



PRIMECLUSTER™

Installation and Administration Guide 4.1

(for Linux)

Edition September 2005

Preface

This manual serves as your starting point for using PRIMECLUSTER. It explains the workflow of the series of operations from installation to operation management of the PRIMECLUSTER system. Since the PRIMECLUSTER system comprises multiple features, there are several other manuals besides this one for each feature. However, by reading this manual first, you will be able to perform the series of operations because this manual refers readers to other manuals that contain feature-specific information that is necessary for the operations.

This manual also provides a functional overview of products that are supported by the PRIMECLUSTER system and describes operation procedures.

This manual only covers the basic operation of PRIMECLUSTER. For operations using different hardware and software configurations, see "Related Documentation."

The table below shows the operation flow from PRIMECLUSTER installation to the start of operation management and indicates the reference location in this manual for each operation.

Flow from PRIMECLUSTER system installation to operation management

PRIMECLUSTER system operation flow	Reference location in this manual
1. Understanding the flow of PRIMECLUSTER system building and designing the PRIMECLUSTER system	Part 1 Planning
2. Installing the PRIMECLUSTER system	Part 2 Installation
3. Monitoring the operation status of the PRIMECLUSTER system	Part 3 Operations
4. Changing the PRIMECLUSTER system configuration after system operation has been started	Part 4 System Configuration Modifications
5. Maintaining the PRIMECLUSTER system	Part 5 Maintenance
6. Installing products for the PRIMECLUSTER system	Part 6 PRIMECLUSTER Products

For detailed procedural explanations, refer to the reference manuals that are indicated in the target location of each part.

◆ Target Readers

This manual is intended for all users who use PRIMECLUSTER 4.1 and perform cluster system installation and operation management. It is also intended for programmers who develop applications that operate on PRIMECLUSTER.

◆ Configuration of This Documentation

This manual consists of six parts, appendixes, and a glossary. The contents of each part are described below.

Part 1 Planning

Audience: System administrators who build PRIMECLUSTER systems

Contents: This part describes the overall workflow from installation to operation of the PRIMECLUSTER system.

Part 2 Installation

Audience: System administrators who build PRIMECLUSTER systems

Contents: This part describes operations for software installation, cluster building, and application building.

Part 3 Operations

Audience: System administrators who manage system operations.

Contents: This part describes operation methods for operations such as monitoring the PRIMECLUSTER system and investigating failure causes.

Part 4 System Configuration Modifications

Audience: System administrators who build PRIMECLUSTER systems

Contents: This part describes necessary work items for additions, modifications, and deletions to the PRIMECLUSTER system configuration.

Part 5 Maintenance

Audience: System administrators who build PRIMECLUSTER systems

Contents: This part describes the items related to the maintenance of the PRIMECLUSTER system.

Part 6 PRIMECLUSTER Products

Audience: Users who operate PRIMECLUSTER products on PRIMECLUSTER systems

Contents: This part describes the versions and levels of products that are supported by the PRIMECLUSTER system and provides a functional overview of those products.

Appendix A PRIMECLUSTER System Design Worksheets

Audience: Users who design PRIMECLUSTER systems

Contents: This appendix contains the PRIMECLUSTER System Design Worksheet.

Appendix B Manual Pages

Audience: All users who use PRIMECLUSTER systems

Contents: This appendix describes the online manual pages that are used by the individual features of the PRIMECLUSTER system.

Appendix C Troubleshooting

Audience: All users who use PRIMECLUSTER systems

Contents: This appendix describes corrective actions for problems that may occur in the PRIMECLUSTER system. It also explains how to collect data when requesting a problem investigation.

Appendix D Messages

Audience: All users who use PRIMECLUSTER systems

Contents: This appendix describes the contents and actions for messages output by the userApplication Configuration Wizard GUI and messages output by procedure resources in PRIMECLUSTER systems. For other messages, this manual indicates the reference locations in other manuals.

Appendix E Registering, Changing, and Deleting State Transition Procedure Resources for PRIMECLUSTER Compatibility

Audience: All users who use PRIMECLUSTER-compatible resources

Contents: This appendix describes procedures for registering, changing, and deleting procedure resources when the cluster applications use procedure resources.

Appendix F Registering SynfinityCluster-compatible Resources

Audience: All users who use PRIMECLUSTER systems

Contents: This appendix describes the feature supplied with the Supplement CD of the PRIMECLUSTER product.

Appendix G Changes in Each Version

Audience: All users who use PRIMECLUSTER 4.0A20 or 4.1A20.

Contents: This appendix describes the changes made to the specifications of PRIMECLUSTER 4.1A30.

Glossary

Audience: All users who use PRIMECLUSTER systems

Contents: This section explains terms used to describe the PRIMECLUSTER system.

Abbreviations

Audience: All users who use PRIMECLUSTER systems

Contents: This section explains abbreviations of the PRIMECLUSTER system.

◆ Related Documentation

Refer to the following manuals as necessary when setting up the cluster:

- *PRIMECLUSTER Concepts Guide*
- *PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*
- *PRIMECLUSTER Reliant Monitor Services (RMS) with Wizard Tools Configuration and Administration Guide*
- *PRIMECLUSTER Reliant Monitor Services (RMS) Troubleshooting Guide*
- *PRIMECLUSTER Scalable Internet Service (SIS) Configuration and Administration Guide*
- *PRIMECLUSTER Global Disk Services Configuration and Administration Guide*
- *PRIMECLUSTER Global File Services Configuration and Administration Guide*
- *PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function*
- *PRIMECLUSTER Web-Based Admin View Operation Guide 4.1*
- *ServerView User Guide*
- *LKCD Installation Guide*
- *GR Multipath Driver Installation Guide 1.0 for Linux*
- *PRIMECLUSTER Wizard for Oracle Configuration and Administration Guide*
- *Interstage Application Server Reference Manual - Command Edition*
- *Interstage Application Server Operator's Guide*

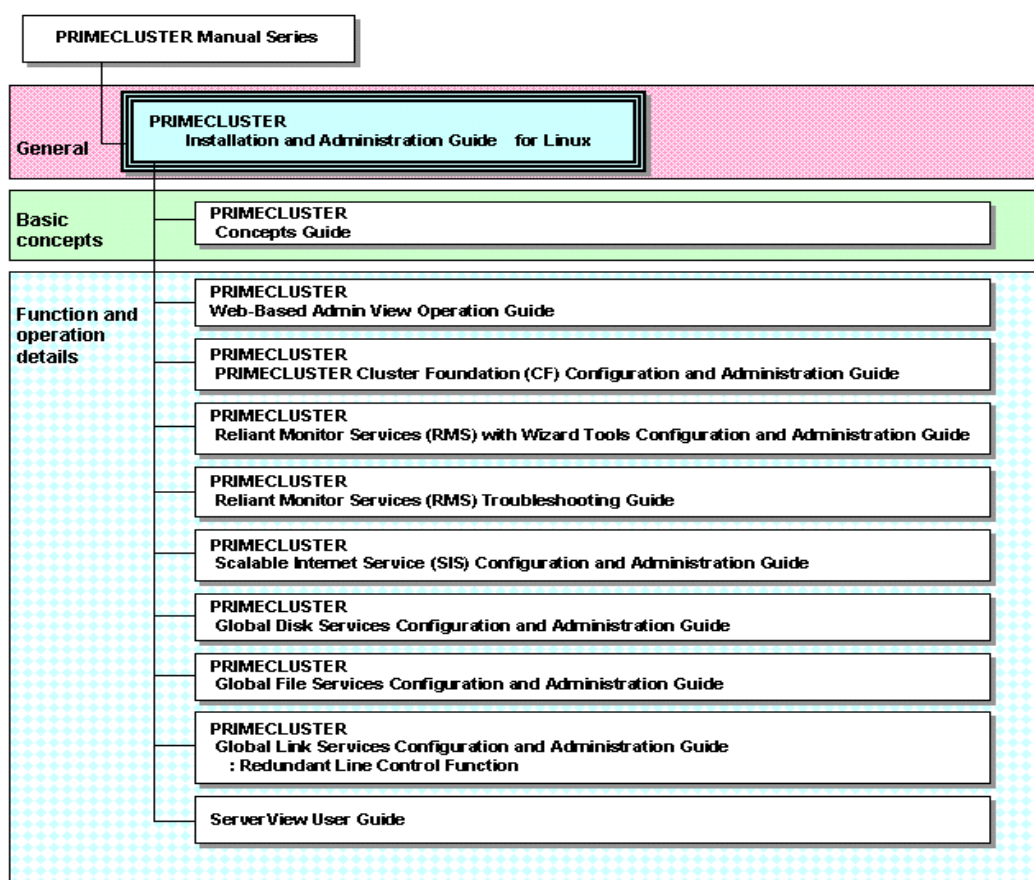


Note

The PRIMECLUSTER documentations include the following documentation in addition to those listed above:

- *PRIMECLUSTER Installation Guide*
This installation guide (text data) is provided with each PRIMECLUSTER product package.
The data is stored on “CD3” of each package. For details on the file names, see the documentation provided with each product.

◆ Manual Series



◆ Manual Printing

If you want to print a manual, use the PDF file found on the CD-ROM for the PRIMECLUSTER product. The correspondences between the PDF file names and manuals are described in the PRIMECLUSTER Installation Guide that comes with the product.

You will need Adobe Acrobat Reader to read and print the PDF file. Use Adobe Acrobat Reader Version 4.0 or higher.

◆ Online Manuals

To allow users to view the online manuals, use the Cluster management server to register each user name to one of the user groups (wvroot, clroot, cladmin, or clmon).

For information on user group registration procedures and user group definitions, see 4.3.1 "Assigning Users to Manage the Cluster."

◆ Conventions

Notation

Prompts

Command line examples that require system administrator (or root) rights to execute are preceded by the system administrator prompt, the hash sign (#). Entries that do not require system administrator rights are preceded by a dollar sign (\$).

Manual page section numbers

References to the Linux(R) operating system commands are followed by their manual page

section numbers in parentheses – for example, cp(1)

The keyboard

Keystrokes that represent nonprintable characters are displayed as key icons such as [Enter] or [F1]. For example, [Enter] means press the key labeled Enter; [Ctrl-b] means hold down the key labeled Ctrl or Control and then press the [B] key.

Typefaces

The following typefaces highlight specific elements in this manual.

Typeface	Usage
Constant Width	Computer output and program listings; commands, file names, manual page names and other literal programming elements in the main body of text.
<i>Italic</i>	Variables that you must replace with an actual value.
Bold	Items in a command line that you must type exactly as shown.

Example 1

Several entries from an /etc/passwd file are shown below:

```
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/bin/bash
daemon:x:2:2:daemon:/sbin:/bin/bash
lp:x:4:7:lp daemon:/var/spool/lpd:/bin/bash
```







Example 2

To use the cat(1) command to display the contents of a file, enter the following command line:

```
$ cat file
```

Notation symbols

Material of particular interest is preceded by the following symbols in this manual:

-  **Point** Contains important information about the subject at hand.
-  **Note** Describes an item to be noted.
-  **Example** Describes operation using an example.
-  **Information** Describes reference information.
-  **See** Provides the names of manuals to be referenced.
-  **Conclusion** Summarizes the contents described in the parts and chapters.

Abbreviations

- Microsoft(R) Windows(R) 98 operating system and Microsoft(R) Windows(R) 98 Second Edition operating system are abbreviated as Windows(R) 98.
- Microsoft(R) Windows NT(R) Server operating system Version 4.0, and Microsoft(R) Windows NT(R) Server Workstation System Version 4.0 are abbreviated as Windows NT(R).
- Microsoft(R) Windows(R) 2000 operating system is abbreviated as Windows(R) 2000.
- Microsoft(R) Windows(R) Millennium Edition is abbreviated as Windows(R) Me.
- Microsoft(R) Windows(R) XP operating system is abbreviated as Windows(R) XP.

-
- Windows(R) 98, Windows NT(R), Windows(R) 2000, Windows(R) Me, and Windows(R) XP are generically referred to as Microsoft(R) Windows.

◆ Trademarks

Linux is a trademark or registered trademark of Mr. Linus Torvalds in the United States and other countries.

NFS and NFS Client are trademarks of Sun Microsystems, Inc.

Java and all Java-related products and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries.

Netscape and Netscape Navigator are trademarks or registered trademarks of Netscape Communications Corporation in the United States and other countries.

Microsoft Internet Explorer is a registered trademark of Microsoft Corporation in the United States and other countries.

Microsoft, Windows, Windows NT, and Windows NT Server are registered trademarks of Microsoft Corporation in the United States and other countries.

ORACLE and Oracle Applications are trademarks or registered trademarks of Oracle Corporation.

CORBA, OMG, and ORB are registered trademarks of Object Management Group (OMG).

NetWorker is a registered trademark of Legato Systems, Inc.

PRIMECLUSTER is a trademark of Fujitsu Limited.

Other product names are product names, trademarks, or registered trademarks of these companies.

Copyright © 1986-1997 Sun Microsystems, Inc.

Copyright ©1983-1989 Portions may be derived from Berkeley BSD system, licensed from the University of California.

©1990-2000 Legato Systems, Inc. All Rights Reserved.

Requests

- No part of this documentation may be reproduced or copied without permission of FUJITSU LIMITED.
- The contents of this documentation may be revised without prior notice.

Copyright © 2005 Fujitsu LIMITED.

All Rights Reserved.

Copyright ©2005 Fujitsu Siemens Computers GmbH.

All Rights Reserved.

September 2005

Contents

Part 1	Planning	1
Chapter 1	Build Flow	3
1.1	Planning	4
1.2	Installation.....	5
1.3	Development.....	8
1.4	Test	9
1.5	Operation and Maintenance.....	13
1.6	Operation Mode Change.....	14
Chapter 2	Site Preparation	15
2.1	PRIMECLUSTER Product Selection	16
2.1.1	Product Selection	16
2.1.2	Function Selection	17
2.2	System Design.....	18
2.3	Determining the Cluster System Operation Mode.....	19
2.3.1	Standby Operation.....	19
2.3.2	Scalable Operation.....	24
2.4	Determining the Web-Based Admin View Operation Mode.....	27
2.5	Determining the Failover Timing of a Cluster Application.....	30
Part 2	Installation	31
Chapter 3	Software Installation	33
3.1	Installation and Setup of Related Software	34
3.1.1	Setting Up the Network.....	35
3.1.2	Setting Up Disk Units.....	35
3.1.3	Setting Up Hardware Monitoring with ServerView	35
3.1.4	Setting Up the Cluster High-Speed Failover Function	37
3.1.5	Checking the Kernel Parameters.....	43
3.2	PRIMECLUSTER Installation.....	44
3.3	Installation and Environment Setup of Applications.....	45
Chapter 4	Preparation Prior to Building a Cluster	47
4.1	Checking the Cluster Worksheet.....	49
4.2	Activating the Cluster Interconnect.....	50
4.3	Preparations for Starting the Web-Based Admin View Screen	51
4.3.1	Assigning Users to Manage the Cluster	51

4.3.2	Preparing the Client Environment	52
4.3.3	Initial Setup of Web-Based Admin View	52
4.3.4	Setting Up the Browser	54
4.3.5	Setting Up the Java Plug-in	55
4.4	Starting the Web-Based Admin View Screen	56
4.5	Web-Based Admin View Screen	58
4.5.1	Operation Menu Functions	58
4.5.2	Global Cluster Services Menu Functions	61
4.5.3	Cluster Admin Functions	61
4.6	Exiting the Web-Based Admin View Screen	63
Chapter 5	Building a Cluster	65
5.1	Initial Cluster Setup	66
5.1.1	Setting Up CF and CIP	66
5.1.2	Setting Up the Shutdown Facility	68
5.1.3	Initial Setup of the Cluster Resource Management Facility	75
5.2	Setting Up Fault Resource Identification and Operator Intervention Request	82
Chapter 6	Building Cluster Applications	85
6.1	Initial RMS Setup	87
6.2	Initial GLS Setup	88
6.2.1	GLS Setup	88
6.2.2	Setting Up Web-Based Admin View When GLS Is Used	92
6.3	Initial GDS Setup	93
6.3.1	Automatic Configuration of Shared Disks	93
6.3.2	GDS Configuration Setup	93
6.4	Initial GFS Setup	100
6.4.1	File System Creation	102
6.5	Setting Up the Application Environment	106
6.6	Setting Up Online/Offline Scripts	107
6.7	Setting Up Cluster Applications	113
6.7.1	Starting RMS Wizard	116
6.7.2	Setting Up userApplication	116
6.7.3	Setting Up Resources	131
6.7.4	Generate and Activate	144
6.7.5	Attributes	144
6.7.6	Exclusive Relationships Between Cluster Applications	144

Part 3 Operations..... 153

Chapter 7 Operations..... 155

7.1	Viewing the PRIMECLUSTER System Operation Management Screens	156
7.1.1	CF Main Window	156
7.1.2	CRM Main Window	157
7.1.3	RMS Main Window	162
7.2	Operating the PRIMECLUSTER System	167
7.2.1	RMS Operation	167
7.2.2	Cluster Application Operations	168
7.3	Monitoring the PRIMECLUSTER System	170
7.3.1	Monitoring the State of a Node	170
7.3.2	Monitoring the State of a Cluster Application	171
7.3.3	Concurrent Viewing of Node and Cluster Application States	172
7.3.4	Viewing Logs Created by the PRIMECLUSTER System	173
7.3.5	Viewing Detailed Resource Information	174
7.3.6	Displaying environment variables	175
7.3.7	Monitoring Cluster Control Messages	176
7.4	Corrective Actions for Resource Failures	177
7.4.1	Corrective Action in the event of a resource failure	177

Part 4 System Configuration Modification 181

Chapter 8 Changing the Operation Configuration 183

8.1	Changing the Cluster Configuration	184
8.2	Changing an IP Address on the Public LAN	190
8.3	Changing a CIP Address	192
8.4	Changing a Node Name	193
8.5	Changing the Operation Attributes of a userApplication	194
8.5.1	Changing Operation Attributes (CUI)	194
8.6	Changing PRIMECLUSTER Operation Attributes	199
8.7	Deleting a Cluster Application	200
8.7.1	Deleting a Resource	200
8.7.2	Deleting the Hardware Resource	202
8.7.3	Deleting a userApplication	202

Part 5	Maintenance	205
Chapter 9	Maintenance of the PRIMECLUSTER System	207
9.1	Maintenance Types	208
9.2	Maintenance Flow	209
9.2.1	Detaching Resources from Operation.....	209
9.2.2	Executing Standby Restoration for an Operating Job	210
9.3	Software Maintenance	211
9.3.1	Notes on Applying Corrections to the PRIMECLUSTER System.....	211
9.3.2	Overview of the Correction Application Procedure	211
Part 6	PRIMECLUSTER Products	215
Chapter 10	PRIMECLUSTER Product List	217
10.1	PRIMECLUSTER Operation Modes.....	219
Chapter 11	PRIMECLUSTER Wizard for Oracle	221
11.1	Functional Overview.....	222
11.2	Operation Environment	223
11.2.1	System Configuration	223
11.2.2	Supported Modes	224
11.2.3	Overview of Cluster System Support	224
11.3	Notes.....	225
Chapter 12	PRIMECLUSTER Wizard for NAS	227
12.1	Functional Overview.....	228
12.2	Operation Environment	229
12.2.1	System Configuration	229
12.2.2	Supported Modes	230
12.2.3	Overview of Cluster System Support.....	230
12.3	Notes.....	231
Chapter 13	PRIMECLUSTER Wizard for MailServer.....	233
13.1	Functional Overview.....	234
13.2	Operation Environment	235
13.2.1	System Configuration	235
13.2.2	Supported Modes	235
13.2.3	Overview of Cluster System Support.....	236
13.3	Notes.....	237

Chapter 14 PRIMECLUSTER Wizard for WebServer	239
14.1 Functional Overview.....	240
14.2 Operation Environment	241
14.2.1 System Configuration	241
14.2.2 Supported Modes	242
14.2.3 Overview of Cluster System Support.....	242
14.3 Notes.....	243
Chapter 15 Interstage Application Server Enterprise Edition	245
15.1 Functional Overview.....	246
15.1.1 Overview of Cluster System Support.....	246
15.1.2 Supported Modes	246
15.1.3 Notes	246
Chapter 16 Systemwalker Centric Manager.....	247
16.1 Functional Overview.....	248
16.1.1 Overview of Cluster System Support.....	248
16.1.2 Supported Modes	248
Chapter 17 Systemwalker Operation Manager	249
17.1 Functional Overview.....	250
17.1.1 Overview of Cluster System Support.....	250
17.1.2 Supported Modes	250
Appendix A PRIMECLUSTER System Design Worksheets.....	251
A.1 Worksheet Purpose.....	251
A.2 Notes on Worksheet Creation	251
A.3 Overall Design Worksheet.....	252
A.4 CE (FE for North America) Instruction Worksheet.....	253
A.5 Cluster Installation Environment Worksheet.....	254
A.6 Kernel Parameter Worksheet	255
A.6.1 CF Configuration.....	255
A.6.2 RMS Configuration.....	256
A.7 Cluster Configuration Worksheet	257
A.8 Cluster Application Configuration Worksheets	259
A.8.1 RMS Setup Worksheet.....	259
A.8.2 GFS Shared File System Setup Worksheet	259
A.8.3 GLS Setup Worksheet	260
A.9 GDS Setup Worksheets	266
A.9.1 Shared Disk Setup Worksheet	266

A.10 Cluster Application Worksheets.....	270
A.10.1 Cmdline Resource Worksheet	270
A.10.2 Fsystem Resource Worksheet	271
A.10.3 Gds Resource Worksheet	271
A.10.4 Gls Resource Worksheet	272
A.10.5 Procedure Resource Worksheet	272
A.10.6 Cluster Application Worksheet	273
A.10.7 Configuration Global Settings Worksheet	274
A.11 System Design Examples	275
A.11.1 Cluster Building Worksheet	276
A.11.2 GFS Shared File System Setup Worksheet	279
A.11.3 GLS Setup Worksheet.....	279
A.11.4 GDS Configuration Worksheet	282
Appendix B Manual Pages	287
B.1 CF	287
B.2 CIP	287
B.3 Operator Intervention	288
B.4 PAS	288
B.5 Cluster Resource Management Facility	288
B.6 RMS	289
B.7 Shutdown Facility (SF)	289
B.8 Tracing Failed Resource	289
B.9 SIS	290
B.10 Web-Based Admin View.....	290
B.11 Procedure Resource	290
B.12 RMS Wizards	290
Appendix C Troubleshooting.....	291
C.1 Collecting Troubleshooting Information	291
C.1.1 Executing the pclsnap Command	291
C.1.2 Crash Dump.....	294
C.2 Detecting a Failed Resource.....	295
C.2.1 Failed Resource Message	296
C.2.2 Resource Fault History	297
C.2.3 Fault Resource List	299
Appendix D Messages.....	301
D.1 Searching for a Message	301
D.2 Information Messages.....	304
D.3 Error Messages.....	305

D.4	Operator Intervention Messages	311
D.5	GUI Messages	313
D.5.1	Messages Related to CRM View	313
D.5.2	Failed Resource and Operator Intervention Messages (GUI).....	313
D.6	Messages Related to the Setting of the Shutdown Facility	315
D.6.1	Notes on the Setting of the Shutdown Facility	315
D.6.2	Error Messages	316
 Appendix E Registering, Changing, and Deleting State Transition Procedure Resources for PRIMECLUSTER Compatibility.....		321
E.1	Registering a Procedure Resource	321
E.2	Changing a Procedure Resource	322
E.3	Deleting a Procedure Resource	323
 Appendix F Registering PRIMECLUSTER-compatible Resources		325
F.1	Registering a Cluster Service.....	325
F.2	Associating Resources to a Cluster Service Instance	327
F.3	Deleting a Cluster Service.....	330
 Appendix G Changes in Each Version.....		333
G.1	Changes in PRIMECLUSTER 4.1A30 from 4.0A20	333
G.1.1	clgettree(1) command.....	334
G.1.2	hvdisp command.....	334
G.1.3	Posting Notification of a Resource Failure or Recovery.....	334
G.1.4	Operator Intervention Function	335
G.1.5	Shutdown Facility.....	335
G.1.6	Setting Up Cluster Applications.....	335
G.1.7	Changing the Cluster Application.....	336
G.1.8	State of the Main CF Table.....	337
G.1.9	Node state	337
G.2	Changes in PRIMECLUSTER 4.1A30 from 4.1A20	337
G.2.1	clgettree(1) command.....	338
G.2.2	hvdisp command.....	338
G.2.3	Node state	338
 Glossary		341
 Abbreviations.....		353
 Index		355

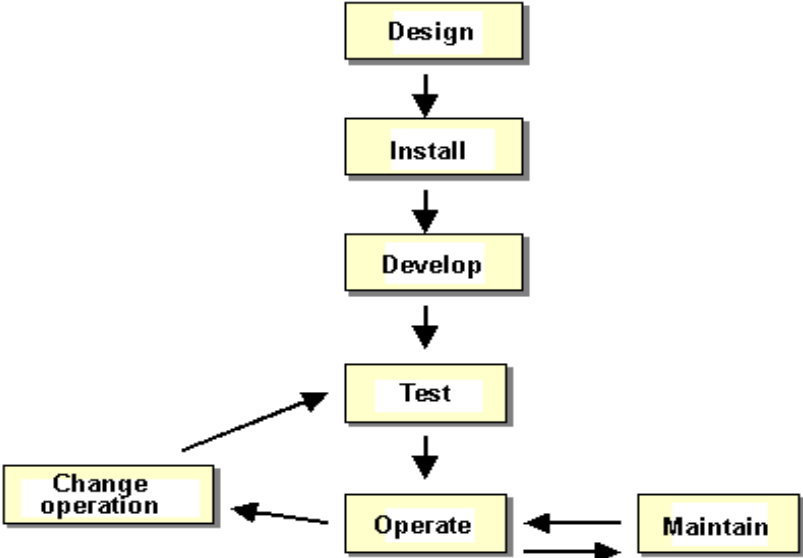
Part 1 Planning

Part 1 describes the workflow from PRIMECLUSTER design to installation and operation management. Users who are installing a PRIMECLUSTER system for the first time need to read this part.

