Sun Fire 880 Dynamic Reconfiguration User's Guide

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Contents

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 `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

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

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CHAPTER 1

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

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.

CHAPTER 2

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

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
```

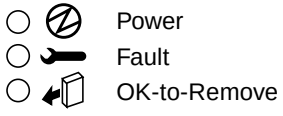
In addition to the information provided by the basic status display, the detailed status information includes the physical attachment point of each card.

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 `cfgadm` 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

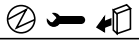
Step		Description
1		Slot occupied; Power LED on
2		Start hot-plug removal via push button or `cfgadm` command
3		Fault LED blinks briefly during unconfigure operation
4		Card busy; check system console messages

TABLE 2-3 Adding a Card

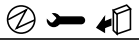
Step		Description
1		Slot empty; all LEDs off
2		Insert new card; OK-to-Remove LED turns on upon insertion
3		Start hot-plug addition via push button or `cfgadm` command
4		Power LED lights; Fault LED blinks during configure operation
5		Operation successful; Power LED remains on

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 `cfgadm` 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.

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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.**