SPARC Enterprise
M4000/M5000/M8000/M9000 Servers

Dynamic Reconfiguration (DR) User's Guide

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Contents

Preface

This guide describes the Dynamic Reconfiguration (DR) feature of SPARC Enterprise M4000/M5000/M8000/M9000 servers from Oracle and Fujitsu. DR enables users to add, remove or exchange system boards in the M4000/M5000 (midrange) and M8000/M9000 (high-end) servers while the domains that contain these boards remain up and running. The M3000 server does not support DR.

Some references to server names and document names are abbreviated for readability. For example, if you see a reference to the M9000 server, note that the full product name is the SPARC Enterprise M9000 server. And if you see a reference to the *XSCF Reference Manual*, note that the full document name is the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

Before reading this document, you should read the overview guide for your server, 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*.

At publication of this document, servers described herein were shipping with XCP 1110 firmware supported or installed. That might no longer be the latest available version, or the version now installed. Always see the Product Notes that apply to the firmware on your server, and those that apply to the latest firmware release.

This chapter includes the following sections:

- "Audience" on page x
- "Related Documentation" on page x
- "Text Conventions" on page xii
- "Syntax of the Command-Line Interface (CLI)" on page xii
- "Documentation Feedback" on page xiii

Audience

This guide is written for experienced system administrators with working knowledge of computer networks and advanced knowledge of the Oracle Solaris Operating System (Oracle Solaris OS).

Related Documentation

All documents for your sever are available online at the following locations:

Documentation	Link
Sun Oracle software-related manuals (Oracle Solaris OS, and so on)	http://www.oracle.com/documentation
Fujitsu documents	http://www.fujitsu.com/sparcenterprise/manual/
Oracle M-series server documents	http://www.oracle.com/technetwork/documentation/sparc-mseries-servers-252709.html

The following table lists titles of related documents.

Related SPARC Enterprise M4000/M5000/M8000/M9000 Servers Documents
SPARC Enterprise M4000/M5000 Servers Site Planning Guide
SPARC Enterprise M8000/M9000 Servers Site Planning Guide
SPARC Enterprise Equipment Rack Mounting Guide
SPARC Enterprise M4000/M5000 Servers Getting Started Guide[*]
SPARC Enterprise M8000/M9000 Servers Getting Started Guide[*]
SPARC Enterprise M4000/M5000 Servers Overview Guide
SPARC Enterprise M8000/M9000 Servers Overview Guide
SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Important Legal and Safety Information [*]
SPARC Enterprise M4000/M5000 Servers Safety and Compliance Guide
SPARC Enterprise M8000/M9000 Servers Safety and Compliance Guide
External I/O Expansion Unit Safety and Compliance Guide
SPARC Enterprise M4000 Server Unpacking Guide[*]

Related SPARC Enterprise M4000/M5000/M8000/M9000 Servers Documents

SPARC Enterprise M5000 Server Unpacking Guide[*]

SPARC Enterprise M8000/M9000 Servers Unpacking Guide[*]

SPARC Enterprise M4000/M5000 Servers Installation Guide

SPARC Enterprise M8000/M9000 Servers Installation Guide

SPARC Enterprise M4000/M5000 Servers Service Manual

SPARC Enterprise M8000/M9000 Servers Service Manual

External I/O Expansion Unit Installation and Service Manual

SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Administration Guide

SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide

SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual

SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide

SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide

SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Product Notes[†]

SPARC Enterprise M4000/M5000 Servers Product Notes

SPARC Enterprise M8000/M9000 Servers Product Notes

External I/O Expansion Unit Product Notes

SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Glossary

[*] This is a printed document.

[†] Beginning with the XCP 1100 release.

Text Conventions

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

Font/Symbol	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 output in the frame.	XSCF> **showuser -P** User Name: jsmith Privileges: useradm auditadm
Italic	Indicates the name of a reference manual, a variable, or user-replaceable text.	See the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.
" "	Indicates names of chapters, sections, items, buttons, or menus.	See Chapter 2, "System Features."

Syntax of the Command-Line Interface (CLI)

The command syntax is as follows:

- A variable that requires input of a value must be put in Italics.
- An optional element must be enclosed in [].
- A group of options for an optional keyword must be enclosed in [] and delimited by |.

Documentation Feedback

If you have any comments or requests regarding this document, go to the following websites:

- For Oracle users:

http://www.oracle.com/goto/docfeedback

Include the title and part number of your document with your feedback:

SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide, part number E27809-01

- For Fujitsu users:

http://www.fujitsu.com/global/contact/computing/sparce_index.html

Overview of Dynamic Reconfiguration

This chapter provides an overview of Dynamic Reconfiguration, which is controlled by the eXtended System Control Facility (XSCF).

This chapter includes these sections:

1.1 DR

Dynamic Reconfiguration (referred to as DR, in this document) enables hardware resources such as processors, memory, and I/O to be added and deleted even while the Oracle Solaris Operating System (referred to as Oracle Solaris OS in this document) is running.

DR has three basic functions; i.e., addition, deletion and move, which can be used for the following purposes.

- Add system boards without stopping the Oracle Solaris OS of the domain, to improve business operations or handle higher system loads.
- Temporarily remove a faulty system board for parts replacement without stopping the Oracle Solaris OS of the domain, in the event of an error that causes the system board to become degraded.

- Move a resource from one domain to another while continuously operating the domains without physically removing or inserting a system board. Resources can be moved to balance the loads on multiple domains, or to share common I/O resources between domains.

SPARC Enterprise M4000/M5000/M8000/M9000 servers have a unique partitioning feature that can divide one physical system board (PSB) into one logical board (undivided status) or four logical boards. A PSB that is logically divided into one board (undivided status) is called a Uni-XSB, whereas a PSB that is logically divided into four boards is called a Quad-XSB. Each composition of physical unit of the divided PSB is called an eXtended System Board (XSB). These XSBs can be combined freely to create domains.

DR functions on these servers are performed on an XSB. This manual uses the term *system board* unless physical units of PSB and XSB are described. For an explanation of each term, see TABLE 1-2.

Note – This document explains DR functions on system boards. Use the Oracle Solaris command cfgadm(1M) to execute DR on I/O devices, including PCI cards. For more information, please see the *Service Manual* for your server, and the cfgadm(1M) and cfgadm_pci(1M) man pages.

FIGURE 1-1 Uni-XSB and Quad-XSB (Midrange Servers)
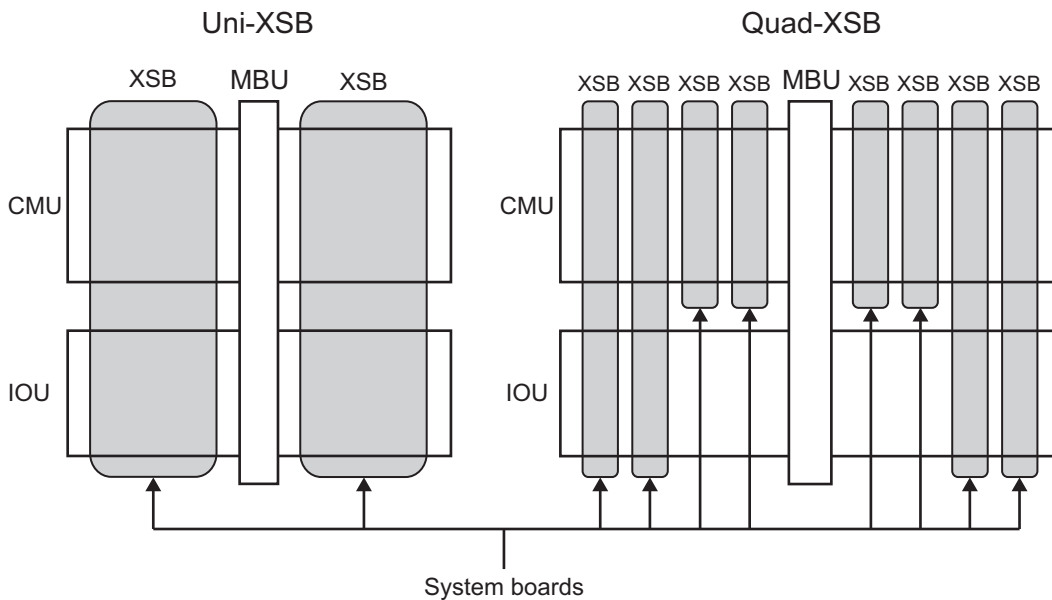
FIGURE 1-2   Uni-XSB and Quad-XSB (High-end Servers)
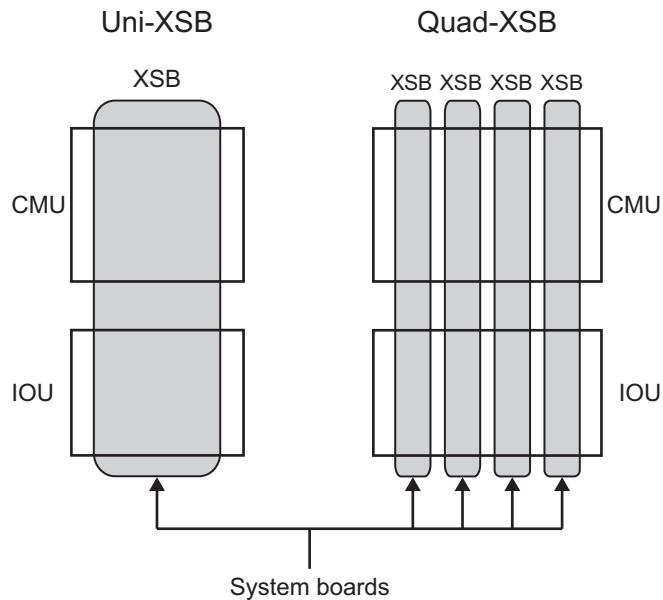
TABLE 1-1 and TABLE 1-2 list DR-related terms.

TABLE 1-1   Basic DR Terms

Term	Definition
Add	To connect a system board to a domain and configure it into the Oracle Solaris OS of the domain.
Delete	To unconfigure a system board from the Oracle Solaris OS of a domain and disconnect it from the domain.
Move	To disconnect a system board from a domain and then connect the system board to another domain.
Register	To register a system board in the domain component list (hereinafter called DCL).
Release	To delete a registered system board from the DCL.
Assign	To assign a system board to a domain.
Unassign	To release a system board from a domain.
Connect	To connect a system board to a domain.
Disconnect	To disconnect a system board from a domain.
Configure	To configure a system board in the Oracle Solaris OS.

TABLE 1-1   Basic DR Terms *(Continued)*

Term	Definition
Unconfigure	To unconfigure a system board in the Oracle Solaris OS.
Reserve	To reserve a system board such that it is assigned to or unassigned from a domain on the next reboot or power-cycle.
Install	To insert a system board into a system.
Remove	To remove a system board from a system.
Replace	To remove a system board and then mount it or a new system board, for system maintenance and inspection.

TABLE 1-2   Terms Related to Hardware Configurations

Term	Definition
CPU/Memory board unit (CMU)	Unit equipped with a CPU module, and memory. High-end servers only.
Motherboard Unit (MBU)	Unit for midrange servers. A CMU is mounted on this board. Midrange servers only.
I/O unit (IOU)	Unit equipped with a PCI card and a disk drive unit.
Physical System Board (PSB)	The PSB is made up of physical parts, and can include 1 CMU and 1 IOU or just 1 CMU. In midrange servers, the CMU is mounted on a MBU. A PSB also can be used to describe a physical unit for addition/deletion/exchange of hardware. The PSB can be used in one of two methods, one complete unit (undivided status) or divided into four subunits.
eXtended System Board (XSB)	The XSB is made of physical parts. In the XSB, the PSB can be either one complete unit (undivided status) or divided into four subunits. The XSB is a unit used for domain construction and identification, and also can be used as a logical unit.
Logical System Board (LSB)	A logical unit name assigned to an XSB. Each domain has its own set of LSB assignments. LSB numbers are used to control how resources such as kernel memory get allocated within domains.

TABLE 1-2   Terms Related to Hardware Configurations *(Continued)*

Term	Definition
System board	The hardware resources of a PSB or an XSB. A system board is used to describe the hardware resources for operations such as domain construction and identification. In this manual, this refers to the XSB.
Uni-XSB	One of the division types of a PSB. Uni-XSB is a name for when a PSB is logically only one unit (undivided status). It is a default value setting for the division type for a PSB. The division type can be changed by using the XSCF command setupfru(8). Uni-XSB may be used to describe a PSB division type or status.
Quad-XSB	One of the division types of a PSB. Quad-XSB is a name for when a PSB is logically divided into four parts. The division type can be changed by using the XSCF command setupfru(8). Quad-XSB may be used to describe a PSB division type or status.

1.2   Basic DR Functions

This section describes the basic DR functions.

shows DR processing.

FIGURE 1-3   DR Processing Flow
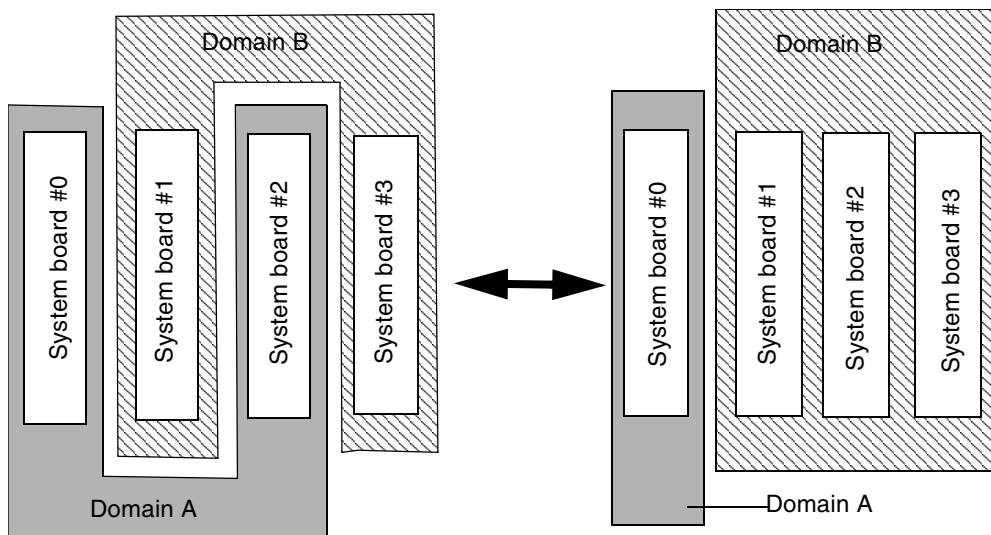
In the example shown in FIGURE 1-3, system board #2 is deleted from domain A and added to domain B. In this way, the physical configuration of the hardware (mounting locations) is not changed but the logical configuration is changed for management of the system boards.

1.2.1 Adding a System Board

You can use DR to add a system board to a domain provided that board is installed in the system and not assigned to another domain. You can do so without stopping the Oracle Solaris OS running in the domain.

A system board is added in such stages as connect, and configure.

In the add operation, the selected system board is connected to the target domain. Then, the system board is configured to the Oracle Solaris OS of the domain. At this point, addition of the system board is completed.

1.2.2 Deleting a System Board

You can use DR to delete a system board from a domain without stopping the Oracle Solaris OS running in that domain.

A system board is deleted in such stages as unconfigure and disconnect. If the board must be assigned to another domain, the delete operation must also include an unassign step.

In the delete operation, the selected system board is unconfigured from its domain by the Oracle Solaris OS. Then, the board is disconnected from the domain. At this point, deletion of the system board is completed.

1.2.3 Moving a System Board

You can use DR to reassign a system board from one domain to another without stopping the Oracle Solaris OS running in either domain.

This move function can change the configurations of both domains without physical removal and remounting of the system board.

The move operation for a system board is a serial combination of the "delete" and "add" operations. In other words, the selected system board is deleted from its domain and then added to the target domain.

1.2.4 Replacing a System Board

You can use DR to remove a system board from a domain and either add it back later, or replace it with another system board, provided both boards satisfy DR requirements as described in this document. You can do so without stopping the Oracle Solaris OS running in either domain.

You can replace system board in the case of exchanging hardware resources such as CPUs, memory, I/O devices.

A system board is replaced successively in stages.

In the replace operation, the selected system board is deleted from the OS of the domain. Then, the system board is removed when it is ready to be released from its domain. After field parts replacement or other such task, the system board is re-installed and added.

Note – You cannot use DR to replace a system board in a midrange server because doing so would replace an MBU. To replace a system board in a midrange server, you must turn off the power of all domains, then replace the board without using DR commands.

1.3 Security

DR operations are executed based on privileges. For information about privileges and user accounts, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers Administration Guide*.

1.4 Overview of DR User Interfaces

DR operations are performed through the command line interface (CLI) within the XSCF shell or through the browser-based user interface (BUI) in the XSCF Web provided by the eXtended System Control Facility (XSCF). These operations are collectively managed by the XSCF. Furthermore, XSCF security management restricts DR operations to administrators who have the proper access privileges.

For details of XSCF shell commands provided for DR, see Section 3.1, "How To Use the DR User Interface" on page 3-1. XSCF Web is beyond the scope of this document. See the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide* for further information.

What You Must Know Before Using DR

This chapter provides information you must know to successfully use the DR functions.

This chapter includes these sections:

2.1 System Configuration

This section describes the conditions, premises, and actions for operating the DR functions to construct a system.

2.1.1 System Board Components

There are three types of system board components that can be added and deleted by DR: CPU, memory, and I/O device. FIGURE 2-1 and FIGURE 2-2 show examples of a system board of a midrange server that is divided into one Uni-XSB, and into Quad-XSBs. FIGURE 2-3 and FIGURE 2-4 show examples of a system board of a high-end server that is divided into one Uni-XSB, and into Quad-XSBs.

> **Note –** Due to diagnostic requirements, the DR function works only on boards that have at least one CPU and memory.

FIGURE 2-1   Example of Hardware Configuration (with Uni-XSB of Midrange Server)
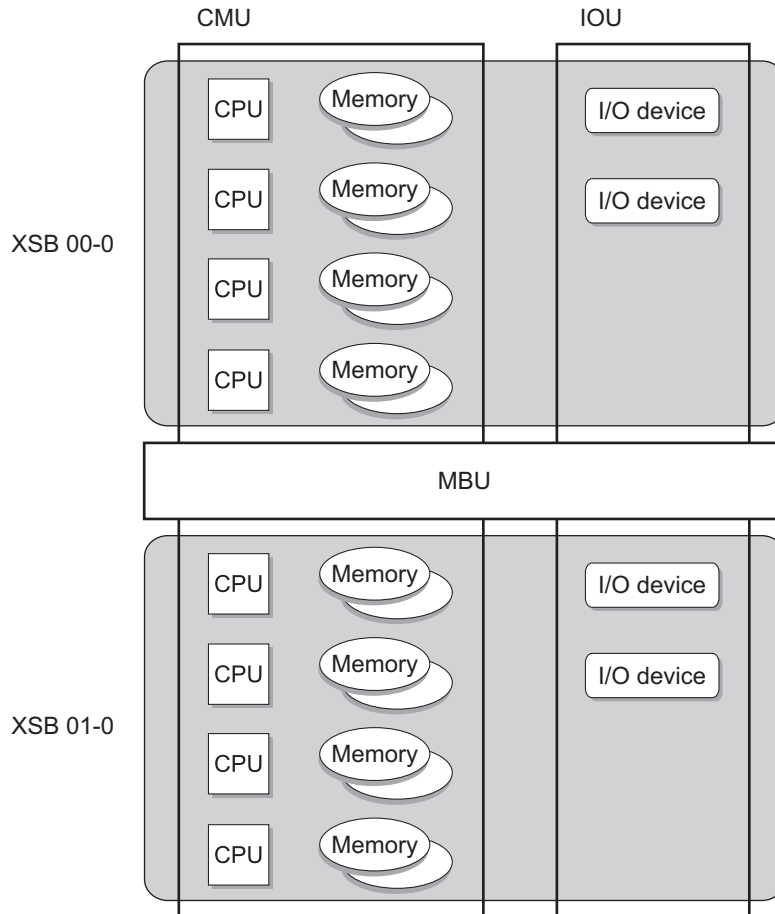
FIGURE 2-2   Example of Hardware Configuration (with Quad-XSBs of Midrange Server)
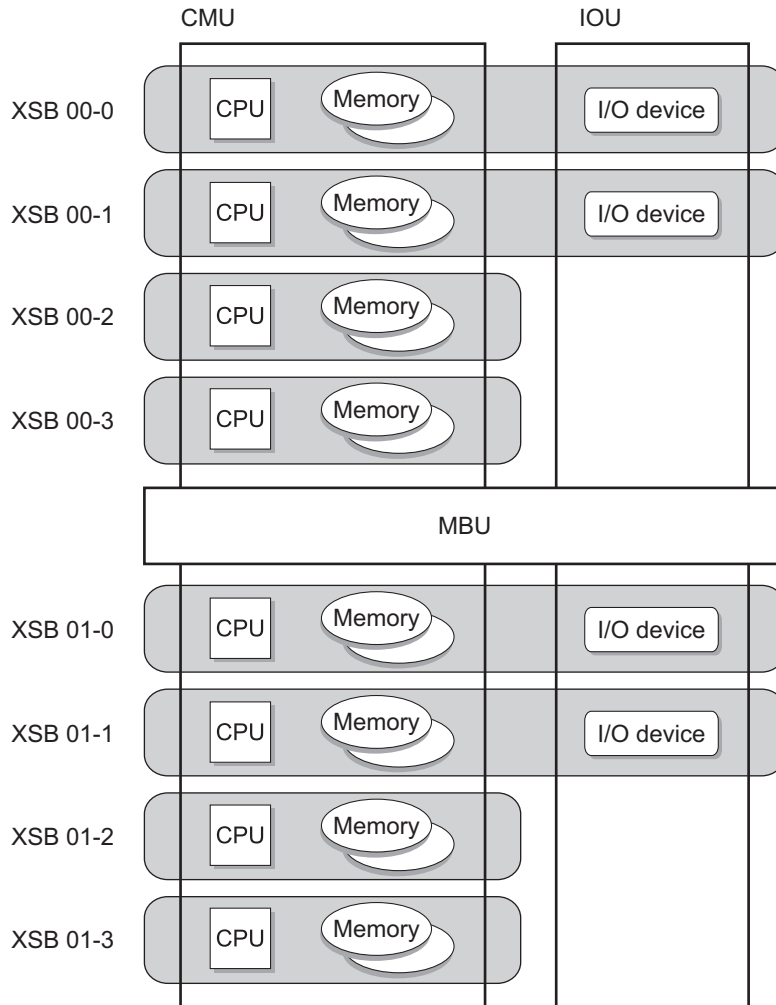
FIGURE 2-3 Example of a Hardware Configuration (with Uni-XSBs of High-end Server)

CMU   IOU

XSB 00-0

CPU	Memory		I/O device
CPU	Memory		I/O device
CPU	Memory		I/O device
CPU	Memory		I/O device
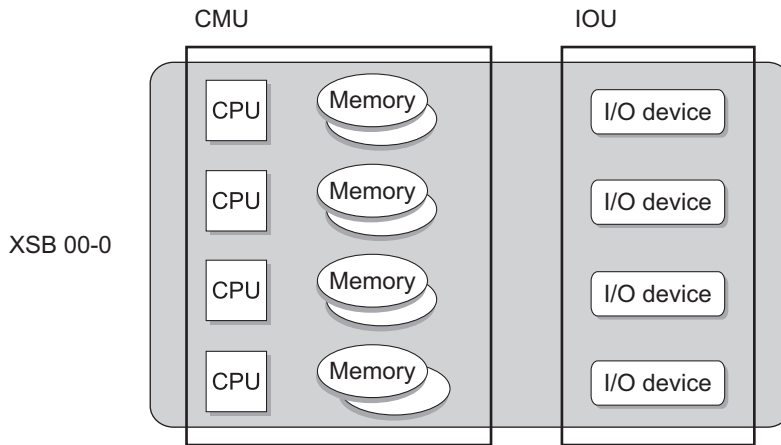
FIGURE 2-4 Example of a Hardware Configuration (with Quad-XSBs of High-end Server)

CMU   IOU

XSB 00-0 | CPU | Memory | | I/O device |

XSB 00-1 | CPU | Memory | | I/O device |

XSB 00-2 | CPU | Memory | | I/O device |

XSB 00-3 | CPU | Memory | | I/O device |
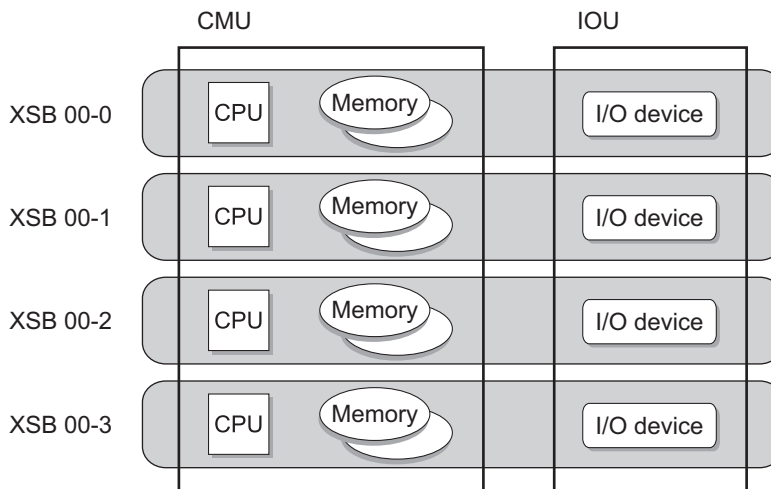
2.1.1.1   CPU

Using DR to change a CPU configuration is easier than using it to change the
configuration of memory or an I/O device.
An added CPU is automatically recognized by the Oracle Solaris OS and becomes
available for use.