Chapter 1 Build Flow

This chapter describes the workflow for building a PRIMECLUSTER system. To build a PRIMECLUSTER system, follow the procedure described below.

Flow of building a PRIMECLUSTER system



1.1 Planning

Before building a PRIMECLUSTER system, you must first design the system.

■ Designing a PRIMECLUSTER system

1. Select the PRIMECLUSTER products.

Select the PRIMECLUSTER products required for the system you want to build.

For details, see 2.1 "PRIMECLUSTER Product Selection."

2. Design the system.

Determine the operation environment for building the PRIMECLUSTER system. This includes selecting the applications to be used and determining the required hardware resources, such as the number of hosts, networks, and disk size. Up to 4 nodes are supported.

For details, see 2.2 "System Design."

3. Determine the cluster system operation mode.

Determine the number of nodes and the operation mode of the cluster system.

For details, see 2.3 "Determining the Cluster System Operation Mode."

4. Determine the operation mode for using Web-Based Admin View.

Determine the operation mode for running Web-Based Admin View. Web-Based Admin View can manage up to 4 nodes.

For details, see 2.4 "Determining the Web-Based Admin View Operation Mode."

5. Determine the cluster applications.

Determine the number of cluster applications. Also determine which nodes are to be used for each application.

6. Determine the resources required for each cluster application.

Determine the resources required for each cluster application.

- Determine the switchover network type (IP address takeover) and the takeover address.

Note that when IP address takeover is to be used, PRIMECLUSTER GLS must be installed.

- Determine whether a user-defined RMS configuration script is to be used. Determine whether there are other items to be used as resources.
- Determine the cluster interconnect paths and quantity. Two cluster interconnects are recommended.
- For a disk device, determine which nodes will be sharing the device, whether the device is to be used as a RAW device (database system), whether the device is to be used as a file system (general files), and whether the device is to be grouped.

7. Determine the failover range of the cluster application.

Determine the trigger for cluster application failover.

For details, see 2.5 "Determining the Failover Timing of a Cluster Application."



See

For details on designing the system, see Chapter 2 "Site Preparation."

1.2 Installation

After completing the design of the PRIMECLUSTER system and determining the configuration of the PRIMECLUSTER system to be built, install the PRIMECLUSTER system.

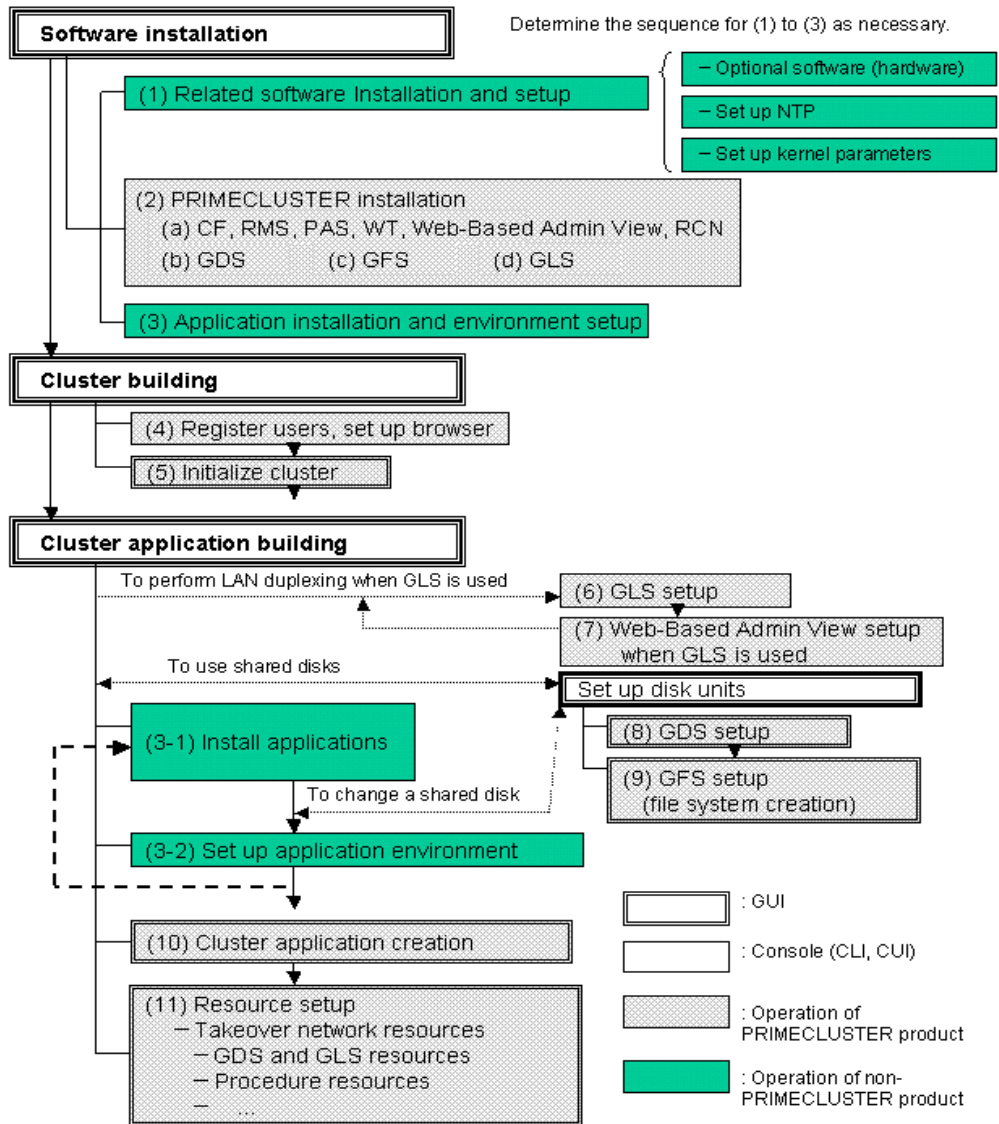
Since the work will be performed based on the PRIMECLUSTER system design worksheet that was created, check that all items on the design worksheet have been entered.

Install the PRIMECLUSTER system by performing the following procedure in sequence from (1). Perform the operations described in the dotted line sections if the system design matches the described conditions.

If you are installing applications after you install the PRIMECLUSTER system, go back to the operations from the Application environment setup to the Application installation.

The screens to be used differ according to the operation. The work procedures to be performed with GUI from Web-Based Admin View and the work procedures to be performed with CLI and CUI from console screens are shown in separate boxes.

Flow of PRIMECLUSTER system installation



The abbreviations in the flowchart for PRIMECLUSTER system installation are explained below.

- CF: Cluster Foundation
- RMS: Reliant Monitor Services
- WT: Wizard Tools
- GDS: Global Disk Services
- GFS: Global File Services
- GLS: Global Link Services

For detailed information on each item, refer as necessary to the corresponding manual reference section mentioned in the table below.

Installation procedure and manual reference sections

Work items	Manual reference section	Required/ optional
System design	Chapter 2 "Site Preparation"	Required
Software installation		
(1) Related software Installation and setup	3.1 "Installation and Setup of Related Software"	Optional
(2) PRIMECLUSTER installation	3.2 "PRIMECLUSTER Installation"	Required
(3) Application installation and environment setup	3.3 "Installation and Environment Setup of Applications"	Optional
Cluster building		
(4) User registration/browser setup	Chapter 4 "Preparation Prior to Building a Cluster"	Required
(5) Initial cluster setup	5.1 "Initial Cluster Setup"	Required
Cluster application building		
(6) GLS setup	6.2 "Initial GLS Setup"	Optional Note that it is required when IP address takeover and redundant line control are used.
(7) Web-Based Admin View setup when GLS is used		
(8) GDS setup	6.3 "Initial GDS Setup"	Optional (required to use GDS)
(9) GFS setup (file system creation)	6.4 "Initial GFS Setup"	Optional (required to use GFS)
(10) Cluster application creation	6.7 "Setting Up Cluster Applications"	Required
(11) Resource setup	6.7.3 "Setting Up Resources"	Optional

1.3 Development

To configure a user application to be monitored by PRIMECLUSTER, you need to create an RMS configuration script.

- Online script
This script executes a process that sets the resources to Online or Standby.
- Offline script
This script executes a process that sets the resources to Offline.

To check the state of a user application, the following RMS configuration script must be developed.

- Check script
This script checks the state of the resource.



For details on the Online/Offline script and the Check script settings, see 6.6 "Setting Up Online/Offline Scripts."

1.4 Test

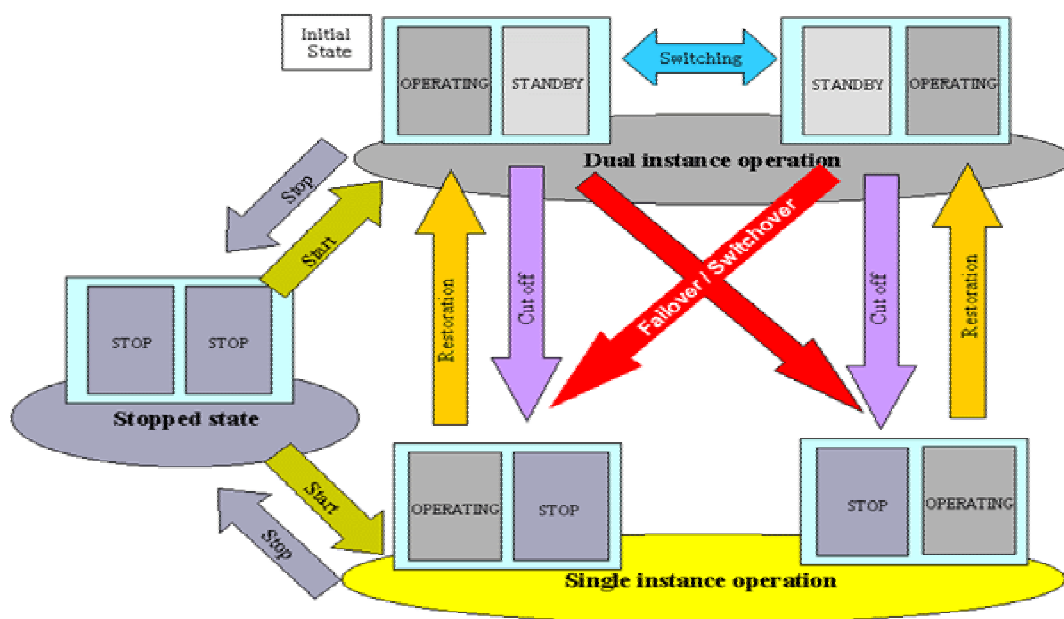
■ Purpose

When you build a cluster system using PRIMECLUSTER, you need to confirm before starting production operations that the entire system will operate normally and cluster applications will continue to run in the event of failures.

For 1:1 standby operation, the PRIMECLUSTER system takes an operation mode like the one shown in the figure below.

The PRIMECLUSTER system switches to different operation modes according to the state transitions shown in the figure below. To check that the system operates normally, you must test all operation modes and each state transition that switches to an operation mode.

State transitions of the PRIMECLUSTER system



◆ PRIMECLUSTER System State

	Description
Dual instance operation	A cluster application is running, and it can switch to the other instance in the event of a failure (failover). Two types of the dual instance operation are OPERATING and STANDBY. Even if an error occurs while the system is operating, the standby system takes over ongoing operations as an operating system. This operation ensures the availability of the cluster application even after failover.
Single instance operation	A cluster application is running, but failover is disabled. Two types of the single instance operation are OPERATING and STOP. Since the standby system is not supported in this operation, a cluster application cannot switch to other instance in the event of a failure. So, ongoing operations are disrupted.
Stopped state	A cluster application is stopped.

The above-mentioned "OPERATING", "STANDBY", and "STOP" are defined by the state of RMS and cluster application as follows:

	RMS state	Cluster application state	Remark
OPERATING	Operating	Online	-
STANDBY	Operating	Offline or Standby	-
STOP	Stopped	Unknown *	SysNode is Offline

* RMS determines the cluster application state. When RMS is stopped, the cluster application state is unknown.

■ Main tests for PRIMECLUSTER system operation

◆ Startup test

Conduct a startup test and confirm the following:

- View the Cluster Admin screen of Web-Based Admin View, and check that the cluster system starts as designed when the startup operation is executed.
- If an RMS configuration script was created, check that the commands written in the script are executed properly as follows.
 - For a command that outputs a message when it is executed, check that a message indicating that the command was executed properly is displayed on the console.
 - Check that the command has been executed properly by executing the “ps(1)” command.
- A new cluster application is not started automatically during the PRIMECLUSTER system startup. To start the cluster application automatically, you must set "AutoStartUp" for that cluster application. The AutoStartUp setting must be specified as a userApplication attribute when the application is created. For details, see 6.7.2 "Setting Up userApplication."

◆ Clear fault

If a failure occurs in a cluster application, the state of that application changes to Faulted.

To build and run this application in a cluster system again, you need to execute "Clear Fault" and clear the Faulted state.

Conduct a clear-fault test and confirm the following:

- Check that the Faulted state of a failed application can be cleared without disrupting ongoing operations.
- If an RMS configuration script was created, check that the commands written in the script are executed properly as follows.
 - For a command that outputs a message when it is executed, check that a message indicating that the command was executed properly is displayed on the console.
 - Check that the command has been executed properly by executing the “ps(1)” command.

◆ Switchover

Conduct a failover or switchover test and confirm the following:

- Check that failover is triggered by the following event:
 - When an application failure occurs
- Check that switchover is triggered by the following events:
 - When the OPERATING node is shut down
 - When an OPERATING cluster application is stopped
- Check that failover or switchover is normally done for the followings:
 - Disk switchover
Check that the disk can be accessed from the OPERATING node.
For a switchover disk, you need to check whether a file system is mounted on the

- disk by executing the “df(1)” command.
- If the Cmdline resources are to be used, check that the commands written in the Start and Stop scripts for the Cmdline resources are executed properly.
 - For a command that outputs a message when it is executed, check that a message indicating that the command was executed properly is displayed on the console.
 - Check that the command has been executed properly by executing the “ps(1)” command.
- If IP address takeover is set, check that the process takes place normally by executing the “ifconfig(8)” command.
- Check that an application is switched to other node.

You need to know the operation downtime in the event of a failure, so measure the switching time for each failure detection cause and check the recovery time.

◆ Replacement test

Conduct a replacement and confirm the followings:

- Check that the OPERATING and STANDBY instances of the OPERATING business application occur normally when the cluster application replacement is executed. Check the followings:
 - If disk switchover is to be used, check that the disk can be accessed from the OPERATING node but not from the STANDBY node.
For a switchover disk, you need to check whether a file system is mounted on the disk by executing the “df(1)” command.
 - If Cmdline resources are to be used, check that the commands written in the Start and Stop scripts for the Cmdline resources are executed properly.
 - For a command that outputs a message when it is executed, check that a message indicating that the command was executed properly is displayed on the console.
 - Check that the command has been executed properly by executing the “ps(1)” command.
 - If IP address takeover is to be used, check that IP address takeover takes place normally.
 - Check that an application is switched to other node.

◆ Stop

Conduct a stop test and confirm the followings:

- Check that an OPERATING work process can be stopped normally by the stop operation.
- Check that work processes can be started by restarting all nodes simultaneously.
- If Cmdline resources are to be used, check that the commands written in the Start and Stop scripts for the Cmdline resources are executed properly.
 - For a command that outputs a message when it is executed, check that a message indicating that the command was executed properly is displayed on the console.
 - Check that the command has been executed properly by executing the “ps(1)” command.

◆ Work process continuity

Conduct work process continuity and confirm the followings:

- Generating some state transitions in a cluster system, check that the application operates normally without triggering inconsistencies in the application data in the event of a failure.
- For systems in which work processes are built as server/client systems, check that while a state transition is generated in the cluster system, work process services can continue to be used by clients, according to the specifications.



See

- For information on the operation procedures for start, clear fault, failover, switchover, and stop, see 7.2 "Operating the PRIMECLUSTER System."
- For information on IP address takeover, see 6.7.3.4 "Setting Up GIs Resources."

1.5 Operation and Maintenance

After confirming that work processes can be continued no matter what state the cluster system lapses into, you can begin actual operations.



Note

The cluster system can continue work processes even if a failure occurs. However, work processes cannot be continued if another failure occurs during single node operation before the first failure is corrected. To enhance reliability, you need to eliminate the cause of the failure immediately and recover the dual node operation.



See

For details for collecting information required for an investigation, see Appendix C "Troubleshooting."

1.6 Operation Mode Change

Change the operation of the PRIMECLUSTER system when it becomes necessary to change the system configuration while the PRIMECLUSTER system is operating. The system configuration must be changed, for example, when a cluster application is added.



[See](#)

For details on changing the operation mode, see Chapter 8 "Changing the Operation Configuration."

Chapter 2 Site Preparation

You must plan the items listed below before building the PRIMECLUSTER system.

Planning items

- PRIMECLUSTER product selection
- System design
- Cluster system operation mode
- Operation mode for using Web-Based Admin View
- Cluster applications and resources to be used by the cluster applications



Point

An overview of each PRIMECLUSTER product is described in the "*PRIMECLUSTER Concepts Guide*." Be sure to read the guide before designing the PRIMECLUSTER system.

2.1 PRIMECLUSTER Product Selection

The sequence for selecting PRIMECLUSTER products is as follows:

1. Select the products to be used.
Select necessary PRIMECLUSTER products according to your environment.
For details, see 2.1.1 "Product Selection."
2. Select the functions to be used.
Check if the products provide the functions you need.
For details, see 2.1.2 "Function Selection."

2.1.1 Product Selection

The product sets described below have been prepared for PRIMECLUSTER. Select the necessary products according to how the system will be used.

- **PRIMECLUSTER Enterprise Edition (EE)**
All-in-one cluster providing the switching (HA) cluster and parallel database.
This product is used for scalable operations, such as RAC and Symfoware.
- **PRIMECLUSTER HA Server (HA)**
Switchover-type cluster system that features HA (switchover) cluster functions, volume management functions, system functions, and network multiplexing functions.
- **PRIMECLUSTER Clustering Base (CB)**
Cluster foundation software that realizes a switchover-type cluster system.
- **PRIMECLUSTER Lite Pack (LP)**
Cluster foundation software that runs in a two-node configuration only and on specific models only. It provides superior cost performance, supporting switching (HA) cluster and volume management through the operation mode, 1:1 standby and mutual standby.

The following table shows the components (modules) that are included in each product.

Components		Products			
Names	Features	EE	HA	CB	LP
PCLsnap	Refers to the function that collects information on a system or cluster that is needed to investigate the failures.	Y	Y	Y	Y
Web-Based Admin View	Refers to the function for realizing PRIMECLUSTER operations and monitoring with the GUI (management view).	Y	Y	Y	Y
Cluster Foundation (CF)	Refers to the basic function that is required for user applications or other PRIMECLUSTER services to manage or communicate within the cluster.	Y	Y	Y	Y
Reliant Monitor Services (RMS)	Refers to the software monitoring function that is used to realize high-availability (HA) of the application that is to be executed within the cluster.	Y	Y	Y	Y
Wizard Tools	Refers to the function that is used to create an application that is to be controlled with RMS.	Y	Y	Y	Y

Components		Products			
Names	Features	EE	HA	CB	LP
RAO	Refers to the function that is used to manage resources that run on PRIMECLUSTER.	Y	Y	Y	Y
RSB	Refers to the function that is used to exit another node forcibly by using the remote service board.	Y	Y	Y	Y
SA_LKCD	Refers to the shutdown agent function for which RSB is used.	Y	Y	Y	Y
Global Link Services (GLS)	Provides highly reliable transmission routes by setting up redundant network.	Y	Y	-	-
Global File Services (GFS)	Refers to the function that is used to realize simultaneous access to the shared file system from multiple nodes to which the shared disk device is connected.	Y	Y	-	-
Global Disk Services (GDS)	Refers to the volume management function that is used to improve the availability and manageability of the data stored on the shared disk device.	Y	Y	-	Y
Parallel Application Services (PAS)	Refers to the function that enables the high-performance and high-speed communication with the parallel databases.	Y	-	-	-

2.1.2 Function Selection

Check if the products provide the necessary functions, using the following documents:

- PRIMECLUSTER basic functions
For information on the basic functions, see "3.3 PRIMECLUSTER modules" in the *"PRIMECLUSTER Concepts Guide."*

2.2 System Design

Use the "PRIMECLUSTER System Design Worksheet" to design the system.

The installation of the PRIMECLUSTER system is based on the completed Appendix A "PRIMECLUSTER System Design Worksheets."



See

For details on the operation environment, see "3. Operating Environment" in the "PRIMECLUSTER Installation Guide."



Information

When designing the system, it may be helpful to see A.11 "System Design Examples."

2.3 Determining the Cluster System Operation Mode

PRIMECLUSTER allows you to configure multiple cluster applications. The operation mode is determined depending on how you set up the cluster applications in the cluster system.

The main operation modes are listed below:

Classification	Operation mode	Number of cluster applications	Number of nodes
Standby operation	1:1 standby	1	2
	Mutual standby	2 to (number of nodes)	2 to (number of supported nodes)
	N:1 standby	2 to (number of nodes – 1)	3 to (number of supported nodes)
	Cascade	1 to (number of nodes)	3 to (number of supported nodes)
	Priority transfer	2 to (number of nodes – 1)	3 to (number of supported nodes)
Scalable operation	Scalable	1 to (number of nodes)	1 to (number of supported nodes)
	High-availability scalable operation	1 to (number of nodes)	2 to (number of supported nodes)



Note

If an operating node is powered off, the failover function may fail to work. Take corrective action as follows.

- * Connect all nodes to UPS.
- * Connect the node and RSB to different power sources to prevent simultaneous power-off.

2.3.1 Standby Operation

The topologies for standby operation are as shown below.



Information

The topologies for standby operation include hot-standby and cold-standby operation.

Hot-standby operation enables preliminary operation so that the operating state can be established immediately on the standby node. In hot-standby operation, the state of the cluster application running on the operating node will be Online, while that of the cluster application on the standby node will be Standby. To perform hot-standby operation, hot-standby must be supported by the PRIMECLUSTER product to be used, the ISV application, and the user applications.

Cold-standby operation does not allow the preliminary operation needed to establish the operating state immediately on the standby node. In cold-standby operation, the state of the cluster application on the operating node will be Online, while that of the standby node

will be Offline.

■ **1:1 standby**

◆ **Definition**

- It is an operation mode in which a cluster system consists of 2 nodes. One is operating, and the other is standby. When a failure occurs in the operating node, a cluster application switches to the standby node. This does not disrupt ongoing operation.

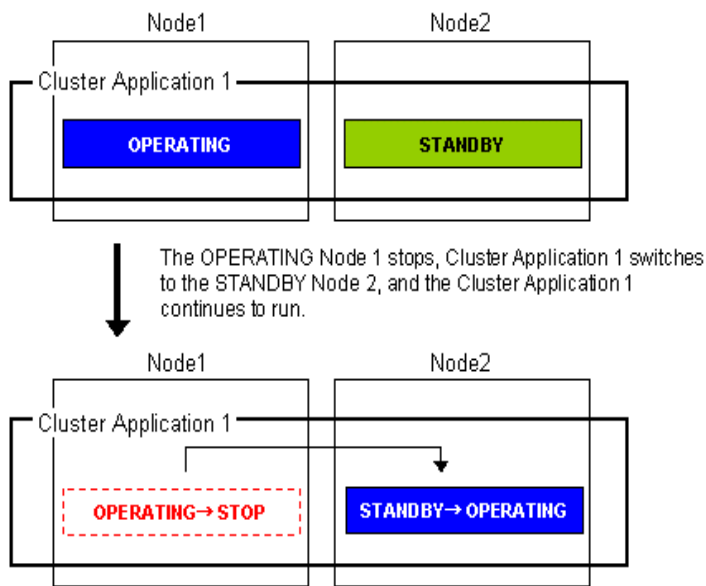
Advantage

- This operation mode ensures the availability of the cluster application even after failover.

Disadvantage

- Nodes cannot be used efficiently because of a redundant configuration.

◆ **Failover image**



■ **Mutual standby**

◆ **Definition**

- It is an operation mode in which a cluster system consists of 2 or more nodes. Normally, 2 nodes are used in this operation mode. Each node has one operating and one standby cluster applications. The operating cluster application has its own standby in each other's node.

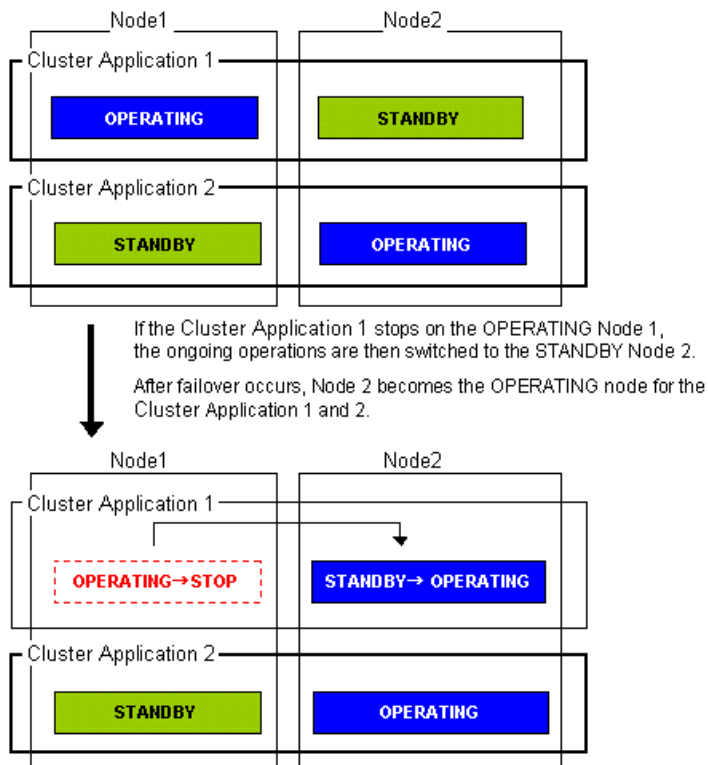
Advantage

- Since all nodes are operating for cluster application, the nodes can be used efficiently.

