x64 Servers Utilities Reference Manual

Sun

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Contents

Preface

The *x64 Servers Utilities Reference Manual* contains instructions for using applications and utilities common to many x64 servers. To determine whether your server supports these applications or utilities, see the *Product Notes* for your product.

Related Documentation

For a description of the document set for your x64 server, see the *Where To Find Documentation* sheet or the *Getting Started Guide* that is packed with your system and also posted on the product's documentation site.

Go to one of the following URLs, and then navigate to your product.

(http://docs.sun.com)

Translated versions of some of these documents are available at the web site described above in French, Simplified Chinese, and Japanese. English documentation is revised more frequently and might be more up-to-date than the translated documentation.

New Manual for LSI RAID Documentation

This manual previously included chapters on the following LSI RAID applications:

- LSI MegaRAID Storage Manager
- LSI SNMP Utility

The information on these applications has been moved to a new manual:

Sun LSI 106x RAID User's Guide, 820-4933

If this manual applies to your product, it appears on the product documentation web page on:

(http://docs.sun.com)

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x64 Servers Utilities Reference Manual, 820-1120-22

Applications and Utilities for x64 Servers

This book describes some applications and utilities that are common to several x64 servers.

The chapter has the following sections:

Supported Applications and Utilities

Many of the applications or utilities are available on your product's Tools and Drivers CD. Alternately, you can download a CD image or individual software packages from the Sun web site at:

All supported applications and utilities can be found on your platform's Tools and Drivers CD, or CD image.

(http://sun.com/downloads/)

Free registration is required.

On this web page, look for the link labelled "x64 Servers and Workstations." The linked page provides links to all x64-related downloads, organized by product name.

A list of some applications and utilities follows:

hd Utility

hd Utility is a hard disk drive utility used to determine the logical-to-physical device mapping of your system. hd Utility is included in the SUNWhd package and is preinstalled on your server. For more information, see Chapter 2, Using the hd Utility on Oracle Solaris; Chapter 4, Using the hd Utility on Linux; or Chapter 3, Using the hd Utility on Windows.

The hd utility is supported on the following OSes:

- Oracle Solaris OS
- OpenOracle Solaris Nevada build 35
- OpenOracle Solaris 2009
- RedHat Enterprise Linux 4
- RedHat Enterprise Linux 5
- SLES10 SP1
- SLES11

Note – The hd utility is not supported on Oracle Solaris 10 10/09, or the Sun Storage 7210, Sun Storage 7410, and Sun Storage 7720 platforms.

Hardware Error Report and Decode (HERD)

Hardware Error Report and Decode (HERD) tool is a utility for monitoring, decoding, and reporting correctable hardware errors.

Note – HERD is supported on platforms with AMD processors.

For more information, see Chapter 7, Hardware Error Report and Decode Tool (HERD) 3.0 for Linux.

Disk Control and Monitor Utility (DCMU)

Disk Control and Monitor Utility (DCMU) controls and monitors disk drives on the Sun Fire X4500 and X4540 servers and does the following tasks:

- Monitors disk drive status and hot plug events.
- Reports disk drive failures, Field Replaceable Units (FRU) information, and hotplug events to the host's service processor (SP).
- Controls connect/disconnect events and logs these events in syslog and, more importantly, in the service processor logs (SDR, FRU, SEL).

You may access these logs individually for specific information to aid in the administration or troubleshooting of the disk array. DCMU for RHEL consist of three components. Each component updates the FRU, SDR (Sensor Data Record), SEL (System Event Log) and service processor logs:

- cfgdisk
- hotplugmon
- faultmond

IPMItool is an additional command line component that may be used as a supplement to DCMU to access service processor sensor data, read the SEL and FRU information, and perform chassis power control operations via the server's Service Processor. For more information, see the *Sun Fire X4540 Server Linux and Solaris OS Installation Guide*.

IPMItool

IPMItool is a simple command-line interface that is useful for managing IPMI-enabled devices. This utility performs IPMI functions with a kernel device driver or over a LAN interface. IPMItool enables you to manage system field-replaceable units (FRUs), monitor system health, and monitor and manage system environmentals independent of the operating system. Some Sun servers implement a subset o f IPMI functions. You can download this tool from (http://ipmitool.sourceforge.net/). For more information, see Chapter 5, IPMItool for Windows.

RAID Utilities

RAID allows you to manage an array of disks for increased redundancy, recoverability, and performance. A RAID-1 volume, or mirror, is a volume that maintains identical copies of the data in RAID-0 (stripe or concatenation) volumes. The RAID-0 volumes that are mirrored are called submirrors. After you configure a mirror, the mirror can be used just like a physical slice.

MegaRAID Storage Manger (MSM) is a configuration setup utility that enables you to configure, monitor, and maintain storage configurations on SAS106x Integrated RAID controllers. MSM is available on the Tools and Drivers CD or the Tools and Drivers CD image on the product download site.

For more information, see the *Sun LSI 106x RAID User's Guide*. For Adaptec-based RAID arrays, see Chapter 6, "Managing RAID Using the StorageTek RAID Manager (for Adaptec-based RAID Controller)" on page 45.

LSI (SAS-IR) SNMP is a utility used over SAS connections to monitor MSM-IR activity from a remote station. It is available on the Tools and Drivers CD or the Tools and Drivers CD image on the product download site. These servers support the LSI SNMP utility on the Windows Server 2003 OS and on Linux.

For more information, see the *Sun LSI 106x RAID User's Guide*. For LSI-based RAID arrays, see "Managing RAID Using the MegaRAID Storage Manager (for LSI-based RAID Controllers)" on page 46.

The raidctl utility creates, deletes, or displays RAID volumes of the LSI1030 HW RAID controller. For more information, see the *Sun LSI 106x RAID User's Guide*.

NIC Teaming

NIC teaming (also known as IEEE 802.3ad Link Aggregation) for Windows is the grouping of Network Interface Cards (NICs) into one logical interface to increase availability and enable load balancing. NIC teaming provides for fault tolerance, load balancing, link aggregation, and Virtual LAN (VLAN) tagging in Windows 2008 and Windows 2008 R2. When you install the NIC Teaming supplemental software for your Sun server, Intel PROSet software configuration tabs are automatically added to the network adapters listed in Device Manager. Adapters that appear in the Intel PROSet teaming wizard can be included in a team.

NVIDIA Network Access Manager (NAM)

The NVIDIA Network Access Manager can be used to configure the teaming of NVIDIA network interface ports on on systems running Windows 2003 and Windows 2008 operating systems. Use NAM to optimize your server's network performance, increase its network bandwidth, and provide optimal throughput in case one of your network adapters stops functioning. See also NIC Teaming.

Supported Utilities by Platform

TABLE 1-1 lists the supported applications and utilities described in this document.

> **Note –** For latest information on supported utilities, see the product notes of your server.

TABLE 1-1 Supported Applications and Utilities by Platform

Server (* — EOL)	HERD	hd Utility	RAID	RAID 0/1	NIC Teaming	NAM	DCMU
Sun Fire X2100* Sun Fire X2100 M2*	--	S	SLW	--	--	W	--
Sun Fire X2200 M2	L	--	--	--	--	--	--
Sun Fire X2250	--	--	SLW	--	--	--	--
Sun Fire X2270 Sun Fire X2270 M2	--	--	W	--	W	--	--
Sun Fire X4100* Sun Fire X4200*	--	--	SLW	--	--	--	--
Sun Fire X4100 M2* Sun Fire X4200 M2*	L	--	SLW	--	--	--	--
Sun Fire X4140 Sun Fire X4240 Sun Fire X4440	L	--	SLW	--	--	W	--
Sun Fire X4150 Sun Fire X4250 Sun Fire X4450	--	--	SLW	--	W	--	--

TABLE 1-1 Supported Applications and Utilities by Platform *(Continued)*

Server (* — EOL)	HERD	hd Utility	RAID	RAID 0/1	NIC Teaming	NAM	DCMU
Sun Fire X4170 Sun Fire X4170 M2 Sun Fire X4270 Sun Fire X4270 M2 Sun Fire X4275	--	--	SLW	--	W	--	--
Sun Fire X4470	--	--	SLW	SLW	W08, W08 R2	--	--
Sun Fire X4500	L	SLW	S, W03	--	W	--	SLW
Sun Fire X4540	L	SLW	W03, W08	--	--	W	SLW
Sun Fire X4600 Sun Fire X4600 M2	L	--	SLW	SLW	--	--	--
Sun Fire X4640	L	--	SLW	SLW	--	--	--
Sun Fire X4800	--	--	SLW	--	W08, W08 R2	--	--
Sun Blade X6220	L	--	SLW	--	--	--	--
Sun Blade X6240	--	--	SLW	--	--		--
Sun Blade X6250	--	--	SLW	--	W	--	--
Sun Blade X6270	--	--	SLW	--	W	--	--
Sun Blade X6275	--	--	SLW	--	W	--	--
Sun Blade X6450	--	--	--	--	W	--	--

Legend: S = Oracle Solaris OS, L = Linux, W = Windows

Locating Other Applications and Utilities

The following applications and utillities are supported by many servers, but are not covered in this document:

- "Sun Installation Assistant (SIA)" on page 7
- "Sun xVM Ops Center" on page 7
- "Sun VTS" on page 7
- "cfggen" on page 7
- "ipmiflash" on page 8
- "Pc-Check" on page 8

Sun Installation Assistant (SIA)

Sun Installation Assistant (SIA) is a tool that assists you in the installation of supported Linux and Microsoft Windows operating systems (OS), firmware upgrades, SP recovery, option card drivers, applications, and utilities onto x64 Sun Fire and Sun Blade servers. SIA is an orderable software option, and can also be download from the Sun Download page at:
(http://www.sun.com/download/index.jsp).

For more information on the SIA, see the *Sun Installation Assistant for Windows and Linux User's Guide*.

VMware runs on Windows and Linux and enables users to configure multiple virtual systems. To install the VMware or VMware ESX Server ISO image, you must first download an ISO image of the software installation CD.

Sun xVM Ops Center

Sun xVM Ops Center, part of Oracle Solaris Management Tools, is used to provision, update, and manage the systems. Sun xVM Ops Center manages multi-platform x64 and SPARC systems, and facilitates many aspects of compliance reporting (ITIL), data center automation, and enables the simultaneous management of systems.

For more information, go to (docs.sun.com).

Sun VTS

SunVTS diagnostic software enables the server to boot using the Oracle Solaris OS on the CD. The SunVTS software runs diagnostic tests and outputs log files that are used to determine the problem with the server. The SunVTS software can be found on the Bootable Diagnostics CD that is shipped with servers that SunVTS supports.

For more information, go to (docs.sun.com).

cfggen

cfggen is a configuration utility used to create Integrated Mirroring (IM) volumes. cfggen runs in the Windows Preinstallation Environment (WinPE) and on DOS. The utility is a minimally interactive program that can be executed from a command-line prompt or a shell script. You can install cfggen from the Tools and Drivers CD, if available, or from your product Tools and Drivers CD image, downloadable from the product web page.

For more information, see *Sun LSI 106x RAID User's Guide*.

ipmiflash

`ipmiflash` utility provides the ability to initiate firmware updates, and can be used to recover the SP firmware image if it becomes corrupted.

The ipmiflash utility provides methods to upgrade the ILOM service processor and BIOS remotely over the management network and locally from the server. This utility is available for Linux and Oracle Solaris operating systems.

See the `ipmiflash` man page for more information.

Pc-Check

The DOS-based Pc-Check utility is a server diagnostics tool that is accessed and executed only from the Tools and Drivers CD. Pc-Check was designed to detect and test all motherboard components, ports, and slots for hardware-related error messages (such as memory errors or hard disk errors) on your server.

Using the hd Utility on Solaris OS 10

This chapter describes how to use the hd utility, also known as hdtool, on the Solaris OS. The hd utility is a hard disk drive mapping tool used to determine the logical-to-physical device mapping on Sun Fire X4500 and X4540 servers.

This chapter includes the following sections:

For additional commands, see the following man pages for additional commands: format(1M), cfgadm(1M), devfsadm(1M), and fdisk(1M).

Installing the hd Utility

You can install the utility from the Tools and Drivers CD, if available. The hd utility is also available on the server product download page and resides in the Tools and Drivers CD in the /solaris/tools/hdtool/ directory

You can install the utility from the Tools and Drivers CD, if available, or from your product Tools and Drivers CD image, downloadable from the product web page.

Note – On the Sun Fire X4500/X4540 servers, the hd utility is included in the SUNWhd package preinstalled in /opt/SUNWhd/hd/bin/hd.

To install the hd, type:

 # pkgadd -d ./SUNWhd-x.xx.pkg

where *x.xx* is the version number of SUNWhd.

To remove the SUNWhd package, type:

 # pkgrm SUNWhd

Once you have downloaded hd, from a command line, go to its directory:

#cd /usr/bin/hd

Then, type:

#hd -c

You can find more information on the hd utility in the HTML man pages at:

/opt/SUNWhd/hd/bin/hd.html

/opt/SUNWhd/hd/bin/hdadm.html

To view the options available for the hd command, type:

#hd -h

Identifying the Hard Disk Drives

You use the utility to get a logical-to-physical mapping of the devices. This mapping can help you to administer the system, manage the hard drives, and troubleshoot the server.

