to delete this type of file system or device file.
22		On a Linux AS/ES 3 host managed by Dynamic Link Manager, the device file to be deleted might bring used as an md device.	Provisioning Manager cannot be used to delete this device file. Delete the md device, delete the definition from the <code>/etc/raidtab</code> file, and then re-execute the operation.
23		On a Linux AS/ES 3 host managed by Dynamic Link Manager, an md device constituting the file system or device file might include the following files: <ul style="list-style-type: none"> <li>▪ SCSI device</li> <li>▪ A device file that represents a partition of the HDLM device and SCSI device.</li> </ul>	Provisioning Manager cannot be used to delete this type of file system or device file.
24		Possible causes are as follows: <ul style="list-style-type: none"> <li>▪ The file system to be deleted is unmounted.</li> <li>▪ The volume group containing the device file to be deleted is deactivated.</li> <li>▪ The file system or device file to be deleted does not exist or has already been deleted.</li> </ul>	<p>The host information might not be up to date. Check the status of the file system to be deleted on the corresponding hosts.</p> <p>If the file system is unmounted, check whether it can be mounted again. If there is a problem, update the host information without mounting it. If there is no problem, manually mount it using a command such as an OS command, update the host information, and then re-execute the deletion operation.</p> <p>If the volume group is deactivated, check whether it can be activated again. If there is a problem, update the host information without activating the volume group. If there is no problem, manually activate it using a command such as an OS command, update the host information, and then re-execute the deletion operation.</p> <p>If the file system or device file does not exist, or has been deleted, update the host information.</p>
25	An error occurs during file system or device file deletion. (continued)	On an HP-UX host, a file system is created on a device file to be deleted.	The host information might not be up to date. Update the host information. Make sure that the file system for which the device file to be deleted was mounted appears in the GUI, and then re-execute deletion of the file system.

No .	Problem	Cause	Recommended Action
26		On an HP-UX host, an attempt was made to delete a file system from which a snapshot was created.	If you want to delete the file system from which a snapshot was created, manually unmount the snapshot file system, refresh the host, and then re-execute the deletion operation.  If you also want to delete the snapshot of the unmounted file system, specify the device file from the GUI device file tree, and then execute the deletion operation.
27		On a Linux AS/ES 4 Update 1 (IPF) host, an attempt was made to delete a logical volume of which the length of the path exceeds 32 characters.	A logical volume whose path length exceeds 32 characters cannot be deleted.
28	An error occurs because a process exists that is using the file system in Windows that is being deleted.  The file system can still continue to be operated, although the file system cannot be operated after restarting the OS.	A file system in Windows can be unmounted and continues to be operated until the OS restarts, even though another process is using the file system.  An actual unmount operation is performed after the OS restarts. This is why the phenomenon described in the Problem column occurs.	If you want to re-use such a file system, use the Windows command to execute mount operations or to assign a drive letter by a user.
29	A file system or device file cannot be deleted.	After Provisioning Manager was used to create the file system or device file, the host's system time was reset.	Uninstall the Device Manager agent while the host is reset to the current system time, and then install the Device Manager agent. Then, re-execute the deletion process. For details on how to uninstall and install the Device Manager agent, see the <i>HiCommand Device Manager Agent Installation Guide</i> .
30	When a file system is deleted, even though an error occurs, the volume that was used for delete operations is displayed in the List Objects - File System subwindow.	Multiple users have deleted the same file system concurrently.	Deletion of the file system finishes successfully. No action is required.
31	In an HP-UX 11i v3 host, after the deletion operation for a file system or device file finishes, device file information for the LDEVs whose paths have been deleted is still displayed in the GUI window.	While the deletion operation for a file system or device file was suspended, the value of the <code>agent.util.hpux.displayDsf</code> property of the property file ( <code>hldutil.properties</code> ) was changed. For details on the <code>agent.util.hpux.displayDsf</code> property file, see the <i>HiCommand Provisioning Manager Installation and Configuration Guide</i> .	Perform a host refresh operation.

