SPARC Enterprise M4000/M5000 Servers

Overview Guide

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Contents

Preface ix

1. System Overview 1–1

1.1 Product Overview 1–1

1.2 Features 1–2

1.2.1 SPARC Enterprise M4000 Server 1–5

1.2.2 SPARC Enterprise M5000 Server 1–7

1.2.3 Operator Panel Overview 1–8

1.3 Components 1–9

1.3.1 Motherboard Unit 1–10

1.3.2 CPU Module 1–11

1.3.3 Memory Board 1–13

1.3.4 Fan Unit 1–15

1.3.5 Power Supply 1–17

CPU Types and Server Maximum Power Consumption 1–19

1.3.6 Operator Panel 1–20

1.3.7 eXtended System Control Facility Unit (XSCFU) 1–23

1.3.8 I/O Unit 1–26

1.3.9 On-Board Drive Units 1–28

1.3.9.1 CD-RW/DVD-RW Drive Unit 1–30

1.3.9.2 Hard Disk Drive 1–30
1.3.9.3 Tape Drive Unit 1–31
1.4 I/O Options 1–31
1.4.1 External I/O Expansion Unit 1–31
1.4.2 PCI Cards 1–31
1.5 Software Features 1–32

2. System Features and Capabilities 2–1

2.1 Hardware Configuration 2–1
2.1.1 CPU Module 2–1
2.1.1.1 CPU Types and Features 2–2
2.1.1.2 Supported Processors and CPU Operational Modes 2–2
2.1.2 Memory Subsystem 2–3
2.1.3 I/O Subsystem 2–3
2.1.4 System Bus 2–3
2.1.5 System Control 2–3
2.1.5.1 eXtended System Control Facility Unit (XSCFU) 2–4
2.1.5.2 Fault Detection and Management 2–4
2.1.5.3 System Remote Control/Monitoring 2–4
2.2 Partitioning 2–5
2.2.1 Physical Unit for Domain Constitution 2–5
2.2.2 Domain Configuration 2–5
2.3 Resource Management 2–6
2.3.1 Dynamic Reconfiguration 2–6
2.3.2 PCI Hot-Plug 2–6
2.3.3 Capacity on Demand (COD) 2–7
2.3.4 Zones 2–7
2.4 Reliability, Availability, and Serviceability 2–8
2.4.1 Reliability 2–8

2.4.2 Availability 2–9

2.4.3 Serviceability 2–10

3. About the Software 3–1

3.1 Oracle Solaris Operating System Software 3–1

3.1.1 Domains 3–1

3.1.2 PCI Hot-Plug 3–2

3.2 XSCF Firmware 3–2

3.2.1 XSCF User Interfaces 3–2

3.2.2 XSCF Features 3–3

3.2.2.1 System Management 3–3

3.2.2.2 Security Management 3–3

3.2.3 System Status Management 3–4

3.2.3.1 Error Detection and Management 3–4

3.2.3.2 Remote Control and Monitoring 3–5

3.2.3.3 Configuration Management 3–5

3.2.3.4 Airflow Indicator 3–5

Index Index–1

Preface

This overview guide describes the hardware and software features of the SPARC Enterprise M4000/M5000 servers from Oracle and Fujitsu. References herein to the M4000 server or M5000 server are references to the SPARC Enterprise M4000 or SPARC Enterprise M5000 server.

This section explains:

- "SPARC Enterprise M4000/M5000 Servers Documentation" on page ix
- "Text Conventions" on page xi
- "Notes on Safety" on page xi
- "Documentation Feedback" on page xii

SPARC Enterprise M4000/M5000 Servers Documentation

For the web location of all SPARC Enterprise M4000/M5000 servers documents, refer to the *SPARC Enterprise M4000/M5000 Servers Getting Started Guide* packaged with your server.

Product notes are available on the website only. Please check for the most recent update for your product.

Note – For Sun Oracle software-related manuals (Oracle Solaris OS, and so on), go to: `http://docs.sun.com`

Book Titles	Sun/Oracle	Fujitsu
SPARC Enterprise M4000/M5000 Servers Site Planning Guide	819-2205	C120-H015
SPARC Enterprise Equipment Rack Mounting Guide	819-5367	C120-H016
SPARC Enterprise M4000/M5000 Servers Getting Started Guide[*]	821-3045	C120-E345
SPARC Enterprise M4000/M5000 Servers Overview Guide	819-2204	C120-E346
SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Important Legal and Safety Information	821-2098	C120-E633
SPARC Enterprise M4000/M5000 Servers Safety and Compliance Manual	819-2203	C120-E348
External I/O Expansion Unit Safety and Compliance Guide	819-1143	C120-E457
SPARC Enterprise M4000 Server Unpacking Guide	821-3043	C120-E349
SPARC Enterprise M5000 Server Unpacking Guide	821-3044	C120-E350
SPARC Enterprise M4000/M5000 Servers Installation Guide	819-2211	C120-E351
SPARC Enterprise M4000/M5000 Servers Service Manual	819-2210	C120-E352
External I/O Expansion Unit Installation and Service Manual	819-1141	C120-E329
SPARC Enterprise M/3000/4000/M5000/M8000/M9000 Servers Administration Guide	821-2794	C120-E331
SPARC Enterprise M/3000/4000/M5000/M8000/M9000 Servers XSCF User's Guide	821-2797	C120-E332
SPARC Enterprise M3000/4000/M5000/M8000/M9000 Servers XSCF Reference Manual	Varies per release	Varies per release
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide	821-2796	C120-E335
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide	821-2795	C120-E336
SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Product Notes[†]	Varies per release	Varies per release
SPARC Enterprise M4000/M5000 Servers Product Notes	Varies per release	Varies per release
External I/O Expansion Unit Product Notes	819-5324	C120-E456
SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Glossary	821-2800	C120-E514

* All getting started guides are printed documents.

† For XCP version 1100 or later

Text Conventions

This manual uses the following fonts and symbols to express specific types of information.

Fonts/symbols	Meaning	Example
AaBbCc123	What you type, when contrasted with on-screen computer output. This font represents the example of command input in the frame.	XSCF> **adduser jsmith**
AaBbCc123	The names of commands, files, and directories; on-screen computer output. This font represents the example of command input in the frame.	XSCF> **showuser -P** User Name: jsmith Privileges: useradm auditadm
Italic	Indicates the name of a reference manual	See the *SPARC Enterprise M/3000/4000/M5000/M8000/M900 0 Servers XSCF User's Guide*.
" "	Indicates names of chapters, sections, items, buttons, or menus	See Chapter 2, "System Features."

Notes on Safety

Read the following documents thoroughly before using or handling any SPARC Enterprise M4000/M5000 server.

- *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Important Legal and Safety Information*
- *SPARC Enterprise M4000/M5000 Servers Safety and Compliance Guide*

Documentation Feedback

If you have any comments or requests regarding this document, go to the following web sites.

- For Oracle users:

http://docs.sun.com

- For Fujitsu users in U.S.A., Canada, and Mexico:

http://www.computers.us.fujitsu.com/www/support_servers.shtml?support/servers

- For Fujitsu users in other countries, refer to this SPARC Enterprise contact:

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CHAPTER 1

System Overview

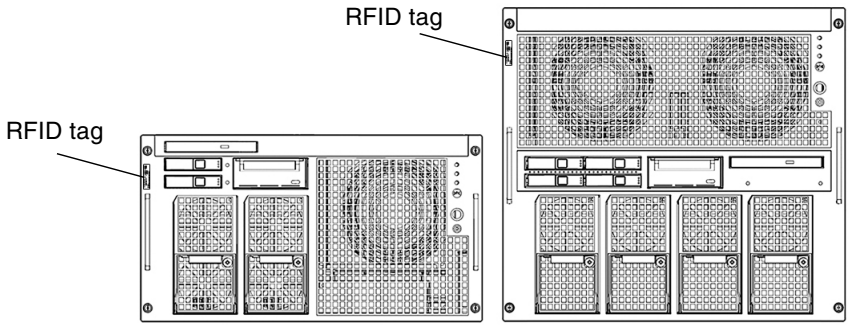
This chapter provides information on the hardware and software features and configurations for the SPARC Enterprise M4000/M5000 midrange servers. This chapter contains these sections.

- Section 1.1, “Product Overview” on page 1-1
- Section 1.2, “Features” on page 1-2
- Section 1.3, “Components” on page 1-9
- Section 1.4, “I/O Options” on page 1-31
- Section 1.5, “Software Features” on page 1-32

1.1 Product Overview

Both midrange servers are based on the SPARC64 VI/SPARC64 VII/SPARC64 VII+ processors.

FIGURE 1-1 M4000 Server [left] and M5000 Server [right] (Front Views)



1.2 Features

TABLE 1-1 provides features for fully configured servers. For more detailed specifications on each component, see Section 1.3, "Components" on page 1-9. For specifications of equipment racks, refer to the technical information manual for your equipment rack.