The hd utility output enables you to locate all the drives visually based on the physical topology of the drives by providing a color-coded hard drive location map. The hd utility provides the following functions:

■ Probes and displays all the available storage devices on the system

■ Provides color-coded hard drive location maps

■ Enables remote analysis

The hd utility maps the disk drives then produces output that can also help you to identify empty slots and drives that have not been enumerated. FIGURE 2-1 displays a map of the Sun Fire X4500 server and the 48 internal SATA disk drives it supports.

FIGURE 2-1   Server Drive and Fan Tray Layout of the Sun Fire X4500 Server
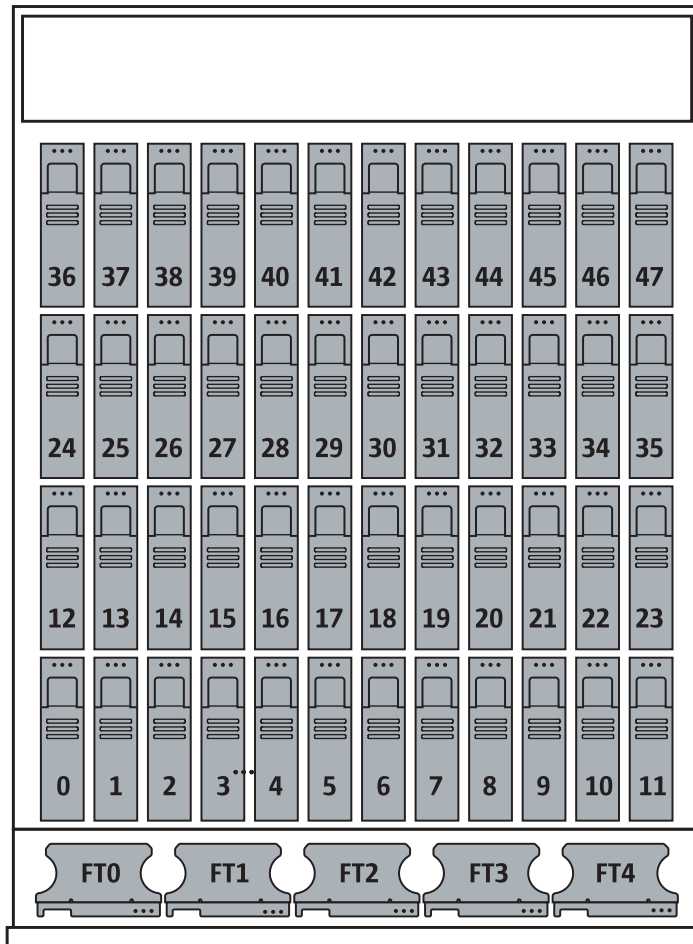
The Sun Fire X4500 server comes with six controllers, each supporting up to eight SATA drives, for a total of 48 SATA drives. Before you reinstall the Solaris OS, you need to determine the logical device name that corresponds to the two bootable drives, which is in the form:

`cXtYdZsW`

where

- `cX` is the controller (or interface) number, such as c0, c2, c4, and so on. Controller numbers are logically assigned in sequential order.
- `tY` is the target ID of the device, such as t0, t1, t2, and so on up to 7.
- `dZ` is the device number (also known as the logical unit number (LUN). It reflects the actual address of the device unit. Z is zero (0) for Solaris 10 11/06 OS.

■ *sW* is the slice number that represents a slice of a drive. Valid numbers are 0 to 7.

Determining the Boot Drive

To determine the bootable drive, use the command `cfgadm`. The `cfgadm` command provides configuration administration operations on dynamically reconfigurable hardware resources. For more information on this command, see the `man` page.

Determining Empty Slots and Unrecognized Drives

The `hd` utility works with Solaris disk maintenance and configuration administration commands like `format` and `cfgadm`. The `hd` output can also help you with identifying empty slots and drives that have not been recognized by the Solaris operating system.

Viewing the Hard Disk Drive Map

The utility probes and displays all of the available drives in the system with their logical device name. Here is sample output from the `hd` utility for the Sun Fire X4500 server:

```
----------------------Sun Fire X4500 Server--------Rear-----------
36:    37:    38:    39:    40:    41:    42:    43:    44:    45:    46:    47:
c5t3   c5t7   c4t3   c4t7   c7t3   c7t7   c6t3   c6t7   c1t3   c1t7   c0t3   c0t7
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
24:    25:    26:    27:    28:    29:    30:    31:    32:    33:    34:    35:
c5t2   c5t6   c4t2   c4t6   c7t2   c7t6   c6t2   c6t6   c1t2   c1t6   c0t2   c0t6
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
12:    13:    14:    15:    16:    17:    18:    19:    20:    21:    22:    23:
c5t1   c5t5   c4t1   c4t5   c7t1   c7t5   c6t1   c6t5   c1t1   c1t5   c0t1   c0t5
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
0:     1:     2:     3:     4:     5:     6:     7:     8:     9:     10:    11:
c5t0   c5t4   c4t0   c4t4   c7t0   c7t4   c6t0   c6t4   c1t0   c1t4   c0t0   c0t4
^b+    ^b+    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
-------*-----------*----Sun Fire X4500 Server----*---Front-----*----
```

> **Note –** The order of controllers in this display can change if you have a different software revision or if you have different devices in the system.

Viewing the Controllers

The following command displays the disk controller number and the corresponding PCI device nodes. This is useful in determining the HBA controller number based on the PCI device node from `syslog` messages.

EXAMPLE 2-1   hd Command for Viewing Controllers

```
# hd -j

0 /devices/pci@0,0/pci1022,7458@1/pci11ab,11ab@1 c0
1 /devices/pci@0,0/pci1022,7458@2/pci11ab,11ab@1 c1
2 /devices/pci@1,0/pci1022,7458@3/pci11ab,11ab@1 c4
3 /devices/pci@1,0/pci1022,7458@4/pci11ab,11ab@1 c5
4 /devices/pci@2,0/pci1022,7458@7/pci11ab,11ab@1 c6
5 /devices/pci@2,0/pci1022,7458@8/pci11ab,11ab@1 c7
```

Viewing Vendor and Temperatures of Drives

Here is sample output from the hd utility for the Sun Fire X4540 server. It includes a list of drives, vendor, and the temperature and is followed by a mapping table.

```
% hd
platform = Sun Fire X4540

Device     Serial         Vendor   Model          Rev  Temperature
------     ------         ------   -----          ---- -----------
c0t0d0p0   VN67ZBHK76DF   ATA      HITACHI HDS7250S  AJ0A 31 C (87 F)
c0t1d0p0   E400P6G1A78E   ATA      HITACHI HUA7250S  A90A 32 C (89 F)
c0t2d0p0   E400P6G1DHYE   ATA      HITACHI HUA7250S  A90A 33 C (91 F)
c0t3d0p0   F400P6G2ME3F   ATA      HITACHI HUA7250S  A90A 35 C (95 F)
c0t4d0p0   E400P6G1DG6E   ATA      HITACHI HUA7250S  A90A 30 C (86 F)
c0t5d0p0   VN67ZBHK16RF   ATA      HITACHI HDS7250S  AJ0A 33 C (91 F)
c0t6d0p0   E400P6G1DEXE   ATA      HITACHI HUA7250S  A90A 33 C (91 F)
c0t7d0p0   F400P6G2MEXF   ATA      HITACHI HUA7250S  A90A 34 C (93 F)
c1t0d0p0   F400P6G2MM1F   ATA      HITACHI HUA7250S  A90A 29 C (84 F)
c1t1d0p0   E400P6G1A4GE   ATA      HITACHI HUA7250S  A90A 32 C (89 F)
c1t2d0p0   F400P6G2MD7F   ATA      HITACHI HUA7250S  A90A 33 C (91 F)
c1t3d0p0   F400P6G2993F   ATA      HITACHI HUA7250S  A90A 34 C (93 F)
```

```
c1t4d0p0   E400P6G1DMHE   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c1t5d0p0   E400P6G1D33E   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c1t6d0p0   F400P6G2MH6F   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c1t7d0p0   E400P6G184NE   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
c2t0d0p0   E400P6G1DHGE   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c2t1d0p0   E400P6G1BVNE   ATA      HITACHI HUA7250S   A90A 31 C (87 F)
c2t2d0p0   E400P6G1DHAE   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c2t3d0p0   E400P6G1DKZE   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c2t4d0p0   E400P6G1DEYE   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c2t5d0p0   F400P6G2K8RF   ATA      HITACHI HUA7250S   A90A 31 C (87 F)
c2t6d0p0   F400P6G28TEF   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c2t7d0p0   E400P6G1D90E   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
c3t0d0p0   F400P6G29SAF   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c3t1d0p0   E400P6G1A94E   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c3t2d0p0   E400P6G1DHPE   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c3t3d0p0   E400P6G18L3E   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
c3t4d0p0   E400P6G1D9SE   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c3t5d0p0   F400P6G2ME0F   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c3t6d0p0   F400P6G2G6WF   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c3t7d0p0   E400P6G18E6E   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c4t0d0p0   E400P6G1DM2E   ATA      HITACHI HUA7250S   A90A 30 C (86 F)
c4t1d0p0   F400P6G2DY0F   ATA      HITACHI HUA7250S   A90A 31 C (87 F)
c4t2d0p0   F400P6G2MEBF   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c4t3d0p0   E400P6G1ABEE   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c4t4d0p0   5SF00Q3F       ATA      SEAGATE ST32502N   SU09 27 C (80 F)
c4t5d0p0   E400P6G1DDGE   ATA      HITACHI HUA7250S   A90A 31 C (87 F)
c4t6d0p0   F400P6G2MG7F   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c4t7d0p0   E400P6G1B96E   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
c5t0d0p0   9QM0FPG3       ATA      SEAGATE ST35002N   SU09 26 C (78 F)
c5t1d0p0   E400P6G1D9TE   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c5t2d0p0   F400P6G2KAJF   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c5t3d0p0   E400P6G1DDXE   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
c5t4d0p0   5QK0485C       ATA      SEAGATE ST37502N   SU09 28 C (82 F)
c5t5d0p0   E400P6G1DHME   ATA      HITACHI HUA7250S   A90A 32 C (89 F)
c5t6d0p0   E400P6G1DGEE   ATA      HITACHI HUA7250S   A90A 33 C (91 F)
c5t7d0p0   E400P6G1AB1E   ATA      HITACHI HUA7250S   A90A 34 C (93 F)
```

Using the hd Command for Troubleshooting

hd utility makes a distinction between controllers, slots, and storage devices that are physically present in the machine and visible to Solaris.

The hd command provides configuration and status information about the server's drives and has several options. Some of the options include displaying color mode (-c), summary (-s), diagnose (-d), identifying platform type (-p), and obtaining configuration and status help messages (-h).

For more information and options, refer to the hd man page.

Viewing Hard Drive Status

Use the hd command to determine the status of a drive by mapping the drive location. For the command options, enter the following:

#hd -h

TABLE 2-1 lists the hd options.

TABLE 2-1   hd Utility Command Options

Options	Descriptions
-c	Displays status in color mode.
	There are three status rows for each device:
	• Physical slot/location that matches the chassis label.
	• Logical location that matches Solaris Storage device name.
	• c*X*t*Y* drive runtime status.
	The following syntax is used.
	• Up arrow (^): Indicates the device.
	• Green: Device enumerated.
	• ++: Device is present and accessible.
	• Red: Device not enumerated or no drive in physical slot/location.
	• --: Device is not accessible, absent/empty or down.
	• .: Devices under the controller are not enumerated. The controller is not enumerated until there is a drive in the slots.
	• Yellow: Device has warning messages. Available in diagnose mode.
	• ##: Device has warning messages from the storage subsystem.
	• Blue: Bootable drive slot.
	• b: Drive slot is bootable if an OS is installed on the drive.

TABLE 2-1   hd Utility Command Options *(Continued)*

Options	Descriptions
-s	Provides a summary list all the storage devices, device types, and the count of all storage devices. **Note -** If the system is a not a Sun Fire X4500 or X4540 server, and the subsystem supports the feature, it lists the storage devices with their logical device names, serial numbers, vendor, model, and drive temperatures.
-p	Identifies x64 platform type based on the x64 storage host controllers.
-b	Displays x64 server platform mapping type regardless of platform type in bypass mode.

Using the hd Command for Administration

The following hd commands enable you to view information on the systems hard drives.

Viewing Devices in Color Mode

The following command starts the utility in color mode and summarizes all the storage devices in the system.

