



Sun Fire 880 Dynamic Reconfiguration User's Guide

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303-4900 U.S.A.
650-960-1300

Part No. 816-1465-10
July 2001, Revision A

Send comments about this document to: docfeedback@sun.com

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road, Palo Alto, CA 94303-4900 U.S.A. All rights reserved.

This product or document is distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, AnswerBook2, docs.sun.com, Sun Enterprise, Sun StorEdge, Solstice DiskSuite, Sun Enterprise SyMON, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

Federal Acquisitions: Commercial Software—Government Users Subject to Standard License Terms and Conditions.

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road, Palo Alto, CA 94303-4900 Etats-Unis. Tous droits réservés.

Ce produit ou document est distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, AnswerBook2, docs.sun.com, Sun Enterprise, Sun StorEdge, Solstice DiskSuite, Sun Enterprise SyMON, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

LA DOCUMENTATION EST FOURNIE "EN L'ETAT" ET TOUTES AUTRES CONDITIONS, DECLARATIONS ET GARANTIES EXPRESSES OU TACITES SONT FORMELLEMENT EXCLUES, DANS LA MESURE AUTORISEE PAR LA LOI APPLICABLE, Y COMPRIS NOTAMMENT TOUTE GARANTIE IMPLICITE RELATIVE A LA QUALITE MARCHANDE, A L'APTITUDE A UNE UTILISATION PARTICULIERE OU A L'ABSENCE DE CONTREFAÇON.



Contents

Preface v

- 1. Introduction to Dynamic Reconfiguration** 1
 - About Hot-Plug and Hot-Swap Operations 2
 - About Hot-Plug Operations and Dynamic Reconfiguration 2
 - About User Interfaces for Hot-Plug Operations 3
 - About Dynamic Reconfiguration and Multipathing Software 4
 - About Dynamic Reconfiguration Requirements 5
 - About Dynamic Reconfiguration Limitations 7

- 2. Using Dynamic Reconfiguration** 9
 - How to Display Card Status 10
 - About Slot LEDs 14
 - How to Identify Cards and Slots 16
 - How to Prepare a PCI Card for Removal 17
 - How to Remove a PCI Card 19
 - How to Remove PCI Cards That Use Detach-Unsafe Drivers 21
 - How to Add a PCI Card 22

Preface

The information in this book is intended for system administrators and service providers.

This User's Guide describes the Sun Fire™ 880 Dynamic Reconfiguration (DR) feature, which enables you to attach and detach PCI cards from a running system. The information in this User's Guide applies only to Sun Fire 880 systems.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ Operating Environment

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

Application	Title	Part Number
Installation	<i>Sun Fire 880 Server Owner's Guide</i>	806-6592
	<i>Sun Fire 880 Server Rackmounting Guide</i>	806-6594
	<i>Sun Fire 880 Server Product Notes</i>	806-6593
Service	<i>Sun Fire 880 Server Service Manual</i>	806-6597
System Administration	<i>Sun Fire 880 Server Owner's Guide</i>	806-6592
	<i>Platform Notes: Using luxadm Software</i>	816-1466
	<i>Sun Fire 880 Server Product Notes</i>	806-6593

Accessing Sun Documentation Online

The `docs.sun.comSM` web site enables you to access a select group of Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

`http://docs.sun.com`

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc.

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at:

`http://www.fatbrain.com/documentation/sun`

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at:

`docfeedback@sun.com`

Please include the part number (816-1465-10) of your document in the subject line of your email.

Introduction to Dynamic Reconfiguration

This chapter introduces you to the concepts of Dynamic Reconfiguration and hot-plug operations. It also explains the requirements and limitations of Dynamic Reconfiguration.