TABLE 1-1 Server Features

Features	M4000 Server	M5000 Server
Motherboard unit	1	1
CPU	Type: SPARC64 VI 2 CPU modules, 8 processor cores	Type: SPARC64 VI 4 CPU modules, 16 processor cores
	Type: SPARC64 VII/SPARC64 VII+ 2 CPU modules, 16 processor cores	Type: SPARC64 VII/SPARC64 VII+ 4 CPU modules, 32 processor cores
Memory board (4 or 8 DIMMs per memory board)	4 (32 DIMMs total)	8 (64 DIMMs total)
I/O unit (IOU)	1	2
PCI slots	5 slots per tray in the IOU 1 IOU (5 cassettes)	5 slots per tray in the IOU 2 IOUs (10 cassettes)
PCI cards	5 (1 PCI-X and 4 PCI Express)	10 (2 PCI-X and 8 PCI Express)
eXtended System Control Facility Unit (XSCFU)	1	1
Power supplies (2000W)	2 (1+ 1 redundant @200 VAC)	4 (2 + 2 redundant @200 VAC)

TABLE 1-1 Server Features *(Continued)*

Features	M4000 Server	M5000 Server
Redundant cooling	• Two 172-mm fans (One fan is redundant) • Two 60-mm fans (One fan is redundant)	Four 172-mm fans per server Two fans are redundant
Internal drives	1 CD-RW/DVD-RW drive unit, 2 hard disk drives, 1 tape drive unit (optional)	1 CD-RW/DVD-RW drive unit, 4 hard disk drives, 1 tape drive unit (optional)
Domains	2	4
Architecture	Platform group: sun4u Platform name: SUNW, SPARC-Enterprise	
Rackmountable	Equipment rack	
Server dimensions (width x depth x height)	444 x 810 x 263 mm (6 rack units) 17.5 x 31.9 x 10.3 inches	444 x 810 x 440 mm (10 rack units) 17.5 x 31.9 x17.3 inches
Weight	185 lb. (84 kg)	275 lb. (125 kg)
RFID tag*	PASSIVE UHF EPC Class 1 GEN2 Financial Services Technical Consortium (FSTC) compliant EPC pre-programmed Frequency: 860-960 MHz† Read range: 1.8m (6ft) fixed reader/ 90cm (3ft) hand-held‡	

* A Radio Frequency Identification(RFID) tag is used for asset identification. The RFID tag provides identification information via short distance radio waves to an RFID reader or sensor. The tag contains a unique Electronic Product Code (EPC) serial number and a 2-D Data Matrix code.

† Frequency is defined by the government of each country.

‡ Read range is affected by tag orientation, sensitivity, and reader performance.

The environmental requirements listed in TABLE 1-2 reflect the test results of the server. The optimum conditions indicate the recommended operating environment. Operating the server for extended periods at or near the operating range limits or installing the server in an environment where it remains at or near the non-operating range limits could possibly increase the failure rate of hardware components significantly. In order to minimize the occurrence of system failure due to component failure, set temperature and humidity in the optimal ranges.

TABLE 1-2 Environmental Requirements

	Operating Range	Non-Operating Range	Optimum
Ambient temperature	5˚C to 35˚C (41˚F to 95˚F)	Unpacked: 0˚C to 50˚C (32˚F to 122˚F) Packed: -20˚C to 60˚C (-4˚F to 140˚F)	21˚C to 23˚C (70˚F to 74˚F)
Relative humidity *	20% RH to 80% RH	to 93% RH	45% RH to 50% RH
Altitude restriction †	3,000 m (10,000 ft)	12,000 m (40, 000 ft)	
Temperature conditions	5˚C to 35˚C (41˚ F to 95˚F): 0 m to 500 m (0 ft to 1,640 ft)		
	5˚C to 33˚C (41˚ F to 91.4˚F): 501 m to 1,000 m (1,644 ft to 3,281 ft)		
	5˚C to 31˚C (41˚ F to 87.8˚F): 1,001 m to 1,500 m (3,284 ft to 4,921 ft)		
	5˚C to 29˚C (41˚ F to 84.2˚F): 1,501 m to 3,000 m (4,925 ft to 9,843 ft)		

* There is no condensation regardless of the temperature and humidity.

† All altitudes are above sea level.

Note – In order to minimize any chance of downtime due to component failure, use the optimal temperature and humidity ranges.

Both midrange servers have these features:

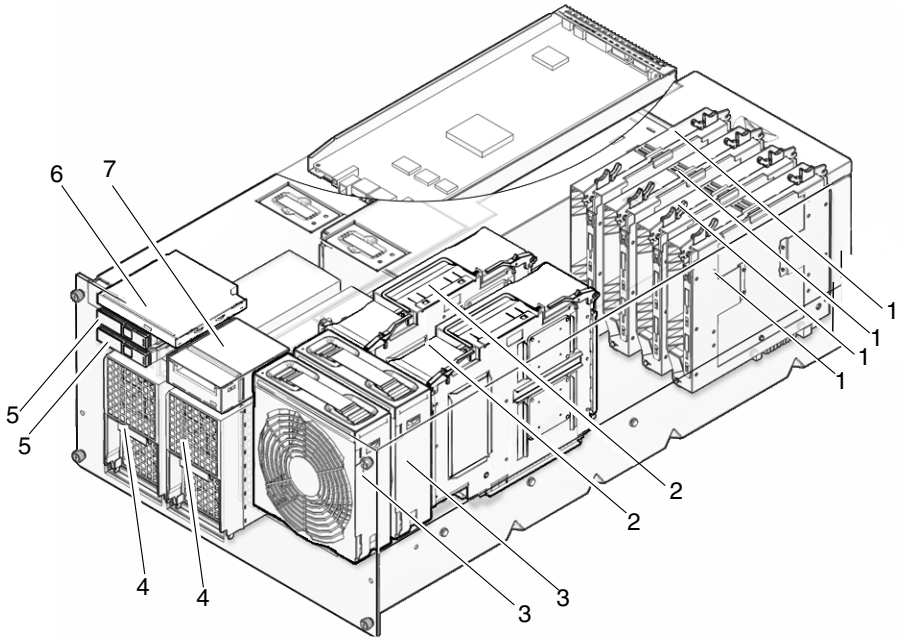
- Rackmountable
- Support for multiple CPU modules
- Symmetric multiprocessing (SMP), which is making multiple CPUs available to complete individual processes simultaneously
- eXtended System Control Facility Unit (XSCFU)
- PCI Express I/O bus
- PCI cassettes
- Operator panel
- Hard disk drives, CD-RW/DVD-RW drive unit, tape drive unit (optional)

- Redundant power and cooling
- Hot FRU replacement capability
- I/O expandability with the External I/O Expansion Unit

1.2.1 SPARC Enterprise M4000 Server

The M4000 server is a six-rack unit (6 RU) enclosure (10.35 inches, 263 mm), which supports up to two dynamic server domains. FIGURE 1-2 and FIGURE 1-3 illustrate the components. See Section 1.3, "Components" on page 1-9 for a brief description of each component.

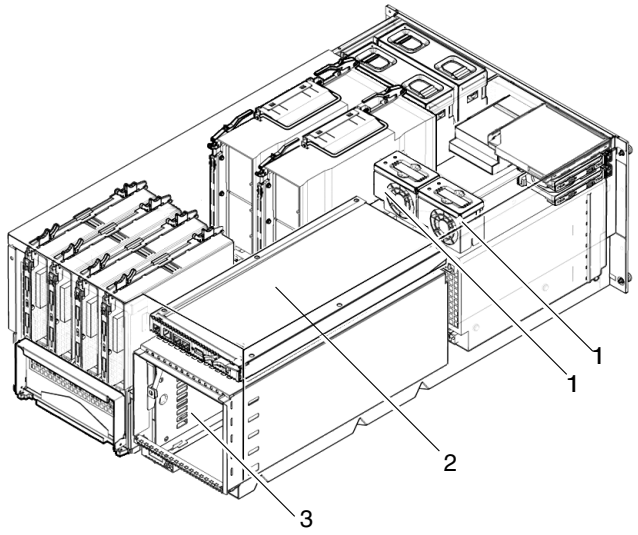
FIGURE 1-2 M4000 Server (Internal Front View)



Location Number	Component	Maximum Number per Server
1	Memory boards (MEMB)	4
2	CPU modules each containing two processor chips (CPUM)	2
3	172-mm fans (FAN_A)	2

Location Number	Component	Maximum Number per Server
4	Power supply units (PSU)	2
5	Hard disk drives (HDD), Serial-attached SCSI (SAS)	2
6	CD-RW/DVD-RW drive unit (DVDU)	1
7	Tape drive unit (TAPEU), optional	1

FIGURE 1-3 M4000 Server (Internal Rear View)

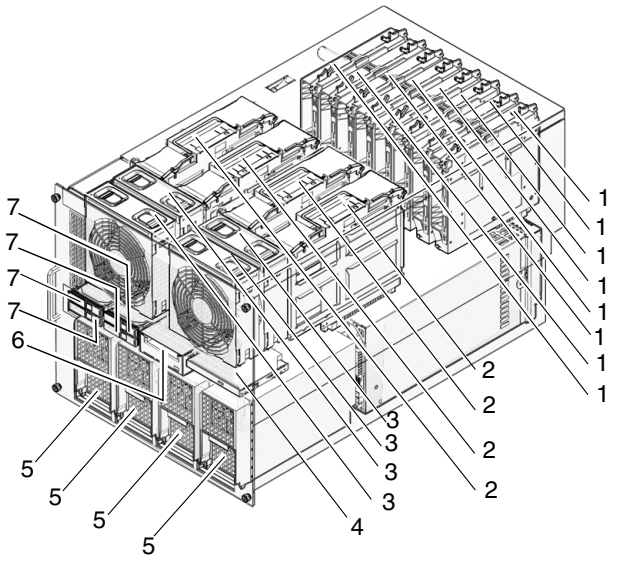


Location Number	Component	Maximum Number per Server
1	60-mm fans (FAN_B)	2
2	eXtended System Control Facility unit (XSCFU)	1
3	I/O unit—supports one PCI-X slot (lowest slot) and four PCI Express slots (four upper slots)	1

1.2.2 SPARC Enterprise M5000 Server

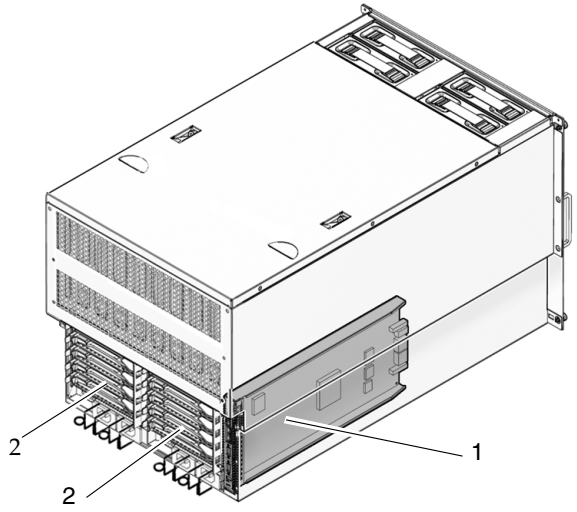
The M5000 server is a ten-rack unit (10 RU) enclosure (17.25 inches, 438 mm), which supports up to four dynamic server domains. FIGURE 1-4 and FIGURE 1-5 illustrates the components. See Section 1.3, “Components” on page 1-9 for a brief description of each component.