**Table 11.10 Troubleshooting Information: Storage Pool Information Display**

No.	Problem	Cause	Recommended Action
1	Dialog box does not display any logical group or logical device.	No logical group that can add a path to a logical unit exists within the range that can be used by the logged-in user.	In the Create Group window of Device Manager, create a logical group within the range that can be used by the logged-in user. For details on how to perform operations on the Create Group window of Device Manager, see the <i>HiCommand Device Manager Web Client User's Guide</i> .
2		No logical device that satisfies the condition exists within the range that can be used by the logged-in user.	In the Resource Group Administration window of Device Manager, add a logical device that satisfies the condition, to the storage pool that can be used by the logged-in user. For details on how to perform operations on the Resource Group Administration window of Device Manager, see the <i>HiCommand Device Manager Web Client User's Guide</i> .

**Table 11.11 Troubleshooting Information: Transaction Log Deletion**

No.	Problem	Cause	Recommended Action
1	Transaction log cannot be deleted.	If no limits are set in the property file, the transaction logs are not deleted until their number reaches the default maximum storage limit. Transaction logs are automatically deleted according to the maximum number of logs that can be stored or the maximum number of storage periods.	Transaction logs cannot be deleted individually. If you want to delete multiple transaction logs or transaction logs for which a certain period has passed, in the property file for Provisioning Manager, specify the maximum number of logs that can be stored or the maximum number of storage periods.

**Table 11.12 Troubleshooting Information: Transaction Log Status**

No.	Problem	Cause	Action Required
1	Setup operation that was being executed in the background failed.	Depends on the individual case.	See the error message and the troubleshooting information related to management of the file system or device file, and remove the cause of the error.  After removing the cause of the error, eliminate the cause of the cancellation according to the procedure described in section 11.1.1, and then resume the setup operation.
2	Setup operation that was being executed in the background was cancelled.	Manual setup or restarting of the host is necessary during the setup operation.	Eliminate the cause of the cancellation according to the procedure described in section 11.1.1, and then resume the setup operation. For details about how to resume the setup operation, see section 10.3
3		Raw device (SCSI device or HDLM device) recognition or release of the recognition might have failed.	No.4 to No.15 describe the details of the possible causes. Take the appropriate action for the most likely cause in your environment.  If the same problem occurs repeatedly, perform raw device (SCSI device or HDLM device) recognition or release the recognition by following the OS, HBA, or Dynamic Link Manager manual.
4		In a Solaris host, the addition or expansion of a file system or device file was performed by using the host bus adapter that requires manual setup and restart for recognizing the raw device.	See the manual for the host bus adapter and perform the necessary steps as required: <ul style="list-style-type: none"> <li>■ Editing the SCSI driver definition file</li> <li>■ Editing the <code>/kernel/drv/sd.conf</code> file</li> <li>■ Editing the environment setup file of the host bus adapter</li> <li>■ Setting up the host bus adapter using a configuration utility</li> <li>■ Rebooting with a reconfiguration option</li> </ul>
5	If you are using Dynamic Link Manager, in addition to the tasks for HBA, see the Dynamic Link Manager documentation to update the configuration definition file by executing the <code>/opt/DynamicLinkManager/bin/dlmsetconf</code> command and restarting the system.		

No .	Problem	Cause	Action Required
6			If VERITAS Volume Manager is used on the Solaris host that is not using Dynamic Link Manager, in addition to the tasks for HBA, the device is initialized for VERITAS Volume Manager when you set <code>enable</code> in the <code>/usr/sbin/vxdctl</code> command.