Topics covered in this chapter include:

- “About Hot-Plug and Hot-Swap Operations” on page 2
- “About Hot-Plug Operations and Dynamic Reconfiguration” on page 2
- “About User Interfaces for Hot-Plug Operations” on page 3
- “About Dynamic Reconfiguration and Multipathing Software” on page 4
- “About Dynamic Reconfiguration Requirements” on page 5
- “About Dynamic Reconfiguration Limitations” on page 7

About Hot-Plug and Hot-Swap Operations

Sun Fire 880 system hardware is designed to support hot plugging of Peripheral Component Interconnect (PCI) cards. This hot-plug capability enables you to add, remove, or replace a PCI card on a powered-on system, while the rest of the system's capabilities remain unaffected.

Hot-plugging significantly reduces system downtime associated with PCI card replacement. However, the hot-plug procedure involves software commands for preparing the system prior to removal of a PCI card and for reconfiguring the operating environment after installation of a new card.

In contrast, Sun Fire 880 fan trays and power supplies are hot-swappable. You can remove or insert these components at any time without any prior software preparation. For more information about hot-swappable system components, refer to the *Sun Fire 880 Server Owner's Guide*.

Note – The Sun Fire 880 Remote System Control (RSC) card is *not* a hot-pluggable component. Before installing or removing an RSC card, you must power off the system and disconnect all system power cords.

About Hot-Plug Operations and Dynamic Reconfiguration

Hot-plug operations for PCI cards involve Dynamic Reconfiguration (DR). Dynamic Reconfiguration is an operating environment feature that enables you to reconfigure system hardware while the system is running. Using DR, you can add or replace hardware resources with little or no interruption of normal system operations.

PCI hot-plug procedures may involve software commands for preparing the system prior to removing a device, and for reconfiguring the operating environment after installing a new device. In addition, certain other system requirements must be met in order for hot-plug operations to succeed. For details, see "About Dynamic Reconfiguration Requirements" on page 5.

For detailed PCI hot-plug procedures, see Chapter 2.

Note – You can hot-plug any standard PCI card, provided a suitable software driver exists for the Solaris Operating Environment, and the driver supports PCI hot-plug operations. In addition, the card must comply with the PCI Hot-Plug Specification Revision 1.1.

About User Interfaces for Hot-Plug Operations

There are two different methods for performing PCI hot-plug operations on Sun Fire 880 systems:

- Push-button method
- Command-line method

The push-button method relies on push buttons and status LEDs located near each PCI card slot. You can initiate a hot-plug operation by pressing the push button for the corresponding slot. Three status LEDs located near each slot indicate successful results or failure conditions.

The command-line method lets you perform hot-plug operations via a remote login session, a locally attached console, or an RSC console. This method involves the Solaris `cfgadm(1M)` command, and uses the LEDs near each slot to indicate where to insert or remove the affected card.

Both hot-plug methods use the status LEDs located near each PCI slot. These LEDs indicate when it is safe to insert or remove a card from its slot, and show whether the operation has succeeded or failed. For additional details on Sun Fire 880 hot-plug status LEDs, see “About Slot LEDs” on page 14.

Note – Regardless of the method you use, it is often necessary to perform additional administrative steps to prepare for a hot-plug removal operation. Prior to performing a removal operation, you must ensure that the devices residing on the card are not currently in use. To identify and manually terminate usage of such devices, you can use standard Solaris Operating Environment commands such as `mount(1M)`, `umount(1M)`, `swap(1M)`, `ifconfig(1M)`, and `ps(1)`.

For detailed PCI hot-plug procedures, see Chapter 2.

About Dynamic Reconfiguration and Multipathing Software

DR works in conjunction with (but does not require) multipathing software. You can use multipathing software to switch I/O operations from one I/O controller to another to prepare for DR operations. With a combination of DR and multipathing software, you can remove, replace, or deactivate a PCI controller card with no interruption to system operation. Note that this requires redundant hardware; that is, the system must contain an alternate I/O controller that is connected to the same device(s) as the card being removed or replaced. The alternate controller must reside on a different PCI card or be integrated into the Sun Fire 880 system motherboard or I/O board. For more information about multipathing software, refer to the *Sun Fire 880 Server Owner's Guide*.

