HITACHI
DATA SYSTEMS

Hitachi Freedom Storage™
Thunder 9200™
HP-UX® Host Installation Guide

Document Revision Level

Revision	Date	Description
MK-90DF516-0	January 2001	Initial Release

Source Document Revision Level

The following source document was used to produce this Thunder 9200 host installation guide: *Hitachi Disk Array Subsystem Installation Manual (Fibre Channel)*, revision 1.

Preface

The *Hitachi Freedom Storage™ Thunder 9200™ HP-UX® Host Installation Guide* describes and provides instructions for configuring the devices on the Hitachi Thunder 9200™ disk array subsystem for operation with the HP-UX® operating system. This configuration guide assumes that:

- the user has a background in data processing and understands direct-access storage device subsystems and their basic functions,
- the user is familiar with the Hitachi Thunder 9200™ array subsystem,
- the user is familiar with the HP-UX® operating system and fibre-channel adapters, and
- the user is familiar with the UNIX® file system, system commands, and utilities.

Note: The term "9200" refers to the entire Hitachi Thunder 9200™ subsystem family, unless otherwise noted. Please refer to the *Hitachi Freedom Storage™ Thunder 9200™ User and Reference Guide* (MK-90DF504) for further information on the 9200 disk array subsystems.

Note: For further information on the HP-UX® operating system, please consult the HP-UX® user documentation, or contact HP® technical support.

Contents

List of Figures

List of Tables

Chapter 1 Overview of Thunder 9200™ HP-UX® Configuration

1.1 HP-UX® Configuration

This document describes the requirements and procedures for connecting the 9200 subsystem to an NT® server and configuring the new 9200 devices for operation with the HP-UX® server operating system. The Hitachi Data Systems representative performs the physical installation of the 9200 subsystem. The user prepares for 9200 subsystem installation, and then configures the new 9200 devices with assistance as needed from the Hitachi Data Systems representative.

Configuration of the 9200 disk devices for HP-UX® operations includes:

- Setting LUs and file sizes (see chapter 2),
- Installing the 9200 subsystem (see chapter 2),
- Creating and formatting volumes and groups (see chapter 3), and
- Verifying file system operations (see chapter 3).

1.2 Hitachi Thunder 9200™ Array Subsystem

The Hitachi Freedom Storage™ Thunder 9200™ RAID subsystem supports concurrent attachment to multiple UNIX®-based and PC-server platforms. Please contact your Hitachi Data Systems account team for the latest information on platform support. The 9200 subsystem provides continuous data availability, high-speed response, scaleable connectivity, and expandable capacity for PC server and open-system storage. The 9200 subsystem can operate with multihost applications and host clusters, and is designed to handle very large databases as well as data warehousing and data mining applications that store and retrieve terabytes of data.

Chapter 2 Preparing for New Device Configuration

2.1 Configuration Requirements

The requirements for 9200 HP-UX® configuration are:

- Hitachi Thunder 9200™ subsystem, all-open or multiplatform configuration:
  - The LUN Manager software on the 9200 Remote Console PC is used to configure the fibre-channel (FC) ports. If remote LUN Manager is not installed, please contact your Hitachi Data Systems account team for information on LUN configuration services.

  Note: The availability of 9200 features and devices depends on the level of microcode installed on the 9200 subsystem.

- HP-UX® operating system, version 10.20 or 11.0. ***Important:*** Please contact HP® technical support to make sure the most current OS patches are installed on the HP® system(s).
  - **root** log-in (superuser) access to the HP® system is required.

  Note: Hitachi Data Systems plans to support future releases of the HP-UX® operating system. For the latest information on HP-UX® version support, please contact your Hitachi Data Systems account team.

- Fibre-channel adapters. Make sure to install all utilities, tools, and drivers that come with the adapter(s). For information on driver requirements for the adapters, please refer to the user documentation for the adapter or contact the vendor.
  - The 9200 subsystem supports full-speed (100 MB/s) fibre-channel interface, including shortwave non-OFC (open fibre control) optical interface, and multimode optical cables with SC connectors. Do not connect any OFC-type fibre-channel interface to the 9200 subsystem. For information on supported FC adapters (FCAs), optical cables, hubs, and fabric switches, please contact your Hitachi Data Systems account team or the Hitachi Data Systems Support Center.

2.2 Installing the 9200 Subsystem

The 9200 subsystem comes with all hardware and cabling required for installation.

Note: The Hitachi Data Systems representative must use the 9200 Maintenance Manual during all installation activities. Follow all precautions and procedures in the maintenance manual, and always check all specifications to ensure proper installation and configuration.