A CPU to be deleted must meet the following conditions:

- No running process is bound to the CPU to be deleted.   If a running process is bound to the target CPU, you must unbind or stop the process.

- The CPU to be deleted does not belong to any processor set.   If the target processor belongs to a processor set, you must delete the CPU from the processor set by using the psrset(1M) command.

- If the resource pools facility is in use by the domain, the CPU cannot be deleted unless the minimum processor set sizes can otherwise be maintained. Use the Oracle Solaris commands pooladm(1M) and poolcfg(1M) to check these parameters and, if necessary, adjust the sizes of the domain's resource pools.

Note – These conditions also apply to movement of a system board.

If any of the above conditions are not met, the DR operation is stopped and a message is displayed. However, if you specify the deleteboard(8) command with the -f (force) option, these protections are ignored and DR continues the deletion process.

Note – Exercise care when using the -f (force) option, as doing so introduces risk of domain failure.

To avoid this problem and automate the operations for CPUs, the Oracle Solaris OS provides the Reconfiguration and Coordination Manager (RCM) script function. For details of RCM, see Section 3.4, "RCM Script" on page 3-27.

For information about mixed configurations of SPARC64 VII+, SPARC64 VII, and SPARC64 VI processors, see Section 2.5.9, "SPARC64 VII+, SPARC64 VII, and SPARC64 VI Processors and CPU Operational Modes" on page 2-30.

2.1.1.2   Memory

The DR functions classify system boards by memory usage into two types:

- Kernel memory board
- User memory board

(1) Kernel Memory Board

A kernel memory board is a system board on which kernel memory (memory internally used by the Oracle Solaris OS and containing an OpenBoot PROM program) is loaded. Kernel memory cannot be removed from the system. But the location of kernel memory can be controlled, and kernel memory can be copied from one board to another.

- To control whether a system board contains kernel memory, use one or more of the following features, which are described below: kernel cage, floating boards, and kernel memory assignment.
- To copy kernel memory from one board to another, use the Copy-rename operation. Copy-rename makes it possible for you to perform DR operations on kernel memory boards.

(1.1) Kernel Cage

The kernel cage function must be in use for DR operations on memory to succeed. Without the kernel cage, kernel memory could be assigned to all system boards, making it impossible to perform DR operations on memory. With the kernel cage, kernel memory is limited to a minimum set of system boards.

For details on enabling this function, see Section 2.3.2, "Settings of Kernel Cage Memory" on page 2-17.

(1.2) Floating Boards

A floating board is a system board that is designated to be moved easily to another domain. In general, kernel memory is not assigned to a floating board unless absolutely necessary.

However, kernel memory can be assigned to a floating board when one of the following is true:

- The total amount of space available among non-floating boards is not enough to hold the kernel memory.
- The deleteboard(8) command is used with its -f (force) option.

For details on enabling the floating board option for a system board, see Section 2.2.2.2, "Floating Board Option" on page 2-14. For further details, also see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide* or the setdcl(8) man page.

(1.3) Kernel Memory Assignment

When a domain is powered on, the Power On Self Test (POST) initially assigns an address space to each system board in that domain. The order in which address spaces are assigned depends on the LSB number and floating board option of each system board. The first address spaces are assigned to non-floating boards in ascending order of LSB number. Then, additional address spaces are assigned to floating boards, again in ascending order of their LSB numbers.

When the kernel cage is enabled, kernel memory is assigned to system boards in the order of their address spaces. The kernel cage begins in the first address space (which initially corresponds to the non-floating board with the lowest LSB number). If the kernel requires more memory, then the kernel cage expands to the next address space (which initially corresponds to the non-floating board with the next-lowest LSB number), and so on. The kernel cage extends into the address spaces of floating boards only if kernel memory is too large to fit in the address spaces of the non-floating boards.

Note – During a copy-rename operation, the address spaces initially assigned by POST are exchanged between system boards. The effects of this process persist through reboots of a domain. Therefore, kernel memory may be assigned in a seemingly different order until the domain has gone through a full poweroff(8) and poweron(8) cycle, as this pair of operations cancels the effects of copy-rename operations.

For details on assigning LSB numbers to system boards, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide* or the setdcl(8) man page.

(1.4) Copy-rename

Kernel memory itself cannot be removed, but it can be transferred to another system board. A DR operation to delete a kernel memory board must first perform this transfer, which is called a copy-rename operation.

The Oracle Solaris OS selects the target for the copy-rename operation from among the available user memory boards. The following selection and preference criteria are in effect:

■ The copy-destination board must not yet contain any kernel memory. (It must be a user memory board.)

■ The copy-destination board must not be a floating board, unless the -f (force) option is used with the deleteboard(8) command.

■ The copy-destination board must contain at least as much physical memory as the system board being deleted.

- If more than one system board satisfies all the selection criteria to the same degree of satisfaction, the one with the lowest LSB number is selected as the copy-destination board.

Note – If no system boards meet the selection criteria, the DR operation to delete the kernel memory board will fail.

Once the copy-destination board has been selected, the Oracle Solaris OS performs a memory deletion on the selected user memory board.

Then, the kernel memory on the system board to be deleted is copied into memory on the selected copy-destination system board. The system is suspended while the copying is in progress. After all the memory is copied, the address space of the copy-destination board is renamed to that of the kernel memory board being deleted.

Note – If the address space of a system board is renamed by a copy-rename operation, the change will persist across reboots of the domain. A poweroff(8)/poweron(8) cycle of the domain will reset the address space assignments and remove the effects of one or more copy-rename operations.

(2) User Memory Board

A user memory board is a system board on which no kernel memory is loaded. Before deleting user memory, the system attempts to swap out the physical pages to the swap area. Sufficient swap space must be available for this operation to succeed.

(2.1) Locked Pages and ISM Pages

Some user pages are locked into memory and cannot be swapped out. These pages receive special treatment by DR.

Intimate Shared Memory (ISM) pages are special user pages which are shared by all processes. ISM pages are permanently locked and cannot be swapped out as memory pages. ISM is usually used by Data Base Management System (DBMS) software to achieve better performance.

Although locked pages cannot be swapped out, the system automatically moves them to the memory on another system board to avoid any problem concerning the pages. Note, however, that the deletion of user memory fails if there is not sufficient free memory size on the remaining system boards to hold the relocated pages.

Although such moving of memory (called *save processing*) requires a certain length of time, system operations can continue during save processing because it is executed as a background task.

Note – The Dynamic Intimate Shared Memory (DISM) is a feature that allows applications to dynamically resize their ISM segments. Some applications use RCM scripts to resize their DISM segments to assist DR. See the Oracle Solaris man page for `rcmscript(4)`.

Deleting or moving a user memory board fails if either of the following statements is true:

- The swap area does not have sufficient free space to save data from the user memory to be deleted.
- There are too many locked or ISM pages to be covered by the memory on other system boards.

2.1.1.3   I/O Device

(1) Adding an I/O Device

The device driver processing executed by the Oracle Solaris OS is based on the premise that all device drivers dynamically recognize newly added devices. In the domain where DR is performed, all device drivers must support the addition of devices by DR. Upon the addition of an I/O device by DR, the I/O device is reconfigured automatically.

The path name of a device file under /dev is configured as the path name of the newly added I/O device to make the I/O device accessible.

(2) Deleting an I/O Device

An I/O device can be deleted when both of the following conditions are met:

- The device to be deleted is not in use in the domain where the DR operation is to be performed.
- The device drivers in the domain where the DR operation is to be performed support DR.

In most cases the device to be deleted is in use. For example, the root file system or any other file systems requisite for operation cannot be unmounted.
To solve this problem, you can configure the system by using redundant

configuration software to make the access path to each requisite I/O device redundant. For a disk drive unit, you can make the unit redundant by using disk mirroring software.

If a device driver that does not support DR is used in the domain, all access to I/O devices controlled by the device driver must be stopped, and the device driver must be unloaded by using the modunload(1M) command.

Note – Do not move a device that is part of a redundant configuration from one domain to another domain. The consequences of two domains simultaneously accessing the same device through different paths could be disastrous, such as data corruption.

2.1.2 System Board Configuration Requirements

XSCF enables the Uni-XSB or Quad-XSB setting according to the configuration conditions to determine the division type. If the CPU or memory configuration does not meet the configuration conditions, neither Uni-XSB nor Quad-XSB can be set as the division type.
For the CPU configuration and memory configuration conditions set for the division types, see the *System Overview* for your server.

The setting of division type may be changed for DR operation if a domain operation requirement dictates changing of a necessary hardware resource when a system board is added to the domain.
In such cases, the CPU configuration and memory configuration conditions for changing the division type are the same as described above. For the conditions, see the *System Overview* for your server.

Note – Changing the division type before a DR operation may not be possible depending on the system board status or DR operation, even if configuration conditions have been met.

2.1.3 System Board Pool Function

The system board pooling function places a specific system board in the status where that board does not belong to any domain.

This function can be effectively used to move a system board among multiple domains as needed.

For example, a system board can be added from the system board pool to a domain where CPU or memory has a high load. When the added system board becomes unnecessary, the system board can be returned to the system board pool.

All system boards that are targets of DR operations must be registered in the target domain's Domain Component List (DCL). A domain's DCL, managed by XSCF, is a list of system boards that are, or are to be, attached to that domain. The DCL of each domain contains not only information of registered system boards but also domain information and option information of each system board.

Moreover, a system board that is pooled can be assigned to a domain only when it is registered on DCL. Pooled system boards must be properly managed.

You can add and delete system boards by combining the system board pooling function with the floating board, omit-memory, and omit-I/O options described in Section 2.2, "Conditions and Settings Using XSCF" on page 2-13.

2.1.4   Checklists for System Configuration

This section describes the prerequisites and the checklists for configuring the system for DR.

1. Redundant Configuration of I/O Devices - Before a system board can be replaced, any I/O device connected to that board must be temporarily disconnected.

   You should use redundant-configuration software to prevent any problem that might be caused by disconnection of an I/O device that would affect a job process. You should also confirm that the driver and software support DR before performing a DR operation.

2. Selection of PCI Cards Supporting DR - All PCI cards and I/O device interfaces on a system board must support DR. If not, you cannot execute DR operations on that system board. You must turn off the power supply to the domain before performing maintenance and installation.

3. Confirmation of DR Compliance of Drivers and Other Software - You must confirm that all I/O device drivers and software installed in the system support DR and allow the I/O device operations of DR.

   You should also apply the latest patches to the drivers and other software before performing DR.

4. Allocation of Sufficient Memory and Distributed Swap Areas - You must allocate sufficient memory resources to be used when the memory on a system board is disconnected. Performing a DR operation with a high load already applied to memory may significantly lower job process performance and DR operability.

5. Consideration of Hardware Configuration and System Boards on Which Kernel Memory is Loaded - Before determining the hardware configuration and operations, you must understand how job processes are affected by DR operations on system boards on which CPUs, memory, and I/O devices are mounted.

   You can perform DR operations on system boards that contain kernel memory. When disconnecting a system board on which kernel memory is loaded, DR copies kernel memory into the memory on another system board. The copy operation is based on the premise that the copy-destination system board does not already contain any kernel memory.

   When kernel memory is copied, the Oracle Solaris OS is temporarily suspended. Therefore, you must understand the effect of disconnecting the network connection with remote systems and other influences of the DR operation on job processes before determining system operations.

2.1.5 Reservation of Domain Configuration Changes

Besides letting you add, delete, or move system boards dynamically, DR also lets you order such reconfiguration to take place the next time the affected domains are turned on or turned off, or the domain is rebooted. Use the addboard(8), deleteboard(8), or moveboard(8) command with the -c reserve option to specify these actions.

Some of the reasons you might want to reserve a domain change include:

- A hardware resource cannot be dynamically reconfigured by DR for business or operational reasons.

- Domain configuration settings should not be immediately changed.

- You want to avoid changing the current domain configuration settings and change the configuration immediately after the domain is rebooted when necessary to delete a system board having a driver or PCI card that does not support DR.

- You want to assign a floating board to a specific domain beforehand to prevent the system board from being acquired by another domain.

For how to reserve domain changes, see Section 3.1.10, "Reserving a Domain Configuration Change" on page 3-25.

2.2 Conditions and Settings Using XSCF

This section describes the operating conditions required for XSCF to start DR operations and the settings that are established by XSCF.

2.2.1 Conditions Using XSCF

The DR operation to add a system board cannot be executed when the system board has only been mounted. The DR operation is enabled by registering the system board in the DCL by using the XSCF shell or XSCF Web. You must confirm that the system board to be added is registered in the DCL before performing the DR operation.
As a matter of course, system boards to be deleted, moved, or replaced have already been registered in the DCL. You need not confirm that these boards have been registered in the DCL.

For details about the DCL and how to register system boards in the DCL and to confirm registration, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

2.2.2 Settings Using XSCF

The DR functions provide users with some options to avoid the complexities of reconfiguration and memory allocation with the Oracle Solaris OS, and make DR operations smoother. You can set up these options using the XSCF shell or XSCF Web. This section describes the following options:

- Configuration policy option
- Floating board option
- Omit-memory option
- Omit-I/O option

These options are set using setdcl(8) command. For details of how to set the options, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide* or the setdcl(8) man page.

2.2.2.1 Configuration Policy Option

DR operations involve automatic hardware diagnosis to add or move a system board safely. Degradation of components occurs when the components are set according to the configuration of this option, and a hardware error is detected. This option specifies the range of degradation. Moreover, this option can be used for initial diagnosis by domain startup in addition to DR operations.

The unit of degradation can be a component where a hardware error is detected, the system board (XSB) where the component is mounted, or a domain.

Values that can be set and units of degradation are explained in TABLE 2-1.

The default value of the configuration policy option is FRU.

Note – Enable the configuration policy option when the power supply of the domain is turned off.

TABLE 2-1　Unit of Degradation

Value	Unit of degradation
FRU	Hardware is degraded in units of components such as CPU and memory.
XSB	Hardware is degraded in units of system boards (XSB).
System	Hardware is degraded in units of domains or the relevant domain is stopped without degradation.

2.2.2.2 Floating Board Option

The floating board option controls kernel memory allocation.
Upon deletion of a system board on which kernel memory is loaded, the OS is temporarily suspended. The suspended status affects job processes and may disable DR operations. To avoid this problem, use the floating board option to set the priority of kernel loading into the memory of each system board, which increases the likelihood of successful DR operations.
To move a system board among multiple domains, this option can be enabled for the system board to facilitate the system board move.

The value of this option is "true" (to enable the floating board setting) or "false" (to disable the floating board setting). The default is "false".
A system board with "true" set for this option is called a floating board. A system board with "false" set for this option is called a non-floating board.

Kernel memory is allocated to the non-floating boards in a domain by priority in ascending order of LSB number. When only floating boards are set in the domain, one of them is selected and used as a kernel memory board. In that case, the status of the board is changed from floating board to non-floating board. When Copy-rename is operated by system board deletion or removal, and only floating board can be used because non-floating board cannot be used, specify the -f (force) option. Configuration of floating board option does not change when the force option is used.

Note – Enable the floating board option when the system board is in the system board pool or when the system board is not connected to the domain configuration.

2.2.2.3   Omit-memory Option

When the omit-memory option is enabled, the memory on a system board cannot be used in the domain.
Even when a system board actually has memory, this option enables you to make the memory on the system board unavailable through a DR operation to add or move the system board.
This option can be used when the target domain needs only the CPU (and not the memory) of the system board to be added.
If a domain has a high load on memory, an attempt to delete a system board from the domain may fail. This failure results if a timeout occurs in memory deletion processing (saving of the memory of the system board to be disconnected onto a disk by paging) when many memory pages are locked because of high load. To prevent this situation, you can enable the omit-memory option to facilitate the DR operation beforehand.

Note – For diagnosis and management of a system board, memory must be mounted on the system board even if the omit-memory option is enabled. Enabling the omit-memory option reduces available memory in the domain and may lower system performance. This option must be used in consideration of the influence on jobs.

The value of this option is "true" (omit memory) or "false" (do not omit memory). The default value is "false".

Note – Enable the omit-memory option when the system board is in the system board pool or when the system board is not connected to the domain configuration.

2.2.2.4 Omit-I/O Option

The omit-I/O option disables the PCI cards, disk drives, and basic local-area network (LAN) ports on a system board to prevent the target domain from using them.

Set this option to "true" if the domain needs to use only the system board's CPU and memory.

Set this option to "false" if the domain needs to use the system board's PCI cards and I/O units. In this case you must fully understand the restrictions on use of these I/O components. And you must stop the software (e.g. application programs or daemons) that uses them before you attempt to delete or move the system board.

The value of this option is "true" (omit I/O units) or "false" (do not omit I/O units). The default value is "false".

Note – Enable the omit-I/O option when the system board is in the system board pool or when the system board is not connected to the domain configuration.

2.3 Conditions and Settings Using Oracle Solaris OS

This section describes the operating conditions and settings required for DR operations.

2.3.1 I/O and Software Requirements

As described in Section 2.1, "System Configuration" on page 2-1, all I/O device drivers and software installed in a domain where DR is to be used must support DR. The device drivers that support DR must also support the following DDI and DKI entries:

attach(9E): DDI_ATTACH and DDI_RESUME

detach(9E): DDI_DETACH and DDI_SUSPEND

If a device driver that does not support DR is present, the deletion of a system board might fail.

Even if the DDI_DETACH interface is supported, DDI_DETACH processing fails when the relevant driver is in use. Before starting the deletion of a system board, you must stop using all devices on the system board to be deleted.

The device drivers that do not support DR must be unloaded before a system board is deleted. To unload a device driver, you must stop using all I/O devices controlled by the device driver. To unload a device driver, you can use the Oracle Solaris command modunload(1M). Then, you can reload the driver for the remaining instances and resume using those remaining instances after deleting the system board.

2.3.2   Settings of Kernel Cage Memory

Kernel cage memory is a function used to minimize the number of system boards to which kernel memory is allocated. Kernel cage memory is enabled by default in the Oracle Solaris 10 OS.

If the kernel cage is disabled, the system may run more efficiently, but kernel memory will be spread among all boards and DR operations will not work on memory.

To determine whether kernel cage memory is enabled after the system has been rebooted, check the following message output from the /var/adm/messages file:

```
NOTICE: DR kernel Cage is ENABLED
```

If the kernel cage is disabled, the message will be:

```
NOTICE: DR kernel Cage is DISABLED
```

In most cases the kernel cage should be enabled. However, you must consider actual operations before changing the setting. If you do not need to perform DR operations, you do not need to enable the kernel cage.
To enable kernel cage memory, remove or comment out the following setting from the /etc/system file:

```
set kernel_cage_enable=0
```

The OS must be rebooted to make the new setting effective.

2.3.3 Setting of Oracle Solaris Service Management Facility (SMF)

Certain DR operations succeed only when the following Oracle Solaris Service Management Facility (SMF) services are active on the domain:

- Domain SP Communication Protocol (dscp)
- Domain Configuration Server (dcs)
- Sun Cryptographic Key Management Daemon (sckmd)

For details, see the Notes about SMF services in Section 3.1.4, "Displaying Device Information" on page 3-10, Section 3.1.6, "Adding a System Board" on page 3-15, Section 3.1.7, "Deleting a System Board" on page 3-17, and Section 3.1.8, "Moving a System Board" on page 3-19.

2.4 Status Management

The success of DR operations depends on the status of domains and system boards. This section describes the status information on the domains and system boards managed by XSCF, and the points to be noted for a better understanding of DR operation conditions.

2.4.1 Domain Status

XSCF manages the status of each domain.
You can display and reference the status of each domain through a user interface provided by XSCF. For details of the user interface, see Chapter 3, DR User Interface.

XSCF manages the following aspects of domain status:

TABLE 2-2 Domain Status

Status	Description
Powered Off	Domain power is off.
Initialization Phase	POST processing or OpenBoot PROM initialization is in progress.
OpenBoot Executing Completed	Initialization of OpenBoot PROM is completed.

TABLE 2-2   Domain Status *(Continued)*

Status	Description
Booting	Oracle Solaris OS is being booted or, due to the domain being shutdown or reset, the system is in the OpenBoot PROM running state or is suspended in the OpenBoot PROM (ok prompt) state.
Running	Oracle Solaris OS is running.
Shutdown Started	Oracle Solaris OS is being shut down.
Panic State	Oracle Solaris OS has panicked.

To perform a DR operation for a system board, you must determine the method of DR operation according to the status of the relevant domain. The conditions of domain status available for DR operation are described in individual sections of Chapter 3, DR User Interface. For details of each method used for DR, see the relevant section.

