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Hitachi Freedom Storage™ Thunder 9200™ Sun® Solaris® Host Installation Guide (SCSI)

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The following source document was used to produce this Thunder 9200 host installation guide: *Hitachi Disk Array Subsystem Installation Manual (SCSI)*, revision 2.

Preface

The *Hitachi Freedom Storage™ Thunder 9200™ Sun® Solaris® Host Installation Guide* describes and provides instructions for configuring the devices on the Hitachi Thunder 9200™ array subsystem for operation with the Sun® Solaris® operating system. This configuration guide is written for system administrators responsible for disk management and 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 Sun® Solaris® operating system, 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.

For further information on the Sun® Solaris® operating system, please consult the Sun® Solaris® online help and/or user documentation, or contact Sun® technical support.

COMMENTS

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

Thank you!

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1.1 Sun® Solaris® Configuration

This document describes the requirements and procedures for connecting the 9200 subsystem to Sun® Solaris® server and configuring the new 9200 devices for operation with the Sun® Solaris® 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 Sun® Solaris® operations includes:

- Setting LUs and file sizes (see Chapter 2),
- Installing the 9200 subsystem (see Chapter 3),
- Creating and formatting partitions (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

Before using the Hitachi Freedom Storage™ 9200, have the host platform and software installed and ready to use.

Note: Hitachi Data Systems recommends applying the latest patches to your operating system. Contact Sun Microsystems for the latest Solaris patch revision information.

The requirements for 9200 Sun® Solaris® configuration are:

- Hitachi Thunder 9200™ subsystem, all-open or multiplatform configuration.
  - The 9200 Resource Manager is used to configure the SCSI ports.

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

- Sun® Solaris® PC server. Please refer to the Sun® Solaris® user documentation for PC server hardware and configuration requirements.

  Note: For the latest information on Sun® Solaris® version support, please contact your Hitachi Data Systems account team.

Specific drivers have been verified for use with the 9200 subsystem, yet certain NetWare versions and features may not be supported by all vendors. Please contact your Hitachi Data Systems representative for specific information.

You need superuser privileges to perform the system administrator functions described in this chapter. If you do not have superuser privileges, contact your Sun® Solaris® system administrator.

This document pertains specifically to the Software Configuration of your host platform. Refer to the *Hitachi Freedom Storage™ Thunder 9200™ User and Reference Manual* (MK-90DF504) for hardware specific details and information for connecting and configuring your 9200.

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

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 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, and
- Setting file system sizes.

2.3.1 Setting Logical Units

The maximum number of logical units (LUs) that can be set on a single disk array subsystem is 64 for the Hitachi Freedom Storage™ Thunder 9200™. Contact your Hitachi Data Systems representative for information.

2.4 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.

2.5 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

2.6 Connecting Dual Controller Multiple Ports

In a dual controller, multiple ports configuration, a one-to-one pattern in connecting ports between the host adapter and the subsystem, or a one-to-many pattern in connecting the ports between the host adapter and the subsystem via a fibre-channel hub or switch is needed. Use the LU mapping function for this to avoid access competition. Such competition could corrupt data. Access contention may be avoided by operating the host server in the cold standby mode. To ensure availability, configuring with a fibre-channel hub or switch provides distribution to several hubs and switches.

Chapter 3 Configuring the New Devices

Configuration of the new 9200 devices for the Sun® Solaris® involve the following activities:

- Setting the logical units
- Setting and Registering Disk Geometry and Partitions Setting the Logical Units
- Creating file systems
- Setting Auto-Mount

Once the 9200 is installed and connected, you must set and recognize the new LUs by adding the 9200 logical devices to the **sd.conf** file (/kernel/drv/sd.conf). See Figure 3.1 and Figure 3.2.The **sd.conf** file includes the SCSI TID and LUN for all LDEVs connected to the Sun® system. After editing the **sd.conf** file, you will halt the system and reboot.