FIGURE 1-4 M5000 Server (Internal Front View)



Location Number	Component	Maximum Number per Server
1	Memory boards (MEMB)	8
2	CPU modules each containing two processor chips (CPUM)	4
3	172-mm fans (FAN_A)	4
4	CD-RW/DVD-RW drive unit (DVDU)	1
5	Power supply units (PSU)	4
6	Tape drive unit (TAPEU), optional	1
7	Hard disk drives (HDD), Serial-attached SCSI (SAS)	4

FIGURE 1-5 M5000 Server (Rear View)



Location Number	Component	Maximum Number per Server
1	eXtended System Control Facility Unit (XSCFU)	1
2	I/O unit (IOU) Each I/O unit supports one PCI-X slot (lowest slot) and four PCIe slots (four upper slots)	2

1.2.3 Operator Panel Overview

The operator panel, which is identical for both midrange servers, is located on the front of the server in the upper right corner. The operator panel is used for the following tasks:

- Displaying the server status
- Storing server identification information
- Storing user setting information
- Turning on the power supply of all domains
- Changing operational and maintenance mode by using the mode switch

See Section 1.3.6, “Operator Panel” on page 1-20 for a description of the LEDs and status indicators.

For complete details on the operator panel controls, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual.*

1.3 Components

The components of both midrange servers are described in the following sections:

- Section 1.3.1, "Motherboard Unit" on page 1-10
- Section 1.3.2, "CPU Module" on page 1-11
- Section 1.3.3, "Memory Board" on page 1-13
- Section 1.3.4, "Fan Unit" on page 1-15
- Section 1.3.5, "Power Supply" on page 1-17
- Section 1.3.6, "Operator Panel" on page 1-20
- Section 1.3.7, "eXtended System Control Facility Unit (XSCFU)" on page 1-23
- Section 1.3.8, "I/O Unit" on page 1-26
- Section 1.3.9, "On-Board Drive Units" on page 1-28
- Section 1.4.1, "External I/O Expansion Unit" on page 1-31

TABLE 1-3 identifies the FRU components. Components using "hot FRU replacement" can be removed from the server and replaced while the operating server is running without performing a dynamic reconfiguration operation. Components using "active FRU removal" must be dynamically reconfigured out of the domain before removing the component.

TABLE 1-3 FRU Components for Both Midrange Servers

Component	Redundant	Cold Replacement	Hot Replacement	Active Replacement
Motherboard unit	No	Yes		
CPU module	No	Yes		
Memory board	No	Yes		
DIMM	No	Yes		
eXtended System Control Facility unit (XSCFU)	No	Yes		
I/O Unit	No	Yes		
PCI cassette with PCI card	No	Yes	Yes	Yes
Fan unit	Yes	Yes	Yes	Yes
Fan backplane	No	Yes		

TABLE 1-3 FRU Components for Both Midrange Servers *(Continued)*

Component	Redundant	Cold Replacement	Hot Replacement	Active Replacement
Power supply unit	Yes	Yes	Yes	Yes
Bus bar, I/O backplane, and power backplane unit (M5000 server)	No	Yes		
I/O backplane and power backplane unit (M4000 server)	No	Yes		
Hard disk drive	No	Yes	Yes	Yes
Tape drive unit (optional)	No	Yes	Yes	Yes
CD-RW/DVD-RW drive unit	No	Yes		
Operator panel	No	Yes		

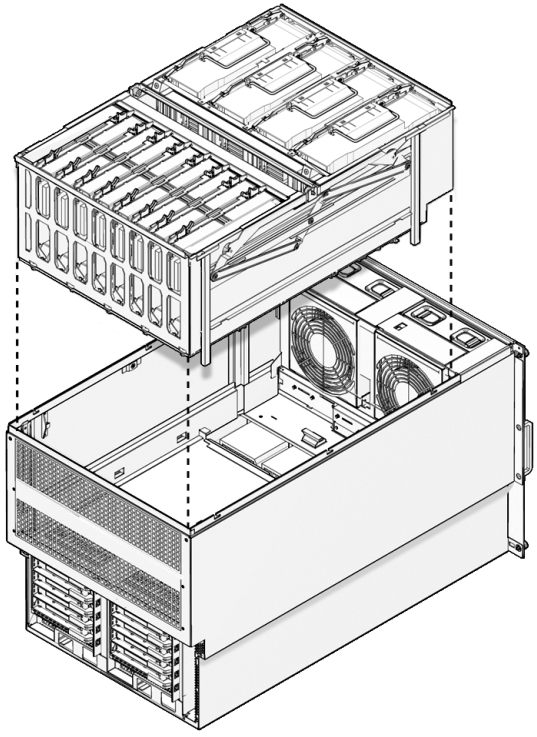
1.3.1 Motherboard Unit

The motherboard unit (FIGURE 1-6) is the main circuit board in both midrange servers. The following components connect to the motherboard unit:

- CPU modules (two CPU chips per module)
- Memory boards
- Bus bar, I/O backplane, and power backplane unit (SPARC Enterprise M5000 server only)
- I/O unit(s) through the I/O backplane
- eXtended System Control Facility Unit (XSCFU) through the bus bar, I/O backplane, and power backplane unit

To remove and replace the motherboard and these components, you must power the server off. For more details on the motherboard unit, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

FIGURE 1-6 Removing the Motherboard Unit From the M5000 Server



1.3.2 CPU Module

Each CPU module contains SPARC64 VI processors or SPARC64 VII/SPARC64 VII+ processors. Each processor chip incorporates and implements the following:

- Chip multithreading (CMT) design that sequentially executes the multiple processes on the CPU.
- SPARC64 VI processors are two-core processors.
- SPARC64 VII/SPARC64 VII+ processors are four-core processors.

The CPU modules can be accessed from the top of the midrange server. FIGURE 1-7 and FIGURE 1-8 illustrate the number of CPU modules per midrange server and their location. TABLE 1-4 lists features of the CPU modules. For additional information on the CPU module, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

TABLE 1-4 CPU Module Features

CPU module location	Top of server
Cold FRU replacement capability	Yes

FIGURE 1-7 CPU Modules in the M4000 Server

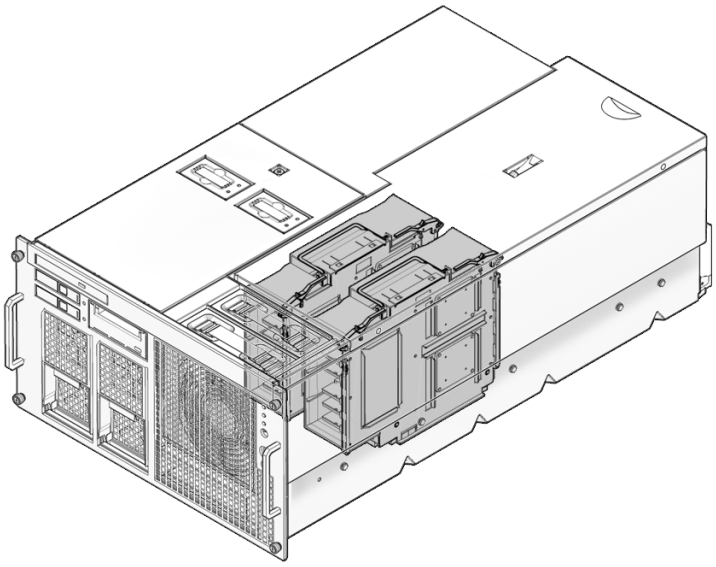
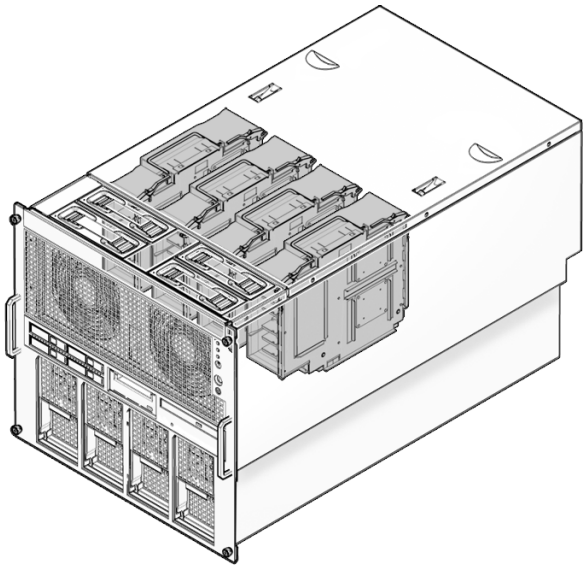


FIGURE 1-8 CPU Modules in the M5000 Server



1.3.3 Memory Board

Each memory board provides a memory access controller (MAC) and eight DIMM slots (FIGURE 1-9 and FIGURE 1-10). To remove or install memory boards, you must power the server off. TABLE 1-5 lists the memory board features.

TABLE 1-5 Memory Board Features

Location	Top of server
Cold FRU replacement capability	Yes

To install DIMMs, you must remove the memory board and open the case of the memory board. The servers use Double Data Rate II (DDR-II) type memory with the following features:

- Error Checking and Correction (ECC) error protection
- Recovery from memory chip failures

FIGURE 1-9 and FIGURE 1-10 illustrate the location of the memory boards in both midrange servers.