Disadvantage

- If failover occurs for any of the cluster applications, the performance of the cluster applications may drop because two or more cluster applications will be operating in the failover node. For this operation mode, you need to estimate adequate resources.

◆ Failover image



■ N:1 standby

◆ Definition

- It is an operation mode in which a cluster system consists of 3 or more nodes. One is standby, and the others are operating. When a failure occurs in one of the operating nodes, a cluster application switches to the standby node. If a failure occurs in two or more operating nodes at the same time, the cluster applications switch to the standby node.

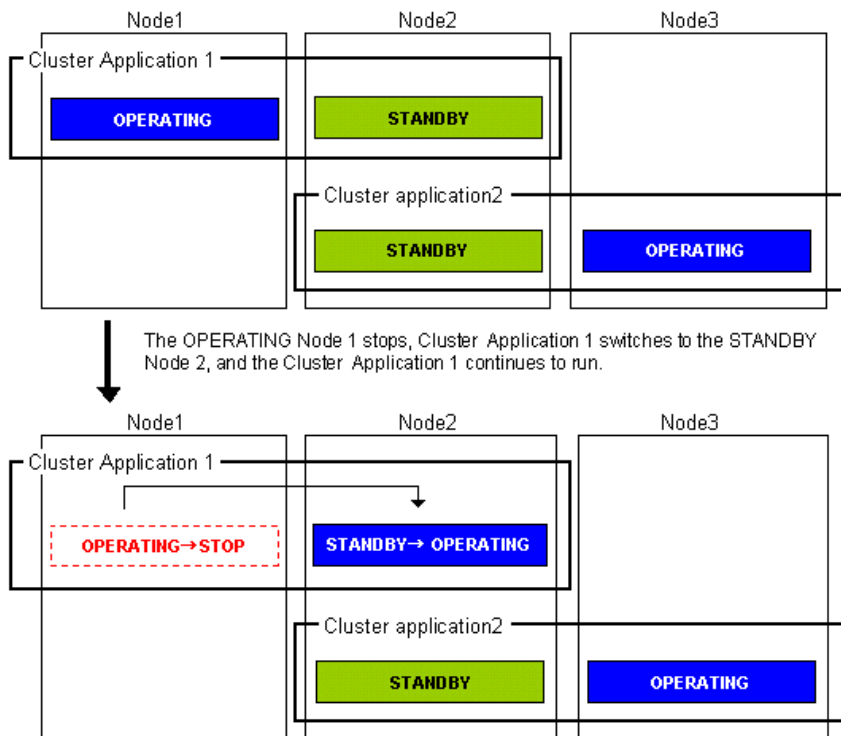
Advantages

- This operation mode ensures the availability of the cluster application even after failover.
- Since one node serves as the STANDBY node for multiple cluster applications, the STANDBY cost can be reduced when the number of cluster applications is large.

Disadvantages

- If failover occurs for multiple cluster applications, the performance of the cluster applications is reduced because multiple cluster applications will be operating in one node.

◆ **Failover image**



■ **Cascade (using one cluster application)**

◆ **Definition**

- It is an operation mode in which a cluster system consists of 3 or more nodes: one is operating, and the others are standby. When a failure occurs in the operating node, a cluster application switches to one of the standby nodes. When a failover is even failed, this cluster application switches to other standby node.

Advantages

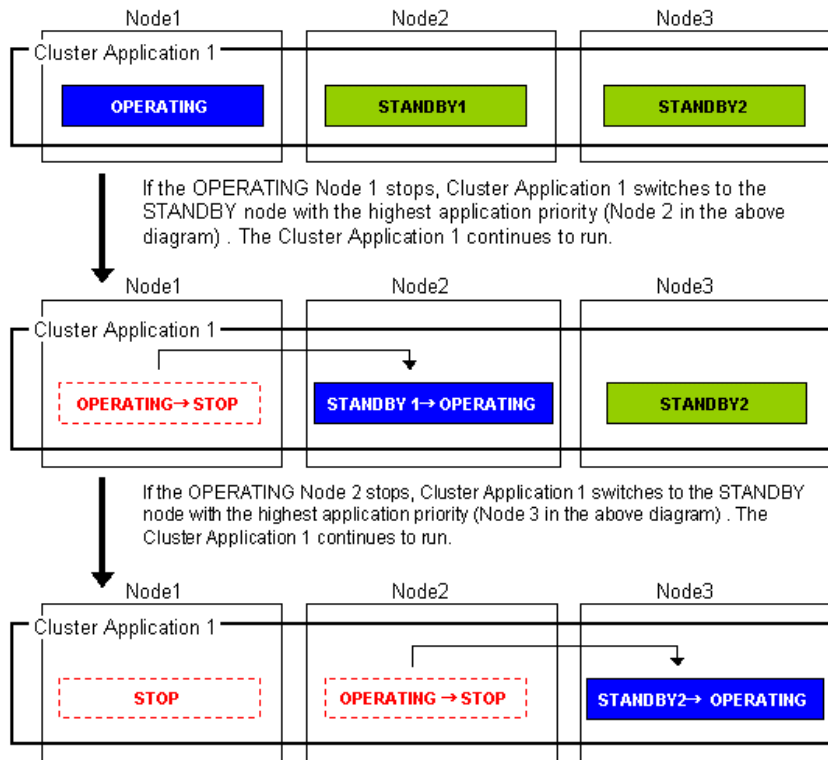
- Even after one node is stopped, the redundant configuration of the cluster application can be maintained by using other nodes. The availability is guaranteed during system maintenance.
- This operation mode ensures the availability of cluster applications even after failover.

Disadvantage

- As the system has a redundant configuration, nodes cannot normally be used efficiently.

◆ **Failover image**

In this example, the nodes are defined in the sequence Node 1, Node 2, and Node 3 starting from the node with the highest cluster application priority. These nodes are defined when the cluster application is set up.



■ **Priority transfer (application of N:1 standby)**

◆ **Definition**

- A single node functions as STANDBY for multiple cluster applications. For the other nodes, a single cluster application functions as OPERATING for every node of the other nodes while the other multiple cluster applications function as STOP.
- This topology uses the exclusivity function between cascade and cluster applications.

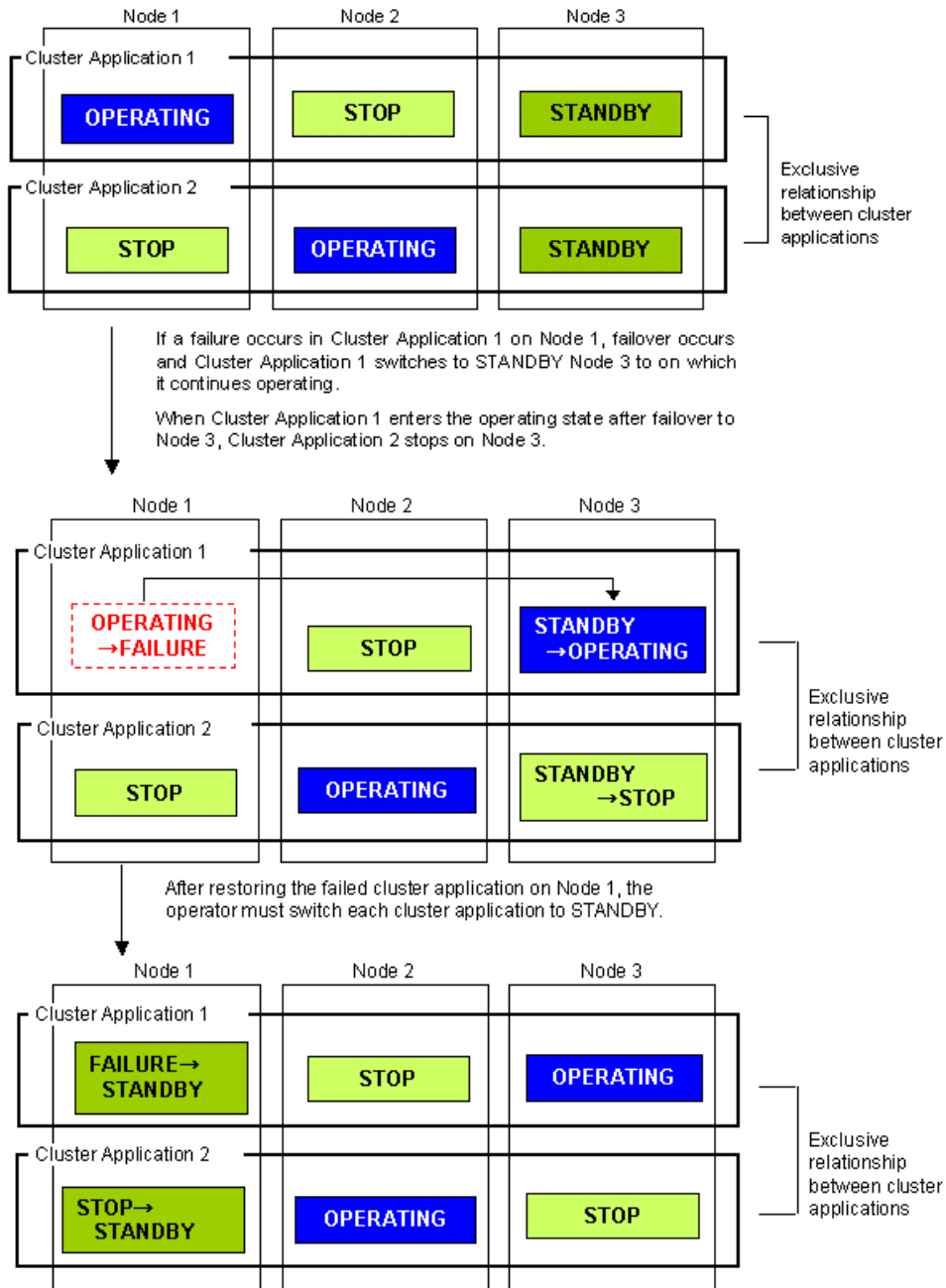
Advantages

- On that node on which a single cluster application is OPERATING, the other cluster applications do not become either OPERATING or STANDBY. Therefore, the throughput of that cluster application is guaranteed even after failover occurs.
- Because failback of the cluster application is not necessary during the restoration of a cluster application, a job can also be continued during the restoration.
- Since a single node is used as STANDBY exclusively for multiple cluster applications, the cost incurred for standby can be saved when there are many cluster applications.

Disadvantages

- Since a single node is used as STANDBY of multiple cluster applications, availability decreases when there are many cluster applications.
- If a failover occurs due to the occurrence of an error on a single node, the availability decreases because no standby node is available until the completion of the maintenance work.

◆ **Failover image**



2.3.2 Scalable Operation

This section explains the topologies used for scalable operation:

■ **Scalable**

◆ **Definition**

- A cluster system consists of two or more operating nodes, and all the nodes are used for online cluster applications. This operation mode is suitable for parallel jobs that use the I/O load balancing and load sharing on a parallel database.

Advantage

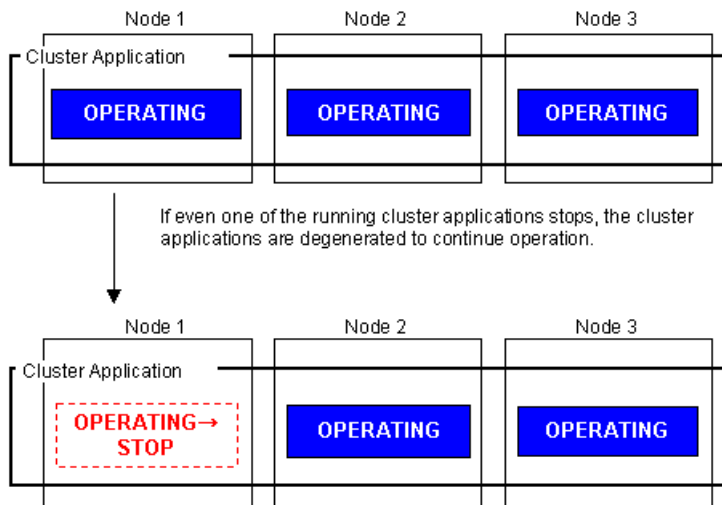
- Degenerated operation is possible even if part of the cluster applications stops.

Disadvantage

- If part of the cluster applications stops, throughput of the cluster applications cannot be

guaranteed because degenerated operation is assumed.

◆ Failover image



Note

Scalable operation can be used in combination with some PRIMECLUSTER-related products. For information on the related products, see the Table 10-1 "PRIMECLUSTER Product List."

■ High-availability scalable operation

◆ Definition

- Refers to the topology in which standby operation is configured for each cluster application that constitutes scalable operation. Suitable for a parallel database for which scalability and availability are required, as well as parallel job execution for which load share/load balance is used.
- Standby operation that constitutes scalable operation can be combined with 1:1 standby and N:1 standby, with priority transfer.

Advantages

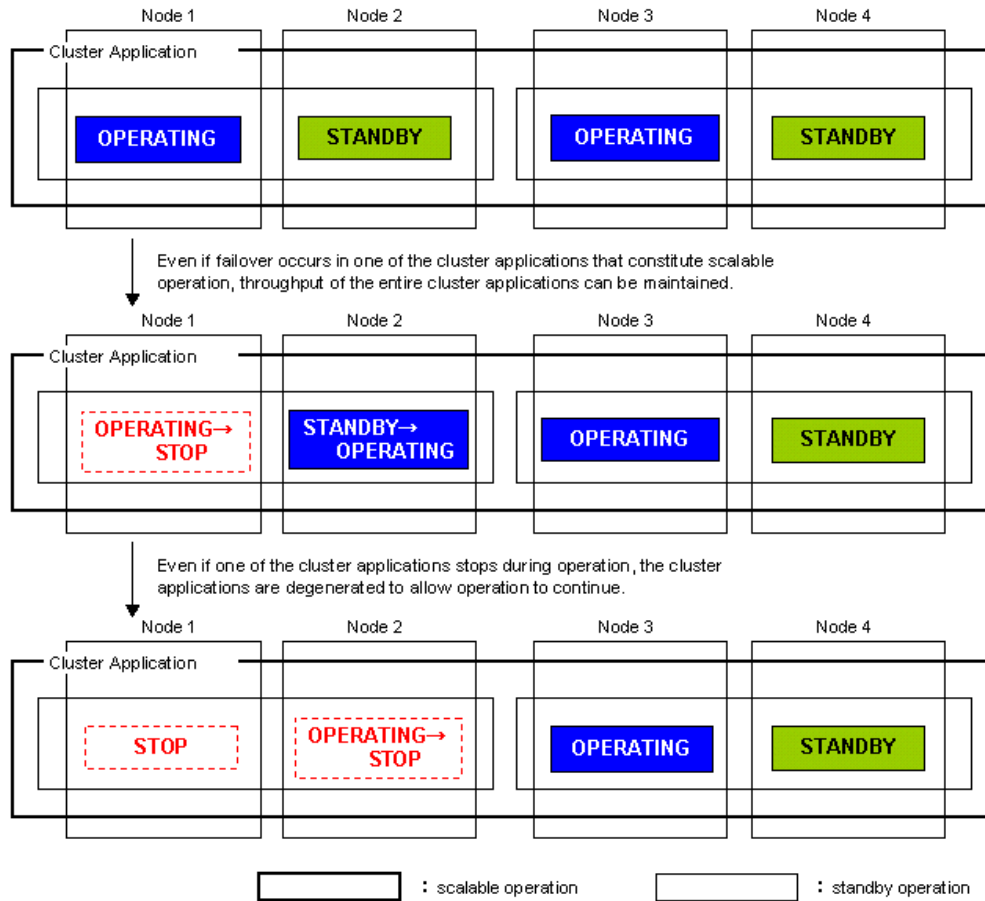
- Even if failover occurs in one of the cluster applications that constitute scalable operation, the throughput of all the cluster applications can be maintained by using a redundant configuration.
- Degenerated operation is possible even if part of the cluster applications stops.

Disadvantage

- Since a redundant configuration is used, the node usage efficiency is poor during normal operation.

◆ Failover image

The following illustrates failover when two 1:1 standby operations are combined to enable scalable operation.



Note

Scalable operation can be used in combination with some PRIMECLUSTER-related products. For information on the related products, see the Table 10-1 "PRIMECLUSTER Product List."

2.4 Determining the Web-Based Admin View Operation Mode

Determine the operation mode of Web-Based Admin View according to your PRIMECLUSTER configuration.

This section describes operation modes and typical models of PRIMECLUSTER systems that run Web-Based Admin View, and provides a guideline for adopting models.



See

For information on the operation modes of Web-Based Admin View, see "1.2 Web-Based Admin View topology" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide 4.1."*

■ Roles of individual nodes

Web-Based Admin View adopts a logical 3-tier architecture, which consists of clients, a cluster management server, and cluster nodes.

◆ Clients

A client is a computer with which a user manages operations. Basically, the computer is a personal computer that uses a Web browser or Linux(R) Workstation (with Intel CPU).

◆ Management server

The cluster management server manages cluster operation and features web server functions. The server can be as a cluster node. The cluster management server can be duplexed. In this case the system will have a two-server configuration, consisting of a primary management server and a secondary management server.

Set up both primary and secondary management servers for redundancy.

You can dynamically move the secondary management server depending on the operation mode.

The cluster management servers run on the Linux (R) servers.

◆ Cluster nodes

Cluster nodes construct the PRIMECLUSTER system.

Cluster nodes run on the Linux (R) servers.

■ Logical 3-tier architecture and operation models

Web-Based Admin View adopts a logical 3-tier architecture consisting of clients, management servers, and monitored nodes. Physically, the system can adopt a 2-tier architecture.

Typical operation modes that run Web-Based Admin View are introduced below.

◆ 2-tier model

In the 2-tier model, the cluster management server and the cluster node are used together on the same machine, and the client is on a machine other than the nodes and the management servers.

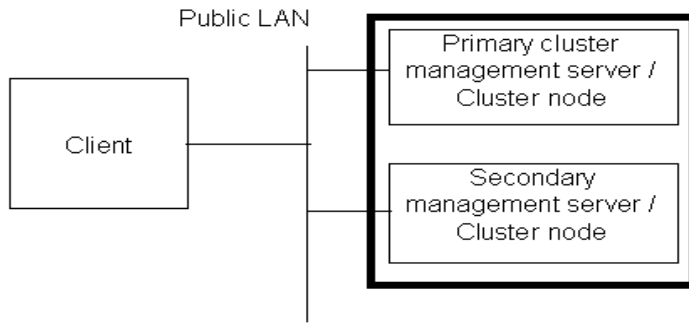
This model supports configurations where the number of nodes is relatively small and which does not require a specific cluster management server.

This model supports 2 types of topology, which are described below.

● Topology where a network is shared

In this topology, the public LAN and the LAN that is connected to the management client are used together. You can adopt this topology if the network users and network range are limited for security. This is the default Web-Based Admin View configuration after PRIMECLUSTER

installation.

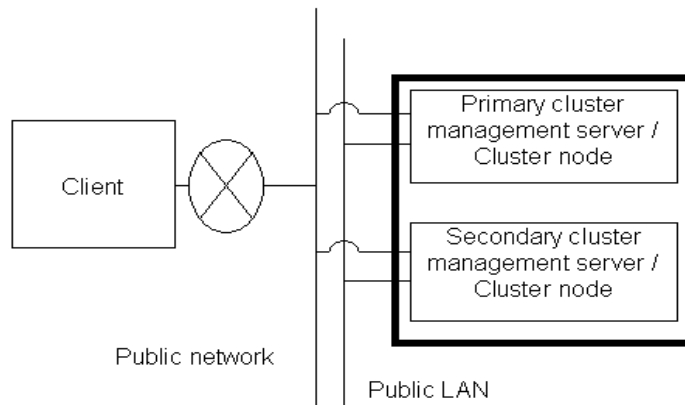


The cluster system is working in

- **Topology where separate LANs are used**

In this topology, the public LAN and the LAN that is connected to the management client are separate. When using a management client from a public network, this topology is recommended for security. After the PRIMECLUSTER installation is done, you will need to modify the Web-Based Admin View configuration.

Specify IP addresses used for a cluster node and a client respectively. For details, see 5.1.1 "Setting Up CF and CIP."



The cluster system is working in

- ◆ **3-tier model**

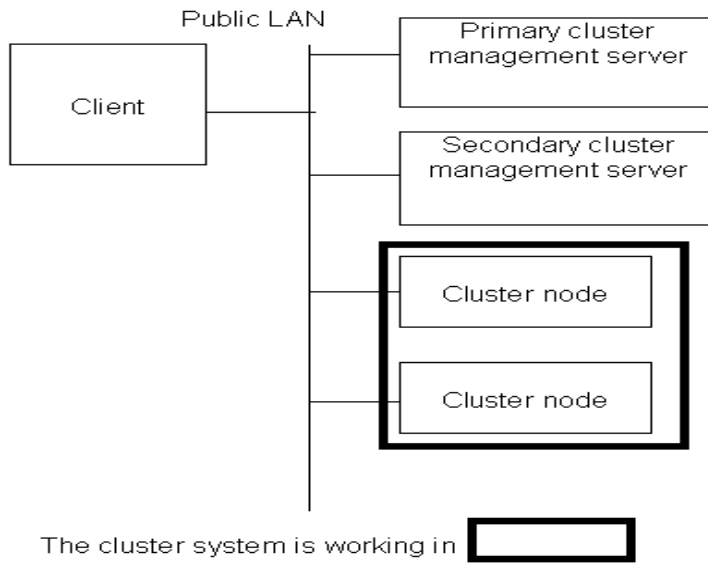
In the 3-tier model, clients, cluster management servers, and cluster nodes are set up separately. This model is adopted for configurations where the number of nodes is relatively large.

Normally, this model is used for integrated management of the PRIMECLUSTER system. You can also use this mode when you do not want to impose the load of running the management server on the cluster node or when you want to perform the integrated management of the PRIMECLUSTER system.

This model supports 2 types of topology, which are described below.

- **Topology where a network is shared**

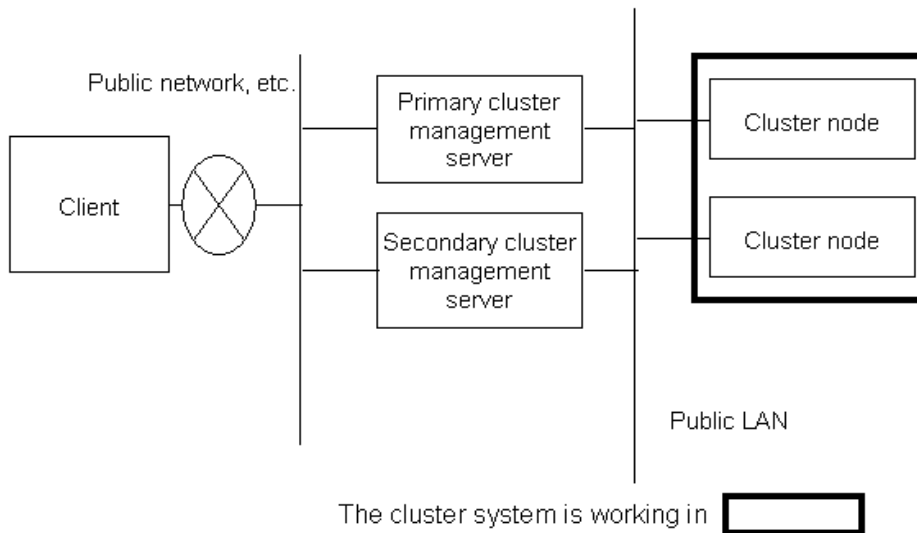
In this topology, the public LAN and the LAN that is connected to the management client are the same. You can adopt this topology if the network users and network range are limited for security. This is the default Web-Based Admin View configuration after PRIMECLUSTER installation.



- **Topology where separate LANs are used**

In this topology, the public LAN and the LAN that is connected to the management client are separate. When using a management client from a public network, this topology is recommended for security. After PRIMECLUSTER installation is done, you will need to modify the Web-Based Admin View configuration.

Specify IP addresses used for a cluster node and a client respectively. For details, see 5.1.1 "Setting Up CF and CIP."



2.5 Determining the Failover Timing of a Cluster Application

Determine the trigger for cluster application failover. You can choose from the followings:

1. The cluster application does not automatically switch to other host.
2. The cluster application switches to other host in the event of a node failure or a resource failure.
3. The cluster application switches to other host in the event of a node failure, a resource failure, or RMS shutdown.



[See](#)

The failover timing is set in 6.7.2 "Setting Up userApplication."

Part 2 Installation

This part describes procedures for installing the PRIMECLUSTER system and running Web-Based Admin View.

The operations include the procedures up to installing a new PRIMECLUSTER system.

For procedures on changing the PRIMECLUSTER system configuration after the system is installed, see Chapter 8 "Changing the Operation Configuration."

Chapter 3 Software Installation

Install software products related to PRIMECLUSTER on each node.



Note

For the security, set “No Firewall” when a Red Hat Enterprise Linux ES / Red Hat Enterprise Linux AS is installed or when the setup command is executed. If Firewall has already been set for the security, change the setting to “No Firewall.” If the “Firewall” setting is left as is, the clsetup (setting of the resource database) command will operate abnormally.