About Dynamic Reconfiguration Requirements

Certain system requirements must be met in order for DR operations to succeed. These requirements are summarized below and covered in more detail in the sections that follow.

Detachability

For a PCI card to be successfully detached from a running operating environment:

- All devices on the card must use detach-safe device drivers.
- If the card controls any vital system resources, alternate paths to those resources must be available through some other card or on-board controller integrated into the system motherboard or system I/O board.

Detach-Safe Device Drivers

For a PCI card to be successfully detached from a running operating environment, each device on the card must have a detach-safe driver. A *detach-safe* driver enables a single instance of a driver to be closed while other instances are allowed to remain open to service similar devices used elsewhere in the system. To be considered detach-safe, a driver must be able to perform a basic Device Driver Interface/Device Kernel Interface (DDI/DKI) function called `DDI_DETACH`. Any driver that does not support the `DDI_DETACH` function is called *detach-unsafe*.

Sun Microsystems offers a variety of hot-pluggable PCI cards that use detach-safe device drivers. For an up-to-date list of Sun PCI cards that use detach-safe drivers, please see the *Sun Fire 880 Server Product Notes* or contact your local Sun sales representative.

Note – Many third-party drivers (those purchased from vendors other than Sun Microsystems) do not support the `DDI_DETACH` function. Sun Microsystems suggests that you test these driver functions during the qualification and installation phases of any third-party PCI card, prior to use in a production environment.

While it is possible to detach a PCI card that has detach-unsafe drivers, it is a fairly complex procedure. To do so, you must:

1. Stop all usage of the detach-unsafe drivers on the card.
2. Stop all usage of other devices in the system that share the same detach-unsafe drivers.
3. Manually close all instances and unload all of the affected drivers.

For more information, see “How to Remove PCI Cards That Use Detach-Unsafe Drivers” on page 21.

Vital System Resources

You cannot dynamically detach a PCI card that controls vital system resources unless alternate paths to those resources are available. The alternate paths must be available through a different PCI card or an on-board controller integrated into the system motherboard or system I/O board. Before detaching the card, you must switch control of the vital resources over to the alternate path (note that some multipathing software may handle this automatically). Examples of vital system resources include the system’s boot disk, swap space, and primary network interface.

Some cards cannot be detached. A PCI card is not detachable if it controls a boot drive for which no alternate path is available.

If possible, the system’s swap space should reside on two or more disks attached to controllers on separate boards. For example, some of the swap space might be controlled by a PCI host adapter card, while the rest could be controlled by the system’s on-board controller. With this kind of configuration, a particular swap partition is not a vital system resource, because swap space is accessible through multiple controllers, and additional swap space can be dynamically configured via the `swap(1M)` command.

Note – Before detaching a PCI card that controls disk swap space, you must ensure that the system’s remaining memory and disk swap space will be large enough to accommodate currently running programs.

About Dynamic Reconfiguration Limitations

Faulty Cards



Caution – Inserting a faulty card may cause a system crash. Use only cards that are known to be functional.

When hot-plugging a PCI card, it is important to be aware that a newly inserted PCI card with a serious failure can, when powered-on, introduce failures in the bus segment to which it is connected.

FC-AL Disk Arrays

For Sun StorEdge™ A5000 disk arrays, the firmware version must be ST19171FC 0413 or later.

Using Dynamic Reconfiguration

This chapter provides detailed instructions for Dynamic Reconfiguration procedures on a Sun Fire 880 system. Topics covered in this chapter include:

- “How to Display Card Status” on page 10
- “About Slot LEDs” on page 14
- “How to Identify Cards and Slots” on page 16
- “How to Prepare a PCI Card for Removal” on page 17
- “How to Remove a PCI Card” on page 19
- “How to Remove PCI Cards That Use Detach-Unsafe Drivers” on page 21
- “How to Add a PCI Card” on page 22

How to Display Card Status

You can use the `cfgadm` command to display status information about cards and slots. Refer to the `cfgadm(1M)` man page for options to this command.