2.4.2   System Board Status

XSCF manages system board status in units of XSB for the following management items:

TABLE 2-3   System Board Management Items

Management item	Description
Power	Power on/off status of system board
Test	Diagnostic status of system board
Assignment	Status of assignment to domain
Connectivity	Status of connection to domain
Configuration	Status of addition into Oracle Solaris OS

The table below lists the status types available for individual management items.

TABLE 2-4   System Board Management Items

Management item	Status	Description
Power	Power Off	The system board is powered off and cannot be used.
	Power On	The system board is powered on.

TABLE 2-4 System Board Management Items *(Continued)*

Management item	Status	Description
Test	Unmount	The system board is not mounted or cannot be recognized, perhaps because it is faulty.
	Unknown	The system board is not being diagnosed.
	Testing	Testing
	Passed	Passed
	Failed	A system board error was detected and the board has been deconfigured.
Assignment	Unavailable	The system board is in the system board pool (not assigned to a domain) and its status is one of the following: not-yet diagnosed, under diagnosis, or diagnosis error. All system boards that are not mounted are also shown as Unavailable.
	Available	The system board is in the system board pool and its diagnosis has completed normally.
	Assigned	The system board is reserved or assigned to the domain.
Connectivity	Disconnected	The system board is disconnected from the domain configuration and is in the system board pool.
	Connected	The system board is connected to the domain configuration.
Configuration	Unconfigured	The hardware resources of the system board have been deleted from the Oracle Solaris OS.
	Configured	The hardware resources of the system board have been added into the Oracle Solaris OS.

XSCF changes and configures system board status according to the conditions under which a system board is installed, removed, or registered in the DCL, or when a domain is started or stopped. System board status also changes when the system board is added, deleted, or moved by DR.

To perform a DR operation for a system board, you must determine the method of DR operation according to the status of the target system board.
You can display and reference the status of each system board via a user interface provided by XSCF.   For details of the user interface, see Chapter 3, DR User Interface.

2.4.3 Flow of DR Processing

This section describes the flow of DR processing and the changes in system board status during individual DR operations.

2.4.3.1 Flowchart: Adding a System Board

The flow of DR operations and the transition of system board status when a system board has been added or reserved for addition are described in the schematic flowchart, below.

Each system board status indicated in FIGURE 2-5 is the main status that is changed.

FIGURE 2-5 Flow of System Board Addition Processing
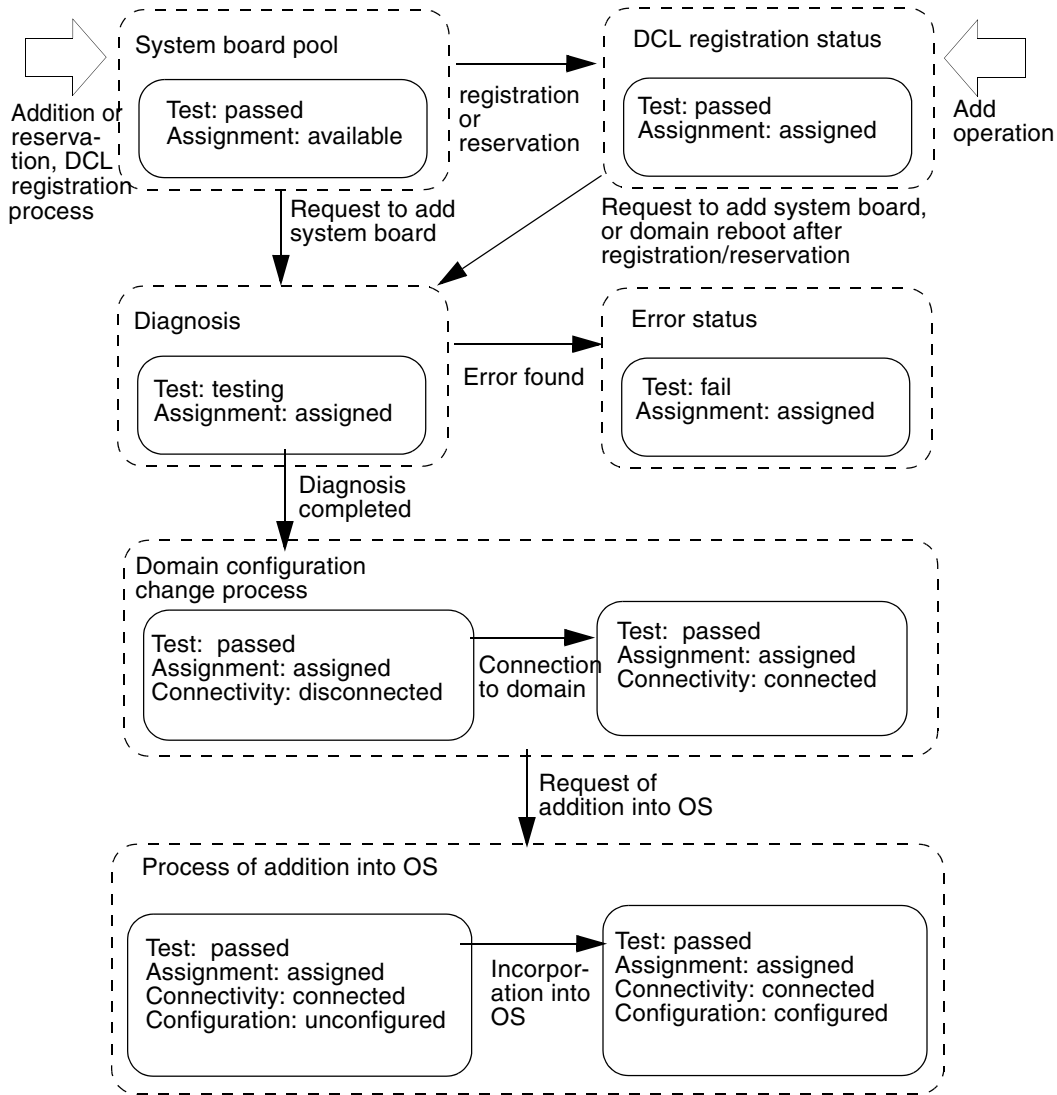
2.4.3.2 Flowchart: Deleting a System Board

The flow of DR operations and the transition of system board status when a system board has been deleted or reserved for deletion are described in the schematic flowchart, below.

Each system board status indicated in FIGURE 2-6 is the main status that is changed.

FIGURE 2-6 Flow of System Board Deletion Processing
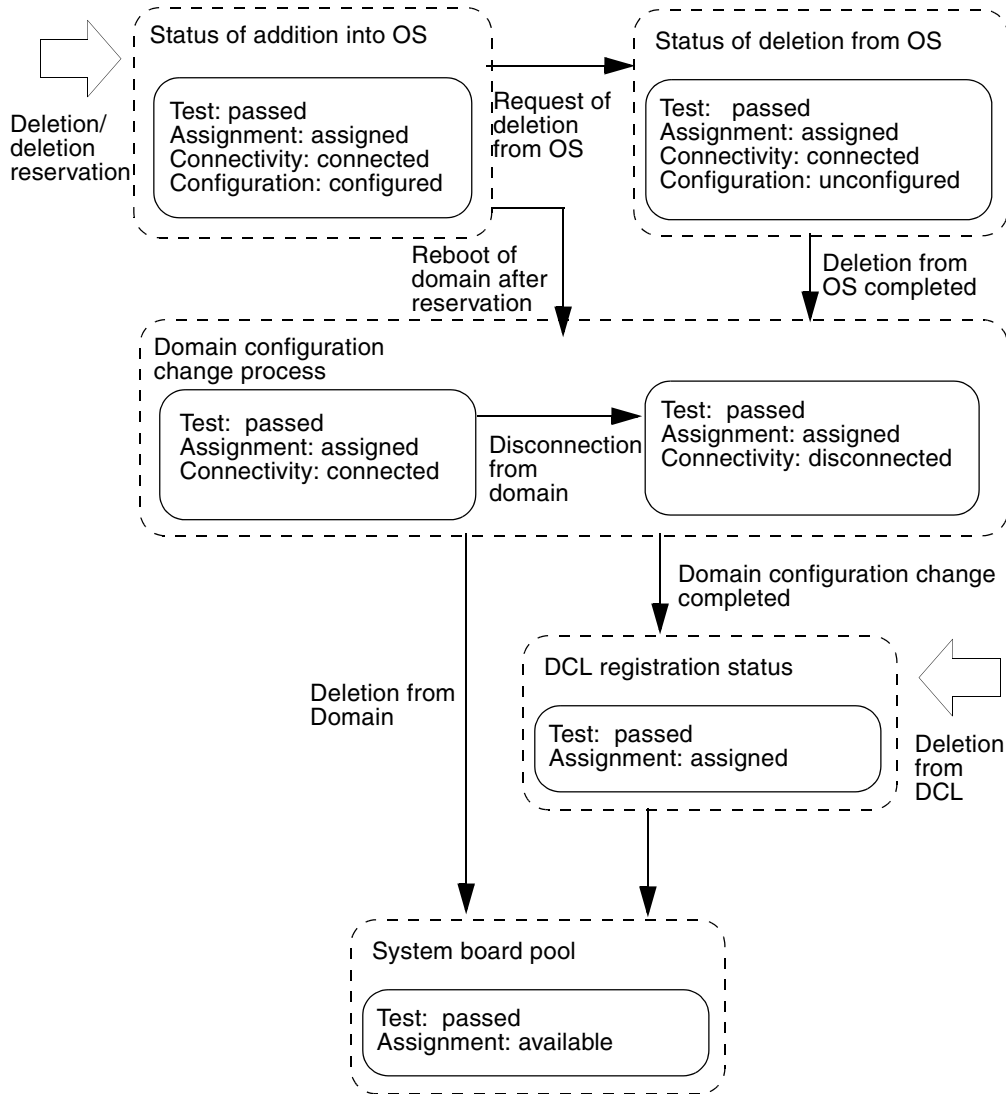
2.4.3.3 Flowchart: Moving a System Board

The flow of DR operations and the transition of system board status when a system board has been moved or reserved for a move are described in the schematic flowchart, below.

Each system board status indicated in FIGURE 2-7 is the main status that is changed.

For the flow of system board addition processing or deletion processing and the related system board status, see Section 2.4.3.1, "Flowchart: Adding a System Board" on page 2-21 or Section 2.4.3.2, "Flowchart: Deleting a System Board" on page 2-22, respectively.

FIGURE 2-7   Flow of System Board Move Processing
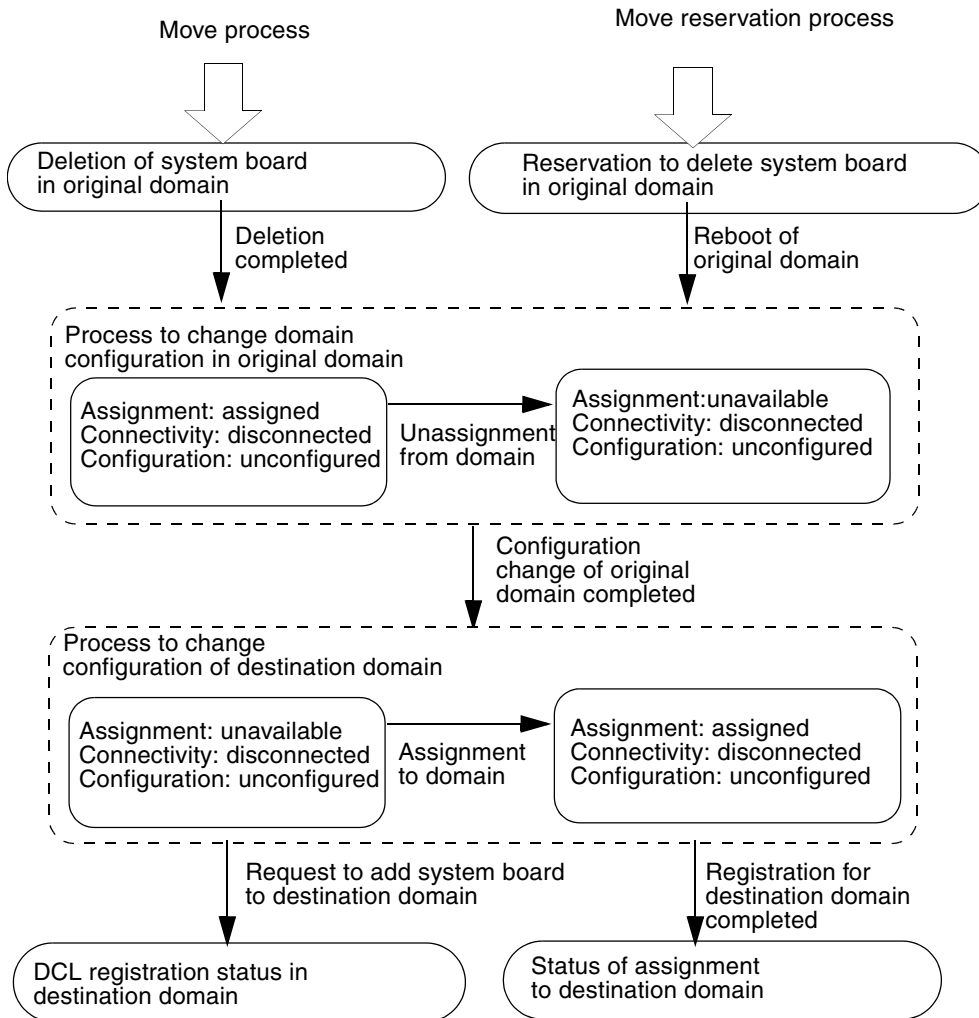
2.4.3.4 Flowchart: Replacing System Board

The flow of DR operations and the transition of system board status when a system board has been replaced are described using the schematic flowchart.

Each system board state indicated in FIGURE 2-8 is the main status that is changed.

The sample status before and after replacement as shown in the figure are explained below. The actual status after hardware replacement may not match the indicated status.

For the flow of system board addition processing or deletion processing and the related system board status, see Section 2.4.3.1, "Flowchart: Adding a System Board" on page 2-21 or Section 2.4.3.2, "Flowchart: Deleting a System Board" on page 2-22, respectively.

For details of hardware replacement operations, see the *Service Manual* for your server.

FIGURE 2-8   Flow of System Board Replacement Processing

Deletion process

Deleting a system board

Request to delete from DCL registration status

Deletion of system boards also from system board pool

DCL registration status

Assignment: assigned

System board pool

Assignment: available

Replacement process

Replacement process

Hardware replacement and diagnosis

Replacement completed

Replacement completed

DCL registration status

Test: passed
Assignment: assigned

System board pool

Test: passed
Assignment: available

Addition process

Addition process

Addition of system board

2.5 Operation Management

This section describes the premises and the actions for DR operations.

2.5.1 I/O Device Management

Upon the addition of a system board, device information is reconfigured automatically. However, addition of the system board and the reconfiguration of device information do not end at the same time.

Sometimes, device link in /dev directory is not automatically cleaned up by devfsadmd(1M) daemon. Using devfsadm(1M), you can manually clean up this device link. See the devfsadm(1M) Oracle Solaris man page for details.

2.5.2 Swap Area

The size of available virtual memory is the sum of the size of memory mounted in the system and the size of the swap area on the disk. You must ensure that the size of available memory is sufficient for all necessary operations.

2.5.2.1 Swap Area at System Board Addition

By default in Oracle Solaris, the swap area is also used to store a system crash dump. You should use a dedicated dump device, instead. See the Oracle Solaris man page dumpadm(1M). The default swap area used to store the crash dump varies in size according to the size of mounted memory.

The size of the dump device used to store the crash dump must be larger than the size of mounted memory. When a system board is added, thereby increasing the size of mounted memory, the dump device must be reconfigured as required. For details, see the dumpadm(1M) Oracle Solaris man page.

2.5.2.2 Swap Area at System Board Deletion

When you delete a system board, the memory of the system board is swapped to the swap area of the disks. The available swap area is decreased by the memory size to be deleted. So, before you execute a delete board command, check the total swap area to verify that enough free swap space is available to hold the board's physical

memory contents. Be aware that some of the total swap space may be supplied by disks that are attached to the board to be deleted. When making your assessment, be certain to also account for the swap space that will be lost.

- If the size of available memory (e.g., 1.5 gigabytes) is larger than the size of deleted memory (e.g., 1 gigabytes), the total size of available memory will be 0.5 gigabytes after deleting the system board.

- If the size of available memory (e.g., 1.5 gigabytes) is smaller than the size of deleted memory (2 gigabytes), the attempt to delete the system board will fail.

To determine the size of currently available swap area, execute the swap -s command on the OS and verify that the memory size is marked *available*. For details, see the Oracle Solaris man page swap(1M). Moreover, the size of physical memory of system board to be deleted and information on I/O devices connected can be confirmed by the showdevices(8) command. See Section 3.1.4, "Displaying Device Information" on page 3-10, or the showdevices(8) man page. see Appendix B for a more complete example.

2.5.3   Real-time Processes

The Oracle Solaris OS is temporarily suspended when a kernel memory board is deleted or moved. If your system has any real-time requirements (such as might be indicated by the presence of real-time processes), be aware that such a DR operation could significantly affect these processes.

2.5.4   Memory Mirror Mode

The memory mirror mode is a function used to duplex memory to ensure the hardware reliability of memory. When memory mirror mode is enabled, the domain can continue operation even if a fault occurs in a part of memory (provided that the fault is recoverable).

Memory mirror mode cannot be set in some division types of PSB. For more information, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

Enabling memory mirror mode does not restrict any DR functions. However, you must consider the domain configuration and operation when enabling memory mirror mode.

For example, when a kernel memory board with memory mirror mode enabled is deleted or moved, kernel memory is moved from the kernel memory board to another system board. Kernel memory is moved normally even if memory mirror mode is disabled for the move-destination system board. However, this operation results in lowered reliability of memory on the new kernel memory board.

You must properly plan and decide the setting of memory mirror mode by fully considering the requirements for the domain configuration and operations.

2.5.5　Capacity on Demand (COD)

DR works the same on COD boards as on other system boards, but standard COD restrictions still apply.

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

2.5.6　XSCF Failover

An XSCF reset or failover might prevent a DR operation from completing. Log in to the active XSCF to determine if DR succeeded. If not, try it again.

2.5.7　Kernel Memory Board Deletion

An XSCF reset or failover during the Copy-rename phase of a deleteboard(8) or moveboard(8) operation might cause the domain to panic and display the following message::

```
Irrecoverable FMEM error error_code
```

If the XSCF reset or failover results in a domain panic, check the active XSCF to determine if the DR operation succeeded. If not, try it again.

2.5.8   Deletion of Board with CD-RW/DVD-RW Drive

To delete the system board to which the server's CD-RW/DVD-RW drive is connected, execute the following steps:

1. Stop the `vold`**(1M) daemon by disabling the** `volfs` **service.**

```
# /usr/sbin/svcadm disable volfs
```

2. Execute the DR operation.

3. Restart the `vold`**(1M) daemon by enabling the** `volfs` **service.**

```
# /usr/sbin/svcadm enable volfs
```

For details, see the `vold`(1M) Oracle Solaris man page.

2.5.9   SPARC64 VII+, SPARC64 VII, and SPARC64 VI Processors and CPU Operational Modes

Note – This section applies only to M4000/M5000/M8000/M9000 servers that run or will run SPARC64 VII+ or SPARC64 VII processors.

The M4000/M5000/M8000/M9000 servers support system boards that contain a mix of SPARC64 VII+, SPARC64 VII, and SPARC64 VI processors.

Note – Supported firmware releases and Oracle Solaris releases vary based on processor type. For details, see the Product Notes that apply to the XCP release running on your server and the latest version of the Product Notes (no earlier than XCP version 1100).

FIGURE 2-9 shows an example of a mixed configuration of SPARC64 VII and SPARC64 VI processors.

FIGURE 2-9   CPUs on CPU/Memory Board Unit (CMU) and Domain Configuration
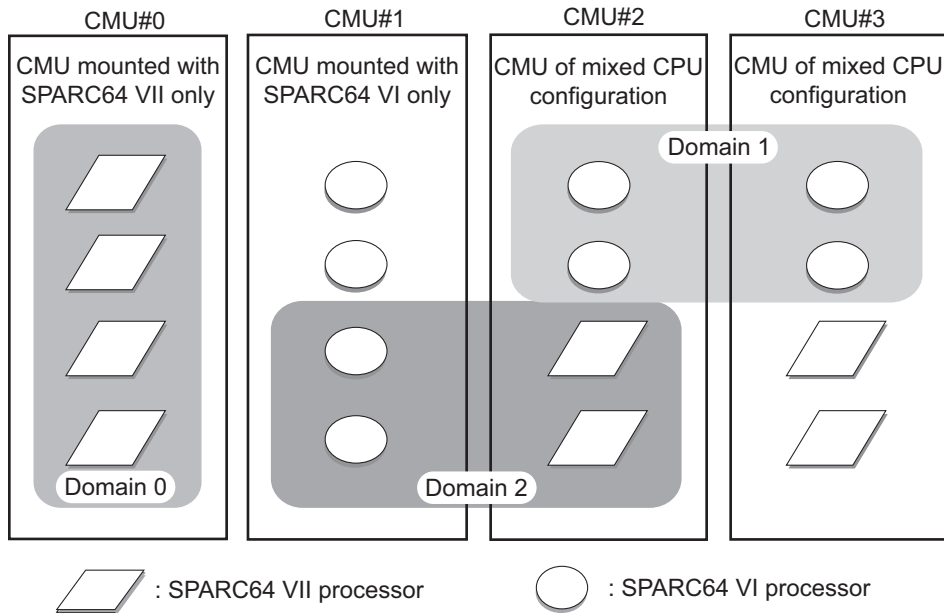
Different types of processors can be mounted on a single CMU, as shown in CMU#2 and CMU#3 in FIGURE 2-9. And a single domain can be configured with different types of processors, as shown in Domain 2 in FIGURE 2-9.

2.5.9.1   CPU Operational Modes

An M4000/M5000/M8000/M9000 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 Oracle Solaris OS as SPARC64 VI processors. The extended capabilities of SPARC64 VII+ and SPARC64 VII processors are not available in this mode. Domains 1 and 2 in FIGURE 2-9 correspond to 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 extended capabilities of these processors. Domain 0 in FIGURE 2-9 corresponds to this mode.

To check the CPU operational mode, execute the prtdiag (1M) command on the Oracle Solaris OS. If the domain is in SPARC64 VII Enhanced Mode, the output will display SPARC64-VII on the System Processor Mode line. If the domain is in SPARC64 VI Compatible Mode, nothing is displayed on that line.

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 – which can be viewed or changed by using the setdomainmode(8) command – is set to auto.

You can override the above process by using the setdomainmode(8) command to change the cpumode from auto to compatible, which forces the Oracle Solaris OS to set the CPU operational mode to SPARC64 VI Compatible Mode on reboot. To do so, power off the domain, execute the setdomainmode(8) command to change the cpumode setting from auto to compatible, then reboot the domain.

DR operations work normally on domains running in SPARC64 VI Compatible Mode. You can use DR to add, delete or move boards with any of the processor types, which are all treated as if they are SPARC64 VI processors.

DR also operates normally on domains running in SPARC64 VII Enhanced Mode, with one exception: You cannot use DR to add or move into the domain a system board that contains any SPARC64 VI processors. To add a SPARC64 VI processor you must power off the domain, change it to SPARC64 VI Compatible Mode, then reboot the domain.