No .	Problem	Cause	Action Required
7	Setup operation that was being executed in the background failed. Setup operation that was being executed in the background was interrupted.	You are trying to add or expand a file system or device file in a Solaris host that is using both Dynamic Link Manager and VERITAS Volume Manager.	If a Solaris host is using both Dynamic Link Manager and VERITAS Volume Manager, see the manual for Dynamic Link Manager and edit the <code>/etc/vx/vxvm.exclude</code> file to disable certain paths.
8		To add or expand a file system or device file when the host OS is Linux, raw device recognition must be performed through manual settings.	Consult the HBA manual and take appropriate action, such as executing the following command or restarting: <pre>echo "scsi add-single-device a b c d" &gt; /proc/scsi/scsi</pre> <ul style="list-style-type: none"> <li>▪ a: Host ID (host port number)</li> <li>▪ b: Channel number (bus number)</li> <li>▪ c: Target ID</li> <li>▪ d: Lun (host LU number)</li> </ul> If Dynamic Link Manager is being used and you did not use the above command to restart the host, see the manual for Dynamic Link Manager and execute <code>/sbin/dlmcfgmgr -r</code> , the utility for managing the configuration of Dynamic Link Manager.
9		To add or expand a file system or device file when Dynamic Link Manager is being used on an HP-UX host, the HDLM device must be configured through manual settings.	See the manual for Dynamic Link Manager and execute the <code>/opt/DynamicLinkManager/bin/dlmdefpath -a</code> utility to set Dynamic Link Manager path information.
10		When deleting a file system or device file, you must delete the path to the logical unit.	File system or device file deletion is completed when the deletion of the path to the logical unit is detected. Delete the path to the logical unit: for example, by using the Properties - <i>host-name</i> subwindow of Device Manager. For details on how to perform operations in this subwindow, see the <i>HiCommand Device Manager Web Client User's Guide</i> .
11			When the host OS is Linux: if you delete an LU path and then restart the OS, existing device file names that have already been recognized might be changed.  If this happens, you must update the host after changing the device file name in the <code>/etc/fstab</code> file and restarting the OS.

No .	Problem	Cause	Action Required
12		In a Solaris host, the deletion of a file system or device file is performed by using the host bus adapter that requires manual setup and restart for recognizing the raw device deletion.	<p>See the manual for the host bus adapter and perform the necessary steps as required:</p> <ul style="list-style-type: none"> <li>■ Deleting the raw device from the SCSI driver definition file</li> <li>■ Deleting the raw device from the /kernel/drv/sd.conf file</li> <li>■ Deleting the raw device from the HBA environment setup file</li> <li>■ Deleting the HBA setup using a configuration utility</li> <li>■ Restarting with a reconfiguration option</li> </ul>

No .	Problem	Cause	Action Required
13	Setup operation that was being executed in the background failed. Setup operation that was being executed in the background was interrupted. (continued)	To delete a file system or device file when the host OS is Linux, raw device recognition must be released through manual settings.	Consult the HBA manual and take appropriate action, such as executing the following command or restarting: <pre>echo "scsi remove-single-device a b c d" &gt; /proc/scsi/scsi</pre> <ul style="list-style-type: none"> <li>▪ a: Host ID (host port number)</li> <li>▪ b: Channel number (bus number)</li> <li>▪ c: Target ID</li> <li>▪ d: Lun (host LU number)</li> </ul> If you are using Dynamic Link Manager, see the manual for Dynamic Link Manager to check the SCSI devices that Dynamic Link Manager recognizes. Then, execute the <code>/sbin/dlmcfgmgr -u</code> utility to define the configuration of Dynamic Link Manager.
14		Whether VERITAS Volume Manager is used or not, you are trying to delete a file system or device file in a Solaris host that is using Dynamic Link Manager.	Whether VERITAS Volume Manager is used or not, if a Solaris host is using Dynamic Link Manager, see the manual for Dynamic Link Manager, and update the configuration definition file by executing the <code>/opt/DynamicLinkManager/bin/dlmsetconf</code> command and restarting the system.
15		To delete a file system or device file on an HP-UX host, raw device recognition must be released through manual settings.	See the OS documentation to execute the <code>ioscan</code> command. If you are using Dynamic Link Manager, see the manual for Dynamic Link Manager and execute the <code>/opt/DynamicLinkManager/bin/dlmdefpath -a</code> utility to set Dynamic Link Manager path information.
16	Automatic setup operation that had been interrupted in the background failed.	The interruption time limit accepted by the setup operation was exceeded.	Manually continue the operation that has failed. If necessary, change the time limit in the Provisioning Manager property file.