FIGURE 1-9 Memory Board Location in the M4000 Server

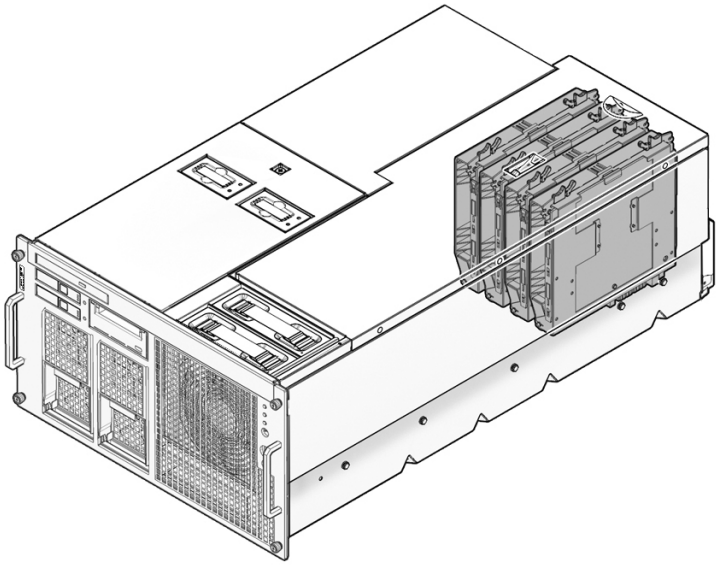
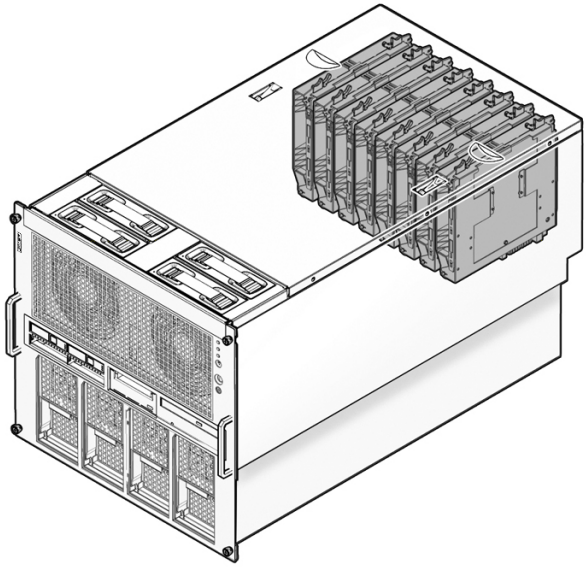


FIGURE 1-10 Memory Board Location in the M5000 Server



1.3.4 Fan Unit

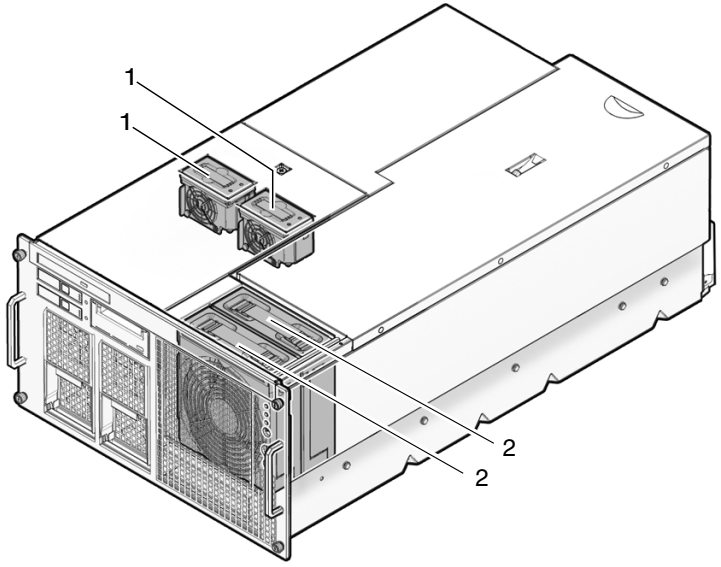
Both midrange servers use 172-mm fan units as the primary cooling system. The M4000 server also use two 60-mm fans. FIGURE 1-11 and FIGURE 1-12 illustrate the number of fans per midrange server, fan location, and the fan types used in both midrange servers.

The fan units in both midrange servers move air currents into and out of the server. The fans in both midrange servers are redundant. Because of the redundancy, system operation continues when a failure occurs with one fan. If the midrange server has two fans of each fan type, one fan of each fan type is redundant. If the midrange server has a total of four fans, two of the four fans are redundant (FIGURE 1-11 and FIGURE 1-12). Fan failures can be detected by the eXtended System Control Facility (XSCF).

The fans are accessed from the top of the midrange server.

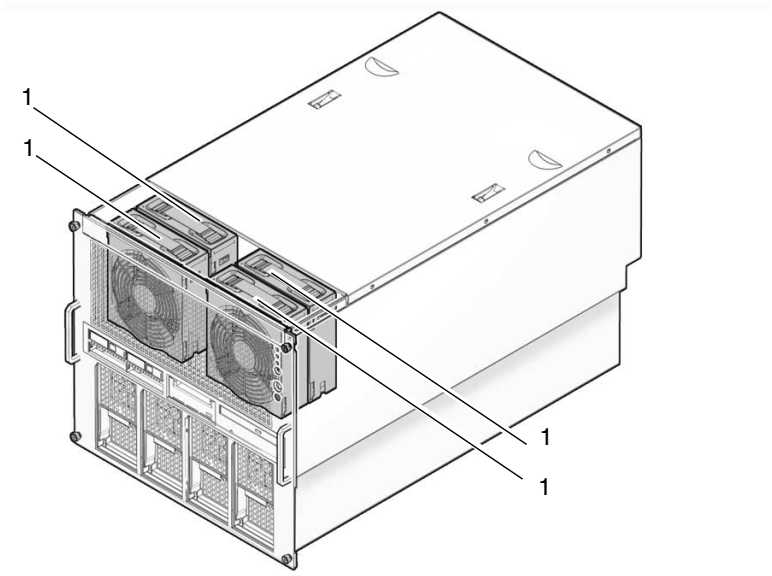
FIGURE 1-11 and FIGURE 1-12 show the fan unit locations in both midrange servers.

FIGURE 1-11 Fan Unit Locations in the M4000 Server



Location Number	Component	Maximum Number per Server
1	Fan units, 60-mm (FAN_B#0, FAN_B#1)	2
2	Fan units, 172-mm (FAN_A#0, FAN_A#1)	2

FIGURE 1-12 172-mm Fan Unit Locations in the M5000 Server

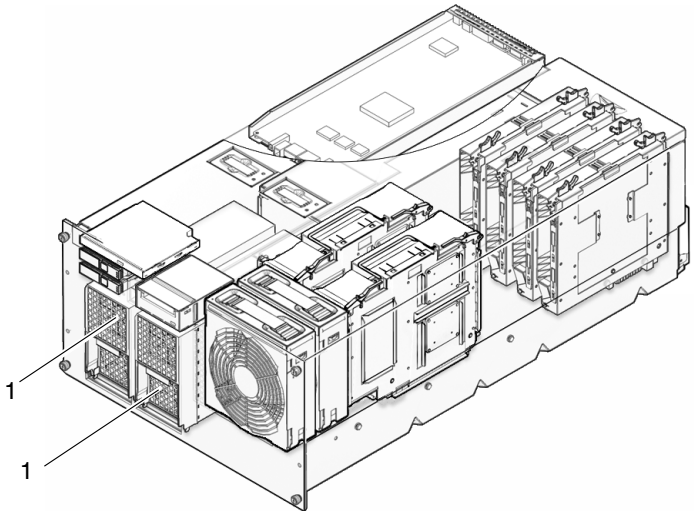


Location Number	Component	Maximum Number per Server
1	Fan units, 172-mm (FAN_A#0 - FAN_A#3)	4

1.3.5 Power Supply

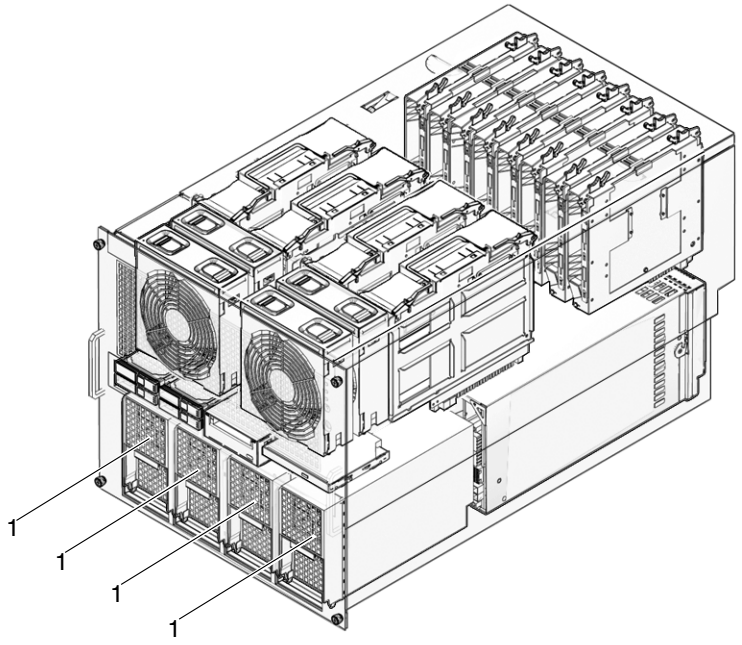
Power is provided to both midrange servers by power supply units (FIGURE 1-13 and FIGURE 1-14).

FIGURE 1-13 Power Supply Units in the M4000 Server



Location Number	Component	Maximum Number per Server
1	Power supply units	2

FIGURE 1-14 Power Supply Units in the M5000 Server



Location Number	Component	Maximum Number per Server
1	Power supply units	4

The redundant power supplies allow continued server operation if a power supply fails. You can remove a power supply by way of active replacement, cold replacement, or hot replacement.

TABLE 1-6 lists the power supply features and some specifications. For additional specifications, refer to the *SPARC Enterprise M4000/M5000 Servers Site Planning Guide*.