▼ To Access the Basic Status Display

Many DR operations require that you specify a card or slot.

- To obtain the system names for cards or slots, as superuser, type:

```
# cfgadm
```

When used without options, `cfgadm` displays information about all known cards and slots. The following display shows a typical output.

```
# cfgadm
Ap_Id      Type      Receptacle  Occupant    Condition
PCI0       unknown  empty       unconfigured unknown
PCI1       unknown  empty       unconfigured unknown
PCI2       unknown  empty       unconfigured unknown
PCI3       mult/hp   connected   configured  ok
PCI4       ethernet/hp connected   configured  ok
PCI5       pci-pci/hp connected   configured  ok
PCI6       unknown  empty       unconfigured unknown
PCI7       unknown  empty       unconfigured unknown
PCI8       unknown  empty       unconfigured unknown
SBa        cpu/mem   connected   configured  ok
SBb        cpu/mem   connected   configured  ok
SBc        cpu/mem   connected   configured  ok
SBd        none     empty       unconfigured ok
```

The first column, `Ap_Id`, lists the system's attachment points. An *attachment point* is a collective term for a card and its associated slot. There are two types of system names for attachment points. A *physical* attachment point describes the physical path to the slot in the system device tree. A *logical* attachment point, or attachment point ID, is an alias created by the system to refer to the physical attachment point.

For example, in the `cfgadm` output shown previously, the logical attachment point ID of the PCI card in the first slot is `PCI0`.

Note – The `cfgadm` status display shows attachment points for both PCI cards and CPU/Memory boards. However, DR operations for Sun Fire 880 CPU/Memory boards are not supported in the Solaris 8 7/01 Operating Environment.

The following table lists the attachment point IDs for all of the Sun Fire 880 PCI and CPU/Memory board slots.

Slot	Attachment Point ID
CPU/Memory slot A	SBa
CPU/Memory slot B	SBb
CPU/Memory slot C	SBc
CPU/Memory slot D	SBd
PCI slot 0	PCI0
PCI slot 1	PCI1
PCI slot 2	PCI2
PCI slot 3	PCI3
PCI slot 4	PCI4
PCI slot 5	PCI5
PCI slot 6	PCI6
PCI slot 7	PCI7
PCI slot 8	PCI8

The following table describes the values that may appear in the `Type`, `Receptacle`, `Occupant`, and `Condition` columns of the basic status display. The values listed for the `Type` column represent the most common board and card types.

Column	Entry	Meaning
Type	mult/hp	Multifunction (hot-pluggable PCI card)
	ethernet/hp	Gigabit Ethernet (hot-pluggable PCI card)
	pci_pci/hp	Quad Ethernet (hot-pluggable PCI card)
	scsi/hp	SCSI (hot-pluggable PCI card)
	raid/hp	Hardware RAID (hot-pluggable PCI card)
	tokenrg/hp	Token Ring (hot-pluggable PCI card)
	fddi/hp	FDDI (hot-pluggable PCI card)

Column	Entry	Meaning
	atm/hp	ATM (hot-pluggable PCI card)
	network/hp	Network interface (unspecified type, hot-pluggable PCI card)
	storage/hp	Storage interface (unspecified type, hot-pluggable PCI card)
	display/hp	Graphics interface (unspecified type, hot-pluggable PCI card)
	pci-card/hp	PCI card (unspecified type, hot-pluggable PCI card)
	unknown	Board or card type cannot be determined
	cpu/mem	CPU/Memory board
Receptacle	empty	Slot is empty
	connected	Slot is electrically connected
	disconnected	Slot is not electrically connected
Occupant	configured	Board or card is logically attached to the operating system
	unconfigured	Board or card is logically detached from the operating system
Condition	ok	Board or card is ready for use
	unknown	Board or card condition cannot be determined
	failing	A board or card that was in the OK condition has developed a problem
	failed	Board or card has failed
	unusable	Either an attachment point has incompatible hardware or an empty attachment point lacks power or precharge current

▼ To Access the Detailed Status Display

You can use the `-v` (verbose) option to access expanded descriptions.