2.3 Connecting the Single Controller, Multiple Ports Configuration

To use a single controller, multiple ports configuration, the following rules apply:

- Setting alternate links causes a port fault to become a controller fault
- The same LU cannot be installed from different ports when using a single host. Each LU must be installed individually.
- In a host adapter configuration for a 1:1 connection between host and port, the same LU may be installed Section 2.3.1 explains how.

2.3.1 Recognizing LUs from all Ports

Use the **ioscan** command to verify LUs from all connected ports (see Figure 2.1).

```
# ioscan␣-nfC␣disk ↵
Class I    H/W Path            Driver      S/W State   H/W Type     Description
=============================================================================
disk 37  8/12.8.0.255.0.0.0  sdisk       CLAIMED     DEVICE       HITACHI DFXXX
                               /dev/dsk/c7t0d0   /dev/rdsk/c7t0d0
disk 38  8/12.8.0.255.0.0.1  sdisk       CLAIMED     DEVICE       HITACHI DFXXX
                               /dev/dsk/c7t0d1   /dev/rdsk/c7t0d1
disk 0   10/0.6.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t6d0   /dev/rdsk/c0t6d0
disk 1   10/0.8.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t8d0   /dev/rdsk/c0t8d0
disk 2   10/0.9.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t9d0   /dev/rdsk/c0t9d0
disk 3   10
```

Figure 2.1 Recognizing LUs in the Single Controller, Multiple Ports Configuration

2.3.2 Installing the Host System through the Sub-host

After making a normal installation from the master host, it is possible to use disks from the sub-host if you import Volume Groups so that disks are recognized from the sub-host. It should be noted, however, that data is not guaranteed if simultaneous access is made from hosts of the both systems. Basically, access from only one of the hosts is a must even if you execute an installation (import) from both hosts.

```
# pvcreate /dev/rdsk/c7t0d0 ↵
Physical volume "/dev/rdsk/c7t0d0" has been successfully created.
# ls /dev/vg* ↵

/dev/vg00:
group   lvol2   lvol4   lvol6   lvol8   rlvol2  rlvol4  rlvol6  rlvol8
lvol1   lvol3   lvol5   lvol7   rlvol1  rlvol3  rlvol5  rlvol7

/dev/vg01:
group   lvol1   lvol2   lvol3   rlvol1  rlvol2  rlvol3

/dev/vg02:
group
# mkdir /dev/vg03 ↵

# ls -l /dev/vg* | grep group ↵
crw-r-----       1 root       sys          64 0x000000 Apr 18 22:51 group
crw-rw-rw-    1 root       sys          64 0x010000 Aug  3 12:51 group
crw-rw-rw-    1 root       sys          64 0x020000 Aug  3 12:02 group
# mknod /dev/vg03/group c 64 0x030000 ↵

# vgcreate /dev/vg03 /dev/dsk/c7t0d0 ↵
Volume group "/dev/vg03" has been successfully created.
Volume Group configuration for /dev/vg03 has been saved in /etc/lvmconf/vg03.conf
#
# vgdisplay /dev/vg03 ↵
--- Volume groups ---
VG Name                     /dev/vg03
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      0
Open LV                     0
Max PV                      16
Cur PV                      1
Act PV                      1
Max PE per PV         1016
VGDA                  2
PE Size (Mbytes)            4
Total PE                    511
Alloc PE                    0
Free PE                     511
Total PVG                   0
Total Spare PVs             0
Total Spare PVs in use              0
```

Figure 2.2 Installing the Host System through the Sub-host

2.4 Connecting the Dual Controller Multiple Ports Configuration

In a single controller, multiple ports configuration, Alternate paths cannot be set between ports of the same controller. Set alternate paths accordingly (see 2.4.1.1).

2.4.1 Verifying Recognition of the Subsystem from all Connected Ports

Use the **ioscan** command to verify recognition of the subsystem (see Figure 2.3).

```
# ioscan_Δ-nfC_Δdisk ↵
Class     I  H/W Path            Driver      S/W State   H/W Type     Description
============================================================================
disk      5  8/8.8.0.255.0.1.0   sdisk       CLAIMED     DEVICE         HITACHI DFXXX
                                /dev/dsk/c6t1d0   /dev/rdsk/c6t1d0
     : Alternate Path
disk     37  8/12.8.0.255.0.0.0  sdisk       CLAIMED     DEVICE       HITACHI DFXXX
                                /dev/dsk/c7t0d0   /dev/rdsk/c7t0d0
     : Primary Path
disk      0  10/0.6.0           sdisk       CLAIMED     DEVICE          SEAGATE ST34573WC
                                /dev/dsk/c0t6d0   /dev/rdsk/c0t6d0
```