TABLE 1-6 Midrange Servers Electrical Specifications

	M4000 Server	M5000 Server
Number of power cords	2 (1 power cord per power supply unit)	4 (1 power cord per power supply unit)
Redundancy	1 + 1 redundant Second power supply is redundant at 200 VAC	2 + 2 redundant Second and fourth power supplies are redundant at 200 VAC
Input voltage	100–127 VAC 200–240 VAC	100–127 VAC 200–240 VAC
Maximum current	24.0A at 100–127 VAC (12A/cord) 12.0A at 200–240 VAC (12A/cord)	48A at 100–127 VAC (12A/cord) 24A at 200–240 VAC (12A/cord)
Frequency	50–60 Hz	50–60 Hz
Power factor	0.98	0.98

CPU Types and Server Maximum Power Consumption

This section describes the CPU types and the maximum power consumption of the server.

There are four types of CPU. The power specifications of the M4000/M5000 servers vary depending on the CPU type and the system configuration.

TABLE 1-7 and TABLE 1-8 list the specifications of maximum power consumption, apparent power, and heat dissipation by the type of CPU. The figures represent the system configuration described below the table, in which every CPU Modules (CPUM) is mounted with the same CPU.

Note – Values in TABLE 1-7 and TABLE 1-8 are rounded to the nearest whole number.

TABLE 1-7 CPU Types and Maximum Power Consumption on the M4000 Server*

CPU Type	Frequency (GHz)	Number	Power Consumption (W)	Apparent Power (VA)	Heat Dissipation (KJ/h)
SPARC 64 VI processor	2.15	4	1556	1621	5602
SPARC 64 VII processor	2.4/2.53	4	1656	1725	5962
SPARC 64 VII+ processor	2.66	4	1692	1763	6091

* M4000 system configuration: CPUM x 2, MEMB x 4, 8GB DIMM x 32, HDD x 2, PCIe x 4, PCI-X x 1, DAT x 1.

TABLE 1-8 CPU Types and Maximum Power Consumption on the M5000 Server*

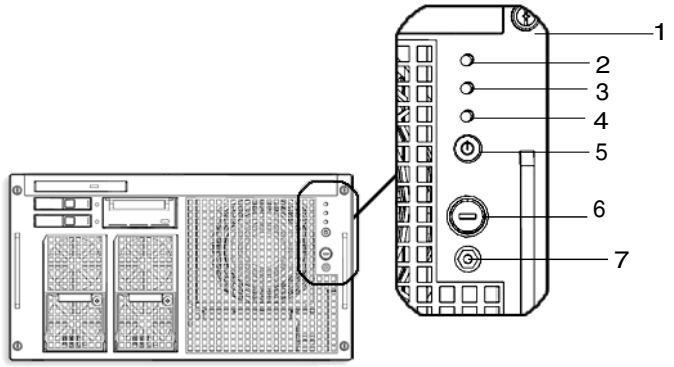
CPU Type	Frequency (GHz)	Number	Power Consumption (W)	Apparent Power (VA)	Heat Dissipation (KJ/h)
SPARC 64 VI processor	2.15	8	2998	3123	10793
SPARC 64 VII processor	2.4/ 2.53	8	3198	3331	11513
SPARC 64 VII+ processor	2.66	8	3270	3406	11772

* M5000 system configuration: CPUM x 4, MEMB x 8,8GB DIMM x 64, HDD x 4, PCIe x 8, PCI-X x 1, DAT x 1.

1.3.6 Operator Panel

The operator panel (FIGURE 1-15), which is not redundant, displays the system status, system problem alerts, and location of system faults. It also stores the system identification and user setting information. For more information on the operator panel functions, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual.*

FIGURE 1-15 Operator Panel



Location Number	Function
1	Operator panel (FRU)
2	POWER LED
3	XSCF STANDBY LED
4	CHECK LED
5	Power switch
6	Mode switch (key switch)
7	Antistatic ground socket

During startup, the front panel LED status indicators are individually toggled on and off to verify that each component is working correctly. After startup, the front panel LED status indicators operate as described in TABLE 1-9.

TABLE 1-9 Operator Panel LEDs and Switches

Icon	Name	Color	Description
	POWER LED	Green	Indicates the server power status. • On: Server has power. • Off: Server is without power. • Blinking: The power-off sequence is in progress.
	XSCF STANDBY LED	Green	Indicates the readiness of the XSCF. • On: XSCF unit is functioning normally. • Off: XSCF unit is stopped. • Blinking: Under system initialization after server power-on, or under system power-on process.
	CHECK LED	Amber	Indicates that server detected a fault. • On: Error detected that disables the startup. • Off: Normal, or the server is power-off (power failure). • Blinking: Indicates the position of fault.
	Power switch		Button to direct server power on/power off.
	Mode switch (key switch)		The Locked setting: • Normal key position. Power on is available with the Power switch, but power off is not. • Disables the Power switch to prevent unauthorized users from powering the server on or off. • The Locked position is the recommended setting for normal day-to-day operations.
			The Service setting: • Service should be provided at this position. • Power on and off is available with Power switch. • The key cannot be pulled out at this position.

LED status indicators are located on some of the FRUs. For information about LED status indicator locations, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

TABLE 1-10 Status Indicator LED Pattern Summary

LED			
POWER	**XSCF STANDBY**	**CHECK**	**Description of the State**
Off	Off	Off	The circuit breaker is switched off.
Off	Off	On	The circuit breaker is switched on.
Off	Blinking	Off	The XSCF is being initialized.
Off	Blinking	On	An error occurred in the XSCF.
Off	On	Off	The XSCF is on standby. The system is waiting for power-on of the air conditioning system.
On	On	Off	Warm-up standby processing is in progress (power-on is delayed). The power-on sequence is in progress. The system is in operation.
Blinking	On	Off	The power-off sequence is in progress. Fan termination is being delayed.

1.3.7 eXtended System Control Facility Unit (XSCFU)

The eXtended System Control Facility Unit (XSCFU) is a service processor that operates and administrates both midrange servers (FIGURE 1-16 and FIGURE 1-17). The XSCFU diagnoses and starts the entire server, configures domains, offers dynamic reconfiguration, as well as detects and notifies various failures. The XSCFU enables standard control and monitoring function through network. Using this function enables starts, settings, and operation managements of the server from remote locations.

FIGURE 1-16 XSCFU Location in the M4000 Server

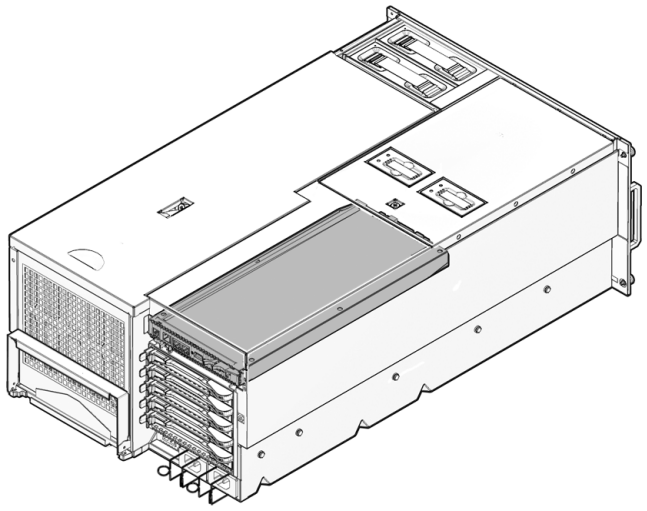
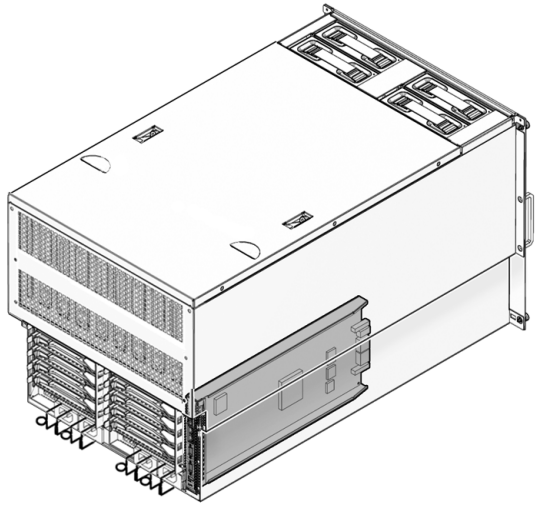


FIGURE 1-17 XSCFU Location in the M5000 Server



The XSCFU uses the eXtended System Control Facility (XSCF) firmware to provide the following functions:

- Controls and monitors the main unit hardware
- Monitors the Oracle Solaris Operating System (Oracle Solaris OS), power-on self-test (POST), and the OpenBoot PROM

- Controls and manages the interface for the system administrator (such as a terminal console)
- Administrators device information
- Controls remote messaging of various events

Both midrange servers have one XSCFU, which is serviced from the rear of the server. To replace it, you must power off the server. For more information, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

The XSCF firmware provides the system control and monitoring interfaces listed below.

- Serial port through which the command-line interface (XSCF Shell) can be used
- Two LAN ports:
  - XSCF Shell
  - XSCF Web (browser-based user interface)

The following additional interfaces for system control are also provided:

- The uninterruptible power supply unit (UPC) interface ports (2), which are used to communicate to uninterruptible power supply units (UPS).

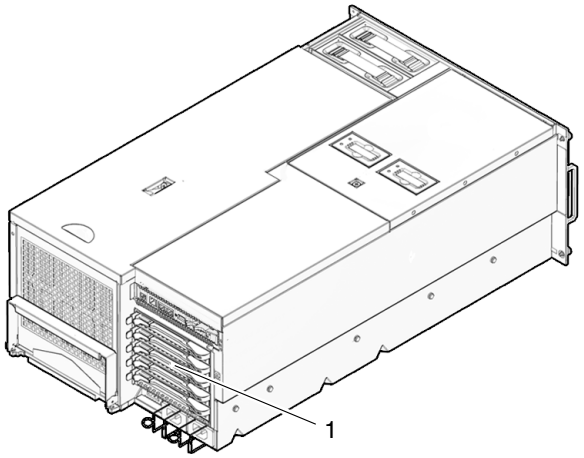
  A UPS unit is used to provide a stable supply of power to the system in the event of a power failure or an extensive power interruption. By connecting the UPC port of the server and a UPS which has a UPC interface via signal cables, you can execute emergency shutdown processing when the commercial AC power supply failure detected.
- RCI port, which is used for power supply synchronization through a connected remote cabinet interface (RCI) device.
- USB interface port for maintenance operator

  This is dedicated for use by field engineers and cannot be connected to general-purpose USB devices.