- **For a more detailed status report, as superuser, type:**

```
# cfgadm -v
```

In addition to the information provided by the basic status display, the detailed status information includes the physical attachment point of each card.

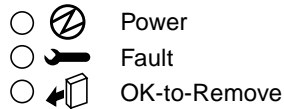
The following is an example of the display produced by the `cfgadm -v` command.

```
# cfgadm -v
```

Ap_Id	Receptacle	Occupant	Condition	Information	When
Type	Busy	Phys_Id			
PCI0	empty	unconfigured	ok	pci8b:5 Slot 0	Dec 31 19:05
	unknown	n	/devices/pci@8,700000:hpc1_slot0		
PCI1	empty	unconfigured	ok	pci8b:4 Slot 1	Dec 31 19:05
	unknown	n	/devices/pci@8,700000:hpc1_slot1		
PCI2	empty	unconfigured	ok	pci8b:3 Slot 2	Dec 31 19:05
	unknown	n	/devices/pci@8,700000:hpc1_slot2		
PCI3	connected	configured	ok	pci8b:2 Slot 3	Dec 31 19:05
	mult/hp	n	/devices/pci@8,700000:hpc1_slot3		
PCI4	connected	configured	ok	pci9b:4 Slot 4	Dec 31 19:05
	ethernet/hp	n	/devices/pci@9,700000:hpc2_slot4		
PCI5	connected	configured	ok	pci9b:3 Slot 5	Dec 31 19:05
	pci-pci/hp	n	/devices/pci@9,700000:hpc2_slot5		
PCI6	empty	unconfigured	ok	pci9b:2 Slot 6	Dec 31 19:05
	unknown	n	/devices/pci@9,700000:hpc2_slot6		
PCI7	empty	unconfigured	ok	pci9a:1 Slot 7	Dec 31 19:05
	unknown	n	/devices/pci@9,600000:hpc0_slot7		
PCI8	empty	unconfigured	ok	pci9a:2 Slot 8	Dec 31 19:05
	unknown	n	/devices/pci@9,600000:hpc0_slot8		
SBa	connected	unconfigured	ok	powered-on, assigned	Dec 31 19:05
	cpu/mem	n	/devices/pseudo/gptwo@0:SBa		
SBb	connected	configured	ok	powered-on, assigned	Dec 31 19:05
	cpu/mem	n	/devices/pseudo/gptwo@0:SBb		
SBc	connected	configured	ok	powered-on, assigned	Dec 31 19:05
	cpu/mem	n	/devices/pseudo/gptwo@0:SBc		
SBd	empty	unconfigured	ok	assigned	Dec 31 19:05
	none	n	/devices/pseudo/gptwo@0:SBd		

About Slot LEDs

Inside the Sun Fire 880 system, status LEDs provide power, fault, and hot-plug indications for each PCI card slot. Each LED is labeled with an icon as shown below:



The following quick reference tables summarize how to interpret the LEDs for various hot-plug scenarios. In each table, the LED states are represented as follows:

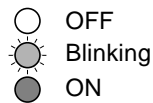


TABLE 2-1 Removing a Card



















Step	  	Description
1	  	Slot occupied; Power LED on; card is logically connected
2	  	Start hot-plug removal via push button or <code>cfgadm</code> command
3	  	Fault LED blinks during unconfigure operation
4	  	Operation successful; OK-to-Remove LED turns on
5	  	Remove card; OK-to-Remove LED turns off