#/hd -c -s

Here is an example of output listing a summary of all disks:

```
platform = Sun Fire X4500 Server
Device      Serial        Vendor    Model            Rev Temperature
------      ------        ------    -----            --- -----------
c0t0d0s2    K41BT4C7M6PS  HITACHI   HDS7225SBSUN250G V44O 29 C (84 F)
c0t4d0s2    K41BT4C7N4HS  HITACHI   HDS7225SBSUN250G V44O 32 C (89 F)
c1t0d0s2    K41BT4C7MTSS  HITACHI   HDS7225SBSUN250G V44O 30 C (86 F)
c1t4d0s2    K41BT4C7NXHS  HITACHI   HDS7225SBSUN250G V44O 32 C (89 F)
c2t0d0s2                  AMI       Virtual CDROM    1.00 None
c3t0d0s2                  AMI       Virtual Floppy   1.00 None
c4t0d0s2                  TEAC      DV-W516GA        C4S2 None
c5t0d0s2    K41BT4C7NVYS  HITACHI   HDS7225SBSUN250G V44O 34 C (93 F)
c5t4d0s2    K41BT4C7MP2S  HITACHI   HDS7225SBSUN250G V44O 33 C (91 F)
c6t0d0s2    K41BT4C7P2BS  HITACHI   HDS7225SBSUN250G V44O 31 C (87 F)
c6t4d0s2    K41BT4C7NG1S  HITACHI   HDS7225SBSUN250G V44O 34 C (93 F)
```

```
c7t0d0s2    K41BT4C7N54S  HITACHI  HDS7225SBSUN250G  V44O 29 C (84 F)
c7t4d0s2    K41BT4C7NVES  HITACHI  HDS7225SBSUN250G  V44O 33 C (91 F)
c8t0d0s2    K41BT4C7MKRS  HITACHI  HDS7225SBSUN250G  V44O 29 C (84 F)
c8t4d0s2    K41BT4C7N49S  HITACHI  HDS7225SBSUN250G  V44O 35 C (95 F)
----------------------Sun Fire X4500 Server--------Rear-----------
36:   37:   38:   39:   40:   41:   42:   43:   44:   45:   46:   47:
c6t3  c6t7  c5t3  c5t7  c8t3  c8t7  c7t3  c7t7  c1t3  c1t7  c0t3  c0t7
^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--
24:   25:   26:   27:   28:   29:   30:   31:   32:   33:   34:   35:
c6t2  c6t6  c5t2  c5t6  c8t2  c8t6  c7t2  c7t6  c1t2  c1t6  c0t2  c0t6
^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--
12:   13:   14:   15:   16:   17:   18:   19:   20:   21:   22:   23:
c6t1  c6t5  c5t1  c5t5  c8t1  c8t5  c7t1  c7t5  c1t1  c1t5  c0t1  c0t5
^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--   ^--
0:    1:    2:    3:    4:    5:    6:    7:    8:    9:    10:   11:
c6t0  c6t4  c5t0  c5t4  c8t0  c8t4  c7t0  c7t4  c1t0  c1t4  c0t0  c0t4
^b+   ^b+   ^++   ^++   ^++   ^++   ^++   ^++   ^++   ^++   ^++   ^++
-------*-----------*----Sun Fire X4500 Server----*---Front-----*----
Summary:
Vendor          Model                   Count
------          -----                   -----
HITACHI         HDS7225SBSUN250G        12
AMI             Virtual CDROM            1
AMI             Virtual Floppy           1
TEAC            DV-W516GA                1
Total Storage Devices = 15
```

Viewing the x64 Platform Type

The following command displays the x64 platform type:

```
#hd -p
platform = Sun Fire X4500 server
```

Viewing the PCI Storage Device Path

The following command displays the cXtY device name from the Solaris PCI storage
device path:

```
# hd -w
/pci@3,0/pci1022,7458@a/pci11ab,11ab@1/disk@0,0 c7t0 =
/pci@3,0/pci1022,7458@a/pci11ab,11ab@1/disk@0,0
```

Viewing Drive Warning Messages

The following command displays drive warning messages:

```
# hd -c -d -f /var/adm/messages
```

Viewing the `fdisk` Partition

The following command displays the `fdisk` partition for each `cXtY` device name with a summary:

```
# hd -c -s -a
platform = Sun Fire X4500
```

Here is an example of output listing the `fdisk` partition for each `cXtY` device name:

```
 Device     Serial        Vendor    Model                Rev Temperature Type
 ------     ------        ------    -----                --- ----------- ----
c0t4d0p0   K41BT4C7NXHS  HITACHI   HDS7225SBSUN250G     V44O 29 C (84 F) Solaris2
c5t0d0p0   K41BT4CG0PEE  HITACHI   HDS7225SBSUN250G     V44O 32 C (89 F) Solaris2
c5t4d0p0   K41BT4C7MULS  HITACHI   HDS7225SBSUN250G     V44O 30 C (86 F) Solaris2
c6t4d0p0   K41BT4CB6J5E  HITACHI   HDS7225SBSUN250G     V44O 32 C (89 F) None
c4t0d0p0   K41BT4CEMKHE  HITACHI   HDS7225SBSUN250G     V44O 34 C (93 F) OtherOS
c7t0d0p0   K41BT4C7NVYS  HITACHI   HDS7225SBSUN250G     V44O 29 C (84 F) Solaris2
c6t0d0p0   K41BT4CEE9NE  HITACHI   HDS7225SBSUN250G     V44O 34 C (93 F) Solaris2
c0t0d0p0   K41BT4CE447E  HITACHI   HDS7225SBSUN250G     V44O 29 C (84 F) OtherOS
c7t4d0p0   K41BT4CE87AE  HITACHI   HDS7225SBSUN250G     V44O 34 C (93 F) OtherOS
c4t4d0p0   K41BT4C838MS  HITACHI   HDS7225SBSUN250G     V44O 29 C (84 F) LinuxNative
Solaris LinuxNative
c1t0d0p0   VN03ZAG1WYWD  HITACHI   HDS7250SASUN500G     K2AO 33 C (91 F) IFS:NTFS
c1t4d0p0   K41BT4C7N4HS  HITACHI   HDS7225SBSUN250G     V44O 32 C (89 F) None
c5t1d0p0   VN03ZAGAVSUD  HITACHI   HDS7250SASUN500G     K2AO 29 C (84 F) None
----------------------SunFireX4500--------Rear------------------------
36:    37:    38:    39:    40:    41:    42:    43:    44:    45:    46:    47:
c5t3   c5t7   c4t3   c4t7   c7t3   c7t7   c6t3   c6t7   c1t3   c1t7   c0t3   c0t7
^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
24:    25:    26:    27:    28:    29:    30:    31:    32:    33:    34:    35:
c5t2   c5t6   c4t2   c4t6   c7t2   c7t6   c6t2   c6t6   c1t2   c1t6   c0t2   c0t6
^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
12:    13:    14:    15:    16:    17:    18:    19:    20:    21:    22:    23:
c5t1   c5t5   c4t1   c4t5   c7t1   c7t5   c6t1   c6t5   c1t1   c1t5   c0t1   c0t5
^++    ^++    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
0:     1:     2:     3:     4:     5:     6:     7:     8:     9:     10:    11:
c5t0   c5t4   c4t0   c4t4   c7t0   c7t4   c6t0   c6t4   c1t0   c1t4   c0t0   c0t4
^b+    ^b+    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
-------*-----------*----SunFireX4500----*---Front-----*-----------*
```

```
Summary:
Vendor          Model                       Count
------          -----                       -----
HITACHI         HDS7225SBSUN250G            12
HITACHI         HDS7250SASUN500G             2
Total Storage Devices = 14
Partition Type                              Count
--------------                              -----
Solaris2                                         6
None                                             3
OtherOS                                          3
LinuxNative Solaris LinuxNative                  1
IFS:NTFS                                         1
Total partition type = 14
```

Here is an example of output from ht Utility of an fdisk partition listing:

```
 Device     Serial        Vendor   Model              Rev Temperature Type
------     ------        ------   -----              --- ------------ ----
c0t4d0p0   K41BT4C7NXHS  HITACHI  HDS7225SBSUN250G   V44O 29 C (84 F) Solaris2
c5t0d0p0   K41BT4CG0PEE  HITACHI  HDS7225SBSUN250G   V44O 32 C (89 F) Solaris2
c5t4d0p0   K41BT4C7MULS  HITACHI  HDS7225SBSUN250G   V44O 30 C (86 F) Solaris2
c6t4d0p0   K41BT4CB6J5E  HITACHI  HDS7225SBSUN250G   V44O 32 C (89 F) None
c4t0d0p0   K41BT4CEMKHE  HITACHI  HDS7225SBSUN250G   V44O 34 C (93 F) OtherOS
c7t0d0p0   K41BT4C7NVYS  HITACHI  HDS7225SBSUN250G   V44O 29 C (84 F) Solaris2
c6t0d0p0   K41BT4CEE9NE  HITACHI  HDS7225SBSUN250G   V44O 34 C (93 F) Solaris2
c0t0d0p0   K41BT4CE447E  HITACHI  HDS7225SBSUN250G   V44O 29 C (84 F) OtherOS
c7t4d0p0   K41BT4CE87AE  HITACHI  HDS7225SBSUN250G   V44O 34 C (93 F) OtherOS
c4t4d0p0   K41BT4C838MS  HITACHI  HDS7225SBSUN250G   V44O 29 C (84 F) LinuxNative
Solaris LinuxNative
c1t0d0p0   VN03ZAG1WYWD  HITACHI  HDS7250SASUN500G   K2AO 33 C (91 F) IFS:NTFS
c1t4d0p0   K41BT4C7N4HS  HITACHI  HDS7225SBSUN250G   V44O 32 C (89 F) None
c5t1d0p0   VN03ZAGAVSUD  HITACHI  HDS7250SASUN500G   K2AO 29 C (84 F) None
----------------------SunFireX4500--------Rear------------------------
36:    37:    38:    39:    40:    41:    42:    43:    44:    45:    46:    47:
c5t3   c5t7   c4t3   c4t7   c7t3   c7t7   c6t3   c6t7   c1t3   c1t7   c0t3   c0t7
^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
24:    25:    26:    27:    28:    29:    30:    31:    32:    33:    34:    35:
c5t2   c5t6   c4t2   c4t6   c7t2   c7t6   c6t2   c6t6   c1t2   c1t6   c0t2   c0t6
^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
12:    13:    14:    15:    16:    17:    18:    19:    20:    21:    22:    23:
c5t1   c5t5   c4t1   c4t5   c7t1   c7t5   c6t1   c6t5   c1t1   c1t5   c0t1   c0t5
^++    ^++    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--    ^--
0:     1:     2:     3:     4:     5:     6:     7:     8:     9:     10:    11:
c5t0   c5t4   c4t0   c4t4   c7t0   c7t4   c6t0   c6t4   c1t0   c1t4   c0t0   c0t4
^b+    ^b+    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
-------*-----------*----SunFireX4500----*---Front-----*-----------*
Summary:
```

```
Vendor          Model                   Count
------          -----                   -----
HITACHI         HDS7225SBSUN250G        12
HITACHI         HDS7250SASUN500G         2
Total Storage Devices = 14
Partition Type                              Count
--------------                              -----
Solaris2                                        6
None                                            3
OtherOS                                         3
LinuxNative Solaris LinuxNative                 1
IFS:NTFS                                        1
Total partition type = 14
```

Viewing the Disks in Sequential Order (Sun Fire X4500/X4540 Servers Only)

The following command displays the drive's physical slot number, logical name, and status (present or absent).

```
# hd -q
```

```
Physical Slot Number        Logical Name        Status
0                           c5t0                present
1                           c5t4                present
2                           c4t0                present
3                           c4t4                present
4                           c7t0                present
5                           c7t4                present
6                           c6t0                present
7                           c6t4                present
8                           c1t0                present
9                           c1t4                present
10                          c0t0                present
11                          c0t4                present
12                          c5t1                present
13                          c5t5                absent
14                          c4t1                absent
15                          c4t5                absent
16                          c7t1                absent
17                          c7t5                absent
18                          c6t1                absent
19                          c6t5                absent
20                          c1t1                absent
21                          c1t5                absent
22                          c0t1                absent
```

```
23                          c0t5                absent
24                          c5t2                absent
25                          c5t6                absent
26                          c4t2                absent
27                          c4t6                absent
28                          c7t2                absent
29                          c7t6                absent
30                          c6t2                absent
31                          c6t6                absent
32                          c1t2                absent
33                          c1t6                absent
34                          c0t2                absent
35                          c0t6                absent
36                          c5t3                absent
37                          c5t7                absent
38                          c4t3                absent
39                          c4t7                absent
40                          c7t3                absent
41                          c7t7                absent
42                          c6t3                absent
43                          c6t7                absent
44                          c1t3                absent
45                          c1t7                absent
46                          c0t3                absent
47                          c0t7                absent
```

Viewing SMART Raw Data Count

The following command displays the raw data count for the Self-Monitoring, Analysis and Reporting Technology (SMART) data. This is useful in checking the raw data count for a specific drive:

```
# hd -e c5t0
Revision: 16
Offline status 130
Selftest status 0
Seconds to collect 4797
Time in minutes to run short selftest 1
Time in minutes to run extended selftest 80
Offline capability 91
SMART capability 3
Error logging capability 1
Checksum 0x0b
Identification                    Status Current Worst      Raw data
  1 Raw read error rate           0xb        100   100             1
  2 Throughput performance        0x5        129   129           359
```

```
  3 Spin up time                   0x7     120   120      21493907745
  4 Start/Stop count               0x12    100   100              342
  5 Reallocated sector count       0x33    100   100                0
  7 Seek error rate                0xb     100   100                0
  8 Seek time performance          0x5     142   142               28
  9 Power on hours count           0x12     99    99             9339
 10 Spin retry count               0x13    100   100                0
 12 Device power cycle count       0x32    100   100              342
192 Power off retract count        0x32    100   100              512
193 Load cycle count               0x12    100   100              512
194 Temperature                    0x2     148   148  37/ 24/ 39
    (degrees C cur/min/max)
196 Reallocation event count       0x32    100   100                0
197 Current pending sector count   0x22    100   100                0
198 Scan uncorrected sector count  0x8     100   100                0
199 Ultra DMA CRC error count      0xa     200   253                0
```

Using the `hd` Utility on Windows 2003

This chapter describes how to use the `hd` utility, also known as `hdtool`, on Windows Server 2003 in 32-bit and 64-bit mode. The `hd` utility is a hard drive mapping tool used to determine the logical-to-physical device mapping and can be used on many x64 servers.