1.3.8 I/O Unit

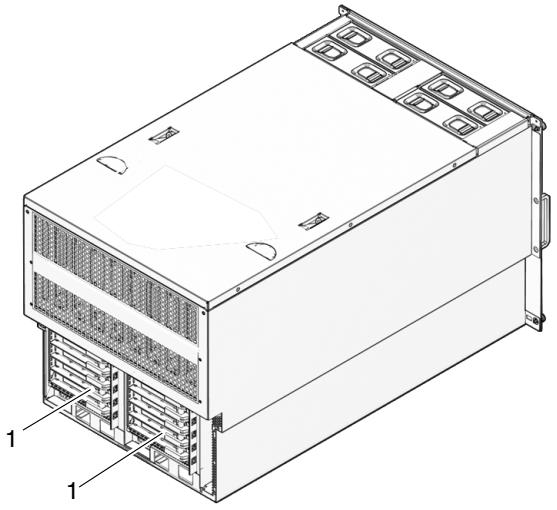
The I/O unit is illustrated in FIGURE 1-18 and FIGURE 1-19. Four PCIe buses are connected from one I/O controller. These buses support all of the systems on-board I/O controllers in addition to the interface cards in the server.

FIGURE 1-18 I/O Unit Location in the M4000 Server



Location Number	Component	Maximum Number per Server
1	I/O unit	1

FIGURE 1-19 I/O Unit Locations in the M5000 Server



Location Number	Component	Maximum Number per Server
1	I/O unit	2

The I/O unit (IOU) is used in both the midrange servers. Refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual* for more information on the IOU.

The IOU houses the following:

- Four PCIe 8 lane, short card slots (four upper slots)
- One PCI-X short card slot (lowest slot)

The IOU holds cassettes that support four PCIe cards and one PCI-X card.

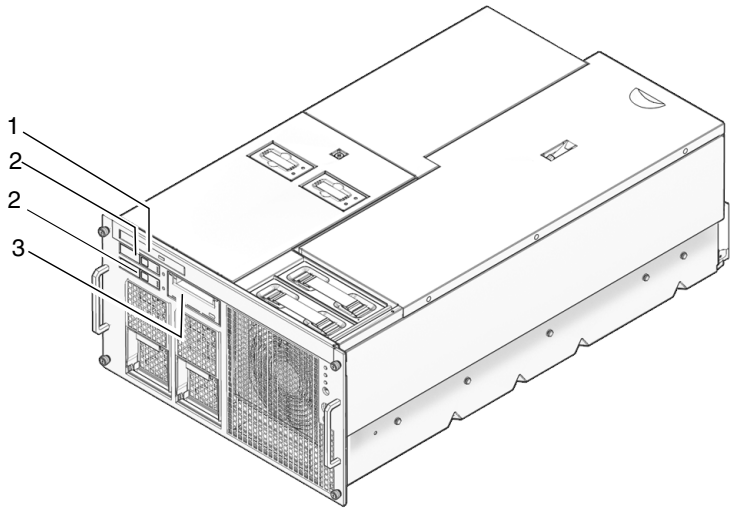
The PCIe features include a high-speed serial point-to-point interconnect. Compared with conventional PCI buses, the PCIe data transfer rates are doubled.

1.3.9 On-Board Drive Units

Both midrange servers provide front-panel access to the drives (FIGURE 1-20 and FIGURE 1-21). The following drives are provided on both midrange servers:

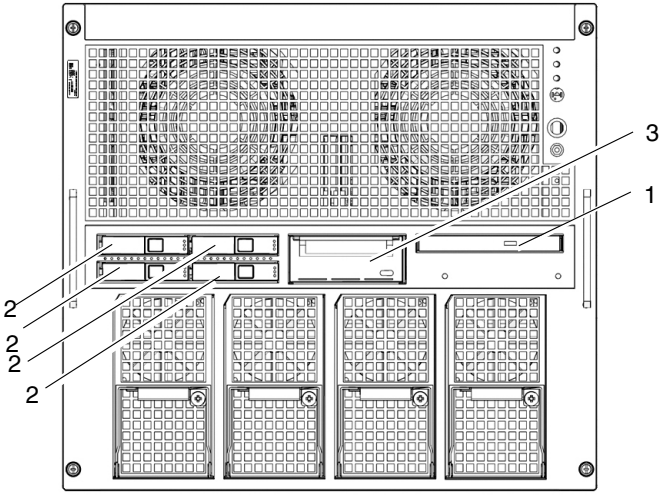
- One CD-RW/DVD-RW drive unit
- Hard disk drive
- One tape drive unit (optional)

FIGURE 1-20 CD-RW/DVD-RW Drive Unit, Hard Disk Drive, and Tape Drive Unit in the M4000 Server



Location Number	Component	Maximum Number per Server
1	CD-RW/DVD-RW drive unit	1
2	Hard disk drive, Serial-attached SCSI (SAS)	2
3	Tape drive unit	1

FIGURE 1-21 CD-RW/DVD-RW Drive Unit, Hard Disk Drive, and Tape Drive Unit in the M5000 Server



Location Number	Component	Maximum Number per Server
1	CD-RW/DVD-RW drive unit	1
2	Hard disk drive, Serial-attached SCSI (SAS)	4
3	Tape drive unit	1

1.3.9.1 CD-RW/DVD-RW Drive Unit

TABLE 1-11 lists the features, location, and specifications of the CD-RW/DVD-RW drive unit.

TABLE 1-11 CD-RW/DVD-RW Drive Unit Features and Specifications for Both Servers

Number of CD-RW/DVD-RW drive unit	1
Location	Front of server to the right of the hard disk drives
Hot FRU replacement	No

There are two types of CD-RW/DVD-RW drive units: tray load or slot load. Each type of drive unit will connect only with its corresponding drive unit backplane.

Caution – Prior to ordering CD-RW/DVD-RW drive unit or CD-RW/DVD-RW drive unit backplane replacements, inspect both the CD-RW/DVD-RW drive and CD-RW/DVD-RW drive unit backplane of your system for compatibility.

FIGURE 1-22 Two Types of CD-RW/DVD-RW Drive Units

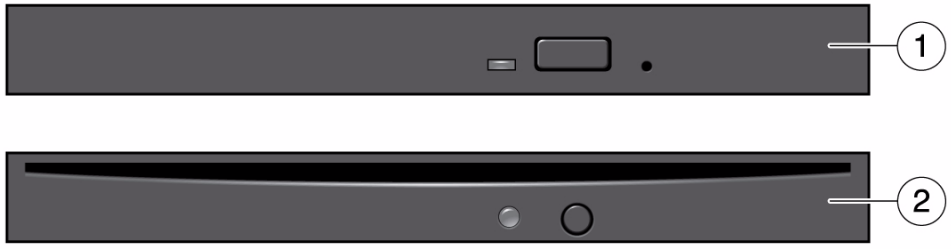


Figure Legend

1	Tray-loading CD-RW/DVD-RW drive unit
2	Slot-loading CD-RW/DVD-RW drive unit

Note – The locations of the LED and button might vary depending on the servers.

1.3.9.2 Hard Disk Drive

The hard disk drives are located on the front of the midrange server. The SAS interface on the hard disk drive allows a fast data transmission rate.

1.3.9.3 Tape Drive Unit

The tape drive unit in both midrange servers is an optional component. TABLE 1-12 lists the features, location, and specifications of the optional tape drive unit.

Contact your sales representative for tape drive unit options on M4000/M5000 servers.

TABLE 1-12 Tape Drive Unit Features and Specifications for Both Midrange Servers

Feature	Quantity, Location, and Specifications
Number of tape drive units	1 (optional)
Location	Front of server
Cold FRU replacement capability	Yes
Tape drive unit type	Digital audio tape (DAT) drive
Data transfer rate	About 6 MB/s
Capacity	36 Gbytes of data (non compressed format) 72 Gbytes of data (double-compressed format)
Media type	Sequential access
Transfer rate	150 MB/s or faster

1.4 I/O Options

1.4.1 External I/O Expansion Unit

You can purchase an optional External I/O Expansion Unit to add I/O capacity to the server. For more information, refer to the *External I/O Expansion Unit Installation and Service Manual*.

1.4.2 PCI Cards

Each PCI card in the server must be mounted to a PCI cassette before the card can be inserted into the I/O unit slot. For more information, see Section 1.3.8, "I/O Unit" on page 1-26.

1.5 Software Features

Oracle Solaris OS is installed on the system domains. In addition to its suite of software capabilities, Oracle Solaris OS provides functions that interact with system hardware.

- Dynamic Reconfiguration
- Oracle Solaris zones
- PCI hot-plug
- Capacity on Demand

Both midrange servers use the eXtended System Control Facility (XSCF) firmware. This firmware runs on the service processor and provides control and monitoring functions for the system platform.

For more information on the software features, see Chapter 3.

CHAPTER 2

System Features and Capabilities

This chapter provides information on hardware and domain configuration, resource management, and reliability, availability, and serviceability (RAS).

- Section 2.1, “Hardware Configuration” on page 2-1
- Section 2.2, “Partitioning” on page 2-5
- Section 2.3, “Resource Management” on page 2-6
- Section 2.4, “Reliability, Availability, and Serviceability” on page 2-8

2.1 Hardware Configuration

This section describes the hardware configuration. It includes these topics:

- CPU Module
- Memory Subsystem
- I/O Subsystem
- System Bus
- System Control

2.1.1 CPU Module

The M4000 server supports up to two CPU modules and the M5000 server supports up to four CPU modules. The CPU module consists of two processors per module. The CPU modules are high-performance multicore processor chips which contain an on-chip secondary cache to minimize memory latency. These processor chips also support the instruction retry function that enables continuous processing by retrying instructions when any error is detected.