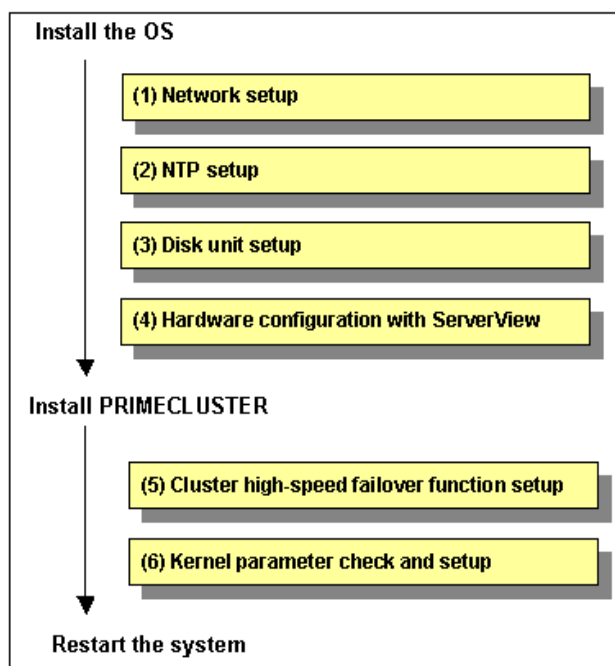
This chapter describes the following topics:

- Installation and configuration of related software
- PRIMECLUSTER installation (overview)
- Application installation and environment configuration

3.1 Installation and Setup of Related Software

After installation of the software products related to PRIMECLUSTER is done, you need to set up the OS and hardware for installing and operating PRIMECLUSTER.

Set up the followings if necessary.



- **Network setup**
If a network adapter for a public LAN has been installed, you need to configure the IP addresses after installing the OS.
Perform this setup after installing the operating system.
For details, see 3.1.1 "Setting Up the Network."
- **NTP setup**
This setup synchronizes the time in all of the nodes of the cluster system. This NTP setup needs to be done before installing PRIMECLUSTER.
- **Disk unit setup**
When using a shared disk unit, you need to install and set up the software product. This disk unit setup should be done after installing the OS.
For details, see 3.1.2 "Setting Up Disk Units."
- **Hardware configuration with ServerView**
You need to configure software that monitors hardware after installing the OS.
For details, see 3.1.3 "Setting Up Hardware Monitoring with ServerView."
- **Cluster high-speed failover function setup**
You need to configure software and hardware that enables cluster high-speed failover after installing the OS and PRIMECLUSTER.
For details, see 3.1.4 "Setting Up the Cluster High-Speed Failover Function."
- **Kernel parameter check and setup**
When operating the software products related to PRIMECLUSTER, you need to adjust kernel parameters according to the hardware configuration and applications. This kernel parameter setup should be done before operating PRIMECLUSTER.
For details, see 3.1.5 "Checking the Kernel Parameters."

3.1.1 Setting Up the Network

If a network adapter for a public LAN has been installed, the IP address setup is required.



See

For information on changing the public LAN that the PRIMECLUSTER system uses, see 8.2 "Changing an IP Address on the Public LAN."



Information

Web-Based Admin View automatically sets up an interface that was assigned the IP address of the host name corresponding to the node on which PRIMECLUSTER was installed. This interface will be used as a transmission path between cluster nodes and cluster management server, and between cluster management servers and clients.

3.1.2 Setting Up Disk Units

■ Installation and Setup of Related Software

Install and set up the software products (GRMPD) required for using shared disk units. For details on the installation and setup procedure, see the "*Installation Guide GR Multipath Driver*."

3.1.3 Setting Up Hardware Monitoring with ServerView

■ Overview

ServerView supports monitoring of the fan, temperature sensor, and power supply in addition to watchdog monitoring of the OS. In the ServerView, you can set up the behavior of each monitored target in the event of a failure. For example, if "Shut down the server immediately" is selected and an error is detected, the failed node will be shut down. The ongoing operations on the failed node are then quickly moved to the standby node.

■ Behavior setup of recovery function

When setting the behavior of the monitored targets in the event of a failure, you need to consider the operating environment in which a failover is generated. The recommended behaviors are as follows:

Monitored item		Recommended behavior
Fan		
	Fan check time	00:00 AM/PM *
	Action after Fan Fail	Continues ongoing operations.
Temperature sensor		
	When abnormally raised temperature is detected.	Shuts down the node immediately.
Restart settings		
	Automatic Power On Delay (minutes)	2 **
	Number of Reboot Tries	3 **
	Action after exceeding reboot tries	Abandons attempts to restart and power off the node.
	Watchdog Settings	Not supported ***
Monitoring time	Watchdog Timeout Delay (minutes)	3 **
	Action	Continues ongoing operations. **
	Startup monitoring	Not supported
Monitoring time	Elapse time (minutes)	6 **
	Action	Restart. **

* The default value is 00:00 midnight. You need to change the value according to the operating environment.

** The default value is recommended. Note that the default value might vary depending on the machine model.

*** If communication with cluster interconnect is performed normally even when the operating system hangs up, no failover is generated with PRIMECLUSTER. This state can be avoided by enabling watchdog timer monitoring.

Since the hardware products that are not listed above only support monitoring, the behavior setup for the recovery function is not available.

For information about behavior setup, see the “*ServerView User Guide*.”

3.1.4 Setting Up the Cluster High-Speed Failover Function

■ Overview

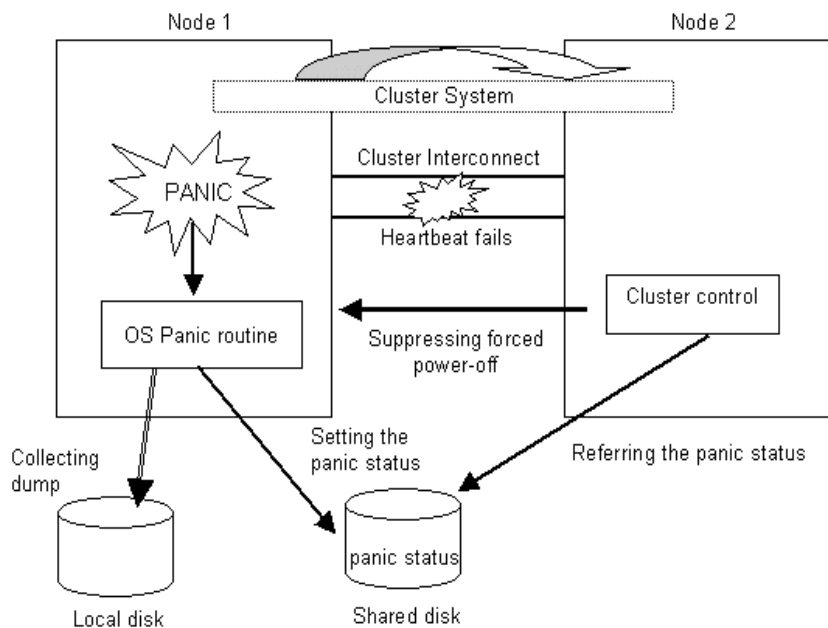
If heartbeat monitoring fails because of a node failure, PRIMECLUSTER shutdown facility removes the failed node. If this occurs during crash dump collection, you might not be able to acquire information for troubleshooting.

The cluster high-speed failover function prevents node elimination during crash dump collection, and at the same time, enables the ongoing operations on the failed node to be quickly moved to the another node.

The crash dump collection facility varies depending on the version of RHEL being used.

Version of Red Hat Enterprise Linux	Crash dump collection facility
RHEL-AS2.1/RHEL-ES2.1	LKCD
RHEL-AS3/RHEL-ES3	Netdump
RHEL-AS3 batch correction U05011/ RHEL-ES3 batch correction U05011	Netdump or Diskdump

◆ LKCD



If a failure occurs in one node, the cluster high-speed failover function notifies other nodes of the failure by using a dedicated shared disk area. The node that detected a heartbeat error assumes that the failed node enters the Offline mode.



Note

When the crash dump collection of the failed node is done, the operations such as reboot, power-off, and stop are initiated according to the LKCD settings.

For details, see the “*LKCD Installation Guide*.”

◆ Prerequisites for LKCD shutdown agent

- Enable acquisition of Linux kernel crash dump.

down forcibly from the RSB shutdown agent of another node within the cluster system.

- If an error (a network failure, etc.) occurs between the Netdump client and the Netdump server during crash dump collection, crash dump collection will be disabled and the node will be shut down forcibly from the RSB shutdown agent of another node configuring the cluster system.
- If you reset either the Netdump server or panicked node during crash dump collection, crash dump collection will not be performed correctly. Therefore, do not perform a reset during crash dump collection.
- The operation of the panicked node after crash dump collection is determined by the netdump settings.
- Netdump cannot be used with diskdump.

◆ Netdump server (server dedicated to dump collection)

You must prepare another node, to be used as the Netdump server, independently of the cluster nodes. It must be connected to the LAN for the Netdump server (a dedicated LAN). For example, when you build a cluster system configured with four nodes, you must prepare a total of five nodes, one of which will be used as the Netdump server.



Note

To enable to use the Netdump function, you must first set up the Netdump server and Netdump client.

◆ Settings required for the netdump shutdown agent

● Settings for the Netdump server

1. Confirming the Netdump function

Confirm that the Netdump server function is available. If not, enable it.

Use the "runlevel(8)" command and the "chkconfig(8)" command to confirm the operation.

- Confirm the current run level with the "runlevel(8)" command.

(Example) When the following is given, the current run level is 3.

```
# /sbin/runlevel
N 3
```

- Confirm whether the Netdump server function is available with the "chkconfig(8)" command.

(Example) When the following is given, the Netdump server function at the current run level 3 is Off.

```
# /sbin/chkconfig --list netdump-server
netdump-server 0:Off 1:Off 2:Off 3:Off 4:Off 5:Off 6:Off
```

- If the Netdump server function is Off at the current run level, change it to On with the "chkconfig(8)" command.

```
# /sbin/chkconfig netdump-server on
```

2. Confirming the NFS function

The netdump shutdown agent uses NFS. Confirm if NFS is available. If it is not available, make it available.

Use the "runlevel(8)" command and the "chkconfig(8)" command to confirm the operation.

- Confirm the current run level with the "runlevel(8)" command.

(Example) When the following is given, the current run level is 3.

```
# /sbin/runlevel
N 3
```

- Confirm whether the NFS function is available with the "chkconfig(8)" command.
(Example) When the following is given, the NFS function at the current run level 3 is Off.

```
# /sbin/chkconfig --list nfs
nfs    0:Off 1:Off 2:Off 3:Off 4:Off 5:Off 6:Off
```

- If the NFS function is Off at the current run level, change it to On with the "chkconfig(8)" command.

```
# /sbin/chkconfig nfs on
```

3. Setting to avoid rebooting

The netdump command is used to reboot a node from which a dump was collected after crash dump collection. Set up the following in "/etc/netdump.conf" to prevent the node from rebooting after dump collection.

```
noreboot=true
```

4. Setting the NFS function

Set up the following in "/etc/exports."

```
/var/crash/log/netdump_status NodeA(ro,no_root_squash) NodeB(ro,no_root_squash)
```

- In "/var/crash/log/netdump_status," describe all mountable nodes that constitute the cluster system.
- Specify the host names of the nodes that constitute the cluster system in NodeA and NodeB.

(Example) When there are three nodes constituting the cluster system, namely, NodeA, NodeB, and NodeC

```
/var/crash/log/netdump_status NodeA(ro,no_root_squash)
NodeB(ro,no_root_squash) NodeC(ro,no_root_squash)
```

5. Rebooting the system

Reboot the system.

```
# shutdown -r now
```

● Setting for the Netdump client (cluster system configuration node)

1. Confirming the NFS function

Confirm if NFS is available. If it is not available, make it available. This operation must be executed on all the nodes that constitute the cluster system.

Use the "runlevel(8)" command and the "chkconfig(8)" command to confirm the operation.

- Confirm the current run level with the "runlevel(8)" command.

(Example) When the following is given, the current run level is 3.

```
# /sbin/runlevel
N 3
```

- Confirm whether the NFS function is available with the "chkconfig(8)" command.
(Example) When the following is given, the NFS function at the current run level 3 is Off.

```
# /sbin/chkconfig --list nfs
nfs    0:Off 1:Off 2:Off 3:Off 4:Off 5:Off 6:Off
```

- If the NFS function is Off at the current run level, change it to On with the

"chkconfig(8)" command.

```
# /sbin/chkconfig nfs on
```

2. Setting the NFS function

This operation must be executed on all the nodes that constitute the cluster system.

- Create the NFS mount point.

Create the mount point (/var/crash/panicinfo). Create the mount point as follows.

```
# mkdir -m 0444 -p /var/crash/panicinfo
```

- Set /etc/fstab.

Set up the following in "/etc/fstab."

```
Netdump_server:/var/crash/log/netdump_status /var/crash/panicinfo nfs
ro,fg,soft,noac 0 0
```

- Specify an IP address or host name of the Netdump server in Netdump_server.
When the host name is to be set up, configure the IP address of the Netdump server in "/etc/hosts."

(Example)

```
Node0:/var/crash/log/netdump_status /var/crash/panicinfo nfs ro,fg,soft,noac 0 0
```

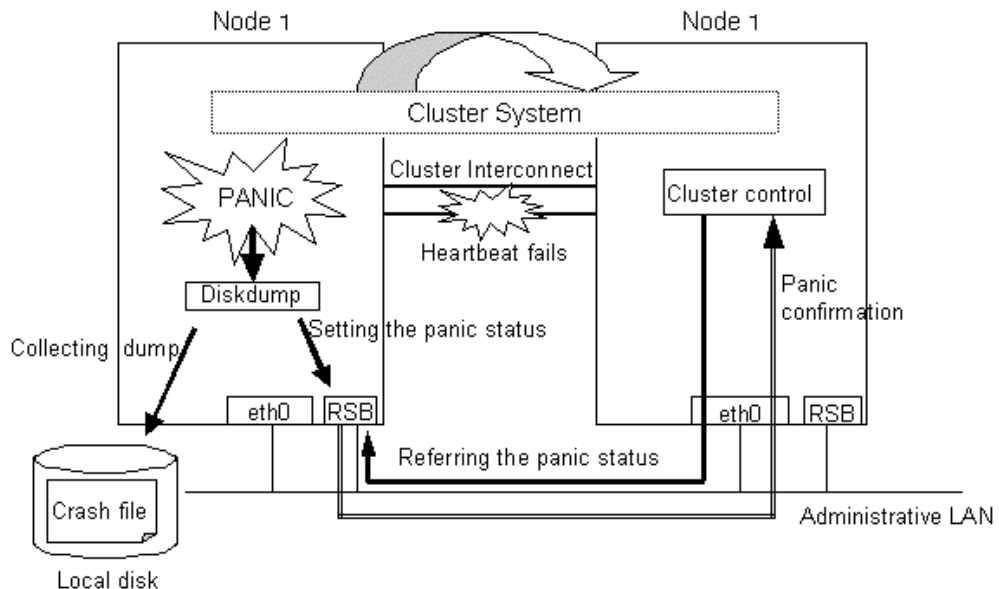
3. Rebooting the system

Reboot the system.

This operation must be executed on all the nodes that configure the cluster system.

```
# shutdown -r now
```

■ Diskdump



As shown in the above figure, the cluster fast switching function allows for panic status setting and reference through RSB or BMC (Baseboard Management Controller) when a heartbeat monitoring failure occurs. The node that detects the failure can consider that the other node is stopped and takes over ongoing operation without eliminating the node that is collecting crash dump.



Note

- If you reboot the node that is collecting crash dump, collection of the crash dump will fail.
- When the node completes collecting the crash dump after it gets panicked, the behavior of the node follows the diskdump setting.
- Diskdump cannot be used with netdump.

◆ **Required setting for the diskdump shutdown agent**

1. Configure diskdump

When using diskdump, it is necessary to configure the diskdump.

2. Check diskdump

Check if the diskdump is available. If not, enable the diskdump using the "runlevel(8)" and "chkconfig(8)" commands.

- Check the current run level using the "runlevel(8)" command.

Example)

```
# /sbin/runlevel
N 3
```

The above example shows that the run level is 3.

- Check if the diskdump is available using the "chkconfig(8)" command.

Example)

```
# /sbin/chkconfig --list diskdump
diskdump 0:off 1: off 2: off 3: off 4: off 5: off 6: off
```

The above example shows that the diskdump of the runlevel 3 is currently off.

- If the diskdump is off, enable it by executing the "chkconfig(8)" command.

```
# /sbin/chkconfig diskdump on
```

Then, start it by executing the service command.

```
# /sbin/service diskdump start
```

■ **Prerequisites for RSB shutdown agent**

After you completed configuring the LKCD shutdown agent, Netdump shutdown agent, or Diskdump shutdown agent, set the remote service board (RSB) or BLADE server.

◆ **Prerequisites for the RSB shutdown agent settings**

Set the following for the remote service board (RSB):

- User ID
- Password
- IP address

For details, see the operation manual provided with the remote service board and the "ServerView User Guide."

◆ **Prerequisites for the BLADE shutdown agent settings**

Set the following for the BLADE server:

- Install ServerView
- Set SNMP community
- Set an IP address of the management blade

For details, see the operation manual provided with the hardware and the "ServerView User Guide."

3.1.5 Checking the Kernel Parameters

You need to edit the values of the kernel parameters, depending on the environment.

Target node:

All nodes in which PRIMECLUSTER is to be installed

The kernel parameters differ according to the products and components to be used.

Check the Kernel Parameter Worksheet and edit the value if necessary.



See

For information on the kernel parameters, see the A.6 "Kernel Parameter Worksheet."



Note

To enable modifications, you need to restart the system after installation.

3.2 PRIMECLUSTER Installation

You can install PRIMECLUSTER using an installation script.

- Installation script

The installation script is also called the CLI Installer. It is used to install PRIMECLUSTER on a system in which Linux(R) software and related Fujitsu software have been installed. This method is also used for installation of the cluster management server.



[See](#)

For details on the installation procedures, see the "*PRIMECLUSTER Installation Guide.*"

3.3 Installation and Environment Setup of Applications

Install software products to be operated on the PRIMECLUSTER system and configure the environment as necessary.

To bring about application switchover in the event of a failure, you need to register the resources of software application to RMS. RMS will monitor these resources. For details, see Chapter 6 "Building Cluster Applications."



[See](#)

- For information on products supported by the PRIMECLUSTER system, see Table 10-1 "PRIMECLUSTER Product List."
- For details on installing applications, see the manuals and installation guides for the individual applications.

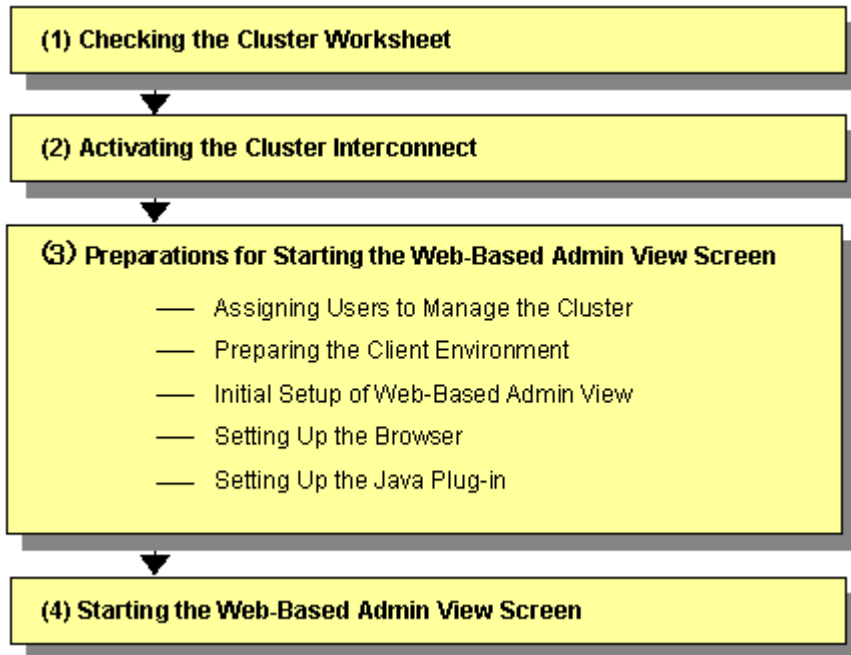
Chapter 4 Preparation Prior to Building a Cluster

This chapter explains the preparation work that is required prior to building a cluster, such as starting up the Web-Based Admin View screen.



See

As preparation for building the cluster, check the operation environment. See "3 Operating Environment" in the "PRIMECLUSTER Installation Guide."



Operation procedure and manual reference location for starting the Web-Based Admin View screen

	Work item	Execution Node	Required/Optional	Manual reference location*
(1)	4.1 Checking the Cluster worksheet	-	Required	This manual: Appendix A
(2)	4.2 Activating the Cluster Interconnect	All nodes	Required	
(3)	4.3 Preparations for Starting the Web-Based Admin View Screen			
	4.3.1 Assigning Users to Manage the Cluster	Cluster node	Required	
	4.3.2 Preparing the Client Environment	Client	Required	WEB "3.1.2 Prerequisite client environment"
	4.3.3 Initial Setup of Web-Based Admin View	Cluster node	Required	
	4.3.4 Setting Up the Browser	Client	Required	WEB "3.1.3.1 Preparing the Web browser"
	4.3.5 Setting Up the Java Plug-in	Client	Required	WEB "3.1.3.2 Required for the Web Browser Environment"
(4)	4.4 Starting the Web-Based Admin View Screen	Client	Required	WEB "3.2 Screen startup"

* The PRIMECLUSTER manual name is abbreviated as follows:

- **WEB:** PRIMECLUSTER Web-Based Admin View Operation Guide 4.1

4.1 Checking the Cluster Worksheet

Make certain of filling the worksheet. If there is missing information, you should specify values and complete the sheet.



[See](#)

For information on the worksheet, see Appendix A "PRIMECLUSTER System Design Worksheets"

4.2 Activating the Cluster Interconnect

As preparation for setting up CF, execute the following operation:

1. Edit the `/etc/sysconfig/network-scripts/ifcfg-ethX` file.

Edit "ONBOOT" of the `/etc/sysconfig/network-scripts/ifcfg-ethX` file as follows:

```
ONBOOT=yes
```



Note

ethX indicates a network interface that is used for the cluster interconnect.

A number is specified in X.

2. Confirm the cluster interconnect.

Confirm the state of the interface for interconnect with the following command.

```
# ifconfig <relevant interface> <Return>
```

3. If the beginning of the second row output with the above command is not "UP," execute the following command to confirm if "UP" is output.

```
# ifconfig <relevant interface> up <Return>
```

4.3 Preparations for Starting the Web-Based Admin View Screen

Take the following steps for starting the GUI screen of Web-Based Admin View:

1. Environment setup

You can set up the following in any order:

 - 4.3.1 Assigning Users to Manage the Cluster
 - 4.3.2 Preparing the Client Environment
 - 4.3.3 Initial setup of Web-Based Admin View
2. Web environment preparation

You need to set up the browser first.

 - 4.3.4 Setting Up the Browser
 - 4.3.5 Setting Up the Java Plug-in

4.3.1 Assigning Users to Manage the Cluster

Web-Based Admin View restricts access to specific operation management GUIs by using user groups in the management server.

The table below shows the groups used for operation management GUIs of PRIMECLUSTER.

Operation management GUIs of Web-Based Admin View and authorized user groups

GUI name	user group name	Privileges
All GUIs	wvroot	Root authority. This group can execute all operations.
Cluster Admin	clroot	Root authority. This group can specify settings, execute management commands, and display information.
	cladmin	Administrator authority. This group cannot specify settings. It can execute management commands and display information.
	clmon	User authority. This group cannot specify settings and cannot execute management commands. It can only display information.
GDS (Global Disk Services)	sdxroot	Root authority. This group can use the GDS management view.

The groups for the operation management GUIs are defined as shown in the above table.

wvroot is a special user group, and is used for Web-Based Admin View and GUIs. Users belonging to this group are granted the highest access privileges for Web-Based Admin View and all kinds of operation management GUIs.

The system administrator can allow different access privileges to users according to the products that the users need to use.

For example, a user who belongs to the "clroot" group but not to "sdxroot" is granted all access privileges when opening the Cluster Admin screen but no access privileges when opening the Global Disk Services (GDS) GUIs.

You need to create the above Linux(R) groups for both the primary and secondary management servers as necessary, and assign users to these groups. The Web-Based Admin View group membership should maintain consistency among all management servers associated with a specific cluster system. To set a user group, execute the "useradd(8)" command as follows:

```
# useradd -g wvroot username
```

The root user is granted the highest access privilege regardless of which group the root user

belongs to.

For details about user groups, see "3.1.1 User group determination" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*

4.3.2 Preparing the Client Environment

Prepare hardware, operating systems, and Web browsers of the clients supported by Web-Based Admin View.



See

For details, see "3.1.2 Preparing the Client Environment" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*



Note

If Windows(R) is used for a client that is supported with Web-Based Admin View, the following color pallet problem may occur:

When the GUI screen of Web-Based Admin View is displayed with Windows(R), the 16-bit or 32-bit color mode must be used. The 24-bit color mode does not properly support an alpha component (transparency) that is required for RMS graphs. If 24-bit color is used, RMS graphs may not be displayed properly.

Whether problems will occur in 24-bit color mode depends on the graphics card and video driver being used.

4.3.3 Initial Setup of Web-Based Admin View

4.3.3.1 Initial setup of the operation management server

When using Web-Based Admin View for the first time, you need to initialize the management server on each node. Take the following steps in the order listed below.

◆ **Operation Procedure:**

1. Stop Web-Based Admin View on all the management servers and nodes.

```
# /etc/init.d/fjsvwvcnf stop
# /etc/init.d/fjsvwvbs stop
```

2. Set the IP addresses of the primary management server and secondary management server.

Execute the following command on all the management servers and nodes, referring to the example.

```
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam primary-server
<primary-management-server-IP-address>
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam secondary-server
<secondary-management-server-IP-address>
```

Example: Set the "primary management server IP" and "secondary management server IP" of the "operation management mode" found on the cluster building worksheet.

```
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam primary-server 10.20.30.40
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam secondary-server 10.20.30.41
```

3. Start Web-Based Admin View on all the management servers and nodes.


```
# /etc/opt/FJSVwvbs/etc/bin/wvCntl start
# /etc/init.d/fjsvwcnf start
```



See

Web-Based Admin View has some different operation management modes. For further details, see "1.2.2 System topology" and "Chapter 7 Web-Based Admin View setup modification" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide*."

