Enhanced Support Facility User's Guide

Dynamic Reconfiguration I/O device

FUJITSU

Preface

-Purpose

This manual describes the procedure to perform hot replacement and hot expansion of PCI cards for file and network devices by using Dynamic Reconfiguration (DR) feature.

-Intended Readers

This manual is intended for the following readers:

- · System software developers and test engineers
- · System support engineers
- · System administrators who introduce and operate this software
- · Technicians who maintain system hardware

-Organization

This manual is organized as follows:

- · "Chapter1 PCI cards with support for DR" describes the lists of PCI cards which support DR.
- · "Chapter2 Outline of Replacement and Expansion Procedure" describes the outline of procedure to execute replacement or expansion of PCI cards by using DR.
- · "Chapter3 File Devices" describes the DR execution procedure of PCI cards for file devices.
- · "Chapter4 Network Devices" describes the DR execution procedure of PCI cards for network devices.
- · "Chapter5 Notes" gives some notes on using DR.

-Related Manuals

- · Enhanced Support Facility User's Guide For Dynamic Reconfiguration (C120-E115)
- · Partition Operation Guide (C120-E087)
- · Dynamic Reconfiguration Architecture Guide (C120-E114)

-Notation Used

The following shows the notation conventions used in this manual.

- · Oracle Solaris might be described as Solaris, Solaris Operating System, or Solaris OS in this manual.

- · The titles of chapters are enclosed in parentheses ("").
  Example: See "Chapter1 PCI cards with support for DR"
- · Commands and other input use the following prompts:
  C shell prompt:
  prompt%
  Bourne and korn shell prompt:
  prompt$
  Super user prompt:
  #
- · Commands entered by the user is shown in bold:

  > # **/opt/FJSVhwr/sbin/drc -connect sb00** <Return>

- · Key combinations are represented, for example, by CTL-C, which means to simultaneously press the Control and C key.

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Notes

-Revision History

Revision	Data	Details
Tenth	Jul, 2007	Supporting SPARC Enterprise M4000/M5000/M8000/M9000
Eleventh	Oct, 2010	Revised according to changing the company name from Sun to Oracle.

Contents

Chapter 1 PCI cards with support for DR

This chapter shows capabilities of PCI cards for DR (Dynamic Reconfiguration).
Please ask FUJITSU sales division about the newest information.

The driver patches and the option driver packages enclosed with a PCI card in this chapter can be downloaded from the following URLs.

· Driver patches
  http://www.fujitsu.com/global/support/software/security/products-s/patch-info/
· Option driver packages enclosed with a PCI card
  https://updatesite.jp.fujitsu.com/unix/en/download/driver/index.html

Please ask FUJITSU sales division about the newest information of the driver patches and the option driver packages.

1.1 PCI cards for file devices

The following list describes the PCI cards that support DR for file devices (at the time of Oct 2010).
Please ask FUJITSU sales division about the newest information of cards that support DR.

Functions	Product ID	Software of driver (driver name)	Supporting Functions			Redundant Software
			Hot replacement		Hot expansion	
			Non kernel memory board	Kernel memory board		
SAS	SE0X7SA1X	FUJITSU ULTRA LVD SCSI Host Bus Adapter Driver 2.1 Update1 or later (enclosed with a PCI card)	OK	OK	OK	*When ETERNUS is connected, ETERNUS Multipath Driver 3.0 or later.
SCSI	X6540A-U	Solaris (glm)	NG (*1)	NG (*1)	NG (*1)	None
	X6541A-U X6541A-X	Solaris (glm) (*2)	NG (*3)	NG (*3)	OK (*15)	*Multipath Disk Control 2.1 or later (*4)(*5)(*6) (*17) *Multipath Disk Control load balance option 2.1 or later (*6)(*7)(*8) *GR Multipath Driver 1.0.1 or later(*17)(*18)
	GP7B8SC1U GP7B8SC1X	Solaris (glm) (*2)	OK (*16)	OK (*16)	OK	*Multipath Disk Control 2.1 or later (*4)(*5)(*6) (*17) *Multipath Disk Control load balance option 2.1 or later (*6)(*7)(*8) *GR Multipath Driver 1.0.1 or later(*17)(*18)
	PP028SC1U PP028SC1X	FUJITSU PCI SCSI Adapter Driver 1.0 or later (enclosed with a PCI card)	OK	OK	OK	None
	PW008SC3 PW0G8SC1	Solaris (fjulsa) (*9)(*10)	NG (*3)	NG (*3)	OK (*15)	None

		FUJITSU ULTRA LVD SCSI Host Bus Adapter Driver 1.0 or later (enclosed with a PCI card) (*9)(*10)	NG (*3)	NG (*3)	OK (*15)	None
	SE0X7SC2X SE0X7SC1X	FUJITSU ULTRA LVD SCSI Host Bus Adapter Driver 2.0 Update2 or later (enclosed with a PCI card)	NG	NG	NG	None
Fibre Channel	GP7B8FC1U	FUJITSU PCI Fibre Channel 2.2 or later (enclosed with a PCI card) (*11)(*12) (*13)	OK	OK	OK	*Multipath Disk Control 2.1 or later (*4)(*5)(*6) (*17) *Multipath Disk Control load balance option 2.1 or later (*6)(*7)(*8) *GR Multipath Driver 1.0.1 or later(*17) (*18) *ETERNUS Multipath Driver 2.0.1 or later(*17)
	PW008FC2U	FUJITSU PCI Fibre Channel 2.2.1 or later (enclosed with a PCI card) (*12) (*13)	OK	OK	OK	*Multipath Disk Control 2.1 or later (*4)(*5)(*6) (*16) *Multipath Disk Control load balance option 2.1 or later (*6)(*7)(*8) *GR Multipath Driver 1.0.1 or later (*17) (*18) *ETERNUS Multipath Driver 2.0.1 or later(*17)
	PW008FC3U	FUJITSU PCI Fibre Channel 2.2.1 Update2 or later (enclosed with a PCI card) (*13)	OK	OK	OK	*Multipath Disk Control 2.1 or later (*4)(*5)(*6) (*17) *Multipath Disk Control load balance option 2.1 or later (*6)(*7)(*8) *GR Multipath Driver 1.0.1 or later (*17) (*18) *ETERNUS Multipath Driver 2.0.1 or later(*17)
	SE0X7F11X SE0X7F12X	FUJITSU PCI Fibre Channel 4.0 or later (enclosed with a PCI card)	OK	OK	OK	*ETERNUS Multipath Driver 2.0.1 or later(*22)
	PW028FC3 PW028FC3U	Emulex LightPulse FC SCSI/IP Host Bus Adapter driver 6.02f or later (*14)	OK (*19)	OK (*19)	OK (*19)	(*20)

Base I/O Card (IOUA)						
	PW028FC4S PW028FC4U	Emulex LightPulse FC SCSI/IP Host Bus Adapter driver 6.02f or later (*14)	OK (*19)	OK (*19)	OK (*19)	(*20)
	PW028FC5S PW028FC5U	Emulex LightPulse FC SCSI/IP Host Bus Adapter driver 6.02f or later (*14)	OK (*19)	OK (*19)	OK (*19)	(*20)
	XSEFC401AU XSEFC402AU	Solaris (emlxs)	NG	NG	NG	*Solaris (mpxio)
	SE0X7F21X SE0X7F22X	Solaris (qlc)	OK (*23)	OK (*23)	OK (*23)	*Solaris (mpxio)
Base I/O Card (IOUA)	SEMX7BS1X	Solaris (mpt)/(bge)	OK (*21)	OK (*21)	OK (*21)	*None (mpt) *See 1.2 for Ethernet function (bge)

(*1) Replacement and expansion are not supported due to hardware specifications.

(*2) In case of using Solaris 8, patch 109885-09 or later is needed.

(*3) Replacement is not supported due to hardware specifications.

(*4) In case of using Solaris 9, Multipath Disk Control 2.2.1 or later is needed.

(*5) In case of using Multipath Disk Control 2.1, patches 911012-10 or later (MPHD) and 911013-12 or later (HDDV) are needed.
And in case of using Multipath Disk Control 2.2, patches 911258-03 or later (MPHD) and 911886-08 or later (HDDV) are needed.
Moreover in case of using Multipath Disk Control 2.2.1, patches 912629-02 or later (MPHD) and 910989-07 or later (HDDV) are needed.

(*6) Multipath Disk Control and load balance option 2.2 are needed to hot expansion.

(*7) Multipath Disk Control load balance option is not supporting Solaris 9 or later.

(*8) In case of using Multipath Disk Control load balance option 2.1, patch 910990-01 or later is needed.

(*9) When using Solaris 8, the patch 114632-04 or later is needed.
When applying the patch 114632-04 or later, if the patch 912773-02 or later has applied, it is necessary to remove the patch.

(*10) When using Solaris 9, the patch 114951-03 or later is needed.
When applying the patch 114951-03 or later, if the patch 912774-01 or later has applied, it is necessary to remove the patch.

(*11) In case of using Solaris 9, FUJITSU PCI Fibre Channel 2.2 (patchlevel 08) or later is needed.

(*12) In case of using FUJITSU PCI Fibre Channel 2.2, patch 910936-13 or later is needed. And in case of using FUJITSU PCI Fibre Channel 2.2.1, patch 912069-09 or later is needed.

(*13) In case of using Solaris 10, FUJITSU PCI Fibre Channel 3.0 or later is needed.

(*14) Firmware version 1.91a1 or later and Fcode version 1.41a4 or later are required.

(*15) When connecting a shared device with a cluster system, please attach the system board after connecting the PCI card and the shared device with each node of the cluster system.

(*16) When a shared device of non-multipath configuration is connected with a cluster system, it is necessary to stop the use of the shared device from the active node of the cluster system.

(*17) Solaris 10 is supported only on ETERNUS Multipath driver. 914267-04 is necessary for Solaris 10 system.

(*18) In case of using GR Multipath Driver 1.0.1 or later, patch 912651-11 or later is needed.

(*19) DR is not permitted with fcode boot (SAN boot) environment.

(*20) Please confirm support version from product vendor.

(*21) If you perfome Dynamic Reconfiguration on a partition which Base I/O Card is installed, 125424-01 or later is needed

(*22) Only ETERNUS Multipath Driver can be used for the cards. 914267-05 is necessary for them.

(*23) Patch 127111-07 or later is needed.

1.2 PCI cards for network devices

The following list describes the PCI cards that support DR for network devices (at the time of Oct 2010).
When using below PCI cards, please refer to "5.1.8 Network driver configuration changing". Please ask FUJITSU sales division about the newest information of cards that support DR.

Functions	Product ID (Functions)	Software of driver (driver name)	Supporting Functions			Redundant Software (*13)
			Hot replacement		Hot expansion	
			Non kernel memory board	Kernel memory board (*1)		
Ethernet	X1033A-U X1033A-X and Onboard LAN interface (*2) (10/100BASE-T)	Solaris (hme)	OK	OK	OK	*SynfinityLink 2.2 *PRIMECLUSTER GLS 4.0 or later
	X1034A-X (10/100BASE-T x4)	Solaris (qfe)	NG	NG	NG	*SynfinityLink 2.2 *PRIMECLUSTER GLS 4.0 or later
	PW008FE1 (10/100BASE-T)	FUJITSU PCI 10/100 Ethernet 1.0 or later (supplied with a PCI card) (*3)	OK	OK	OK	*SynfinityLink 2.2 (*4) *PRIMECLUSTER GLS 4.0 or later (*5)
	PW008QE1 (10/100BASE-T x4)	FUJITSU PCI Quad 10/100 Ethernet 1.0 or later (supplied with a PCI card) (*6) (*14) (*15) (*16)	OK	OK	OK	*SynfinityLink 2.2 (*4) *PRIMECLUSTER GLS 4.0 or later (*5)
	PW008QE2 (10/100BASE-T x4)	FUJITSU PCI Quad 10/100 Ethernet 1.1 or later (supplied with a PCI card) (*12) (*14) (*15) (*16)	OK	OK	OK	*SynfinityLink 2.2 (*4) *PRIMECLUSTER GLS 4.0 or later (*5)
	PP028GE1U PP028GE1X (1000BASE-SX)	FUJITSU PCI Gigabit Ethernet 1.4.1 or later (supplied with a PCI card) (*7)	OK	OK	OK	*SynfinityLink 2.2 *PRIMECLUSTER GLS 4.0 or later
	PW008GE1U PW008GE1X (1000BASE-T)	FUJITSU PCI Gigabit Ethernet 1.4.1 or later (supplied with a PCI card) (*7)	OK	OK	OK	*SynfinityLink 2.2 *PRIMECLUSTER GLS 4.0 or later
	PW008GE4 PW008GE4A (1000BASE-SX)	FUJITSU PCI Gigabit Ethernet 2.0 or later (supplied with a PCI card) (*8) (*9)	OK	OK	OK	*SynfinityLink 2.2 (*4) *PRIMECLUSTER GLS 4.0 or later (*5)

6	PW008GE5 PW008GE5A (10/100/1000BASE-T)	FUJITSU PCI Gigabit Ethernet 2.0 or later (supplied with a PCI card) (*8) (*9)	OK	OK	OK	SynfinityLink 2.2 (*4) PRIMECLUSTER GLS 4.0 or later (*5)
	PW008QG1 (10/100/1000Base-T x 4)	FUJITSU PCI Gigabit Ethernet 2.3 or later (supplied with a PCI card) (*14) (*15) (*16)	OK	OK	OK	SynfinityLink 2.2 (*4) PRIMECLUSTER GLS 4.0 or later(*5)
	PW0G8GE1 (1000BASE-SX)	FUJITSU PCI Gigabit Ethernet 2.4 or later (supplied with a PCI card)	OK	OK	OK	SynfinityLink 2.2 (*4) PRIMECLUSTER GLS 4.0 or later(*5)
	PW0G8GE2 (10/100/1000BASE-T)	FUJITSU PCI Gigabit Ethernet 2.4 or later (supplied with a PCI card)	OK	OK	OK	SynfinityLink 2.2 (*4) PRIMECLUSTER GLS 4.0 or later(*5)
	SE0X7GD1X (10/100/1000BASE-T x2)	FUJITSU PCI Gigabit Ethernet 3.0 or later (supplied with a PCI card)	OK	OK	OK	*PRIMECLUSTER GLS 4.1A40 or later
	SE0X7GD2X (1000BASE-SX x2)	FUJITSU PCI Gigabit Ethernet 3.0 or later (supplied with a PCI card)	OK	OK	OK	*PRIMECLUSTER GLS 4.1A40 or later
	SE0X7GQ1X (10/100/1000BASE-T x 4)	FUJITSU PCI Gigabit Ethernet 3.0 or later (supplied with a PCI card)	OK	OK	OK	*PRIMECLUSTER GLS 4.1A40 or later
	SE0X7GQ2X (10/100/1000BASE-T x 4)	FUJITSU PCI Gigabit Ethernet 3.0 or later (supplied with a PCI card)	OK	OK	OK	*PRIMECLUSTER GLS 4.1A40 or later
	SE0X7HE!X (10GBASE-SR)	FUJITSU 10Gigabit Ethernet 1.0 or later (supplied with a PCI card)	OK	OK	OK	*PRIMECLUSTER GLS 4.1A40 or later
ATM	GP7B8AT1U GP7B8AT1X (ATM)	FUJITSU PCI ATM 1.2 or later (supplied with a PCI card) (*14)	OK	OK	NG (*10)	*SynfinityLink 2.2 *PRIMECLUSTER GLS 4.0 or later
InfiniBand(*11)	PW028SY1	BLASTBAND 1.0 or later	OK	OK	OK	*PRIMECLUSTER GLS 4.1A20 or later
Base I/O Card (IOUA)	SEMX7BS1X (10/100/1000Base-T × 2)	Solaris (mpt) / (bge)	OK (*18)	OK (*18)	OK (*18)	* PRIMECLUSTER GLS 4.1A40 or later (*17) *See 1.1 for SCSI function (mpt)

| Multi-port Communication | SE0X7PC1X | Netcompo WAN SUPPORT | NG | NG | NG | |

(*1) The replacement of the kernel memory board is not supporting on the redundant system which used the SynfinityLink 2.2 and the PRIMECLUSTER GLS 4.0.

(*2) The below machines have an Onboard LAN interface (hme).
- PRIMEPOWER 800/1000/2000, 900/1500/2500

(*3) Patch 912785-05 or later is needed.

(*4) The replacement and expansion are supported only on the Redundant Line Control Function.

(*5) When using the PRIMECLUSTER GLS 4.0 Multipath Function, patch 911872-03 or later is needed.

(*6) When using the "FUJITSU PCI Quad 10/100 Ethernet 1.0," patch 912216-09 or later is needed.

(*7) The driver version 1.4.1 or later and the patch 912214-03 or later are needed.

(*8) When using Solaris 8, the patch 114536-03 or later is needed.
When applying the patch 114536-03 or later, if the patch 912314-01 or later has applied, it is necessary to remove the patch. When removing the patch 912314-01 or 912314-02, the /platform/sun4us/kernel/drv/fjgi.conf file, which defines fjgi interface settings, will be replaced. If you have edited fjgi.conf, please make a backup copy of fjgi.conf beforehand and pick up your own settings and add them to the new one after removing the patch if necessary.

(*9) When using Solaris 9, the patch 114994-03 or later is needed.
When applying the patch 114994-03 or later, if the patch 912660-01 or later has applied, it is necessary to remove the patch. When removing the patch 912660-01 or 912660-02, the /platform/sun4us/kernel/drv/fjgi.conf file, which defines fjgi interface settings, will be replaced. If you have edited fjgi.conf, please make a backup copy of fjgi.conf beforehand and pick up your own settings and add them to the new one after removing the patch if necessary.

(*10) System rebooting is needed for hot expansion.

(*11) When PCI card is InfiniBand, please refer to "BLASTBAND GUIDE" for the procedure for replacement and expansion.

(*12) Patch 913294-03 or later is needed.

(*13) PRIMECLUSTER GLS 4.1A40 or later is necessary for Solaris 10.

(*14) 912680-04 or later is necessary, if Enhanced Support Facility 2.3 is used on Solaris 9.

(*15) 913371-01 or later is necessary, if Enhanced Support Facility 2.4 or 2.4.1 is used on Solaris 9.

(*16) 913732-02 or later is necessary, if Enhanced Support Facility 2.5 or 2.5.1 is used on Solaris 9.

(*17) Only Redundant Line Control Function supports this card.

(*18) If you perfome Dynamic Reconfiguration on a partition which Base I/O Card is installed, 125424-01 or later is needed.

1.3 PCI cards other than for file or network devices

The following list describes the PCI cards that support DR other than file or for network devices (at the time of Oct 2010).

Functions	Product ID (Functions)	Software of driver (driver name)	Supporting Functions			Redundant Software
			Hot replacement		Hot expansion	
			Non kernel memory board	Kernel memory board		
Link Card Kit (Optical)	SENX8LK2F SENX8LK3F		OK	OK	OK	

Chapter 2 Outline of Replacement and Expansion Procedure

This chapter provides the outline procedure of replacement or expansion of PCI cards by using DR.

2.1 Replacement Procedure

This section explains the outline procedure for replacement of PCI cards for non-redundant and redundant configurations by using DR.

Please refer to the each redundant software manuals for more details on redundant configuration.

2.1.1 Replacement of non-redundant configuration

When the PCI cards are needed to be replaced in non-redundant configuration without using redundant software that controls the multipath, it is necessary to stop all the high-level products (services) that are using these PCI cards on the system boards equipped with the PCI cards and the connected devices.

The flow of the replacement procedure of PCI cards for non-redundant configuration is as follows.
Please refer to "Chapter 3 File Devices" and "Chapter 4 Network Devices" for detailed replacement procedure.

File devices procedures
1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), stop the daemons.
2. Locating the PCI cards and the system boards
   Locate the system boards equipped with the faulty PCI cards and the connected devices and interfaces.
3. Stopping the high-level products (services)
   Stop all the high-level products that are using these PCI cards on the system boards equipped with the faulty PCI cards and the connected devices.
4. Detaching the system boards
   Detach the system boards equipped with the faulty PCI cards and enable the replacement of the PCI cards.
5. Replacing the PCI cards
   Pull out the system boards equipped with the faulty PCI cards and replace the PCI cards, then mount back the system boards.
6. Attaching the system boards
   Attach the system boards equipped with the replaced PCI cards and enable the use of the PCI cards.
7. Restarting the high-level products (services)
   Restart the high-level products that are stopped in step 3.
8. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), start the daemons.

Network devices procedures
1. Locating the PCI cards and the system boards
   Locate the system boards equipped with the faulty PCI cards and the connected devices and interfaces.
2. Stopping the high-level products (services)
   Stop all the high-level products that are using these PCI cards on the system boards equipped with the faulty PCI cards and the connected devices.
3. Detaching the system boards
   Detach the system boards equipped with the faulty PCI cards and enable the replacement of the PCI cards.
4. Replacing the PCI cards
   Pull out the system boards equipped with the faulty PCI cards and replace the PCI cards, then mount back the system boards.
5. Attaching the system boards
   Attach the system boards equipped with the replaced PCI cards and enable the use of the PCI cards.
6. Restarting the high-level products (services)
   Restart the high-level products that are stopped in step 2.

2.1.2 Replacement of redundant configuration

When the PCI cards are needed to be replaced in redundant configuration with using redundant software that controls the multipath, the PCI cards can be replaced without stopping the high-level products (services).

The flow of the replacement procedure of PCI cards for redundant configuration is as follows.
Please refer to "Chapter 3 File Devices" and "Chapter 4 Network Devices" for detailed replacement procedure.