## 11.3 Troubleshooting Method

If a problem occurs in Provisioning Manager, take the necessary action by following the procedure described below.

1. Check the problem status. Check the operation status when the problem occurred, and the message that has been output.

If a dialog is displayed with an error message, follow the corrective action indicated for the message. For details on the messages, see the *HiCommand Provisioning Manager Error Codes*.

2. When the Device Manager agent error message such as KARF15000-E is output, check the Device Manager agent error log.

The Device Manager agent error message such as KARF15000-E might be output when an error occurs in the host. In the message text of such a message, a message ID is not attached. In such a case, view the Device Manager agent error log (`error.log`) to identify the message ID, and then investigate the error cause and troubleshooting. For details on obtaining error log information and investigating the error cause, see section 11.3.1.

3. Collect information, such as log information, for investigating the cause.

If the problem cannot be resolved in step 2, use the error information batch collection tool to collect all the following types of information:

- Error information on the server side
- Error information on the host side
- Information on the state of the host when the error occurred

For information on the error information batch collection tool, see section 11.3.2.

4. Check the collected information and analyze the problem.

Investigate the error cause based on the collected information. If you cannot correct the problem, contact the Hitachi Data Systems Support Center.

### 11.3.1 Checking the Device Manager Agent Error Log

For a message text of the error message such as KARF15000-E indicating that an error occurred in Device Manager agent, a message ID is not attached. In such a case, you need to view the Device Manager agent error log (`error.log`) to identify the message ID.

In accordance with a prefix of the identified message ID, check the error cause and troubleshooting by viewing one of the following:

- When a prefix is KARF: See the *HiCommand Provisioning Manager Error Codes*.
- When a prefix is KAIC: See the *HiCommand Device Manager Error Codes* document.

The error log (`error.log`) is stored in the following directory:

- In Windows  
`Device-Manager-agent-installation-directory\agent\logs`

- In Solaris, AIX, Linux, or HP-UX

*Device-Manager-agent-installation-directory/agent/logs*

A message ID can be identified by using the following procedure. If an error message is output by Device Manager because of a problem on the host side, you must check the Device Manager agent error log (`error.log`) to determine the error cause as explained below.

Among the logs inside the Device Manager agent error log (`error.log`), find a log that satisfies the following two conditions:

- The error occurrence time matches the time at which the problem occurred.  
**Caution:** The time at which an error was detected might conflict between the server and the agent. Note that time lag might occur. Also note that times may be different due to standard/daylight time.
- The message text matches the message text of the message that was output by the Device Manager agent.

The message ID that you want to identify is shown in this log. The output format of the Device Manager agent error log (`error.log`) is as follows:

```
error-occurrence-time identifier message-ID message-text
```

The output items are explained below.

- *error-occurrence-time*: The time at which the error occurred is displayed in the following format: *day/month/year: hour:minute:second difference-from-GMT/UT*
- *Identifier*: This indicates the program being executed. When an error occurred during the Provisioning Manager processing, `HPVM` is displayed.
- *message-ID*: A message number with a prefix indicating a program. For Provisioning Manager, the prefix is `KARF`. For Device Manager, the prefix is `KAIC`.
- *message-text*: Describes the details of the error that has occurred.