TABLE 2-2 Removing a Card – Card Busy
















Step	  	Description
1	  	Slot occupied; Power LED on
2	  	Start hot-plug removal via push button or <code>cfgadm</code> command
3	  	Fault LED blinks briefly during unconfigure operation
4	  	Card busy; check system console messages

TABLE 2-3 Adding a Card











































Step	  	Description
1	  	Slot empty; all LEDs off
2	  	Insert new card; OK-to-Remove LED turns on upon insertion
3	  	Start hot-plug addition via push button or <code>cfgadm</code> command
4	  	Power LED lights; Fault LED blinks during configure operation
5	  	Operation successful; Power LED remains on

TABLE 2-4 Adding a Card – Fault Encountered

Step	  	Description
1	  	Slot empty; all LEDs off
2	  	Insert new card; OK-to-Remove LED turns on upon insertion
3	  	Start hot-plug addition via push button or <code>cfgadm</code> command
4	  	Fault LED blinks during configure operation
5	  	Fault encountered; Fault LED turns on
6	  	Remove faulty card
7	  	Slot empty; all LEDs off

How to Identify Cards and Slots

Note – Internal access to the Sun Fire 880 system is restricted to qualified service personnel only. Installation procedures for internal components are covered in the *Sun Fire 880 Server Service Manual*, which is included on the *Sun Fire 880 Server Online Documentation CD*.



Caution – Hazardous energy levels are present inside the system when the system remains connected to a power source, regardless of the keyswitch position. Also, hazardous energy levels are present in the system's batteries even when all AC power cords are disconnected. Follow the safety procedures in your system Owner's Guide or Service Manual.



Caution – Avoid keeping doors open for extended periods of time while the system is operating. All doors must be closed to prevent automatic thermal shutdown.

Identifying a Card Inside the System

1. Check the system front panel LEDs.

If a card is faulty, a directional LED on the front panel display turns on and points to the side of the system where the card is located. If a card is ready for you to remove after a successful DR operation, the OK-to-Remove LED turns on and a directional LED indicates the location of the card. For additional details on the system front panel LEDs, see the *Sun Fire 880 Server Owner's Guide*.

2. Open the appropriate side access door and check the interior LEDs.

Inside the system, a Fault LED turns on to indicate which slot contains the faulty card. After a successful DR remove operation, an OK-to-Remove LED turns on to indicate which slot contains the card to be removed. For more information, see "About Slot LEDs" on page 14.

Identifying a Card or Slot From a System Console

1. Log in to the system as superuser.
2. Type the `cfgadm` command to display detailed status information for the system's PCI slots.

```
# cfgadm
```

The command output identifies each slot and any cards occupying those slots. For more information, see “How to Display Card Status” on page 10.

3. Determine the attachment point ID for the card to be removed, or the slot where you will add the new card.

To identify a faulty card, look in the `Condition` column of the `cfgadm` output for cards marked `failed`, `failing`, or `unusable`. The `Ap_Id` column indicates the slot's attachment point ID.

How to Prepare a PCI Card for Removal

▼ What to Do

1. Terminate usage of all devices on the card.

All I/O devices must be closed before they can be unconfigured. Ensure that any networking interfaces on the card are not in use. All storage devices attached to the card must be unmounted and closed.

- a. To identify the components that are on the card to be unconfigured, use the `prtdiag(1M)`, `ifconfig(1M)`, `mount(1M)`, `df(1)`, `ps(1)`, or `swap(1M)` commands.
 - b. To see which processes have these devices open, use the `fuser(1M)` command.
 - c. Warn all users to stop using the functions that the card provides.
2. Use the `ifconfig` command to terminate usage of any network interfaces on the card.

Note – You cannot terminate the usage of network interfaces if the network interface is the primary network interface and no alternate path is available.

3. **If any disk partitions that the card controls are used for swap space, remove them from the swap configuration.**
4. **Use the `umount(1M)` command to unmount any file systems, including Solstice DiskSuite™ metadevices, residing on disk partitions controlled by the card.**

Note – You may need to place a hard lock on the file systems before unmounting them by using the `lockfs` command.