To set and recognize LUNs:

1. Log in as root, and make a back up of the /kernel/drv/sd.conf file by entering the command: **`cp -ip /kernel/drv/sd.conf /kernel/drv/sd.conf.standard`**
2. Edit the /kernel/drv/sd.conf file as shown in Figure 3.1 and Figure 3.2. Make sure to make an entry (SCSI TID and LUN) for every new device being added to the Sun® system.
3. Exit the vi editor by entering the command: ESC + **`:wq`**
4. Shutdown the Sun® system by entering the command: **`halt`**
5. Reboot the Sun® system by entering the comand **`boot –r`**
6. Log in to the Sun® as root and verify that the system recognizes the 9200 by entering the command dmesg | more. Figure 3.3 shows the SCSI device recognition.
7. Verify that the vendor name, product name, and number of blocks match the values listed in Figure 3.3.

```
# cp -ip /kernel/drv/sd.conf/standard                ← Copy the /kernel/drv.sd.conf file.
# vi /kernel/drv/sd.conf ↵                           ← Enter the file (vi shown).
# Copyright (c) 1992, by Sun Microsystems, Inc.
#
#ident "@(#)sd.conf    1.8     93/05/03 SMI"
name="sd" class="scsi"
     target=0 lun=0;

name="sd" class="scsi"       ← Add this information for all assigned target IDs and LUNs.
     target=0 lun=1;

#name="sd" class="scsi"
     target=0 lun=2;

#name="sd" class="scsi"
     target=0 lun=3;

#name="sd" class="scsi"
     target=0 lun=4;
```

Figure 3.1 Setting and Recognizing LUNs

```
# cp -ip /kernel/drv/sd.conf/standard          ← Copy the /kernel/drv.sd.conf file.
# vi /kernel/drv/sd.conf ↵
# Copyright (c) 1992, by Sun Microsystems, Inc.
#
#ident       "@(#)sd.conf    1.9     98/01/11 SMI"
name="sd" class="scsi" class_prop="atapi"
     target=0 lun=0;

name="sd" class="scsi" class_prop="atapi
     target=0 lun=1;

name="sd" class="scsi" class_prop="atapi"
     target=0 lun=2;

name="sd" class="scsi" class_prop="atapi"
     target=0 lun=3;

name="sd" class="scsi" class_prop="atapi"
     target=0 lun=4;
```

Figure 3.2 Setting and Recognizing LUNs for Solaris 8

```
# dmesg ↵
May 25 23:23
cpu0: SUNW,UltraSPARC-II (upaid 3 impl 0x11 ver 0x11 clock 296 MHz)
SunOS Release 5.6 Version Generic [UNIX(R) System V Release 4.0]
Copyright (c) 1983-1997, Sun Microsystems, Inc.
mem = 131072K (0x8000000)
avail mem = 124452864
Ethernet address = 8:0:20:90:cf:29
root nexus = Sun Ultra Enterprise 450 (UltraSPARC-II 296MHz)

glm5:   Rev. 4 Symbios 53c875 found.
PCI-device: scsi@1,1, glm #5
glm5 is /pci@6,2000/scsi@1,1
sd0 at glm0: target 0 lun 0
sd0 is /pci@1f,4000/scsi@3/sd@0,0
        <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
sd21 at glm1: target 6 lun 0
sd21 is /pci@1f,4000/scsi@2/sd@6,0
sd31 at glm2: target 1 lun 0
sd31 is /pci@1f,2000/scsi@1/sd@1,0 ← Indicates that LU0 of the Hitachi Disk Array
                                    Subsystem <HITACHI DFXXX> has been connected to sd31.
WARNING: /pci@1f,2000/scsi@1/sd@1,0 (sd31):
        corrupt label - wrong magic number

        Vendor 'HITACHI', product 'DFXXX', 139745280 512 byte blocks
root on /pci@1f,4000/scsi@3/disk@0,0:a fstype ufs
PCI-device: ebus@1, ebus #0
SUNW,envctrl0 at ebus0: offset 14,600000
SUNW,envctrl0 is /pci@1f,4000/ebus@1/SUNW,envctrl@14,600000
su0 at ebus0: offset 14,3083f8
su0 is /pci@1f,4000/ebus@1/su@14,3083f8
su1 at ebus0: offset 14,3062f8
su1 is /pci@1f,4000/ebus@1/su@14,3062f8
keyboard is </pci@1f,4000/ebus@1/su@14,3083f8> major <37> minor <0>
mouse is </pci@1f,4000/ebus@1/su@14,3062f8> major <37> minor <1>
stdin is </pci@1f,4000/ebus@1/su@14,3083f8> major <37> minor <0>
PCI-device: SUNW,m64B@3, m64 #0
SUNW,m64B0 is /pci@4,4000/SUNW,m64B@3

se0 is /pci@1f,4000/ebus@1/se@14,400000
se1 at ebus0: offset 14,200000
se1 is /pci@1f,4000/ebus@1/se@14,200000
SUNW,hme0: CheerIO 2.0 (Rev Id = c1) Found
PCI-device: network@1,1, hme #0
SUNW,hme0 is /pci@1f,4000/network@1,1
```