Figure 2.3 Dual Controller Multiple Ports: Verifying Subsystem Recognition

2.4.1.1 Setting an Alternate Link

Use the **vegextend** command to set alternate links (see Figure 2.4).

```
# vgextend_Δvg03_Δ/dev/dsk/c6t1d0 ↵
Volume group "vg03" has been successfully extended.
Volume Group configuration for /dev/vg03 has been saved in /etc/lvmconf/vg03.conf
# vgdisplay_Δ-v_Δvg03 ↵

--- Volume groups ---
VG Name                     /dev/vg03
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      1
Open LV                     1
Max PV                      16
Cur PV                      1
Act PV                      1
Max PE per PV         1016
VGDA                  2
PE Size (Mbytes)            4
Total PE                    511
Alloc PE                    511
Free PE                     0
Total PVG                   0
Total Spare PVs             0
Total Spare PVs in use              0

   --- Logical volumes ---
   LV Name            /dev/vg03/lvol1
   LV Status          available/syncd
   LV Size (Mbytes)           2044
   Current LE         511
   Allocated PE               511
   Used PV            1

   --- Physical volumes ---
   PV Name            /dev/dsk/c7t0d0
   PV Name            /dev/dsk/c6t1d0 Alternate Link
   PV Status          available
   Total PE                    511
```

Figure 2.4 Setting Alternate Links

2.5 Preparing for New Device Configuration

Before setting up or installing the disk array subsystem, you should be familiar with the following activities:

- Setting logical units,
- Setting file system sizes, and
- Configuring the adapter(s).

2.5.1 Setting Logical Units

The maximum number of logical units (LUs) that can be set on a single disk array subsystem in HP-UX is 8 for the Hitachi Freedom Storage™ Thunder 9200™.

2.5.2 Setting File System Sizes

See Table 2.1 for maximum file sizes.

Table 2.1 File Limitations

OS Version	Maximum Capacity
HP-UX 10.20	131072 MB (128 GB)
HP-UX 10.20	131072 MB (128 GB)
HP-UX 11.0	1 TB (JFS)

Chapter 3 Configuring the New Devices

Configuration of the new 9200 devices for HP-UX operations involves the following activities:

- Verifying Device Files
- Creating Volume Groups,
- Creating logical volumes,
- Mounting and verifying the file systems, and
- Setting Auto Mount.

Note: Do not use the HP® System Administrator Manager (SAM) for system administrator functions. Alternate links cannot be created through SAM, and SAM will not recognize LUs that are recognized with the **ioscan** command.

3.1 Creating Volume Groups

Use the **pvcreate** command to create volume groups (see Figure 3.1).

```
# pvcreate /dev/rdsk/c7t0d0 ↵
Physical volume "/dev/rdsk/c7t0d0" has been successfully created.
# ls /dev/vg* ↵

/dev/vg00:
group   lvol2   lvol4   lvol6   lvol8   rlvol2  rlvol4  rlvol6  rlvol8
lvol1   lvol3   lvol5   lvol7   rlvol1  rlvol3  rlvol5  rlvol7

/dev/vg01:
group   lvol1   lvol2   lvol3   rlvol1  rlvol2  rlvol3

/dev/vg02:
group
# mkdir /dev/vg03 ↵

# ls -l /dev/vg* | grep group ↵
crw-r-----       1 root       sys         64 0x000000 Apr 18 22:51 group
crw-rw-rw-   1 root       sys         64 0x010000 Aug  3 12:51 group
crw-rw-rw-   1 root       sys         64 0x020000 Aug  3 12:02 group
# mknod /dev/vg03/group c 64 0x030000 ↵

# vgcreate /dev/vg03 /dev/dsk/c7t0d0 ↵
Volume group "/dev/vg03" has been successfully created.
Volume Group configuration for /dev/vg03 has been saved in /etc/lvmconf/vg03.conf
#
# vgdisplay /dev/vg03 ↵
--- Volume groups ---
VG Name                     /dev/vg03
VG Write Access             read/write
VG Status                   available
Max LV                      255
Cur LV                      0
Open LV                     0
Max PV                      16
Cur PV                      1
Act PV                      1
Max PE per PV         1016
VGDA                  2
PE Size (Mbytes)            4
Total PE                    511
Alloc PE                    0
Free PE                     511
Total PVG                   0
Total Spare PVs             0
Total Spare PVs in use              0
```