4.3.3.2 Confirming Web-Based Admin View Startup

This section describes the procedure for confirming whether Web-Based Admin View has been started

◆ Confirmation Procedure

Check that all node information is output by executing the "wvstat" command on the connected management server.

(Example)

In a two-node configuration consisting of node1(10.20.30.40) and node2(10.20.30.41), node1 is the primary management server and node2 is the secondary management server.

```
# /etc/opt/FJSVwvbs/etc/bin/wvstat
primaryServer 10.20.30.40 node1 http=10.20.30.40 Run 3m41s
primaryServer Sessions: 0
primaryServer Nodes: 2
    10.20.30.40 node1 Linux-2.4.9-e.8enterprise 3m36s
    10.20.30.41 node2 Linux-2.4.9-e.8enterprise 2m58s
secondaryServer 10.20.30.41 node2 http=10.20.30.41 Run 2m46s
secondaryServer Sessions: 0
secondaryServer Nodes: 2
    10.20.30.40 node1 Linux-2.4.9-e.8enterprise 2m41s
    10.20.30.41 node2 Linux-2.4.9-e.8enterprise 2m23s
#
```

If the information is not properly displayed, Web-Based Admin View has not been started or there may be an error in the Web-Based Admin View settings. Restart Web-Based Admin View and execute the operation again. If node information is still not displayed, refer to the "*PRIMECLUSTER Web-Based Admin View Operation Guide*" and check the parameter settings. For details on the "wvstat" command, see the manual page.

4.3.3.3 Setting the Web-Based Admin View Language

The language environment in which Web-Based Admin View operates is set to English as default. Even though the client has a Japanese environment, the text of cluster resource management facility messages that are sent from the cluster node is displayed in English.

If you want to display the messages in Japanese, take the following steps to set up environment variables of Web-Based Admin View. You need to set up the variables using a system administrator access privilege on all nodes and the cluster management servers that construct a cluster system.

This operation must be executed with the system administrator authority for all cluster nodes and the cluster management server that make up the cluster system.

Environment variable for the operation language of Web-Based Admin View

Attribute	Variable	Possible values	Meaning
sys	Lang	C, ja	Language environment in which Web-Based Admin View operates. C: Operates in English. ja: Operates in Japanese. If this variable is not set, Web-Based Admin View operates in the English environment.

◆ Operation Procedure:

1. Stop Web-Based Admin View on all the management servers and nodes.

```
# /etc/init.d/fjsvwvcnf stop
# /etc/init.d/fjsvwvbs stop
```

2. Add the environment variable to the definition file (/etc/opt/FJSVwvbs/etc/webview.cnf) of Web-Based Admin View, and set the language.

Execute the following command on all the management servers and nodes, referring to the example.

```
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam -add <attribute>
<environment-variable> <setting_value>
```

Example: Add the environment variable and set the operation language to Japanese.

```
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam -add sys lang ja
```

3. Restart Web-Based Admin View on all the management servers and nodes.

```
# /etc/opt/FJSVwvbs/etc/bin/wvCntl restart
# /etc/init.d/fjsvwvcnf start
```



Note

- For Web-Based Admin View to display messages in Japanese, the language environment of the personal computers and Linux(R) workstations that are being used as clients must be set to Japanese. If a client has an English environment, the message contents turn into garbled characters by the above setting change.
- To change the environment variable again after it is added by the above procedure, execute the following command:

```
# /etc/opt/FJSVwvbs/etc/bin/wvSetparam lang <setting_value>
```

For details on the command, see "4.5.3 Environment variable modification" in the "PRIMECLUSTER Web-Based Admin View Operation Guide."

4.3.4 Setting Up the Browser

Set up a Web browser on the clients.



See

See "3.1.3.1 Preparing the Web browser" in the "PRIMECLUSTER Web-Based Admin View Operation Guide."

4.3.5 Setting Up the Java Plug-in

Install the Java Plug-in on the clients.



[See](#)

For details on the supported Java Plug-in versions, see "3.1.2 Prerequisite client environment" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide*." For instructions on setting up the Java Plug-in, see "3.1.3.2 Required for the Web Browser Environment" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide*."

4.4 Starting the Web-Based Admin View Screen

After completing all the preparations, start the Web-Based Admin View GUI screen.

◆ Operation Procedure:

1. Start the Web browser in the client.
2. Specify the URL in the following format, and access the cluster management server:

http://<host-name>:<port-number>/Plugin.cgi

<host-name>

IP address or host name (**httpip**) that clients use to access the primary or secondary management server.

The default value of **httpip** is the IP address that is assigned to the node name that is output when "uname -n" is executed.

<port-number>

Specify "8081."

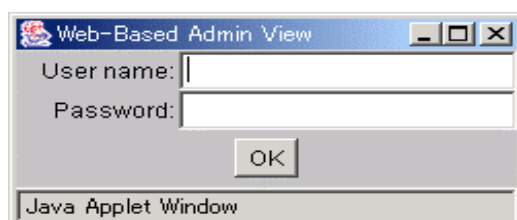
If the port number has been changed, specify the up-to-date number.

For instructions on changing the http port number, see "7.2.1 http port number" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*



Note

- If the Web-Based Admin View screen cannot be started when the host name is specified in **<host-name>**, specify the IP address directly that corresponds to the host name.
 - Note that the access method may be different depending on the operation management product. To use operation management products that have different access methods at the same time, see "3.3.4 Concurrent use of operation management products with different access methods" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*
 - For information on the IP address or host name (httpip) used by clients, see the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*
 - When a URL is to be registered for the bookmark of a browser, register "Plugin.cgi."
3. When the Web-Based Admin View is started, the following window appears. Enter a user name and password that have been registered to the management server, and click *OK*.



Note

You cannot close this window by clicking "x" at the top right corner.

4. When authentication ends, you can use Web-Based Admin View.

**Note**

- After starting the Web-Based Admin View screen, do not change the page by pressing the *Forward/Next*, *Back*, or *Reread/Refresh* buttons.
- The screen of some browsers may hang.
 - If the browser is terminated, restart the browser and display Web-Based Admin View.
 - Reread the URL or restart the browser if the browser does not work (no response).
 - The operation can be continued after the Web-Based Admin View is started by moving the mouse on the browser if the page switches to a black screen.
- If the URL of the Java Plug-in is read with Netscape Communicator or Netscape Navigator, a message stating “Click here to get the plugin” may appear. In this case, the Java Plug-in may not be installed or an older Java Plug-in version that is not supported might have been installed. See the *“PRIMECLUSTER Web-Based Admin View Operation Guide”* and install the Java Plug-in. Note that if you click the “Click here to get the plugin” icon, a dialog box indicating “Plug-in is not read” appears. Select *Cancel*.
- If “Welcome to Web-Based Admin View” does not appear after you read the URL of the Java Plug-in with Internet Explorer, an appropriate Java Plug-in may not be installed. Confirm that an appropriate Java Plug-in is installed by using “Add/Remove Programs” in the control panel. If the Java Plug-in is not installed or if an older Java Plug-in version that is not supported is installed, see the *“PRIMECLUSTER Web-Based Admin View Operation Guide”* and install the Java Plug-in. Also, if the “security warning” dialog box appears, and prompts you to specify whether the “Java Plug-in” is to be installed and executed, select *No*.
- If the secondary cluster management server is set to operate dynamically, there is a function that connects automatically to the primary or secondary cluster management server that is operating at that time even if the URL of a specific monitoring node is specified. For details, see “7.4 Secondary management server automatic migration” in the *“PRIMECLUSTER Web-Based Admin View Operation Guide.”*
- If repeated errors occur during the authentication of Step 3, the message 0016 may be displayed and you may not be able to log in. For the action to take if this happens, see “Symptom 17” in “Appendix B Troubleshooting” of the *“PRIMECLUSTER Web-Based Admin View Operation Guide.”*
- If Netscape 6.X is used, URL input may become disabled. This condition is a Netscape problem and Netscape is currently working to correct the problem.
If this condition occurs, minimize the Netscape window and then return it to its original size, or restart the Netscape Web browser.
- If some problems occur while you are using Web-Based Admin View, see “Appendix A Message” and “Appendix B Troubleshooting” of the *“PRIMECLUSTER Web-Based Admin View Operation Guide.”*

4.5 Web-Based Admin View Screen

When you start Web-Based Admin View, the Web-Based Admin View screen is displayed. The left area of the Web-Based Admin View screen displays the currently supported functions as **operation menus**.

4.5.1 Operation Menu Functions

Web-Based Admin View screen supports the functions shown below. See "Menu Outline."

Web-Based Admin View screen



■ Menu Outline

The operation menus are divided into the following two categories:

1. **PRIMECLUSTER category**
Management screens and manuals of operation management products that are presented by PRIMECLUSTER
2. **MISC category**
Management screens and manuals of operation management products that are provided by non-PRIMECLUSTER products.

The following operations are enabled for each category:

- **PRIMECLUSTER**
 - **Operation management product name**
You can operate the screen of the operation management product. For details, see the manual provided with each operation management product.
 - Global Cluster Services (CF, CRM, RMS, SIS)
 - Global Disk Services (PRIMECLUSTER GDS)
 - Global File Services (PRIMECLUSTER GFS)
 - **Web-Based Admin View tools**
These tools display the Web-Based Admin View log and allow you to set the operation environment. For details, see "Part 3 Web-Based Admin View tools"

menu" in the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*

- **Manual**

The PRIMECLUSTER online manual is displayed.

- **MISC**

Buttons for starting the management screens of installed operation management products other than the PRIMECLUSTER products are displayed. For example, in an environment in which Symfoware is installed, this menu category will be displayed.

For details, see the manual provided with each operation management product.

- **Operation management product name**

You can operate the management screens of installed operation management products other than the PRIMECLUSTER products.

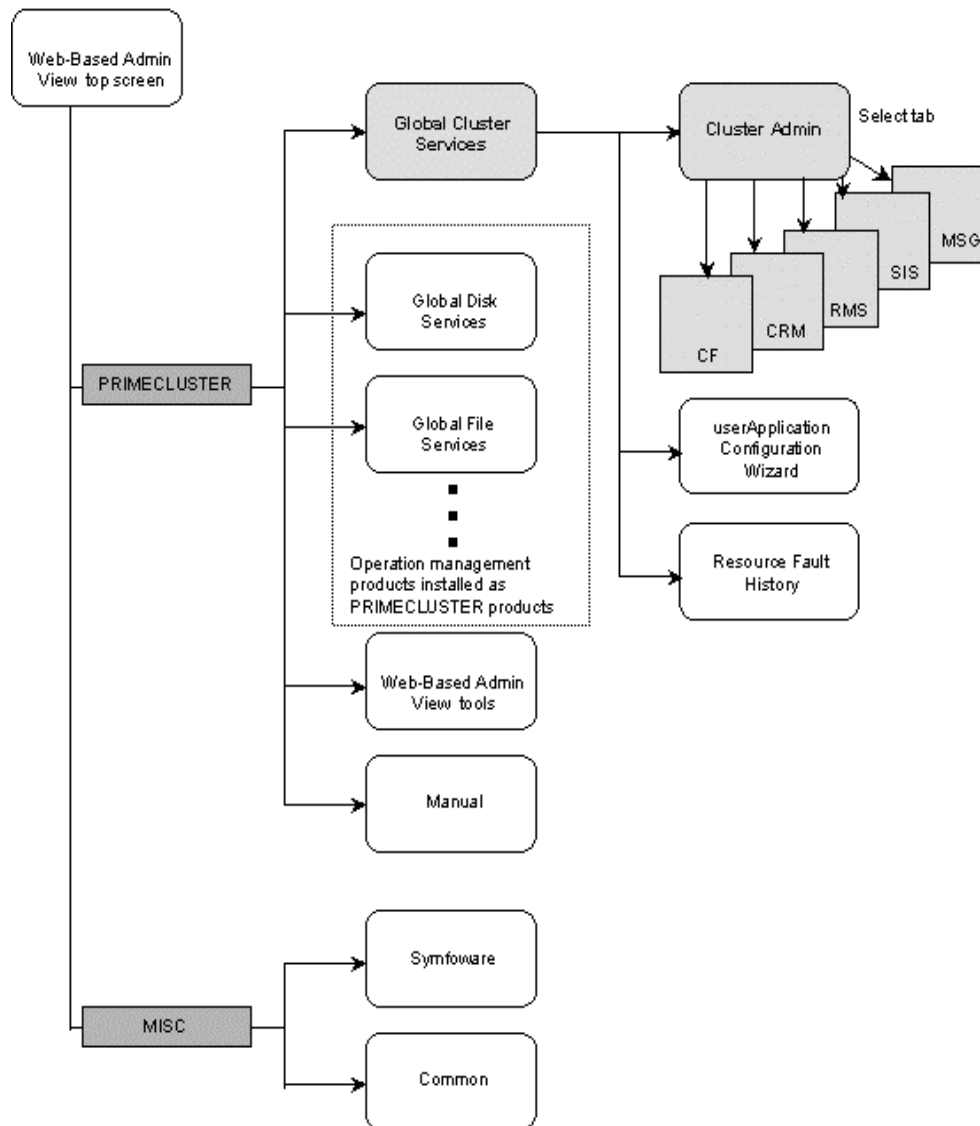
- Symfoware

- **Common**

You can refer to manuals that are available as online manuals. For details, see the *"PRIMECLUSTER Web-Based Admin View Operation Guide."*

- **Operation menu transition diagram**

Shown below are the transitions from the top screen of Web-Based Admin View to the other screens.



At the Cluster Admin screen, you can switch the window by clicking the following tabs:

- CF: Cluster Foundation
- CRM: Cluster Resource Management
- RMS: Reliant Monitor Services
- SIS: Scalable Internet Services
- MSG: Message

The following sections describe the screens found after the Global Cluster Services menu.

4.5.2 Global Cluster Services Menu Functions

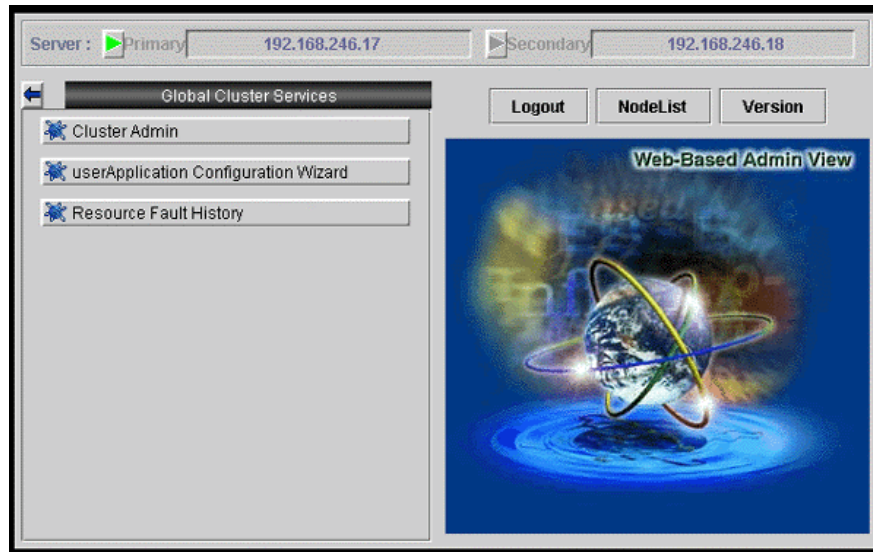
Display procedure

Web-Based Admin View screen -> Global Cluster Services

Exit procedure

To return to the Web-Based Admin View screen, click the arrow next to *the Global Cluster Services*.

Web-Based Admin View screen (Global Cluster Services menu)



Overview of the Global Cluster Services menu

- **Cluster Admin**
This function allows you to monitor the status of the PRIMECLUSTER system and operate the system.
- **userApplication Configuration Wizard**
This function allows you to create cluster applications.
- **Resource Fault History**
This function allows you to display the resource fault history. For details, see C.2.2 "Resource Fault History."

4.5.3 Cluster Admin Functions

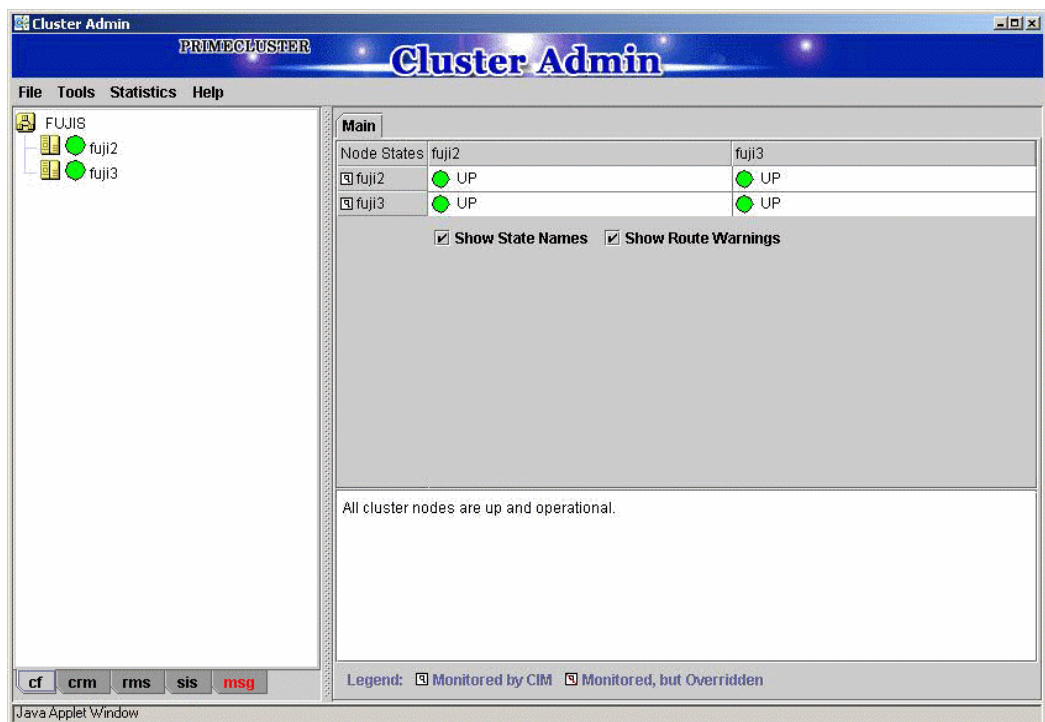
Display procedure

Web-Based Admin View screen -> Select *Global Cluster Services*. -> Select *Cluster Admin*. -> Node selection screen -> Select the node.

Exit procedure

Select the *Exit* in the *File* menu. -> Confirmation screen -> Select the *Yes*. -> *Global Cluster Services* menu

Web-Based Admin View screen (Cluster Admin)



Cluster Admin supports the functions described below.

The manual reference locations are indicated in "Overview of Cluster Admin."

Overview of Cluster Admin

- **cf (CF: Cluster Foundation)**
This function allows you to manage, build, monitor, and diagnose the cluster.
Reference location: 5.1 "Initial Cluster Setup", Chapter 7 "Operations"
- **crm (CRM: Cluster resource management facility)**
This function manages the resource database, which contains information about the hardware devices (including shared disks and network interface cards).
Reference location: 5.1.3 "Initial Setup of the Cluster Resource Management Facility", Chapter 7 "Operations"
- **rms (RMS: Reliant Monitor Services)**
This function monitors the status of the cluster system and manages applications and resources.
Reference location: Chapter 7 "Operations"
- **sis (SIS: Scalable Internet Services)**
This function enables PRIMECLUSTER to act as a scalable, reliable, and easily managed network system.
Reference location: "PRIMECLUSTER Scalable Internet Services (SIS) Configuration and Administration Guide."
- **msg (Message)**
Cluster control messages are displayed.
Reference location: Chapter 7 "Operations"

4.6 Exiting the Web-Based Admin View Screen

To exit the Web-Based Admin View screen, follow the procedure below.

◆ Logging out of the screen

To log out of the Web-Based Admin View screen, follow the procedure below.

1. Close all screens if the management screen of the operation management product is displayed.
2. When only the Web-Based Admin View screen is displayed, select *the Logout*.

◆ Exiting the screen

To exit the Web-Based Admin View screen, follow the procedure below.

1. Log out from the Web-Based Admin View screen according to "Logging out of the screen" described above.
2. The login screen will be displayed. To exit the Web-Based Admin View screen, execute one of the following operations while the login screen is still displayed:
 - Terminate the Web browser.
 - Specify another URL in the Web browser to switch the screen. (Enter a new URL or specify a bookmark.)
 - Select the *Back* button of the browser.

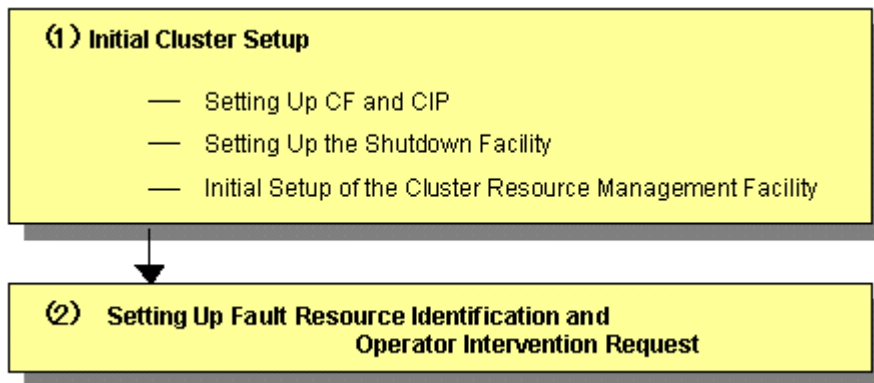


Note

- To terminate the Web browser, select the *Close* in the *File* menu, or click the "x" at the top right corner of the screen.
Note that if you are using Netscape, selecting the *Exit* in the *File* menu will terminate all browser screens.
- At the login screen, clicking the "x" at the top right corner of the screen will not terminate the screen.
- The login screen will remain temporarily after exiting the browser.

Chapter 5 Building a Cluster

The procedure for building a PRIMECLUSTER cluster is shown below:



Cluster building procedure and manual reference locations

	Work item	Execution Node	Required/Optional	Manual reference location*
(1)	5.1.1 Setting up CF and CIP	All nodes	Required	CF
	5.1.2 Setting Up the Shutdown Facility	All nodes	Required	CF "8 Shutdown Facility "
	5.1.3 Initial Setup of the Cluster Resource Management Facility	All nodes	Required	CF "4.3 Resource Database configuration"
(2)	5.2 Setting Up Fault Resource Identification and Operator Intervention Request	1 node	Required	

* The PRIMECLUSTER manual names are abbreviated as follows:

- CF: *PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*

5.1 Initial Cluster Setup

This section describes the initial setup of the PRIMECLUSTER cluster.

For details on the setup methods, see the reference locations indicated in the table below.

	Contents	Manual reference location*
1	5.1.1 Setting up CF and CIP (setting up cluster configuration information and IP addresses)	CF "2.1 CF, CIP, and CIM configuration"
2	5.1.2 Setting up the shutdown facility	CF "8 Shutdown Facility"
3	5.1.3 Initial Setup of the Cluster Resource Management Facility	CF "4.3 Resource Database configuration"

* The PRIMECLUSTER manual names are abbreviated as follows:

- **CF:** *PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*

5.1.1 Setting Up CF and CIP

Set up Cluster Foundation (CF) and CIP using the CF Wizard of Cluster Admin. Enter the information described in the table below. The worksheet for the CF and CIP setup is the A.7 "Cluster Configuration Worksheet." For details on the setting, see "2.1.4 Example of creating a cluster" in the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."

Setup item	Description	Described in worksheet
Cluster name	Define the name of the cluster systems. Use up to 31 printable ASCII characters (except space, line feed, and tab characters) for each name. Cluster names are always processed as uppercase characters.	"Cluster name"
Cluster nodes	Select the nodes that will construct a cluster system.	"Node name (uname-n)" for "Node 1", "Node 2", "Node 3" and "Node 4"
CF node names	Set the names of the nodes that construct the cluster. Use up to 11 printable ASCII characters (except space, line feed, and tab characters) for each node name. Upper-case characters cannot be used as a CF node name. In the setup screen, the same names as the "Cluster nodes" above are displayed by default.	"CF node name" for "Node 1", "Node 2", "Node 3" and "Node 4"
Cluster interconnects	In each node of the cluster, determine the network interface to be used in CF inter-node communication. A representative network interface is the Ethernet device. Set the network interfaces to be used for CF inter-node communication so that they are activated when the system is started. However, IP addresses must not be assigned to the interfaces.	"Path 0 NIC name" and "Path 1 NIC name" for "Node 1", "Node 2", "Node 3" and "Node 4"
IP interconnects	Optional. This setup allows you to operate CF over IP.	"IP interconnect setup"

Setup item	Description	Described in worksheet
CIP subnets	Set the following items, and set the IP address used by CF: <ul style="list-style-type: none"> • CIP subnet count • Host suffix • Subnet number • Subnet mask 	"Number of subnets," "Subnet IP," and "Net mask" for "CIP"
Usage confirmation of CF remote services	Check whether the following functions are to be enabled: <ul style="list-style-type: none"> • Remote file copy (cfcp) • Remote command execution (cfsh) <p>With the default settings, these services are "Not selected." To use RMS, you need to select at least one function.</p>	"CF remote service usage"
Cluster Integrity Monitor (CIM) configuration	Set the nodes to be monitored by CIM.	"Node in CF quorum set" for "Node 1", "Node 2", "Node 3" and "Node 4"



Note

- If you enable any one of the CF remote services, do not connect the following systems in the same cluster interconnect:
 - Systems that have a security problem
 - Systems in which cluster interconnects are not secured
- Hereinafter, the CF remote services (CFCP and CFSH) must be enabled. To enable the CFCP and CFSH, add the following definition to the "/etc/default/cluster.config" file before configuring the CF.

```
CFCP    "cfcp"
CFSH    "cfsh"
```
- If the CF and CIP configuration fails, check the following:
 - The cluster interconnect is connected.
 - The network interface that is used for the cluster interconnect is activated.
 - An IP address is configured for the network interface.
- The cluster node name will be automatically used for the CF node name. The name string must consist of eleven characters or less. Change it if necessary.