This chapter includes the following sections:

Installing the `hd` Utility on Windows

For instructions on installing the utility, see "Installing the hd Utility" on page 9 and follow this procedure.

▼ To Install the `hd` Utility on Windows

1. **From the** `/windows/w2k3/tools/hdtool` **directory of the Tools and Drivers CD or CD image, get the** `w2k3_hd1.0x_pkg.zip` **file.**

2. **Unzip the file and move to the appropriate** `Program` **directory.**

▼ To Remove `hd` Utility on Windows

● **From the Start menu, choose All Programs > Control Panel > Add or Remove Programs > hd > Remove.**

Running the `hd` Utility on Windows

You use the utility to get a logical-to-physical mapping of the devices. This mapping can help you to administer the system, manage the hard drives, and troubleshoot the server.

The `hd` utility output enables you to locate all the disks visually based on the physical topology of the Sun Fire X4500/X4540 server drives by providing a color-coded hard drive location map. The `hd` utility has the following features:

■ Probes and displays the available storage devices on the Sun Fire X4500/X4540 servers

■ Enables remote analysis

The `hd` utility maps the drives and produces output that can help you to identify empty slots and drives that have not been enumerated.

The following are sample output that displays the hard drive's physical slot number, logical name, and status:

```
--------------------------------SunFireX4540------Rear-----------------
 3:    7:    11:    15:    19:    23:    27:    31:    35:    39:    43:    47:
drive3 drive7  drive11 drive15 drive19 drive23 drive27 drive31 drive35 drive39
drive43 drive47
^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++
2:    6:    10:    14:    18:    22:    26:    30:    34:    38:    42:    46:
drive2 drive6  drive10 drive14 drive18 drive22 drive26 drive30 drive34 drive38
drive42 drive46
^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++
1:    5:    9:    13:    17:    21:    25:    29:    33:    37:    41:    45:
drive1 drive5  drive9  drive13 drive17 drive21 drive25 drive29 drive33 drive37
drive41 drive45
^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++
0:    4:    8:    12:    16:    20:    24:    28:    32:    36:    40:    44:
drive0 drive4  drive8  drive12 drive16 drive20 drive24 drive28 drive32 drive36
drive40 drive44
^b+     ^b+     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++     ^++
-------------*------------------*----SunFireX4540----*---Front-----*---------
```

The Sun Fire X4500/X4540 server comes with six controllers, each supporting up to eight SATA drives, for a total of 48 SATA drives.

The drive number is the Windows logical drive number as used by the Windows `diskpart` application and the Windows Disk Management software. You can access the Windows Disk Management software from Start > All Programs > Administrative Tools > Computer Management > Disk Management.

A Sun Fire X4500/X4540 server with 48 drives is the only supported configuration.

On the *Sun Fire X4500* server, the boot device nodes are the following:

- Drive 24 (in slot 0)
- Drive 28 (in slot 1)

These are the bootable drives, and the operating system must be installed on one of these drives.

On the *Sun Fire X4540* server, the boot device nodes are the following:

- Drive 0 (in slot 0)
- Drive 1 (in slot 1)
- Drive 8 (in slot 8)
- Drive 9 (in slot 9)

The `hd` output can also help you with identifying empty slots and drives that have not been recognized by the Windows operating system.

Starting the `hd` Utility Command Line

To use `hd` utility, choose Start > All Programs > Sun HD Tool > hdtool.

Start a command prompt and run the `hd` utility:

> hd

If a command prompt is started, type:

cd "C:\Program Files (x86)\Sun\hd"

Tip – For better viewing, widen the screen to 95 or 110 in size. Move and right-click the mouse on the left top corner of the `hdtool` command prompt to choose **Command Prompt > Properties > Layout > Window Size > Width > "110".**

`hd` Command Options and Parameters

Use the `hd` command to determine the status of a hard drive by mapping the drive location using the parameters shown in TABLE 3-1.

TABLE 3-1

Option	Description
no option	Maps and displays a status of all hard drives in color mode. There are three status rows for each device: • Physical slot/location that matches the chassis label. • Logical location that matches Windows device name. • Drive runtime status The following syntax is used. • Up arrow (^): Indicates the device. • ++: Device is present and accessible. • --: Device is not accessible, absent/empty or down. • .: Devices under the controller are not enumerated. The controller is not enumerated until there is a drive in the slots. • ##: Device has warning messages from the storage subsystem. • b: Drive slot is bootable if there is OS installed on the drive.
-h or /?	Provides utility help information.
-q or /q	This option is for the Sun Fire X4500/X4540 server only. It provides a list of Sun Fire X4500/X4540 hard drive physical slot numbers, logical names, and status (present or absent). This option is useful for scripting environments. For example, some applications could include hd -q in noninteractive mode to determine if a specific drive in a specific physical slot is accessible before configuring RAID.
-s or /s	Shows summary of all drives.
-x	Produces `hd_map.html` page.

Viewing the `hd` Utility Drive Mapping Output

You can use the drive mapping output from `hd` utility for remote analysis. The utility probes and displays the available storage devices in the system.

The hd utility output makes the distinction between controllers, slots, and storage devices that are physically present in the machine and visible to Linux.

This chapter includes the following sections:

▼ To Display the Hard Drive Map

● **Enter the following command to display a map of the disk drives:**

```
> hd -h
> hd -x
> hd_map.html
```

The following information is displayed:

```
Slot   Device        Model


----   ------    ------------------------
 0     drive24      HITACHI HDS7250SASUN500G
 1     drive28      HITACHI HDS7250SASUN500G
 2     drive16      HITACHI HDS7225SBSUN250G
 3     drive20      HITACHI HDS7250SASUN500G
 4     drive40      HITACHI HDS7250SASUN500G
 5     drive44      HITACHI HDS7250SASUN500G
 6     drive32      HITACHI HDS7250SASUN500G
 7     drive36      HITACHI HDS7250SASUN500G
 8     drive8       HITACHI HDS7250SASUN500G
 9     drive12      HITACHI HDS7250SASUN500G
10     drive0       HITACHI HDS7225SBSUN250G
11     drive4       HITACHI HDS7250SASUN500G
12     drive25      HITACHI HDS7225SBSUN250G
13     drive29      HITACHI HDS7225SBSUN250G
14     drive17      HITACHI HDS7225SBSUN250G
15     drive21      HITACHI HDS7225SBSUN250G
16     drive41      HITACHI HDS7225SBSUN250G
17     drive45      HITACHI HDS7250SASUN500G
18     drive33      HITACHI HDS7250SASUN500G
19     drive37      HITACHI HDS7225SBSUN250G
20     drive9       HITACHI HDS7225SBSUN250G
21     drive13      HITACHI HDS7250SASUN500G
22     drive1       HITACHI HDS7250SASUN500G
```

```
23      drive5       HITACHI HDS7225SBSUN250G
24      drive26      HITACHI HDS7250SASUN500G
25      drive30      HITACHI HDS7250SASUN500G
26      drive18      HITACHI HDS7250SASUN500G
27      drive22      HITACHI HDS7250SASUN500G
28      drive42      HITACHI HDS7250SASUN500G
29      drive46      HITACHI HDS7250SASUN500G
30      drive34      HITACHI HDS7250SASUN500G
31      drive38      HITACHI HDS7250SASUN500G
32      drive10      HITACHI HDS7250SASUN500G
33      drive14      HITACHI HDS7250SASUN500G
34      drive2       HITACHI HDS7225SBSUN250G
35      drive6       HITACHI HDS7225SBSUN250G
36      drive27      HITACHI HDS7250SASUN500G
37      drive31      HITACHI HDS7225SBSUN250G
38      drive19      HITACHI HDS7250SASUN500G
39      drive23      HITACHI HDS7250SASUN500G
40      drive43      HITACHI HDS7250SASUN500G
41      drive47      HITACHI HDS7225SBSUN250G
42      drive35      HITACHI HDS7250SASUN500G
43      drive39      HITACHI HDS7250SASUN500G
44      drive11      HITACHI HDS7250SASUN500G
45      drive15      HITACHI HDS7250SASUN500G
46      drive3       HITACHI HDS7250SASUN500G
47      drive7       HITACHI HDS7250SASUN500G
-----------------------------------SunFireX4500------Rear------------------
36:    37:    38:    39:    40:    41:    42:    43:    44:    45:    46:    47:
drive27 drive31 drive19 drive23 drive43 drive47 drive35 drive39 drive11 drive15
drive3 drive7
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
24:    25:    26:    27:    28:    29:    30:    31:    32:    33:    34:    35:
drive26 drive30 drive18 drive22 drive42 drive46 drive34 drive38 drive10 drive14
drive2 drive6
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
12:    13:    14:    15:    16:    17:    18:    19:    20:    21:    22:    23:
drive25 drive29 drive17 drive21 drive41 drive45 drive33 drive37 drive9 drive13
drive1 drive5
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
 0:     1:     2:     3:     4:     5:     6:     7:     8:     9:    10:    11:
drive24 drive28 drive16 drive20 drive40 drive44 drive32 drive36 drive8 drive12
drive0 drive4
^b+    ^b+    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
--------------*-------------------*----SunFireX4500----*---Front-----*---------
--*----------
```

▼ To Display the Drives in Sequential Order

Use the following command to display the disk's physical slot number, logical name, and status (present or absent).

This option is useful for scripting environments.

For example, some applications could include hd -q in noninteractive mode to determine if a specific drive in a specific physical slot is accessible before configuring RAID.

> hd -q

● **The following display appears:**

```
0     drive24     present
1     drive28     present
2     drive16     present
3     drive20     present
4     drive40     present
5     drive44     present
6     drive32     present
7     drive36     present
8     drive8      present
9     drive12     present
10     drive0      present
11     drive4      present
12     drive25     present
13     drive29     present
14     drive17     present
15     drive21     present
16     drive41     present
17     drive45     present
18     drive33     present
19     drive37     present
20     drive9      present
21     drive13     present
22     drive1      present
23     drive5      present
24     drive26     present
25     drive30     present
26     drive18     present
.
.
.
47     drive7      present
```

▼ To Display the Summary

● **Use the following command to display the drive slot summary.**

```
> hd -q -s
```

This command shows the same output as in "To Display the Drives in Sequential Order" on page 29 but appends the following summary information:

```
Summary:
Model    Count
-----    -----
HITACHI HDS7250SASUN500G34
HITACHI HDS7225SBSUN250G14
        Total Storage Devices = 48
```

▼ To Display Help

● **Use the following command to show help for the hd command.**

```
> hd /?
```

The following display shows the help output.

```
Usage: hd
[ -q (list drive slot number in seQuential list) ]
[ -s (summary of drives) ]
[ -x (produce hd_map.html page) ]
[ -V(ersion) ]
```

Using the `hd` Utility on Linux

This chapter describes how to use the `hd` utility, also known as `hdtool` on Linux. The `hd` utility is a hard drive mapping tool used to determine the logical-to-physical device mapping and can be used on the Sun Fire X4500/X4540 servers.

This chapter includes the following sections:

Installing the `hd` Utility

You can install the utility from the Tools and Drivers CD, if available. The hd utility is also available on the server product download page and resides in the Tools and Drivers CD in the `/solaris/tools/hdtool/` directory

You can install the utility from the Tools and Drivers CD, if available, or from your product Tools and Drivers CD image, downloadable from the product web page.

The Linux version of the hd utility resides in the `/linux/tools/hdtool/` directory.

Tip – On the Sun Fire X4500/X4540 servers, the `hd` utility is included in the `SUNWhd` package preinstalled in `/opt/SUNWhd/hd/bin/hd`.

Once you have downloaded `hd`, from a command line, go to its directory and type:

```
> hd
```

Running the `hd` Utility on Linux

You use the utility to get a logical-to-physical mapping of the devices. This mapping can help you to administer the system, manage the hard drives, and troubleshoot the server.

The `hd` utility works with existing Linux disk maintenance, configuration, and administration commands like `cfgdisk`.

The `hd` utility provides a color-coded hard drive location map. It has the following functions:

- Probes and displays all the available storage devices on the system
- Provides color-coded hard drive location maps
- Enables remote analysis

To use `hd` utility you must have the `hd` package installed. For additional commands related to `hd`, see the following man pages for additional commands: `cfgdisk`, `hd`, and `hdadm.`

Viewing the `hd` Utility Drive Mapping Output

You can use the drive mapping output from `hd` utility for remote analysis. The utility probes and displays the available storage devices in the system.

The `hd` utility output makes the distinction between controllers, slots, and storage devices that are physically present in the machine and visible to Linux.

This chapter includes the following sections:

Viewing the Hard Drive Map Using the `hd` Command

The `hd` utility maps the disks and produces output that can help you to identify empty slots and drives that have not been enumerated.