An output example follows:

```
12/7/2004:14:25:37 0900 HPVM KARF66006-E The specified raw devices do not exist.
```

## 11.3.2 Collecting Error Information

This section explains how to use the error information batch collection tools:

- Batch collection tool for server error information (hcmdsgetlogs)
- Batch collection tool for host error information (TIC)

### 11.3.2.1 Batch Collection for Server Error Information (hcmdsgetlogs)

If an error occurs on a Provisioning Manager server, you can use the `hcmdsgetlogs` command of the maintenance information batch collection tool (TIA: Trouble Information Acquisition) to collect the information for analyzing the error. Collect this information, which covers log files and databases, from the server execution environment of the Device Manager server.

For details on the `hcmdsgetlogs` command of TIA, see the *Hitachi HiCommand Device Manager Server Installation and Configuration Guide*.

### 11.3.2.2 Batch Collection Tool for Host Error Information (TIC)

If an error occurs on a Device Manager agent, you can use the error information batch collection tool (TIC: Trouble Information Collector) to collect the log files and system information necessary for error analysis from the environment of the Device Manager agent.

**Note:** To use TIC, you need to log on as a user who has Administrator or root access privilege.

For details on TIC, see the *Hitachi HiCommand Device Manager Agent Installation Guide*.

## 11.4 Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure,
- The exact content of any error messages displayed on the host system(s)

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America  
San Diego, California, USA  
1-800-446-0744
- Hitachi Data Systems Europe  
Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific  
North Ryde, Australia  
011-61-2-9325-3300

## Appendix A Provisioning Manager Terms

Table A.1 shows the Provisioning Manager terms and the corresponding storage subsystem terms.

**Table A.1 Provisioning Manager Terms and Corresponding Storage Subsystem Terms**

Provisioning Manager	TagmaStore USP	Lightning 9900V	Lightning 9900	TagmaStore AMS/WMS Series	Thunder 9500V	Thunder 9200
Port controller	CHA	CHA	CHA	Controller	Controller	Controller
Port	Port	Port	Port	Port	Port	Port
Host storage domain	Host group	Host group	Not applicable	Host group	Host group	N/A
Logical unit (LUN)	LUN	LUN	LUN	LUN	LUN	LUN
Array group	VDEV (area created by dividing the parity group into pieces)	VDEV (area created by dividing the parity group into pieces)	Parity group	RAID group	RAID group	RAID group
Logical device (LDEV)	LDEV	LDEV	LDEV	Logical unit (LU)	Logical unit (LU)	Logical unit (LU)
ShadowImage	ShadowImage	ShadowImage	ShadowImage	ShadowImage	ShadowImage	MRCF-Lite
TrueCopy	TrueCopy	TrueCopy	TrueCopy	TrueCopy ( <b>Note</b> )	TrueCopy	Synchronous Remote Copy
QuickShadow (Copy-on-Write Snapshot)	Copy-on-Write Snapshot	Not applicable	Not applicable	Copy-on-Write Snapshot	QuickShadow	Not applicable
Universal Replicator	Universal Replicator	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

**Note:** TagmaStore WMS does not support TrueCopy.

Table A.2 shows the relationship between Provisioning Manager terms and the corresponding OS terms.

**Table A.2 Provisioning Manager Terms and the Corresponding OS Terms**

Provisioning Manager (Display in GUI)	Windows	Solaris	AIX	Linux	HP-UX
Raw device (RawDevice)	Device	Block device or character device	Block device or character device	Block device or raw device	Block device or character device
Raw device (RawDevice(Partitioned))	Partition	Slice	Not applicable	Partition	Partition
Volume group (VolumeGroup)	Disk group ( <b>Note 1</b> )	Disk group ( <b>Note 2</b> )	Volume group	Volume group	Volume group
Logical volume (LogicalVolume)	Basic disk partition or dynamic disk volume	Logical volume	Logical volume	Logical volume	Logical volume
Device file	Device	Device file	Device special file	Device file	Device file

**Note 1:** When Logical Disk Manager is used, Provisioning Manager virtually creates a volume group that has the same name as the logical volume. The corresponding volume group does not exist on the host.

**Note 2:** When SDS/SVM is used, Provisioning Manager virtually creates a volume group that has the same name as the logical volume. The corresponding volume group does not exist on the host.