File devices procedures

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), stop the daemons.
2. Locating the PCI cards and the system boards
   Locate the system boards equipped with the faulty PCI cards and the connected devices and interfaces.
3. Disconnect from redundant system
   Disconnect the devices path and interfaces of PCI cards from the redundant system.
4. Detaching the system boards
   Detach the system boards equipped with the faulty PCI cards and enable the replacement of the PCI cards, then check the multipath status.
5. Replacing the PCI cards
   Pull out the system boards equipped with the faulty PCI cards and replace the PCI cards, then mount back the system boards.
6. Attaching the system boards
   Attach the system boards equipped with the replaced PCI cards and enable the use of the PCI cards, then check the multipath status.
7. Connect to redundant system
   Connect device paths and interfaces of the replaced PCI card to the redundant system.
   If necessary, switch back the active paths.
8. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), start the daemons.

Network devices procedures

1. Locating the PCI cards and the system boards
   Locate the system boards equipped with the faulty PCI cards and the connected devices and interfaces.
2. Detaching the system boards
   Detach the system boards equipped with the faulty PCI cards and enable the replacement of the PCI cards, then check the multipath status.
3. Replacing the PCI cards
   Pull out the system boards equipped with the faulty PCI cards and replace the PCI cards, then mount back the system boards.
4. Attaching the system boards
   Attach the system boards equipped with the replaced PCI cards and enable the use of the PCI cards, then check the multipath status. If necessary, switch back the active paths.

2.2 Expansion Procedure

This section explains the outline procedure for expansion of PCI cards for non-redundant and redundant configurations by using DR.

Please refer to the each redundant software manuals for more details on redundant configuration.

2.2.1 Expansion of non-redundant configuration

The flow of the expansion procedure of PCI cards for non-redundant configuration is as follows.
Please refer to "Chapter 3 File Devices" and "Chapter 4 Network Devices" for detailed expansion procedure.

File devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), stop the daemons.
3. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
4. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
5. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 2, restart the stopped high-level products.
6. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), start the daemons.
7. Preparation to recognize devices for Fibre Channel
   If you use SAN management function, preparation to recognize devices.
8. Adding the setting of drivers
   a. Adding the setting of the PCI card drivers

For file drivers, add the setting of the PCI card drivers.
- b. Adding the setting of the device drivers
    For file drivers, add the setting of the device drivers.
- c. Add configure of PCI card driver
    If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), bind the auto mapped target connected with the card.
9. Adding the setting of high-level products (services)
   Add the setting of the high-level products with the expanded PCI cards.
10. Starting the high-level products (services)
   Start the high-level products using the expanded PCI cards.

Network devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
3. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
4. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 2, restart the stopped high-level products.
5. Expanding the devices
   Connect the devices to the expanded PCI cards.
6. Adding the setting of drivers
    - a. Adding the setting of the PCI card drivers
        For file drivers, add the setting of the PCI card drivers.
    - b. Adding the setting of the device drivers
        For file drivers, add the setting of the device drivers.
7. Adding the setting of high-level products (services)
   Add the setting of the high-level products with the expanded PCI cards.
8. Starting the high-level products (services)
   Start the high-level products using the expanded PCI cards.

2.2.2 Expansion of new redundant configuration

The flow of the expansion procedure of PCI cards for new redundant configuration is as follows.
Please refer to "Chapter 3 File Devices" and "Chapter 4 Network Devices" for detailed expansion procedure.

File devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), stop the daemons.
3. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
4. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
5. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 3, restart the stopped high-level products.
6. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), start the daemons.
7. Preparation to recognize devices for Fibre Channel
   If you use SAN management function, preparation to recognize devices.
8. Adding the setting of drivers
    - a. Adding the setting of the PCI card drivers
        For file drivers, add the setting of the PCI card drivers.
    - b. Adding the setting of the device drivers
        For file drivers, add the setting of the device drivers.
    - c. Add configure of PCI card driver
        If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), bind the auto mapped target connected with the card.

9. Setup of the redundant configuration
   Define the environment setting and start the use of the new expanded redundant configuration.

10. Adding the setting of high-level products (services)
    Add the setting of the high-level products with the expanded PCI cards.
11. Starting the high-level products (services)
    Start the high-level products using the expanded PCI cards.

Network devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
3. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
4. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 2, restart the stopped high-level products.
5. Expanding the devices
   Connect the devices to the expanded PCI cards.
6. Adding the setting of drivers
     a. Adding the setting of the PCI card drivers
        For file drivers, add the setting of the PCI card drivers.
     b. Adding the setting of the device drivers
        For file drivers, add the setting of the device drivers.
7. Setup of the redundant configuration
   Define the environment setting and start the use of the new expanded redundant configuration.
8. Adding the setting of high-level products (services)
   Add the setting of the high-level products with the expanded PCI cards.
9. Starting the high-level products (services)
   Start the high-level products using the expanded PCI cards.

2.2.3 Expansion of PCI cards to redundant configuration

The flow of the expansion procedure of PCI cards for existing redundant configuration to reinforce redundancy is as follows.
Please refer to "Chapter 3 File Devices" and "Chapter 4 Network Devices" for detailed expansion procedure.

File devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), stop the daemons.
3. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
4. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
5. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 3, restart the stopped high-level products.
6. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), start the daemons.
7. Preparation to recognize devices for Fibre Channel
   If you use SAN management function, preparation to recognize devices.
8. Adding the setting of drivers
     a. Adding the setting of the PCI card drivers
        For file drivers, add the setting of the PCI card drivers.
     b. Adding the setting of the device drivers
        For file drivers, add the setting of the device drivers.
     c. Add configure of PCI card driver
        If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), bind the auto mapped target connected with the card.
9. Attaching to the redundant configuration

Attach the I/O device paths and interfaces of the expanded PCI cards to the existing redundant configuration.
10. Switching over active paths
    If necessary, switch over the active paths to the expanded PCI cards.

Network devices procedures

1. Reserving the definition of I/O devices that are expected to expand
   In case of expanding file devices by using DR on Solaris 8 system, need to reserve the definition of I/O devices that are expected to expand before system operation.
   Please confirm the definition of I/O devices before the start of operation in this case.
2. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards and detach them.
3. Expanding the PCI cards
   Expand the PCI cards on the choosed system boards and mount the system boards.
4. Attaching the system boards
   Attach the system boards equipped with the expanded PCI cards and enable the use of the PCI cards.
   In case of detaching the system boards in step 2, restart the stopped high-level products.
5. Expanding the devices
   Connect the devices to the expanded PCI cards.
6. Adding the setting of drivers
       a. Adding the setting of the PCI card drivers
          For file drivers, add the setting of the PCI card drivers.
       b. Adding the setting of the device drivers
          For file drivers, add the setting of the device drivers.
7. Attaching to the redundant configuration
   Attach the I/O device paths and interfaces of the expanded PCI cards to the existing redundant configuration.
8. Switching over active paths
   If necessary, switch over the active paths to the expanded PCI cards.

Chapter 3 File Devices

This chapter provides the detail procedure of replacement or expansion of PCI cards for file devices by using DR.

Please refer to "Dynamic Reconfiguration User's Guide" for details of the drc(1M) command and the drcstat(1M) command used in procedure of this chapter.

And refer to the each redundant software manual for more details on redundant configuration of PCI cards.

3.1 Replacement Procedure

This section explains the procedure for replacement of PCI cards for non-redundant and redundant configurations by using DR.

3.1.1 Replacement of non-redundant configuration

When the PCI cards are needed to be replaced in non-redundant configuration without using software that controls the multipath, it is necessary to stop all the high-level products (services) as applications that are using these PCI cards on the system boards equipped with the PCI cards and the connected devices.

The replacement procedures of PCI cards for non-redundant configuration are below.

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   > # **/etc/rc0.d/K10ElxRMSrv stop** <Return>
   > # **/etc/rc0.d/K10ElxDiscSrv stop** <Return>

2. Locating the PCI cards and the system boards
   Using the following procedures, locate the system boards equipped with the faulty PCI cards and the all connected devices.

   a. Locate the path interfaces connected the faulty PCI cards with I/O devices from the WARNING messages information output to the console.
      The following example shows that **glm2** is the path interface connected the faulty PCI card with I/O device.

      >   :
      > WARNING: /pci@80,4000/scsi@2 (**glm2**):
      > invalid intcode=fe00
      >   :
      > WARNING: /pci@80,4000/scsi@2/sd@3,0 (sd20):
      > SCSI transport failed: reason 'reset': giving up
      >   :

      If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), the messages are shown as follows.

      >   :
      > WARNING: lpfc0:INe:Adapter Hardware Error
      > :WARNING: /pci@89,4000/fibre-channel@2/sd@3,0 (sd20):
      > SCSI transport failed: reason 'reset': giving up
      >   :

      Exec the following command and check the physical path name.

      > # **grep lpfc /etc/path_to_inst** <Return>
      > "/pci@89,4000/fibre-channel@2" 0 "lpfc"

      The second value is instance number of each lpfc instance.

   b. Locate the system board numbers for the path interfaces connected the faulty PCI cards with I/O devices in step 2.a (glm2) and display a list of devices under the system boards.

      The system board number, in the following example of PRIMEPOWER PPAR environment, is the below underlined part: **XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet). Also, it is understood that the hme0 of network device ("/pci@83,4000/network@1,1" 0 "hme") excluding file devices (sd1,sd20) exists on the relevant system board from the results of execution of the second command.

      It is possible to ignore about se driver and scf driver (FJSVscfx) with the redundant configuration automatically.

Refer to "Enhanced Support Facility User's Guide" for details of se driver and scf driver.

```
# /opt/FJSVhwr/sbin/drcstat -device | grep /pci@80,4000/scsi@2 <Return>
00-PCI#0B "/pci@80,4000/scsi@2" 2 "glm"
00-PCI#0B "/pci@80,4000/scsi@2,1" 3 "glm"
00-PCI#0B "/pci@80,4000/scsi@2/sd@1,0" 1 "sd"
00-PCI#0B "/pci@80,4000/scsi@2/sd@3,0" 20 "sd"
# /opt/FJSVhwr/sbin/drcstat -device sb00 <Return>
00-PCI#0B "/pci@80,4000/scsi@2" 2 "glm"
00-PCI#0B "/pci@80,4000/scsi@2,1" 3 "glm"
00-PCI#0B "/pci@80,4000/scsi@2/sd@1,0" 1 "sd"
00-PCI#0B "/pci@80,4000/scsi@2/sd@3,0" 20 "sd"
00-ONBOARD "/pci@83,4000/ebus@1/FJSV,scfc@14,200000" 0 "FJSVscf2"
00-ONBOARD "/pci@83,4000/ebus@1/FJSV,se@14,400000" 0 "se"
00-ONBOARD "/pci@83,4000/network@1,1" 0 "hme"
```

If you use drc or drcstat commands on XPAR or Quad-XSB environment, specify -xpar option. See "Enhanced Support Facility User's Guide For Dynamic Reconfiguration" for details about drc or drcstat commands.

Following shows drcstat of SPARC Enterprise Quad-XSB environment(mpt).

```
# /opt/FJSVhwr/sbin/drcstat -device -xpar | grep /pci@0,600000/pci@0/scsi@1
<Return>
07-0 mpt            0 "/pci@0,600000/pci@0/scsi@1"
07-0 sd             0 "/pci@0,600000/pci@0/scsi@1/sd@0,0"
# /opt/FJSVhwr/sbin/drcstat -device sb07-0 -xpar    <Return>
07-0 bge            0 "/pci@0,600000/pci@0,1/network@1"
07-0 mpt            0 "/pci@0,600000/pci@0/scsi@1"
07-0 oplpanel       0 "/pci@8,4000/ebus@1/panel@14,280030"
07-0 scfd           0 "/pci@8,4000/ebus@1/scfc@14,200000"
07-0 sd             0 "/pci@0,600000/pci@0/scsi@1/sd@0,0"
07-0 su             0 "/pci@8,4000/ebus@1/serial@14,400000"
```

In the following sections, the detach procedure is explained by taking **sd20**("/pci@80,4000/scsi@2/sd@3,0" 20 "sd") as an example.

c. Determine the logical path under /dev/dsk corresponding to the /devices side path of sd20.
The following example shows that "**c2t3d0**" is the logical path corresponding to sd20.

```
# ls -l /dev/dsk | grep /pci@80,4000/scsi@2/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s0
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s1
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s2
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s3
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s4
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s5
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s6
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t3d0s7
-> ../../devices/pci@80,4000/scsi@2/sd@3,0:h
```

3. Stopping the high-level products (services)
Using the steps below, stop all the high-level products (services) that are using these PCI cards on the system boards equipped with the faulty PCI cards and the connected devices.

When connecting network devices that are using as step 2.b, refer to "Chapter 4 Network Devices" about how to stop them.

a. Please stop vold(1M).

```
# sh /etc/init.d/volmgt stop <Return>
```

b. Stop the use of the devices located in step 2.

[Disk devices (in file system operation)]

1) Determine the mount point of the target disk by using the logical path name (c2t3d0) in step 2.c.

```
# mount | grep c2t3d0 <Return>
/export/home on /dev/dsk/c2t3d0s3 setuid/read/write/largefiles on Mon
Sep 30 01:00:51 2002
/develop/firm on /dev/dsk/c2t3d0s0 setuid/read/write/largefiles on Mon
Sep 30 01:00:51 2002
/develop/drv on /dev/dsk/c2t3d0s1 setuid/read/write/largefiles on Mon
Sep 30 01:00:51 2002
/pub on /dev/dsk/c2t3d0s6 setuid/read/write/largefiles on Mon Sep 30
01:00:50 2002
```

2) Stop access to the target disk. To examine the process that uses the target file system, use the fuser(1M) command as follows.

```
# fuser -c /export/home <Return>
/export/home: 14967c 14571c 14493ctm 14020c 13828tm 13803c
13575c 13133c 13125tm 13107c 12682ctm 12066tm 12048c 11971ctm
11952ctm 11937c 11867c 11846c 349m
```

3) Unmount the target disk.

```
# umount /export/home <Return>
# umount /develop/firm <Return>
# umount /develop/drv <Return>
# umount /pub <Return>
```

[Disk devices (in raw access operation) / Tape devices]

1) Check the access status of the target disk (sd20) in step 2.b up to now. This step is same for tape devices.

```
# iostat -xc <Return>
extended device statistics cpu
device   r/s   w/s   kr/s   kw/s  wait  actv svc_t  %w   %b   us  sy  wt  id
sd      59.7   7.5  474.5   45.0   0.0   3.9  58.6   0   41    3   7  23  67
sd1      0.1   0.3    1.0    2.5   0.0   0.0  16.0   0    0
sd20     0.0   0.1    0.3    0.7   0.0   0.0  14.7   0    0
st82     0.0   0.0    0.0    0.0   0.0   0.0   0.0   0    0
nfs1     0.0   0.0    0.0    0.0   0.0   0.0   0.0   0    0
```

2) Stop access to the target disk from high-level products.
The access status to the target disk can be checked in the following way, the access status for one minute is checked.

This step is same for tape devices.

```
# sar -d 60 1 <Return>

SunOS machine0 5.8 Generic_108528-05 sun4u 10/02/02

17:56:00   device   %busy  avque  r+w/s  blks/s  avwait  avserv
17:57:00   nfs1       0     0.0      0      0      0.0     0.0
           sd0        2     0.3      2     37      0.0   145.5
           sd0,a      1     0.1      0      5      0.0   301.4
           sd0,b      0     0.0      0      9      0.0    31.5
           sd0,c      0     0.0      0      0      0.0     0.0
           sd0,d      1     0.0      0      4      0.0   126.8
           sd0,e      0     0.0      0      0      0.0     0.0
           sd0,f      1     0.1      1      6      0.0   120.9
           sd0,g      1     0.1      1     14      0.0   111.7
                          :
           sd20       0     0.0      0      0      0.0     0.0
```

sd20,a	0	0.0	0	0	0.0	0.0
sd20,c	0	0.0	0	0	0.0	0.0
sd20,g	0	0.0	0	0	0.0	0.0
:						
st82	0	0.0	0	0	0.0	0.0
:						

3) Stop (Detach) high-level products.
For details, refer to the manual for each product.

[Disk devices (swap device)]

1) Display the swap device list and check if the target disk of the logical path name (c2t3d0) in step 2.c is a swap device.

```
# swap -l <Return>
swapfile dev swaplo blocks free
/dev/dsk/c2t3d0s4 32,164 16 788384 683680
```

2) Delete the swap device.

```
# swap -d /dev/dsk/c2t3d0s4 <Return>
```

4. Detaching the system boards
Detach the system boards equipped with the faulty PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Unconfigured".
When the high-level products do not stop completely, the drc(1M) command terminates abnormally. So go back to step 3 again and stop the high-level products.

```
# /opt/FJSVhwr/sbin/drc -disconnect sb00 -keep <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
-- --   --------------    ---   --------   ----------   --------
00  0   Unconfigured      00      00          10           300
```

5. Replacing the PCI cards
Pull out the system boards detached in step 4 and replace the faulty PCI cards to replacement parts, then mount back the system boards and connect cable to devices. A certified service engineer takes charge of this work. When replacing the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
No procedure is necessary. Go to step 6.

When not using SAN management function of the above products
In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
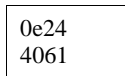-   Setting up the zoning by WWPN(World Wide Port Name) on SN200 series
-    Using the host zoning (Host Affinity) function of ETERNUS3000/4000/6000/8000,GR700/800 series
For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.
When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the replacement fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.
This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.
For instance, when the following seal puts on the replacement fibre channel card, the WWPN of the replacement card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.
-    If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.

- If the Host Zoning function of disk array device is used.

For details, see the document of each product.

To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

> IEEE:0000c9366037

Note

When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.

I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.

Please execute the change of the zoning setting after stopping backup processes.

6. Attaching the system boards

Using the steps below, attach the detached system board.

a. Attach the system boards equipped with the replaced PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   --------------    ---   --------   ----------   --------
00   0       Configured     00       00          10          300
```

b. When replacing the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:
When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

1) Refresh current condition on management window.

SAN (Storage Area Network) management function searches and indicates replaced PCI card.

Use "Inherit of Access Path" function on management window.

This function will adjust switch zoning and host affinity function of disk array device ETERNUS3000/4000/6000/8000,GR700/800 series with new WWPN of replaced PCI card.

See "Operation guide" or "User's Manual" of each product for details.

Note

When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.

I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.

Please execute the change of the zoning setting after stopping backup processes.

2) Reattach the system boards equipped with the replaced PCI cards with changed zoning setting by using the following commands.

```
# /opt/FJSVhwr/sbin/drc -disconnect sb00 -keep <Return>
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   --------------    ---   --------   ----------   --------
00   0       Configured     00       00          10          300
```

If you don't use SAN management function of the above products
No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
No procedure is necessary.

7. Restarting the high-level products (services)
   Using the steps below, restart the stopped high-level products.
   When stopping network devices in step 3, refer to "Chapter 4 Network Devices" about how to restart them.

   a. Please start vold(1M).

   > **# sh /etc/init.d/volmgt start** <Return>

   b. Restart the use of the devices stopped in step 3.b.
      [Disk devices (in file system operation)]
      · Mount the unmounted file systems and restart the use.

      > **# mount -F ufs /dev/dsk/c2t3d0s3 /export/home** <Return>
      > **# mount -F ufs /dev/dsk/c2t3d0s0 /develop/firm** <Return>
      > **# mount -F ufs /dev/dsk/c2t3d0s1 /develop/drv** <Return>
      > **# mount -F ufs /dev/dsk/c2t3d0s6 /pub** <Return>

      [Disk devices (in raw access operation) / Tape devices]
      · Reactivate high-level products and restart.
        For details, refer to the manual for each product.

      [Disk devices (swap device)]
      · Add the swap devices and restart the use.

      > **# /sbin/swapadd -2** <Return>

8. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   > **# /etc/rc2.d/S99ElxRMSrv start** <Return>
   > **# /etc/rc2.d/S99ElxDiscSrv start** <Return>

3.1.2 Replacement of redundant configuration

When the PCI cards are needed to be replaced in redundant configuration with using software that controls the multipath, the PCI cards can be replaced without stopping the high-level products (services) as applications.

This section shows the replacement procedure of PCI cards for redundant configuration with using the following redundant software products.

· Multipath Disk Control (MPHD)
· Multipath Disk Control load balance option (MPLB)
· GR Multipath Driver (GRMPD)
· ETERNUS Multipath Driver (ETERNUS MPD)

In case of using the other redundant software products, refer to the manual for each product.

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   > **# /etc/rc0.d/K10ElxRMSrv stop** <Return>
   > **# /etc/rc0.d/K10ElxDiscSrv stop** <Return>

2. Locating the PCI cards and the system boards
   Using the following procedures, locate the system boards equipped with the faulty PCI cards and the all connected devices. The following procedure is described for MPHD/MPLB/GRMPD/ETERNUS MPD. If you use the redundancy software other than MPHD/MPLB/GRMPD/ETERNUS MPD, see the document for each product.
   If you use ETERNUS MPD, **mplbt** is displayed instead of **hddv**.

   a. Locate the path interfaces connected the faulty PCI cards with I/O devices from the WARNING messages information output to the console.
      The following example shows that **fjpfca3** is the path interface connected the faulty PCI card with I/O device.

      >   :
      > WARNING: /pci@80,4000/fibre-channel@1 (fjpfca3):
      > Hard Error : PCI DMA error.
      >   :
      > WARNING: /pci@80,4000/fibre-channel@1/hddv@1,0 (hddv1):
      > SCSI transport failed: reason 'reset': giving up
      >   :
      > NOTICE: mphd0: I/O path switchover succeeded.

```
/pci@80,4000/fibre-channel@1/hddv@1,0 =>
/pci@84,4000/fibre-channel@1/hddv@2,0
         :
```

In the following explanation we assume that above messages were printed out on the console.

b. Locate the system board numbers for the path interfaces connected the faulty PCI cards with I/O devices in step 1.a (fjpfca3) and display a list of devices under the system boards.
The system board number, in the following example of PRIMEPOWER PPAR environment, is the figure in the below underlined part: **XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).

Also, it is understood that the hme0 of network device ("/pci@83,4000/network@1,1" 0 "hme") excluding file devices (hddv1,hddv2,..) exists on the relevant system board from the results of execution of the second command.

It is possible to ignore about se driver and scf driver (FJSVscfx) with the redundant configuration automatically. Refer to "Enhanced Support Facility User's Guide" for details of se driver and scf driver.