See

For information on the corrective action to be applied when the setting of the cluster interconnect fails, see "11 Diagnostics and Troubleshooting" in the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."

5.1.2 Setting Up the Shutdown Facility

The procedure for setting up the shutdown facility is given below:



See

For details on the shutdown facility, see the following manuals:

- "3.3.1.8 PRIMECLUSTER SF" in the "*PRIMECLUSTER Concept Guide*"
- "8. Shutdown Facility" in the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*"



Point

Survival priority

Even if a **cluster partition** occurs due to a failure in the cluster interconnect, all the nodes will still be able to access the user resources. For details on the cluster partition, see "2.2.2.1 Protecting data integrity" in the "*PRIMECLUSTER Concept Guide*."

To guarantee the consistency of the data constituting user resources, you have to determine the node groups to survive and those that are to be forcibly stopped.

The weight assigned to each node group is referred to as a "Survival priority" under PRIMECLUSTER.

The greater the weight of the node, the higher the survival priority. Conversely, the less the weight of the node, the lower the survival priority. If multiple node groups have the same survival priority, the node group that includes a node with the name that is first in alphabetical order will survive.

Survival priority can be found in the following calculation:

Survival priority = SF node weight + ShutdownPriority of userApplication

SF node weight (Weight):

Weight of node. Default value = 1. Set this value while configuring the shutdown facility.

userApplication ShutdownPriority:

Set this attribute when userApplication is created. For details on how to change the settings, see 8.5 "Changing the Operation Attributes of a userApplication."



See

For details on the ShutdownPriority attribute of userApplication, see "13.1 Attributes available to the user" in the "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

Survival scenarios

The typical scenarios that are implemented are shown below:

[Largest node group survival]

- Set the weight of all nodes to 1 (default).
- Set the attribute of ShutdownPriority of all user applications to 0 (default).

	Node group1			Node group2
	node1	node2	node3	node4
weight of node	1	1	1	1
ShutdownPriority of app1 = 0				0
ShutdownPriority of app2 = 0				0
ShutdownPriority of app3 = 0				0
Survival priority	3			1

[Specific node survival]

- Set the “weight” of the node to survive to a value more than double the total weight of the other nodes.
- Set the ShutdownPriority attribute of all user applications to 0 (default).

In the following example, node1 is to survive:

	Node group1	Node group2		
	node1	node2	node3	node4
weight of node	10	1	1	1
ShutdownPriority of app1 = 0		0		
ShutdownPriority of app2 = 0			0	
ShutdownPriority of app3 = 0				0
Survival priority	10	3		

[Specific application survival]

- Set the “weight” of all nodes to 1 (default).
- Set the ShutdownPriority attribute of the user application whose operation is to continue to a value more than double the total of the ShutdownPriority attributes of the other user applications and the weights of all nodes.

In the following example, the node for which app1 is operating is to survive:

	Node group1	Node group2		
	node1	node2	node3	node4
weight of node	1	1	1	1
ShutdownPriority of app1 = 20	20			
ShutdownPriority of app2 = 1			1	
ShutdownPriority of app3 = 1				1
Survival priority	21	5		

◆ Setting up the shutdown facility

● Setting up the shutdown daemon

Create `/etc/opt/SMAW/SMAWsf/rcsd.cfg` on all nodes as shown below:

```
CFNameX,weight=weight,admIP=myadmIP: agent=SA_XXX,timeout=20
CFNameX,weight=weight,admIP=myadmIP: agent=SA_XXX,timeout=20
```

CFNameX : CF node name of the cluster host.
weight : Weight of the SF node.
myadmIP : IP address of the public LAN on the local node.
agent=SA_XXX : Specify the name of the Shutdown Agent.
 For the RSB Shutdown Agent, specify `SA_rsb`.
 For the BLADE Shutdown Agent, specify `SA_blade`.

Example) RSB Shutdown Agent

```
node1,weight=1,admIP=10.20.30.100: agent=SA_rsb,timeout=20
node2,weight=1,admIP=10.20.30.101: agent=SA_rsb,timeout=20
```

Example) BLADE Shutdown Agent

```
node1,weight=1,admIP=10.20.30.100: agent=SA_blade,timeout=20
node2,weight=1,admIP=10.20.30.101: agent=SA_blade,timeout=20
```



Information

When the `/etc/opt/SMAW/SMAWsf/rcsd.cfg` file is to be created, the `/etc/opt/SMAW/SMAWsf/rcsd.cfg.template` file can be used as a prototype.

● Setting up the RSB shutdown agent

For the server with the Remote Services Board installed, configure the RSB shutdown agent. You must configure the RSB shutdown agent before you configure the Linux Kernel Crash Dump (LKCD) shutdown agent, the netdump shutdown agent or the diskdump shutdown agent.

Create `/etc/opt/SMAW/SMAWsf/SA_rsb.cfg` on all nodes as shown below:

```
CFName1 ip-address: [port]: [user]: [passwd] [cycle | leave-off]
CFName2 ip-address: [port]: [user]: [passwd] [cycle | leave-off]
```

CFNameX : CF node name of the cluster host
ip-address : IP address of the remote service board
port : Unused
user : User name defined when remote service board is set up
passwd : Password defined when remote service board is set up
cycle : Reboot the node after forcibly stopping the node.
leave-off : Power-off the node after forcibly stopping the node.

Example)

```
node1 10.20.30.50::root:rsbpwd cycle
node2 10.20.30.51::root:rsbpwd cycle
```



Information

When the `/etc/opt/SMAW/SMAWsf/SA_rsb.cfg` file is to be created, the `/etc/opt/SMAW/SMAWsf/SA_rsb.cfg.template` file can be used as a prototype.

- **Setting up the BLADE shutdown agent**

For the Blade server, configure the BLADE shutdown agent. You must configure the BLADE shutdown agent before you configure the netdump shutdown agent.

Create `/etc/opt/SMAW/SMAWsf/SA_blade.cfg` on all nodes as shown below:

```
management-blade-ip IPaddress
community-string SNMPcommunity
CFName1 slot-no [cycle | leave-off]
CFName2 slot-no [cycle | leave-off]
```

IPaddress : IP address of the management blade
SNMPcommunity : SNMP community
CFNameX : CF node name of the cluster host.
slot-no : Slot No. of the server blade
cycle : Reboot the node after forcibly stopping the node.
leave-off : Power-off the node after forcibly stopping the node.

Example)

```
management-blade-ip 10.20.30.40
community-string public
node1 1 cycle
node2 2 cycle
```



Information

When the `/etc/opt/SMAW/SMAWsf/SA_blade.cfg` file is to be created, the `/etc/opt/SMAW/SMAWsf/SA_blade.cfg.template` file can be used as a prototype.



Note

You need to set the node behavior after collecting the crash dump in the failed node to [reboot | power-off] according to the [cycle | leave-off] settings in the above file. The behavior is defined by modifying the `DUMP_ACTION` variables in `/etc/sysconfig/dump`. For details, see the *"LKCD Installation Guide."*



Note

The `rcsd.cfg`, `SA_rsb.cfg`, and `SA_blade.cfg` files must be the same on all nodes. If not, operation errors might occur.

- **Setting up the LKCD shutdown agent**

If the operating system of cluster node is Red Hat Enterprise Linux AS v.2.1 or Red Hat Enterprise Linux ES v.2.1, configure the LKCD shutdown agent.

- Specify the disk that notifies the panic status.

Add the following row to `/etc/sysconfig/dump` on all the nodes:

```
NOTIFY_DEV=/dev/sdX
```

`sdX`: Device name of the disk that notifies the panic status.

(Example) `NOTIFY_DEV=/dev/sdc`



Note

Specify a shared disk in the panic status notification disk that is to be set up as part of this procedure.

- Change the reboot wait time after collecting the crash dump.
Change PANIC_TIMEOUT of /etc/sysconfig/dump to 30 on all the nodes.
(Example) PANIC_TIMEOUT=30

- Initialize the panic status notification function
Execute the following command on any one of the nodes of the cluster system.

```
# /etc/opt/FJSVc1kcd/bin/panicinfo_setup
```



Note

- To use this command, CF and CF services (CFSH and CFCP) must be running. For details on the setting, see the notes in 5.1.1 "Setting Up CF and CIP."
- If the command ends abnormally, see D.6.1 "Notes on the Setting of the Shutdown Facility."

- Enable the panic status notification function.
Execute the following command on all the nodes:

```
# /sbin/lkcd config
```

- Set up crash dump collection
The procedures for setting up may differ depending on the hardware used for the node.

- PRIMERGY TX600 or PRIMERGY RX800
Change RSB_PANIC of /etc/opt/FJSVc1kcd/etc/SA_lkcd.tout as follows on all the nodes.

Before change

```
RSB_PANIC 0
```

After change

```
RSB_PANIC 1
```

Change DUMP_FLAGS of /etc/sysconfig/dump as follows on all the nodes.

Before change

```
DUMP_FLAGS=0
```

After change

```
DUMP_FLAGS=2
```

- PRIMERGY RX300



Note

You must configure the crash dump settings for PRIMERGY RX300 after "Enable the panic status notification".

Add ".agent=SA_user,timeout=20" after each "CFNameX,weight=weight,admIP=myadmIP" in /etc/opt/SMAW/SMAWsf/rcsd.cfg on all the nodes.

Example)

```
node1,weight=1,admIP=10.20.30.100:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
node2,weight=1,admIP=10.20.30.101:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
```

- **Setting up the netdump shutdown agent**

If the operating system of cluster node is Red Hat Enterprise Linux AS v.3 or Red Hat Enterprise Linux ES v.3, configure the netdump shutdown agent.

- Initialize the netdump definition file

Execute the following command on any one of the nodes of the cluster system.

```
# /etc/opt/FJSCv11kcd/bin/panicinfo_setup
```



Note

To use this command, CF and CF services (CFSH and CFCP) must be running. For details on the setting, see the notes in 5.1.1 "Setting Up CF and CIP."

- Set up crash dump collection

The procedures for setting up may differ depending on the hardware used for the node.

- PRIMERGY TX600 or PRIMERGY RX800

Change RSB_PANIC of /etc/opt/FJSCv11kcd/etc/SA_lkcd.tout as follows on all the nodes.

Before change

```
RSB_PANIC 0
```

After change

```
RSB_PANIC 1
```

- PRIMERGY RX300



Note

You must configure the crash dump settings for PRIMERGY RX300 after "Initialize the netdump definition file".

Add ":agent=SA_user,timeout=20" after each

"CFNameX,weight=weight,admIP=myadmIP" in /etc/opt/SMAW/SMAWsf/rcsd.cfg on all the nodes.

Example)

```
node1,weight=1,admIP=10.20.30.100:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
node2,weight=1,admIP=10.20.30.101:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
```

- **Diskdump shutdown agent configuration**

If you are using Red Hat Enterprise Linux AS v.3 batch correction U05011 or Red Hat Enterprise Linux ES v.3 batch correction U05011 as basic software of cluster nodes, and PRIMERGY (*1) that supports the cluster fast switching function through diskdump, you can configure the diskdump shutdown agent.

*1: PRIMERGY TX600, RX300

- Initializing the configuration file for the diskdump
Execute the following command on any one of the cluster nodes.

```
# /etc/opt/FJSCvllkcd/bin/panicinfo_setup
```



Note

To execute the command, CF and CF services (CFSH and CFPC) must be activated. For details, see 5.1.1 "Setting Up CF and CIP."
Also, you must configure the RSB shutdown agent in advance.

- Setting crash dump collection
The procedures for setting up may differ depending on the hardware used for the node.
 - PRIMERGY TX600
Change RSB_PANIC of /etc/opt/FJSCvllkcd/etc/SA_lkcd.tout as follows on all the nodes.

Before change

```
RSB_PANIC 0
```

After change

```
RSB_PANIC 1
```

- PRIMERGY RX300



Note

You must configure the crash dump settings for PRIMERGY RX300 after "Initializing the configuration file for the diskdump".

Add ":agent=SA_user,timeout=20" after each "CFNameX,weight=weight,admIP=myadmIP" in /etc/opt/SMAW/SMAWsf/rcsd.cfg on all the nodes.

Example)

```
node1,weight=1,admIP=10.20.30.100:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
node2,weight=1,admIP=10.20.30.101:agent=SA_user,timeout=20:agent=SA_lkcd,timeout=20:agent=SA_rsb,timeout=20
```

- **Starting up the shutdown daemon**

Start or restart the shutdown daemon (rcsd) on all the nodes.

If rcsd has not yet been started, execute `sdtool -b`. If rcsd is active, stop rcsd by using `sdtool -e` and then execute `sdtool -b`. Use `sdtool -s` to confirm whether rcsd is activated.

```
# sdtool -b
```

or,

```
# sdtool -e
```

```
# sdtool -b
```

5.1.3 Initial Setup of the Cluster Resource Management Facility

This section explains how to set up the resource database that the cluster resource management facility (CRM) manages.

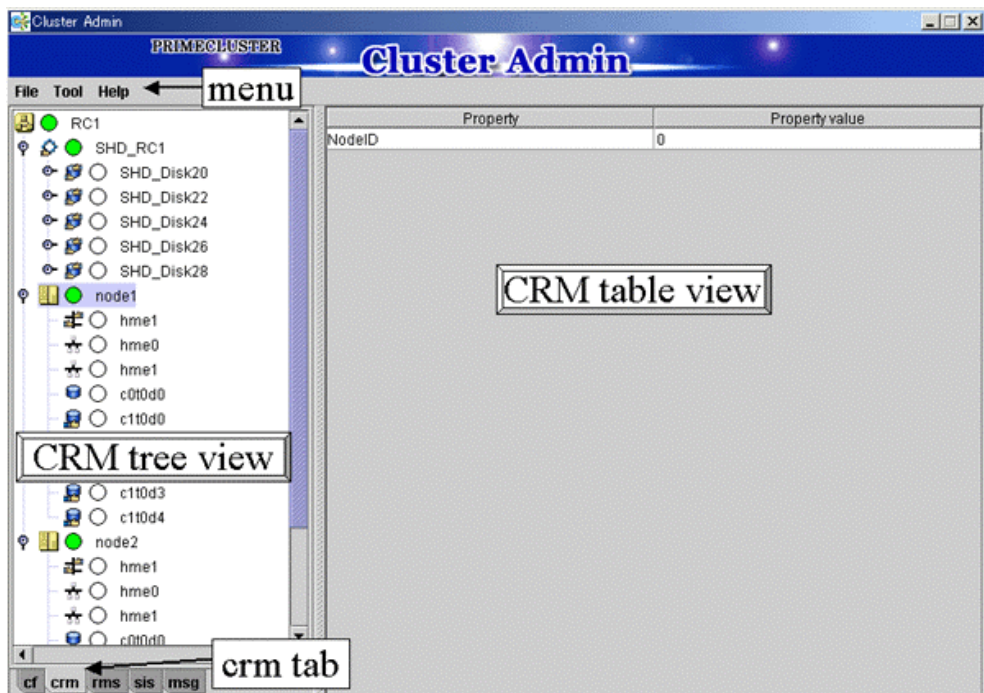
Set up the CRM resource database according to the following procedure:

1. Initial setup
 - Set up the resource database that CRM manages.
2. Registering Hardware Devices
 - Register the connected hardware devices (shared disks and network interface cards) to the resource database that CRM manages.

Set up the CRM resource database from the CRM main window. Use the CRM main window as follows:

◆ **Operation Procedure:**

1. Select *PRIMECLUSTER -> Global Cluster Services -> Cluster Admin* in the *Web-Based Admin View* operation menu.
2. When the "Cluster Admin" screen is displayed, select the *crm* tab.



The areas shown in the screen are described below.

Menu bar

This area displays the menu. See 7.1.2.1.3 "Operations."

CRM tree view

This area displays the resources registered to CRM. The resources are displayed in a tree structure.

For details on the colors and status of the icons displayed in the tree, see 7.1.2.1 "Displayed Resource Types."

CRM table view

This area displays attribute information for the resource selected in the CRM tree view. For information on the displayed information, see 7.1.2.2 "Detailed Resource Information."

5.1.3.1 Initial Configuration Setup

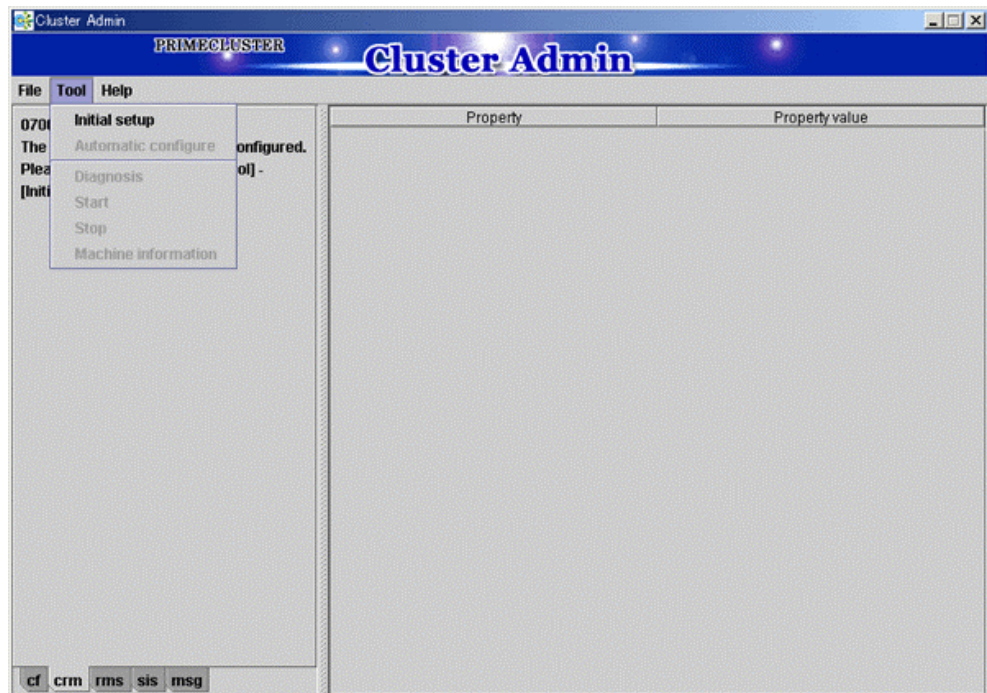
Set up the resource database that CRM manages.

When setting up the initial configuration, make sure that all nodes in the cluster have been started and that CF configuration is completed.

◆ **Operation Procedure:**

1. Select the *Initial setup* in the *Tool* menu.

Screen for cluster resource management facility

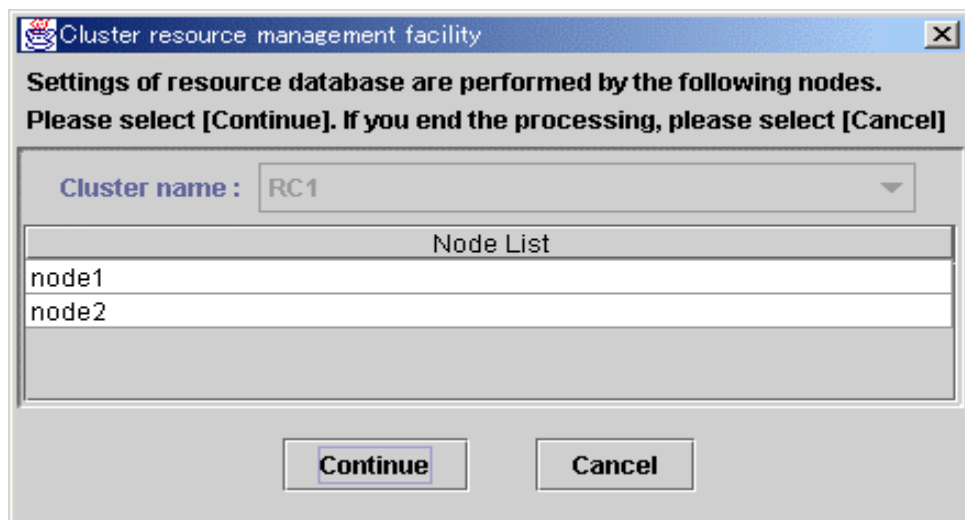


Note

The *Initial setup* can be selected only if the resource database has not been set.

2. The screen for initial setup is displayed.

Screen for initial setup



Cluster name

This area displays the names of the clusters that make up the resource database. The cluster names displayed here were defined during CF configuration.

Node List

This area displays the list of the nodes that make up the resource database.

**Note**

Check that the nodes that were configured in the cluster built with CF and the nodes displayed here are the same.

If the nodes do not match, check the following:

- Whether all nodes displayed by selecting the *cf* tab in the Cluster Admin screen are Up.
- Whether Web-Based Admin View is operating in all nodes.
For instructions on checking this, see 4.3.3.2 "Confirming Web-Based Admin View Startup."

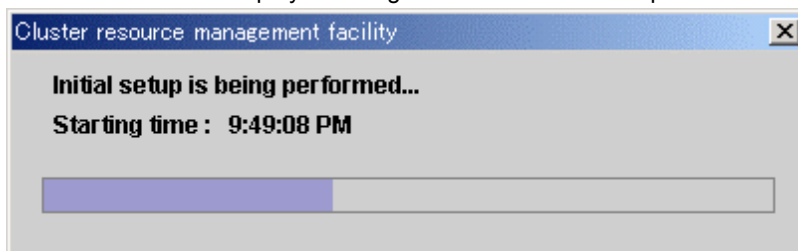
Continue button

Click this button to set up the resource database for the displayed cluster. Initial setup is executed on all nodes displayed in the Node list.

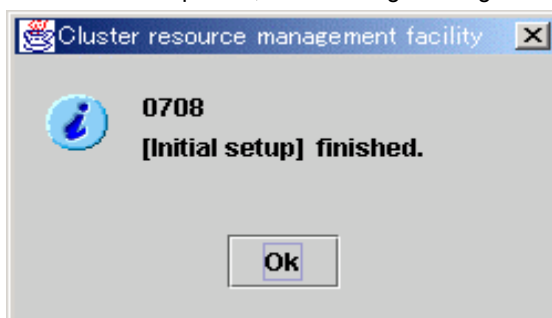
Cancel button

Click this button to cancel processing and exit the screen.

3. Check the displayed contents, and click the *Continue* to start initial setup.
4. The screen below is displayed during execution of initial setup.



5. When initial setup ends, the following message is displayed.

**Note**

- If a message appears during operation at the CRM main window, or if a message dialog box entitled "Cluster resource management facility" appears, refer to the following:
 - "PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide"
 - "10.10 Resource Database messages"
 - Appendix D in this manual
 - D.5.2 "Failed Resource and Operator Intervention Messages (GUI)"

- If you want to add, delete, or rename a disk class from the *Global Disk Services* screen after executing Initial Setup from the CRM main window, close the *Cluster Admin* screen.

5.1.3.2 Registering Hardware Devices

The automatic configure process registers the connected hardware devices (shared disks and network interface cards) to the resource database.

◆ Operation Procedure:

1. Registering the network interface card

- 1) Confirm that all nodes have been started in multi-user mode.
- 2) Log in to any of nodes using system administrator access privileges and execute the "clautoconfig" command. Then, the network interface is automatically recognized and registered in the resource database.

```
#/etc/opt/FJSVcluster/bin/clautoconfig -r -n [RETURN]
```

For details on this command, see the manual pages of "clautoconfig".



Note

- Do not execute the "clautoconfig" command on the node in which the "clautoconfig" command is being executed or on any other node while the "clautoconfig" command is being executed. If you execute it, a shared disk device cannot be registered correctly. If you have executed it, execute the following operation on all the nodes that constitute the cluster system to re-execute "Initial Setup of the Cluster Resource Management" described in this chapter:
 - 1- Reset the resource database using the "clinitreset" command. For details on this command, see the manual pages of "clinitreset".
 - 2- Reboot the node.
- Only an active network interface card is automatically detected. Confirm the state of the network interface card using the "ifconfig(8)" command.

2. Registering a shared disk

When you use GDS, register a shared disk in the resource database using the following steps on any one of the nodes of the cluster system. For details on the procedure, see "Appendix H" in the *"PRIMECLUSTER Global Disk Services Configuration and Administration Guide ."*

- 1) Log in any one of the nodes of the cluster system using system administrator access privileges.
- 2) Create a shared disk configuration file in the following format. The configuration file defines settings of a shared disk connected to all the nodes of the cluster system. Create a shared disk definition file with an arbitrary name.

```
<Resource key name> <device name> <node identifier>
<Resource key name> <device name> <node identifier>
:
```

- Define "resource key name device name node identifier" for each shared disk in one row.
- "resource key name", "device name", and "node identifier" are delimited by a single space.

Set up resource key name, device name and node identifier as follows;

Resource key name

Specify a resource key name that indicates the sharing relationship for each shared disk. You need to specify the same name for each disk shared between nodes. The resource key name should be specified in the "shd number" format. "shd" is a fixed string. For "number", you can specify any four-digit numbers. If multiple shared disks are used, specify unique numbers for each shared disk.

(Example) When /dev/sdb and /dev/sdc are shared between nodes

```
Resource key name of /dev/sdb: shd0001
```

```
Resource key name of /dev/sdc: shd0002
```

Device name

Specify a device name of the shared disk in the "/dev/device" format.

(Example) In the case of /dev/sdb

```
/dev/sdb
```

Node identifier

Specify a node identifier for which a shared disk device is available. Confirm the node identifier by executing the "clgettree" command. For details on this command, see the manual pages of "clgettree".