# Glossary

array group	A sequential storage area that has a RAID structure. An array group contains of multiple LDEVs. It contains user data and parity information, which ensures user data integrity in the event of a hard disk drive failure within the array group.
CHA	An adapter for controlling the channels of a storage subsystem. A channel adapter is equipped with a port for connecting to a storage subsystem via a cable.
CLPR	(cache logical partition): A function that partitions the cache for each logical device in a subsystem in order to protect the cache from exclusive use by any logical device with a high hit rate. This is a function specific to Universal Storage Platform V and TagmaStore USP. The Cache Partition Manager in the TagmaStore AMS/WMS series also serves the same function.
command device	An LU used exclusively for communicating with the CCI that is installed on a host to control ShadowImage, TrueCopy, QuickShadow, Universal Replicator, or Copy-on-Write Snapshot functionalities.
copy pair	A pair consisting of a P-VOL (primary volume) and S-VOL (secondary volume), created in the storage subsystem by the ShadowImage or TrueCopy facilities.
Copy-on-Write Snapshot	Hitachi Copy-on-Write Snapshot
CV	(customized volume): A volume created by dividing the following LDEV into a partition of any size: an LDEV of the Universal Storage Platform V, TagmaStore USP, Lightning 9900V series, and Lightning 9900™ series whose size is determined by the emulation type.
data path	In Provisioning Manager, the route from the HBA port on the host to the channel adapter of the storage subsystem via its LU.
Differential Management LU	In the TagmaStore AMS/WMS series, the LU that stores the differential when data is copied. The Differential Management LU must be defined before an operation is performed on a pair.
emulation type	An LDEV attribute, the emulation type is used by Universal Storage Platform V, TagmaStore USP, Lightning 9900V series and Lightning 9900 series storage systems when an LDEV is created within an array group. The size of the LDEV is determined by this attribute.
GUI	graphical user interface
HBA	(host bus adapter): An adapter for connecting host fibre channels and SCSI.

HDLM	HiCommand Dynamic Link Manager
Host	A single physical application server unit equipped with a host bus adapter (HBA). A host bus adapter includes one or two ports, each of which is assigned a world wide name (WWN).
host storage domain	In the TagmaStore AMS/WMS series, Universal Storage Platform V, TagmaStore USP, Lightning 9900V and Thunder 9500V, this is called a host group. In the Thunder 9500V, the host group is available when the security option is set to the LUN Management mode. A host storage domain is a unit used to apply LUN security that restricts a host, according to its WWN, to access the storage. A host storage domain is assigned to each port, and the LUN security configuration for a host storage domain is applied to all LUNs within that host storage domain.
I/O	input/output
LDEV	(logical device): A unit of storage area created by logically partitioning a storage area within an array group.
Linux	Red Hat Enterprise Linux AS 3 Red Hat Enterprise Linux AS 4 Red Hat Enterprise Linux ES 3 Red Hat Enterprise Linux ES 4
Linux AS/ES 3	Red Hat Enterprise Linux AS 3 Red Hat Enterprise Linux ES 3
Linux AS/ES 4	Red Hat Enterprise Linux AS 4 Red Hat Enterprise Linux ES 4
LU	(logical unit): A unit of storage area used as an I/O access unit. You can combine multiple LDEVs and create an LU called a LUSE volume. An LU in TagmaStore AMS/WMS series, Thunder 9500V, and Thunder 9200 is called an LDEV in Device Manager.
LUN	(logical unit number): A number for identifying a logical unit (LU).
LUN security	Functionality designed to limit the hosts that are able to access LUs within a storage subsystem. Only hosts (WWNs) for which this function has been used to set a port in a storage subsystem can access the LUs on the path routed through this port.
LUSE	(LU size expansion): An LU composed of multiple LDEVs. You can create a LUSE on TagmaStore AMS/WMS series, Universal Storage Platform V, TagmaStore USP, Lightning 9900V, Thunder 9500V, Lightning 9900, and Thunder 9200.
MSCS	Microsoft® Cluster Server