```
# /opt/FJSVhwr/sbin/drcstat -device | grep /pci@80,4000/fibre-channel@1 <Return>
00-PCI#0B "/pci@80,4000/fibre-channel@1" 3 "fjpfca"
00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@1,0" 1 "hddv"
00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@1,1" 2 "hddv"
         :
# /opt/FJSVhwr/sbin/drcstat -device sb00 <Return>
00-PCI#0B "/pci@80,4000/fibre-channel@1" 3 "fjpfca"
00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@1,0" 1 "hddv"
00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@1,1" 2 "hddv"
         :
00-ONBOARD "/pci@83,4000/ebus@1/FJSV,scfc@14,200000" 0 "FJSVscf2"
00-ONBOARD "/pci@83,4000/ebus@1/FJSV,se@14,400000" 0 "se"
00-ONBOARD "/pci@83,4000/network@1,1" 0 "hme"
```

If you use drc or drcstat commands on XPAR or Quad-XSB environment, specify -xpar option. See "Enhanced Support Facility User's Guide For Dynamic Reconfiguration" for details about drc or drcstat comm.

Following shows drcstat of SPARC Enterprise Quad-XSB environment (mpt).

```
# /opt/FJSVhwr/sbin/drcstat -device -xpar | grep /pci@0,600000/pci@0/scsi@1
<Return>
07-0 mpt              0 "/pci@0,600000/pci@0/scsi@1"

07-0 sd               0 "/pci@0,600000/pci@0/scsi@1/sd@0,0"

# /opt/FJSVhwr/sbin/drcstat -device sb07-0 -xpar    <Return>
07-0 bge              0 "/pci@0,600000/pci@0,1/network@1"

07-0 mpt              0 "/pci@0,600000/pci@0/scsi@1"

07-0 oplpanel         0 "/pci@8,4000/ebus@1/panel@14,280030"

07-0 scfd             0 "/pci@8,4000/ebus@1/scfc@14,200000"

07-0 sd               0 "/pci@0,600000/pci@0/scsi@1/sd@0,0"
07-0 su               0 "/pci@8,4000/ebus@1/serial@14,400000"
```

In the following, sections the detach procedure is explained by taking **hddv1** ("/pci@80,4000/fibre-channel@1/hddv@1,0" 1 "hddv") as an example.

c. Find hddv1 with the "offline fail" status from the results of execution of the iompadm command and determine the logical path name corresponding to the faulty path connected hddv1 (the character string from 'c' to 'd' under /dev/rdsk).

The following example is the results of execution of MPHD and shows that "**c3t1d0**" is the logical path name corresponding to the faulty path.
In case of using MPLB, GRMPD or ETERNUS MPD, specify the "mplb" as -c option parameter of the iompadm command.
In case of updated GRMPD from MPHD, specify the "mphd" as -c option parameter of the iompadm command.

```
# /usr/opt/FJSViomp/bin/iompadm -c mphd -p info <Return>
                :
IOMP: /dev/FJSVmphd/fiomp/adm2
-> /devices/pseudo/mphd@2:adm
Element:
/dev/rdsk/c3t1d0s2 offline fail block "target completed hard reset sequence [GR7104546-
010000-00-00-30] (hddv1)"
-> /devices/pci@80,4000/fibre-channel@1/hddv@1,0:c,raw
/dev/rdsk/c2t2d0s2 online active block "good status with active [GR7104546-
010000-01-01-32] (hddv15)"
-> /devices/pci@84,4000/fibre-channel@1/hddv@2,0:c,raw
Node:
   /dev/FJSVmphd/rdsk/mphd2s0
   /dev/FJSVmphd/rdsk/mphd2s1
   /dev/FJSVmphd/rdsk/mphd2s2
   /dev/FJSVmphd/rdsk/mphd2s3
   /dev/FJSVmphd/rdsk/mphd2s4
   /dev/FJSVmphd/rdsk/mphd2s5
   /dev/FJSVmphd/rdsk/mphd2s6
   /dev/FJSVmphd/rdsk/mphd2s7
Function:
   MPmode=false
   AutoPath=true
   Block=true
   NeedSync=false
      :
```

3. Disconnect from redundant system
   In the case of MPHD/MPLB/GRMPD/ETERNUS MPD, the path is disconnected from redundant system automatically when the system boards are detached.If you use the redundancy software other than MPHD/MPLB/GRMPD/ETERNUS MPD, see the document for each product.

4. Detaching the system boards
   Detach the system boards equipped with the faulty PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Unconfigured".
   In addition, check if the status of the all LUNs (Logical Unit Number) under the logical path in step 2.c is changed to "unconfigured disconnected".
   In case of detaching an active path of the active/standby configuration, the status of the standby side path is changed to active automatically.

```
# /opt/FJSVhwr/sbin/drc -disconnect sb00 -keep <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   ---------------   ---   --------   ----------   --------
00   0    Unconfigured      00    00         10           300
# /usr/opt/FJSViomp/bin/iompadm -c mphd info | grep c3t1d <Return>
/dev/rdsk/c3t1d0s2 unconfigured disconnected unblock "changing parts with power supply
charged [GR7104546- 010000-00-00-30] (hddv1)"
/dev/rdsk/c3t1d1s2 unconfigured disconnected unblock "changing parts with power supply
charged [GR7104546- 010000-00-00-30] (hddv2)":
```

5. Replacing the PCI cards
   Pull out the system boards detached in step 4 and replace the faulty PCI cards to new parts, then mount back the system boards and connect cable to devices. A certified service engineer takes charge of this work. When replacing the fibre channel PCI cards, the steps below are required.

   [for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:
   When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
   No procedure is necessary. Go to step 6.

   When not using SAN management function of the above products
   In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
   - Setting up the zoning by WWPN(World Wide Port Name) on SN200 series
   - Using the host zoning (Host Affinity) function of ETERNUS3000/4000/6000/8000,GR700/800 series
     For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide".

If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.

When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the replacement fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate. This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number. For instance, when the following seal puts on the replacement fibre channel card, the WWPN of the replacement card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.
- If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
- If the Host Zoning function of disk array device is used.

    For details, see the document of each product.

    To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form. For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

Note

When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

6. Attaching the system boards
    Using the steps below, attach the detached system board.

    a. Attach the system boards equipped with the replaced PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

    ```
    # /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
    # /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
    SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
    --   --   --------------    ---   --------   ----------   --------
    00    0     Configured       00      00          10          300
    ```

    b. When replacing the fibre channel PCI cards, the steps below are required.

    [for PCI Fibre Channel (PW008FC3U/PW008FC2U/ GP7B8FC1U)]:
    When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

    Refresh current condition on management window.
    SAN (Storage Area Network) management function searches and indicates replaced PCI card.
    Use "Inherit of Access Path" function on management window.
    This function will adjust switch zoning and host affinity function of disk array device ETERNUS3000/4000/6000/8000,GR700/800 series with new WWPN of replaced PCI card.
    See "Operation guide" or "User's Manual" of each product for details.

    Note

    When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
    I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
    Please execute the change of the zoning setting after stopping backup processes.

    Reattach the system boards equipped with the replaced PCI cards with changed zoning setting by using the following commands.

    ```
    # /opt/FJSVhwr/sbin/drc -disconnect sb00 -keep <Return>
    # /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
    ```

```
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB BN Status (Detail) PID Next_PID Board_Type CPU(MHz)
-- -- --------------- --- -------- ---------- -------
00 0 Configured 00 00 10 300
```

If you don't use SAN management function of the above products

No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:

No procedure is necessary.

c. Check if the status of the all LUNs under the logical path in step 1.c is changed to "online active" or "online standby".
When switching over the active path in step 2, switch back to the original active side automatically.

```
# /usr/opt/FJSViomp/bin/iompadm -c mphd info | grep c3t1d <Return>
/dev/rdsk/c3t1d0s2 online active block "good status with active [GR7104546-
010000-00-00-30] (hddv1)"
/dev/rdsk/c3t1d1s2 online active block "good status with active [GR7104546-
010000-00-00-30] (hddv2)"
:
```

7. Connect to redundant system
In the case of MPHD/MPLB/GRMPD/ETERNUS MPD, the path is connected to redundant system automatically when the system boards are attached. If you use the redundancy software other than MPHD/MPLB/GRMPD/ETERNUS MPD, see the document for each product.

8. Start the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

3.2 Expansion Procedure

This section explains the procedure for expansion of PCI cards for non-redundant and redundant configurations by using DR in case of Solaris 8 and Solaris 9 or later.

The difference of the both procedures is as follows.
In Solaris 8, it is necessary to reserve the definition of I/O devices that are expected to expand beforehand before system operation, but in Solaris 9 or later, this procedure is not required..

3.2.1 Solaris 8

This section explains the procedure for expansion of PCI cards on Solaris 8 system.

To expand by using DR on Solaris 8, it is necessary to reserve the definition of I/O devices that are expected to expand beforehand and restart the system.
When the I/O devices to expand are already defined, the reserved definition is not required. So omit the following procedure of step 1.

If you use Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), ensure the automap function is effective. Boot the system after modifying lpfc.conf.

```
# vi /kernel/drv/lpfc.conf <Return>
:
# If automap is set, SCSI IDs for all FCP nodes without
# persistent bindings will be automatically generated.
# If new FCP devices are added to the network when the system is down,
# there is no guarantee that these SCSI IDs will remain the same
# when the system is booted again.
# The bind method of the port is used as the binding method of
# automap devices to preserve SCSI IDs between link down and link up.
# If automap is 0, only devices with persistent bindings will be
# recognized by the system.
automap=1; <- set to 1
```

3.2.1.1 Expansion of non-redundant configuration

This section shows the flow of the procedure PCI cards expansion for non-redundant configuration on Solaris 8 system.

1. Reserving the definition of I/O devices that are expected to expand
   Using the following procedures for each device type, reserve the definition of I/O devices that are expected to expand.
   When the I/O devices are not defined, it is not possible to expand by using DR.
   So please define them before system operation is started.

   [Disk Devices/Tape Devices (Solaris:sd/st)]
   In the following, the procedure is explained by taking the reserved definition of the disk device (target=2 lun=0) as an example.
   For tape devices, execute the same operations with replacing "sd" of the following procedures to "st".

   a. Refer to the file "/kernel/drv/sd.conf", and check if the "target=2, lun=0" is defined.
      If this definition does not exist, add this, and if this definition is treated as comment, remove the comment symbols.

   ```
   ·  [Disk Devices]
      # vi /kernel/drv/sd.conf <Return>
      :
      name="sd" class="scsi"
      target=0 lun=0;
      :
      name="sd" class="scsi"  <------ If undefined, add this definition
      target=2 lun=0;  <------ or remove the comment symbols.
      :
   ·  [Tape Devices]
      # vi /kernel/drv/st.conf <Return>
      :
      name="st" class="scsi"
      target=0 lun=0;
      :
      name="st" class="scsi"  <------ If undefined, add this definition
      target=5 lun=0;  <------ or remove the comment symbols.
      :
   ```

   b. In case of updating the file "/kernel/drv/sd.conf" in step 1.a, reconfigure the kernel and restart the system.
      In case of not updating in step 1.a, this procedure is not required.

   ```
   # touch /reconfigure <Return>
   # /usr/sbin/shutdown -y -i6 -g0 <Return>
   ```

   [Disk Array devices (Hard Disk Driver:hddv)]
   In the following, the procedure is explained by taking the reserved definition of the disk array device (target=3 lun=0 to 2) as an example.
   - In case of first reserved expansion of disk array devices, begin from step 1.a.
   - In case of second or later, begin from step 1.e.

   a. Check the presence of the file "/kernel/drv/hddv.conf".
      If it does not exist, this case is "Hard Disk Driver first installation", so go to step 1.c, and if it exists, this case is "non-hot expansion settings", so go to step 1.b.

   ```
   [In case of not existing (first installation)] --> go to step 1.c
   # ls /kernel/drv/hddv.conf <Return>
   /kernel/drv/hddv.conf: No such file or directory

   [In case of existing (non-hot expansion settings)] --> go to step 1.b
   # ls /kernel/drv/hddv.conf <Return>
   /kernel/drv/hddv.conf
   ```

   b. After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

   ```
   # hddvadm -i <Return>
   # ls /kernel/drv/hddv.conf <Return>
   /kernel/drv/hddv.conf: No such file or directory
   ```

   c. Using the following command, create the hddv.conf file for reserved expansion function.

The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

```
·  [First installation] --> go to step 1.e
   # hddvadm -M <Return>
·  [Non-hot expansion settings] --> go to step 1.d
   # hddvadm -M <Return>
   already          ID=          1          exists.
   /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720
```

d. When the reserved expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf.
So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf.

The below example shows the duplicated definition of target=1.

```
# vi /kernel/drv/sd.conf <Return>
  :
name="sd" class="scsi"
target=0 lun=0;
  :
#name="sd" class="scsi"          <------
target=1 lun=0;
#name="sd" class="scsi"           Delete or comment out
target=1 lun=1;                   the duplicated definitions of   sd   and
                                  hddv drivers.
#name="sd" class="scsi"
target=1 lun=2;                  <------
  :
```

But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver.
In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

e. Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of reserved expansion and using in non-hot expansion settings.
If the definition of LUNs that are expected to expand is found, because of second or later execution of reserved expansion, it is not required to execute the procedures from step 1.f to 1.g.

The below example shows registrations of reserved expansion targets (target=3, lun=0 to 2) and disk array device GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
  :
#name="hddv" class="scsi" target=0 lun=0;
  :
#name="hddv" class="scsi" target=0 lun=7;
  :
name="hddv" class="scsi" target=1 lun=0;     <------
name="hddv" class="scsi" target=1 lun=1;       Remove the comment symbols of using LUNs
name="hddv" class="scsi" target=1 lun=2;     <------
  :
name="hddv" class="scsi" target=3 lun=0;     <------
name="hddv" class="scsi" target=3 lun=1;       Remove the comment symbols of
name="hddv" class="scsi" target=3 lun=2;     <------ LUNs that are expected to expand
#name="hddv" class="scsi" target=3 lun=3;
  :
```

f. Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 1.d.
Also, the following example is execution when the FJSVhddv package is installed to /opt.

The placed path of the hddvchk_conf command changes by installed directory.

```
·  [Check OK] --> go to step 1.g
   # /opt/FJSVhddv/bin/hddvchk_conf <Return>
```

> /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be correct
> · **[Check NG]** --> go back to step 1.d
> **# /opt/FJSVhddv/bin/hddvchk_conf** <Return>
> NG ID = [3]

　　　g. Reconfigure the kernel and restart the system.

> **# touch /reconfigure** <Return>
> **# /usr/sbin/shutdown -y -i6 -g0** <Return>

2. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

> **# /etc/rc0.d/K10ElxRMSrv stop** <Return>
> **# /etc/rc0.d/K10ElxDiscSrv stop** <Return>

3. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards of expansion target and detach the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
   This procedure is not required when expanding the new system boards together.

4. Expanding the PCI cards
   Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work.
   When expanding the fibre channel PCI cards, the steps below are required.

   [for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:
   　　When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

   　　　No procedure is necessary. Go to step 6.

   　　When not using SAN management function of the above products

   　　　In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
   　　　-　　Setting up the zoning by WWPN on the fibre channel switch SN200 series
   　　　-　　Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series
   　　For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.
   　　When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.
   　　This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.
   　　For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

> 0e24
> 4061

   [for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
   　　To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.
   　　　-　　If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
   　　　-　　If the Host Zoning function of disk array device is used.
   　　For details, see the document of each product.
   　　To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.
   　　For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

> IEEE:0000c9366037

a. Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

> # **/opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre** \<Return>

b. Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.
A certified service engineer takes charge of this work.
In the following example, the expansion of PCI cards to the system board: **sb00** is explained.
The format of the system board is sb**XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).

Note
When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

5. Attaching the system boards
Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

In case of detaching the system boards in step 3, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 2.c in Section 3.1.2.

> # **/opt/FJSVhwr/sbin/drc -connect sb00** \<Return>
> # **/opt/FJSVhwr/sbin/drcstat -board sb00** \<Return>
>
> | SB | BN | Status (Detail) | PID | Next_PID | Board_Type | CPU(MHz) |
> |----|----|-----------------|-----|----------|------------|----------|
> | -- | -- | --------------- | --- | -------- | ---------- | -------- |
> | 00 | 0 | Configured | 00 | 00 | 10 | 300 |

6. Start the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

> # **/etc/rc2.d/S99ElxRMSrv start** \<Return>
> # **/etc/rc2.d/S99ElxDiscSrv start** \<Return>

7. Preparation to recognize devices for Fibre Channel
When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:
When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.
See "Operation guide" or "User's Manual" of each product for details.
Before using this function, the following step 8.a.1) and 8.a.2) [except fcp-bind-target setting] are necessary.
Moreover, begin from step 8.a.3) after executing this function.

When not using SAN management function of the above products
No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
No procedure is necessary.

Note
When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
Please execute the change of the zoning setting after stopping backup processes.

8. Adding the setting of drivers
Using the steps below, add the setting of drivers.
For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.
a. Adding the setting of the PCI card drivers
[SCSI drivers (Solaris:glm, FUJITSU PCI SCSI Adapter Driver)]

· Setting is not required.

[PCI Fibre Channel(PW008FC3U/PW008FC2U/GP7B8FC1U)]

1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the instance numbers of fjpfca driver for the expanded PCI cards.
The following example shows that fjpfca1 (instance number: 1) is added.
If the relation between the instance number and the slot position is necessary, locate it by blinking LED of the expanded PCI card with using the fc_adm command.

Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
  :
> 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
# /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
```

2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 8.a.1).

port (topology types, link speed)
In case of expanding the PCI cards of fabric connection, define this property.
In FC-AL connection, this definition is not required.

fcp-bind-target (binding target ID and WWN)
In case of expanding the disk array devices of fabric connection, define this property.
In FC-AL connection, this definition is not required.

max-throttle (the number of maximum SCSI command issues)
This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
The necessity and setting value of this property depend on the specification of the disk array devices, so refer to the manual of each disk array device.

The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1) and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
  :
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1"; <------ added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0"; <------ added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240"; <------ added
  :
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[Fibre Channel driver (PW028FC3*/PW028FC4*/PW028FC5*)]
Configuration is not required. Compare the output of prtpicl(1M) command with the output saved at 4.a and find the instance number of the added card.

b. Adding the setting of the device drivers
Using the following procedures for each I/O device type, add the setting of the device drivers.

[Disk Devices/Tape Devices (Solaris:sd/st)]
In the following, the procedure is explained by taking the expansion in step 5 after the reserved definition of the disk device (target=2 lun=0) in step 1 as an example.
For tape devices, execute the same operations with replacing "sd" of the following procedures to "st".

> 1) Notify the sd driver of the attachment of the expanded disk devices by using the following command.

```
# /usr/sbin/devfsadm <Return>
```

> 2) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded disk device.
> The following example shows that "**c2t2d0**" is the logical path name of the expanded disk device.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
    ·  [Disk Devices]
       # diff /tmp/drcstat.pre /tmp/drcstat.post | grep sd <Return>
       :
       > 00-PCI#0B "/pci@80,4000/scsi@2/sd@2,0" 10 "sd"
       # ls -l /dev/dsk | grep /pci@80,4000/scsi@2/sd@2,0 <Return>
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s0
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:a
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s1
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:b
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s2
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:c
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s3
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:d
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s4
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:e
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s5
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:f
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s6
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:g
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s7
       -> ../../devices/pci@80,4000/scsi@2/sd@2,0:h
    ·  [Tape Devices]
       # diff /tmp/drcstat.pre /tmp/drcstat.post | grep st <Return>
       :
       > 00-PCI#0B "/pci@80,4000/scsi@2/st@5,0" 1 "st"
       # ls -l /dev/rmt | grep /pci@80,4000/scsi@2/st@5,0 <Return>
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1b
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:b
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1bn
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:bn
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1c
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:c
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cb
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:cb
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cbn
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:cbn
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cn
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:cn
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1h
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:h
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hb
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:hb
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hbn
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:hbn
       lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hn
       -> ../../devices/pci@80,4000/scsi@2/st@5,0:hn
```

> 3) For disk devices, label a disk and perform the setting of partitions (slices) for the logical path names in step 8.b.2) by using the format command.

For tape devices, this procedure is not required.

[Disk Array devices (Hard Disk Driver:hddv)]
In the following, the procedure is explained by taking the expansion in step 5 after the reserved definition of the disk array device (target=3 lun=0 to 2) in step 1 as an example.

1) Check if no duplicate definitions exist in the sd.conf and hddv.conf files again, because the situation could be changed since step 1.

The message example in "Check NG" shows the duplicate definition, so go back to step 1.d.

```
·  [Check OK] --> go to step 8.b.2)
   # /opt/FJSVhddv/bin/hddvchk_conf <Return>
   /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be correct
·  [Check NG] --> go back to step 1.d
   # /opt/FJSVhddv/bin/hddvchk_conf <Return>
   NG ID = [ 3 ]
```

2) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# /usr/sbin/hddvadmdr <Return>
```

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.
The following example shows that "**c3t3d0**" is the logical path name of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**" and "**c3t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
```

4) Label a disk and perform the setting of partitions (slices) for the logical path names in step 8.b.3) by using the format(1M) command.

c. Add configure of PCI card driver
[SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
    No procedure is necessary.

[Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
    No procedure is necessary.

[Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
    Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time. In

the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 1
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)

MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5 <Return>

PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5 <Return>

Automapped FCP Nodes:
                   Node   Target   WWPN                   WWNN
                   ----   ------   ---------              --------
Automapped FCP Node         2    50-06-0e-80-00-10-04-92   50-06-0e-80-00-10-04-92

Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y <Return>

Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID
0. Cancel
Enter Choice => 2 <Return>
```

9. Adding the setting of high-level products (services)
   Add the setting of the high-level products (services) by using the logical path name in step 8.b.

   [Disk and Disk Array devices (in file system operation)]
   - Create the file systems.
     To mount automatically on bootup, edit /etc/vfstab file and add the below entry.

   ```
   # newfs /dev/rdsk/c2t2d0s6 <Return>
   # vi /etc/vfstab <Return>
          :
   /dev/dsk/c2t2d0s6 /dev/rdsk/c2t2d0s6 /mnt ufs 1 yes -
          :
   ```

   [Disk and Disk Array devices (in raw access operation)/Tape devices]
   - Execute the setting addition of the high-level products.
     For details, refer to the manual for each product.

   [Disk and Disk Array devices (swap device)]
   - Add the swap devices.
     To be available automatically on bootup, edit /etc/vfstab file and add the below entry.

   ```
   # swap -a /dev/dsk/c2t2d0s4 <Return>
   # vi /etc/vfstab <Return>
          :
   /dev/dsk/c2t2d0s4 - - swap - no -
   ```

```
            :
# swap -l <Return>
swapfile dev swaplo blocks free
            :
/dev/dsk/c2t2d0s4 32,164 16 788384 683680
```

10. Starting the high-level products (services)
    Start the high-level products (services) by using the logical path name in step 8.b.

   [Disk and Disk Array devices (in file system operation)]
   - Mount the file systems.

   ```
   # mount -F ufs /dev/dsk/c2t2d0s6 /mnt <Return>
   ```

   [Disk and Disk Array devices (in raw access operation)/Tape devices]
   - Start the high-level products.
     For details, refer to the manual for each product.

   [Disk and Disk Array devices (swap device)]
   - This procedure is not required.

3.2.1.2 Expansion of new redundant configuration

This section shows the flow of the procedure of PCI cards expansion for new redundant configuration on Solaris 8 system by taking the following redundant software products as examples.
   · Multipath Disk Control (MPHD)
   · Multipath Disk Control load balance option (MPLB)
   · GR Multipath Driver (GRMPD)
In case of using the other redundant software products, refer to the manual for each product.

1. Reserving the definition of I/O devices that are expected to expand
   In the following, the procedure is explained by taking the reserved definition of disk array devices with redundant controller configuration (target=3 lun=0 to 2) as an example.
   When the disk array devices are not defined, it is not possible to expand by using DR.
   So please define them before system operation is started.

   [If you use Solaris:sd]
   - In case of first reserved expansion of disk array devices, begin from step 1.a.
   - In case of second or later, begin from step 2.

      a. Ensure target=3,lun=0 target=3,lun=1 target=3,lun=3 are defined in /kernel/drv/sd.conf. If they are not defined or commented, modify /kernel/drv/sd.conf.

      ```
      # vi /kernel/drv/sd.conf<Return>
      :
      name="sd" class="scsi"
      target=0 lun=0;
      :
      name="sd" class="scsi" <------ If undefined, add this definition
      target=3 lun=0; <------ or remove the comment symbols.
      name="sd" class="scsi"
      target=3 lun=1;
      name="sd" class="scsi"
      target=3 lun=2;
      :
      ```

      b. Boot the system and reconfigure the kernel.

      ```
      # touch /reconfigure <Return>
      # /usr/sbin/shutdown -y -i6 -g0 <Return>
      ```

   [If you use hddv]
   - In case of first reserved expansion of disk array devices, begin from step 1.a.
   - In case of second or later, begin from step 1.e.

a. Check the presence of the file "/kernel/drv/hddv.conf".
If it does not exist, this case is "Hard Disk Driver first installation", so go to step 1.c, and if it exists, this case is "non-hot expansion settings", so go to step 1.b.

```
[In case of not existing (first installation)] --> go to step 1.c
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory

[In case of existing (non-hot expansion settings)] --> go to step 1.b
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
```

b. After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

```
# hddvadm -i <Return>
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory
```

c. Using the following command, create the hddv.conf file for reserved expansion function.
The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

```
·  [First installation] --> go to step 1.e
   # hddvadm -M <Return>

·  [Non-hot expansion settings] --> go to step 1.d
   # hddvadm -M <Return>
   already          ID=              1              exists.
   /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720
```

d. When the reserved expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf. So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf.
   The below example shows the duplicated definition of target=1.

```
# vi /kernel/drv/sd.conf <Return>
:
name="sd" class="scsi"
target=0 lun=0;
:
#name="sd" class="scsi"        <------
target=1 lun=0;
#name="sd" class="scsi"          Delete or comment out
target=1 lun=1;                   the duplicated definitions of sd and hddv drivers.
#name="sd" class="scsi"
target=1 lun=2;                  <------
:
```

But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver. In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

e. Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of reserved expansion and using in non-hot expansion settings.
When the target number of each disk array device controller for redundant configuration is different, add each target number definition at the same time.
If the definitions of LUNs that are expected to expand is found, because of second or later execution of reserved expansion, it is not required to execute the procedures from step 1.f to 1.g.

The below example shows registrations of reserved expansion targets (target=3, lun=0 to 2) and disk array device GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
:
#name="hddv" class="scsi" target=0 lun=0;
:
```

```
#name="hddv" class="scsi" target=0 lun=7;
:
name="hddv" class="scsi" target=1 lun=0;    <------
name="hddv" class="scsi" target=1 lun=1;    Remove the comment symbols of using LUNs
name="hddv" class="scsi" target=1 lun=2;    <------
:
name="hddv" class="scsi" target=3 lun=0;    <------
name="hddv" class="scsi" target=3 lun=1;      Remove the comment symbols of
name="hddv" class="scsi" target=3 lun=2;    <------ LUNs that are expected to expand
#name="hddv" class="scsi" target=3 lun=3;
:
```

    f. Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 1.d.
Also, the following example is execution when the FJSVhddv package is installed to /opt.

The placed path of the hddvchk_conf command changes by installed directory.

> · **[Check OK]** --> go to step 1.g
> **# /opt/FJSVhddv/bin/hddvchk_conf** <Return>
> /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be correct
> · **[Check NG]** --> go back to step 1.d
> **# /opt/FJSVhddv/bin/hddvchk_conf** <Return>
> NG ID = [3]

    g. Reconfigure the kernel and restart the system.

> **# touch /reconfigure** <Return>
> **# /usr/sbin/shutdown -y -i6 -g0** <Return>

2. Stop the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

> **# /etc/rc0.d/K10ElxRMSrv stop** <Return>
> **# /etc/rc0.d/K10ElxDiscSrv stop** <Return>

3. Detaching the system boards
In case of expanding PCI cards on the existing redundant system boards, choose the system boards of expansion target and detach the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
This procedure is not required when expanding the new system boards together.

4. Expanding the PCI cards
Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work.
In expansion of new redundant configuration, it is necessary to expand two or more PCI cards on different system boards, then execute from step 4 to 5 every expansion PCI cards.
When expanding the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

No procedure is necessary. Go to step 6.

When not using SAN management function of the above products

In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
-     Setting up the zoning by WWPN on the fibre channel switch SN200 series
-     Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series
For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.
When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card

on front plate.

This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.

For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:

To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.

- If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
- If the Host Zoning function of disk array device is used.

For details, see the document of each product.

To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

a. Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

> **# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre** <Return>

b. Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.
A certified service engineer takes charge of this work.
In the following example, the expansion of PCI cards to the system board: sb00 is explained.
The format of the system board is sbXY (X represents the cabinet number, Y represents the system board slot number in the cabinet).

Note

When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

5. Attaching the system boards
Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

In case of detaching the system boards in step 3, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 6.c in Section 3.1.2.

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB BN Status (Detail) PID Next_PID Board_Type CPU(MHz)
-- -- --------------- --- -------- ---------- --------
00 0 Configured 00 00 10 300
```

6. Start the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

7. Preparation to recognize devices for Fibre Channel
When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.
See "Operation guide" or "User's Manual" of each product for details.
Before using this function, the following step 8.a.1) and 8.a.2) [except fcp-bind-target setting] are necessary.
Moreover, begin from step 8.a.3) after executing this function.

If you don't use SAN management function of the above products
No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
No procedure is necessary.

Note
When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
Please execute the change of the zoning setting after stopping backup processes.

8. Adding the setting of drivers
   Using the steps below, add the setting of drivers.
   For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.

   a. Adding the setting of the PCI card drivers

      [SCSI drivers (Solaris:glm)]
      · Setting is not required.

      [PCI Fibre Channel(PW008FC3U/PW008FC2U/GP7B8FC1U)]
      1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the instance numbers of fjpfca driver for the expanded two or more PCI cards.
      The following example shows that fjpfca1 (instance number: 1) is one of the expanded PCI cards.
      Locate the relation between the instance number and the slot position by blinking LED of the expanded PCI card with using the fc_adm command.
      Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
:
# /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
```

      2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 8.a.1).

      port (topology types, link speed)
      In case of expanding the PCI cards of fabric connection, define this property.
      In FC-AL connection, this definition is not required.

      fcp-bind-target (binding target ID and WWN)
      In case of expanding the disk array devices of fabric connection, define this property.
      In FC-AL connection, this definition is not required.

      max-throttle (the number of maximum SCSI command issues)
      This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
      The necessity and setting value of this property depend on the specification of the disk array devices, so refer to the manual of each disk array device.

      The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1) and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
:
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1"; <------ added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0"; <------ added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240"; <------ added
:
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
No procedure is necessary.
Compare the output of prtpicl(1M) command with the output saved at 4.b and find the instance number of the added card.

b. Adding the setting of the device drivers
In the following, the procedure is explained by taking the expansion in step 7 after the reserved definition of the disk array device with redundant controller configuration (target=3 lun=0 to 2) in step 1 as an example.

[Solaris : sd]

1) Execute the following command to make the sd driver set up the added disk device.

```
# /usr/sbin/devfsadm <Return>
```

2) After saving the execution result of the prtpicl(1M) command, take the difference between the result and the information obtained in 4.a. and get the physical path name of additional disk device, then get the logical path name under /dev/dsk. The following example shows that "c3t3d0" and "c4t3d0" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# prtpicl -v > /tmp/prtpicl.post <Return>
# diff /tmp/prtpicl.pre /tmp/prtpicl.post | grep devfs-path | grep hddv <Return>
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,2
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,2
# ls -l /dev/dsk | grep /pci@8d,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:h
```

```
# ls -l /dev/dsk | grep /pci@89,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@89,2000/fibre-channel@1/sd@3,0:a
          :
```

3) Label a disk and perform the setting of partitions (slices) for the logical path names in step 6.b.3) by using the format(1M) command.

[Disk array device (hard disk driver : hddv)]

1) Check if no duplicate definitions exist in the sd.conf and hddv.conf files again, because the situation could be changed since step 1.
The message example in "Check NG" shows the duplicate definition, so go back to step 1.d.

```
[Check OK] --> go to step 8.b.2)
# /opt/FJSVhddv/bin/hddvchk_conf <Return>
/kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be
correct[Check NG] --> go back to step 1.d
# /opt/FJSVhddv/bin/hddvchk_conf <Return>
NG ID = [ 3 ]
```

2) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# /usr/sbin/hddvadmdr <Return>
```

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.

The following example shows that "**c3t3d0**" and "**c4t3d0**" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,0" 13 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,1" 14 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,2" 15 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
# ls -l /dev/dsk | grep /pci@8d,4000/fibre-channel@1/hddv@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@8d,4000/fibre-channel@1/hddv@3,0:a
          :
```

4) Label a disk and perform the setting of partitions (slices) for the logical path names in step 8.b.3) by using the format(1M) command.
It is sufficient to execute for one representative logical path name of each expanded LUN, so need not to execute for every all PCI cards.

c. Add configure of PCI card driver
[SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
No procedure is necessary.

[Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
No procedure is necessary.

[Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time. In the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 2
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)
Host Adapter 1 (lpfc9) is an LP9802 (Ready Mode)

MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5 <Return>

PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5 <Return>
0. lpfc11
1. lpfc9
Select an adapter => 0<Return>

Automapped FCP Nodes:
Node                 Target   WWPN                   WWNN
----                 ------   ---------              --------
Automapped FCP Node 3         50-06-0e-80-00-10-04-92   50-06-0e-80-00-10-04-92

Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y <Return>

Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID
0. Cancel
Enter Choice => 2 <Return>
```

9. Setup of the redundant configuration
Set up the new redundant configuration by using the following command. The following procedure is described for MPHD/MPLB/GRMPD. If you use the redundancy software other than MPHD/MPLB/GRMPD, see the document for each product.
In case of MPHD or MPLB2.1, specify the logical path names in step 8.b.3) as the command parameter, and need to execute the command every expanded LUNs.

The below italic part strings are the new configured path names of redundant software, and the underlined part strings are the each logical path names configuring the path of redundant software.

> · **[MPHD]**
>   **#   /usr/opt/FJSViomp/bin/iompadm   -c   mphd   new   /dev/rdsk/c3t3d0s2 /dev/rdsk/c4t3d0s2** <Return>
>   IOMP: /dev/FJSVmphd/fiomp/adm2
>   Node:
>   */dev/FJSVmphd/rdsk/mphd2s0*
>   */dev/FJSVmphd/rdsk/mphd2s1*
>   */dev/FJSVmphd/rdsk/mphd2s2*
>   */dev/FJSVmphd/rdsk/mphd2s3*
>   */dev/FJSVmphd/rdsk/mphd2s4*
>   */dev/FJSVmphd/rdsk/mphd2s5*
>   */dev/FJSVmphd/rdsk/mphd2s6*
>   */dev/FJSVmphd/rdsk/mphd2s7*
> · **[MPLB2.1]**
>   **# /usr/opt/FJSViomp/bin/iompadm -c mplb new /dev/rdsk/c3t3d0s2 /dev/rdsk/c4t3d0s2** <Return>
>   IOMP: /dev/FJSVmplb/fiomp/adm2
>   Node:
>   */dev/FJSVmplb/rdsk/mplb2s0*
>   */dev/FJSVmplb/rdsk/mplb2s1*
>   */dev/FJSVmplb/rdsk/mplb2s2*
>   */dev/FJSVmplb/rdsk/mplb2s3*
>   */dev/FJSVmplb/rdsk/mplb2s4*
>   */dev/FJSVmplb/rdsk/mplb2s5*
>   */dev/FJSVmplb/rdsk/mplb2s6*
>   */dev/FJSVmplb/rdsk/mplb2s7*
> · **[MPLB2.2 or later / GRMPD]**
>   **# /usr/sbin/mplbconfig -nv** <Return>
>   *** Phase 1: checking /dev/rdsk ***
>   *** Phase 2: checking multi path ***
>   *** Phase 3: analyzing path ***
>   Path : Action : Element path : LUN : Storage : Zone
>   mplb0 : exist : c1t4d0s2 c2t3d0s2 : 0 : GR720464f-12340001 :
>   :
>   <u>mplb8</u> : <u>new</u> : <u>c3t3d0s2</u> <u>c4t3d0s2</u> : 0 : GR8404550- 000213 :
>   :
>   **# /usr/sbin/mplbconfig -av** <Return>
>   :
>   IOMP: /dev/FJSVmplb/fiomp/adm8
>   Node:
>   */dev/FJSVmplb/rdsk/mplb8s0*
>   */dev/FJSVmplb/rdsk/mplb8s1*
>   */dev/FJSVmplb/rdsk/mplb8s2*
>   */dev/FJSVmplb/rdsk/mplb8s3*
>   */dev/FJSVmplb/rdsk/mplb8s4*
>   */dev/FJSVmplb/rdsk/mplb8s5*
>   */dev/FJSVmplb/rdsk/mplb8s6*
>   */dev/FJSVmplb/rdsk/mplb8s7*
>   :

10. Adding the setting of high-level products (services)
    Add the setting of the high-level products (services) by using the path names of redundant software in step 9.

    [File system operation]
    - Create the file systems.
      To mount automatically on bootup, edit /etc/vfstab file and add the below entry.

      > **# newfs /dev/FJSVmphd/rdsk/mphd2s6** <Return>
      > **# vi /etc/vfstab** <Return>
      >   :
      > /dev/FJSVmphd/dsk/mphd2s6 /dev/FJSVmphd/rdsk/mphd2s6 /mnt ufs 1 yes -
      >   :

    [Raw access operation]
    - Execute the setting addition of the high-level products.

For details, refer to the manual for each product.

[Swap device]
- Add the swap devices.
  To be available automatically on bootup, edit /etc/vfstab file and add the below entry.

```
# swap -a /dev/FJSVmphd/dsk/mphd2s4 <Return>
# vi /etc/vfstab <Return>
        :
/dev/FJSVmphd/dsk/mphd2s4 - - swap - no -
        :
# swap -l <Return>
swapfile dev swaplo blocks free
        :
/dev/FJSVmphd/dsk/mphd2s4 154,132 16 788384 683680
```

11. Starting the high-level products (services)
    Start the high-level products (services) by using the path names of redundant software in step 9.

[File system operation]
- Mount the file systems.

```
# mount -F ufs /dev/FJSVmphd/dsk/mphd2s6 /mnt <Return>
```

[Raw access operation]
- Start the high-level products.
  For details, refer to the manual for each product.

[Swap device]
- This procedure is not required.

3.2.1.3 Expansion of PCI cards to redundant configuration

This section shows the flow of the procedure of PCI cards expansion for existing redundant configuration to reinforce redundancy on Solaris 8 system by taking the following redundant software products as examples.

- Multipath Disk Control load balance option (MPLB)
  The expansion pattern of this section is supported in MPLB2.2 or later, and is not supported in MPLB2.1.
- GR Multipath Driver (GRMPD)

The expansion pattern of this section is not supported in MPHD.
In case of using the redundant software products except MPLB/GRMPD, refer to the manual for each product.

The procedures of the high-level products are not required for the expansion of PCI cards to existing redundant configuration.

1. Reserving the definition of I/O devices that are expected to expand
   In the following, the procedure is explained by taking the reserved definition of the expansion of disk array device controller (target=3 lun=0 to 2) to the existing disk array device as an example.
   When the disk array devices are not defined, it is not possible to expand by using DR.
   So please define them before system operation is started.

[If you use Solaris:sd]
- In case of first reserved expansion of disk array devices, begin from step 1.a.
- In case of second or later, begin from step 2.

a. Ensure target=3,lun=0 target=3,lun=1 target=3,lun=3 are defined in /kernel/drv/sd.conf. If they are not defined or commented, modify /kernel/drv/sd.conf.

```
# vi /kernel/drv/sd.conf<Return>
        :
name="sd" class="scsi"
target=0 lun=0;
        :
name="sd" class="scsi" <------ If undefined, add this definition
target=3 lun=0; <------ or remove the comment symbols.
name="sd" class="scsi"
target=3 lun=1;
name="sd" class="scsi"
target=3 lun=2;
        :
```

b. Boot the system and reconfigure the kernel.

```
# touch /reconfigure <Return>
# /usr/sbin/shutdown -y -i6 -g0 <Return>
```

[If you use hddv]
  - In case of first reserved expansion of disk array devices, begin from step 1.a.
  - In case of second or later, begin from step 1.e.

a. Check the presence of the file "/kernel/drv/hddv.conf".
   If it does not exist, this case is "Hard Disk Driver first installation", so go to step 1.c, and if it exists, this case is "non-hot expansion settings", so go to step 1.b.

```
·  [In case of not existing (first installation)] --> go to step 1.c
   # ls /kernel/drv/hddv.conf <Return>
   /kernel/drv/hddv.conf: No such file or directory
·  [In case of existing (non-hot expansion settings)] --> go to step 1.b
   # ls /kernel/drv/hddv.conf <Return>
   /kernel/drv/hddv.conf
```

b. After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

```
# hddvadm -i <Return>
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory
```

c. Using the following command, create the hddv.conf file for reserved expansion function.
   The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

```
·  [First installation] --> go to step 1.e
   # hddvadm -M <Return>
·  [Non-hot expansion settings)] --> go to step 1.d
   # hddvadm -M <Return>
   already              ID=            1            exists.
   /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720
```

d. When the reserved expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf.
   So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf
   The below example shows the duplicated definition of target=1.

```
# vi /kernel/drv/sd.conf <Return>
        :
name="sd" class="scsi"
target=0 lun=0;
        :
#name="sd" class="scsi"          <------
target=1 lun=0;
#name="sd" class="scsi"          Delete or comment out
target=1 lun=1;                    the duplicated definitions of sd and hddv drivers.
#name="sd" class="scsi"
target=1 lun=2;                  <------
        :
```

But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver.
In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

e. Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of reserved expansion and using in non-hot expansion settings.
   When the target numbers of two or more disk array device controllers are different, add each target number definition at the same time.
   If the definition of LUNs that are expected to expand is found, because of second or later execution of reserved expansion, it is not required to execute the procedures from step 1.f to 1.g.

   The below example shows registrations of reserved expansion targets (target=3, lun=0 to 2) and disk array device

GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
                  :
#name="hddv" class="scsi" target=0 lun=0;
                  :
#name="hddv" class="scsi" target=0 lun=7;
                  :
name="hddv" class="scsi" target=1 lun=0;    <------
name="hddv" class="scsi" target=1 lun=1;       Remove the comment symbols of using LUNs
name="hddv" class="scsi" target=1 lun=2;    <------
                  :
name="hddv" class="scsi" target=3 lun=0;    <------
name="hddv" class="scsi" target=3 lun=1;       Remove the comment symbols of
name="hddv" class="scsi" target=3 lun=2;    <------ LUNs that are expected to expand
#name="hddv" class="scsi" target=3 lun=3;
 :
```

   f. Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 1.d.

Also, the following example is execution when the FJSVhddv package is installed to /opt.
The placed path of the hddvchk_conf command changes by installed directory.