2.1.1.1 CPU Types and Features

This section describes the CPU types and features.

TABLE 2-1 CPU Specifications

CPU Name	SPARC64 VI Processor	SPARC64 VII/VII+ Processor
Number of cores	2 cores	4 cores
Operational mode	SPARC64 VI compatible mode	SPARC64 VI compatible mode/SPARC64 VII enhanced mode

2.1.1.2 Supported Processors and CPU Operational Modes

The M4000/M5000 servers can support SPARC64 VI processors, SPARC64 VII processors, SPARC64 VII+ processors, or a mix of these different types of processors. A single domain can be configured with a mix of these processors. This section applies only to M4000/M5000 servers that run or will run SPARC64 VII/SPARC64 VII+ processors.

Note – Supported firmware and Oracle Solaris OS will vary based on the processor type. For details, see the latest version of the Product Notes (for XCP version 1100 or later) for your server.

A SPARC Enterprise M4000/M5000 server domain runs in one of the following CPU operational modes:

- SPARC64 VI Compatible Mode

  All processors in the domain behave like and are treated by the OS as SPARC64 VI processors. The new capabilities of SPARC64 VII or SPARC64 VII+ processors are not available in this mode.

- SPARC64 VII Enhanced Mode

  All boards in the domain must contain only SPARC64 VII or SPARC64 VII+ processors. In this mode, the server utilizes the new features of these processors.

By default, the Oracle Solaris OS automatically sets a domain's CPU operational mode each time the domain is booted based on the types of processors it contains. It does this when the `cpumode` variable is set to `auto`.

For more information on CPU operational modes, refer to the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

2.1.2 Memory Subsystem

Each memory board in the server contains four or eight DIMMs (dual inline memory modules). Both midrange servers use Double Data Rate II (DDR II) type DIMMs. The memory subsystem supports up to eight-way memory interleaving for high-speed memory access. For more information on memory boards and DIMMs, see Section 1.3.3, "Memory Board" on page 1-13.

2.1.3 I/O Subsystem

Each I/O subsystem contains the following:

- PCI cards—Four short PCIe slots (four upper slots) and one short PCI-X slot (lowest slot). For additional information see FIGURE 1-18 and FIGURE 1-19.
- One I/O controller (IOC) chip, which is the bridge chip between the system bus and the IO bus
- PCIe switches or bridges connected to the slots

The PCI slots support the hot-plug function, which enables you to replace the IOU while the domain is operating. Before you can remove a PCI card, you must first unconfigure and disconnect it.

You can also add an optional External I/O Expansion Unit, which contains additional PCIe slots or PCI-X slots.

2.1.4 System Bus

The CPU, memory subsystem, and I/O subsystem are directly connected to implement data transfer by using a high-speed broadband switch. Individual components are connected through tightly coupled switches, which use an even latency for data transfer. These components can be added to the server to enhance the processing capability (in proportion to the number of components added).

When a data error is detected in a CPU, Memory Access Controller (MAC), or I/O Controller (IOC), the system bus agent corrects the data and transfers it.

2.1.5 System Control

This section on system control describes XSCFU Hardware, Fault Detection and Management, and System Remote Control/Monitoring.

2.1.5.1 eXtended System Control Facility Unit (XSCFU)

The eXtended System Control Facility Unit (XSCFU), also known as the Service Processor, operates independently from the SPARC64 VI/SPARC64 VII/SPARC64 VII+ domains. The Service Processor directs the system startup, reconfiguration, and fault diagnosis. This is where the system management software, which is the eXtended System Control Facility (XSCF) firmware, runs.

2.1.5.2 Fault Detection and Management

The XSCF firmware provides fault detection and management capabilities, such as monitoring, detecting, and reporting system errors or faults to the Service Processor. The XSCF firmware monitors the system status continuously to help the system operate in a stable condition.

The XSCF firmware promptly collects a hardware log when any system fault is detected. The firmware does the following:

- Analyzes the fault
- Determines the fault location
- Evaluates the fault conditions

As necessary, according to the fault conditions, the XSCF firmware degrades parts of domains or resets the system to prevent another fault from occurring. The firmware provides easy-to-understand and accurate information on hardware errors and fault locations. This enables you to take prompt action on faults.

For more information on XSCF fault management, refer to the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide.*

2.1.5.3 System Remote Control/Monitoring

The XSCF firmware provides an IP address filtering function, which permits access to XSCF and an encryption communication based on SSH and SSL. XSCF logs operator mistakes and unauthorized access attempts made during system operation. The system administrator can grant users appropriate privileges for particular tasks.

The XSCF firmware also manages user accounts for system or domain administration. The system administrator can grant users an adequate user privilege.

The XSCF firmware provides the following remote notification services:

- Notification to people of any problem that occurs (by sending email to the registered email address).
- SNMP agent function can be used for trap notification.
- Remote maintenance service can be used with the remote notification functions.

2.2 Partitioning

The M4000 and M5000 servers can be divided into multiple independent systems for operation. This dividing function is called partitioning. This section describes features of partitioning and system configurations that can be implemented through partitioning.

The individual systems that result from the partitioning of the server are called domains. Domains are sometimes called partitions. Partitioning enables arbitrary assignment of resources in the server. Partitioning also enables flexible domain configurations to be used according to the job load or processing amount.

Each domain runs on an independent operating system. Each domain is protected by hardware so that it is not affected by other domains. For example, a software-based problem, such as an OS panic, in one domain does not directly affect jobs in the other domains. Furthermore, the operating system in each domain can be reset and shut down independently.

2.2.1 Physical Unit for Domain Constitution

The basic hardware resource making up a domain in the server is called the physical system board (PSB). The physical unit configuration of each divided part of a PSB is called an extended system board (XSB). A PSB in this server can be logically divided into one part (no division) or four parts. A PSB that is logically divided into one part (no division) is called a Uni-XSB, and a PSB that is logically divided into four parts is called a Quad-XSB. A domain can be configured with any combination of these XSBs. The XSCF is used to configure a domain and specify the PSB division type.

2.2.2 Domain Configuration

A domain is an independent computing resource that runs an individual instance of the Oracle Solaris OS. Each domain is separated from other domains, and is not affected by operations in other domains. Domains enable one server to perform different types of processing.

The operations within a domain are controlled with Oracle Solaris administration tools. However, to create, configure, and monitor domains, you must use the XSCF, as described in the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Administration Guide* and the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide.* For more background on domains, see Section 3.1.1, "Domains" on page 3-1.

2.3 Resource Management

Both midrange servers provide four means of managing the server's resources:

- Dynamic Reconfiguration
- PCI Hot-Plug
- Capacity on Demand (COD)
- Zones

2.3.1 Dynamic Reconfiguration

Dynamic reconfiguration (DR) enables hardware resources on system boards to be added and removed dynamically without stopping system operation. DR thus enables optimal relocation of system resources. Using the DR function enables additions or distributions of resources as required for job expansions or new jobs, and it can be used for the following purposes.

- Effective use of system resources – By reserving some resources, the reserved resources can be added according to changes in the workload occurring daily, monthly, or annually. This enables flexible resource allocations on the system that needs to operate 24 hours a day, every day of the year in accordance with changes in the amount of data and the workload.
- Active replacement of system resources – If a failure occurs in a CPU for a domain that has been configured with system resources of multiple system boards, the DR function enables the faulty CPU to be isolated dynamically without stopping the system. For details on DR, refer to the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide*

2.3.2 PCI Hot-Plug

You can insert and remove PCI cards for certain PCIe and PCI-X hot-plug controllers while the server is running. Before you can remove a PCI card, you must first unconfigure and disconnect it using the Oracle Solaris `cfgadm`(1M) command. For more information, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

2.3.3 Capacity on Demand (COD)

The COD feature allows you to configure spare processing resources on your M4000/M5000 server in the form of one or more COD CPUs which can be activated at a later date when additional processing power is needed. To access each COD CPU, you must purchase a COD hardware activation permit. Under certain conditions, you can use COD resources before purchasing COD permits for them.

For more information, refer to the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide*.

2.3.4 Zones

Oracle Solaris OS has a function called zones, which divides the processing resources and allocates them to applications. Zones provide flexible resource allocation, which enables optimal resource management with consideration given to the processing load.

In a domain, resources can be divided into sections called containers. The processing sections are allocated to each application. The processing resources are managed independently in each container. If a problem occurs in a container, the container can be isolated so it does not affect other containers.

2.4 Reliability, Availability, and Serviceability

Reliability, availability, and serviceability (RAS) are aspects of the system design that affect the ability of the system to:

- Operate without stopping
- Remain accessible and usable
- Minimize the time necessary to service the system

TABLE 2-2 defines each RAS feature.

TABLE 2-2 RAS Definitions

RAS Feature	Description
Reliability	Length of time the midrange server can operate normally without failure. The ability to detect failures with accuracy.
Availability	Ratio of time during which the system is accessible and usable.
Serviceability	Time required for the system to be recovered by specific maintenance after a failure occurs.

2.4.1 Reliability

Reliability represents the length of time the midrange server can operate normally without failure.

To improve quality, adequate components must be selected with consideration given to the product service life and the required response in case of a failure. In evaluations such as stress tests that check the service life, components and products are inspected to determine whether they meet the target reliability levels.

Reliability is equally important to both hardware and software. Naturally, trouble-free software is desired, but eliminating all software problems is difficult.

Installing the functions below leads to reliability improvements in the field.

- Cooperates with XSCF firmware to periodically check whether the software, including the domain OS, is running (host watchdog monitoring).

- Periodically performs memory patrol to detect memory software errors and stuck-at faults, even in memory areas not normally used (Memory patrol).

  Memory patrol prevents faulty areas from being used and thereby prevents the occurrence of system failures.

- Keeps checking the status of each component to detect signs of an imminent fault, such as system down occurrences. Prevents system failures (Status checking of components).

2.4.2 Availability

Availability represents the ratio of time the midrange server is accessible and usable. An operating ratio is used as an index.