(Example) node1 and node2 are node identifiers in the following case:

```
# /etc/opt/FJSVcluster/bin/clgettree
```

```
Cluster 1 cluster
```

```
Domain 2 PRIME
```

```
Shared 7 SHD_PRIME
```

```
Node 3 node1 ON
```

```
Node 5 node2 ON
```

The following example shows the configuration file of the shared disk when shared disks /dev/sdb and /dev/sdc are shared between node1 and node2.

```
shd0001 /dev/sdb node1
shd0001 /dev/sdb node2
shd0002 /dev/sdc node1
shd0002 /dev/sdc node2
```

- 3) Execute the "clautoconfig" command to register the settings of the shared disk device that is stored in the configuration file in the resource database.

Specify the "clautoconfig" command in the following format:

(Format)

```
/etc/opt/FJSVcluster/bin/clautoconfig -f [full path of the shared disk definition file]
```

(Example)

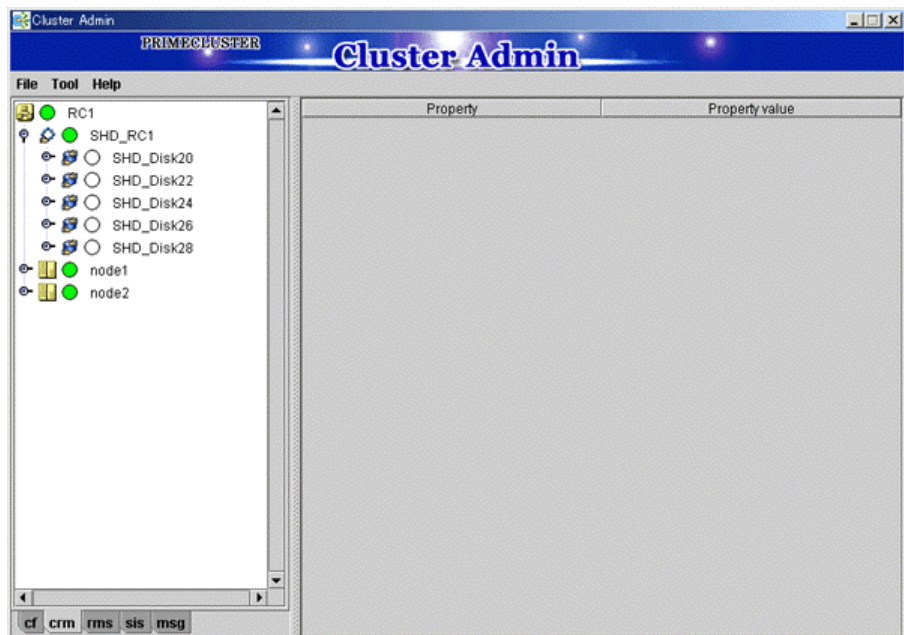
```
# /etc/opt/FJSVcluster/bin/clautoconfig -f /var/tmp/diskfile
```

**Note**

If the "clautoconfig" command ends abnormally, take corrective action according to the error message. For details on the messages of this command, see the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*." This command does not check whether the shared disk defined in the configuration file is physically connected. If you found an error in the shared disk configuration file after executing the

“clautoconfig” command, reset the resource database by executing the “clinitreset” command and reboot the node.

- 4) When the initial setup and automatic configure are completed, the following screen appears.



- 5) When automatic configuration is completed, go to the CRM main window and confirm that the resource registration is completed by checking the following.
 - Whether the disk configuration is different among the nodes.
 - Whether the number of disks in each node differs from the number of shared disk units.
 - Whether the number of shared disk unit resources is less than the actual device configuration.
 - Whether any disks other than shared disk unit are registered as shared disk unit.
 - Whether the number of public LAN resources is less than the actual device configuration.

If the actual device configuration and the resources do not match each other as described above, automatic detection may have been disabled because of one of the following causes:

- There is a connection path failure between a host device and a disk array unit.
- A disk array unit is not ready.
- A network adapter failed.
- A network adapter driver failed.

If the resources are not registered correctly, first review the above causes.



Note

- If a message is displayed in the CRM main window during operation or a message is displayed in the message dialog box entitled "Cluster resource management facility," see the following manuals for details:
 - "PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide"

- "10.10 Resource Database messages"
 - Appendix D in this manual
 - D.5.2 "Failed Resource and Operator Intervention Messages (GUI)"
- If you want to add, delete, or rename a disk class from the *Global Disk Services* screen after executing automatic configuration from the CRM main window, close the *Cluster Admin* screen.

5.2 Setting Up Fault Resource Identification and Operator Intervention Request

The fault resource identification is a function that outputs a message to syslogd(8) and Cluster Admin and a history of failed resources to Resource Fault History if a failure occurs in a resource or node that is registered to a cluster application.

After setting the initial configuration of the resource database, specify the settings for enabling fault resource identification and operator intervention request. An example of a message displayed by fault resource identification is shown below.

```
6750 A resource failure occurred. SysNode:node1RMS
userApplication:app0 Resource:apl1
```

The operator intervention request function displays a query-format message to the operator if a failed resource or a node in which RMS has not been started is found when a cluster application is started. The messages for operator intervention requests are displayed to syslogd(8) and Cluster Admin.

```
1421 userApplication "app0" was not started automatically because all
SysNodes that make up userApplication were not started within the
prescribed time.
Forcibly start userApplication in SysNode "node1RMS"? (no/yes)
Message number: 1001
Warning: When userApplication is forcibly started, the safety check
becomes disabled.
If the operation is used incorrectly, data may be damaged and the
consistency may be lost.
Check that userApplication to be forcibly started is not online in the
cluster before executing the forced startup.
```



See

For details on the messages displayed by the fault resource identification function and the messages displayed by the operator intervention request function, see D.5.2 "Failed Resource and Operator Intervention Messages (GUI)" and D.4 "Operator Intervention Messages."

This section describes procedures for operating fault resource identification and operator intervention request.



Note

- After PRIMECLUSTER is installed, fault resource identification and operator intervention request are initially disabled. The following Cluster Admin functions are also disabled:
 - Messages for fault resource identification and operator intervention request are not displayed to Cluster Admin.
 - The list of resources that are currently affected by faults is not displayed in the Resource Fault History screen of Cluster Admin.

- The fault history of the resources is not displayed in the Resource Fault History screen of Cluster Admin.
- To view the manual pages of each command, add "/etc/opt/FJSVcluster/man" to the MANPATH variable.

■ Preparation prior to displaying fault resource identification and operator intervention request messages

The fault resource identification and operator intervention request messages are displayed by using `syslogd(8)`. `daemon.err` is specified to determine the priority (facility.level) of the fault resource identification and operator intervention request messages. For details on the priority, see the manual page describing `syslog.conf(5)`. The procedure for displaying the fault resource identification and operator intervention request messages on the console is explained below. Execute the following procedure on all the nodes.

◆ Procedure:

1. Log in the node using system administrator access privileges.
2. Check the setting of `syslogd` in `/etc/syslog.conf` to see that `daemon.err` is set to be displayed on the console. For further details on `/etc/syslog.conf`, see the manual pages of `syslog.conf(5)`.

(Example) `Daemon.err` is set to be displayed on the console.

```
daemon.err      /dev/console
```

If `daemon.err` is not set to be displayed on the console, change the setting of `syslogd` in `/etc/syslog.conf`. To enable this change, send the `SIGHUP` signal to `syslogd`. Execute the following command to let `syslogd` reread the definition file.

```
# kill -SIGHUP `cat /var/run/syslogd.pid`
```

3. Starting the console.

Start the console.

(Example)

```
# kterm -C
```



Note

If a Japanese-language system is being used, use a console that supports Japanese.

By setting the operator intervention request messages, messages other than the operator intervention request messages will be displayed on the console. If a console that does not support Japanese is used, Japanese messages will not be displayed.

■ Enabling the operation of fault resource identification and operator intervention request

1. Execute the "`clsetparam`" command and specify the settings for enabling the fault resource identification and operator intervention request. Execute this procedure in any node that is part of the cluster system.

```
# /etc/opt/FJSVcluster/bin/clsetparam -p AppWatch ON
```

2. Execute the "`clsetparam`" command, and check that the parameters are set so that the operation of fault resource identification and operator intervention request is enabled. Execute this procedure on any node that is part of the cluster system.

```
# /etc/opt/FJSVcluster/bin/clsetparam -p AppWatch  
ON
```

3. Restart all the operating nodes.

If a node is stopped, the fault resource identification and operator intervention request begin operating in that node from the next node reboot.

■ **Disabling the operation of fault resource identification and operator intervention request**

To cancel the setting previously made for “Enabling the operation of fault resource identification and operator intervention request,” perform the following procedure:

1. Execute the “clsetparam” command and specify the settings for disabling the fault resource identification and operator intervention request. Execute this procedure in any node that is part of the cluster system.

```
# /etc/opt/FJSVcluster/bin/clsetparam -p AppWatch OFF
```

2. Execute the “clsetparam” command, and check that the parameters are set so that the operation of fault resource identification and operator intervention request is disabled. Execute this procedure on any node that is part of the cluster system.

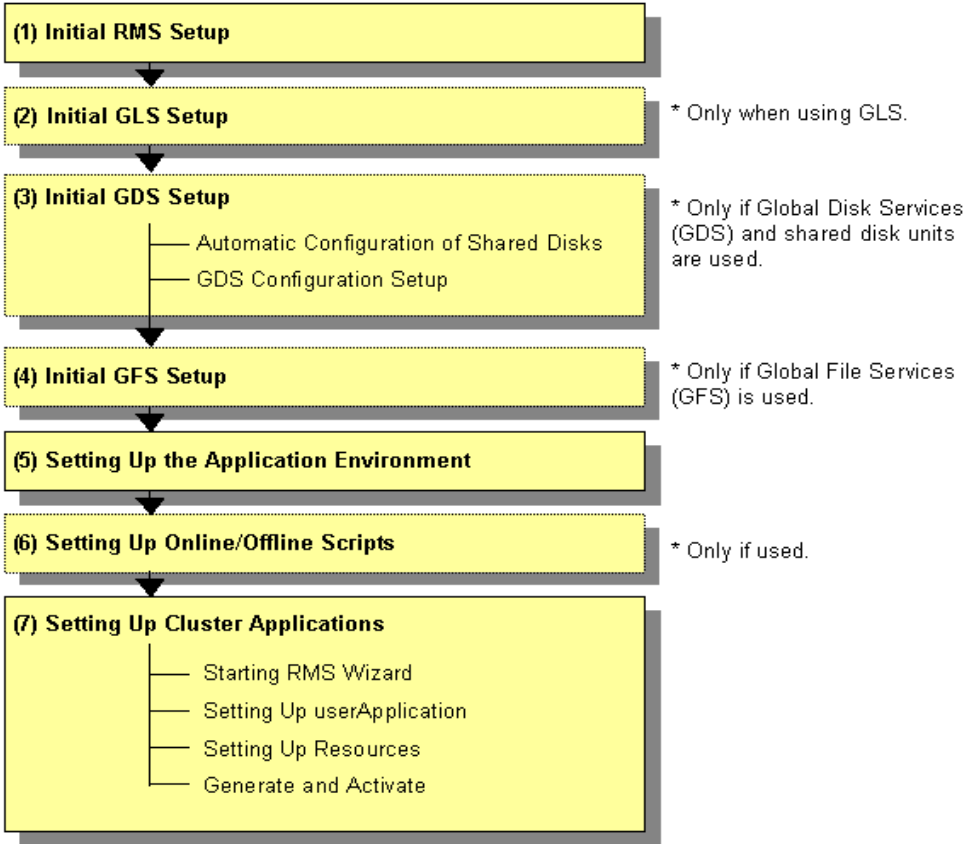
```
# /etc/opt/FJSVcluster/bin/clsetparam -p AppWatch  
OFF
```

3. Restart all the operating nodes.

If a node is stopped, the fault resource identification and operator intervention request stop operating in that node from the next node reboot.

Chapter 6 Building Cluster Applications

The procedure for building a cluster application is shown below.



Application building procedure and manual reference locations

	Work item	Execution Nodes	Required/ optional	Manual reference location*
(1)	6.1 Initial RMS Setup	All nodes	Required	-
(2)	6.2 Initial GLS Setup	All nodes	Optional (Required when the GLS redundant line control function is used)	GLSR
(3)	6.3.1 Automatic Configuration of Shared Disks	All nodes	Optional (required when GDS is used)	GDSG "Appendix H Preparations"
	6.3.2 GDS Configuration Setup	All nodes	Optional (required when GDS is used)	GDSG "Chapter 5 Operations"
(4)	6.4 Initial GFS Setup	All nodes	Optional (required when GFS is used)	GFSG
(5)	6.5 Setting Up the Application Environment	All nodes	Required	Manuals for each application
(6)	6.6 Setting up Online/Offline Scripts	All nodes	Optional	RMS "2.9 Environment variables", "14 Appendix – Environment Variables"
(7)	6.7.1 Starting RMS Wizard	All nodes	Required	-
	6.7.2 Setting Up userApplication			
	6.7.3 Setting Up Resources			
	6.7.4 Generate and Activate			

* The names of the reference PRIMECLUSTER manuals are abbreviated as follows:

- **RMS:** *PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*
- **GDSG:** *PRIMECLUSTER Global Disk Services Configuration and Administration Guide (Linux)*
- **GFSG:** *PRIMECLUSTER Global File Services Configuration and Administration Guide (Linux)*
- **GLSR:** *PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function*

6.1 Initial RMS Setup

When RMS is to be used, you must first check the A.8.1 "RMS Setup Worksheet" and change the following environment variable as required:

- Automatic startup of RMS (HV_RCSTART)

In this version, "Does not start up automatically" is set as default.

If you want to set RMS to be started automatically along with node startup, select "Start up automatically."

When RMS is to be used, we recommend that you set "Start up automatically."



[See](#)

For information on how to check and change the environment variables of RMS automatic startup, see "5.4.2 Starting RMS automatically at boot time" in *"PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."*

6.2 Initial GLS Setup

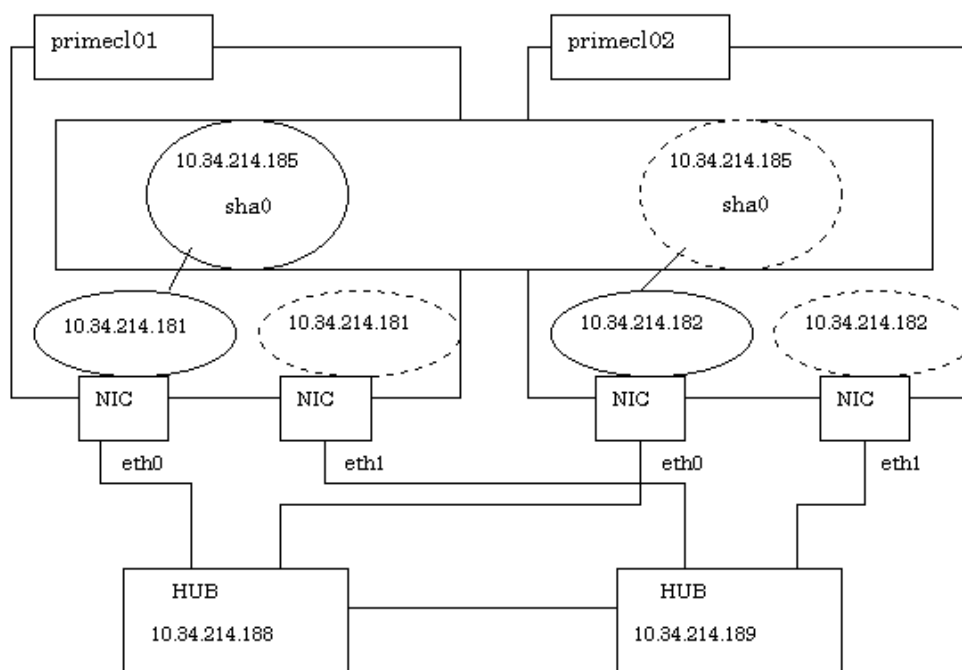
This section outlines the steps for configuring Global Link Services (GLS).

6.2.1 GLS Setup

For information on the initial GLS setup, see "Chapter 5 Operation on Cluster System" in the *"PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function."*

This section describes how to set up "the Single system without NIC sharing of the NIC switching mode (IPv4)" that GLS (redundant line control function) provides. This procedure is described in the example below.

The setup values correspond to those on the A.8.3 "GLS Setup Worksheet."



◆ Operation Procedure:

● If the OPERATING node is [HOST-primecl01]

1. Setting up the system

1) Define the IP address and Host name in /etc/hosts file.

```
10.34.214.185 takeoverIP # Virtual IP
10.34.214.181 primecl01 # primecl01 Physical IP
10.34.214.182 primecl02 # primecl02 Physical IP
10.34.214.188 swhub1 # primary HUB IP
10.34.214.189 swhub2 # secondary HUB IP
```

2) Configure /etc/sysconfig/network-scripts/ifcfg-ethX (X is 0,1) file as follows.

Contents of /etc/sysconfig/network-scripts/ifcfg-eth0

```

DEVICE=eth0
BOOTPROTO=static
BROADCAST=10.34.214.255
IPADDR=10.34.214.181
NETMASK=255.255.255.0
NETWORK=10.34.214.0
ONBOOT=yes
TYPE=Ethernet

```

Contents of /etc/sysconfig/network-scripts/ifcfg-eth1

```

DEVICE=eth1
ONBOOT=no
TYPE=Ethernet

```

- 3) On the /etc/sysconfig/network file, define a statement which enables the network configuration.

```

NETWORKING=yes
NETWORKING_IPV6=no

```

2. Rebooting

Run the following command and reboot the system. After rebooting the system, verify eth0 is enabled using "ifconfig" command.

```
# /sbin/shutdown -r now
```

3. Setting a subnet mask

For the underlined parameter, specify the network address and the subnet mask of the virtual interface.

```
# /opt/FJSVhanet/usr/sbin/hanetmask create -i 10.34.214.0 -m 255.255.255.0
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetmask print
```



Note

For details on the subnet mask value, see "hanetmask command" in the "PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function."

4. Creating of virtual interface

For the underlined parameter, specify the physical IP address of the node.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig create -n sha0 -m d -i 10.34.214.185 -e 10.34.214.181 -t eth0,eth1
```

Check that the virtual interface has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig print
```

5. Setting up the HUB monitoring function

For the underlined parameter, specify the IP addresses of the hubs to be monitored.

```
# /opt/FJSVhanet/usr/sbin/hanetpoll create -n sha0 -p 10.34.214.188,10.34.214.189 -b off
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetpoll print
```

6. Setting up the Standby patrol monitoring function

```
# /opt/FJSVhanet/usr/sbin/hanetconfig create -n sha1 -m p -t sha0
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig print
```

7. Creating of the takeover IP address (takeover virtual Interface)

```
# /opt/FJSVhanet/usr/sbin/hanethvrsc create -n sha0
```

Check that the registration has been done correctly.

```
# /opt/FJSVhanet/usr/sbin/hanethvrsc print
```

- **If the STANDBY node is [HOST-primecl02]**

1. Setting up the system

- 1) Define the IP address and Host name in /etc/hosts file. Defined content is same as HOST-primecl01.

- 2) Configure /etc/sysconfig/network-scripts/ifcfg-ethX (X is 0,1) file as follows.

Contents of /etc/sysconfig/network-scripts/ifcfg-eth0

```
DEVICE=eth0
BOOTPROTO=static
BROADCAST=10.34.214.255
IPADDR=10.34.214.182
NETMASK=255.255.255.0
NETWORK=10.34.214.0
ONBOOT=yes
TYPE=Ethernet
```

Contents of /etc/sysconfig/network-scripts/ifcfg-eth1

```
DEVICE=eth1
ONBOOT=no
TYPE=Ethernet
```

- 3) On the /etc/sysconfig/network file, define a statement which enables the network configuration.

```
NETWORKING=yes
NETWORKING_IPV6=no
```

2. Rebooting

Run the following command and reboot the system. After rebooting the system, verify eth0 is enabled using "ifconfig" command.

```
# /sbin/shutdown -r now
```

3. Setting a subnet mask

For the underlined parameter, specify the network address and the subnet mask of the virtual interface.

```
# /opt/FJSVhanet/usr/sbin/hanetmask create -i 10.34.214.0 -m 255.255.255.0
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetmask print
```

**Note**

For details on the subnet mask value, see “hanetmask command” in the “*PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function.*”

4. Creating of virtual interface

For the underlined parameter, specify the physical IP address of the node.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig create -n sha0 -m d -i
10.34.214.185 -e 10.34.214.182 -t eth0,eth1
```

Check that the virtual interface has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig print
```

5. Setting up the HUB monitoring function

In the underlined parameter, specify the IP addresses of the hubs to be monitored.

```
# /opt/FJSVhanet/usr/sbin/hanetpoll create -n sha0 -p
10.34.214.188,10.34.214.189 -b off
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetpoll print
```

6. Setting up the Standby patrol monitoring function

```
# /opt/FJSVhanet/usr/sbin/hanetconfig create -n sha1 -m p -t sha0
```

Check that the facility has been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanetconfig print
```

7. Creating of the takeover IP address (takeover virtual Interface)

```
# /opt/FJSVhanet/usr/sbin/hanethvrsc create -n sha0
```

Check that the resources have been set up correctly.