```
·  [Check OK] --> go to step 1.g
   # /opt/FJSVhddv/bin/hddvchk_conf <Return>
   /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be correct
·  [Check NG] --> go back to step 1.d
   # /opt/FJSVhddv/bin/hddvchk_conf <Return>
   NG ID = [ 3 ]
```

   g. Reconfigure the kernel and restart the system.

```
# touch /reconfigure <Return>
# /usrt/sbin/shutdown -y -i6 -g0 <Return>
```

2. Stop the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc0.d/K10ElxRMSrv stop <Return>
# /etc/rc0.d/K10ElxDiscSrv stop <Return>
```

3. Detaching the system boards
In case of expanding PCI cards on the existing system boards, choose the system boards of expansion target and detach the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
This procedure is not required when expanding the new system boards together.

4. Expanding the PCI cards
Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work.
In expansion of PCI cards to redundant configuration, it is possible to expand two or more PCI cards on different system boards, then execute from step 4 to 5 every expansion PCI cards.
When expanding the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
   No procedure is necessary. Go to step 6.

When not using SAN management function of the above products
   In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
-     Setting up the zoning by WWPN on the fibre channel switch SN200 series
-     Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series
     For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide".

If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.

When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.

This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.

For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:

To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.

- If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
- If the Host Zoning function of disk array device is used.

For details, see the document of each product.

To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

a. Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre <Return>
```

b. Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.

A certified service engineer takes charge of this work.

In the following example, the expansion of PCI cards to the system board: **sb00** is explained.

The format of the system board is sb**XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).

Note

When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

5. Attaching the system boards

Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

In case of detaching the system boards in step 3, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 6.c in Section 3.1.2.

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   ---------------   ---   --------   ----------   --------
00   0        Configured    00        00           10        300
```

6. Start the daemons

If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

7. Preparation to recognize devices for Fibre Channel

When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.
See "Operation guide" or "User's Manual" of each product for details.
Before using this function, the following step 8.a.1) and 8.a.2) [except fcp-bind-target setting] are necessary.
Moreover, begin from step 8.a.3) after executing this function.

If you don't use SAN management function of the above products
No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
No procedure is necessary.

Note
When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
Please execute the change of the zoning setting after stopping backup processes.

8. Adding the setting of drivers
Using the steps below, add the setting of drivers.
For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.

   a. Adding the setting of the PCI card drivers
   [SCSI drivers (Solaris:glm)]
   · Setting is not required.

   [PCI Fibre Channel(PW008FC3U/PW008FC2U/GP7B8FC1U)]
   1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the instance numbers of fjpfca driver for the expanded PCI cards.
   The following example shows that fjpfca1 (instance number: 1) is added.
   If the relation between the instance number and the slot position is necessary, locate it by blinking LED of the expanded PCI card with using the fc_adm command.

   Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

   ```
   # /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
   # diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
   :
   > 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
   :
   # /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
   ```

   2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 8.a.1).

   port (topology types, link speed)
   In case of expanding the PCI cards of fabric connection, define this property.
   In FC-AL connection, this definition is not required.

   fcp-bind-target (binding target ID and WWN)
   In case of expanding the disk array devices of fabric connection, define this property.
   In FC-AL connection, this definition is not required.

   max-throttle (the number of maximum SCSI command issues)
   This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
   The necessity and setting value of this property depend on the specification of the disk array devices, so refer to the manual of each disk array device.

   The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1)

and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
        :
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1";              <------ added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0";   <------ added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240";                  <------ added
        :
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
No procedure is necessary.
Compare the output of prtpicl(1M) command with the output saved at 4.b and find the instance number of the added card.

b. Adding the setting of the device drivers
In the following, the procedure is explained by taking the expansion in step 7 after the reserved definition of the expansion of disk array device controller (target=3 lun=0 to 2) to the existing disk array device in step 1 as an example.

[Solaris : sd]

1) Execute the following command to make the sd driver set up the added disk device.

```
# /usr/sbin/devfsadm <Return>
```

2) After saving the execution result of the prtpicl(1M) command, take the difference between the result and the information obtained in 4.a. and get the physical path name of additional disk device, then get the logical path name under /dev/dsk.

The following example shows that "**c3t3d0**" and "**c4t3d0**" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# prtpicl -v > /tmp/prtpicl.post <Return>
# diff /tmp/prtpicl.pre /tmp/prtpicl.post | grep devfs-path | grep hddv <Return>
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,2
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,2
# ls -l /dev/dsk | grep /pci@8d,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
```

```
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:h
# ls -l /dev/dsk | grep /pci@89,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@89,2000/fibre-channel@1/sd@3,0:a
:
```

3) Label a disk and perform the setting of partitions (slices) for the logical path names in step 6.b.3) by using the format(1M) command.

[Disk array device (hard disk driver : hddv)]

1) Check if no duplicate definitions exist in the sd.conf and hddv.conf files again, because the situation could be changed since step 1.
The message example in "Check NG" shows the duplicate definition, so go back to step 1.d.

```
[Check OK] --> go to step 8.b.2)
# /opt/FJSVhddv/bin/hddvchk_conf <Return>
/kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be
correct[Check NG] --> go back to step 1.d
# /opt/FJSVhddv/bin/hddvchk_conf <Return>
NG ID = [ 3 ]
```

2) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# /usr/sbin/hddvadmdr <Return>
```

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 4.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.
The following example shows that "c3t3d0" is the logical path name of the expanded lun=0. Then the logical path names of lun=1 to 2 are "c3t3d1" and "c3t3d2" (cXtYdZ; X:PCI card number, Y:target ID, Z:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
```

Label a disk and perform the setting of partitions (slices) for the logical path names in step 8.b.3) by using the format(1M) command.
It is sufficient to execute for one representative logical path name of each expanded LUN, so need not to execute for every all PCI cards.

c. Add configure of PCI card driver
   [SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
   No procedure is necessary.

[Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
  No procedure is necessary.

[Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
  Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time.

  In the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 2
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)
Host Adapter 1 (lpfc9) is an LP9802 (Ready Mode)

MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5 <Return>

PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5 <Return>
0. lpfc11
1. lpfc9
Select an adapter => 0<Return>

Automapped FCP Nodes:
                  Node   Target WWPN                 WWNN
                  ----   ------   --------- -              -------
Automapped FCP Node   3       50-06-0e-80-00-10-04-92 50-06-0e-80-00-10-04-92

Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y <Return>

Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID
0. Cancel
Enter Choice => 2 <Return>
```

9. Attaching to the redundant configuration
   Attach the paths connected expanded PCI cards with disk array device controllers to the existing redundant configuration by using the following command, and check if the logical path names in step 8.b.3) are added (the below   underlined part strings part).
   The following procedure is described for MPLB/GRMPD. If you use the redundancy software other than MPLB/GRMPD, see the document for each product.

```
·  [MPLB2.2 or later / GRMPD]
   # /usr/sbin/mplbconfig -nv <Return>
   *** Phase 1: checking /dev/rdsk ***
   *** Phase 2: checking multi path ***
   *** Phase 3: analyzing path ***
   Path : Action : Element path : LUN : Storage : Zone
```

```
mplb0 : exist : c1t4d0s2 c2t3d0s2 : 0 : GR720464f-12340001 :
:
mplb8 : add : c3t3d0s2 c4t3d0s2 c5t3d0s2: 0 : GR8404550- 000213 :
:
# /usr/sbin/mplbconfig -av <Return>
:
IOMP: /dev/FJSVmplb/fiomp/adm8
Node:
/dev/FJSVmplb/rdsk/mplb8s0
/dev/FJSVmplb/rdsk/mplb8s1
/dev/FJSVmplb/rdsk/mplb8s2
/dev/FJSVmplb/rdsk/mplb8s3
/dev/FJSVmplb/rdsk/mplb8s4
/dev/FJSVmplb/rdsk/mplb8s5
/dev/FJSVmplb/rdsk/mplb8s6
/dev/FJSVmplb/rdsk/mplb8s7
:
```

3.2.2 Solaris 9 or later

This section explains the procedure for expansion of PCI cards on Solaris 9 or later system.

3.2.2.1 Expansion of non-redundant configuration

This section shows the flow of the procedure of PCI cards expansion for non-redundant configuration on Solaris 9 or later system.

If you use Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), ensure the automap function is effective. Boot the system after modifying lpfc.conf.

```
# vi /kernel/drv/lpfc.conf <Return>
:
# If automap is set, SCSI IDs for all FCP nodes without
# persistent bindings will be automatically generated.
# If new FCP devices are added to the network when the system is down,
# there is no guarantee that these SCSI IDs will remain the same
# when the system is booted again.
# The bind method of the port is used as the binding method of
# automap devices to preserve SCSI IDs between link down and link up.
# If automap is 0, only devices with persistent bindings will be
# recognized by the system.
automap=1; <- set to 1
:
```

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   ```
   # /etc/rc0.d/K10ElxRMSrv stop <Return>
   # /etc/rc0.d/K10ElxDiscSrv stop <Return>
   ```

2. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards of expansion target and detach the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
   This procedure is not required when expanding the new system boards together.

3. Expanding the PCI cards
   Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work. When expanding the fibre channel PCI cards, the steps below are required.

   [for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

   When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
   No procedure is necessary. Go to step 6.

   When not using SAN management function of the above products
   In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
   -    Setting up the zoning by WWPN on the fibre channel switch SN200 series

- Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series

For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.

When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.

This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.

For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:

To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.

- If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
- If the Host Zoning function of disk array device is used.

For details, see the document of each product.

To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

a. Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre <Return>
```

b. Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.
A certified service engineer takes charge of this work.
In the following example, the expansion of PCI cards to the system board: **sb00** is explained.
The format of the system board is sb**XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).

Note

When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.

I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.

Please execute the change of the zoning setting after stopping backup processes.

4. Attaching the system boards
Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

In case of detaching the system boards in step 2, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 6.c in Section 3.1.2.

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB  BN  Status (Detail)  PID  Next_PID  Board_Type  CPU(MHz)
--  --  --------------   ---  --------  ----------  --------
00  0      Configured    00       00          10       300
```

5. Start the daemons
If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

6. Preparation to recognize devices for Fibre Channel
When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.
See "Operation guide" or "User's Manual" of each product for details.
Before using this function, the following step 7.a.1) and 7.a.2) [except fcp-bind-target setting] are necessary.
Moreover, begin from step 7.a.3) after executing this function.

When not using SAN management function of the above products
No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
No procedure is necessary.

Note
When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
Please execute the change of the zoning setting after stopping backup processes.

7. Adding the setting of drivers
Using the steps below, add the setting of drivers.
For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.

    a. Adding the setting of the PCI card drivers
    [SCSI drivers (Solaris:glm, FUJITSU PCI SCSI Adapter Driver)]
      · Setting is not required.

    [PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]
      1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the instance numbers of fjpfca driver for the expanded PCI cards.
The following example shows that fjpfca1 (instance number: 1) is added.
If the relation between the instance number and the slot position is necessary, locate it by blinking LED of the expanded PCI card with using the fc_adm command.
Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
# /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
```

      2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 7.a.1).

      port (topology types, link speed)
In case of expanding the PCI cards of fabric connection, define this property.
In FC-AL connection, this definition is not required.

      fcp-bind-target (binding target ID and WWN)
In case of expanding the disk array devices of fabric connection, define this property.
In FC-AL connection, this definition is not required.

      max-throttle (the number of maximum SCSI command issues)
This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
The necessity and setting value of this property depend on the specification of the disk array

devices, so refer to the manual of each disk array device.

The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1) and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
:
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1"; added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0"; added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240"; added
:
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[Fibre Channel driver (PW028FC3*/PW028FC4*/PW028FC5*)]
Configuration is not required. Compare the output of prtpicl(1M) command with the output saved at 4.a and find the instance number of the added card.

b. Adding the setting of the device drivers
Using the following procedures for each I/O device type, add the setting of the device drivers.

[Disk Devices/Tape Devices (Solaris:sd/st)]
In the following, the procedure is explained by taking the expansion of the disk device (target=2 lun=0) in step 6 as an example.
For tape devices, execute the same operations with replacing "sd" of the following procedures to "st".

1) Refer to the file "/kernel/drv/sd.conf", and check if the "target=2, lun=0" is defined.
If this definition does not exist, add this, and if this definition is treated as comment, remove the comment symbols.

```
· [Disk Devices]
  # vi /kernel/drv/sd.conf <Return>
  :
  name="sd" class="scsi"
  target=0 lun=0;
  :
  name="sd" class="scsi"  <------ If undefined, add this
  definition
  target=2 lun=0; <------ or remove the comment symbols.
  :
· [Tape Devices]
  # vi /kernel/drv/st.conf <Return>
  :
  name="st" class="scsi"
  target=0 lun=0;
  :
  name="st" class="scsi"  <------ If undefined, add this
  definition
  target=5 lun=0; <------ or remove the comment symbols.
  :
```

2) Notify the sd driver of the attachment of the expanded disk devices by using the following command.
The following messages come out this time. There is no problem.
Also under the present using tape devices, the same messages come out. There is no problem.

```
· [Disk Devices]
  # update_drv -f sd <Return>
```

```
Cannot unload module: sd
Will be unloaded upon reboot.
Forcing update of sd.conf.
·   [Tape Devices]
    # update_drv -f st <Return>
```

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded disk device.

The following example shows that "**c2t2d0**" is the logical path name of the expanded disk device.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
    ·   [Disk Devices]
        # diff /tmp/drcstat.pre /tmp/drcstat.post | grep sd <Return>
        :
        > 00-PCI#0B "/pci@80,4000/scsi@2/sd@2,0" 10 "sd"
        # ls -l /dev/dsk | grep /pci@80,4000/scsi@2/sd@2,0 <Return>
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s0
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:a
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s1
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:b
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s2
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:c
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s3
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:d
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s4
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:e
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s5
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:f
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s6
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:g
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 c2t2d0s7
        -> ../../devices/pci@80,4000/scsi@2/sd@2,0:h
    ·   [Tape Devices]
        # diff /tmp/drcstat.pre /tmp/drcstat.post | grep st <Return>
        :
        > 00-PCI#0B "/pci@80,4000/scsi@2/st@5,0" 1 "st"
        # ls -l /dev/rmt | grep /pci@80,4000/scsi@2/st@5,0 <Return>
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1b
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:b
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1bn
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:bn
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1c
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:c
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cb
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:cb
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cbn
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:cbn
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1cn
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:cn
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1h
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:h
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hb
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:hb
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hbn
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:hbn
        lrwxrwxrwx 1 root root 41 Sep 20 22:53 1hn
        -> ../../devices/pci@80,4000/scsi@2/st@5,0:hn
```

4) For disk devices, label a disk and perform the setting of partitions (slices) for the logical path names in step 7.b.3) by using the format(1M) command.
For tape devices, this procedure is not required.

[Disk Array devices (Hard Disk Driver:hddv)]
In the following, the procedure is explained by taking the expanded the disk array device (target=3 lun=0 to 2) in step 6 as an example.

    · In case of first hot expansion of disk array devices, begin from step 7.b.1).
    · In case of second or later, begin from step 7.b.5).
    1) Check the presence of the file "/kernel/drv/hddv.conf".
    If it does not exist, this case is "Hard Disk Driver first installation", so go to step 7.b.3), and if it exists, this case is "non-hot expansion settings", so go to step 7.b.2).

> · **[In case of not existing (first installation)]** --> go to step 7.b.3)
>   **# ls /kernel/drv/hddv.conf** <Return>
>   /kernel/drv/hddv.conf: No such file or directory
> · **[In case of existing (non-hot expansion settings)]** --> go to step 7.b.2)
>   **# ls /kernel/drv/hddv.conf** <Return>
>   /kernel/drv/hddv.conf

    2) After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

> **# hddvadm -i** <Return>
> **# ls /kernel/drv/hddv.conf** <Return>
> /kernel/drv/hddv.conf: No such file or directory

    3) Using the following command, create the hddv.conf file for hot expansion function.
    The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

> · **[First installation]** --> go to step 7.b.5)
>   **# hddvadm -M** <Return>
> · **[Non-hot expansion settings]** --> go to step 7.b.4)
>   **# hddvadm -M** <Return>
>   already   ID=   1   exists.
>   /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720

    4) When the hot expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf.
    So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf

    The below example shows the duplicated definition of target=1.

> **# vi /kernel/drv/sd.conf** <Return>
>   :
> name="sd" class="scsi"
> target=0 lun=0;
>   :
> #name="sd" class="scsi" **<------**
> target=1 lun=0;
> #name="sd" class="scsi" **Delete or commend out**
> target=1 lun=1; **the duplicated definitions of sd and hddv drivers.**
> #name="sd" class="scsi"
> target=1 lun=2; **<------**
>   :

    But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver.
    In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

    5) Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of hot expansion and using in non-hot expansion settings.
    If the definition of LUNs that are expected to expand is found, because of second or later execution of hot expansion, it is not required to edit.

    The below example shows registrations of hot expansion targets (target=3, lun=0 to 2) and disk array device GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
      :
 #name="hddv" class="scsi" target=0 lun=0;
      :
 #name="hddv" class="scsi" target=0 lun=7;
      :
 name="hddv" class="scsi" target=1 lun=0;      <------
 name="hddv" class="scsi" target=1 lun=1;          Remove the comment symbols of using LUNs
 name="hddv" class="scsi" target=1 lun=2;      <------
 :
 name="hddv" class="scsi" target=3 lun=0;      <------
 name="hddv" class="scsi" target=3 lun=1;          Remove the comment symbols of
 name="hddv" class="scsi" target=3 lun=2;      <------ expanded LUNs
 #name="hddv" class="scsi" target=3 lun=3;
 :
```

6) Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 7.b.4).

Also, the following example is execution when the FJSVhddv package is installed to /opt.
The placed path of the hddvchk_conf command changes by installed directory.

```
·   [Check OK] --> go to step 7.b.7)
    # /opt/FJSVhddv/bin/hddvchk_conf <Return>
    /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be
    correct
·   [Check NG] --> go back to step 7.b.4)
    # /opt/FJSVhddv/bin/hddvchk_conf <Return>
    NG ID = [ 3 ]
```

7) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# update_drv -f hddv <Return>
```

Under the present using disk array devices, the following messages come out. There is no problem.

```
# update_drv -f hddv <Return>
Cannot unload module: hddv
Will be unloaded upon reboot.
Forcing update of hddv.conf.
```

8) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.

The following example shows that "c3t3d0" is the logical path name of the expanded lun=0. Then the logical path names of lun=1 to 2 are "c3t3d1" and "c3t3d2" (cXtYdZ; X:PCI card number, Y:target ID, Z:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
      :
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
```

```
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
  -> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
  -> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
  -> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
  -> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
  -> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
```

     9) Label a disk and perform the setting of partitions (slices) for the logical path names in step 7.b.8) by using the format(1M) command.

c. Add configure of PCI card driver

[SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
    No procedure is necessary.

[Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
    No procedure is necessary.

[Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
    Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time. In the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.


Emulex Fibre Channel Host Adapters Detected: 1
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)


MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5 <Return>


PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5 <Return>


Automapped FCP Nodes:
                Node Target   WWPN                   WWNN
                ----  ------  ---------              --------
Automapped FCP Node    2      50-06-0e-80-00-10-04-92  50-06-0e-80-00-10-04-92


Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y <Return>


Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID 0. Cancel
Enter Choice => 2 <Return>
```

8. Adding the setting of high-level products (services)
   Add the setting of the high-level products (services) by using the logical path name in step 7.b.

   [Disk and Disk Array devices (in file system operation)]
   - Create the file systems.
     To mount automatically on bootup, edit /etc/vfstab file and add the below entry.

     ```
     # newfs /dev/rdsk/c2t2d0s6 <Return>
     # vi /etc/vfstab <Return>
              :
     /dev/dsk/c2t2d0s6 /dev/rdsk/c2t2d0s6 /mnt ufs 1 yes -
              :
     ```

   [Disk and Disk Array devices (in raw access operation)/Tape devices]
   - Execute the setting addition of the high-level products.
     For details, refer to the manual for each product.

   [Disk and Disk Array devices (swap device)]
   - Add the swap devices.
     To be available automatically on bootup, edit /etc/vfstab file and add the below entry.

     ```
     # swap -a /dev/dsk/c2t2d0s4 <Return>
     # vi /etc/vfstab <Return>
              :
     /dev/dsk/c2t2d0s4 - - swap - no -
              :
     # swap -l <Return>
     swapfile dev swaplo blocks free
              :
     /dev/dsk/c2t2d0s4 32,164 16 788384 683680
     ```

9. Starting the high-level products (services)
   Start the high-level products (services) by using the logical path name in step 7.b.

   [Disk and Disk Array devices (in file system operation)]
   - Mount the file systems.

     ```
     # mount -F ufs /dev/dsk/c2t2d0s6 /mnt <Return>
     ```

   [Disk and Disk Array devices (in raw access operation)/Tape devices]
   - Start the high-level products.
     For details, refer to the manual for each product.

   [Disk and Disk Array devices (swap device)]
   - This procedure is not required.

3.2.2.2 Expansion of new redundant configuration

This section shows the flow of the procedure of PCI cards expansion for new redundant configuration on Solaris 9 or later system by taking the following redundant software products as examples.
- Multipath Disk Control (MPHD)
- Multipath Disk Control load balance option (MPLB)
- GR Multipath Driver (GRMPD)
- ETERNUS Multipath Driver (ETERNUS MPD)

In case of using the other redundant software products, refer to the manual for each product.

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   ```
   # /etc/rc0.d/K10ElxRMSrv stop <Return>
   # /etc/rc0.d/K10ElxDiscSrv stop <Return>
   ```

2. Detaching the system boards
   In case of expanding PCI cards on the existing redundant system boards, choose the system boards of expansion target and detach the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
   This procedure is not required when expanding the new system boards together.