Caution – Unmounting file systems may affect NFS client systems.

5. **Remove any Solstice DiskSuite databases from disk partitions that the card controls.**

The location of Solstice DiskSuite databases is chosen by the system user and can be changed.

6. **Deport any VERITAS Volume Manager disk groups and offline any disks associated with the card.**

Use the `vxdiskadm` script to deport disk groups and offline disks.

7. **For any process that directly opens a device or raw partition that the card controls, either kill the process using the `kill` command, or direct the process to close the open device on the card.**

8. **If a detach-unsafe device is present on the card, close all instances of the device and use `modunload(1M)` to unload the driver.**

See “How to Remove PCI Cards That Use Detach-Unsafe Drivers” in the *Sun Fire 880 Dynamic Reconfiguration User’s Guide*.

What Next

- To remove a PCI card, see “How to Remove a PCI Card” on page 19.

How to Remove a PCI Card

Note – Internal access to the Sun Fire 880 system is restricted to qualified service personnel only. Installation procedures for internal components are covered in the *Sun Fire 880 Server Service Manual*, which is included on the *Sun Fire 880 Server Online Documentation CD*.



Caution – Hazardous energy levels are present inside the system when the system remains connected to a power source, regardless of the keyswitch position. Also, hazardous energy levels are present in the system's batteries even when all AC power cords are disconnected. Be sure to follow the safety procedures in your system Owner's Guide or Service Manual.



Caution – Avoid keeping doors open for extended periods of time while the system is operating. All doors must be closed to prevent automatic thermal shutdown.

Before You Begin

- Make sure that your system meets all DR requirements; see “About Dynamic Reconfiguration Requirements” on page 5.
- Identify the card to be removed; see “How to Identify Cards and Slots” on page 16.
- Stop all activity on the card to be removed; see “How to Prepare a PCI Card for Removal” on page 17.

What to Do

1. Open the appropriate side access door.

See “How to Open the Side Access Doors” in the *Sun Fire 880 Server Owner's Guide*.

If you are replacing a faulty card, a Fault LED inside the system illuminates to indicate which slot contains the faulty card. See “About Slot LEDs” on page 14.

2. Use a hot-plug push button or the `cfgadm` command to initiate the hot-plug operation.

If you are located near the system, press the push button for the slot that contains the card to be removed.

If you are working at a system console, enter the following `cfgadm` command and the attachment point ID for the card to be removed:

```
# cfgadm -c disconnect ap_id
```

Note – You can also initiate hot-plug operations through a graphical user interface using a version of Sun Management Center software that supports DR operations. For more information, refer to the *Sun Management Center Software User's Guide* and the *Sun Management Center Software Supplement for Workgroup Servers*.

The Fault LED for the slot blinks while the card is being unconfigured.

3. When the OK-to-Remove LED illuminates, it is safe to remove the card from its slot.

Refer to the *Sun Fire 880 Server Service Manual* for removal and replacement procedures. If the OK-to-Remove LED never turns on, the process has failed.



Caution – Do not remove a card until the OK-to-Remove LED illuminates; otherwise, the system will crash.

If a replacement card is not immediately available, you can leave the card in the system until a replacement arrives.

Note – After removing a card, the DR software automatically executes the Solaris `devfsadm` command. The `devfsadm` command updates the `/etc/path_to_inst` file to remove any physical path names for devices associated with the card. The same path names are removed from the `/devices` hierarchy and associated links are removed from the `/dev` directory.

4. If you unloaded any detach-unsafe drivers before removing a PCI card, reload any drivers that are required by other devices in the system.

What Next

- To add a new PCI card, see “How to Add a PCI Card” on page 22.

How to Remove PCI Cards That Use Detach-Unsafe Drivers

Some drivers do not yet support DR on Sun Fire 880 systems. DR cannot detach these drivers, but you can remove some undetachable drivers manually using the following procedure.