In an exception to the above rule, you can use the DR addboard(8) command with its -c reserve or -c assign option to reserve or register a board with one or more SPARC64 VI processors in a domain running in SPARC64 VII Enhanced Mode. The next time the domain is powered off then rebooted, it comes up running in SPARC64 VI Compatible Mode and can accept the reserved or registered board.

Note – Change the cpumode from auto to compatible for any domain that has or is expected to have SPARC64 VI processors. If you leave the domain in auto mode and all the SPARC64 VI processors later fail, the Oracle Solaris OS will see only the SPARC64 VII+ and SPARC64 VII processors – because the failed SPARC64 VI processors will have been degraded – and it will reboot the domain in SPARC64 VII Enhanced Mode. You will be able to use DR to delete the bad SPARC64 VI boards so you can remove them. But you will not be able to use DR to add replacement or repaired SPARC64 VI boards until you change the domain from SPARC64 VII Enhanced Mode to SPARC64 VI Compatible mode, which requires a reboot.

Setting cpumode to compatible in advance enables you to avoid possible failure of a later DR add operation and one or more reboots.

The *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide* contains the above information, as well as more detailed instructions.

DR User Interface

This chapter describes the user interfaces for DR.

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3.1 How To Use the DR User Interface

XSCF provides two user interfaces for DR: the command line interface by XSCF shell, and the browser-based user interface by XSCF Web. This section describes the main XSCF shell commands used for DR. For other related commands, see Section 3.2, "Command Reference" on page 3-26. For XSCF Web, see Section 3.2, "Command Reference" on page 3-26 and Section 3.3, "XSCF Web" on page 3-27.

Note – If your server is configured with SPARC64 VII processors, some restrictions regarding DR might apply. Please see Section 2.5.9, "SPARC64 VII+, SPARC64 VII, and SPARC64 VI Processors and CPU Operational Modes" on page 2-30.

XSCF shell commands for DR operations are classified into two types: DR display and DR operation commands.

TABLE 3-1   DR Display Commands

Command name	Function
showdcl	Display the DCL and domain status.
showdomainstatus	Display domain status.
showboards	Display system board information.
showdevices	Display information about the CPUs, memory, and I/O devices on system boards.
showfru	Display PSB configuration information.

TABLE 3-2   DR Operation Commands

Command name	Function
setdcl	Update and edit the DCL.
setupfru	Set the division type and memory mirror mode for a PSB.
addboard	Add a system board to a domain.
deleteboard	Delete a system board from a domain.
moveboard	Move a system board between domains.

The sections below describe the DR display and DR operation commands in detail and show examples. For details of the options, operands, and usage of these commands, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

Note – Use of the user interfaces with XSCF shell and XSCF Web is restricted to selected administrators, and requires administrator privileges for DR operations. When system boards are shared by multiple administrators, the administrators must carefully prepare and plan secure DR operations.

3.1.1   Displaying Domain Information

The showdcl(8) command displays domain information including the domain ID, configured system board numbers, and domain status in list format.

The showdcl(8) command is used before a DR operation to determine whether the domain status permits DR operation, and confirm the registration of the DR-target system board in the DCL. The showdcl(8) command is also used after a DR operation to confirm domain status and configuration.

To change domain settings or register a system board in the DCL, use the setdcl(8) command. To change PSB settings, use the setupfru(8) command.

The following examples show the format and specifiable options of the showdcl(8) command.

```
showdcl [-v] -a
showdcl [-v] -d domain_id [-l lsb [-l lsb]]...
showdcl -h
```

TABLE 3-3   Options of the showdcl Command

Option	Description
-a	Displays configuration information and status of all domains.
-v	Displays detailed domain configuration information.
-h	Displays usage information.
-d *domain_id*	Displays information about the specified domain, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.
-l *lsb*	Displays information about the specified logical system board (LSB), numbered 00 to 15. For information about multiple LSBs, list board numbers separated by a space. For example: **showdcl -l 00 -l 01**.

TABLE 3-4   Items of Domain Information to be Displayed

Display items	Description
DID	Domain ID.
LSB	Logical system board number.
XSB	System board number.

TABLE 3-4   Items of Domain Information to be Displayed *(Continued)*

Display items	Description	
Status	Domain Status	
	Powered Off	Domain power is off.
	Initialization Phase	POST processing or OpenBoot PROM initialization is in progress.
	OpenBoot Executing Completed	Initialization of OpenBoot PROM is completed.
	Running	Oracle Solaris OS is running.
	Shutdown Started	Oracle Solaris OS is being shut down.
	Panic State	Oracle Solaris OS panic occurred.
No-mem	Setting of omit-memory option	
	true	Enabled: Oracle Solaris OS does not use memory
	false	Disabled: Oracle Solaris OS uses memory.
No-IO	Setting of omit-IO option	
	true	Enabled: Oracle Solaris OS does not use I/O device.
	false	Disabled: Oracle Solaris OS uses I/O device.
Float	Setting of floating board option	
	true	Enabled: Board is designated as a Floating board.
	false	Disabled: Board is not designated as Floating board.
Cfg-policy	Setting of configuration policy	
	FRU	Degradation in units of components.
	XSB	Degradation in units of XSB.
	System	Stopping of domain without degradation.

The table below lists the items displayed by the showdcl(8) command.

The following shows examples of displays by the showdcl(8) command.

■ Example 1: Display of information on domain #0

```
XSCF> showdcl -d 0
DID   LSB   XSB     Status
00                  Running
      00    00-0
      04    01-0
      05    01-01
      06    01-2
      07    01-3
      08    02-0
```

■ Example 2: Display of detailed information on domain #0

```
XSCF> showdcl -v -d 0
DID   LSB   XSB   Status    No-Mem   No-IO   Float   Cfg-policy
00                Running                            FRU
      00    00-0            False    False   False
      01    -
      02    -
      03    -
      04    01-0            False    False   False
      05    01-1            False    True    False
      06    01-2            False    True    True
      07    01-3            True     True    True
      08    02-0            True     True    True
      09    -
      10    -
      11    -
```

3.1.2   Displaying Domain Status

The showdomainstatus(8) command lists the domains in the system and their status. This command displays the same domain status information as the showdcl(8) command.

Use the showdomainstatus(8) command to check domain status before and after a DR operation.

The following examples show the format and options of the showdomainstatus(8) command:

```
showdomainstatus -a
showdomainstatus -d domain_id
showdomainstatus -h
```

TABLE 3-5   Options of the showdomainstatus Command

Option	Description
-a	Displays the status of all domains.
-d *domain_id*	Displays information about the specified domain, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.
-h	Displays usage information.

The table below lists the items displayed by the showdomainstatus(8) command.

TABLE 3-6   Items of Domain Information to be Displayed

Display items	Description	
DID	Domain ID	
Status	Domain status	
	Powered Off	Domain power is off.
	Initialization Phase	POST processing or OpenBoot PROM initialization is in progress.
	OpenBoot Executing Completed	Initialization by OpenBoot PROM is completed.
	Booting/OpenBoot PROM prompt	Oracle Solaris OS is being booted or, due to the domain shutdown or reset, the system is in the OpenBoot PROM running state, or is suspended in the OpenBoot PROM (ok prompt) state.
	Running	Oracle Solaris OS is running.
	Shutdown Started	Oracle Solaris OS is being shut down.
	Panic State	Oracle Solaris OS panic occurred.

The following example shows a display of the showdomainstatus (8) command.

■ Example: Display of information on all domains

```
XSCF> showdomainstatus
DID      Domain Status
00       Running
01       Powered Off
02       -
03       Running
```

3.1.3　Displaying System Board Information

The showboards(8) command displays system board information including the domain ID of the domain to which the target system board belongs and various kinds of system board status in list format.

Use the showboards(8) command before a DR operation to determine whether the system board status permits DR operations, and to confirm the domain ID of the domain to which the target system board belongs. The showboards(8) command is also used after a DR operation to confirm system board status.

To change domain settings or register a system board in the DCL, use the setdcl(8) command. To change PSB settings, use the setupfru(8) command.

The following examples show the format and options of the showboards(8) command.

```
showboards [-v] -a [-c sp]
showboards [-v] -d domain _id [-c sp]
showboards [-v] xsb
showboards -h
```

TABLE 3-7　Options of the showboards Command

Option	Description
-v	Displays detailed information about the system board.
-a	Displays information about all mounted system boards.
-h	Displays the usage information.
-d *domain_id*	Displays information about the specified domain, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.
xsb	Displays information about the specified XSB. Specify *xsb* in the *XX-Y* format. (*XX* = 00 to 15, *Y* = 0 to 3). The value depends on your server.
-c sp	Displays information about system boards in system board pool.

The table below lists the items displayed by the showboards(8) command.

TABLE 3-8   Items of System Board Information to be Displayed

Display items	Description	
XSB	System board number.	
R	Reservation status of a system board. "*" is displayed for a system board when the board is reserved for addition, deletion, or a move.	
DID (LSB)	Domain ID of the domain into which the system board is added and logical system board number "SP" is displayed for a system board that is in the system board pool.	
Assignment	Status of assignment to domain configuration	
	Unavailable	The system board is in the system board pool (not assigned to a domain) and its status is one of the following: not-yet diagnosed, under diagnosis, or diagnosis error. All system boards that are not mounted are also shown as Unavailable.
	Available	The system board is in the system board pool and its diagnosis has completed normally.
	Assigned	The system board is assigned to the domain.
Pwr	Power-on/off status of system board	
	n	Power-off status. The system board is powered off and cannot be used.
	y	Power-on status. The system board is powered on.
Conn	Status of connection to domain configuration	
	n	Disconnected status. The system board is disconnected from the relevant domain configuration or in the system board pool.
	y	Connected status. The system board is connected to the relevant domain configuration.
Conf	Status of addition into Oracle Solaris OS	
	n	Unconfigured status. The hardware resources of the system board have been deleted from the Oracle Solaris OS.
	y	Configured status. The hardware resources of the system board have been added into the Oracle Solaris OS.

TABLE 3-8   Items of System Board Information to be Displayed *(Continued)*

Display items	Description	
Test	Diagnostic status of system board	
	Unmount	The system board is not mounted or cannot be recognized because it is faulty.
	Unknown	The system board is not being diagnosed.
	Testing	testing.
	Passed	The system board was tested, and passed.
	Failed	A system board error was tested, and failed. The system board cannot be used or has been degraded.
Fault	Normal/abnormal status of system board	
	Normal	Normal.
	Degraded	Components have been degraded, but the system board is operating. Degraded here means that a system board included in the corresponding component is faulty.
	Failed	The system board cannot operate because of an error.
COD	Indication of whether the system board is a COD board.	
	n	The board is not a COD board.
	y	The board is a COD board.

The following examples show displays of the showboards(8) command

- **Example 1**: Display of information on all system boards

```
XSCF> showboards -a
XSB    DID(LSB)   Assignment   Pwr   Conn   Conf   Test      Fault
----------------------------------------------------------------
00-0   00(00)     Assigned     y     y      y      Passed    Normal
00-1   00(01)     Assigned     y     n      n      Passed    Degraded
00-2   SP         Available    y     n      n      Unknown   Normal
00-3   01(15)     Assigned     y     y      y      Passed    Normal
```

- **Example 2**: Display of detailed information on all system boards

```
XSCF> showboards -v -a
XSB   R  DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault     COD
------------------------------------------------------------------------------
00-0     00(00)     Assigned     y     y      y      Passed   Normal    n
00-1     00(01)     Assigned     y     n      n      Passed   Degraded  n
00-2  *  SP         Available    y     n      n      Unknown  Normal    n
00-3     01(15)     Assigned     y     y      y      Passed   Normal    n
```

- **Example 3**: Display of information on the system board in the system board pool in domain #0

```
XSCF> showboards -c sp -d 0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------------
00-2  SP         Available    y     n      n      Passed   Normal
```

3.1.4   Displaying Device Information

Use the showdevices(8) command to display device information.

The showdevices(8) command displays information about the physical devices including CPUs, memory, and PCI cards mounted on system boards, and displays the hardware resources usable with these devices in hardware resource format. The showdevices(8) command is used before a DR operation to confirm information about and status of the hardware resources of the DR-target system board, and to determine the process to access the CPU and I/O devices.

Resource management applications or subsystems provide information concerning use of the hardware resources. A showdevices(8) command offline query about management target resources estimates the effect of each DR operation applied to the system boards and displays the results.

The following examples show the format and options of the showdevices(8) command.

```
showdevices [-v] [-p bydevice|byboard|query|force] xsb
showdevices [-v] [-p bydevice|byboard] -d domain_id
showdevices -h
```

Note – The showdevices(8) command only reports information about a running domain.

Note – (Note 2) The showdevices(8) command will succeed only if the following
Oracle Solaris Service Management Facility (SMF) services are active on that domain:
- Domain SP Communication Protocol (dscp)
- Domain Configuration Server (dcs)
- Oracle Sun Cryptographic Key Management Daemon (sckmd).

TABLE 3-9 Options of the showdevices Command

Option	Description
-v	Specifies that the command displays information about all devices. Information about not only the management target devices but also other devices is displayed. However, the displayed information includes resource information about the devices whose resources are managed and does not include resource information about the devices whose resources are not managed.
-p bydevice	Specifies that the command display information about the devices mounted on a system board (CPU, memory, and I/O devices), sorted by device. If neither -p bydevice nor -p byboard is specified, -p bydevice is the default.
-p byboard	Specifies that the command display information about the devices mounted on system boards (CPU, memory, and I/O devices) by system board.
-p query	Tests the detachability of the board by test-running the DR command without actually executing it.
-p force	Tests the detachability of the board by test-running the DR command with the force flag without actually executing it.
xsb	Specifies a system board (XSB) number. Specify *xsb* in the *XX-Y* format. (*XX* = 00 to 15, *Y* = 0 to 3). The value depends on your server.
-d *domain_id*	Specifies ID of the specified domain, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.

TABLE 3-10 Domain Information Displayed by the `showdevices` command

Display items	Description	
CPU	CPU information.	
	DID	Domain ID.
	XSB	System board number.
	id	CPU ID.
	state	CPU status.
	speed	CPU frequency (MHz).
	ecache	CPU cache size (Megabyte: MB).
	usage	Description of instance using resources.
Memory	Memory information.	
	DID	Domain ID
	XSB	System board number
	board mem	Size of memory on system board (MB).
	perm mem	Size of non-relocatable (kernel) memory on system board (MB)
	base address	Base physical address of memory on system board.
	domain mem	Size of memory in domain (MB).
	target board	System board number of the system board whose kernel memory is drained.
	deleted mem	Size of already deleted memory (MB).
	remaining mem	Size of remaining memory to be deleted (MB).
IO Devices	I/O device information.	
	DID	Domain ID.
	XSB	System board number.
	device	Instance name and number of I/O device.
	resource	Management resource name.
	usage	Description of resource usage.
	query	Results of estimation with an offline query.
	usage/reason	Description of resource usage and reason for the results of estimation with an offline query.

The following example shows a display by the `showdevices`(8) command.

■ **Example:** Display of device information on XSB00-0

```
XSCF> showdevices 00-0
CPU:
----
DID   XSB   id    state     speed   ecache
00    00-0  0     on-line   2048    4
00    00-0  1     on-line   2048    4

Memory:
-------
          board  perm    base                    domain  target   deleted
remaining
DID   XSB   mem MB mem MB  address                 mem MB  XSB      mem MB
mem MB
00    00-0  8192   2048    0x000003c000000000      65536

I/O Devices:
----------
DID   XSB   device   resource             usage
00    00-0  sd0      /dev/dsk/c0t0d0s0     mounted filesystem "/"
00    00-0  sd0      /dev/dsk/c0t0d0s1     swap area
00    00-0  sd0      /dev/dsk/c0t0d0s1     dump device (swap)
00    00-0  bge0     SUNW_network/bge0     bge0 hosts IP addresses:
10.1.1.1
```

3.1.5 Displaying System Board Configuration Information

Use the showfru(8) command to display system board configuration information. The showfru(8) command displays information about the PSB division type and memory mirroring mode settings in list format.

To change the PSB configuration, use the setupfru(8) command.

The following examples show the format and options of the showfru(8) command.

```
showfru -a device
showfru device location
showfru -h
```

TABLE 3-11 Options of the `showfru` Command

Option	Description
-a	Specifies that the command display all configuration information on devices of the type specified by devtype.
-h	Displays usage information.
device	Specifies a device type. Specify "sb" for DR.
location	Specifies a device name. Specifies a physical system board (PSB) number. Specify a decimal number from 00 to 15 for PSB. To display information about multiple system boards, several PSB numbers can be specified by delimiting each with a space. The range of PSB numbers to be specified varies depending on your server.

The table below lists the items displayed by the `showfru`(8) command.

TABLE 3-12 Items of System Board Configuration Information to be Displayed

Display items	Description	
Device	Device type. "sb" is the corresponding device for DR.	
Location	Mounting location of a device. Displays a physical system board (PSB) number.	
XSB Mode	XSB division type.	
	Uni	Uni-XSB (no division) mode.
	Quad	Quad-XSB: four-division mode.
Memory Mirror Mode	Memory mirror mode.	
	yes	Memory mirror mode is enabled.
	no	Memory mirror mode is disabled.

The following example shows a display of the `showfru`(8) command.

■ **Example**: Display of configuration information on all system boards

```
XSCF> showfru -a sb
Device    Location    XSB Mode    Memory Mirror Mode
sb        00          Quad        yes
sb        01          Quad        yes
sb        02          Quad        no
sb        03          Uni         no
```

3.1.6 Adding a System Board

Use the addboard(8) command to add a system board to a domain or reserve the addition of a system board to a domain based on the DCL. The system board must already be registered in the target domain's DCL.

Use the showdcl(8) command to check whether a system board is registered in the DCL. To register a system board in the DCL, use the setdcl(8) command.

Before executing the addboard(8) command, check the status of the DR-target domain and system board. You must determine whether you can perform the DR operation based on the status of the domain and system board.

The following examples show the format and options of the addboard(8) command.

```
addboard [[-q] -{y|n}] [-f] [-v] [-c configure] -d domain_id xsb [...]
addboard [[-q] -{y|n}] [-f] [-v] -c assign -d domain_id xsb [...]
addboard [[-q] -{y|n}] [-f] [-v] -c reserve -d domain_id xsb [...]
addboard -h
```

TABLE 3-13   Options of the addboard Command

Option	Description
-q	Specifies the suppression of output message display.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-y	Specifies that a response of "yes" is made automatically to all output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-n	Specifies that a response of "no" is made automatically to all output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-f	Forcibly adds a system board that has not been diagnosed to a domain. This option for normal DR operations must not be used.
	A faulty system board, or a system board where a fault is detected will not be forcibly added to the destination domain.
-v	Displays the progress of this DR command.
	If the option is specified with the -q option, the -v option is ignored.

TABLE 3-13 Options of the `addboard` Command *(Continued)*

Option	Description
`-h`	Displays the usage information.
`-c configure`	Specifies that the command add a system board to the domain. If no other `-c` option is specified, `-c configure` is the default.
`-c assign`	Specifies that the command assign a system board to the domain.
	With this option specified, the command assigns the target system board to the domain. The assigned system board is added to the domain when the `addboard(8)` command with the `-c configure` option specified is executed, and then the domain power is turned on or the domain rebooted.
`-c reserve`	Specifies that the command reserve the addition of a system board to the domain.
	With this option specified, the command executes the same processing as for the `-c assign` option, and it assigns the target system board to the domain. The assigned system board is added to the domain when the `addboard(8)` command with the `-c configure` option specified is executed, and then the domain power is turned on or the domain is rebooted.
`-d` *domain_id*	Specifies the domain ID of the domain to add a system board, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.
xsb	Specifies the system board (XSB) number of the system board to be added.
	Specify *xsb* in the *XX-Y* format. (*XX* = 00 to 15, *Y* = 0 to 3). The value depends on your server. To specify multiple system boards, several XSB numbers can be specified by delimiting each with a space.

Note – (Note 1) In the system board addition processing executed by this command, a diagnosis of the system board to be added is performed first, and then the system board is added to the target domain. For this reason, much time may be required for the command to complete its operation.

Note – (Note 2) If DR processing by the `addboard(8)` command fails, the target system board cannot be restored to its previous status. You must identify the cause of failure based on the error message output by the `addboard(8)` command and Oracle Solaris OS messages, and then take appropriate corrective action. Note that some errors require the domain to be rebooted.

Note – (Note 3) If a system board has been forcibly added to a domain by the `addboard`(8) command with the `-f` option specified, normal operation of all added hardware resources may be disabled. For this reason, you should avoid using the `-f` option for normal DR operations. After adding a system board by using the `addboard`(8) command with the `-f` option specified, be sure to check the status of the added system board and the devices on the system board.

Note – (Note 4) You can execute the `addboard`(8) command on a domain that is not running. When the domain is running, the `addboard`(8) command with "`-c configure`" will succeed only if the following Oracle Solaris Service Management Facility (SMF) services are active on that domain:
- Domain SP Communication Protocol (dscp)
- Domain Configuration Server (dcs)
- Oracle Sun Cryptographic Key Management Daemon (sckmd)

3.1.7 Deleting a System Board

Use the `deleteboard`(8) command to delete a system board from a domain and assign it to the system board pool. If you specify the `-c reserve` option, the action takes place the next time the domain is powered off or rebooted.

Before executing the `deleteboard`(8) command, check the status of the target domain and system board, and the device usage status on the system board. You must determine whether you can perform the DR operation according to the status of the domains and system board, and the device usage status on the system board. You must also stop the processes that are bound to the CPU and the accessing of I/O devices to prepare for system board deletion.
If the system board to be deleted is a kernel memory board, check the status and memory size of the system board to which kernel memory is to be moved.

The following examples show the format and options of the `deleteboard`(8) command.

```
deleteboard [[-q] -{y|n}] [-f] [-v] [-c disconnect] xsb [xsb...]
deleteboard [[-q] -{y|n}] [-f] [-v] -c unassign xsb [xsb...]
deleteboard [[-q] -{y|n}] [-f] [-v] -c reserve xsb [xsb...]
deleteboard -h
```

TABLE 3-14   Options of the `deleteboard` Command

Option	Description
-q	Specifies the suppression of output message display.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-y	Specifies that a response of "yes" is made automatically to output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-n	Specifies that a response of "no" is made automatically to output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-f	Forcibly deletes a system board from the domain. This option for normal DR operations must not be used.
-v	Displays the progress of this DR command.
	If the option is specified with the -q option, the -v option is ignored.
-h	Displays the usage information.
-c disconnect	Specifies that the command delete a system board from the domain and set it in the status where it is assigned to the domain. This is a default option.
-c unassign	Deletes the board and adds it to the system board pool.
	The command unconfigures and disconnects the system board from the domain. If the board is in the state where it is assigned to the domain, the command unassigns the board from the domain and puts it in the system board pool. Also, if the domain power is off, the command similarly puts the board in the system board pool.
-c reserve	Reserves the deletion of a system board from a domain. The system board is deleted from the domain and placed in the system board pool when the domain power is turned off or the domain is rebooted.
	If the board is in the state where it is assigned to the domain, the command unassigns the board from the domain and places it in the system board pool. Also, if the domain power is off, the command similarly places the board in the system board pool.
xsb	Specifies the system board (XSB) number of the system board to be deleted.
	Specify *xsb* in the *XX-Y* format. (*XX* = 00 to 15, *Y* = 0 to 3). The value depends on your server. To specify multiple system boards, several XSB numbers can be specified by delimiting each with a space.