3. Expanding the PCI cards
   Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work.

In expansion of new redundant configuration, it is necessary to expand two or more PCI cards on different system boards, then execute from step 3 to 4 every expansion PCI cards. When expanding the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
No procedure is necessary. Go to step 6.

When not using SAN management function of the above products
In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
- Setting up the zoning by WWPN on the fibre channel switch SN200 series
- Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series

For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.
When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.
This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.
For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually.
- If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
- If the Host Zoning function of disk array device is used.

For details, see the document of each product.
To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

a. Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

> **# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre** <Return>

b. Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.
A certified service engineer takes charge of this work.
In the following example, the expansion of PCI cards to the system board: **sb00** is explained.
The format of the system board is sb**XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).

Note
When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

4. Attaching the system boards
Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".
In case of detaching the system boards in step 1, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 6.c in Section 3.1.2.

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB    BN    Status (Detail)    PID    Next_PID    Board_Type    CPU(MHz)
--    --    ---------------    ---    --------    ----------    --------
00    0        Configured    00        00          10            300
```

5. Start the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

6. Preparation to recognize devices for Fibre Channel
   When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

   [for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

   When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
   WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.
   See "Operation guide" or "User's Manual" of each product for details.
   Before using this function, the following step 7.a.1) and 7.a.2) [except fcp-bind-target setting] are necessary.
   Moreover, begin from step 7.a.3) after executing this function.

   When not using SAN management function of the above products
   No procedure is necessary.

   [for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
   No procedure is necessary.

   Note
   When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.
   I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.
   Please execute the change of the zoning setting after stopping backup processes.

7. Adding the setting of drivers
   Using the steps below, add the setting of drivers.
   For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.
   If you use ETERNUS MPD, settings of drivers are configured using grmpdautoconf command. If you use ETERNUS MPD, skip to the procedure "8.Setup of the redundant configuration".

   a. Adding the setting of the PCI card drivers
      [SCSI drivers (Solaris:glm)]
      · Setting is not required.

      [PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]
      1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the instance numbers of fjpfca driver for the expanded two or more PCI cards.
      The following example shows that fjpfca1 (instance number: 1) is one of the expanded PCI cards.
      Locate the relation between the instance number and the slot position by blinking LED of the expanded PCI card with using the fc_adm command.
      Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
:
# /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
```

2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 7.a.1).

port (topology types, link speed)
In case of expanding the PCI cards of fabric connection, define this property.
In FC-AL connection, this definition is not required.

fcp-bind-target (binding target ID and WWN)
In case of expanding the disk array devices of fabric connection, define this property.
In FC-AL connection, this definition is not required.

max-throttle (the number of maximum SCSI command issues)
This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
The necessity and setting value of this property depend on the specification of the disk array devices, so refer to the manual of each disk array device.

The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1) and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
:
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1"; <------ added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0"; <------ added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240"; <------ added
:
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[Fibre Channel driver (PW028FC3*/PW028FC4*/PW028FC5*)]
Configuration is not required. Compare the output of prtpicl(1M) command with the output saved at 3.a and find the instance number of the added card.

b. Adding the setting of the device drivers
In the following, the procedure is explained by taking the expanded the disk array device with redundant controller configuration (target=3 lun=0 to 2) in step 6 as an example.

[If you use Solaris:sd]

1) Ensure target=3,lun=0 target=3,lun=1 target=3,lun=3 are defined in /kernel/drv/sd.conf. If they are not defined or commented, modify /kernel/drv/sd.conf.

```
# vi /kernel/drv/sd.conf<Return>

name="sd" class="scsi"
target=0 lun=0;
:
name="sd" class="scsi" <------ If undefined, add this definition
target=3 lun=0; <------ or remove the comment symbols.
name="sd" class="scsi"
target=3 lun=1;
name="sd" class="scsi"
target=3 lun=2;
:
```

2) Notify the sd driver of the attachment of the expanded disk devices by using the following command.

The following messages come out this time. There is no problem.

> · **# update_drv -f sd** <Return>
> Cannot unload module: sd
> Will be unloaded upon reboot.
> Forcing update of sd.conf.

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded disk device.

The following example shows that "**c3t3d0**" and "**c4t3d0**" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# prtpicl -v > /tmp/prtpicl.post <Return>
# diff /tmp/prtpicl.pre /tmp/prtpicl.post | grep devfs-path | grep
hddv <Return>
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,2
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,2
# ls -l /dev/dsk | grep /pci@8d,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:h
# ls -l /dev/dsk | grep /pci@89,2000/fibre-channel@1/sd@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@89,2000/fibre-channel@1/sd@3,0:a
          :
```

3) Label a disk and perform the setting of partitions (slices) for the logical path names in step 7.b.3) by using the format(1M) command.

[Disk array device (hard disk driver : hddv)]
> · In case of first hot expansion of disk array devices, begin from step 7.b.1).
> · In case of second or later, begin from step 7.b.5).

1) Check the presence of the file "/kernel/drv/hddv.conf".
If it does not exist, this case is "Hard Disk Driver first installation", so go to step 7.b.3), and if it exists, this case is "non-hot expansion settings", so go to step 5.b.2).

> **[In case of not existing (first installation)]** --> go to step 7.b.3)
> **# ls /kernel/drv/hddv.conf** <Return>
> /kernel/drv/hddv.conf: No such file or directory
> **[In case of existing (non-hot expansion settings)]** --> go to step 7.b.2)
> **# ls /kernel/drv/hddv.conf** <Return>

```
/kernel/drv/hddv.conf
```

2) After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

```
# hddvadm -i <Return>
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory
```

3) Using the following command, create the hddv.conf file for hot expansion function.
The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

```
·  [First installation] --> go to step 7.b.5)
   # hddvadm -M <Return>

·  [Non-hot expansion settings] --> go to step 7.b.4)
   # hddvadm -M <Return>
   already              ID=              1              exists.
   /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720
```

4) When the hot expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf.
So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf

The below example shows the duplicated definition of target=1.

```
# vi /kernel/drv/sd.conf <Return>
        :
name="sd" class="scsi"
target=0 lun=0;
        :
#name="sd" class="scsi"       <------
target=1 lun=0;
#name="sd" class="scsi"       Delete or comment out
target=1 lun=1;                the duplicated definitions of sd and hddv drivers.
#name="sd" class="scsi"
target=1 lun=2;               <------
        :
```

But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver.
In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

5) Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of hot expansion and using in non-hot expansion settings.
When the target number of each disk array device controller for redundant configuration is different, add each target number definition at the same time.
If the definition of LUNs that are expected to expand is found, because of second or later execution of hot expansion, it is not required to edit.

The below example shows registrations of hot expansion targets (target=3, lun=0 to 2) and disk array device GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
       :
#name="hddv" class="scsi" target=0 lun=0;
       :
#name="hddv" class="scsi" target=0 lun=7;
:
name="hddv" class="scsi" target=1 lun=0;       <------
name="hddv" class="scsi" target=1 lun=1;       Remove the comment symbols of using LUNs
name="hddv" class="scsi" target=1 lun=2;       <------
:
name="hddv" class="scsi" target=3 lun=0;       <------
```

```
name="hddv" class="scsi" target=3 lun=1;       Remove the comment symbols of
name="hddv" class="scsi" target=3 lun=2;       <------ expanded LUNs
#name="hddv" class="scsi" target=3 lun=3;
:
```

6) Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 5.b.4).

Also, the following example is execution when the FJSVhddv package is installed to /opt.
The placed path of the hddvchk_conf command changes by installed directory.

```
    ·  [Check OK] --> go to step 7.b.7)
       # /opt/FJSVhddv/bin/hddvchk_conf <Return>
       /kernel/drv/sd.conf  and  /kernel/drv/hddv.conf  seems  to  be
       correct

    ·  [Check NG] --> go back to step 7.b.4)
       # /opt/FJSVhddv/bin/hddvchk_conf <Return>
       NG ID = [ 3 ]
```

7) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# update_drv -f hddv <Return>
```

Under the present using disk array devices, the following messages come out. There is no problem.

```
# update_drv -f hddv <Return>
Cannot unload module: hddv
Will be unloaded upon reboot.
Forcing update of hddv.conf.
```

8) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.

The following example shows that "**c3t3d0**" and "**c4t3d0**" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
:
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,0" 13 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,1" 14 "hddv"
> 03-PCI#1B "/pci@8d,4000/fibre-channel@1/hddv@3,2" 15 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
```

```
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
# ls -l /dev/dsk | grep /pci@8d,4000/fibre-channel@1/hddv@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@8d,4000/fibre-channel@1/hddv@3,0:a
                :
```

9) Label a disk and perform the setting of partitions (slices) for the logical path names in step 7.b.8) by using the format(1M) command.
It is sufficient to execute for one representative logical path name of each expanded LUN, so need not to execute for every all PCI cards.

c. Add configure of PCI card driver
[SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
No procedure is necessary.

[Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
No procedure is necessary.

[Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time. In the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 2
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)
Host Adapter 1 (lpfc9) is an LP9802 (Ready Mode)

MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5 <Return>

PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5 <Return>
0. lpfc11
1. lpfc9
Select an adapter => 0<Return>

Automapped FCP Nodes:
Node                Target  WWPN                 WWNN
                    ----    ------    ---------            --------
Automapped FCP Node    3   50-06-0e-80-00-10-04-92   50-06-0e-80-00-10-04-92

Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y <Return>

Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID
0. Cancel
```

```
Enter Choice => 2 <Return>
```

8. Setup of the redundant configuration
   Set up the new redundant configuration by using the following command.
   In case of using MPHD or MPLB2.1, specify the logical path names in step 7.b.8) as the command parameter, and need to execute the command every expanded LUNs.
   The below italic part strings are the new configured path names of redundant software, and the underlined part strings are the each logical path names configuring the path of redundant software. The following procedure is described for MPHD/MPLB/GRMPD/ETERNUS MPD. If you use the redundancy software other than MPHD/MPLB/GRMPD/ETERNUS MPD, see the document for each product.

```
·  [MPHD]
   # /usr/opt/FJSViomp/bin/iompadm -c mphd new /dev/rdsk/c3t3d0s2 /dev/rdsk/c4t3d0s2
   <Return>
   IOMP: /dev/FJSVmphd/fiomp/adm2
   Node:
   /dev/FJSVmphd/rdsk/mphd2s0
   /dev/FJSVmphd/rdsk/mphd2s1
   /dev/FJSVmphd/rdsk/mphd2s2
   /dev/FJSVmphd/rdsk/mphd2s3
   /dev/FJSVmphd/rdsk/mphd2s4
   /dev/FJSVmphd/rdsk/mphd2s5
   /dev/FJSVmphd/rdsk/mphd2s6
   /dev/FJSVmphd/rdsk/mphd2s7

·  [MPLB2.1]
   # /usr/opt/FJSViomp/bin/iompadm -c mplb new /dev/rdsk/c3t3d0s2 /dev/rdsk/c4t3d0s2
   <Return>
   IOMP: /dev/FJSVmplb/fiomp/adm2
   Node:
     /dev/FJSVmplb/rdsk/mplb2s0
     /dev/FJSVmplb/rdsk/mplb2s1
     /dev/FJSVmplb/rdsk/mplb2s2
     /dev/FJSVmplb/rdsk/mplb2s3
     /dev/FJSVmplb/rdsk/mplb2s4
     /dev/FJSVmplb/rdsk/mplb2s5
     /dev/FJSVmplb/rdsk/mplb2s6
     /dev/FJSVmplb/rdsk/mplb2s7

·  [MPLB2.2 or later / GRMPD]
   # /usr/sbin/mplbconfig -nv <Return>
   *** Phase 1: checking /dev/rdsk ***
   *** Phase 2: checking multi path ***
   *** Phase 3: analyzing path ***
   Path : Action : Element path : LUN : Storage : Zone
   mplb0 : exist : c1t4d0s2 c2t3d0s2 : 0 : GR720464f-12340001 :
   :
   mplb8 : new : c3t3d0s2 c4t3d0s2 : 0 : GR8404550- 000213 :
   :
   # /usr/sbin/mplbconfig -av <Return>
   :
   IOMP: /dev/FJSVmplb/fiomp/adm8
   Node:
     /dev/FJSVmplb/rdsk/mplb8s0
     /dev/FJSVmplb/rdsk/mplb8s1
     /dev/FJSVmplb/rdsk/mplb8s2
     /dev/FJSVmplb/rdsk/mplb8s3
     /dev/FJSVmplb/rdsk/mplb8s4
     /dev/FJSVmplb/rdsk/mplb8s5
     /dev/FJSVmplb/rdsk/mplb8s6
     /dev/FJSVmplb/rdsk/mplb8s7
   :

·  [ETERNUS MPD]
   # /usr/sbin/grmpdautoconf <Return>
   Refer to the "ETERNUS Multipath driver 2.0 User's guide" for the use of grmpdautoconf.
```

9. Adding the setting of high-level products (services)
   Add the setting of the high-level products (services) by using the path names of redundant software in step 8.

   [File system operation]
   - Create the file systems.
     To mount automatically on bootup, edit /etc/vfstab file and add the below entry.

     ```
     # newfs /dev/FJSVmphd/rdsk/mphd2s6 <Return>
     # vi /etc/vfstab <Return>
                :
     /dev/FJSVmphd/dsk/mphd2s6 /dev/FJSVmphd/rdsk/mphd2s6 /mnt ufs 1 yes -
                :
     ```

   [Raw access operation]
   - Execute the setting addition of the high-level products.
     For details, refer to the manual for each product.

   [Swap device]
   - Add the swap devices.
     To be available automatically on bootup, edit /etc/vfstab file and add the below entry.

     ```
     # swap -a /dev/FJSVmphd/dsk/mphd2s4 <Return>
     # vi /etc/vfstab <Return>
                :
     /dev/FJSVmphd/dsk/mphd2s4 - - swap - no -
                :
     # swap -l <Return>
     swapfile dev swaplo blocks free
                :
     /dev/FJSVmphd/dsk/mphd2s4 154,132 16 788384 683680
     ```

10. Starting the high-level products (services)
    Start the high-level products (services) by using the path names of redundant software in step 8.

    [File system operation]
    - Mount the file systems.

      ```
      # mount -F ufs /dev/FJSVmphd/dsk/mphd2s6 /mnt <Return>
      ```

    [Raw access operation]
    - Start the high-level products.
      For details, refer to the manual for each product.

    [Swap device]
    - This procedure is not required.

3.2.2.3 Expansion of PCI cards to redundant configuration

This section shows the flow of the procedure of PCI cards expansion for existing redundant configuration to reinforce redundancy on Solaris 9 or later system by taking the following redundant software products as examples.
- Multipath Disk Control load balance option (MPLB)
  The expansion pattern of this section is supported in MPLB2.2 or later, and is not supported in MPLB2.1.
- GR Multipath Driver (GRMPD)
- ETERNUS Multipath Driver (ETERNUS MPD)

The expansion pattern of this section is not supported in MPHD.
In case of using the redundant software products except MPLB, GRMPD and ETERNUS MPD, refer to the manual for each product.

The procedures of the high-level products are not required for the expansion of PCI cards to existing redundant configuration.

1. Stop the daemons
   If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

   ```
   # /etc/rc0.d/K10ElxRMSrv stop <Return>
   # /etc/rc0.d/K10ElxDiscSrv stop <Return>
   ```

2. Detaching the system boards
   In case of expanding PCI cards on the existing system boards, choose the system boards of expansion target and detach

the system boards according to step 3 to 4 in Section 3.1.1 or step 4 in Section 3.1.2.
This procedure is not required when expanding the new system boards together.

3. Expanding the PCI cards
Using the following procedures, expand the PCI cards. A certified service engineer takes charge of this work.
In expansion of PCI cards to redundant configuration, it is possible to expand two or more PCI cards on different system boards, then execute from step 3 to 4 every expansion PCI cards.
When expanding the fibre channel PCI cards, the steps below are required.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility
No procedure is necessary. Go to step 6.

When not using SAN management function of the above products
In case of replacing of the fibre channel cards of the below environment setting, it is necessary to change the setting of the fibre channel switch SN200 series and the disk array device ETERNUS3000/4000/6000/8000,GR700/800 series.
-    Setting up the zoning by WWPN on the fibre channel switch SN200 series
-    Using the host zoning (Host Affinity) function of the disk array device ETERNUS3000/4000/6000/8000, GR700/800 series
For details, refer to the manual "Zoning User's Guide" and "ETERNUSmgr User Guide/GRmgr User Guide". If you use the Fibre Channel switch or disk array device other than described above, see the document of each product.
When changing the above setting, WWPNs (Figures of sixteen digits in all) of the replacement parts are needed. The WWPN of the expansion fibre channel card is determined by using eight-digit number printed on the seal of the card on front plate.
This figure of eight digit represents the lower eight digit of WWPN by the hexadecimal number. The upper eight digit of WWPN is 10000000 by a fixed hexadecimal number.
For instance, when the following seal puts on the expansion fibre channel card, the WWPN of the expansion card is 100000000e244061.

```
0e24
4061
```

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:
To replace PCI cards with the following configurations, Fibre Channel switch and disk array device need to be reconfigured individually. If zone configuration by WWPN (World Wide Port Name) is done on Fibre Channel switch.
If the Host Zoning function of disk array device is used.
For details, see the document of each product.
To perform the above reconfiguration, the WWPN(a 16-digit number) of the replacement card is needed. The WWPN of the PCI card can be known from the twelve characters shown on a label on the back of the card. These characters represent the bottom twelve digits of the WWPN in hexadecimal form. The top four digits are fixed to 1000 in hexadecimal form.

For example, if the following label is shown on the back of the card, the WWPN of the replacement card is 10000000c9366037.

```
IEEE:0000c9366037
```

a.   Before expanding the PCI cards, save the results of execution of the drcstat(1M) command in a file (current configuration information).

 # /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pre <Return>

b.   Choose the system boards for expansion target of PCI cards and the equipped slots, then expand the PCI cards and mount the system boards and connect cable to devices.
A certified service engineer takes charge of this work.
In the following example, the expansion of PCI cards to the system board: **sb00** is explained.
The format of the system board is sb**XY** (**X** represents the cabinet number, **Y** represents the system board slot number in the cabinet).
Note
When the zoning setting is changed in SN200 series or other Fibre Channel switch, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes. I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally. Please execute the change of the zoning setting after stopping backup processes.

4. Attaching the system boards

Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command, and check if the status of the system boards is changed to "Configured".

In case of detaching the system boards in step 2, restart the stopped high-level products and check the multipath status according to step 7 in Section 3.1.1 or step 6.c in Section 3.1.2.

```
# /opt/FJSVhwr/sbin/drc -connect sb00 <Return>
# /opt/FJSVhwr/sbin/drcstat -board sb00 <Return>
SB   BN     Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --     ---------------   ---   --------   ----------   --------
00   0        Configured      00      00          10          300
```

5. Start the daemons

If you use the Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*), execute the following.

```
# /etc/rc2.d/S99ElxRMSrv start <Return>
# /etc/rc2.d/S99ElxDiscSrv start <Return>
```

6. Preparation to recognize devices for Fibre Channel

When the zoning function is used on fiber channel switch SN200 series configuration, it is necessary to set zoning to the expanded devices.

[for PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]:

When using any of SAN management function of Systemwalker/StorageMGR, Softek SANView for ETERNUS (except for Vixel), Softek Strorage Cruiser, ETERNUS SF Storage Cruiser and SP5000 SRM Facility

WWPN zoning of SN200 series, Host affinity of Array disk device ETERNUS3000/4000/6000/8000,GR700/800 series and binding setting for fjpfca.conf/sd.conf of host can be added from SAN management window automatically.

See "Operation guide" or "User's Manual" of each product for details.

Before using this function, the following step 7.a.1) and 7.a.2) [except fcp-bind-target setting] are necessary.

Moreover, begin from step 7.a.3) after executing this function.

When not using SAN management function of the above products

No procedure is necessary.

[for Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]:

No procedure is necessary.

Note

When the zoning setting is changed in SN200 series, executing I/O requests to other devices sometimes terminate abnormally with temporary errors by the setting changes.

I/O requests to disk array devices and the like are recovered normally by retry processes, but backup processes of fibre channel tape devices sometimes terminate abnormally.

Please execute the change of the zoning setting after stopping backup processes.

7. Adding the setting of drivers

Using the steps below, add the setting of drivers.

For file drivers, it is necessary to add the setting of PCI card drivers and device drivers.

If you use ETERNUS MPD, settings of drivers are configured using grmpdautoconf command. If you use ETERNUS MPD, skip to the procedure "8.Attaching to the redundant configuration".

a. Adding the setting of the PCI card drivers

[SCSI drivers (Solaris:glm)]

· Setting is not required.

[PCI Fibre Channel(PW008FC3U/PW008FC2U/ GP7B8FC1U)]

1) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the instance numbers of fjpfca driver for the expanded PCI cards.

The following example shows that fjpfca1 (instance number: 1) is added.

If the relation between the instance number and the slot position is necessary, locate it by blinking LED of the expanded PCI card with using the fc_adm command.

Also, check by using the "fc_info -a" command about the relation between the WWPN of expanded card and the instance number.

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.pfca <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.pfca | grep fjpfca <Return>
```

```
           :
         > 00-PCI#0B "/pci@80,4000/fibre-channel@1" 1 "fjpfca"
           :
         # /usr/sbin/FJSVpfca/fc_adm -l fjpfca1 <Return>
```

2) Edit the setting file "/kernel/drv/fjpfca.conf" and add the below definitions of property for instance numbers in step 7.a.1).
port (topology types, link speed)

In case of expanding the PCI cards of fabric connection, define this property.
In FC-AL connection, this definition is not required.

fcp-bind-target (binding target ID and WWN)
In case of expanding the disk array devices of fabric connection, define this property.
In FC-AL connection, this definition is not required.

max-throttle (the number of maximum SCSI command issues)
This is the property to limit the number of SCSI commands (tag) that can be accepted at the same time.
The necessity and setting value of this property depend on the specification of the disk array devices, so refer to the manual of each disk array device.