The following command displays a map of the disk drives.

```
# hd
```

For example, here is output for the Sun Fire X4500 server that includes a list of drives, format and vendor, followed by a mapping table.

```
% hd
platform = SUN FIRE X4500

sdaa    ATA       HITACHI HDS7250   K2AO
sdab    ATA       HITACHI HDS7250   K2AO
sdac    ATA       HITACHI HDS7250   K2AO
sdad    ATA       HITACHI HDS7250   K2AO
sda     ATA       HITACHI HDS7250   K2AO
sdae    ATA       HITACHI HDS7250   K2AO
sdaf    ATA       HITACHI HDS7250   K2AO
sdag    ATA       HITACHI HDS7250   K2AO
sdah    ATA       HITACHI HDS7250   K2AO
sdai    ATA       HITACHI HDS7250   K2AO
sdaj    ATA       HITACHI HDS7250   K2AO
sdak    ATA       HITACHI HDS7250   K2AO
sdal    ATA       HITACHI HDS7250   K2AO
sdam    ATA       HITACHI HDS7250   K2AO
sdan    ATA       HITACHI HDS7250   K2AO
sdao    ATA       HITACHI HDS7250   K2AO
sdap    ATA       HITACHI HDS7250   K2AO
sdaq    ATA       HITACHI HDS7250   K2AO
sdar    ATA       HITACHI HDS7250   K2AO
sdas    ATA       HITACHI HDS7250   K2AO
sdat    ATA       HITACHI HDS7250   K2AO
sdau    ATA       HITACHI HDS7250   K2AO
sdav    ATA       HITACHI HDS7250   K2AO
sdb     ATA       HITACHI HDS7250   K2AO
sdc     ATA       HITACHI HDS7250   K2AO
sdd     ATA       HITACHI HDS7250   K2AO
sde     ATA       HITACHI HDS7250   K2AO
sdf     ATA       HITACHI HDS7250   K2AO
sdg     ATA       HITACHI HDS7250   K2AO
sdh     ATA       HITACHI HDS7250   K2AO
sdi     ATA       HITACHI HDS7250   K2AO
```

```
sdj      ATA      HITACHI HDS7250   K2AO
sdk      ATA      HITACHI HDS7250   K2AO
sdl      ATA      HITACHI HDS7250   K2AO
sdm      ATA      HITACHI HDS7250   K2AO
sdn      ATA      HITACHI HDS7250   K2AO
sdo      ATA      HITACHI HDS7250   K2AO
sdp      ATA      HITACHI HDS7250   K2AO
sdq      ATA      HITACHI HDS7250   K2AO
sdr      ATA      HITACHI HDS7250   K2AO
sds      ATA      HITACHI HDS7250   K2AO
sdt      ATA      HITACHI HDS7250   K2AO
sdu      ATA      HITACHI HDS7250   K2AO
sdv      ATA      HITACHI HDS7250   K2AO
sdw      ATA      HITACHI HDS7250   K2AO
sdx      ATA      HITACHI HDS7250   K2AO
sdy      ATA      HITACHI HDS7250   K2AO
sdz      ATA      HITACHI HDS7250   K2AO
```

Viewing the Hard Drive Map Using the `hdadm` `display` Command

The following command displays a map of the disk drives:

```
# hdadm display
```

Here is an example of using the `hdadm` command to display the hard drive's physical slot number, logical name, and status:

```
# hdadm display
----------------------Sun Fire X4500 Server--------Rear-----------
36:    37:    38:    39:    40:    41:    42:    43:    44:    45:    46:    47:
sdab   sdaf   sdt    sdx    sdar   sdav   sdaj   sdan   sdl    sdp    sdd    sdh
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
24:    25:    26:    27:    28:    29:    30:    31:    32:    33:    34:    35:
sdaa   sdae   sds    sdw    sdaq   sdau   sdai   sdam   sdk    sdo    sdc    sdg
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
12:    13:    14:    15:    16:    17:    18:    19:    20:    21:    22:    23:
sdz    sdad   sdr    sdv    sdap   sdat   sdah   sdal   sdj    sdn    sdb    sdf
^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
0:     1:     2:     3:     4:     5:     6:     7:     8:     9:     10:    11:
sdy    sdac   sdq    sdu    sdao   sdas   sdag   sdak   sdi    sdm    sda    sde
^b+    ^b+    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++    ^++
-------*-----------*----Sun Fire X4500 Server----*---Front-----*----
```

Viewing the Disk Controllers and Bootable Drives

The Sun Fire X4500/X4540 server comes with six controllers, each supporting up to eight SATA drives, for a total of 48 SATA drives. Before you reinstall the Linux OS, you need to determine the logical device name that corresponds to the two bootable disks, which is in the form:

sd*X*

Where sd*X* is the SCSI disk name.

A Sun Fire X4500/X4540 server with 48 disks is the only supported configuration. For the Sun Fire X4500 server, the boot device nodes are in:

- /dev/sdy in slot 0
- /dev/sdac in slot 1

For the Sun Fire X4540 server, the boot device notes are in:

- /dev/sda in slot 0
- /dev/sdb in slot 1
- /dev/sdi in slot 8
- /dev/sdj in slot 9

These are the bootable disks, and the operating system must be installed on one of these device nodes.

Use the hd command parameters to determine the status of a hard drive. The command parameters and the information they display are shown in TABLE 4-1.The hd output can also help you identify the empty slots and drives that have not been recognized by the Linux operating system.

Viewing Hard Disk Drive Status

Use the hd command parameters to determine the status of a hard drive. The command parameters and the information they display are shown in TABLE 4-1.

TABLE 4-1 hd Utility Command Options on Linux

Option	Description
-c	Maps and displays a status of all hard disks in color mode.
	There are three status rows for each device:
	• Physical slot/location that matches the chassis label.
	• Logical location that matches Linux Storage device name.
	• sdX drive runtime status.
	The following syntax is used:
	• Up arrow (^): Indicates the device.
	• Green: Device enumerated.
	• ++: Device is present and accessible.
	• Red: Device not enumerated or no drive in physical slot/location.
	• --: Device is not accessible, absent/empty or down.
	• .: Devices under the controller are not enumerated. The controller is not enumerated until there is a drive in the slots.
	• ##: Device has warning messages from the storage subsystem.
	• Blue: Bootable drive slot.
	• b: Drive slot is bootable if an OS is installed on the drive.
-s	Gives summarized version.
-B	Lists bootable slot number, devname with present/absent status.
-q	This option is for the Sun Fire X4500/X4540 server only.
	It provides a list of the hard drive physical slot numbers, logical names, and status (present or absent). This option is useful for scripting environments.
	For example, some applications could include hd -q in noninteractive mode to determine if a specific drive in a specific physical slot is accessible before configuring RAID.
-r	Lists SMART data for all disks in drive slot number for Sun Fire X4540.
-R	Lists SMART data per individual ID in landscape mode for all disks.
-e sd*XY*	Lists SMART data for specified drive for Sun Fire X4540.
-E sd*XY*	Lists raw hex SMART data for specified drive for Sun Fire X4540.
-h	Provides utility help information.
-j	Lists Sun Fire X4500/X4540 controller number.

TABLE 4-1   hd Utility Command Options on Linux *(Continued)*

Option	Description
-o	Lists Sun Fire X4540 HBA/Target sdname sysfs.
-V	Displays the utility version.
-x	Generates `hd_map.html`.

Viewing the Hard Drives in Sequential Order

The following command displays the drive's physical slot number, logical name, and status (present or absent) in sequential order.

hd -q

Here is sample output for the Sun Fire X4500 server:

```
 Physical Slot Number           Name               Status
 0                              sdy               present
 1                              sdac              present
 2                              sdq               present
 3                              sdu               present
 4                              sdao              present
 5                              sdas              present
 6                              sdag              present
 7                              sdak              present
 8                              sdi               present
 9                              sdm               present
 10                             sda               present
 11                             sde               present
 12                             sdz               present
 13                             sdad              present
 14                             sdr               present
 15                             sdv               present
 16                             sdap              present
 17                             sdat              present
 18                             sdah              present
 19                             sdal              present
 20                             sdj               present
 21                             sdn               present
 22                             sdb               present
 23                             sdf               present
 24                             sdaa              present
```

25	sdae	present
26	sds	present
27	sdw	present
28	sdaq	present
29	sdau	present
30	sdai	present
31	sdam	present
32	sdk	present
33	sdo	present
34	sdc	present
35	sdg	present
36	sdab	present
37	sdaf	present
38	sdt	present
39	sdx	present
40	sdar	present
41	sdav	present
42	sdaj	present
43	sdan	present
44	sdl	present
45	sdp	present
46	sdd	present
47	sdh	present

Viewing the hd Command Help Options

The following command displays utility help.

```
# hd -h

# hd -h
Usage: hd [ -c(olor mode) ] [ -s(ummary) ]
 [ -B (list Bootable slot number, devname with present/absent
status) ]
 [ -q (list drive slot number in seQuential list) ]
 [ -r (List SMART data for all disks in drive slot number for x4540)
]
 [ -R (List SMART data's indivdual id in landscape view for all
disks) ]
 [ -e <sdXY> (List SMART data for specified disk) for x4540 ]
 [ -E <sdXY> (List raw hex SMART data for specified disk) for x4540
]
 [ -j (list x4500/x4540 controller number) ]
 [ -o (list x4540 ( HBA/Target sdname sysfs ) ]
 [ -x (Generate hd_map.html) ]
```

Configuring Offline and Online Hard Disk Drives Using the `hdadm Command`

The `hdadm` command is a hard drive management tool for the x64 systems, such as the Sun Fire X4500 server. This command supports drive hot-plugging features and assists with configuring disk drives before they are inserted or removed.

Additionally, the `hdadm` command consist of subcommands that allows you to configure hard disk drives using the disk logical name or physical slot number.

The `hdadm` subcommands allows the system administrator to choose command combinations to configure disks online or offline. The `hdadm` command along with the `hd` and `cfgdisk` commands provides a full range of tools to configure and manage their Sun Fire X4500/X4540 server disk drives.

TABLE 4-2   `hdadm` Subcommand Options

Option	Description
`online`	This option configures all drives that are in *connected* and *unconfigured* state to an online and accessible status. It takes the slot as argument, and all the other option as specified in the synopsis.
`offline`	This option unconfigures all drives that are in *connected* and *configured* state to an offline status. It takes the argument `slot` or `disk` and all the other option as specified in the synopsis.
`display`	This option displays all drives within the Sun Fire X4500/X4540 server.
`slot`	This option can use any number between 0 and 47 as argument. This number corresponds to the drive in the physical slot number on the chassis in the Sun Fire X4500 server.
`disk`	This option requires `sdX` argument which corresponds to the Linux storage device name on Sun Fire X4500/X4540 server.
`all`	This option applies to all the disk drives in Sun Fire X4500/X4540 server. It is dependent on the *offline* and *online* subcommand selected. This option can be used when you need to initialize all the drives.
`row[0..3]`	This option allows you to take a series of drives in a row offline or online.
`col[0..3]`	The option allows you to take a series of drives in a column offline or online.
`checker0`	This option offlines or onlines disk drives in *checker pattern 0*.
`checker1`	This option offlines or onlines disk drives in *checker pattern 1*.

TABLE 4-2 hdadm Subcommand Options *(Continued)*

Option	Description
alt_col0	This option offlines or onlines disk drives in alternate column *pattern 0*.
alt_col1	This option offlines or onlines disk drives in alternate column pattern 1.
up	This option offlines or onlines the disk drives in an *up pattern*.
down	This option offlines or onlines the disk drives in an *down pattern*.

Examples Using the hdadm Command

This section contains examples of common hdadm commands. For more information and options, refer to the hdadm man page.

This chapter includes the following sections:

▼ To Take a Disk Offline by Physical Slot Number

For example, to take a drive offline in slot 11 by its physical slot number, perform the following steps:

1. Type the following command:

```
# hdadm offline slot 11
```

2. Remove the drive in slot 11 with the blue LED.

▼ To Take a Disk Offline by Logical Name

For example to take a drive offline in slot 10 by its logical name, perform the following steps:

1. **Type the following command:**

   # **hdadm offline disk sda**

2. **Remove the drive in slot 10 with the blue LED.**

▼ To Put a Disk Online by Physical Slot Number

For example, to take a disk drive in slot 11 online by using its physical slot number, perform the following steps:For example, to take a disk drive in slot 11 online by using its physical slot number, perform the following steps:

1. **Insert the drive in slot 11.**

2. **Type the following command:**

   ```
   # hdadm offline row3
   ```

   The LED for slot 11 turns green.

▼ To Take Multiple Disks Offline in a Row

For example, to take disk drives in row 3 offline, perform the following step:

● **Type the following command:**

   ```
   # hdadm offline row3
   ```

   The LEDs for drives in row 3 turn blue.

▼ To Take Multiple Disks Offline in Column

For example, to take disk drives in column 3 offline, perform the following step:

● **Type the following command:**

   ```
   # hdadm offline col3
   ```

   The LEDs for drives in column 3 turn blue.

▼ To Put All Drives Online

For example, to take all disk drives online, perform the following steps:

1. **Insert all of the disk drives into the server.**

2. **Type the following command:**

```
# hdadm online all
```

The LEDs for all disk drives turn green.

IPMItool for Windows

This chapter describes how to install IPMItool on systems equipped with the Windows operating system.

The procedures in this chapter assume that you have already done the following:

- Installed the Microsoft Windows Server 2003 or Windows Server 2008 operating system.
- Downloaded `Windows.zip` and extracted `InstallPack_x_x_x.exe`.
- Run `InstallPack_x_x_x.exe` to install supplemental software on the server, or for Windows Server 2008, downloadeded and installed the contents of the Tools and Driver ISO image.

Note – The _x_x_x_ number identifies the version of the package (for example, `InstallPack_1_1_4.zip`).

Completing the IPMItool Installation

The IPMItool is a command line utility that reads the sensor data repository (SDR) and displays sensor values, System Event Log (SEL), Field Replaceable Unit (FRU) inventory information, gets and sets LAN configuration parameters, and performs chassis power control operations via the server's Service Processor.