Figure 3.3 Verifying New Devices

3.1 Setting the Disk Geometry

Use the **format** command to register Disk Geometry and partition information (see Figure 3.4). Following this, check the /etc/format.dat file (see Figure 3.9).

```
# format ↵

Searching for disks...done

AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
          /pci@1f,4000/scsi@3/sd@0,0
       1. c2t1d0 <HITACHI-DFXXX-0000 cyl 11370 alt 2 hd 32 sec 384>
          /pci@1f,2000/scsi@1/sd@1,0
Specify disk (enter its number): 1 ↵   ← Enter number of disk to register.
selecting c2t1d0
[disk formatted]
 :
format> partition ↵

PARTITION MENU:
        0      - change `0' partition
        1      - change `1' partition
        2      - change `2' partition
        3      - change `3' partition
        4      - change `4' partition
        5      - change `5' partition
        6      - change `6' partition
        7      - change `7' partition
        select - select a predefined table
        modify - modify a predefined partition table
        name   - name the current table
        print  - display the current table
        label  - write partition map and label to the disk
        !<cmd> - execute <cmd>, then return
        quit

partition> name ↵                    ← Assign a name to the partition.
Enter table name (remember quotes): DFXXX-LU00 ↵

partition> quit ↵


FORMAT MENU:
        disk       - select a disk
 :
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return
        quit

format> save ↵                       ← Registers the geometry information.
Saving new disk and partition definitions
Enter file name["./format.dat"]: /etc/format.dat ↵
format> quit ↵
```

Figure 3.4 Setting and Registering Disk Geometry and Partitions

3.2 Setting the Partitions

Use the **format menu** to set the partitions (see Figure 3.5). Use the label command to label the disk (see Figure 3.6).

```
FORMAT MENU:
        disk       - select a disk
        type       - select (define) a disk type
        partition  - select (define) a partition table
        current    - describe the current disk
        format     - format and analyze the disk
        repair     - repair a defective sector
        label      - write label to the disk
        analyze    - surface analysis
        defect     - defect list management
        backup     - search for backup labels
        verify     - read and display labels
        save       - save new disk/partition definitions
        inquiry    - show vendor, product and revision
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return
        quit
format> partition ↵       ← Enter a partition.


PARTITION MENU:
        0      - change `0' partition
        1      - change `1' partition
        2      - change `2' partition
        3      - change `3' partition
        4      - change `4' partition
        5      - change `5' partition
        6      - change `6' partition
        7      - change `7' partition
        select - select a predefined table
        modify - modify a predefined partition table
        name   - name the current table
        print  - display the current table
        label  - write partition map and label to the disk
        !<cmd> - execute <cmd>, then return
        quit
```

```
partition> print ↵   ← Using Auto Configuration, confirm the partition information is set.
Current partition table (original):
Current partition table (default):
Total disk cylinders available: 11370 + 2 (reserved cylinders)

Part      Tag      Flag     Cylinders         Size           Blocks
  0        root    wm       0 -    21      132.00MB        (22/0/0)       270336
  1        swap    wu       22 -    43     132.00MB        (22/0/0)       270336
  2      backup    wu       0 - 11369       66.62GB        (11370/0/0) 139714560
  3  unassigned    wm       0                         0     (0/0/0)            0
  4  unassigned    wm       0                         0     (0/0/0)            0
  5  unassigned    wm       0                         0     (0/0/0)            0
  6         usr    wm       44 - 11369      66.36GB        (11326/0/0) 139173888
  7  unassigned    wm       0                         0        (0/0/0)            0

partition> b ↵                        ← Enter the partition number to set.
Part      Tag    Flag     Cylinders         Size            Blocks
  0             root    wm       0 -    21      132.00MB    (22/0/0)       270336

Enter partition id tag[root]: ↵
Enter partition permission flags[wm]: ↵
Enter new starting cyl[0]: 1 ↵       ← Start the "starting cyl" from a value of 1.
Enter partition size[270336b, 22c, 132.00mb, 0.13gb]: 170c ↵  ← Enter partition size.
partition> 1 ↵
Part      Tag    Flag     Cylinders         Size            Blocks
  1       swap    wu      22 -    43      132.00MB    (22/0/0)       270336

Enter partition id tag[swap]: ↵
Enter partition permission flags[wu]: ↵
Enter new starting cyl[22]: 171 ↵
Enter partition size[270336b, 22c, 132.00mb, 0.13gb]: 342c ↵
```