The following example is the setting addition of the PCI card for fjpfca1 (instance number: 1) and the disk array device of target=3.

```
# vi /kernel/drv/fjpfca.conf <Return>
  :
port=
"fjpfca0:nport",
"fjpfca1:nport:sp1";  <------ added

fcp-bind-target=
"fjpfca0t0:0x50000e1000002501",
"fjpfca1t3:0x50000e1000002ab0";  <------ added

max-throttle=
"fjpfca0t0:128",
"fjpfca1t3:240";  <------ added
  :
```

3) Notify the fjpfca driver of the attachment of the expansion parts by using the following command.

```
# /usr/sbin/FJSVpfca/fc_config -v <Return>
```

[Fibre Channel driver (PW028FC3*/PW028FC4*/PW028FC5*)]

Configuration is not required. Compare the output of prtpicl(1M) command with the output saved at 4.a and find the instance number of the added card.

b. Adding the setting of the device drivers
In the following, the procedure is explained by taking the expanded disk array device controller (target=3 lun=0 to 2) to the existing disk array device in step 6 as an example.

[If you use Solaris:sd]

1) Ensure target=3,lun=0 target=3,lun=1 target=3,lun=3 are defined in /kernel/drv/sd.conf. If they are not defined or commented, modify /kernel/drv/sd.conf.

```
# vi /kernel/drv/sd.conf<Return>
  :
name="sd" class="scsi"
target=0 lun=0;
  :
name="sd" class="scsi"  <------ If undefined, add this definition
target=3 lun=0;  <------ or remove the comment symbols.
name="sd" class="scsi"
target=3 lun=1;
```

```
name="sd" class="scsi"
target=3 lun=2;
  :
```

2) Notify the sd driver of the attachment of the expanded disk devices by using the following command.
The following messages come out this time. There is no problem.

```
·  # update_drv -f sd <Return>
   Cannot unload module: sd
   Will be unloaded upon reboot.
   Forcing update of sd.conf.
```

3) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded disk device.

The following example shows that "**c3t3d0**" and "**c4t3d0**" are the logical path names of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**", "**c4t3d1**","**c3t3d2**" and "**c4t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# prtpicl -v > /tmp/prtpicl.post <Return>
# diff /tmp/prtpicl.pre /tmp/prtpicl.post | grep devfs-path | grep
hddv <Return>
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@8d,2000/fibre-channel@1/sd@3,2
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,0
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,1
> :devfs-path /pci@89,2000/fibre-channel@1/sd@3,2
# ls -l /dev/dsk | grep /pci@8d,2000/fibre-channel@1/sd@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:e
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@8d,2000/fibre-channel@1/sd@3,0:h
# ls -l /dev/dsk | grep /pci@89,2000/fibre-channel@1/sd@3,0
<Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c4t3d0s0
-> ../../devices/pci@89,2000/fibre-channel@1/sd@3,0:a
  :
```

4) Label a disk and perform the setting of partitions (slices) for the logical path names in step 7.b.3) by using the format(1M) command.

[Disk array device (hard disk driver : hddv)]
 · In case of first hot expansion of disk array devices, begin from step 7.b.1).
 · In case of second or later, begin from step 7.b.5).

1) Check the presence of the file "/kernel/drv/hddv.conf".
If it does not exist, this case is "Hard Disk Driver first installation", so go to step 7.b.3), and if it exists, this case is "non-hot expansion settings", so go to step 7.b.2).

> **[In case of not existing (first installation)]** --> go to step 7.b.3)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory
[In case of existing (non-hot expansion settings)] --> go to step
7.b.2)
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
```

2) After executing the following command on non-hot expansion specified in the settings, check if the file "/kernel/drv/hddv.conf" is deleted.

```
# hddvadm -i <Return>
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf: No such file or directory
```

3) Using the following command, create the hddv.conf file for hot expansion function.
The message example in "Non-hot expansion settings" shows disk array device GR720 of target=1(lun=0) with using now is overlapped in sd/hddv drivers.

```
    ·  [First installation] --> go to step 7.b.5)
       # hddvadm -M <Return>

    ·  [Non-hot expansion settings] --> go to step 7.b.4)
       # hddvadm -M <Return>
       already              ID=              1              exists.
       /devices/pci@1d,2000/fibre-channel@1/sd@1,0:a,raw : GR720
```

4) When the hot expansion function is used, the target IDs registered in hddv.conf cannot be registered in sd.conf.
So if definition in sd.conf and hddv.conf are overlapped, delete or comment out the duplicated definitions of sd.conf

The below example shows the duplicated definition of target=1.

```
# vi /kernel/drv/sd.conf <Return>
:
name="sd" class="scsi"
target=0 lun=0;
:
#name="sd" class="scsi" <------
target=1 lun=0;
#name="sd" class="scsi" Delete or comment out
target=1 lun=1; the duplicated definitions of sd and hddv drivers.
#name="sd" class="scsi"
target=1 lun=2; <------
:
```

But it is impossible to delete the target IDs being recognized as a system volume a CD-ROM device etc. in sd driver.
In this case, change the target ID on hddv.conf and the disk array device side to unduplicated definition of sd.conf.

5) Edit the file "/kernel/drv/hddv.conf" generated automatically by using the hddvadm -M command, remove the comment symbols of the LUN definitions of hot expansion and using in non-hot expansion settings.
When the target numbers of two or more disk array device controllers are different, add each target number definition at the same time.
If the definition of LUNs that are expected to expand is found, because of second or later execution of hot expansion, it is not required to edit.

The below example shows registrations of hot expansion targets (target=3, lun=0 to 2) and disk array device GR720 using in non-hot expansion settings (target=1)

```
# ls /kernel/drv/hddv.conf <Return>
/kernel/drv/hddv.conf
# vi /kernel/drv/hddv.conf <Return>
    :
#name="hddv" class="scsi" target=0 lun=0;
```

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```
        :
#name="hddv" class="scsi" target=0 lun=7;
        :
name="hddv" class="scsi" target=1 lun=0        <------
name="hddv" class="scsi" target=1 lun=1;          Remove the comment symbols of using LUNs
name="hddv" class="scsi" target=1 lun=2;        <------
        :
name="hddv" class="scsi" target=3 lun=0;        <------
name="hddv" class="scsi" target=3 lun=1;          Remove the comment symbols of
name="hddv" class="scsi" target=3 lun=2;        <------ expanded LUNs
#name="hddv" class="scsi" target=3 lun=3;
:
```

6) Check if no duplicate definitions exist in the sd.conf and hddv.conf files by using the hddvchk_conf command.
The message example in "Check NG" shows the duplicated definition is target=3, so go back to step 5.b.4).

Also, the following example is execution when the FJSVhddv package is installed to /opt.
The placed path of the hddvchk_conf command changes by installed directory.

```
  ·  [Check OK] --> go to step 7.b.7)
     # /opt/FJSVhddv/bin/hddvchk_conf <Return>
     /kernel/drv/sd.conf and /kernel/drv/hddv.conf seems to be
     correct

  ·  [Check NG] --> go back to step 7.b.4)
     # /opt/FJSVhddv/bin/hddvchk_conf <Return>
     NG ID = [ 3 ]
```

7) Notify the hard disk driver of the attachment of the expanded LUNs by using the following command.

```
# update_drv -f hddv <Return>
```

Under the present using disk array devices, the following messages come out. There is no problem.

```
# update_drv -f hddv <Return>
Cannot unload module: hddv
Will be unloaded upon reboot.
Forcing update of hddv.conf.
```

8) Save the results of execution of the drcstat(1M) command in a file, and find a difference between the data in step 3.a and the current result, then determine the physical path names and the logical path names under /dev/dsk of the expanded LUNs.

The following example shows that "**c3t3d0**" is the logical path name of the expanded lun=0. Then the logical path names of lun=1 to 2 are "**c3t3d1**" and "**c3t3d2**" (c**X**t**Y**d**Z**; **X**:PCI card number, **Y**:target ID, **Z**:lun number).

```
# /opt/FJSVhwr/sbin/drcstat -device > /tmp/drcstat.post <Return>
# diff /tmp/drcstat.pre /tmp/drcstat.post | grep hddv <Return>
        :
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,0" 10 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,1" 11 "hddv"
> 00-PCI#0B "/pci@80,4000/fibre-channel@1/hddv@3,2" 12 "hddv"
# ls -l /dev/dsk | grep /pci@80,4000/fibre-channel@1/hddv@3,0 <Return>
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s0
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:a
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s1
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:b
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s2
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:c
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s3
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:d
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s4
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:e
```

```
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s5
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:f
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s6
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:g
lrwxrwxrwx 1 root root 41 Sep 20 22:53 c3t3d0s7
-> ../../devices/pci@80,4000/fibre-channel@1/hddv@3,0:h
```

c. Add configure of PCI card driver
   [SCSI driver(Solaris: glm , FUJITSU PCI SCSI Adapter Driver)]
   No procedure is necessary.

   [Fibre Channel driver (PW008FC3U/PW008FC2U/ GP7B8FC1U)]
   No procedure is necessary.

   [Fibre Channel Card (PW028FC3*/PW028FC4*/PW028FC5*)]
   Bind the auto mapped target connected with the card and modify the entries of lpfc.conf to match the requirements of the extended Fibre Channel Controller. These procedures are reflected on next boot time. In the following, indicate to bind the auto mapped target with the card.

```
# /usr/sbin/lpfc/lputil <Return>
LightPulse Common Utility for Solaris/SPARC. Version 1.6a8 (03/03/2004).
Copyright (c) 2003, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 1
Host Adapter 0 (lpfc11) is an LP9802 (Ready Mode)

MAIN MENU
1. List Adapters
2. Adapter Information
3. Firmware Maintenance
4. Reset Adapter
5. Persistent Bindings
0. Exit
Enter choice => 5

PERSISTENT BINDINGS MENU
1. Display Current Bindings
2. Display All Nodes
3. Duplicate Adapter Bindings
4. Bind Target Manually
5. Bind Automapped Targets
6. Delete Binding(s)
0. Return to Main Menu
Enter choice => 5

Automapped FCP Nodes:
Node                 Target   WWPN                  WWNN
----                 ------   ---------             --------
Automapped FCP Node   2       50-06-0e-80-00-10-04-92   50-06-0e-80-00-10-04-92

Press the Enter or Return key to continue:
Bind all auto-mapped targets? (Y/N) => Y

Select Binding Method:
1. By Node Name
2. By Port Name
3. By D_ID
0. Cancel
Enter Choice => 2
```

8. Attaching to the redundant configuration
   Attach the paths connected expanded PCI cards with disk array device controllers to the existing redundant configuration by using the following command, and check if the logical path names in step 7.b.8) are added (the below underlined part strings part).

   The following procedure is described for MPLB/GRMPD/ETERNUS MPD. If you use the redundancy software other than MPLB/GRMPD/ETERNUS MPD, see the document for each product.

- **[MPLB2.2 or later / GRMPD]**
  # /usr/sbin/mplbconfig -nv <Return>
  *** Phase 1: checking /dev/rdsk ***
  *** Phase 2: checking multi path ***
  *** Phase 3: analyzing path ***
  Path : Action : Element path : LUN : Storage : Zone
  mplb0 : exist : c1t4d0s2 c2t3d0s2 : 0 : GR720464f-12340001 :
  :
  mplb8 : add : c3t3d0s2 c4t3d0s2 c5t3d0s2: 0 : GR8404550- 000213 :
  :
  # /usr/sbin/mplbconfig -av <Return>
  :
  IOMP: /dev/FJSVmplb/fiomp/adm8
  Node:
  /dev/FJSVmplb/rdsk/mplb8s0
  /dev/FJSVmplb/rdsk/mplb8s1
  /dev/FJSVmplb/rdsk/mplb8s2
  /dev/FJSVmplb/rdsk/mplb8s3
  /dev/FJSVmplb/rdsk/mplb8s4
  /dev/FJSVmplb/rdsk/mplb8s5
  /dev/FJSVmplb/rdsk/mplb8s6
  /dev/FJSVmplb/rdsk/mplb8s7
  :

- **[ETERNUS MPD]**
  # /usr/sbin/grmpdautoconf <Return>
  Refer to the "ETERNUS Multipath driver 2.0 User's guide" for the use of grmpdautoconf.

Chapter 4 Network Devices

This chapter provides the detail procedure of replacement or expansion of PCI cards for network devices by using DR.

Please refer to "Dynamic Reconfiguration User's Guide" for details of the drc(1M) command and the drcstat(1M) command used in procedure of this chapter.

And refer to the each redundant software manual for more details on redundant configuration of PCI cards.

4.1 Replacement Procedure

This section explains the procedure for replacement of PCI cards for non-redundant and redundant configurations by using DR.

4.1.1 Replacement of non-redundant configuration

When the PCI cards are needed to be replaced in non-redundant configuration without using redundant software, it is necessary to stop all the high-level products (services) as applications that are using these PCI cards.

The replacement procedures of PCI cards for non-redundant configuration are below.

1. Locating the PCI cards and the system boards
   Using the following procedures, locate the system boards equipped with the faulty PCI cards and the connected interfaces.

   a. Check the interface (example:hme2) of replacement target by the WARNING messages output to console etc.

   b. Locate the system boards equipped with the faulty PCI cards and display a list of interfaces about all PCI cards of the system boards by using the drcstat(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drcstat -device | grep hme <Return>
   00-ONBOARD "/pci@83,4000/network@1,1" 0 "hme"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   # /opt/FJSVhwr/sbin/drcstat -device sb01 <Return>
   01-PCI#0B "/pci@84,4000/scsi@2" 2 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2,1" 3 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2/sd@1,0" 1 "sd"
   01-PCI#0B "/pci@84,4000/scsi@2/sd@3,0" 20 "sd"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,scfc@14,200000" 1
   "FJSVscf2"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,se@14,400000" 1 "se"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   ```

   The above example shows the relevant interface is hme2("/pci@87,4000/SUNW,hme@2,1" 2 "hme"), and so the faulty PCI card is equipped with the PCI slot#3B of the system board#01.
   And it is understood that the hme1 and SCSI devices excluding hme2 exist on the relevant system board from the results of execution of the second command.
   It is possible to ignore about se driver and scf driver (FJSVscfx) with the redundant configuration automatically.
   Refer to "Enhanced Support Facility User's Guide" for details of se driver and scf driver.

2. Stopping the high-level products (services)
   Stop the high-level applications that are using the interfaces located in step 1.
   When connecting SCSI devices that are using as the above example, refer to "Chapter 3 File Devices" about how to stop them.
   When the card which has two or more ports such as Quad Gigabit Ethernet card is used, before the replacement it is necessary to stop all high layer applications on each port of the card. Please refer to the reference guide of each driver product to specify the port numbers of the card.

   a. When a high-level protocol is TCP/IP interface

      1) Checking the IP address and host name of the interface to be stopped.
      For example, run the ifconfig(1M) command, see the files /etc/hostname.*interface* and /etc/inet/hosts.

      ```
      # ifconfig hme2 <Return>hme2:
      flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu
      1500 index 2 inet 192.168.10.1 netmask ffffff00 broadcast 192.168.10.1
      ```

```
ether 0:0:e:25:0:d6
# grep 192.168.10.1 /etc/inet/hosts <Return>
192.168.10.1 kscl05
```

2) Stopping the use of the relevant interface of high-level applications.
Check the remote hosts communicating with the relevant interface by the netstat(1M) command.

```
# netstat | grep kscl105 <Return> (If the host name is ksc105)kscl105.32790
kscl103.9798 24820 0 24820 0 ESTABLISHED
kscl105.telnet kscl103.56528 24820 0 24820 0 ESTABLISHED
kscl105.32945 kscl105.fjwv_s 32768 0 32768 0 ESTABLISHED
kscl105.fjwv_s kscl105.32945 32768 0 32768 0 ESTABLISHED
kscl105.33075 kscl105.32776 32768 0 32768 0 TIME_WAIT
kscl105.33076 kscl105.32776 32768 0 32768 0 TIME_WAIT
kscl105.33077 kscl105.32776 32768 0 32768 0 TIME_WAIT
kscl105.33078 kscl105.32776 32768 0 32768 0 TIME_WAIT
kscl105.telnet kscl101.1888 63949 3 24820 0 ESTABLISHED
kscl105.33079 kscl105.32776 32768 0 32768 0 TIME_WAIT
kscl105.33080 kscl105.32776 32768 0 32768 0 ESTABLISHED
kscl105.32776 kscl105.33080 32768 0 32768 0 ESTABLISHED
```

Stop communication with checked remote hosts. If a connection has been established from the remote host side, stop the communication from the remote host side to stop access to the relevant interface.

3) Inactivating the high-level drivers.
Inactivate the relevant interface of TCP/IP.

```
# ifconfig hme2 down <Return>
```

```
# ifconfig hme2 unplumb <Return>
```

b. When a high-level protocol is FNA (Fujitsu Network Architecture) or SNA (System Network Architecture) interface
When using the FNA or SNA interface as a high-level protocol for non-redundant configuration, it is impossible to replace the located interface only, and so it is necessary to inactivate all interfaces of the system.
To replace the located interface only, it is required to be redundant configuration using the multipath function of SynfinityLink or PRIMECLUSTER GLS.

1) Stopping the high-level applications.
Stop the high-level applications using the FNA or SNA interface as Netcompo application conversation service etc.
Refer to the manual for each high-level application product about how to stop them.

2) Inactivating the high-level drivers.
Inactivate the high-level drivers as Netcompo FNA-BASE etc.
Refer to the manual for each high-level driver product about how to inactivate them.

3) Inactivating the low-level drivers.
Inactivate the low-level drivers as Netcompo FNA-LAN etc.
Refer to the manual for each low-level driver product about how to inactivate them.

3. Detaching the system boards

a. Detach the system boards equipped with the faulty PCI cards by using the drc(1M) command.
When using PCI card drivers on target system boards, the drc(1M) command terminates abnormally. So go back to the stopping the high-level products.

```
# /opt/FJSVhwr/sbin/drc -disconnect sb01 -keep <Return>
```

Notes
When the ATM cards (GP7B8AT1) are mounted on more than one system board, the operation below cannot be performed for the system boards on which the ATM cards are mounted.
Performing this operation will also disable communication by the ATM card.

1) Detaching the system board during configuration modification via system reboot

```
# drc -connect sb01 -reset <Return><System reboot>
```

2) Moving a system board to another partition

> **# drc -disconnect sb01 -next 1 -reset** <Return><System reboot>

b. Check if the status of the system boards is changed to "Unconfigured".

```
# /opt/FJSVhwr/sbin/drcstat -board sb01
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   ---------------   ---   --------   ----------   --------
01   0    Unconfigured      00       00          10          300
```

4. Replacing the PCI cards
   Pull out the detached system boards and replace the faulty PCI cards located in step 1 to replacement parts, then mount back the system boards. A certified service engineer takes charge of this work.

5. Attaching the system boards

   a. Attach the system boards equipped with the replaced PCI cards by using the drc(1M) command.

   > **# /opt/FJSVhwr/sbin/drc -connect sb01** <Return>

   b. Check if the status of the system boards is changed to "Configured".

```
# /opt/FJSVhwr/sbin/drcstat -board sb01
SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
--   --   ---------------   ---   --------   ----------   --------
01   0    Configured        00       00          10          300
```

6. Restarting the high-level products (services)

   a. When a high-level protocol is TCP/IP interface

   1) Activating the high-level drivers.
   Activate the relevant interface of TCP/IP.

   > **# ifconfig hme2 plumb** <Return>
   >
   > **# ifconfig hme2** *hostname* **netmask** *netmask* **up** <Return>

   2) Restarting the high-level applications.
   Restart high-level applications using the relevant interface.

   b. When a high-level protocol is FNA or SNA interface
   Using the steps below, restart the stopped high-level products.

   1) Activating the low-level drivers.
   Activate the low-level drivers as Netcompo FNA-LAN etc.
   Refer to the manual for each low-level driver product about how to activate them.

   2) Activating the high-level drivers.
   Activate the high-level drivers as Netcompo FNA-BASE etc.
   Refer to the manual for each high-level driver product about how to activate them.

   3) Restarting the high-level applications.
   Restart the high-level applications using the FNA or SNA interface as Netcompo application conversation service etc.
   Refer to the manual for each high-level application product about how to start them.

4.1.2 Replacement of redundant configuration

When the PCI cards are needed to be replaced in redundant configuration with using redundant software, the PCI cards can be replaced without stopping the high-level products (services) as applications.

This section shows the replacement procedures of system boards and PCI cards with using the following redundant software products.

　　· SynfinityLink
　　· PRIMECLUSTER GLS

In case of using the other redundant software products, refer to the manual for each product.

Notes

The redundant line control function of SynfinityLink 2.2 does not support the hot replacement by using DR function. Please use the redundant line control function of PRIMECLUSTER GLS 4.0 or later.

1. Locating the PCI cards and the system boards
   Using the following procedures, locate the system boards equipped with the faulty PCI cards and the connected interfaces.

   a. Check the interface (example:hme2) of replacement target by the WARNING messages output to console etc.

   b. Locate the system boards equipped with the faulty PCI cards and display a list of interfaces about all PCI cards of the system boards by using the drcstat(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drcstat -device | grep hme <Return>
   00-ONBOARD "/pci@83,4000/network@1,1" 0 "hme"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   # /opt/FJSVhwr/sbin/drcstat -device sb01 <Return>
   01-PCI#0B "/pci@84,4000/scsi@2" 2 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2,1" 3 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2/sd@1,0" 1 "sd"
   01-PCI#0B "/pci@84,4000/scsi@2/sd@3,0" 20 "sd"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,panel@14,280030" 1
   "FJSVpanel"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,scfc@14,200000" 1
   "FJSVscf2"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,se@14,400000" 1 "se"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   ```

   The above example shows the relevant interface is hme2("/pci@87,4000/SUNW,hme@2,1" 2 "hme"), and so the faulty PCI card is equipped with the PCI slot#3B of the system board#01.
   And it is understood that the hme1 and SCSI devices excluding hme2 exist on the relevant system board from the results of execution of the second command.
   It is possible to ignore about se driver and scf driver (FJSVscfx).
   Refer to "Enhanced Support Facility User's Guide" for details of se driver and scf driver.

2. Detaching the system boards

   a. Detach the system boards equipped with the faulty PCI cards by using the drc(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drc -disconnect sb01 -keep <Return>
   ```

   Notes
   When the ATM cards (GP7B8AT1) are mounted on more than one system board, the operation below cannot be performed for the system boards on which the ATM cards are mounted.
   Performing this operation will also disable communication by the ATM card.