Note – (Note 1) The time required for system board deletion processing depends on the amount of hardware resources mounted on the target system board. For this reason, much time may be required for the command to end its operation. If the system board contains kernel memory, the OS is suspended for a while.

Note – (Note 2) If the DR processing executed by the deleteboard(8) command fails, the target system board cannot be restored to the previous status. If DR processing fails, identify the cause of failure based on the error message output by the deleteboard(8) command and Oracle Solaris OS messages, and then take appropriate corrective action. Note that some errors require the domain to be rebooted.

Note – (Note 3) When a system board is forcibly deleted from a domain by the deleteboard(8) command with the -f option specified, a serious problem may occur in a process that is bound to the CPU or in accessing an I/O device. For this reason, you should avoid using the -f option for normal DR operations. When using the deleteboard(8) command with the -f option specified, be sure to check the status of the domain and application processes.

Note – (Note 4) You can execute the deleteboard(8) command on a domain that is not running. When the domain is running, the deleteboard(8) command with "-c disconnect" or "-c unassign" will succeed only if the following Oracle Solaris Service Management Facility (SMF) services are active on that domain:
- Domain SP Communication Protocol (dscp)
- Domain Configuration Server (dcs)
- Oracle Sun Cryptographic Key Management Daemon (sckmd)

3.1.8   Moving a System Board

Use the moveboard(8) command to delete a system board from the move-source domain and add it to the move-destination domain, assign it to the move-destination domain, or reserve it to be moved later.

To execute the moveboard(8) command, the system board must have been configured in or assigned to the move-source domain, and be registered in the DCL for the move-destination domain.

Use the showdcl(8) command to check whether a system board is registered in the DCL. To register a system board in the DCL, use the setdcl(8) command.

Before executing the moveboard(8) command, check the status of the move-source and move-destination domains and move-target system board, and the device usage status on the system board. You must determine whether you can perform the DR operation according to the status of the domains and system board, and the device usage status on the system board. You must also stop any processes that are bound to the CPU and any that are accessing I/O devices to prepare for system board deletion.
If the system board to be deleted is a kernel memory board, check the status and memory size of the system board to which kernel memory is to be moved.

The following examples show the format and options of the moveboard(8) command.

```
moveboard [[-q] -{y|n}][-f][-v][-c configure] -d domain_id xsb[xsb...]
moveboard [[-q] -{y|n}][-f][-v] -c assign -d domain_id xsb[xsb...]
moveboard [[-q] -{y|n}][-f][-v] -c reserve -d domain_id xsb[xsb...]
moveboard -h
```

TABLE 3-15 Options of the moveboard Command

Option	Description
-q	Specifies the suppression of output message display.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-y	Specifies that a response of "yes" is made automatically to output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-n	Specifies that a response of "no" is made automatically to output messages.
	The -y or -n option determines how output messages are automatically answered, whether or not the messages themselves are suppressed (with the -q option) or displayed.
-f	Forcibly deletes a system board from the move-source domain and move it to the move-destination domain. This option for normal DR operations must not be used. A faulty system board, or a system board where a fault is detected will not be forcibly added to the destination domain.
-v	Displays messages about the progress of this DR operation.
	If the option is specified with the -q option, the -v option is ignored.
-h	Displays the usage information.

TABLE 3-15 Options of the `moveboard` Command *(Continued)*

Option	Description
`-c configure`	Specifies that the command delete a system board from the move-source domain and adds it to the move-destination domain.
	If no other `-c` option is specified, `-c configure` is the default.
	The move operation from the move-source domain is performed when the domain power is off or the Oracle Solaris OS is running in the move-source domain. However, if the domain power is off or the Oracle Solaris OS is not running in the move-destination domain, the move operation from the move-source domain is not performed and DR processing terminates with an error.
`-c assign`	Specifies that the command delete a system board from the move-source domain and assign it to the move-destination domain.
	The assigned system board is added to the move-destination domain when the `addboard(8)` command is executed in the move-destination domain, the power of the move-destination domain is turned on, or the move-destination domain is rebooted.
	The move operation from the move-source domain is performed and the system board is set to the state where it is assigned to the move-destination domain when the domain power is off in both the move-source domain and the move-destination domain or the Oracle Solaris OS is not running in both domains.
`-c reserve`	Specifies that the command reserve a system board move in the move-source domain.
	The system board is deleted from the move-source domain and assigned to the move-destination domain when the power of move-source domain is turned off or the move-source domain rebooted. The assigned system board is added to the move-destination domain when the `addboard(8)` command is executed in the move-destination domain, the power of the move-destination domain is turned on, or the move-destination domain is rebooted.
	The move operation from the move-source domain is performed and the system board is set to the state where it is assigned to the move-destination domain when the domain power is off or the Oracle Solaris OS is not running in the move-source domain.
`-d` *domain_id*	Specifies the domain ID of the move-destination domain, where *domain_id* is the domain number, possibly 0 to 23, depending on your server. Only one domain ID can be specified.
xsb	Specifies the system board (XSB) number of the system board to be moved.
	Specify *xsb* in the *XX-Y* format. (*XX* = 00 to 15, *Y* = 0 to 3). The value depends on your server. To specify multiple system boards, several XSB numbers can be specified by delimiting each with a space.

Note – (Note 1) The time required for system board deletion processing in the move-source domain depends on the amount of hardware resources mounted on the target system board. Moreover, in the system board addition processing in the move-destination domain, the system board to be added is first diagnosed, and then added to the domain. For this reason, much time may be required for the command to end its operation. Oracle Solaris OS is suspended for a while when the system board includes kernel memory.

Note – (Note 2) If the DR processing executed by the moveboard(8) command fails, the target system board cannot be restored to the previous status. If DR processing fails, identify the cause of failure based on the error message output by the moveboard(8) command and Oracle Solaris OS messages in the move-source and move-destination domains, and then take appropriate corrective action. Note that some errors require one of the domains to be rebooted.

Note – (Note 3) When a system board is forcibly deleted from the move-source domain by the moveboard(8) command with the -f option specified, a serious problem may occur in a process that is bound to the CPU or in accessing an I/O device. For this reason, you should avoid using the -f option for normal DR operations. When using the moveboard(8) command with the -f option specified, be sure to check the status of the move-source domain and application processes.

Note – (Note 4) You can execute the moveboard(8) command on a source domain or a destination domain that is not running. When the source domain is running, the moveboard(8) command with "-c configure" or "-c assign" will succeed only if the following Oracle Solaris Service Management Facility (SMF) services are active on that domain:
- Domain SP Communication Protocol (dscp)
- Domain Configuration Server (dcs)
- Oracle Sun Cryptographic Key Management Daemon (sckmd)

3.1.9 Replacing a System Board

Use the deleteboard(8) and addboard(8) commands to replace a system board. Use them to replace, add, or delete such hardware resources as the CPU, memory, and I/O devices, or replace the PSB of a CMU or IOU.

Note – In a midrange server, you cannot use DR commands to replace a system board. Instead, turn off the power of all domains, and then replace the target system board.

To replace a system board in a domain, first delete the target system board from the domain by using the deleteboard(8) command to make the PSB replaceable. Next, replace the PSB with a new one, and then add the target system board to the domain.

For details of the conditions and actions for executing the deleteboard(8) command, see . For details of the conditions and actions for executing the addboard(8) command, see .

Note – (Note 1) Before replacing a system board, you must know the division type of the replacement-target PSB and the configurations and operation status of all domains to which all XSBs on the PSB belong.
If the division type of the replacement-target PSB is Quad-XSB and the XSBs on the replacement-target PSB belong to multiple domains, you must consult with all administrators of the relevant domains in advance to adequately adjust the method of replacing the system board.
If the division type of the replacement-target PSB is Uni-XSB, its replacement does not affect any other domains. However, prior adjustment may be required when the replacement-target system board is used as a floating board for multiple domains or hardware replacement work may affect other domains

Note – (Note 2) If the DR processing executed by the deleteboard(8) or addboard(8) commands fails, the target system board cannot be restored its previous status. Identify the cause of failure based on the error messages output by the commands and Oracle Solaris OS messages, and then take appropriate corrective action. Note that some errors require the domain to be rebooted.

Note – (Note 3) If a system board is forcibly deleted from a domain by the deleteboard(8) command with the -f option specified, a serious problem may occur in a process bound to the CPU or accessing an I/O device. For this reason, you should avoid using the -f option in normal DR operations. If you must use the deleteboard(8) command with the -f option specified, be sure to check the status of the domain and application processes before and after execution.

Note – (Note 4) To execute the addboard(8) command to add a system board by DR, the system board must already be registered in DCL. Use the showdcl(8) command to check whether a system board is registered in the DCL. To register a system board in the DCL, use the setdcl(8) command.

To replace hardware, you must set the system board to the state where it is assigned to the domain or to the state where it is placed in the system board pool by using the deleteboard(8) command.

3.1.10   Reserving a Domain Configuration Change

Use the addboard(8), deleteboard(8), or moveboard(8) command to reserve a domain configuration change.

A domain configuration change is reserved when a system board cannot be added, deleted, or moved immediately for operational reasons. The reserved addition, deletion, or move of the system board is executed when the power of the target domain is turned on or off, or the domain rebooted.
If a system board is placed in the system board pool, a domain configuration change can be reserved to assign the system board to the intended domain in advance, preventing the system board from being acquired by another domain.

To reserve the addition of a system board to a domain, use the addboard(8) command with the -c reserve option specified. The system board will be added to the domain when the domain power is turned on, the domain is rebooted, or the next time the addboard(8) command with the -c configure option specified is executed.
For details about the addboard(8) command, see Section 3.1.6, "Adding a System Board" on page 3-15.

To reserve the deletion of a system board from a domain, use the deleteboard(8) command with the -c reserve option specified. The system board will be deleted from the domain when the domain power is turned off, the domain is rebooted, or the next time the deleteboard(8) command with the -c disconnect or -c unassign option specified is executed. For details about the deleteboard(8) command, see Section 3.1.7, "Deleting a System Board" on page 3-17.

To reserve a system board move in a domain to another domain, use the moveboard(8) command with the -c reserve option specified. The system board will be deleted from the move-source domain and moved to the move-destination domain when the power of the move-source domain is turned off, the move-destination domain is rebooted, or the next time the moveboard(8) command with the -c configure or -c assign option specified is executed.
For details about the moveboard(8) command, see Section 3.1.8, "Moving a System Board" on page 3-19.

3.2 Command Reference

This section lists the DR commands and other commands related to DR.

For details of the commands, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*. For the DR commands, see Section 3.1, "How To Use the DR User Interface" on page 3-1.

Note – (Note 1) Use of each command is restricted to selected administrators only. To use each command, you must have appropriate administrator privileges. For details, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

Note – (Note 2) This section does not list all commands related to DR. For other DR-related commands, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

TABLE 3-16   DR Display Commands

Command name	Function
showdcl	Displays the DCL and the domain status.
showdomainstatus	Displays domain status.
showboards	Displays system board information.
showdevices	Displays information about the CPUs, memory, and I/O devices on system boards.
showfru	Displays PSB configuration information.

TABLE 3-17   DR Operation Commands

Command name	Function
setdcl	Updates and edits the DCL.
setupfru	Sets the division type and memory mirror mode for PSB.
addboard	Adds a system board into a domain.
deleteboard	Deletes a system board from a domain.
moveboard	Moves a system board between domains.

TABLE 3-18 DR-related Commands

Command name	Function
poweron	Turns on the power of all domains or a specified domain.
poweroff	Turns off the power of all domains or a specified domain.
setdscp	Configures DSCP network.
showdscp	Displays the DSCP network configuration.
addfru	Installs a Field Replaceable Unit (FRU).
deletefru	Removes a Field Replaceable Unit (FRU).
replacefru	Replaces a Field Replaceable Unit (FRU).
showhardconf	Displays all components mounted in the server.
showstatus	Lists degraded components.
showlog	Displays an error log, power log, event log, console log, panic log, IPL log, temperature/humidity log, and monitoring message log.

3.3   XSCF Web

XSCF Web lets you execute DR functions from a browser. XSCF Web is beyond the scope of this document. For details, see the *SPARC Enterprise M3000/M4000/M5000/M8000/M9000 Servers XSCF User's Guide*.

3.4   RCM Script

Reconfiguration Coordination Manager (RCM) is a framework used to manage the dynamic disconnection of system components. RCM provides script functions that enable you to write your own scripts for dynamic reconfiguration.
Using RCM scripts enables you to avoid complicated DR operations (e.g., stopping applications and releasing devices from applications).

For details of how to register RCM scripts and script execution timing, see the Oracle Solaris man page for rcmscript(4).

Note – (Note 1) An RCM script can only automate actions performed to prepare for the deletion of a system board. When a system board is added to a domain, any actions required for use of the added resources must be manually performed.

Note – (Note 2) You should test the RCM scripts you create for DR before executing the DR operations. The RCM scripts may not be able to execute certain processing.

Practical Examples of DR

This chapter provides examples of DR operations, such as the addition, deletion, move, and replacement of system boards.

Each example shows an operation procedure using the command line interface of the XSCF shell. Similar procedures can also be applied to DR operations using the browser-based interface of the XSCF Web.

Note that the sections below explain only procedures such as those for checking the status of parts and devices for DR operations and not hardware operations (e.g., installing, removing, and replacing system boards). See the *Service Manual* for your server, as needed.

Note – If your server is configured with SPARC64 VII processors, some restrictions regarding DR might apply. Please see Section 2.5.9, "SPARC64 VII+, SPARC64 VII, and SPARC64 VI Processors and CPU Operational Modes" on page 2-30.

This chapter includes these sections:

4.1 Flow of DR Operation

This section provides the flows of basic DR operations to add, delete, move, and replace system boards, along with flow diagrams.

4.1.1 Flow: Adding a System Board

FIGURE 4-1   Flow: Adding a System Board
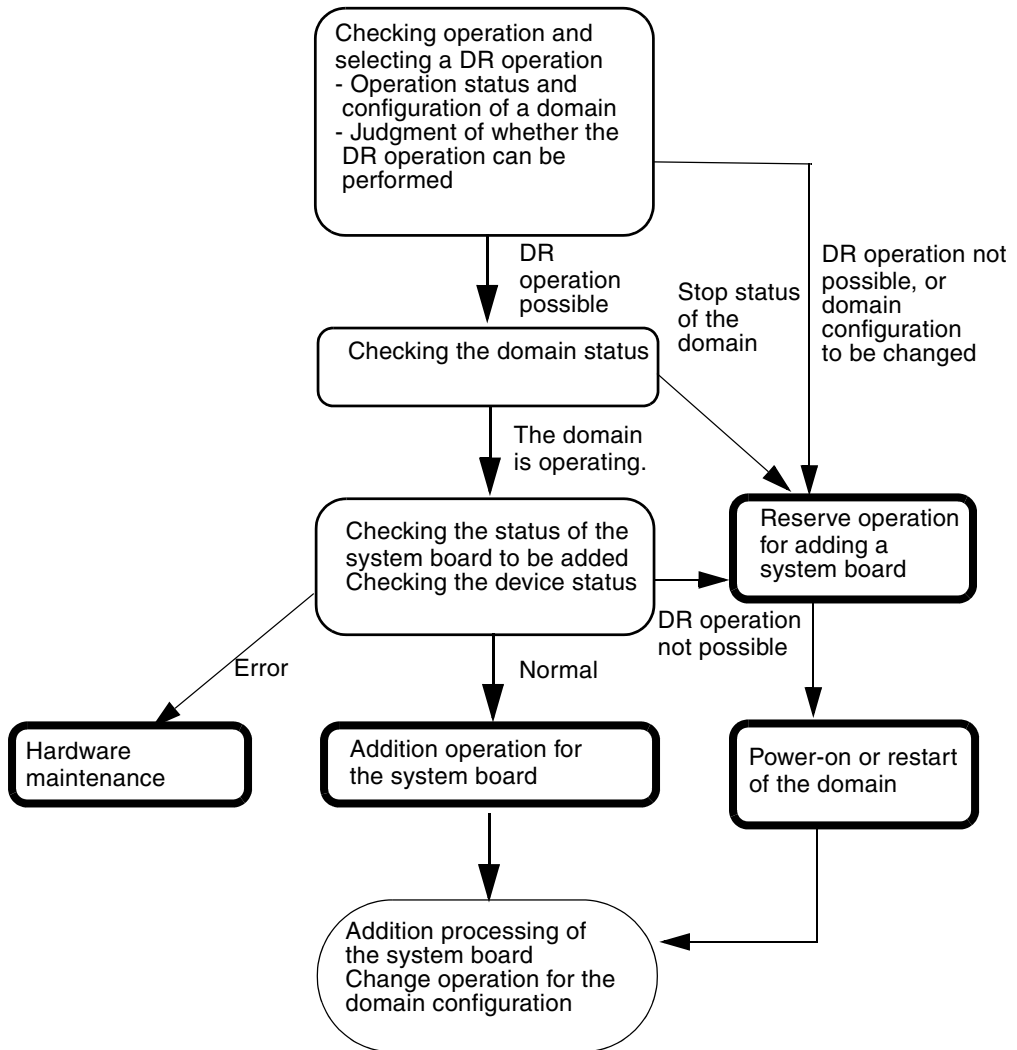
4.1.2　Flow: Deleting a System Board

FIGURE 4-2　Flow: Deleting a System Board
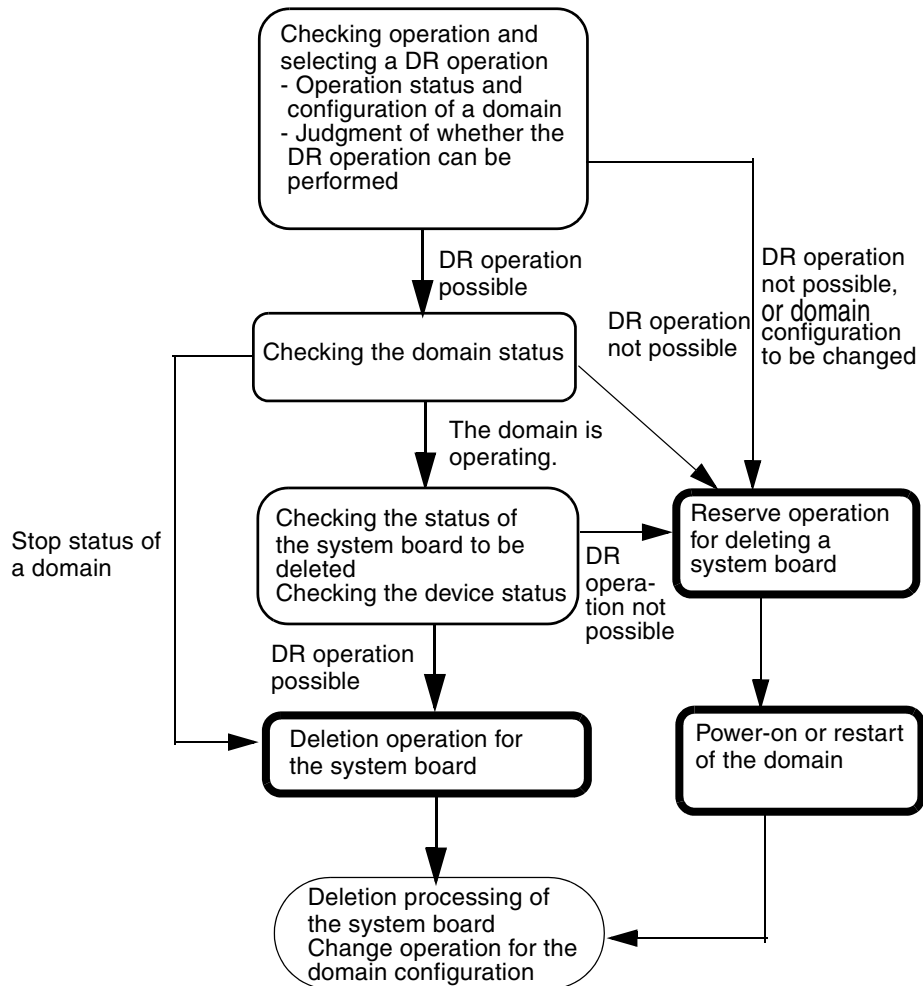
4.1.3   Flow: Moving a System Board

FIGURE 4-3   Flow: Moving a System Board

Checking operation and selecting a DR operation
- Operation status and configuration of the move-source domain
- Operation status and configuration of the move-destination domain
- Judgment of whether the DR operation can be performed

DR operation possible

DR operation not possible, or domain configuration to be changed

DR operation not possible, or domain configuration to be changed

Confirmation of the move-source and move-destination domains and selecting an operation

DR operation possible

DR operation not possible

Checking the status of the system board to be moved
Checking the device status

Reserve operation for moving a system board

DR operation possible

Move operation for the system board

Power-on or restart of the move-source domain

Move processing of the system board
Change operation for the move-source and move-destination domain configurations

Addition operation for the system board in the move-destination domain

Status of reserved addition in the move-destination domain

4.1.4 Flow: Replacing a System Board

FIGURE 4-4 Flow: Replacing a System Board
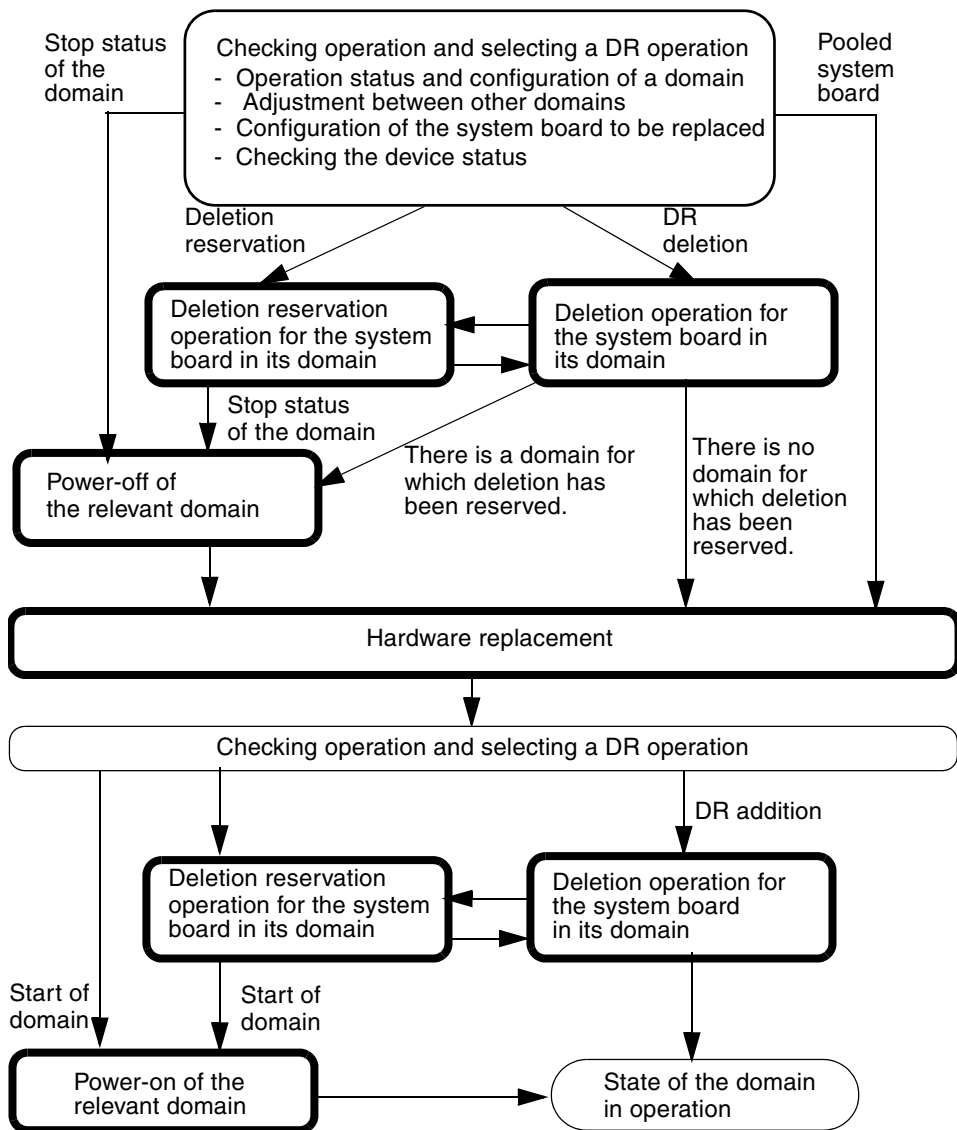
4.2 Example: Adding a System Board

This section provides an example of the DR operation to add a system board to a domain. In the example, a procedure conforming to section 4.1.1, "Flow: Adding a System Board.", is used, and the system board shown in the figure is added by using the XSCF shell.