What to Do

1. **Stop usage of all detach-unsafe devices on the card to be removed.**
2. **Stop usage of all other devices of the same type used throughout the entire system.**
The system can use these devices after the DR unconfigure operation is complete.
3. **Use the appropriate UNIX commands to manually close all instances of the affected drivers.**
4. **Use the `modinfo(1M)` command to find the module IDs of the drivers, then use the `modunload(1M)` command to unload them.**

Note – Many third-party drivers (those purchased from vendors other than Sun Microsystems) do not support the standard Solaris `modunload(1M)` interface. Conditions that invoke the functions occur infrequently during normal operation and the functions may sometimes be missing or work improperly. Sun Microsystems suggests that you test these driver functions on a development system during the qualification and installation phases of any third-party device.

What Next

- To remove a PCI card, see “How to Remove a PCI Card” on page 19.

How to Add a PCI Card

Note – Internal access to the Sun Fire 880 system is restricted to qualified service personnel only. Installation procedures for internal components are covered in the *Sun Fire 880 Server Service Manual*, which is included on the *Sun Fire 880 Server Online Documentation CD*.



Caution – Hazardous energy levels are present inside the system when the system remains connected to a power source, regardless of the keyswitch position. Also, hazardous energy levels are present in the system's batteries even when all AC power cords are disconnected. Be sure to follow the safety procedures in your system Owner's Guide or Service Manual.



Caution – Avoid keeping doors open for extended periods of time while the system is operating. All doors must be closed to prevent automatic thermal shutdown.

Before You Begin

- Make sure that your system meets all DR requirements; see "About Dynamic Reconfiguration Requirements" on page 5.
- Identify the slot where the card will be installed; see "How to Identify Cards and Slots" on page 16.



Caution – Inserting a faulty card may cause a system crash. Use only cards that are known to function properly.

What to Do

1. Verify that the selected slot is ready to receive the new card.

If you are working inside the system, confirm that all three LEDs for the slot are off.

If you are working at a system console, use the `cfgadm` command to verify that the slot is ready. See “How to Display Card Status” on page 10.

```
# cfgadm
```

Confirm in the `cfgadm` output that the selected slot’s status in the `Receptacle` column is `empty` or `disconnected` and in the `Occupant` column is `unconfigured`.

2. Physically install the card into the slot.

Refer to the *Sun Fire 880 Server Service Manual* for removal and replacement procedures.

3. Connect any cables or interface modules to the card.

4. Use a hot-plug push button or the `cfgadm` command to initiate the hot-plug operation.

If you are located near the system, press the push button for the slot that contains the new card.

If you are working at a console, enter the following `cfgadm` command and the attachment point ID for the selected slot:

```
# cfgadm -c configure ap_id
```

Note – You can also initiate hot-plug operations through a graphical user interface using a version of Sun Management Center software that supports DR operations. For more information, refer to the *Sun Management Center Software User’s Guide* and the *Sun Management Center Software Supplement for Workgroup Servers*.

The Fault LED for the slot blinks while the card is being configured. When the Fault LED stops blinking, the process is complete. If the Fault LED turns on instead, the process has failed.

Note – If the process fails, the slot is automatically powered off. In order to power up the slot and execute the card’s on-board diagnostics, you must first use the `-x poweron` option of the `cfgadm` command.

Note – After adding the card, the DR software automatically executes the Solaris `devfsadm` command to reconfigure all of the card's devices. The `devfsadm` command updates the `/etc/path_to_inst` file with physical path names for the new devices. The same path names are added to the `/devices` hierarchy and appropriate links are created in the `/dev` directory.

5. If you added a PCI card, perform any final configuration steps as needed.
 - a. Activate the devices on the card using the `mount` and `ifconfig` commands, as appropriate.
 - b. Restore or create any desired swap partitions.
 - c. Restore or create any desired multipathing and/or volume management configurations.