IPMItool is supplemental software and may be installed using the server's Tools and Drivers CD or using the `Installpack_x_x_x.exe` executable file (described earlier in this chapter).

Installing IPMItool

Once installed, the IPMItool can be used to access your server's Service Processor (or another Sun server's Service Processor) in the following ways:

- Through the server's ILOM *(Integrated Lights Out Manager)* interface. For details on using ILOM, refer to your server's ILOM documentation.
- Through the server's Windows operating system. To use the IPMItool with Windows, it must be used in conjunction with the IPMI System Management driver (available with Windows Server 2003 R2 SP2, or as a Sun supplemental software component for Windows Server 2003 SP1). To make sure you have what you need to use the IPMItool with Windows Server 2003, refer to the requirements listed below.

To use IPMItool, ensure that you have completed the requirements specified for your Windows Server 2003 version:

For Windows Server 2003 SP1:

Install the IPMI tool and the Sun IPMI System Management driver as described in the Windows operating system installation guide for your server.

For Windows Server 2003 R2 SP2:

Install the IPMI tool and Microsoft's IPMI System Management driver in Windows Server 2003 R2 SP2 as described in the Windows operating system install guide for your server.

For Windows Server 2008:

Install IPMI tool as described in *Windows Operating System Installation Guide* for your server. No configuration is required. IPMITool is ready for use.

For More Information

For information about using the IPMItool, refer to your *Sun Integrated Lights Out Manager 2.0 User's Guide* (820-1188). For more information on standard IPMItool commands, please see: (http://www.nvidia.com/object/LO_28249.html)

Using RAID Array Configuration Tools for Windows Systems

This chapter provides an overview of the tools used to configure RAID arrays on systems equipped with the Windows operating system. For actual instructions, please see the documents listed in the following sections.

- For Adaptec-based RAID arrays, see "Managing RAID Using the StorageTek RAID Manager (for Adaptec-based RAID Controller)" on page 45

- For LSI-based RAID arrays, see "Managing RAID Using the MegaRAID Storage Manager (for LSI-based RAID Controllers)" on page 46.

Managing RAID Using the StorageTek RAID Manager (for Adaptec-based RAID Controller)

For Sun servers with an Adaptec-based internal RAID controller, you can use the Sun StorageTek RAID Manager graphical user interface (GUI), Command Line Interface (CLI) or the Adaptec Configuration Utility to build your storage space.

- The Sun StorageTek RAID Manager software is an application that helps you build a storage space for your online data. Your storage space can include direct-attached or internal RAID storage. With the Sun StorageTek RAID Manager software, you can group disk drives into logical drives and build in redundancy to protect your data and improve system performance. You can also use the software to monitor and manage all the HBAs, enclosures, and disk drives in your storage space from a single location.

- The Adaptec Configuration Utility is a BIOS-based utility that enables you to create and manage controllers, disk drives and other devices, and arrays using the integrated RAID controller (Adaptec-based). If you use the BIOS Configuration Utility to create arrays, the Sun StorageTek RAID Manager GUI detects those arrays and displays them as logical drives in the GUI.

- The `arcconf` command-line interface (CLI) can be used with the Sun StorageTek SAS RAID HBA to perform many of the same tasks provided with the StorageTek RAID Manager GUI.

  The `arcconf` command line tool allows the deletion of logical volumes without first requiring removal of the partitions. The syntax for this is:

  `arcconf DELETE # LOGICALDRIVE z`

  Where # is the controller number and z is the number of the logical drive to be deleted. You will receive the following warning message:

```
WARNING: logical device z may contain a partition.
All data in logical device z will be lost.
Delete the logical device?
Type y and then Enter to continue. or press Enter to abort.
```

Note – These utilities can also be used on systems equipped with the Solaris and Linux operating system. See the corresponding documentation for details.

Available documentation for the above utilities can be found on your server's documentation web site, and on the Sun documentation web site at:

(http://docs.sun.com/app/docs/coll/dsk-cntrl)

Managing RAID Using the MegaRAID Storage Manager (for LSI-based RAID Controllers)

The MegaRAID Storage Manager (MSM) program enables you to configure the LSI-based integrated RAID controller, physical disk drives, and virtual disk drives on your system. The Configuration Wizard in the MSM program simplifies the process of creating disk groups and virtual disk drives by guiding you through several simple steps to create your storage configurations.

Note – MSM also works on Sun systems equipped with the Linux operating system. See the *Sun LSI 106x RAID User's Guide* for details. For systems equipped with the Solaris operating system, you can use the `raidctl` utility.

MSM works with the appropriate Operating System (OS) libraries and drivers to configure, monitor, and maintain storage configurations attached to x64 servers. The MSM GUI displays device status in the form of icons, which represent the controllers, virtual disk drives, and physical disk drives on your system. Special icons appear next to the device icons on the screen to notify you of disk failures and other events that require immediate attention. System errors and events are recorded in an event log file and are displayed on the screen.

For information on using MSM, refer to the *Sun LSI 106x RAID User's Guide* for your server on the Sun product documentation web site at:

(http://docs.sun.com)

Hardware Error Report and Decode Tool (HERD) 3.0 for Linux

Hardware Error Report and Decode (HERD) 3.0 for Linux is a tool for monitoring, decoding, and reporting correctable hardware errors. This chapter has the following sections:

Downloading HERD

You can download HERD from the Tools and Drivers CD, if available, or from the Tools and Drivers CD image, downloadable from the product web page.

The utility resides in the `/tools/linux/herd` directory.

About HERD

HERD is a tool for monitoring, decoding, and reporting correctable hardware errors. These correctable hardware errors are also known as Machine Check Exceptions (MCE).

Versions of Linux x86_64 kernels since 2.6.4 do not print recoverable MCEs to the kernel log. Instead they are saved into a special kernel buffer which is accessible using `/dev/mcelog`. HERD monitors and collects data from `/dev/mcelog` and reports the corresponding errors to the system log and, if the resource is available, to the system Service Processor (SP) Event Log through the local IPMI interface.

During error decoding, HERD attempts to provide as much information as possible from the data supplied by the AMD CPU. In particular, physical addresses obtained from correctable ECC memory errors are matched to the corresponding CPU slot and DIMM number.

HERD is supported on Sun servers with AMD processors.

Installing HERD

RPMs are provided for the following Linux distributions:

TABLE 7-1   RPM Linux Distributions

Release	RPM Designation
Red Hat RHEL4 (64-bit)	`herd-1.`*x-x*`.rh4.x86_64.rpm`
Red Hat RHEL5 (64-bit)	`herd-1.`*x-x*`.rh5.x86_64.rpm`
Novell SLES9 (64-bit)	`herd-1.`*x-x*`.sl9.x86_64.rpm`
Novell SLES10 (64-bit)	`herd-1.`*x-x*`.sl10.x86_64.rpm`

To install the RPM, run the following command:

`rpm -Uhv herd-1.x-1.rh4.x86_64.rpm`

Each RPM has a set of run-time dependencies that are enforced by RPM. These dependencies include the `openssl` libraries or the OpenIPMI scripts. If one of these dependencies is missing, RPM reports an error and you must install them manually.

With SLES, use the `yast` utility. For example, type:

```
yast2 -i OpenIPMI
```

With RHEL, use `up2date` or system-config-packages. For example, type:

```
up2date -i openssl
```

HERD is designed to be backwardly compatible with the `mcelog` utility. It supports the same command-line options and uses the same format to report errors to the system log. As such, HERD acts as a replacement to `mcelog` (both cannot be used at the same time). Note that this conflict information is encoded into the HERD RPMs, so installing HERD automatically uninstalls `mcelog` if it was present on the system.

Starting the HERD Daemon

All RPMs that are provided come with the appropriate SysV `init` scripts. After installation, the HERD daemon is automatically setup to run after system boot. The daemon is not, however, started right away.

To start HERD immediately after installation:

- For SLES10 OS and RHEL4 OS, type:

```
service herd start
```

- For SLES9 OS, type:

```
/etc/init.d/herd start
```

When the following message appears in the system log, then HERD is running successfully:

```
/var/log/messages:

herd: IPMI connection fully operational
```

Using HERD

Once the HERD daemon is running, any correctable MCEs that occur on the system are reported both on the system log (`/var/log/messages`) and onto the service processor System Event Log (SEL). In the case of correctable ECC memory errors, both reports should correctly identify the CPU slot and DIMM number on which the memory error occurred.

Note – The Linux kernel only harvests MCE errors every 5 minutes, so a delay might occur between an MCE occurrence and its report to the system log and SEL.

HERD Syntax

```
Usage: herd [options]
Options:
-e, --decode <addr>   Decode the given 64-bit hex address and exit-
-D, --nodaemon        Don't detach and become a daemonD-
-d, --debu            Debug moded-
    --ignorenodev     Silent exit if device missing
    --filter          Filter out known bogus MCEs
    --dmi             Lookup MCE address in BIOS tables
    --params          Display herd parameters information
    --setparam <key>=<value>  Set or override parameter value
-h, --help            This messageh-
```

Example of HERD Output

Here is an example of the system log output generated by HERD:

```
Jan 14 18:57:32 host herd: HARDWARE ERROR. This is *NOT* a software problem!
Jan 14 18:57:32 host herd: Please contact your hardware vendor
Jan 14 18:57:32 host herd: CPU 0 4 northbridge
Jan 14 18:57:32 host herd:   Northbridge Watchdog error
Jan 14 18:57:32 host herd:        bit57 = processor context corrupt
Jan 14 18:57:32 host herd:        bit61 = error uncorrected
Jan 14 18:57:32 host herd:  bus error 'generic participation, request timed out
generic error mem transaction generic access, level generic'
Jan 14 18:57:32 host herd: STATUS b200000000070f0f MCGSTATUS 0
Jan 14 18:57:32 host herd: Physical address maps to: Cpu Node 0, DIMM 1
```

```
Jan 14 18:57:32 host herd: HARDWARE ERROR. This is *NOT* a software problem!
Jan 14 18:57:32 host herd: Please contact your hardware vendor
Jan 14 18:57:32 host herd: CPU 0 4 northbridge
Jan 14 18:57:32 host herd:   Northbridge Watchdog error
Jan 14 18:57:32 host herd:        bit57 = processor context corrupt
Jan 14 18:57:32 host herd:        bit61 = error uncorrected
Jan 14 18:57:32 host herd:  bus error 'generic participation, request timed out
generic error mem transaction generic access, level generic'
Jan 14 18:57:32 host herd: STATUS b200000000070f0f MCGSTATUS 0
Jan 14 18:57:32 host herd: Physical address maps to: Cpu Node 0, DIMM 1
```

Additional Options

HERD has a number of parameters that can be changed using the `--setparam` option. The list of available parameters and their descriptions is available by running `herd --params`.

TABLE 7-2   HERD Options

Option	Default Values	Description
`check_timer_secs`	10	Delay in seconds between MCE log checks.
`proc_pci_devices`	`/proc/bus/pci/devices`	Path of procfs file containing PCI devices information. HERD uses this file to obtain the CPU DRAM bridge PCI devices on the system.
`proc_pci_bus`	`/proc/bus/pci`	Path of procfs directory containing PCI devices configuration data. HERD reads the PCI configuration data of the system DRAM controllers from the corresponding files in that directory.
`force_cpu`		Sets the CPU version information. Should be formatted as "family,model,stepping" with decimal values. If not set, the CPU version is auto-detected.

Known Problems and Limitations

Recent Linux kernel versions (2.6.16 and newer) ship with an MCE decoding stack called EDAC, which can conflict with HERD. In order for the HERD daemon to function correctly, it is important to first unload the EDAC-related kernel modules with the `rmmod` command. This is done automatically by the HERD starting script in version 1.8.

On systems that have a 128-bit configured DRAM interface, HERD can only identify DIMM pairs rather than individual DIMM modules. The size of the DRAM interface is reported by HERD when it runs in debug mode. For example, with the following command:

```
herd -d -e 0
```

Identifying CPU and DIMMs With MCEs

If an MCE occurred before HERD was installed on a system, use the HERD tool to identify the CPU slot and DIMM number from the physical address reported by the MCE.

```
# herd -e 0x18000000
```

For example, use the `herd` command with the *-e* option to decode a physical address:

```
000018000000: Cpu Node 0, DIMM 0
address0x18000000.The results identify the DIMM associated with
physical
```

Note – HERD must be run on the system on which the MCE actually occurred to identify the CPU and DIMM numbers correctly.

HERD supports a debug option (*-d*) that gives more system information, including the Opteron CPU identification data, for example:

```
# herd -d -e 0x000008000000
2 cores found, family 15, model 5, stepping 10 (revision C)
2herd: dimm translation against system address 00080000
Node 0: DRAM base 00000000, DRAM lmit 003fffff, HoleEn 0
 Chip 0: CSBase 00000000. CSMask 03ffffff
000008000000: Cpu Node 0, DIMM 0
```

Software Error Report and Decode (SERD)

Software Error Report and Decode (SERD) engine is a component of HERD that filters errors meeting a certain criteria. The default setting for errors on a DIMM (with a unique address) is 24 errors within a 24-hour period. The SERD filter allows 24 errors in a 24-hour time period and will not report an error, but when the SERD filter is triggered on the 25th error, HERD error messages begin to be added to `/var/log/messages`. The logging is done by HERD.