FIGURE 4-5 Example: Adding a System Board

1. **Login to XSCF.**

2. **Check the status of the domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the domain. Based on the operation status of the domain, determine whether to perform the DR operation or change the domain configuration.

```
XSCF> showdcl -d 0
DID   LSB   XSB    Status
00                 Running
      00    00-0
      01    01-0
```

3. **Check the status of the system board to be added.**

   Execute the showboards(8) command to display system board information, and then check the status of the system board to be added and confirm its registration in the DCL.

If you need to change the PSB configuration, use the setupfru(8) command. If the system board to be added is not registered in the DCL, register the system board in the DCL of the target domain by using the setdcl(8) command.

```
XSCF> showboards -a
XSB   DID(LSB)   Assignment    Pwr  Conn  Conf  Test     Fault
-----------------------------------------------------------------
00-0  00(00)     Assigned       y    y     y    Passed   Normal
01-0  SP         Available      y    n     n    Passed   Normal
```

4. Add the new system board.

Execute the addboard(8) command to add the system board to the move-destination domain.

```
XSCF> addboard -c configure -d 0 01-0
```

5. Check the status of the domain and added system board.

When the addboard(8) command ends normally, execute the showdcl(8) command to check the operation status of the domain, and then execute the showboards(8) command to check the status of the added system board.

If the addboard(8) command completes abnormally or leaves the board in an unwanted status, refer output messages to identify the problem, then correct it.

```
XSCF> showdcl -d 0
DID    LSB    XSB    Status
00                   Running
       00     00-0
       01     01-0
```

```
XSCF> showboards -d 0
XSB   DID(LSB)   Assignment    Pwr   Conn   Conf   Test     Fault
-----------------------------------------------------------------
00-0  00(00)     Assigned       y     y      y     Passed   Normal
01-0  00(01)     Assigned       y     y      y     Passed   Normal
```

4.3 Example: Deleting a System Board

This section provides an example of operation to delete a system board from a domain. In the example, a procedure conforming to Section 4.1.2, "Flow: Deleting a System Board" on page 4-4, is used, and the system board shown in the figure is deleted using the XSCF shell.

FIGURE 4-6   Example: Deleting a System Board

1. **Login to XSCF.**

2. **Check the status of the domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the domain. Based on the operation status of the domain, determine whether to perform the DR operation or change the domain configuration.

```
XSCF> showdcl -d 0
DID   LSB   XSB     Status
00                  Running
      00    00-0
      01    01-0
```

3. **Check the status of the system board to be deleted.**

   Execute the showboards(8) command to display system board information, and
   then check the status of the system board to be deleted.

```
XSCF> showboards -a
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
00-0  00(00)     Assigned      y     y      y     Passed   Normal
01-0  00(01)     Assigned      y     y      y     Passed   Normal
```

4. **Delete the system board.**

   Execute the deleteboard(8) command to delete the system board and pool it in
   the system board pool.

```
XSCF> deleteboard -c unassign 01-0
```

5. **Check the status of the domain and deleted system board.**

   When the deleteboard(8) command ends normally, execute the showdcl(8)
   command to check the operation status of the domain, and then execute the
   showboards(8) command to check the status of the deleted system board.

   If the deleteboard(8) command completes abnormally or leaves the board in an
   unwanted status, refer output messages to identify the problem, then correct it.

```
XSCF> showdcl -d 0
DID    LSB    XSB    Status
00                   Running
       00     00-0
       01     01-0
```

```
XSCF> showboards -a
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
00-0  00(00)     Assigned      y     y      y     Passed   Normal
01-0  SP         Available     y     n      n     Passed   Normal
```

4.4 Example: Moving a System Board

This section provides an example of an operation to move a system board between domains. In the example, a procedure conforming to Section 4.1.3, "Flow: Moving a System Board" on page 4-5, is used, and the system board shown in the figure is moved using the XSCF shell.

FIGURE 4-7 Example: Moving a System Board
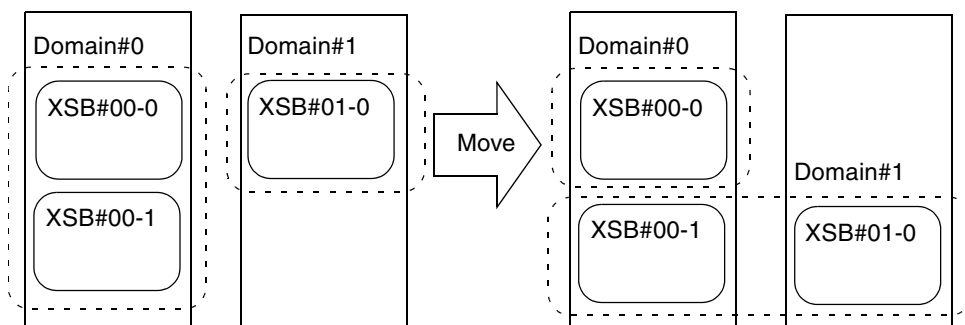
1. **Login to XSCF.**

2. **Check the status of the move-source domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the move-source domain.

```
XSCF> showdcl -d 0
DID    LSB    XSB    Status
00                   Running
       00     00-0
       01     00-1
```

3. **Check the status of the move-destination domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the move-destination domain. Based on the operation status of the move-source and move-destination domains, determine whether to perform the DR operation or change the domain configuration.

```
XSCF> showdcl -d 1
DID    LSB    XSB    Status
01                   Running
       00     01-0
       01     00-1
```

4. Check the status of the system board to be moved.

Execute the showboards(8) command to display system board information, and then check the status of the system board to be moved.

```
XSCF> showboards 00-1
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test      Fault
----  --------   -----------  ----  ----   ----   -------   ---------------
00-1  00(01)     Assigned     y     y      y      Passed    Normal
```

5. Move the system board.

Execute the moveboard(8) command to delete the system board from the move-source domain and add it to the move-destination domain.

```
XSCF> moveboard -c configure -d 1 00-1
```

6. Check the status of the move-source domain.

When the moveboard(8) command ends normally, execute the showdcl(8) command to display and check the operation status of the move-source domain.

If the moveboard(8) command completes abnormally or leaves the board in an unwanted status, refer output messages to identify the problem, then correct it.

```
XSCF> showdcl -d 0
DID   LSB   XSB    Status
00                 Running
      00    00-0
      01    00-1
```

7. Check the status of the move-destination domain and moved system board.

Execute the showdcl(8) command to check the operation status of the move-destination domain, and then execute the showboards(8) command to check the status of the moved system board.

```
XSCF> showdcl -d 1
DID   LSB   XSB    Status
01                 Running
      00    01-0
      01    00-1
```

```
XSCF> showboards 00-1
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test      Fault
----------------------------------------------------------------
00-1  01(01)     Assigned     y     y      y      Passed    Normal
```
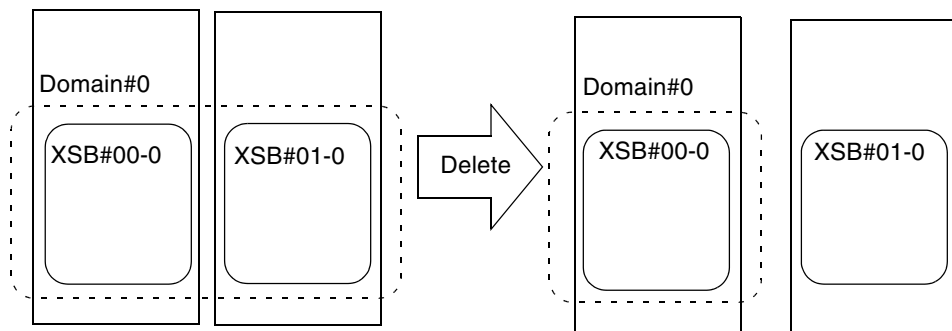
4.5 Examples: Replacing a System Board

This section provides examples of operations to replace a system board in a domain. The examples illustrate replacement of a system board in a Uni-XSB environment and a system board in a Quad-XSB environment. In each sample operation, a procedure conforming to Section 4.1.4, "Flow: Replacing a System Board" on page 4-6, is used, and the system board shown in each figure is replaced using the XSCF shell.

Note – You cannot use DR to replace a system board in a midrange server because replacing a system board replaces an MBU. To replace a system board in a midrange server, you must turn off the power for all domains, then perform a hardware replacement.

4.5.1 Example: Replacing a Uni-XSB System Board

FIGURE 4-8 Example: Replacing a Uni-XSB System Board
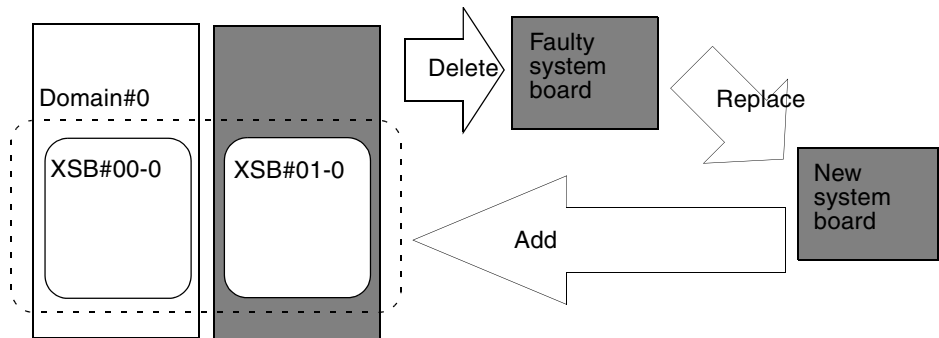
1. **Login to XSCF.**

2. Check the status of the domain.

Execute the showdcl(8) command to display domain information, and then check the operation status of the domain. Based on the operation status of the domain, determine whether to perform the DR operation or replace the system board after stopping the domain.

```
XSCF> showdcl -d 0
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    01-0
```

3. Check the status of the system board to be replaced.

Execute the showboards(8) command to display system board information, and then check the status of the system board to be deleted. The DR operation for replacement may not be possible if the board to be replaced does not support the DR delete operation.

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  00(01)     Assigned     y     y      y      Passed   Normal
```

4. Delete the system board.

Execute the deleteboard(8) command to delete the system board.

```
XSCF> deleteboard -c disconnect 01-0
```

5. Check the status of the system board.

Execute the showboards(8) command to display system board information, and then check the status of the system board.

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  00(01)     Assigned     y     n      n      Passed   Normal
```

6. Physically replace the system board.

Execute the replacefru(8) command, then follow the displayed instructions to replace the system board per the Active Replacement procedure. For information about Active Replacement, see the Service Manual for your server.

```
XSCF> replacefru
```

7. **Check the status of the replaced system board.**

   Execute the showboards(8) command to display system board information, and then check the status of all related system boards and confirm their registration in the DCL.

   If necessary to change the system board configuration (e.g., number of divisions), do so by using the setupfru(8) command. If the system board is not registered in the DCL, register it in the DCL for the target domain by using the setdcl(8) command.

```
XSCF> showboards 01-0
XSB    DID(LSB)    Assignment    Pwr    Conn    Conf    Test      Fault
----------------------------------------------------------------------
01-0   00(01)      Assigned      y      n       n       Passed    Normal
```

8. **Check the status of the domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the domain. Based on the operation status of the domain, determine whether to perform the DR operation or reboot the domains.

```
XSCF> showdcl -d 0
DID    LSB    XSB    Status
00                   Running
       00     00-0
       01     01-0
```

9. **Add the new system board to the domain.**

   Execute the addboard(8) command to add the system board to the move-destination domain.

```
XSCF> addboard -c configure -d 0 01-0
```

10. **Check the status of the domain and added system board.**

    When the addboard(8) command ends normally, execute the showdcl(8) command to check the operation status of the domain, and then execute the showboards(8) command to check the status of the added system board.

    If the addboard(8) command completes abnormally or leaves the board in an unwanted status, see the output messages to identify the problem, then correct it.

```
XSCF> showdcl -d 0
DID    LSB    XSB    Status
00                   Running
       00     00-0
       01     01-0
```

```
XSCF> showboards 01-0
XSB    DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
-----------------------------------------------------------------
01-0   00(01)     Assigned      y     y      y     Passed   Normal
```

4.5.2   Example: Replacing a Quad-XSB System Board

FIGURE 4-9   Example: Replacing a Quad-XSB System Board
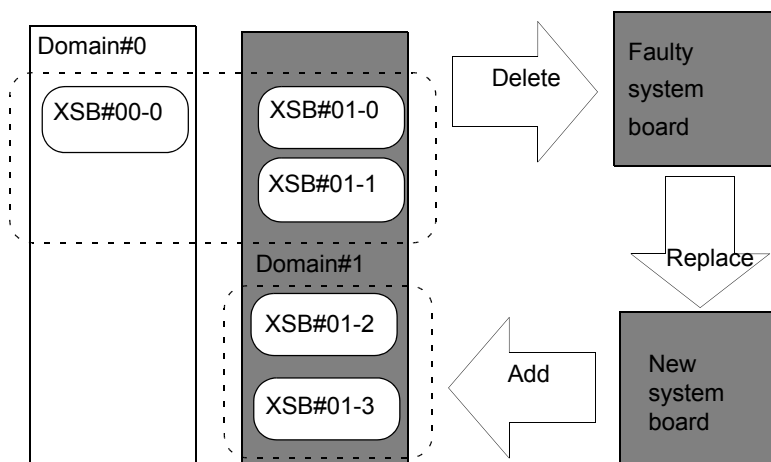
1. Login to XSCF.

2. **Check the configurations and status of all domains to which the relevant system boards belong.**

   Execute the showdcl(8) command to display domain information, and then check the configurations and operation status of all domains to which the relevant XSBs belong.

   Based on the configurations and operation status of the domains, determine whether to perform the DR operation or replace the replacement-target system board after stopping the domains. If a domain is configured by only the XSBs in the PSB to be replaced, the DR operation for replacement is disabled, and the domain must be stopped for replacement.

   In this example, domain #1 has a configuration that requires it to be stopped for system board replacement.

```
XSCF> showdcl -a
DID   LSB   XSB    Status
00                 Running
      00    00-0
      01    01-0
      02    01-1
-------
01                 Running
      00    01-2
      01    01-3
```

3. **Check the status of all related system boards.**

   Execute the showboards(8) command to display system board information, and then check the status of all system boards related to the PSB to be replaced. The DR operation for replacement may not be possible if the board to be replaced does not support the DR delete operation.

```
XSCF> showboards -a
XSB    DID(LSB)    Assignment    Pwr   Conn   Conf   Test     Fault
-----------------------------------------------------------------
00-0   00(00)      Assigned      y     y      y      Passed   Normal
01-0   00(01)      Assigned      y     y      y      Passed   Normal
01-1   00(02)      Assigned      y     y      y      Passed   Normal
01-2   01(00)      Assigned      y     y      y      Passed   Normal
01-3   01(01)      Assigned      y     y      y      Passed   Normal
```

4. **Delete all system boards related to the CMU to be replaced.**

   Execute the deleteboard(8) command to delete the system boards, and then assign the boards to a domain that permits the DR operation.

```
XSCF> deleteboard -c disconnect 01-0 01-1
```

5. **Power off Domain #1 so the CMU can be replaced.**

   Execute the poweroff(8) command so that the CMU being replaced will not be in use by domain #1.

   ```
   XSCF> poweroff -d 1
   ```

6. **Check the status of all related system boards.**

   Execute the showboards(8) command to display system board information, and then check the status of all related system boards.

   ```
   XSCF> showboards -a
   XSB    DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
   -----------------------------------------------------------------
   00-0   00(00)     Assigned     y     y      y      Passed   Normal
   01-0   00(01)     Assigned     y     n      n      Passed   Normal
   01-1   00(02)     Assigned     y     n      n      Passed   Normal
   01-2   01(00)     Assigned     y     n      n      Passed   Normal
   01-3   01(01)     Assigned     y     n      n      Passed   Normal
   ```

7. **Physically replace the system board.**

   Execute the replacefru(8) command, then follow the displayed instructions to replace the system board per the Active Replacement procedure. For information about Active Replacement, see the Service Manual for your server.

   ```
   XSCF> replacefru
   ```

8. **Check the status of the replaced system board.**

   Execute the showboards(8) command to display system board information, and then check the status of the system board to be added and confirm its registration in the DCL.

   If you need to change the PSB configuration, use the setupfru(8) command. If the system board is not registered in the DCL, register it in the DCL for the target domain by using the setdcl(8) command.

   ```
   XSCF> showboards -a
   XSB    DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
   -----------------------------------------------------------------
   00-0   00(00)     Assigned     y     y      y      Passed   Normal
   01-0   00(01)     Assigned     y     n      n      Passed   Normal
   01-1   00(02)     Assigned     y     n      n      Passed   Normal
   01-2   01(00)     Assigned     y     n      n      Passed   Normal
   01-3   01(01)     Assigned     y     n      n      Passed   Normal
   ```

9. **Check the status of all related domains.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of all related domains. Based on the operation status of the domain, determine whether to perform the DR operation or reboot the domains.

```
XSCF> showdcl -a
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    01-0
      02    01-1
-------
01                Powered Off
      00    01-2
      01    01-3
```

10. **Add the new system board to the domain.**

    Execute the addboard(8) command in the domain to add the new system board.

```
XSCF> addboard -c configure -d 0 01-0 01-1
```

11. **Check the status of the related domains and system boards.**

    Execute the showdcl(8) command to check the operation status of related domains, and then execute the showboards(8) command to check the status of related system boards.

    In this example, domain #1 is booted by power-on in this stage.

```
XSCF> poweron -d 1
```

```
XSCF> showdcl -a
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    01-0
      02    01-1
-------
01                Running
      00    01-2
      01    01-3
```

```
XSCF> showboards -a
XSB    DID(LSB)  Assignment    Pwr   Conn   Conf   Test     Fault
------------------------------------------------------------------
00-0   00(00)    Assigned      y     y      y      Passed   Normal
01-0   00(01)    Assigned      y     y      y      Passed   Normal
01-1   00(02)    Assigned      y     y      y      Passed   Normal
01-2   01(00)    Assigned      y     y      y      Passed   Normal
01-3   01(01)    Assigned      y     y      y      Passed   Normal
```

4.6 Examples: Reserving Domain Configuration Changes

This section provides examples of operations to reserve a change in domain configuration by DR. In the examples, the XSCF shell is used to reserve the addition, deletion, and movement of a system board as shown in the given configuration diagram.

4.6.1 Example: Reserving a System Board Add

FIGURE 4-10 Example: Reserve a System Board Add
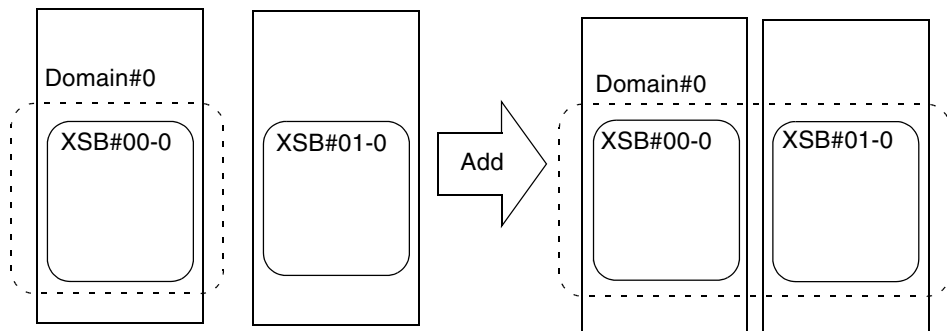
1. **Login to XSCF.**

2. **Check the status of the system board to be added.**

Execute the showboards(8) command to display system board information, and then check the status of the system board to be added and confirm its registration in the DCL.

If you need to change the PSB configuration, use the setupfru(8) command. If the system board is not registered in the DCL, register the system board in the DCL for the target domain by using the setdcl(8) command.

```
XSCF> showdcl -d 0
DID   LSB   XSB    Status
00                 Running
      00    00-0
      01    01-0
```

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  SP         Available    y     n      n      Passed   Normal
```

3. **Reserve the addition of the system board.**

Execute the addboard(8) command to reserve the addition of the system board.

```
XSCF> addboard -c reserve -d 0 01-0
```

4. **Check the status of the system board.**

When the addboard(8) command ends normally, execute the showboards(8) command to display system board information, and then check the status of the target system board and confirm that the addition of the target system board has been reserved.
If the addboard(8) command ends abnormally, identify the cause of the abnormality based on the messages output, and then take appropriate corrective action.

```
XSCF> showboards -v 01-0
XSB   R   DID(LSB)   Assignment   Pwr   Conn   Conf   Test   Fault    COD
-------------------------------------------------------------------------
01-0  *   SP         Available    y     n      n      Passed Normal   n
```

5. **Stop or reboot the domain.**

Stop or reboot the domain. This operation executes the reserved deletion of the system board as a change in domain configuration.

4.6.2 Example: Reserving a System Board Delete

FIGURE 4-11 Example: Reserving a System Board Delete

1. **Login to XSCF.**

2. **Check the status of the domain.**

   Execute the showdcl(8) command to display domain information, and then check
   the operation status of the domain. Based on the operation status of the domain,
   determine whether to perform the DR operation or change the domain
   configuration.

   ```
   XSCF> showdcl -d 0
   DID   LSB   XSB    Status
   00                 Running
         00    00-0
         01    01-0
   ```

3. **Check the status of the system board to be deleted.**

   Execute the showboards(8) command to display system board information, and
   then check the status of the system board to be deleted.

   ```
   XSCF> showboards 01-0
   XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
   ----------------------------------------------------------------
   01-0  00(01)     Assigned     y     y      y      Passed   Normal
   ```

4. **Reserve the deletion of the system board.**

   Execute the deleteboard(8) command to reserve deletion of the system board.

   ```
   XSCF> deleteboard -c reserve 01-0
   ```

5. **Check the reserved status of the system board.**

   Execute the showboards(8) command with the -v option specified to display system board information, and then confirm that deletion of the system board has been reserved.