Faults cannot be completely eliminated. To provide high availability, the system must be incorporated with mechanisms that enable continuous system operation even if a failure occurs in hardware, such as components and devices, basic software such as the operating system, or business application software.

The midrange servers can provide high availability by implementing the items listed below. Also, a cluster configuration can provide higher availability.

- Supporting redundant configurations and active replacement of power supplies and fans.
- Supporting redundant configurations, mirroring, and active replacement of disks.
- Extending the range of automatic correction of temporary faults in memory, system buses, and LSI internal data.
- Support of an enhanced retry function and degradation function for detected faults.
- Shortening the downtime by using automatic system reboot.
- Shortening the time taken for system startup.
- XSCF collection of fault information, and preventive maintenance using different types of warnings.
- Supporting the extended error checking and control function in the memory subsystem. The memory extended error checking and control function is an ECC code that enables correction of data from a 4-bit nibble error caused when an entire DRAM chip fails. This feature works for DIMMs employing x4 I/O DRAM.
- Supporting the memory mirroring function enables normal data processing through the other memory bus, thereby preventing system failures, in response to a DIMM stuck fault in the same memory bus.

Since the memory patrol facility is implemented in hardware, it is not affected by the software processing workload.

2.4.3 Serviceability

Serviceability represents the ease of recovery from a system failure. To facilitate recovery from a failure, after detecting the failure the system administrator and/or field engineer must do the following:

- Determine its cause
- Isolate the faulty component for replacement

The midrange server can provide high serviceability with the following features:

- Status LEDs mounted on the main components and the operator panel to display which active components need replacement
- XSCF firmware to remotely recognize the device operating status and remote device maintenance
- LED blinking function to indicate the maintenance target (CHECK-LED, which is also called the locator LED)
- Notes and cautions marked on various label types are provided for the system administrators and field engineers
- Automatic notification to report different types of faults to the system administrator and field engineers
- Centralized systematic monitoring, such as with SNMP

CHAPTER 3

About the Software

Both midrange servers include these types of software:

- Section 3.1, "Oracle Solaris Operating System Software" on page 3-1
- Section 3.2, "XSCF Firmware" on page 3-2

3.1 Oracle Solaris Operating System Software

The Oracle Solaris OS is installed on the system domains. For complete information about the Oracle Solaris OS, refer to the Oracle Solaris documentation collection. In addition to its suite of software capabilities, Oracle Solaris OS provides PCI hot-plug support, which interacts with the hardware.

3.1.1 Domains

A domain is an independent system resource that runs its own instance of the Oracle Solaris OS. Operations in one domain are not affected by operations in another domain.

Domains can be used to perform different types of processing activity. For example, one domain can be used to test new applications, while another domain can be used for production purposes.

The M4000 server supports up to two domains and the M5000 server supports up to four domains. A domain can be defined by using a single physical system board (Uni-XSB) or by combining resources from system boards that have been divided into separate units (Quad-XSB).

3.1.2 PCI Hot-Plug

Both midrange servers support the insertion and removal of PCI cards while the Oracle Solaris OS is running for certain PCIe and PCI-X slots. PCI cards must be unconfigured and disconnected using the Oracle Solaris `cfgadm`(1M) command before the cards can be physically removed. For additional information on PCI hot-plug operations, refer to the *SPARC Enterprise M4000/M5000 Servers Service Manual*.

3.2 XSCF Firmware

Both midrange servers use the XSCF firmware to manage the system. The XSCF firmware, which is preinstalled on the Service Processor at the factory, enables you to configure, manage, and maintain system components.

This section describes:

- XSCF User Interfaces
- XSCF Features
- System Status Management

3.2.1 XSCF User Interfaces

The interface for XSCF firmware is the command-line interface (CLI), which is also called the XSCF Shell. The XSCF Shell provides the same commands as the XSCF web to configure, monitor, and maintain system resources and services. The interface can be established through a LAN connection or a serial connection.

You enter XSCF commands through a terminal on the service processor. For descriptions of the XSCF commands and how they are used, refer to these manuals:

- *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*
- *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*
- *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Administration Guide*

3.2.2 XSCF Features

The XSCF firmware provides commands to manage the system platform, access control, security, faults, logs, domains, and capacity on demand. Each feature is described briefly in the following sections. The XSCF firmware is preinstalled in the XSCFU at the factory. The XSCF firmware supports the following functions:

- System Management
- Security Management
- System Status Management
- Error Detection and Management
- Remote Control and Monitoring
- Configuration Management
- Capacity on Demand (COD)
- Airflow Management

3.2.2.1 System Management

The XSCF firmware, which is preinstalled, is used to manage the midrange server. The XSCF firmware also has the following remote console I/O functions for increased system availability:

- Centralized control and monitoring of the midrange server
- Hardware monitoring
- Cooling unit (fan unit) monitoring
- System status monitoring
- Fault monitoring
- Partitioning for domain configuration and management
- Monitoring the midrange server using an Ethernet connection, which enables the user to remotely manage the server
- Notifying the system administrator of fault information

3.2.2.2 Security Management

The XSCF firmware manages the XSCF firmware user accounts. The system administrator can assign the minimum required user privilege to users on as-required basis.

The XSCF firmware provides filtering that permits the IP addresses used to access the XSCF firmware and the encryption function. Access to the XSCF firmware and the encryption function is through the Secure Shell (SSH) or SSL.

Because operation failures and unauthorized accesses during system operation are logged, the system administrator can immediately use the logs to investigate the causes of unauthorized accesses.

3.2.3 System Status Management

System status management functions of the XSCF firmware include:

- Managing any faults in resources such as CPUs, memory, and I/O systems while the operating system is running
- Managing errors and faults in fans and power supply units

System configuration information, which is used by the XSCF firmware, does the following:

- Reports errors and failures
- Predicts midrange server problems
- Provides users with prompt and accurate information whenever a problem occurs

Information on system operation and errors is stored as log data on the XSCF firmware. It is used to analyze system problems. The system administrator, domain administrator, and maintenance engineer can access the log data.

The XSCF firmware promptly collects hardware error and fault information and stores it in XSCF. For information on the error messages displayed and their explanations, refer to the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

3.2.3.1 Error Detection and Management

The XSCF firmware monitors the status of the main unit continuously to help the system operate in a stable manner. The XSCF error detection and management function does the following:

- Promptly collects a hardware log when any system fault is detected
- Analyzes the error
- Determines the error location

According to the fault conditions, the XSCF firmware implements part of domain degradation or resets the system when necessary. Easy-to-understand and accurate information on hardware errors and fault locations is provided, which enables the administrator to take prompt action.

3.2.3.2 Remote Control and Monitoring

The XSCF firmware provides the following remote notification services:

- Notifying the administrator of any problem that occurs by sending email to the specified email address.
- The SNMP agent function can be used for trap notification.
- Maintenance can be performed with the remote maintenance services.

3.2.3.3 Configuration Management

The XSCF firmware makes settings such that multiple system boards mounted in each midrange server are logically allocated to domains. One system board can be logically divided into one or four domains.

The COD feature allows you to configure spare processing resources on your M4000/M5000 server in the form of one or more COD CPUs which can be activated at a later date when additional processing power is needed. To access each COD CPU, you must purchase a COD hardware activation permit. Under certain conditions, you can use COD resources before purchasing COD permits for them.

For more information, refer to the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide*.

3.2.3.4 Airflow Indicator

The airflow indicator indicates the amount of air exhausted from the server while the M4000/M5000 servers are up and running. The values do not include the peripheral devices. To display the amount of exhaust air, use the `showenvironment air` command.

EXAMPLE 3-1

```
XSCF> showenvironment air
Air Flow:294 CMH
```

Note – The `showenvironment air` command displays the calculated airflow based on the fan speed such as Low speed or High speed etc. The fan speed is displayed by the `showenvironment Fan` command.

For details of the `showenvironment(8)` command, refer to the man page. For installation details of the SPARC Enterprise M4000/M5000 servers from Oracle and Fujitsu, see the *SPARC Enterprise M4000/M5000 Servers Site Planning Guide* and the *SPARC Enterprise M4000/M5000 Servers Installation Guide*.

You can also obtain the exhaust air data using the SNMP agent function. To obtain the data of exhaust air using the SNMP agent function, install the latest XSCF extension MIB definition file to the SNMP manager. For details on the XSCF extension MIB definition file, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

Index

C

cabinet, expansion, 1-3
CD-RW/DVD-RW drive unit, 1-30
components, 1-5, 1-9
cooling, 1-3
CPU modules, 1-2, 1-12
CPU operational modes, 2-2
cpumode, 2-2
cpumode,auto, 2-2

D

dimensions, 1-3
DIMMs, 1-2, 1-13
domains, 1-3
drives, 1-28
  CD-RW/DVD-RW, 1-30
  tape, 1-31

E

environmental conditions, 1-4
expansion cabinet, 1-3
eXtended System Control Facility (XSCF), 1-24

F

fan carriers, 1-3
fans, 1-3
features, 1-2
  hardware, 1-1
  software, 1-32
  system, 1-5

H

hardware features, 1-1
hot-swappable
  PCI cards, 2-3

I

I/O, 1-26
I/O expansion chassis, 1-31

M

memory boards, 1-2, 1-13
motherboard unit, 1-2, 1-10

O

operator panel, 1-8

P

parts, 1-9
  system, 1-5
PCI, 1-26
  cards, 1-2
    hot-swappable, 2-3
  carrier, 1-2
PCIe, 2-3
PCI-Express (PCIe), 2-3
PCI-eXtended (PCI-X), 1-27
PCI-X, 1-27
Peripheral Component Interconnect (PCI), 1-26
power, 1-17
  supply, 1-2, 1-17

S

SCFB, 1-2
software features, 1-32
SPARC64 VI Compatible Mode, 2-2
SPARC64 VII Enhanced Mode, 2-2
specifications, 1-2
system, 1-5
  cabinet, 1-3
  components, 1-5, 1-9
  features, 1-2
System Control Facility Board (SCFB), 1-2

T

tape drive unit, 1-31

W

weight, 1-3

X

XSCF, 1-24