When HERD is restarted, the internal accounting of the last 24 hours is lost and the policy is reset upon reboot. This means the SERD engine holds the info it uses to account for the last 24 hours in RAM. When the program is interrupted, either by a reboot or restarting HERD, it loses all recollection of the past internal failures. However, the log data in the SERD log remains intact.

NIC Teaming for Windows

This chapter describes how to configue NIC teaming on systems equipped with the Windows operating system.

This chapter includes the following sections:

- "Overview of Network Interfaces" on page 58
- "Using Intel PROSet for Windows Device Manager to Configure NIC Teaming" on page 58
- "Using Network Access Manager (NAM) to Configure NVIDIA NIC Teaming" on page 63

The procedures in this chapter assume that you have already done the following:

- Installed the Microsoft Windows Server 2003 or Windows Server 2008 operating system.
- Downloaded `Windows.zip` and extracted `InstallPack_x_x_x.exe`.
- Ran `InstallPack_x_x_x.exe` to install supplemental software on the server, or for Windows Server 2008, downloadeded and installed the contents of the Tools and Driver ISO image.

Note – The `_x_x_x` number identifies the version of the package (for example, `InstallPack_1_1_4.zip`).

To access to the NVIDIA Network Access Manager (NAM) command-line interface, install the CLI program onto your computer. For more information see:

(http://www.nvidia.com/object/LO_28249.html)

Overview of Network Interfaces

This chapter describes how to configure NIC teaming on systems equipped with Intel and NVIDIA Ethernet network interfaces.

Sun supports Intel and NVIDIA network interfaces. Some systems have both Intel and NVIDIA network interface ports.

Both Intel and NVIDIA provide tools for managing the network interface ports.

- The Intel® PROSet for Windows Device Manager supports teaming Intel and NVIDIA network interface ports.
- The NVIDIA Network Access Manager (NAM) manages NVIDIA network interface ports. It does not allow you to team NVIDIA and Intel ports. See "Using Network Access Manager (NAM) to Configure NVIDIA NIC Teaming" on page 63 for details.

Using Intel PROSet for Windows Device Manager to Configure NIC Teaming

Intel PROSet for Windows Device Manager is an extension to the Windows Device Manager. When you install the NIC Teaming supplemental software for your Sun server, Intel PROSet software configuration tabs are automatically added to the network adapters listed in Device Manager.

Note – To determine which network interface ports are active on your system, use the `ipconfig /all` DOS command, or the Windows Network Connections manager. For more information, see the Service Manual for your server.

Multi-Vendor Teaming

The Multi-Vendor Teaming (MVT) feature allows teaming with a combination of Intel and non-Intel adapters. This feature is currently available under Windows Server 2003 and Windows Server 2008.

For example, the Sun Fire X4100 M2 and X4200 M2 have both Intel and NVIDIA™ Ethernet network interface ports. The order in which the server's BIOS detects these ports during boot-up are as follows:

- NET 0 (NVIDIA CK8-04 NIC)
- NET 1 (NVIDIA IO-04 NIC)
- NET 2 (Intel NIC)
- NET 3 (Intel NIC)

The device naming for the Ethernet ports differ according to the OS. For example, Windows identifies these ports for the Sun Fire X4100 M2 and X4200 M2 as shown in FIGURE 8-1.

FIGURE 8-1 Sun Fire X4100 M2 and X4200 M2 Ethernet Ports
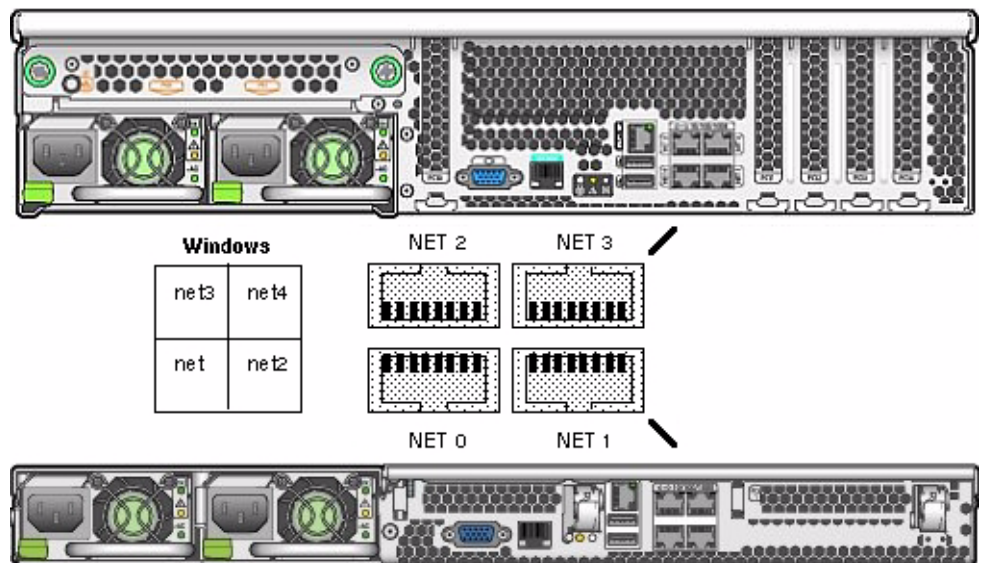
Note – To identify the ports in your server, refer to the Service Manual.

For servers running Windows, adapters that appear in the Intel PROSet teaming wizard can be included in a team.

During the configuration of a multi-vendor team, please note the following rules:

- In order to use MVT, you must have at least one Intel server adapter in the team, which must be designated as the primary adapter.
- A multi-vendor team can be created for any team type, but not for VLANs.

- All members in a MVT must operate on a common feature set (this can mean using the lowest common denominator if a higher performance feature/setting is not offered on all adapters in the team).
- For MVT teams, manually verify that the frame settings for the non-Intel adapter are the same as the frame settings for the Intel adapter.

▼ To Access Intel NIC Teaming Configuration Settings

To access the functions available for your server's network interface, do the following:

1. **From the Taskbar, click Start, and then click Run.**

   The run dialog box is displayed.

2. **In the Open list, type** `devmgmt.msc`**, and then click OK.**

   The Device Manager screen is displayed.

3. **Expand the Network adapters group and select the first adapter.**

4. **Right-click the selection and click Properties.**

   The adapter properties screen is displayed.

FIGURE 8-2   Intel NIC Adapter Properties Screen
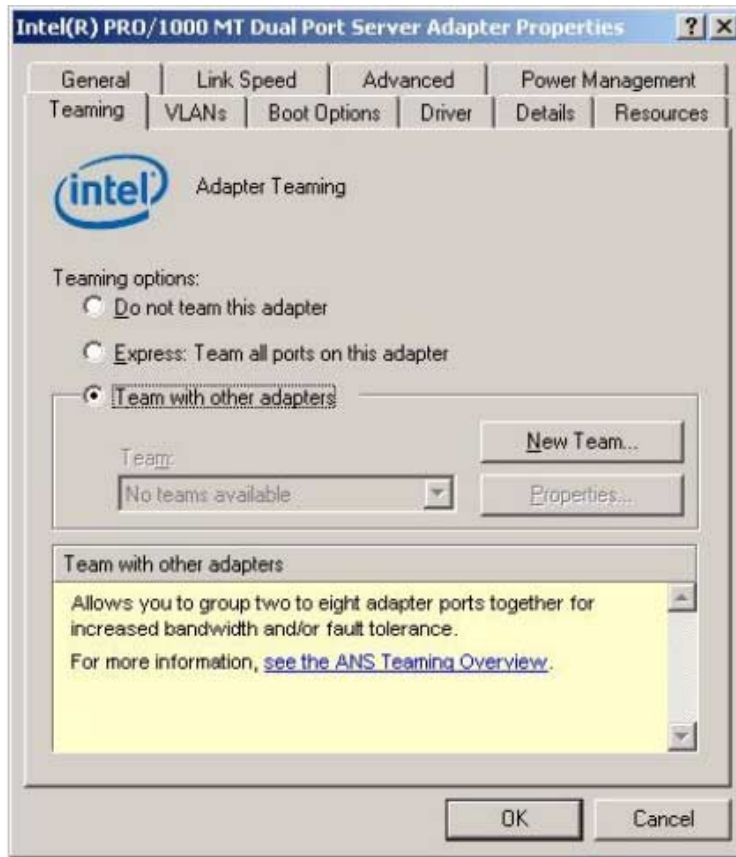
5. **To setup NIC teaming, click the Teaming tab.**

   The teaming options are displayed (see FIGURE 8-2).

6. **Select Team with other adapters and then click New Team.**

   The New Team Wizard is displayed.

FIGURE 8-3   New Team Wizard Screen

7. Click Next. The Adapter Selection screen is displayed.

FIGURE 8-4   Adapter Selection Screen
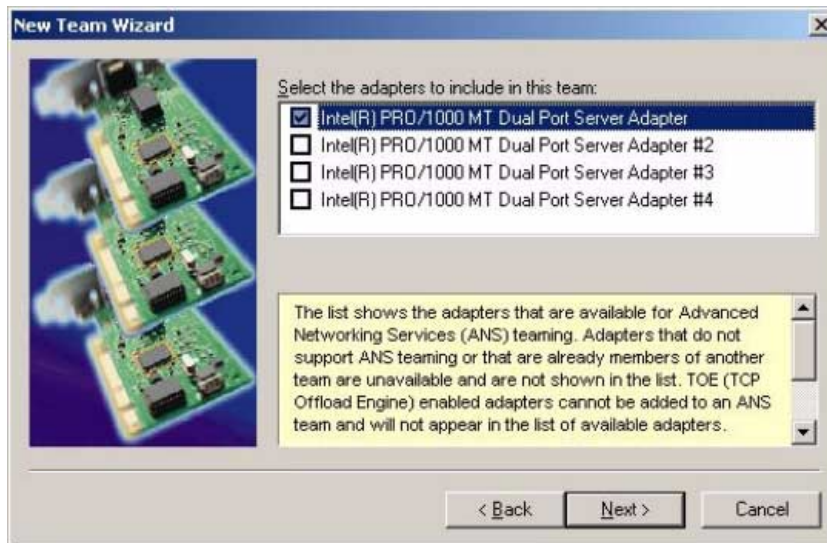
8. Select the adapters to be included in the team from the list of installed adapters and then click Next.

The wizard guides you through the configuration and setup of your team.

Learning More About Intel NIC Teaming

For more information on setting up NIC teaming for your environment, refer to the Intel Connectivity web page on "Advanced Networking Services—Teaming" at:

(http://support.intel.com/support/network/sb/CS-009747.htm)

Additionally, you may download the complete set of Intel Network Connections User Guides for your server's network adapters at:

(http://support.intel.com/support/network/sb/cs-009715.htm)

Using Network Access Manager (NAM) to Configure NVIDIA NIC Teaming

This section describes how to use the NVIDIA Network Access Manager to configure teaming of NVIDIA network interface ports on systems equipped with the Windows 2003 and Windows 2008 operating systems.

Using the NVIDIA Network Access Manager for Windows Server 2003

If you elect to do a custom installation of Sun supplemental software, you can select NVIDIA Network Access Manager (NAM) to be installed on your Sun server. When installed, you can use NAM features to optimize your server's network performance, increase its network bandwidth and provide for optimal throughput in case one of your network adapters stops functioning.

The NVIDIA Network Access Manager software includes:

- **Ethernet setup**: This tool allows you to configure the settings for your NVIDIA integrated network interfaces to best conform to your network configuration.
- **Teaming**: This tool allows you to combine all the NVIDIA Ethernet interfaces on your system to form a team, resulting in increased bandwidth and network fail-over redundancy. In addition, you have the capability to configure TCP/IP acceleration that off-loads the processing of TCP/IP network traffic from your computer's CPU to its NVIDIA hardware resulting in greatly improved system performance.

> **Note –** The TCP/IP Acceleration off loading policy is defined using the NVIDIA Network Access Manager (NAM). Its functionality is disabled by default. When TCP/IP acceleration is enabled, all TCP/IP connections are off-loaded. If you have a software firewall installed on your system, enabling TCP/IP Acceleration technology might cause some network traffic to bypass your firewall. A warning message indicating this is displayed when a user enables TCP/IP acceleration.

- **FirstPacket**: This tool allows you to manage the traffic on your server and improve the performance of user-specified applications, such as networked games, Voice-over-IP (VoIP), and other applications that are sensitive to network delay (latency).

> **Note –** You can not use both NVIDIA FirstPacket and NVIDIA Teaming at the same time. You can only configure your server to use one or the other.

> **Note –** To determine which network interface ports are active on your system, use the `ipconfig /all` DOS command, or the Windows Network Connections manager. For more information, see the Service Manual for your server.

▼ To Launch the Network Access Manager

To access the functions available for your server's network interface, do the following at your server once NAM has been installed:

1. **From your Windows taskbar, click Start, and then click Programs.**

2. **Open the NVIDIA Corporation program group, click the Network Access Manager folder, and then click Web-based Interface.**

   The Network Access Manager screen appears (FIGURE 8-5). You can use it to setup teaming for two or more network interface ports.