```
XSCF> showboards -v 01-0
XSB   R   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault    COD
-----------------------------------------------------------------------------
01-0  *   00(01)     Assigned     y     y      y      Passed   Normal   n
```

6. **Stop or reboot the domain.**

   This operation changes the domain's configuration, reserving deletion of the system board.

4.6.3 Example: Reserving a System Board Move

FIGURE 4-12 Example: Reserving a System Board Move
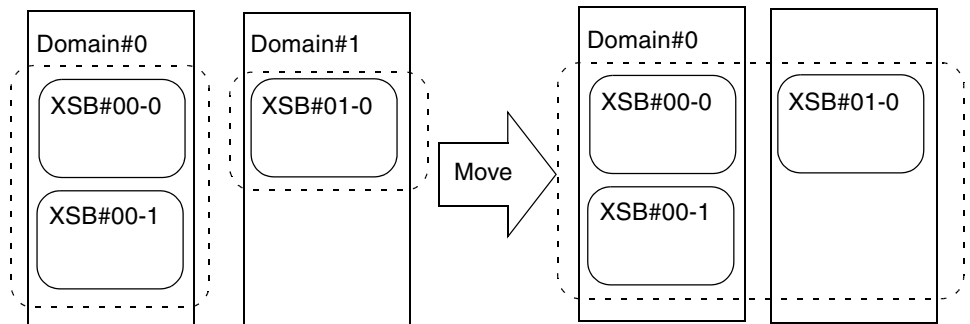
1. **Login to XSCF.**

2. **Check the status of the move-source domain.**

   Execute the showdcl(8) command to display domain information, and then check the operation status of the move-source domain.

```
XSCF> showdcl -d 1
DID   LSB   XSB   Status
01                Running
      00    01-0
```

3. **Check the status of the move-destination domain.**

Execute the showdcl(8) command to display domain information, and then check the operation status of the move-destination domain. Based on the operation status of the move-source and move-destination domains, determine whether to perform the DR operation or change the domain configuration.

```
XSCF> showdcl -d 0
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    00-1
      02    01-0
```

4. **Check the status of the system board to be moved.**

Execute the showboards(8) command to display system board information, and then check the status of the system board to be moved.

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  01(00)     Assigned     y     y      y      Passed   Normal
```

5. **Reserve the move of the system board.**

Execute the moveboard(8) command to reserve deletion of the system board from the move-source domain and addition of the system board to the move-destination domain.

```
XSCF> moveboard -c reserve -d 0 01-0
```

6. **Check the reserved status of the system board.**

Execute the showboards(8) command with the -v option specified to display system board information, and confirm that moving the system board to the move-destination domain has been reserved.

```
XSCF> showboards -v 01-0
XSB   R   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault    COD
--------------------------------------------------------------------------
01-0  *   01(00)     Assigned     y     y      y      Passed   Normal   n
```

7. **Stop the move-source domain.**

Stop the move-source domain. This operation executes the reserved deletion of the system board from the move-source domain as a change in domain configuration, and the reservation of the addition of the system board to the move-destination domain.

8. **Check the status of the move-destination domain and moved system board.**

Execute the showdcl(8) command to check the operation status of the move-destination domain, and then execute the showboards(8) command to check the status of the system board and confirm that addition of the system board has been reserved in the move-destination domain.

```
XSCF> showdcl -d 0
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    00-1
      02    01-0
```

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  00(02)     Assigned     y     n      n      Passed   Normal
```

9. **Add the system board to the move-destination domain.**

Execute the addboard(8) command to add the system board to the move-destination domain. If the move-destination domain is in stopped status, the system board will be added the next time the domain is booted.

```
XSCF> addboard -c configure -d 0 01-0
```

10. **Check the status of the move-destination domain and moved system board.**

Execute the showdcl(8) command to check the operation status of the move-destination domain, and then execute the showboards(8) command to check the status of the moved system board.

```
XSCF> showdcl -d 0
DID   LSB   XSB   Status
00                Running
      00    00-0
      01    00-1
      02    01-0
```

```
XSCF> showboards 01-0
XSB   DID(LSB)   Assignment   Pwr   Conn   Conf   Test     Fault
----------------------------------------------------------------
01-0  00(02)     Assigned     y     y      y      Passed   Normal
```

Message Meaning and Handling

This appendix explains the meaning and handling of DR-related messages.

This appendix includes these sections:

-
-

A.1 Oracle Solaris OS Messages

This section explains the console messages printed by the DR driver. The output for messages that do not have an output field is console.

A.1.1 Transition Messages

`DR: PROM detach board X`

[Explanation] Detach system board *X*.

`OS configure dr@0:SBX::cpuY`

[Explanation] Configure CPU *Y* on system board *X*.

`OS configure dr@0:SBX::memory`

[Explanation] Configure memory on system board *X*.

`OS configure dr@0:SBX::pciY`

[Explanation] Configure PCI *Y* on system board *X*.

```
OS unconfigure dr@0:SBX::cpuY
```
   [Explanation] Unconfigure CPU *Y* on system board *X*.

```
OS unconfigure dr@0:SBX::memory
```
   [Explanation] Unconfigure memory on system board *X*.

```
OS unconfigure dr@0:SBX::pciY
```
   [Explanation] Unconfigure PCI *Y* on system board *X*.

```
suspending <device name>@<device info> (aka <alias>)
```
   [Explanation] Suspending the device

```
suspending <device name>@<device info>
```
   [Explanation] Suspending the device

```
resuming <device name>@<device info> (aka <alias>)
```
   [Explanation] Resuming the device

```
resuming <device name>@<device info>
```
   [Explanation] Resuming the device

```
DR: resuming kernel daemons...
```
   [Explanation] Resuming kernel daemons

```
DR: resuming user threads...
```
   [Explanation] Resuming user threads

```
DR: suspending user threads...
```
   [Explanation] Suspending user threads

```
DR: resume COMPLETED
```
   [Explanation] DR resume operation completed

```
DR: checking devices...
```
   [Explanation] Checking if there are any DR unsafe device drivers loaded

```
DR: dr_suspend invoked with force flag
```

[Explanation] User command requests DR operation without checking for unsafe conditions

`DR: suspending drivers`

[Explanation] Suspending device drivers

`DR: in-kernel unprobe board <board>`

[Explanation] Unprobing the board.

A.1.2   PANIC Messages

`URGENT_ERROR_TRAP is detected during FMA.`

[Explanation] A fatal HW error was encountered during copy-rename.

[Remedy] Please contact customer service.

`Failed to remove CMP X LSB NN`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`drmach_copy_rename_fini: invalid op code <opcode>`

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

`Cannot locate source or target board`

[Explanation] Cannot locate source or target board during kernel migration.

[Remedy] Please contact customer service.

`Could not update device nodes`

[Explanation] Could not update device nodes during kernel migration.

[Remedy] Please contact customer service.

`Irrecoverable FMEM error <error code>`

[Explanation] Internal error during kernel migration

[Remedy] Please contact customer service.

`scf fmem request failed error code = 0x<error code>`

[Explanation] Internal error during kernel migration

[Remedy] Please contact customer service.

`scf_fmem_end() failed rv=0x<error code>`

[Explanation] Internal error during kernel migration

[Remedy] Please contact customer service.

`CPU nn hang during Copy Rename`

[Explanation] A fatal HW error was encountered during copy-rename.

[Remedy] Please contact customer service.

A.1.3　Warning Messages

`# megabytes not available to kernel cage`

[Explanation] Lack of memory resource deleted.

[Remedy] Detach the board, then attach it again.

`IKP: init failed`

[Explanation] The initial device tree walk to locate the nodes that are interesting to IKP fails.

[Remedy] Please contact customer service.

`dr#: failed to alloc soft-state`

[Explanation] Failed to allocate soft-state due to lack of the memory resource

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr#: module not yet attached`

[Explanation] Failed to attach the DR driver.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_add_memory_spans: unexpected kphysm_add_memory_dynamic return value X; basepfn=Y, npages=Z`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_cancel_cpu: failed to disable interrupts on cpu X
```

[Explanation] Failed to disable interrupt on CPU *X*.

[Remedy] Disable interrupt on cpu *X* with `psradm -I` and if this command fails again, respond in the manner directed by command message.

```
dr_cancel_cpu: failed to online cpu X
```

[Explanation] Failed to online CPU *X*.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

```
dr_cancel_cpu: failed to power-on cpu X
```

[Explanation] Failed to power-on cpu *X*

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

```
dr_copyin_iocmd: (32bit) failed to copyin sbdcmd-struct
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_copyin_iocmd: failed to copyin options
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_copyin_iocmd: failed to copyin sbdcmd-struct
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_copyout_errs: (32bit) failed to copyout
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_copyout_errs: failed to copyout
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_copyout_iocmd: (32bit) failed to copyout sbdcmd-struct
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_copyout_iocmd: failed to copyout sbdcmd-struct`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_status: failed to copyout status for board #`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_status: unknown dev type (#)`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_dev2devset: invalid cpu unit# = #`

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_dev2devset: invalid io unit# = #`

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_dev2devset: invalid mem unit# = #`

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_exec_op: unknown command (#)`

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_post_attach_cpu: cpu_get failed for cpu` *X*

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_pre_release_cpu: thread(s) bound to cpu X`

[Explanation] The thread in the process is bound to the detached CPU X.

[Remedy] Check if the process bound to the CPU exists by `pbind`(1M) command. If it exists, unbind from the CPU and repeat the action.

`dr_pre_release_mem: unexpected kphysm_del_release return value #`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_pt_ioctl: invalid passthru args`

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

`dr_release_mem: unexpected kphysm error code #, id 0xX`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_release_mem_done: mem-unit (X.Y): deleted memory still found in phys_install`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_release_mem_done: target: mem-unit (X.Y): deleted memory still found in phys_install`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

`dr_release_mem_done: unexpected kphysm_del_release return value #`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_reserve_mem_spans memory reserve failed. Unexpected
kphysm_del_span return value #; basepfn=# npages=#
```

[Explanation] The selected target board can no longer fit all the kernel memory of the source board since it was last selected.

[Remedy] Please repeat the action. If the problem remains, please contact customer service.

```
dr_release_mem_done: <device path>: error <error code> noted
```

[Explanation] Error noted for a device during releasing memory.

[Remedy] Please contact customer service.

```
drmach_log_sysevent failed (rv #) for SBX
```

[Explanation] There may be minor error in the system.

[Remedy] Please contact customer service.

```
unexpected kcage_range_add return value #
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
unexpected kcage_range_delete return value #
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_select_mem_target: no memlist for mem-unit X, board Y
```

[Explanation] Detected inconsistency of the memory unit information in the DR driver's internal data.

[Remedy] Please contact customer service.

```
FAILED to suspend <device name>@<device info>
```

[Explanation] Device suspension failed

[Remedy] Repeat the action. If the message persists, please contact customer service.

```
FAILED to resume <device name>@<device info>
```

[Explanation] The device cannot be resumed.

[Remedy] Please contact customer service.

```
dr_stop_user_threads: failed to stop thread: process=<name>,
pid=#
```

[Explanation] Cannot stop the user thread.

[Remedy] Please contact customer service.

```
Cannot stop user thread: <pid> <pid> ...
```

[Explanation] The DR driver cannot stop all the user processes in the list.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

```
Cannot setup memory node
```

[Explanation] DR is unable to read the HW information for the memory device.

[Remedy] Please contact customer service.

```
Kernel Migration fails. 0xX
```

[Explanation] Kernel data migration failed as a result of DR detach.

[Remedy] Please contact customer service.

```
TOD on board X has already been attached.
```

[Explanation] Time of Date Clock on board *X* has been attached. This may be a minor inconsistency in the system.

[Remedy] Please contact customer service.

```
TOD on board X has already been removed.
```

[Explanation] Time of Date Clock on board X has been removed. This may be a minor inconsistency in the system.

[Remedy] Please contact customer service.

```
Unable to detach last available TOD on board X
```

[Explanation] Detaching the system board will result in detaching the last available Time of Date clock.

[Remedy] Attach another system board before detaching.

```
Device in fatal state
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

```
I/O error: dr@0:SBX::memory
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

```
Invalid argument
```

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

```
Invalid argument: ########
```

[Explanation] Invalid argument is passed to the driver.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

```
Invalid CPU/core state
```

[Explanation] DR finds some faulty CPU that fails to power on.

[Remedy] Please contact customer service.

```
No error
```

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

```
no error: dr@0:SBX::memory
```

[Explanation] There may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

```
Unrecognized platform command: #
```

[Explanation] Invalid argument is passed to the driver or there may be inconsistency in the system.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Bad address: dr@0:SB`*`X`*`::memory`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Cannot read property value: device node XXXXXX property: name`

[Explanation] Fail to get the property from OBP.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Cannot read property value: property: scf-cmd-reg`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Cannot find mc-opl interface`

[Explanation] DR cannot locate mc-opl driver's suspend/resume interface. mc-opl is probably not loaded or incorrect version is used.

[Remedy] Please contact customer service.

`Cannot find scf_fmem interface`

[Explanation] DR cannot locate SCF driver's FMEM interface functions. SCF is probably not loaded or incorrect version is used.

[Remedy] Please contact customer service.

`Device busy: dr@0:SB`*`X`*`::pci`*`Y`*

[Explanation] Some devices are still referenced.

[Remedy] Confirm that all devices in this pci slot are not in use and repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Device driver failure: path`

[Explanation] The device driver failed in attach or detach operation.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Error setting up FMEM buffer`

[Explanation] DR fails to allocate enough memory to perform copy rename.

[Remedy] Retry and if the problem persists, contact customer service.

`Failed to off-line: dr@0:SBX::cpuY`

[Explanation] Failed to off-line CPU *Y* on board *X*.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Failed to on-line: dr@0:SBX::cpuY`

[Explanation] Failed to online CPU *Y* on system board *X*.

[Remedy] Online CPU with `psradm -n`. If it fails to online CPU, and if this command fails again, respond in the manner directed by command message.

[Output] Console and Standard Output

`Failed to start CPU: dr@0:SBX::cpuY`

[Explanation] Failed to start CPU *Y* on system board *X*.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Failed to stop CPU: dr@0:SBX::cpuY`

[Explanation] Failed to stop CPU *Y* on system board *X*.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Firmware deprobe failed: SBX::cpuY`

[Explanation] Failed to deprobe the CPU.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Firmware probe failed: SBX`

[Explanation] Failed to probe the board.

[Remedy] Respond in the manner directed by the other message.

[Output] Console and Standard Output

`Insufficient memory: dr@0:SBX::memory`

[Explanation] Detected lack of memory resource.

[Remedy] Check the size of memory, detach the board and attach again. If the problem still exists, please contact customer service.

[Output] Console and Standard Output

`Internal error: dr.c #`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Internal error: dr_mem.c #`

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Invalid argument: dr@0:SBX::memory`

[Explanation] The memory board X is currently involved in other DR operation and cannot be detached.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Invalid board number: X`

[Explanation] Invalid board number.

[Remedy] Check the board number and repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Kernel cage is disabled:`

[Explanation] The kernel cage memory feature is disabled.

[Remedy] Ensure `/etc/system` is edited to enable kernel cage memory.

[Output] Console and Standard Output

```
Memory operation failed: dr@0:SBX::memory
```
  [Explanation] There may be inconsistency in the system.

  [Remedy] Please contact customer service.

  [Output] Console and Standard Output

```
Memory operation refused: dr@0:SBX::memory
```
  [Explanation] The DR operation is refused.

  [Remedy] Respond in the manner directed by the other message.

```
Memory operation cancelled: dr@0:SBX::memory
```
  [Explanation] The DR operation is canceled.

  [Remedy] Respond in the manner directed by the other message.

```
No device(s) on board: dr@0:SBX
```
  [Explanation] There may be inconsistency in the system.

  [Remedy] Please contact customer service.

  [Output] Console and Standard Output

```
Non-relocatable pages in span: dr@0:SBX::memory
```
  [Explanation] There is non-relocatable (kernel) memory on the system board.

  [Remedy] The target board with kernel memory cannot be disconnected by DR. It depends on your server if you can remove a kernel memory board or not.

```
Operator confirmation for quiesce is required: dr@0:SBX::memory
```
  [Explanation] There is non-relocatable (kernel) memory on the board.

  [Remedy] The target board with kernel memory cannot be disconnected by DR.

  [Output] Console and Standard Output

  Unexpected internal condition: drmach.c #

  [Explanation] There may be inconsistency in the system.

  [Remedy] Please contact customer service.

  [Output] Console and Standard Output

```
Unexpected internal condition: SBX
```
  [Explanation] The attempt to call OBP failed.

  [Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Device busy: dr@0:SB`*`X`*`::cpu`*`Y`*

[Explanation] CPU *Y* on system board *X* is busy during release operation.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Insufficient memory: dr@0:SB`*`X`*`::cpu`*`Y`*

[Explanation] Lack of memory resources detected.

[Remedy] Check the size of available memory and detach the board. If the problem still exists, please contact customer service.

[Output] Console and Standard Output

`Invalid argument: dr@0:SB`*`X`*`::cpu`*`Y`*

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Invalid state transition: dr@0:SBX::cpuY`

[Explanation] Invalid state transition of cpu *Y* on system board *X*

[Remedy] Repeat the action. If the problem still exists, please contact customer service.

[Output] Console and Standard Output

`Invalid state transition: dr@0:SB`*`X`*`::memory`

[Explanation] Invalid state transition of memory on system board *X*

[Remedy] Repeat the action. If the problem still exists, please contact   customer service.

[Output] Console and Standard Output

`Invalid state transition: dr@0:SB`*`X`*`::pci`*`Y`*

[Explanation] Invalid state transition of pci *Y* on system board *X*

[Remedy] Repeat the action. If the problem still exists, please contact customer service.

[Output] Console and Standard Output

`No such device: dr@0:SB`*`X`*`::cpu`*`Y`*

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Operation already in progress: dr@0:SB`*`X`*`::cpu`*`Y`*

[Explanation] The operation on cpu *Y* on system board *X* is in progress.

[Remedy] Repeat the action. If the problem still exists, please contact customer service.

[Output] Console and Standard Output

`dr_move_memory: failed to quiesce OS for copy-rename`

[Explanation] There is a task not suspended in the process.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`No available memory target: dr@0:SB`*`X`*`::memory`

[Explanation] The system board cannot be detached because it contains kernel memory and there is no available target memory board.

[Remedy] Add new system board and then try the detach operation again.

[Output] Console and Standard Output

`Unsafe driver present: <driver name|major #> ...`

[Explanation] DR driver found DR unsafe drivers in the system.

[Remedy] Unload the unsafe drivers and try the DR operation again.

[Output] Console and Standard Output

`Device failed to resume: <driver name|major #> ...`

[Explanation] Devices on the list failed to resume

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Device failed to suspend: <driver name|major #> ...`

[Explanation] Devices on the list failed to suspend

[Remedy] Please contact customer service.

[Output] Console and Standard Output

`Operation not supported: ERROR`

[Explanation] Invalid operation.

[Remedy] Repeat the action. If this error message appears again, please contact customer service.

[Output] Console and Standard Output

`Cannot setup resource map opl-fcodemem`

[Explanation] Resource memory mapping cannot be set up.

[Remedy] Please contact customer service.

`opl_cfg failed to load, error=<errno>`

[Explanation] opl_cfg module failed to load.

[Remedy] Please contact customer service.

`IKP: failed to read HWD header`

[Explanation] The header of the hardware descriptor could not be read.

[Remedy] Please contact customer service.

`IKP: create cpu (<board>-<chip>-<core>-<cpu>) failed`

[Explanation] There was a problem creating the device node for a cpu.

[Remedy] Please contact customer service.

`IKP: create core (<board>-<chip>-<core>) failed`

[Explanation] There was a problem creating the device node for a core.

[Remedy] Please contact customer service.

`IKP: create chip (<board>-<chip>) failed`

[Explanation] There was a problem creating the device node for a chip.

[Remedy] Please contact customer service.

`IKP: create pseudo-mc (<board>) failed`

[Explanation] There was a problem creating the pseudo-mc device node for the board.

[Remedy] Please contact customer service.

```
opl_claim_memory - unable to allocate contiguous memory of size
zero
```
[Explanation] A claim request with size zero was issued by the fcode interpreter.

[Remedy] If DR failed after this message, please contact customer service.

```
opl_claim_memory - vhint is not zero vhint=0x<vhint> - Ignoring
Argument
```
[Explanation] A claim request with a nonzero hint came from the fcode interpreter.

[Remedy] If DR failed after this message, please contact customer service.

```
opl_claim_memory - unable to allocate contiguous memory
```
[Explanation] Memory allocation failed for the fcode interpreter.

[Remedy] If DR failed after this message, please contact customer service.

```
opl_get_fcode: Unable to copy out fcode image
```
[Explanation] Failed to copy out the fcode image to the efcode daemon.

[Remedy] If DR failed after this message, please contact customer service.

```
opl_get_hwd_va: Unable to copy out cmuch descriptor for <addr>
```
[Explanation] Failed to copy out the cmuch HWD to the efcode daemon.

[Remedy] If DR failed after this message, please contact customer service.

```
opl_get_hwd_va: Unable to copy out pcich descriptor for <addr>
```
[Explanation] Failed to copy out the pcich HWD to the efcode daemon.

[Remedy] If DR failed after this message, please contact customer service.

```
IKP: create leaf (<board>-<channel>-<leaf>) failed
```
[Explanation] A device node was not created for a PCI device.

[Remedy] If DR failed after this message, please contact customer service.

```
IKP: Unable to probe PCI leaf (<board>-<channel>-<leaf>)
```
[Explanation] The fcode interpreter returned a bad status for the probe.

[Remedy] If DR failed after this message, please contact customer service.

```
IKP: Unable to bind PCI leaf (<board>-<channel>-<leaf>)
```
[Explanation] The driver binding fails, after the leaf has been probed.

[Remedy] If DR failed after this message, please contact customer service.

```
IKP: destroy pci (<board>-<channel>-<leaf>) failed
```

[Explanation] The node was not destroyed.

[Remedy] Please contact customer service.

```
IKP: destroy pseudo-mc (<board>) failed
```

[Explanation] The node was not destroyed.

[Remedy] Please contact customer service.

```
IKP: destroy chip (<board>-<chip>) failed
```

[Explanation] The node was not destroyed.

[Remedy] Please contact customer service.

```
dr_del_mlist_query: mlist=NULL
```

[Explanation] The memory list to be deleted is NULL. This warning is also shown at memoryless board.

[Remedy] Please ignore this message on memoryless boards. If DR failed after this message, please contact customer service.

```
dr_memlist_canfit: memlist_dup failed
```

[Explanation] System might have run out of memory. Or there is a memoryless board.

[Remedy] Please ignore this message on memoryless boards. If DR failed after this message, please check if the system has enough memory resource and repeat the action. If the error remains, please contact customer service.

```
Cannot get floating-boards proplen
```

[Explanation] Failed to get property information of floating-boards.