Figure 3.5 Setting the Partitions (continued from previous page)

```
partition> label ↵
Ready to label disk, continue? y ↵

partition> print ↵
Part  Tag     Flag    Cylinders                 Size         Blocks
  0               root       wm        1 -   170            1020.00MB
     (170/0/0)     2088960
  1             swap wu      171 -   512                  2.00GB           (342/0/0)
4202496
  2          backup  wu        0 - 11369                66.62GB            (11370/0/0)
139714560
  3   unassigned     wm       513 -  1194          4.00GB           (682/0/0)     8380416
  4   unassigned     wm       1195 -  2560         8.00GB           (1366/0/0)   16785408
  5   unassigned     wm       2561 -  5290       16.00GB            (2730/0/0)   33546240
  6  usr     wm       5291 – 10752       32.00GB             (5462/0/0)   67117056
  7   unassigned     wm      10753 – 11369        3.62GB     (617/0/0)     7581696

partition> quit ↵
 :
format> quit ↵
```

Figure 3.6 Labeling the Disk

3.3 Registering the Disk Geometry and Partition Information

Use the **format** command to verify disk geometry and partition information.

```
# format ↵
Searching for disks...done

c2t1d0: configured with capacity of 66.62GB


AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
          /pci@1f,4000/scsi@3/sd@0,0
       1. c2t1d0 <HITACHI-DFXXX-0000 cyl 11370 alt 2 hd 32 sec 384>
          /pci@1f,2000/scsi@1/sd@1,0
Specify disk (enter its number): 1 ↵ ← Enter disk number for setting geometry information.
selecting c2t1d0
[disk formatted]
Disk not labeled.  Label it now? y ↵
```

Figure 3.7 Checking Disk Geometry and Partition Information

```
# format ↵

Searching for disks...done

AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
          /pci@1f,4000/scsi@3/sd@0,0
       1. c2t1d0 <HITACHI-DFXXX-0000 cyl 11370 alt 2 hd 32 sec 384>
          /pci@1f,2000/scsi@1/sd@1,0
Specify disk (enter its number): 1 ↵   ← Enter the disk number to register.
selecting c2t1d0
[disk formatted]
 :
format> partition ↵

PARTITION MENU:
        0      - change `0' partition
        1      - change `1' partition
        2      - change `2' partition
        3      - change `3' partition
        4      - change `4' partition
        5      - change `5' partition
        6      - change `6' partition
        7      - change `7' partition
        select - select a predefined table
        modify - modify a predefined partition table
        name   - name the current table
        print  - display the current table
        label  - write partition map and label to the disk
        !<cmd> - execute <cmd>, then return
        quit

partition> name ↵                                  ← Assign a name to the partition.
Enter table name (remember quotes): DFXXX-LU00 ↵   ← Enter any name.

partition> quit ↵


FORMAT MENU:
        disk       - select a disk
 :
        volname    - set 8-character volume name
        !<cmd>     - execute <cmd>, then return
        quit

format> save ↵
Saving new disk and partition definitions          ← Registers the geometry information.
Enter the file name["./format.dat"]: /etc/format.dat ↵
Format. Quit ↵
```

Figure 3.8 Registry Disk Geometry and Partition Information

After verifying the disk's geometry and partition information, use the **tail** command to check contents of the /etc/format.dat file (see Figure 3.9).

```
# tail /etc/format.dat ↵
disk_type = "HITACHI-DFXXX-0000" \
         : ctlr = SCSI : ncyl = 11370 : acyl = 2 : pcyl = 11372 \
         : nhead = 32 : nsect = 384 : rpm = 5400

partition = "DFXXX-LU00" \
         : disk = "HITACHI-DFXXX-0000" : ctlr = SCSI \
         : 0 =  1, 2088960 : 1 =  171, 4202496 : 2 =  0, 139714560 \
         : 3 =  513, 8380416 : 4 =  1195, 16785408 : 5 =  2561, 33546240 \
         : 6 =  5291, 67117056 : 7 =  10753, 7581696
```

Figure 3.9 Verifying Disk Geometry and Partition Information

3.4 Creating the File Systems

Use the **newfs** command to create each file system (see Figure 3.10). Use the **mkdir** command to create a directory for mounting the file system (see Figure 3.11). Use the **mount** command to check the file system (see Figure 3.12).

```
# newfs /dev/rdsk/c2t1d0s0 ↵
newfs: construct a new file system /dev/rdsk/c2t1d0s0: (y/n)? y ↵
/dev/rdsk/c2t1d0s0:  Total number of cylinders:  4202496 (342 cylinders, 32 tracks, 384
sectors)
     2052.0MB in 43 cylinder groups (8 c/g, 48.00MB/g, 7744 i/g)
Where to back up super-blocks (for fsck -F ufs -0 b= #):
32, 98720, 197408, 296096, 394784, 493472, 592160, 690848, 789536, 888224,
 986912, 1085600, 1184288, 1282976, 1381664, 1480352, 1579040, 1677728,
 1776416, 1875104, 1973792, 2072480, 2171168, 2269856, 2368544, 2467232,
```