   1) Detaching the system board during configuration modification via system reboot

   ```
   # drc -connect sb01 -reset <Return><System reboot>
   ```

   2) Moving a system board to another partition

   ```
   # drc -disconnect sb01 -next 1 -reset <Return><System reboot>
   ```

   b. Check if the status of the system boards is changed to "Unconfigured".

   ```
   # /opt/FJSVhwr/sbin/drcstat -board sb01
   SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
   --   --   ---------------   ---   --------   ----------   --------
   01   0    Unconfigured      00    00         10           300
   ```

3. Replacing the PCI cards
   Pull out the detached system boards and replace the faulty PCI cards located in step 1 to replacement parts, then mount back the system boards. A certified service engineer takes charge of this work.

4. Attaching the system boards

   a. Attach the system boards equipped with the replaced PCI cards by using the drc(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drc -connect sb01 <Return>
   ```

   b. Check if the status of the system boards is changed to "Configured".

   ```
   # /opt/FJSVhwr/sbin/drcstat -board sb01
   SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
   --   --   ---------------   ---   --------   ----------   --------
   01   0       Configured      00      00          10          300
   ```

   c. Check the interface status in redundant software.
   Refer to the manual for each redundant software product about how to check the interface status in it.

5. Switching back active paths
   If necessary, switch back the path failed over by hot replacement of DR function to the original path side before the replacement.
   Refer to the manual for each redundant software product about how to switch back active paths.

4.2 Expansion Procedure

This section explains the procedure for expansion of PCI cards for non-redundant and redundant configurations by using DR.

Notes

In case of expanding the ATM cards (GP7B8AT1) by using DR, it is required to reboot the system after setting the environment.

4.2.1 Expansion of non-redundant configuration

This section shows the detail procedure for expansion of PCI cards without using redundant software.

1. Detaching the system boards

   a. Expanding PCI cards to the existing system boards
   It is required to detach the system boards of expansion target beforehand.
   Detach the system boards according to step 2 to 4 in Section 4.1.1.

   b. Expanding new system boards together

   1) When a high-level protocol is TCP/IP interface
   This procedure is not required.

   2) When a high-level protocol is FNA or SNA interface
   When expanding PCI cards in FNA or SNA interface environment, it is required to stop and start the high-level products according to step 2.b in Section 4.1.1.

2. Expanding the PCI cards
   Expand the PCI cards to the system boards and mount them.
   A certified service engineer takes charge of this work.

3. Attaching the system boards
   a. Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drc -connect sb01 <Return>
   ```

   b. Check if the status of the system boards is changed to "Configured".

   ```
   # /opt/FJSVhwr/sbin/drcstat -board sb01
   SB BN Status (Detail) PID Next_PID Board_Type CPU(MHz)
   -- -- --------------- --- -------- ---------- --------
   01 0 Configured 00 00 10 300
   ```

4. Expanding the devices
   Connect the communication equipment to the expanded PCI cards with the cable.

5. Adding the setting of high-level products (services)
   Using the following procedures, add the setting of the high-level products.

      a. Determine interface
   Display a list of devices under the system boards equipped with the expanded PCI cards by using the drcstat(1M) command, and check the interface names of the PCI cards.

   ```
   # /opt/FJSVhwr/sbin/drcstat -device sb01 <Return>
   01-PCI#0B "/pci@84,4000/scsi@2" 2 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2,1" 3 "glm"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,panel@14,280030" 1
   "FJSVpanel"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,scfc@14,200000" 1
   "FJSVscf2"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,se@14,400000" 1 "se"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   ```

   The above example shows the interface name is hme2 when expanding the PCI card to the PCI slot#3B of the system board#01.

      b. Adding the setting of the high-level drivers

         1) When a high-level protocol is TCP/IP interface
   Add the setting of expanded interfaces to the files /etc/hostname.*interface*, /etc/inet/hosts and /etc/netmasks etc.

         2) When a high-level protocol is FNA or SNA interface
   Add the setting of expanded interfaces to Netcompo FNA-LAN and Netcompo FNA-BASE etc.
   Refer to the manual for each high-level driver product for more details.

      c. Adding the setting of the high-level applications
   Add the setting of the high-level applications.
   Refer to the manual for each high-level application product for more details.

6. Starting the high-level products (services)
   Using the following procedures, start the high-level products.

      a. Activating the high-level drivers

         1) When a high-level protocol is TCP/IP interface
   Activate the expanded interface by using the ifconfig(1M) command.
   The option specified for the ifconfig(1M) command is the same content as the added setting.

   ```
   # ifconfig hme2 plumb <Return>

   # ifconfig hme2 hostname netmask netmask up <Return>
   ```

         2) When a high-level protocol is FNA or SNA interface
   Activate the Netcompo FNA-LAN.
   Refer to "Netcompo FNA-LAN User's Guide" about how to activate.

      b. Starting the high-level applications
   Start the high-level applications.
   Refer to the manual for each high-level application product about how to start.

4.2.2 Expansion of new redundant configuration

This section explains the detail procedure for expansion of PCI cards to setup redundant configuration with using redundant software.

1. Detaching the system boards
      a. Expanding PCI cards to the existing system boards
   It is required to detach the system boards of expansion target beforehand.
   Detach the system boards according to step 2 to 4 in Section 4.1.1.

      b. Expanding new system boards together

1) When a high-level protocol is TCP/IP interface
This procedure is not required.

2) When a high-level protocol is FNA or SNA interface
When expanding PCI cards in FNA or SNA interface environment, it is required to stop and start the high-level products according to step 2.b in Section 4.1.1.

2. Expanding the PCI cards
   Expand the PCI cards to the system boards and mount them.
   A certified service engineer takes charge of this work.

3. Attaching the system boards
   a. Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command.

   ```
   # /opt/FJSVhwr/sbin/drc -connect sb01 <Return>
   # /opt/FJSVhwr/sbin/drc -connect sb02 <Return>
   ```

   b. Check if the status of the system boards is changed to "Configured".

   ```
   # /opt/FJSVhwr/sbin/drcstat -board sb01
   SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
   --   --   ---------------   ---   --------   ----------   --------
   01   0       Configured     00       00          10          300

   # /opt/FJSVhwr/sbin/drcstat -board sb02

   SB   BN   Status (Detail)   PID   Next_PID   Board_Type   CPU(MHz)
   --   --   ---------------   ---   --------   ----------   --------
   02   0       Configured     00       00          10          300
   ```

4. Expanding the devices
   Connect the communication equipment to the expanded PCI cards with the cable.

5. Setup of the redundant configuration
   Using the following procedures, set up the redundant configuration of the expanded PCI cards.
   a. Determine interface
      Display a list of devices under the system boards equipped with the expanded PCI cards by using the drcstat(1M) command, and check the interface names of the PCI cards.

   ```
   # /opt/FJSVhwr/sbin/drcstat -device sb01 <Return>
   01-PCI#0B "/pci@84,4000/scsi@2" 2 "glm"
   01-PCI#0B "/pci@84,4000/scsi@2,1" 3 "glm"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,panel@14,280030" 1
   "FJSVpanel"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,scfc@14,200000" 1
   "FJSVscf2"
   01-ONBOARD "/pci@87,4000/ebus@1/FJSV,se@14,400000" 1 "se"
   01-ONBOARD "/pci@87,4000/network@1,1" 1 "hme"
   01-PCI#3B "/pci@87,4000/SUNW,hme@2,1" 2 "hme"
   # /opt/FJSVhwr/sbin/drcstat -device sb02 <Return>
   02-ONBOARD "/pci@8b,4000/ebus@1/FJSV,panel@14,280030" 2
   "FJSVpanel"
   02-ONBOARD "/pci@8b,4000/ebus@1/FJSV,scfc@14,200000" 2
   "FJSVscf2"
   02-ONBOARD "/pci@8b,4000/ebus@1/FJSV,se@14,400000" 2 "se"
   02-ONBOARD "/pci@8b,4000/network@1,1" 3 "hme"
   02-PCI#3B "/pci@8b,4000/SUNW,hme@2,1" 4 "hme"
   ```

   The above example shows the interface names are hme2 and hme4 when expanding the PCI cards to the PCI slot#3B of the system board#01 and system board #02.

   b. Adding to new redundant configuration
      Set up the new redundant configuration with using determined interface.
      Refer to the manual for each redundant software product about how to set up redundant configuration.

6. Adding the setting of high-level products (services)
   Using the following procedures, add the setting of the high-level products.

a. Adding the setting of the high-level drivers

1) When a high-level protocol is TCP/IP interface
Add the setting of interfaces with redundant configuration devices expanded in step 5.b to the files /etc/hostname.*interface*, /etc/inet/hosts and /etc/netmasks etc.

2) When a high-level protocol is FNA or SNA interface
Add the setting of expanded interfaces to Netcompo FNA-LAN and Netcompo FNA-BASE etc. with using the interface names of redundant configuration devices expanded in step 5.b. Refer to the manual for each high-level driver product for more details.

b. Adding the setting of the high-level applications
Add the setting of the high-level applications.
Refer to the manual for each high-level application product for more details.

7. Starting the high-level products (services)
Using the following procedures, start the high-level products.

a. Activating the high-level drivers

1) When a high-level protocol is TCP/IP interface
Activate the expanded interface by using the ifconfig(1M) command.
The option specified for the ifconfig(1M) command is the same content as the added setting.

> **# ifconfig hme2 plumb** <Return>
>
> **# ifconfig hme2 *hostname* netmask *netmask* up** <Return>

2) When a high-level protocol is FNA or SNA interface
Activate the Netcompo FNA-LAN.
Refer to "Netcompo FNA-LAN User's Guide" about how to activate.

b. Starting the high-level applications
Start the high-level applications.
Refer to the manual for each high-level application product about how to start.

4.2.3 Expansion of PCI cards to redundant configuration

This section explains the procedure of PCI cards expansion for existing redundant configuration to reinforce redundancy.

1. Detaching the system boards

a. Expanding PCI cards to the existing system boards
It is required to detach the system boards of expansion target beforehand.
In case of the system boards equipped with non-redundant configuration PCI cards, detach the system boards according to step 2 to 4 in Section 4.1.1.
In case of the system boards equipped with redundant configuration PCI cards, detach the system boards according to step 2 in Section 4.1.2.

b. Expanding new system boards together
This procedure is not required.

2. Expanding the PCI cards
Expand the PCI cards to the system boards and mount them.
A certified service engineer takes charge of this work.

3. Attaching the system boards
Using the following procedure, attach the system boards equipped with the expanded PCI cards.
It is possible to attach the system boards to the redundant configuration automatically at the time with depending on redundant software.
Refer to the manual for each redundant software product whether the system boards are attached to the redundant configuration automatically.

a. Attach the system boards equipped with the expanded PCI cards by using the drc(1M) command.

> **# /opt/FJSVhwr/sbin/drc -connect sb01** <Return>

b. Check if the status of the system boards is changed to "Configured".

> **# /opt/FJSVhwr/sbin/drcstat -board sb01**

```
SB   BN   Status (Detail)   PID     Next_PID   Board_Type   CPU(MHz)
--   --   ---------------   ---     --------   ----------   --------
01   0         Configured   00           00           10        300
```

4. Expanding the devices
Connect the communication equipment to the expanded PCI cards with the cable.
In case of using the software that attached the system boards and the redundant configurations at the same time, it is possible to come out error messages until expansion of devices, but please ignore the messages.

5. Attaching to the redundant configuration
In case of using the software that does not attach to redundant configuration automatically in step 3, attach the expanded PCI cards to redundant configuration manually.
Refer to the each redundant software manual for more details.

6. Switching over active paths
When using PCI cards expanded by using DR as active side paths, switch over these paths.
Refer to the manual for each redundant software product about how to switch over active paths.

Chapter 5 Notes

This chapter provides notes when the PCI cards are replaced or expanded by using DR.

5.1 Notes on DR Operation

5.1.1 DR Operation While Using F6494/5/6/7/8 (SCSI)

Execution jobs may terminate abnormally if the disk array unit F6494/5/6/7/8 (SCSI) is used, because the execution of DR operation temporarily prevents the system from accepting an interrupt of the (SCSI) unit.

Stop the use of the disk array unit F6494/5/6/7/8 (SCSI) during DR operation.

5.1.2 Warning Messages During the Execution of DR Processing

If a DR operation (detaching or attaching a system board) is executed during the operation of the disk array unit or the tape unit, either of the following messages may be displayed to indicate a hardware error.

```
scsi: WARNING: /pci@NN,M000/scsi@M,N/xxxx@M,N (xxxx):
SCSI transport failed: reason 'unexpected_bus_free': xxxx

[Example]
scsi: WARNING: /pci@80,4000/scsi@2,1/sd@3,0 (sd20):
SCSI transport failed: reason 'unexpected_bus_free': retrying command
```

Or,

```
scsi: WARNING: /pci@NN,M000/scsi@M,N (xxxx):
Resetting scsi bus, data overrun: got too much data from target from (M,N)

[Example]
scsi: WARNING: /pci@80,4000/scsi@2,1 (glm2):
Resetting scsi bus, data overrun: got too much data from target from (1,0)
```

This message is displayed because the execution of DR operation has disabled the system to the extent that it is temporarily unable to accept an interrupt of the SCSI unit. This is not a hardware error.

5.1.3 DR Operation While Using Tape Device

By executing DR operation, the system cannot temporarily accept a SCSI device interrupt. As a result, a job being executed may be abnormally terminated if the job is using tape devices which are unable to guarantee the retry operation.

During the DR operation, avoid using tape devices on any system board.

5.1.4 DR Operation While Using hddv Driver

If the hot expansion function is specified in the settings of the hddv driver, an expansion operation by using DR is available for connecting a disk array unit.

If the non-hot expansion function is specified in the settings of the hddv driver, an expansion operation by using DR is not available. (Currently, only hot replacement is available.)

The expansion of using DR described above includes the following operations:

- · New attachment of a system board
- · Attachment by moving a system board
- · Attachment after detaching the system board during configuration modification via system reboot

```
# /opt/FJSVhwr/sbin/drc -connect sb03 <Return>
```

If this operation is executed in the non-hot expansion function setting, it will become impossible to recognize the device under the hddv driver on the corresponding system board, or a system panic may occur.

5.1.5 DR Operation While Using ATM Card (GP7B8AT1-X)

When the ATM cards are mounted on more than one system board, the operation below cannot be performed for the system boards on which the ATM cards are mounted.

- · Detaching the system board during configuration modification via system reboot
- · Moving a system board to another partition

```
# /opt/FJSVhwr/sbin/drc -connect sb03 -reset <Return>
<System reboot>
```

```
# /opt/FJSVhwr/sbin/drc -disconnect sb03 -next 1 -reset <Return>
<System reboot>
```

Performing this operation will also disable communication by the ATM card.

5.1.6 DR Operation During High Load

Even if kernel memory does not exist in the memory on the system board to be separated, separation may fail in a state of high load. This is because a timeout may occur in release (saving the memory of the system board to be separated on the disk by paging) processing of the memory if too many pages are locked in a state of high load. Perform DR operation in a state of low load.

In addition, a specification for not using any memory on a system board to be detached is available. (See the Kernel memory allocation option in "Dynamic Reconfiguration User's Guide".) This specification ensures the detachment of a system board.

5.1.7 Driver installation in hot expansion

In case of hot expansion by using DR function, it is necessary to install the drivers that control PCI cards and devices of expansion targets beforehand.

5.1.8 Network driver configuration changing

- · In case of configuring parameters in driver.conf(4) file and replacing or expanding the system board by using DR, the PCI card on the replaced or expanded system board, their parameters which configured in driver.conf(4) file may not be valid. To change the initial parameters of the PCI card on the replaced or expanded system board by using DR, please refer to the solution of each PCI card shown below. (Each PCI card manual**(*1)** has the description of setting by the ndd command. Please refer it.)

Product ID (Functions)	Software of driver (driver name)	Resolution
X1033A-U X1033A-X and Onboard LAN interface (***2**) (10/100BASE-T)	Solaris (hme)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /kernel/drv/hme.conf file.
PW008FE1 (10/100BASE-T)	FUJITSU PCI 10/100 Ethernet 1.0 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /kernel/drv/fjfe.conf file.
PW008QE1 (10/100BASE-T x4)	FUJITSU PCI Quad 10/100 Ethernet 1.0 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /kernel/drv/fjqe.conf file,
PW008QE2 (10/100BASE-T x4)	FUJITSU PCI Quad 10/100 Ethernet 1.1 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /kernel/drv/fjqe.conf file.
PP028GE1U PP028GE1X	FUJITSU PCI Gigabit Ethernet 1.4.1 or later	· The ndd command is not supported. · Please reboot a system after changing the

(1000BASE-SX)	(supplied with a PCI card)	/kernel/drv/fjge.conf file.
PW008GE1U PW008GE1X (1000BASE-T)	FUJITSU PCI Gigabit Ethernet 1.4.1 or later (supplied with a PCI card)	· The ndd command is not supported. · Please reboot a system after changing the /kernel/drv/fjge.conf file.
PW008GE4 (1000BASE-SX)	FUJITSU PCI Gigabit Ethernet 2.0 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4us/kernel/drv/fjgi.conf file.
PW008GE5 (10/100/1000BASE-T)	FUJITSU PCI Gigabit Ethernet 2.0 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4us/kernel/drv/fjgi.conf file.
PW008QG1 (10/100/1000BASE-T x4)	FUJITSU PCI Gigabit Ethernet 2.3 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4us/kernel/drv/fjgi.conf file.
PW0G8GE1 (1000BASE-SX)	FUJITSU PCI Gigabit Ethernet 2.4 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4us/kernel/drv/fjgi.conf file.
PW0G8GE2 (10/100/1000BASE-T)	FUJITSU PCI Gigabit Ethernet 2.4 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4us/kernel/drv/fjgi.conf file.
Base I/O Card (IOUA) (10/100/1000BASE-T x2)	Solaris (bge)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/sun4u/kernel/drv/bge.conf file.
SE0X7GD1X (10/100/1000BASE-T x2)	FUJITSU PCI Gigabit Ethernet 3.0 Update1 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/SUNW,SPARC-Enterprise/kernel/drv/fjgi.conf file.
SE0X7GD2X (1000BASE-SX x2)	FUJITSU PCI Gigabit Ethernet 3.0 Update1 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/SUNW,SPARC-Enterprise/kernel/drv/fjgi.conf file.
SE0X7GQ1X (10/100/1000BASE-T x4)	FUJITSU PCI Gigabit Ethernet 3.0 Update1 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/SUNW,SPARC-Enterprise/kernel/drv/fjgi.conf file.
SE0X7GQ2X (10/100/1000BASE-T x4)	FUJITSU PCI Gigabit Ethernet 3.0 Update1 or later (supplied with a PCI card)	· Please make a setting by the ndd command. · Or please reboot a system after changing the /platform/SUNW,SPARC-Enterprise/kernel/drv/fjgi.conf file.
SE0X7HE1X (10/100/1000BASE-T x4)	FUJITSU 10Gigabit Ethernet 1.0 or later (supplied with a PCI card)	· Please reboot a system after changing the /kernel/drv/fjxge.conf file.

(*1) In case of X1033A-U(-X), please refer to Oracle web page about "Platform Notes: The hme FastEthernet Device Driver" and ndd(1M) man page etc..
(*2) The below machines have an Onboard LAN interface (hme).
- PRIMEPOWER 800/1000/2000, 900/1500/2500

· In case of using the JumboFrame feature of "FUJITSU PCI Gigabit Ethernet 1.4.1" or "FUJITSU PCI Gigabit Ethernet

2.0" or later, TCP/IP MTU size configured in "**/etc/fjmtu.fjgeX**" file or "**/etc/fjmtu.fjgiX**" file is not set to the interface of the PCI card on the replaced or expanded system board after replacing or expanding the system board by using DR feature.

Please configure the TCP/IP MTU size of that interface using by either following procedure.

- Configure the TCP/IP MTU size by ifconfig(1M) command.
  Following example configures the MTU size of fjgi0 to 1500.

ifconfig fjgi0 mtu 1500 \<RETURN\>

- Reboot the system after configuration of the "**/etc/fjmtu.fjgeX**" file or "**/etc/fjmtu.fjgiX**" file.

· In case of configuring MAC local address on Netcompo FNA-LAN, replacement and extension of PCI card are not supported.
Please reboot the system after configuration of the "**/etc/opt/FSUNnet/mactool/macaddr.conf**" file. Please refer to the "Netcompo FNA-LAN User's Guide" for details of the configuration of MAC local address.

5.1.9 PW007FL2U hot expansion

When you connect PW007FL2U to PCI card PW008SC3/PW0G8SC1 and do hot expansion of them by DR operation, it is necessary to describe a setting to /platform/sun4us/kernel/drv/fjulsa.conf file and reboot a system in advance.

Please refer to "FUJITSU ULTRA LVD SCSI Host Bus Adapter Driver User's Guide" enclosed with a SCSI card PW008SC3/PW0G8SC1 for details of setting.