[Remedy] Please contact customer service.

```
Cannot get floating-boards prop
```

[Explanation] Failed to get property information of floating-boards.

[Remedy] Please contact customer service.

```
Device node 0x<dip> has invalid property value, board#=<board>
```

[Explanation] The device node has invalid property value.

[Remedy] Please contact customer service.

```
DR - IKP initialization failed
```

[Explanation] IKP initialization failed

[Remedy] Please contact customer service.

`I/O callback failed in pre-release`

[Explanation] I/O callback failed in pre-release

[Remedy] Please contact customer service.

`I/O callback failed in post-attach`

[Explanation] I/O callback failed in post-attach

[Remedy] Please contact customer service.

`Kernel Migration fails. 0x%x`

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

`Failed to add CMP%d on board %d`

[Explanation] CPU failed to power-on during DR attach.

[Remedy] Please contact customer service.

`FMEM error = 0x<error code>`

[Explanation] DR detects error during the copy rename operation.

[Remedy] Please contact customer service.

`Cannot proceed; Board is configured or busy`

[Explanation] Board cannot be disconnected because its status is busy.

[Remedy] Repeat the action; If the problem still exists, please contact customer service.

`drmach parameter is not a valid ID`

[Explanation] ID parameter for status command is not a valid ID.

[Remedy] Correct the format of the ID parameter.

`drmach parameter is inappropriate for operation`

[Explanation] Parameter(s) for DR command specified incorrectly.

[Remedy] Correct the parameter(s).

`drmach_node_ddi_get_parent: NULL dip`

[Explanation] Internal error during DR operation.

[Remedy] Please contact customer service.

```
drmach_node_ddi_get_parent: NULL parent dip
```

[Explanation] Internal error during DR operation.

[Remedy] Please contact customer service.

```
Failed to remove CMP xx on board n
```

[Explanation] Internal error during DR operation.

[Remedy] Please contact customer service.

```
scf_fmem_cancel() failed rv=0x<error code>
```

[Explanation] Internal error during kernel migration.

[Remedy] Please contact customer service.

```
scf_fmem_start error
```

[Explanation] SCF fails to start the FMEM operation. It is possible that there is HW error and there is no SCF path or the SP is down.

[Remedy] Please contact customer service.

```
scf_fmem_cancel error
```

[Explanation] DR detects some error in the copy rename process and informs SCF to cancel the operation. However, SCF fails to cancel the operation.

[Remedy] Please contact customer service.

```
Unknown cpu implementation
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
dr_mem_ecache_scrub:address (0x%lx) not on page boundary
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
unexpected kcage_range_delete_post_mem_del return value
```

[Explanation] There may be inconsistency in the system.

[Remedy] Please contact customer service.

```
opl_fc_ops_free_handle: DMA seen!
```

[Explanation] A DMA resource was found in the resource list that is being freed while the board is unprobed.

[Remedy] Please contact customer service.

```
opl_fc_ops_free: unknown resource type <type>
```

[Explanation] An unknown resource type was found in the resource list that is being freed while the board is unprobed.

[Remedy] Please contact customer service.

```
VM viability test failed: dr@0:SBX::memory
```

[Explanation] There is not enough real memory to detach memory on system board X.

[Remedy] Check the amount of available real memory, and repeat the action.If this error message appears again, please contact our customer service.

```
DR parallel copy timeout
```

[Explanation] Internal error happened during kernel migration.

[Remedy] Retry and if the problem persists, contact customer service.

```
SCF busy
```

[Explanation] SCF was busy during kernel migration.

[Remedy] Retry and if the problem persists, contact customer service.

```
SCF I/O Retry Error
```

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

```
FMEM command timeout
```

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

```
Hardware error
```

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

```
FMEM operation terminated
```

[Explanation] Internal error happened during kernel migration.

[Remedy] Please contact customer service.

`Memory copy error`

[Explanation] Memory copy error happened during kernel migration.

[Remedy] Retry and if the problem persists, contact customer service.

```
SCF error
```

　　[Explanation] Internal error happened during kernel migration.

　　[Remedy] Please contact customer service.

```
Cannot add SPARC64-VI to domain booted with all SPARC64-VII CPUs
```

　　[Explanation] System board with SPARC64-VI cannot be added into a domain
　　booted with all SPARC64-VII CPUs when the domain's CPU mode is set as 'auto'
　　via XSCF.

　　[Remedy] The system board that failed to be added is 'assigned' to the target
　　domain. Please delete the system board to restore the status as 'available'.

```
SCF OFFLINE
```

　　[Explanation] XSCF failure or failover occurred during kernel migration.

　　[Remedy] Log in to XSCF again to check the status, and repeat the action.

A.2　Command Messages

A.2.1　addboard

```
XSB#XX-X will be assigned to DomainID X. Continue? [y|n]:
```

　　[Explanation] Confirming whether DR operation is going to be executed or not.
　　Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be configured into DomainID X. Continue? [y|n]:
```

　　[Explanation] Confirming whether DR operation is going to be executed or not.
　　Input "y" to execute it and "n" to stop it.

```
DR operation canceled by operator.
```

　　[Explanation] DR operation canceled by operator.

```
Domain (DomainID X) is not currently running.
```

　　[Explanation] Destination domain #0 was not active when "-c configure" was
　　specified.

　　[Remedy] Execute it by specifying "-c assign".

```
XSB#XX-X is already assigned to another domain.
```

   [Explanation] The specified system board (XSB#XX-X) has already been assigned
   to another domain.

   [Remedy] XSB has already been assigned to another domain. Confirm the XSB by
   `showboards(8)`.

```
XSB#XX-X is not installed.
```

   [Explanation] System board (XSB#XX-X) is not installed.

   [Remedy] Specify the wrong XSB. Confirm the XSB by `showboards(8)`.

```
XSB#XX-X is currently unavailable for DR. Try again later.
```

   [Explanation] The specified system board (XSB#XX-X) has already been executed
   by another operation.

   [Remedy] DR or power-off has been executing for another session. Try again after
   waiting for a while, with the confirmation of the XSB status.

```
XSB#XX-X has not been registered in DCL.
```

   [Explanation] System board (XSB#XX-X) is not registered to DCL.

   [Remedy] Register DCL information by `setdcl(8)`.

```
Another DR operation is in progress. Try again later.
```

   [Explanation] The specified system board (XSB#XX-X) has already been executed
   by another session.

   [Remedy] DR operation is in progress by another session. Try again after waiting
   for a while, with the confirmation of the XSB status.

```
XSB#XX-X has been detected timeout by DR self test.
```

   [Explanation] The timeout occurred during DR processing because the hardware
   diagnosis did not complete. There is something wrong with the hardware.

   [Remedy] Find out the cause of the DR failure referring monitoring message and
   errorlog. Replace the failure component.

```
XSB#XX-X encountered a hardware error. See error log for
details.
```

   [Explanation] An error occurred during hardware diagnosis. There is something
   wrong with the hardware.

   [Remedy] Find out the cause of the DR failure referring monitoring message and
   errorlog. Replace the failure component.

```
IP address of DSCP path is not specified.
```

[Explanation] DR cannot communicate with the domain because the DSCP IP Address is not set up or registered.

[Remedy] Register the DSCP IP Address.

```
An internal error has occurred. This may have been caused by a
DR library error.
```

[Explanation] The DR processing cannot be failed on the domain OS. The error occurred at the DR library.

[Remedy] Find out the cause of the DR failure referring monitoring message and errorlog. Confirm the patch applying status and the XCP version

```
DR failed. Domain (DomainID X) cannot communicate via DSCP path.
```

[Explanation] DR processing cannot communicate with the domain. The reasons are that domain is powered off, the DSCP setting is wrong or the error occurs at the DSCP path.

[Remedy] Confirm the domain powered off, DSCP setting, DSCP error with monitoring message and errorlog.

```
XSB#XX-X could not be configured into DomainID X due to
operating system error.
```

[Explanation] An error occurred from DR library of domain OS at DR process. The error occurred at configuration management of domain OS.

[Remedy] Find out the cause of the DR failure referring monitoring message and console message. Try again after taking out cause.

```
Invalid parameter.
```

[Explanation] There is an error in the specified argument or operand.

[Remedy] Confirm the specified argument or operand and execute the command once again.

```
Permission denied.
```

[Explanation] Do not have privilege.

[Remedy] Confirm the user privilege and the command privilege. In the case of high-end servers, please also confirm whether command is executed by XSCF on standby side.

```
The current configuration does not support this operation.
```

[Explanation] Cannot execute the command in the current configuration, or it is not supported.

[Remedy] Confirm the current hardware configuration and support status.

```
A hardware error occurred. Please check the error log for
details.
```

[Explanation] Hardware error occurred. Please confirm monitoring message and the error log.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Replace the failure component.

```
An internal error has occurred. Please contact your system
administrator.
```

[Explanation] DR failed. There is a possibility that DR failed because of an internal error in XSCF.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Please also confirm the XCP version.

```
Timeout detected during self-test of XSB#XX-X.
```

[Explanation] Because the hardware diagnosis in DR did not complete, a timeout occurred. There is a possibility that a hardware error occurred.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Replace the failure component.

A.2.2   deleteboard

```
XSB#XX-X will be unassigned from domain immediately. Continue?
[y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be unconfigured from domain immediately. Continue?
[y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be unassigned from domain after the domain
restarts. Continue? [y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
DR operation canceled by operator.
```

[Explanation] DR operation canceled by operator

```
XSB#XX-X is not installed.
```

[Explanation] System board (XSB#XX-X) is not installed.

[Remedy] Specify the wrong XSB. Confirm the XSB by showboards(8).

```
XSB#XX-X is currently unavailable for DR. Try again later.
```

[Explanation] The specified system board (XSB#XX-X) has already been executed by another operation.

[Remedy] DR or power-off has been executing for another session. Try again after waiting for a while, with the confirmation of the XSB status.

```
XSB#XX-X has not been registered to DCL.
```

[Explanation] System board (XSB#XX-X) is not registered to DCL.

[Remedy] Register DCL information by setdcl(8).

```
XSB#XX-X is the last LSB for DomainID X, and this domain is
still running. Operation failed.
```

[Explanation] XSB#XX-X is the last LSB for domain#X.

[Remedy] Power-off the domain by specifying "-c reserve".

```
IP address of DSCP path is not specified.
```

[Explanation] DR cannot communicate with the domain because DSCP IP Address is not set up or not registered.

[Remedy] Register the DSCP IP Address.

```
An internal error has occurred. This may have been caused by a
DR library error.
```

[Explanation] The DR processing cannot be failed on the domain OS. The error occurred at the DR library.

[Remedy] Find out the cause of the DR failure referring monitoring message and errorlog. Confirm the patch applying status and the XCP version.

```
DR failed. Domain (DomainID X) cannot communicate via DSCP path.
```

[Explanation] DR processing cannot communicate with the domain. The reasons are that domain is powered off, the DSCP setting is wrong or the error occurs at the DSCP path.

[Remedy] Confirm the domain powered off, DSCP setting, DSCP error with monitoring message and errorlog.

```
XSB#XX-X could not be unconfigured from DomainID X due to
operating system error.
```

[Explanation] An error occurred from DR library of domain OS at DR process. The error occurred at configuration management of domain OS.

[Remedy] Find out the cause of the DR failure referring monitoring message and console message. Try again after taking out cause.

```
Invalid parameter.
```

[Explanation] There is an error in the specified argument or operand.

[Remedy] Confirm the specified argument or operand and execute the command once again.

```
Permission denied.
```

[Explanation] Do not have privilege.

[Remedy] Confirm the user privilege and the command privilege. In the case of high-end servers, please also confirm whether command is executed by XSCF on standby side.

```
A hardware error occurred. Please check the error log for
details.
```

[Explanation] Hardware error occurred. Please confirm monitoring message and the error log.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Replace the failure component.

```
An internal error has occurred. Please contact your system
administrator.
```

[Explanation] DR failed. There is a possibility that DR failed because of an internal error in XSCF.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Please also confirm the XCP version.

A.2.3   moveboard

```
XSB#XX-X will be moved from DomainID X to DomainID X
immediately. Continue? [y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be assigned to DomainID X immediately. Continue?
[y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be assigned to DomainID X after DomainID X
restarts. Continue? [y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
DR operation canceled by operator.
```

[Explanation] DR operation canceled by operator.

```
Domain (DomainID X) is not currently running.
```

[Explanation] Destination domain #X was not active when "-c configure" was specified.

[Remedy] Execute it by specifying "-c assign".

```
XSB#XX-X cannot be moved due to System Board Pool.
```

[Explanation] The XSB in the system board pool cannot be moved.

[Remedy] Executing addboard command.

```
XSB#XX-X is not installed.
```

[Explanation] System board (XSB#XX-X) is not installed.

[Remedy] Specify the wrong XSB. Confirm the XSB by showboards(8).

```
XSB#XX-X is currently unavailable for DR. Try again later.
```

[Explanation] The specified system board (XSB#XX-X) has already been executed by another operation.

[Remedy] DR or power-off has been executing for another session. Try again after waiting for a while, with the confirmation of the XSB status.

```
XSB#XX-X has not been registered in DCL.
```

[Explanation] System board (XSB#XX-X) is not registered to DCL.

[Remedy] Register DCL information by setdcl(8).

```
Another DR operation is in progress. Try again later.
```

[Explanation] The specified system board (XSB#XX-X) has already been executed by another session.

[Remedy] DR operation is in progress by another session. Try again after waiting for a while, with the confirmation of the XSB status.

```
XSB#XX-X is the last LSB for DomainID X, and this domain is
still running. Operation failed.
```

[Explanation] XSB#XX-X is the last LSB for domain#X.

[Remedy] Power off the domain by specifying "-c reserve".

```
XSB#XX-X detected timeout by DR self test.
```

[Explanation] The timeout occurred during DR processing because the hardware diagnosis did not complete. There is something wrong with the hardware.

[Remedy] Find out the cause of the DR failure referring monitoring message and errorlog. Replace the failure component.

```
XSB#XX encountered a hardware error. See error log for details.
```

[Explanation] An error occurred during hardware diagnosis. There is something wrong with the hardware.

[Remedy] Find out the cause of the DR failure referring monitoring message and errorlog. Replace the failure component.

```
IP address of DSCP path is not specified.
```

[Explanation] The DR processing cannot communicate the domain because DSCP IP Address is not set up.

[Remedy] Register the DSCP IP Address.

```
An internal error has occurred. This may have been caused by a
DR library error.
```

[Explanation] The DR processing cannot be failed on the domain OS. The error occurred at the DR library.

[Remedy] Find out the cause of the DR failure referring monitoring message and errorlog. Confirm the patch applying status and the XCP version.

```
DR failed. Domain (DomainID X) cannot communicate via DSCP path.
```

[Explanation] DR processing cannot communicate with the domain. The reasons are that domain is powered off, the DSCP setting is wrong or the error occurs at the DSCP path.

[Remedy] Confirm the domain powered off, DSCP setting, DSCP error with monitoring message and errorlog.

```
XSB#03-0 could not be unconfigured from DomainID 1 due to
operating system error, or XSB#03-0 could not be configured into
DomainID 0 due to operating system error.
```

[Explanation] An error occurred in DR library of domain OS at DR process. The error occurred at configuration management of domain OS.

[Remedy] Find out the cause of the DR failure referring monitoring message and console message. Try again after taking out cause.

```
Invalid parameter.
```

[Explanation] There is an error in the specified argument or operand.

[Remedy] Confirm the specified argument or operand and execute the command once again.

```
Permission denied.
```

[Explanation] Do not have privilege.

[Remedy] Confirm the user privilege and the command privilege. In the case of high-end servers, please also confirm whether command is executed by XSCF on standby side.

```
The current configuration does not support this operation.
```

[Explanation] Cannot execute the command in the current configuration, or it is not supported.

[Remedy] Confirm the current hardware configuration and support status.

```
A hardware error occurred. Please check the error log for
details.
```

[Explanation] Hardware error occurred. Please confirm monitoring message and the error log.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Replace the failure component.

```
An internal error has occurred. Please contact your system
administrator.
```

[Explanation] DR failed. There is a possibility that DR failed because of an internal error in XSCF.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Please also confirm the XCP version.

```
Timeout detected during self-test of XSB#XX-X.
```

[Explanation] Because the hardware diagnosis in DR did not complete, a timeout occurred. There is a possibility that a hardware error occurred.

[Remedy] Find out the cause of the DR failure referring to the monitoring message and error log. Replace the failed component.

```
XSB#XX-X will be assigned to DomainID X. Continue? [y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X will be configured into DomainID X. Continue? [y|n]:
```

[Explanation] Confirming whether DR operation is going to be executed or not. Input "y" to execute it and "n" to stop it.

```
XSB#XX-X could not be configured into DomainID X due to
operating system error.
```

[Explanation] An error occurred in DR library of domain OS at configuration process. The error occurred at configuration management of domain OS.

[Remedy] Find out the cause of the DR failure referring monitoring message and console message. Try again after resolving cause.

A.2.4   setdcl

```
XSB is already assigned to an LSB in a running Domain (DomainID
X).
```

[Explanation] The system board of the specified LSB has already been registered in DCL.

[Remedy] Power off the domain, or move XSB to the system board pool. Try again.

```
LSB#00 is already registered in DCL.
```

[Explanation] The system board of the specified LSB has already been registered in DCL.

[Remedy] Confirm the domain, LSB and XSB. Setup data correctly.

```
LSB#00 has not been registered in DCL yet.
```

[Explanation] The domain and LSB weren't set up, when the DCL of no-mem, no-io and floating-board was changed.

[Remedy] Set up the domain and LSB. Try again.

```
DomainID X does not exist.
```

[Explanation] No LSB was set up on the domain, when the DCL of configuration-policy was changed.

[Remedy] Set up the domain and LSB. Try again.

```
Invalid parameter.
```

[Explanation] There is an error in the specified argument or operand.

[Remedy] Confirm the specified argument or operand and execute the command once again.

```
Permission denied.
```

[Explanation] Do not have privilege.

[Remedy] Confirm the user privilege and the command privilege. In the case of high-end servers, please also confirm whether command is executed by XSCF on standby side.

```
An internal error has occurred. Please contact your system
administrator.
```

[Explanation] DR failed. There is a possibility that DR failed because of an internal error in XSCF.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Please also confirm the XCP version.

A.2.5   setupfru

```
SB#XX is currently in use.
```

[Explanation] Because the system board of the PSB is running on the domain or is assigned, PSB configuration cannot be changed.

[Remedy] Please confirm whether the system board of the PSB is assigned to the domain or not, and release the system board if it is in the assigned status.

```
SB#XX is not installed.
```

[Explanation] Because PSB is not installed, it could not be set.

[Remedy] Please execute it again after confirming installation of the hardware.

```
Operation has completed. However, a configuration error was
detected.
```

[Explanation] Although configuration of PSB is changed, configuration error is occurring on the system board created. Confirm the CPU module and DIMM slot on the specified PSB and status of Memory Mirror Mode.

[Remedy] Confirm the CPU module and DIMM slot on the PSB board and status of Memory Mirror Mode.

```
The specified parameter is not supported in this model.
```

[Explanation] Unsupported parameter in this server is specified. For this reason, the command was canceled.

[Remedy] Confirm the specified parameter and your server, and execute the command once again.

```
Invalid parameter.
```

[Explanation] There is an error in the specified argument or operand.

[Remedy] Confirm the specified argument or operand and execute the command once again.

```
Permission denied.
```

[Explanation] Do not have privilege.

[Remedy] Confirm the user privilege and the command privilege. In the case of high-end servers, please also confirm whether command is executed by XSCF on standby side.

```
The current configuration does not support this operation.
```

[Explanation] Cannot execute the command in the current configuration, or it is not supported.

[Remedy] Confirm the current hardware configuration and support status.

```
An internal error has occurred. Please contact your system administrator.
```

[Explanation] DR failed. There is a possibility that DR failed because of an internal error in XSCF.

[Remedy] Find out the cause of the DR failure referring monitoring message and error log. Please also confirm the XCP version.

A.2.6   showdevices

```
XSB#%s is not currently running.
```

[Explanation] The system was not able to get some parameter for the XSB.

[Remedy] Confirm the information for the XSB via the showboards command.

```
cannot get device information from DomainID.
```

[Explanation] The system was unable to collect the requested information from the domain.

[Remedy] Confirm that the DSCP setting is correct, confirm that the dsc process is running fine on the domain.

Example: Confirm Swap Space Size

This example shows one way to analyze the physical memory on a system board in a SPARC Enterprise M4000/M5000/M8000/M9000 server from Oracle and Fujitsu to determine whether the system has enough swap space to support deletion of a board. It explains how to collect and analyze information using the showdevices(8) command on the XSCF and the swap(1M) command on the Oracle Solaris OS.

In this example, the system board to be deleted contains physical memory and a disk has been attached to it to provide swap space. A disk that is attached to another system board provides additional swap space.

This example is based on the following swap space size and physical memory size. Most of the swap space in the system is still available and the system board can be safely deleted.

- Swap area of the entire domain: 4GB
- Swap area of the system board to be deleted: 1GB
- Physical memory of the system board to be deleted: 2GB

1. **Execute the** showdevices**(8) command on the XSCF to show the resources of the system board (XSB#00-0) to be deleted.**

   This command displays the total physical memory on the board and the I/O devices that are attached.

```
XSCF> showdevices 00-0
CPU:
----
DID   XSB    id     state     speed    ecache
00    00-0   40     on-line   2048     4
00    00-0   41     on-line   2048     4
00    00-0   40     on-line   2048     4
00    00-0   41     on-line   2048     4

Memory:
-------
             board    perm    base                  domain   target   deleted    remaining
DID   XSB    mem MB   mem MB  address               mem MB   XSB      mem MB     mem MB
00    00-0   2048     0       0x0000000000000000    4096

IO Devices:
----------
DID   XSB    device    resource          usage
00    00-0   sd0       /dev/dsk/c0t0d0s1  swap area
```

Notice in the Memory section that 2048 MB (2GB) of physical memory is on this board. And in the I/O Devices section the /dev/dsk/c0t3d0s1 disk contains a configured swap space.

2. On the domain execute the swap**(1M) command with its** -l **option specified to determine the size of the swap space configured on the disk.**

```
# swap -l
swapfile             dev     swaplo     blocks       free
/dev/dsk/c0t3d0s1    118,1   16         2097152      2097152
/dev/dsk/c1t1d0s1    118,2   16         6291456      4109712
```

Notice that /dev/dsk/c0t3d0s1, the disk to be deleted, contributes 2097152 blocks. Each block is 512 bytes, so this disk contributes 1GB of swap space. Moreover, the domain has additional swap space available from /dev/dsk/c1t1d0s1, a disk connected to another system board, which contributes 6291456 blocks (3GB). Thus, the total available swap space is 4GB.

3. Execute the swap**(1M) command with its** -s **option to determine the total value of available swap space.**

This amount could have been determined in the previous step, but you can use the following command to get a brief summary of the details.

```
# swap -s
total: 40096k bytes allocated + 2200k reserved = 42296k used, 4152008k available
```

Notice that most of the 4GB of total swap space is available. When the system board is deleted, 1GB of total swap space will be removed, and the remaining available swap space will be nearly 3GB. Therefore, there is enough remaining swap space to allow this system board to be deleted.

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