Figure 3.10 Creating a File System

```
# mkdir /array1
#
```

Figure 3.11 Creating a Directory for Mounting the File System

```
# mount /dev/dsk/c2t1d0s0 /array1 ↵
#
```

Figure 3.12 Verifying the File System

3.5 Setting and Verifying the Auto-Mount Parameters

To set Auto-Mount, partitions should be registered into the /etc/vfstab file.

```
# vi /etc/vfstab ↵
#device              device          mount   FS      fsck    mount   mount
#to mount            to fsck                 point   type    pass    at boot options
#
/dev/dsk/c1d0s2      /dev/rdsk/c1d0s2        /usr      ufs   1       yes     -
fd           -              /dev/fd           fd    -       no      -
/proc        -              /proc     proc  -       no      -
①                    ②                       ③         ④    ⑤       ⑥
/dev/dsk/c0t8d0s4    -                       -         swap  -       no      -
/dev/dsk/c0t8d0s0    /dev/rdsk/c0t8d0s0      /         ufs   1       no      -
/dev/dsk/c0t8d0s6    /dev/rdsk/c0t8d0s6      /usr      ufs   1       no      -
/dev/dsk/c0t8d0s3    /dev/rdsk/c0t8d0s3      /var      ufs   1       no      -
/dev/dsk/c0t8d0s7    /dev/rdsk/c0t8d0s7      /export/home ufs2       yes     -
/dev/dsk/c0t8d0s5    /dev/rdsk/c0t8d0s5      /opt      ufs   2       yes     -
/dev/dsk/c0t8d0s1    /dev/rdsk/c0t8d0s1      /usr/openwin  ufs       2       yes     -
swap         -              /tmp      tmpfs -       yes     -
/dev/dsk/c2t1d0s0    /dev/rdsk/c2t1d0s0      /array1   ufs   3       yes     - ← Add line.
/dev/dsk/c2t1d0s1    /dev/rdsk/c2t1d0s1      /array2   ufs   3       yes     -
/dev/dsk/c2t1d0s3    /dev/rdsk/c2t1d0s3      /array3   ufs   3       yes     -
/dev/dsk/c2t1d0s4    /dev/rdsk/c2t1d0s4      /array4   ufs   3       yes     -
```

Figure 3.13 Setting and Verifying the Auto-Mounting Parameters

Table 3.1 Auto-Mount Parameters

Parameter #	Name	Enter
①	Device to mount	Block type device filename
②	Device to fsck	Device file name
③	Mount point	Mount directory name
④	fs type	Type of file system (e.g., UFS, AdvFS)
⑤	Fsck pass	Order of performing file system checks
⑥	Mount at Boot	To mount or not to mount at boot

3.6 Checking the File Systems

Use the **df -k command** to check if the newly created file system meets capacity requirements (see Figure 3.14).

```
# df –k ↵
Filesystem            Ksize   used    avail   capacity       Mounted on
/dev/dsk/c0t8d0s0     433279  22158   367794  6%             /
/dev/dsk/c0t8d0s6     529687  218039  258680  46%            /usr
/proc                 0       0       0       0%             /proc
fd                    0       0       0       0%             /dev/fd
/dev/dsk/c0t8d0s3     529687  48988   427731  11%            /var
/dev/dsk/c0t8d0s7     1488943 559285  870101  40%            /export/home
/dev/dsk/c0t8d0s5     133255  44729   75201   38%            /opt
/dev/dsk/c0t8d0s1     529687  209262  267457  44%            /usr/openwin
swap                  726392  232     726160  1%             /tmp
/dev/dsk/c2t1d0s0     982055  9       980410  1%             /array1
/dev/dsk/c2t1d0s1     2058919 9       2052047 1%             /array2
/dev/dsk/c2t1d0s3     4126350 9       4085078 1%             /array3
/dev/dsk/c2t1d0s4     8265005 9       8182346 1%             /array4
#
```

Figure 3.14 Checking the File System

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).

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
LU	logical unit
LUN	logical unit number
MB	megabytes
PC	personal computer system
R-SIM	remote SIM
RAID	redundant array of independent disks
SCSI	small computer system interface