**FIGURE 8-5** Windows Server 2003: Network Access Manager Screen
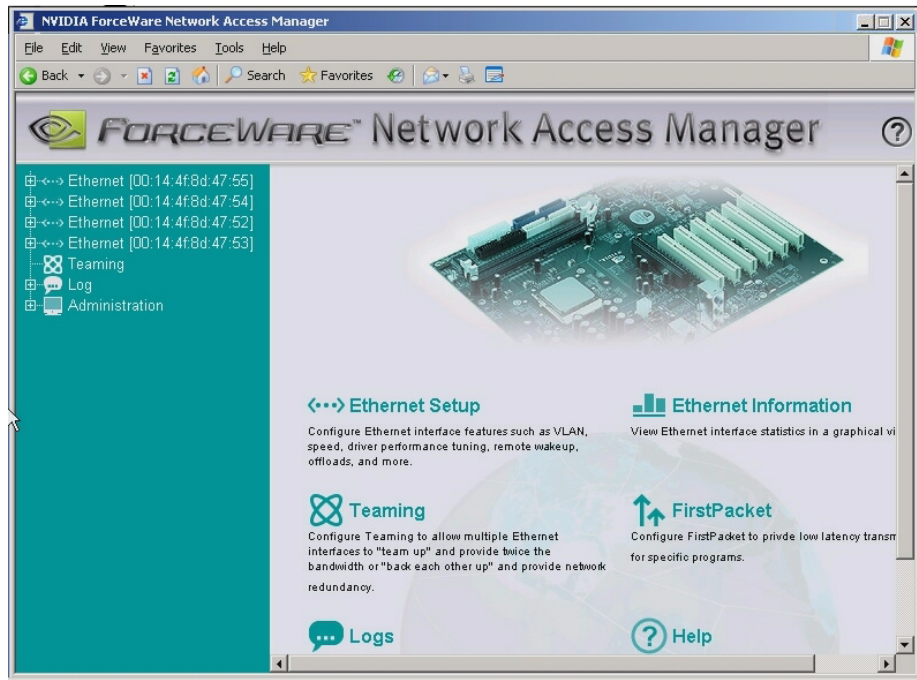
3. **For example, if you wanted to set up NIC teaming, you would click the Teaming link.**

   The Teaming wizard starts.

4. **Select Enable from the Teaming Configuration drop-down menu, and then click Apply. Refer to** FIGURE 8-6**.**

   The unpopulated Teaming Table appears in the Network Access Manager screen.

FIGURE 8-6   Teaming Wizard Screen
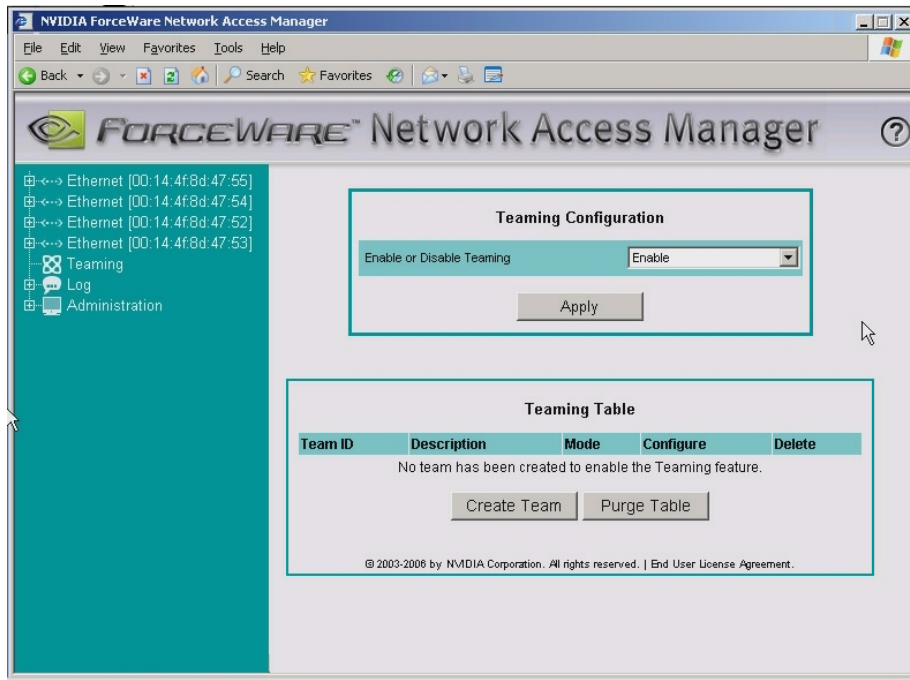
5. To select the network interfaces to team, and configure the teaming options, click the Create Team button.

The wizard displays the network interfaces available for teaming (see FIGURE 8-7) in the Network Access Manager screen.

FIGURE 8-7   Network Interface List
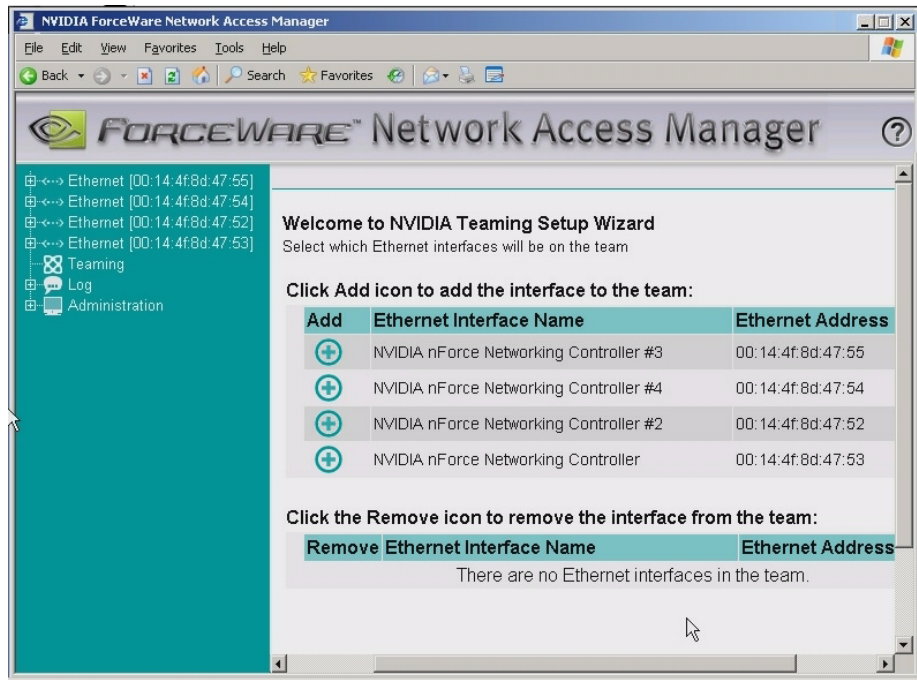
6. **From the available list of Ethernet Interface Names, add available interfaces to the team by clicking the Add icon. You can have two or more interfaces in a team.**

7. **After selecting the interfaces to be teamed, click the Next button (located at the bottom of the screen).**

   The wizard guides you through the configuration and setup of your team.

Note – Once you confirm the team to be created, you must restart the server's network interface and Network Access Manager to configure the new settings.

Learning More About Network Access Manager

For more information about using NVIDIA networking options through either the web-based or CLI interface, refer to the documentation and online help installed with the product.

Using the NVIDIA Network Control Panel for Windows Server 2008

If you elect to do a custom installation of Sun supplemental software, you can select NVIDIA Network Access Manager (NAM) to be installed on your Sun server. When installed, you can use NAM features to optimize your server's network performance, increase its network bandwidth and provide for optimal throughput in case one of your network adapters stops functioning. For Windows Server 2008, NVIDIA Ethernet settings are done through the NVIDIA Control Panel.

The NVIDIA Control Panel software is used to set up network interface **Teaming**. This tool allows you to combine all the NVIDIA Ethernet interfaces on your system to form a team, resulting in increased bandwidth and network failover redundancy.

Note – To determine which network interface ports are active on your system, use the `ipconfig /all` DOS command, or the Windows Network Connections manager. For more information, see the Service Manual for your server.

▼ To Launch the NVIDIA Control Panel

To access the functions available for your server's network interface, do the following at your server once NAM has been installed:

1. From your Windows taskbar, click Start, and then click Programs.

2. Open the NVIDIA Corporation program group, click the NVIDIA Control Panel folder, and then click Control Panel. The NVIDIA Control Panel appears.

The program prompts you to select the Standard or Advanced interface. You can setup teaming for two or more network interfaces. An example of the Advanced interface is shown in FIGURE 8-8.

**FIGURE 8-8** Windows Server 2008: NVIDIA Control Panel Screen
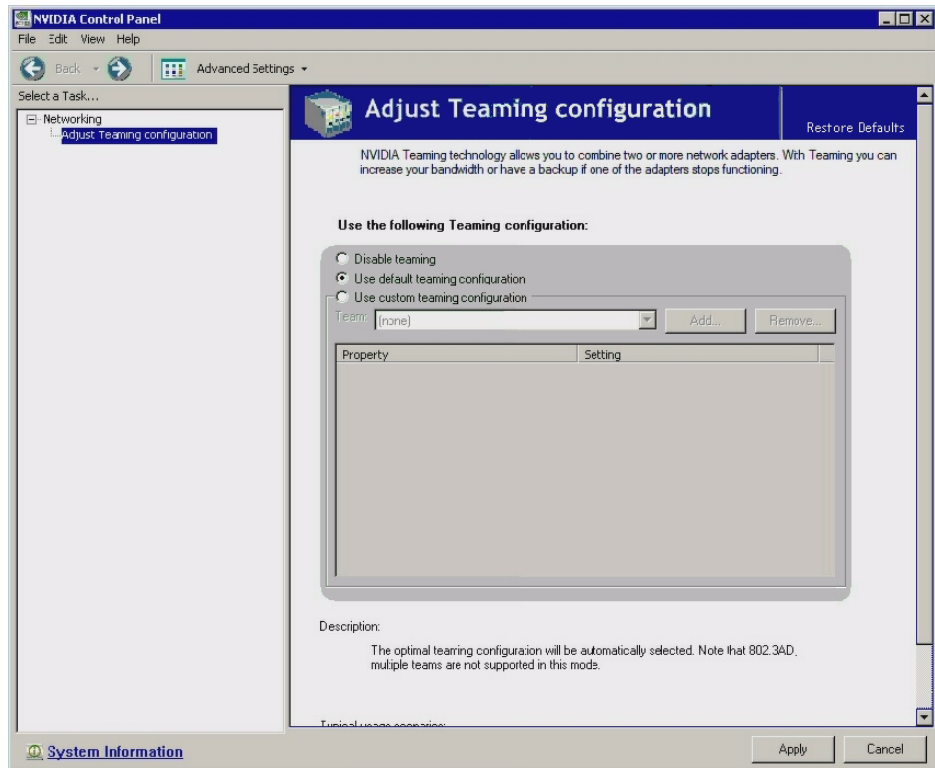
3. **For example, if you wanted to set up NIC teaming and select your On settings, instead of the using the optimal defaults, you would select Use Custom Teaming Configuration.**

   The Custom Teaming Configuration wizard starts and displays the network interfaces available for teaming (see FIGURE 8-9).

FIGURE 8-9 Ethernet Teaming List
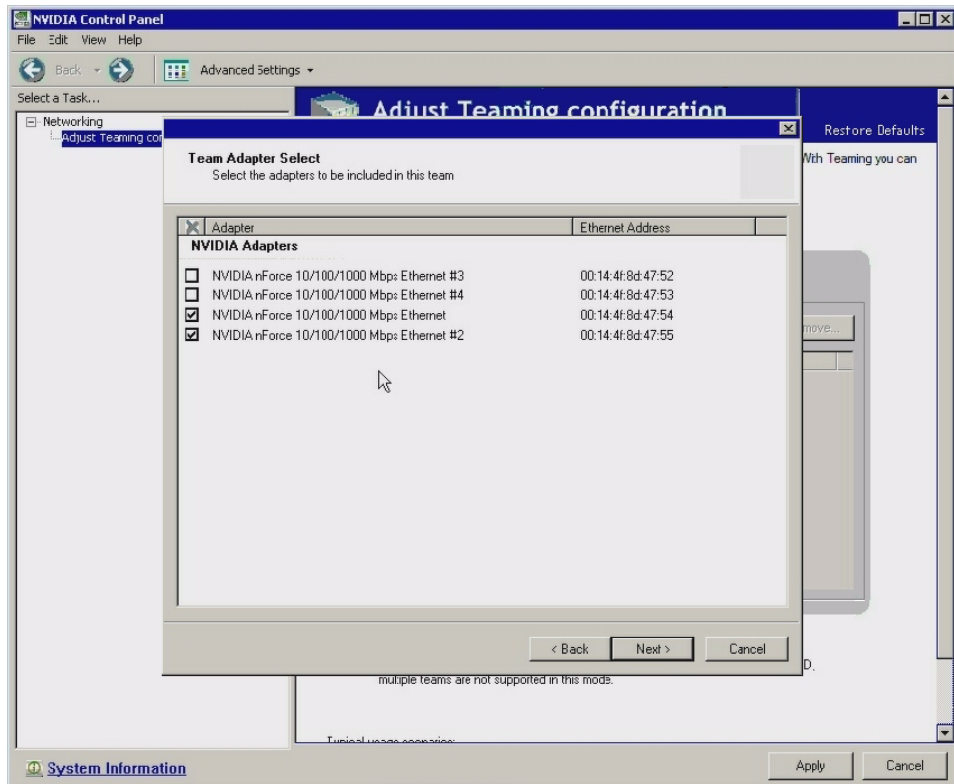
4. **Select the network interfaces you wish to team, and then click**

The wizard guides you through the configuration and setup of your team.

Learning More About NVIDIA Control Panel

For more information about using NVIDIA networking options refer to the documentation and online help installed with the product.

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