OS	operating system
port	A storage subsystem connection to which a cable is connected. For the Universal Storage Platform V, TagmaStore USP, Lightning 9900V and 9900 series, this connection resides on a channel adapter; for the TagmaStore AMS/WMS series, Thunder 9500V, and 9500, it resides on a controller.
provisioning plan	A name associated with a set of volume attributes (parameters). A provisioning plan is used to select a volume from a storage pool, by specifying particular conditions that the volume must satisfy.
P-VOL	(primary volume): The original volume of the replication created by ShadowImage, TrueCopy, QuickShadow, or Copy-on-Write Snapshot.
QuickShadow	Functionality that creates backup copies of volumes within a same storage subsystem. This is a Thunder 9500V-specific function. This is the same functionality as Copy-on-Write Snapshot in the TagmaStore AMS/WMS series.
RAID level	Used to classify types of redundancy. Defined RAID levels include RAID 0, RAID 1, RAID 6, and other RAID levels.
Raw device	A device for an LU that is in the subsystem assigned to the host. A raw device is the same as a block device or a character device for Solaris, AIX, Linux, and HP-UX, and a device for Windows. It is different from the devices in /dev/raw for Linux.
Resource group	A group of users defined by Device Manager to limit the storage and hosts in a network managed by Device Manager that can be accessed by users. Resource groups can be hierarchically structured in a tree-like structure. Device Manager is used to register users into these resource groups.
SDS	Solstice Disk Suite
ShadowImage	Functionality that creates a volume replica in the same storage subsystem.
SLPR	(storage logical partition): A function that partitions the subsystem resources, such as logical devices, cache, and ports, for each user in order to make them invisible to other users. This is a function specific to Universal Storage Platform V and TagmaStore USP.
SP-VOL	(secondary primary volume): When you use the cascade functionality of ShadowImage, you can create a copy pair (in the second layer) whose P-VOL (primary volume) is an S-VOL (secondary volume) of another copy pair (in the top layer). The volume that is specified as an S-VOL in the top layer and also as a P-VOL in the second layer is called an SP-VOL.

SSP	storage service provider
storage pool	A logical area that is created by classifying storage volumes in a storage subsystem. Storage pools are mapped to resource groups using a mechanism provided by the My Storage function. The scope of storage that a user can access is the storage pool assigned to the resource group to which the user belongs, and the storage pools of the resource groups under that resource group. Users can manage storage without having to be aware of the detailed hardware specifications of the storage subsystem.
SVM	Solaris Volume Manager
S-VOL	(secondary volume): A replication-destination volume, which is replicated by ShadowImage or TrueCopy functionality.
TagmaStore AMS	Hitachi TagmaStore Adaptable Modular Storage Series
TagmaStore AMS/WMS series	Generic concatenation of TagmaStore AMS and TagmaStore WMS series
TagmaStore NSC	Hitachi TagmaStore Network Storage Controller (NSC55 in some documentation)
TagmaStore USP	Generic term for Hitachi TagmaStore Universal Storage Platform and Hitachi TagmaStore Network Storage Controller
TagmaStore WMS	Hitachi TagmaStore Workgroup Modular Storage Series
TIC	Trouble Information Collector
TrueCopy	Functionality that replicates a volume in a different storage subsystem.
UR	(Universal Replicator): A function for creating replica volumes, such as ShadowImage and TrueCopy. UR creates replicas in different storage subsystems. This is a function specific to Universal Storage Platform V and TagmaStore USP.
Volume	A term unique to Provisioning Manager that indicates a storage volume (LU or LUSE) on the storage subsystem allocated to the host. With Device Manager, it is referred to as storage.
V-VOL	Virtual Volume
WWN	(world wide name): A unique 64-bit value assigned to each device or port for a Fibre Channel connection.

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