Figure 3.1 Creating Volume Groups

3.2 Creating Logical Volumes

You may divide volume groups into logical volumes. Use the **lvcreate** command (see Figure 3.2).

```
# lvcreate -L 2044 /dev/vg03 ↵
Logical volume "/dev/vg03/lvol1" has been successfully
created with
character device "/dev/vg03/rlvol1".
Logical volume "/dev/vg03/lvol1" has been successfully
extended.
Volume Group configuration for /dev/vg03 has been saved in
/etc/lvmconf/vg03.conf
#
# lvdisplay /dev/vg03/lvol1 ↵
--- Logical volumes ---
LV Name                 /dev/vg03/lvol1
VG Name                 /dev/vg03
LV Permission           read/write
LV Status                       available/syncd
Mirror copies           0
Consistency Recovery            MWC
Schedule                parallel
LV Size (Mbytes)        2044
Current LE                      511
Allocated PE            511
Stripes                 0
Stripe Size (Kbytes)            0
Bad block                       on
Allocation                      strict
IO Timeout (Seconds)            default
```

Figure 3.2 Creating Logical Volumes

3.3 Creating a File System

Create a file system using the **newfs** command (see Figure 3.3).

```
# newfs /dev/vg03/rlvol1 ↵
newfs: /etc/default/fs is used for determining the file system type
     version 3 layout
     2093056 sectors, 2093056 blocks of size 1024, log size 1024 blocks
     unlimited inodes, 2093056 data blocks, 2091440 free data blocks
     64 allocation units of 32768 blocks, 32768 data blocks
     last allocation unit has 28672 data blocks
     first allocation unit starts at block 0
     overhead per allocation unit is 0 blocks
```

Figure 3.3 Creating a File System

3.4 Mounting and Verifying the File System

Create a directory for mounting a file system using the **mkdir** command with the directory name as the argument (see Figure 3.4).

```
# mkdir /array1 ↵
#
```

Figure 3.4 Creating a Directory for Mounting a File System

Check the file system using the **mount** command with the device file as the argument (see Figure 3.5).

```
# mount /dev/vg03/lvol1 /array1 ↵
#
```

Figure 3.5 Checking the File System

3.5 Verifying the File Systems

Verify the file system using the **bdf** command (see Figure 3.6).

```
# bdf ↵
Filesystem          kbytes    used     avail    %used   Mounted on
/dev/vg00/lvol3     307200    143283   153686   48%     /
/dev/vg00/lvol1     203413    50711    132360   28%     /stand
/dev/vg00/lvol8     819200    467392   329910   59%     /var
/dev/vg00/lvol7     921600    555094   343623   62%     /usr
/dev/vg00/lvol6     65536     1229     60348    2%      /tmp
/dev/vg00/lvol5     614400    135130   449361   23%     /opt
/dev/vg01/lvol1     4190208   1519545  2503787  38%     /home1
/dev/vg00/lvol4     204800    1214     190868   1%      /home
/dev/vg03/lvol1     2093056   1614     1960734  0%      /array1
```

Figure 3.6 Verifying the File System

3.6 Setting and Verifying the Auto-Mount Parameters

Use the **vi** command to register the logical volumes that will perform Auto-Mount.

```
# vi△/etc/fstab ↵
# System /etc/fstab file.  Static information about the file systems
# See fstab(4) and sam(1M) for further details on configuring devices.
/dev/vg00/lvol3 /             vxfs delaylog  0 1
/dev/vg00/lvol1 /stand                hfs defaults   0 1
/dev/vg00/lvol4 /home         vxfs delaylog  0 2
/dev/vg00/lvol5 /opt          vxfs delaylog  0 2
/dev/vg00/lvol6 /tmp                  vxfs delaylog  0 2
/dev/vg00/lvol7 /usr          vxfs delaylog  0 2
/dev/vg00/lvol8 /var          vxfs delaylog  0 2
/dev/vg01/lvol1 /home1                vxfs delaylog  0 2
/dev/vg03/lvol1 /array1       vxfs delaylog 0 2
```

Figure 3.7 Setting the Auto-Mount Parameters

Chapter 4 Troubleshooting

4.1 Troubleshooting

The Hitachi Freedom Storage™ Thunder 9200™ array subsystem provides continuous data availability. For troubleshooting information for the 9200 subsystem, please refer to the *Hitachi Freedom Storage™ Thunder 9200™ User and Reference Manual* (MK-90DF504).

4.2 Calling the 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 and the exact content of any error messages displayed on the host system(s). Please check the SVP service information messages (SIMs) using Web access, and note the reference codes and severity levels of the recent messages.

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America
  San Diego, California, USA
  1-800-348-4357
- 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 Acronyms and Abbreviations

FCA	FC adapter
HP	Hewlett-Packard
LU	logical unit
MB	megabyte(s)
OFC	open fibre control
PC	personal computer system
SIM	service information message
RAID	redundant array of independent disks
SAM®	System Administrator Manager®
SIM	service information message
TB	terabyte(s)