```
# /opt/FJSVhanet/usr/sbin/hanethvrsc print
```

◆ Post-setup processing

After the OPERATING and STANDBY node setup is done, create the Gls resources and register them to the cluster application.

For details, see 6.7.3.4 "Setting Up Gls Resources" and 6.7 "Setting Up Cluster Applications."

You also need to reboot the system after registering the cluster application. Then, start RMS and check the RMS tree to confirm whether the Gls resources are displayed correctly. For details, see 7.1.3.1 "RMS Tree."

The Gls resource name is displayed as GlsX (X is integer).

**See**

For information on GLS (redundant line control function) and other operation modes, see "Appendix B Examples of Setting Up" in the "*PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function.*"

6.2.2 Setting Up Web-Based Admin View When GLS Is Used

To use Web-Based Admin View in a network that was made redundant with GLS, you must set up Web-Based Admin View after setting up the NIC switching mode or the Fast switching mode.



See

For setup details, see "2.3 Setup with GLS" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

6.3 Initial GDS Setup

Take the following steps to configure Global Disk Services (GDS). If shared disk units are to be used, you need to use GDS to manage the shared disk units.

6.3.1 Automatic Configuration of Shared Disks

Before setting up GDS, you must have configured the shared disks using automatic configuration. If the disk units were already configured with automatic configuration in 5.1.3.2 "Registering Hardware Devices", skip this operation.



Note

If disk units are not set up for automatic configuration during the initial setup or if a shared disk unit was added after the initial configuration setup, execute automatic configuration of disk units before the GDS setup.

6.3.2 GDS Configuration Setup

The GDS setup operations are described below.

- 6.3.2.1 "Setting Up Shared Disks"
Set up the shared disk volumes.

6.3.2.1 Setting Up Shared Disks

Set up the shared disk as described below:

- **When the GFS Shared File System is to be used**
 - 1) Execute "Volume setup."
 - 2) Go to 6.4 "Initial GFS Setup."
- **When the ext3 file system is to be used**
 - 1) Execute "Volume setup."
 - 2) Execute "File system setup."
- **When the file system is not to be used**
 - 1) Execute "Volume setup."
 - 2) For use as a RAW device, make the settings according to the manual pages related to the "raw(8)" command and rawdevices.



Note

"When the GFS Shared File System is to be used" and "When the file system is not to be used," "File system setup" is not necessary.

■ Volume setup

There are four types of volumes:

- a. Single volume
- b. Mirror volume
- c. Stripe volume
- d. Volume created in a concatenation group

This section separately describes the volume setup procedures for a single volume (a) and for other volumes (b, c, d). For details, see "Chapter 5 Operations" in the "PRIMECLUSTER Global Disk

Services Configuration and Administration Guide.

The values to be set for the individual items correspond to the values in the "GDS Configuration Worksheet" of A.9.1 "Shared Disk Setup Worksheet."



Note

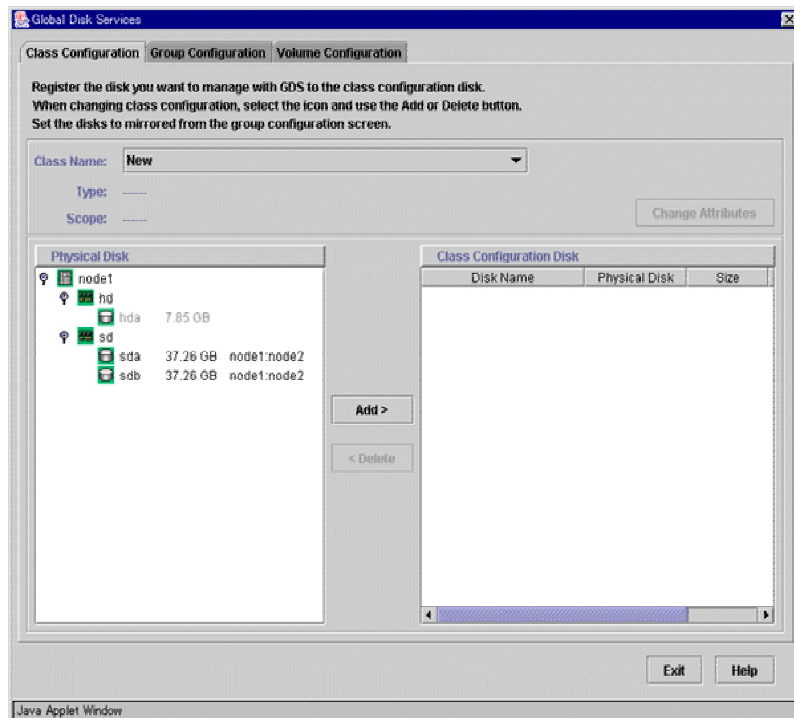
If you plan to add, delete, or rename a disk class from the GDS Management screen (hereinafter main screen), close the Cluster Admin screen before starting the operation.

◆ **Single volume setup**

If you are not using a single volume, this setup is unnecessary.

◆ **Operation Procedure:**

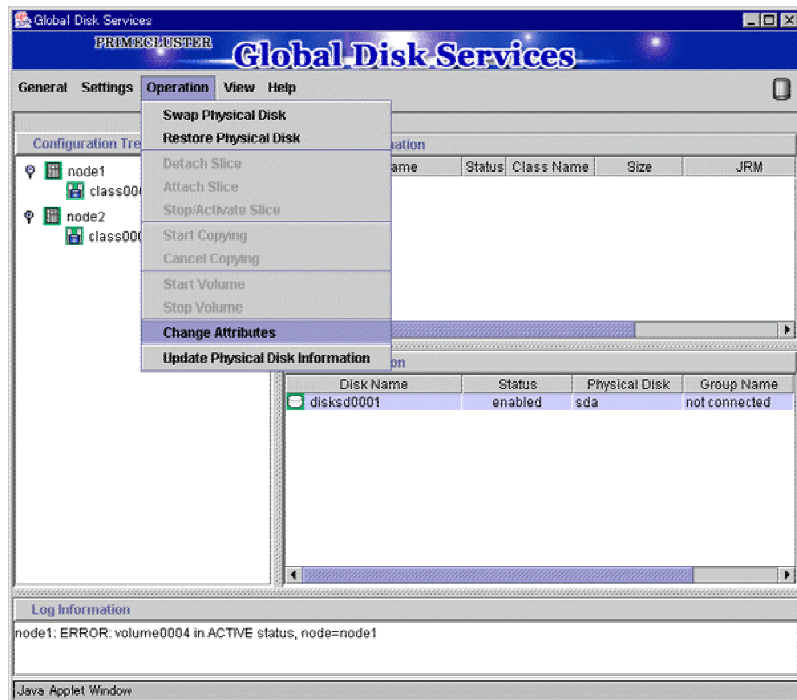
1. Start the main screen.
Choose *Global Disk Services* on the Web-Based Admin screen.
2. Disk class creation and physical disk registration
At the main screen, select *Class Configuration* from the *Settings* menu.



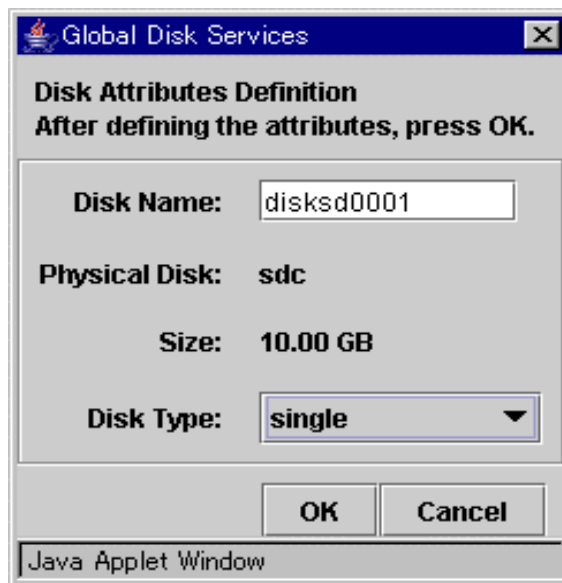
At the above screen, select the physical disk to be registered from the *Physical Disk* list, and then click *Add*. When *Add* is clicked, the Class Attributes Definition screen opens. Enter the *Class Name* but do not change the *Type* value (leave the value as "shared").

3. Disk type attribute setup

At the main screen, select the disk that was registered in Step 1 from the Disk Information field, and select *Operation -> Change Attributes* from the menu bar.



Set *Disk Type* to "single," and then click *OK*.

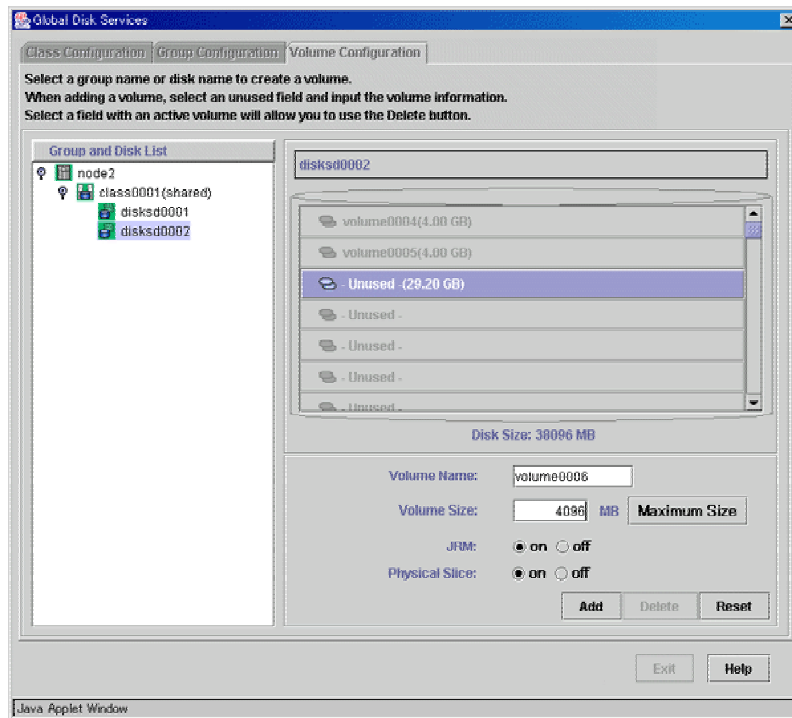


4. Volume creation

Select *Settings* -> *Volume Configuration*, and then select the disk that was registered in Step 1 from the *Group and Disk List*. Select "Unused" in the volume diagram, and enter the *Volume Name*, the *Volume Size*, and the volume attributes.

Click *Add* to enable the settings.

Check the settings, and then click *Exit*.



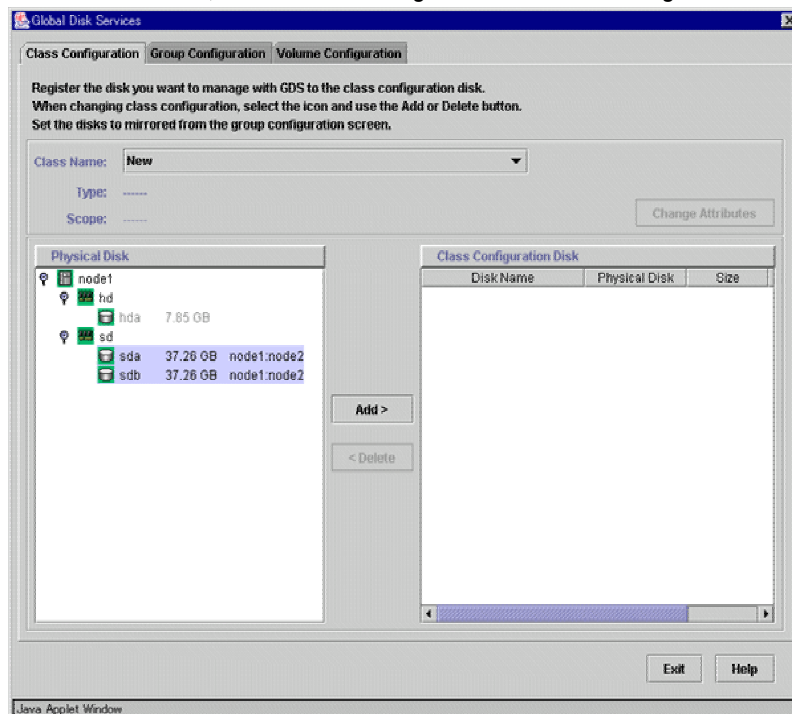
◆ **Setup for other volumes**

If you are using only "single" volumes, this setup is unnecessary.

◆ **Operation Procedure:**

1. Creating a disk class and registering physical disks

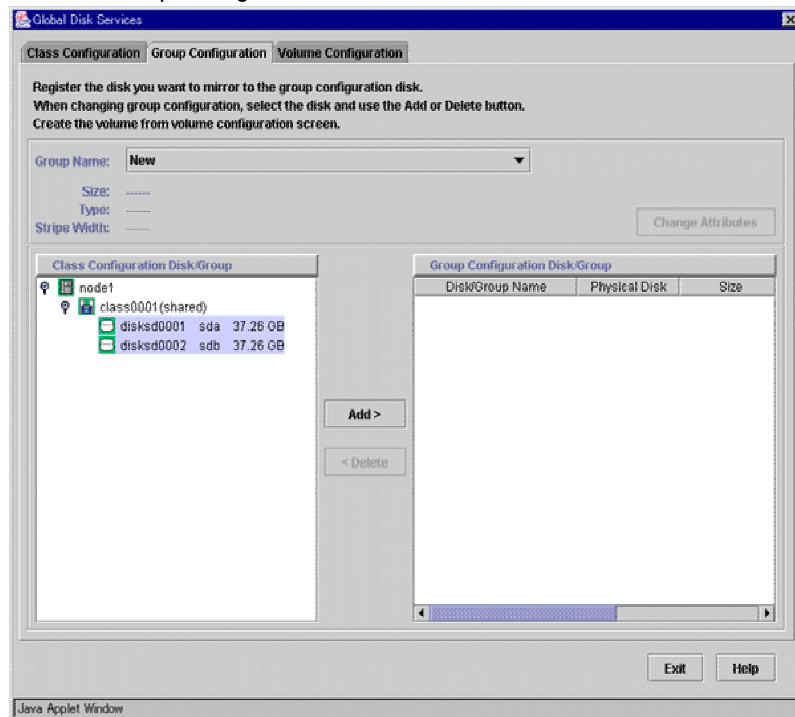
At the main screen, select *Class Configuration* from the *Settings* menu.



At the above screen, select the physical disks to be registered from the *Physical Disk* list, and then click *Add*. When *Add* is clicked, the *Class Attributes Definition* screen opens. Enter the *Class Name* but do not change the *Type* value (leave the value as "shared"). Then click *Exit*.

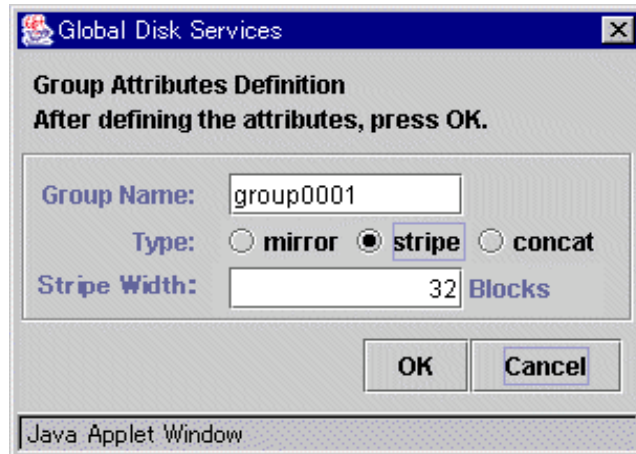
2. Setting up the disk group configuration

Click the *Group Configuration* tab.



At the above screen, select the disks to be added to the group from the *Class Configuration Disk/Group* list, and then click *Add*.

Enter the *Group Name* and *Type* in the Group Attributes Definition screen, and then click *OK*.

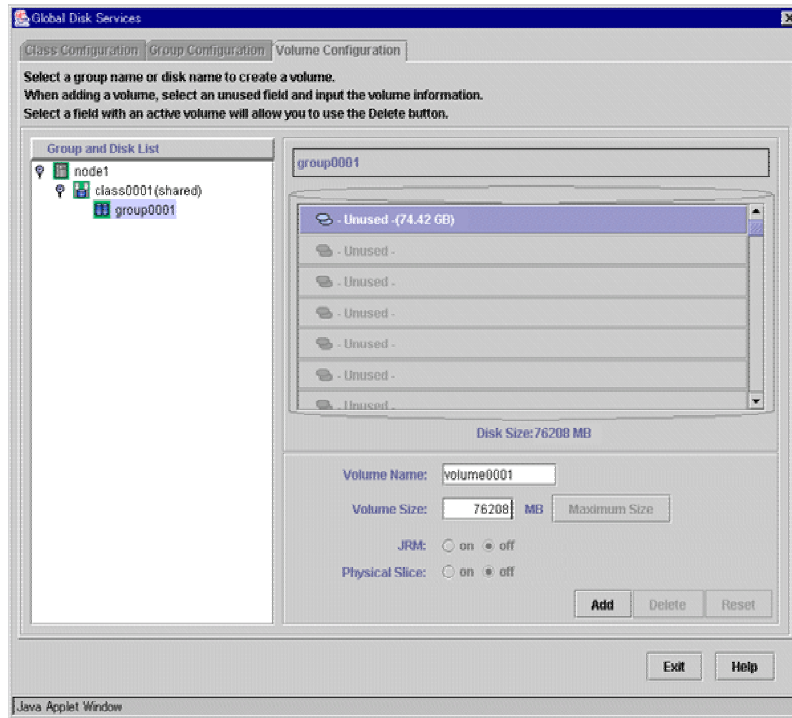


3. Creating a volume

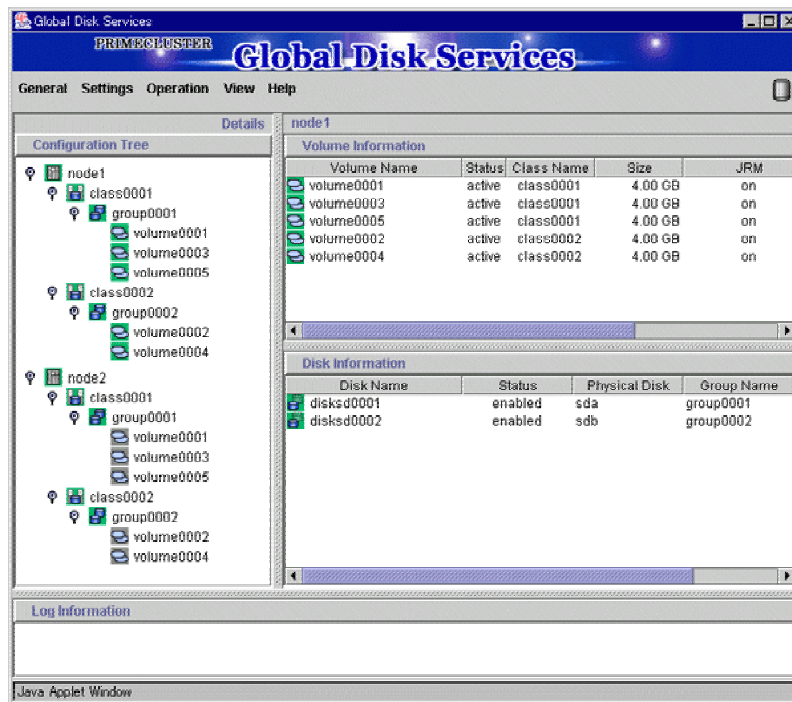
Click the *Volume Configuration* tab, and select the group that was created in Step 2 from the *Group and Disk List*. Select *Unused* in the volume diagram, and enter the *Volume Name*, the *Volume Size*, and the volume attributes.

Click *Add* to enable the settings.

Check the setup information, and then click *Exit*.



4. Checking the configuration
The disk configuration is displayed as shown below.



■ File system setup

You can set up a file system on the File System Configuration screen for the created volume. For Red Hat Enterprise Linux ES / AS, you can set up the “ext3” file system.

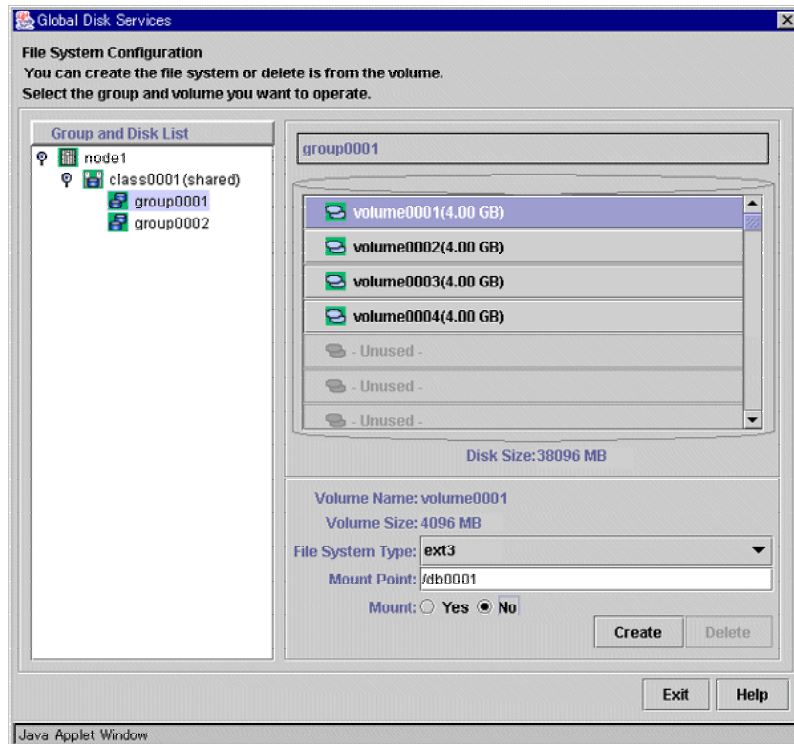


Note

If you set up a file system according to this procedure, an entry of the created file system is added to the “/etc/fstab” file. To use the created file system as an Fsystem resource, you must modify the entry that was added to the “/etc/fstab” file. For details, see 6.7.3.2 “Setting Up Fsystem Resources.”

◆ Operation Procedure:

1. At the main screen, select *File System Configuration* from the *Settings* menu, enter the “File System Type” of the volume and other information, and then click *Create*.



2. To exit the *File System Configuration*, click *Exit*.

6.4 Initial GFS Setup

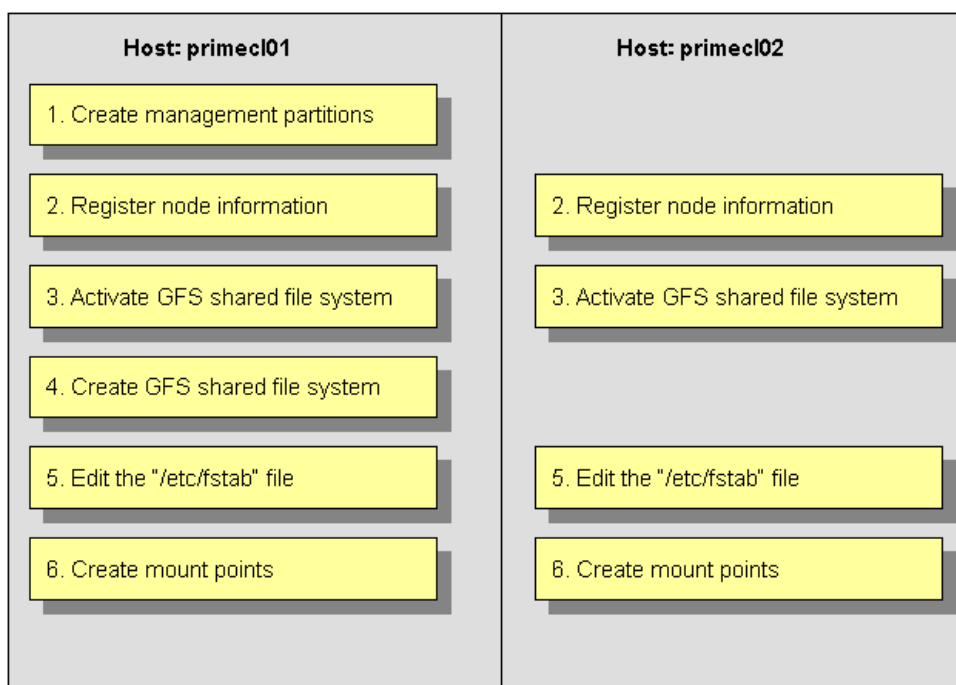
For a Global File Services (GFS) shared file system to be created on the Global Disk Services (GDS) volume, there must be a GDS volume and that volume must be active. If the volume is stopped, start the volume.



See

For information on the volume startup procedure, see "4.2.3 Operation" or "D.4 sdxvolume - Volume operations" in the *"PRIMECLUSTER Global Disk Services Configuration and Administration Guide."*

To use the GFS shared file system in RMS cluster operation, you need to set up GFS according to the flow below:



The device name and mount points that are specified here correspond to the values on the A.8.2 "GFS Shared File System Setup Worksheet."



Note

You need to prepare a management partition that is exclusive to the GFS shared file system. The GDS volume disk class is used for a switching file system and non-switching file system. For the management partition, non-switching file system must be allocated.

◆ **Operation Procedure:**

1. Create a management partition for the GFS shared file system on any one of the nodes.

```
# sfcsetup -c /dev/sfdsk/class0001/rdsk/GFSct1
```

2. Register the node information in the management partition on each node.

```
primecl01# sfcsetup -a /dev/sfdsk/class0001/rdsk/GFSct1
```

```
primecl02# sfcsetup -a /dev/sfdsk/class0001/rdsk/GFSct1
```

3. Activate the GFS shared file system on each node.

```
primecl01# sfcfrmstart
```

```
primecl02# sfcfrmstart
```



Note

If sfcfrmstart ends abnormally, confirm that sfcprmd is started with the "ps" command. If sfcprmd has not been started, execute the following command on the node on which sfcprmd is not started:

```
# service sfcfsrm start
```

4. Create a GFS shared file system on any one of the nodes.

```
# sfcmkfs -o node=primecl01,primecl02
/dev/sfdsk/class0002/dsk/volume0001
```

5. Add the mount information of the GFS shared file system to /etc/fstab on each node. Specify "noauto" in the "mount options" field of the mount information. Do not specify "noatrc" in the same field.

```
/dev/sfdsk/class0002/dsk/volume0001 /sfcfs1 sfcfs rw,noauto 0 0
```

6. Create a mount point on each node.

```
primecl01# mkdir /sfcfs1
```

```
primecl02# mkdir /sfcfs1
```



See

The operations described in procedures 4, 5, and 6 can be set up by using the GUI management view. For details, see 6.4.1 "File System Creation."

6.4.1 File System Creation

This section explains how to create a file system.

◆ Operation Procedure:

1. Start the GFS management view.
Choose Global File Services on the Web-Based Admin screen, select a node from the node list, and then display the main screen of Global File Services.
2. Set up shared information.
Select *Operation* -> *Create* and then open the “Create File System Wizard (1).”
Set up the node information that is to be shared within the file system and then mount the information using the “Create File System Wizard (1).”

	Node name	Host name	Primary MDS	Secondary MDS	MDS
<input checked="" type="checkbox"/>	primecl01	primecl01	Select	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	primecl02	primecl02	Select	<input type="checkbox"/>	<input checked="" type="checkbox"/>

MDS node: all nodes 2 nodes

Mount point: /sfcs1

Make directory: yes no

Buttons: Cancel, Reset, Next, Help

Selecting “Node name”

Select the node names to be shared with “Node Names.” You must select two nodes.

Note that the selection of the local node (displayed node) cannot be canceled.

Selecting a “Host name”

To select a host name other than that which is currently displayed, click the *Select* button and specify the host name of the LAN to be used on each node. Note that two or more host names cannot be specified.

Setting the “Primary MDS” and “Secondary MDS”

Specify the nodes that boot the management server of the shared file system in “Primary MDS” and “Secondary MDS.”

Setting the “Mount point” and “Make directory”

Specify the full path for the “Mount point.” if you select “yes” from “Make directory,” creates a directory with the following attributes:

- Owner: root
- Group: sys
- Access authority: 775

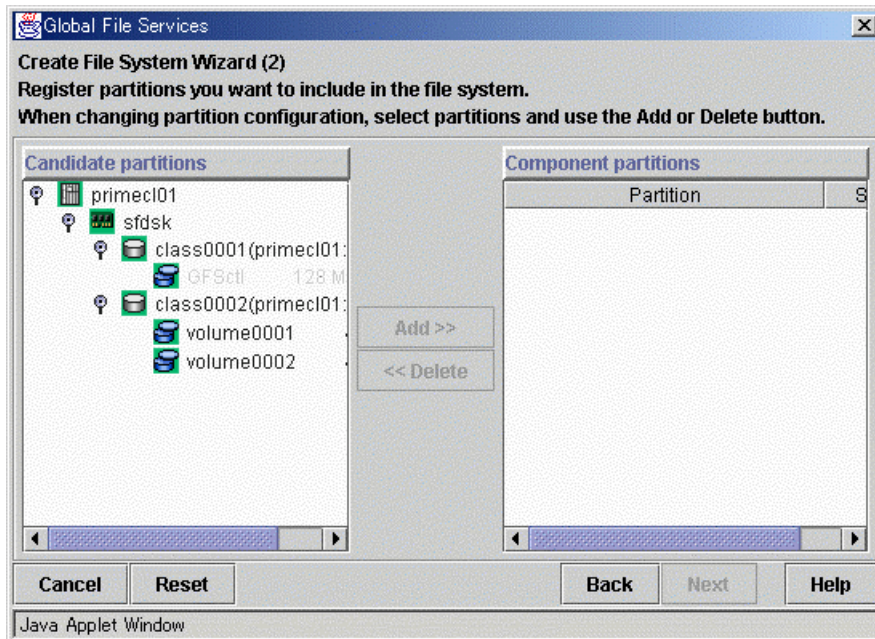
After setting or changing this information, click the *Next* button to open the “Create File System Wizard (2).”

To return each setup item to its default value, click the *Reset* button.

To stop the processing of the file system creation, click the *Cancel* button.

3. Select the configuration partition.

Using the “Create File System Wizard (2),” register the partition that is to be used as the file system.



Select the partition to be used from the [*Candidate partitions*] list and then click the *Add* button.

Only one partition can be selected at a time. A partition that is already being used as a file system or as a management partition cannot be selected.

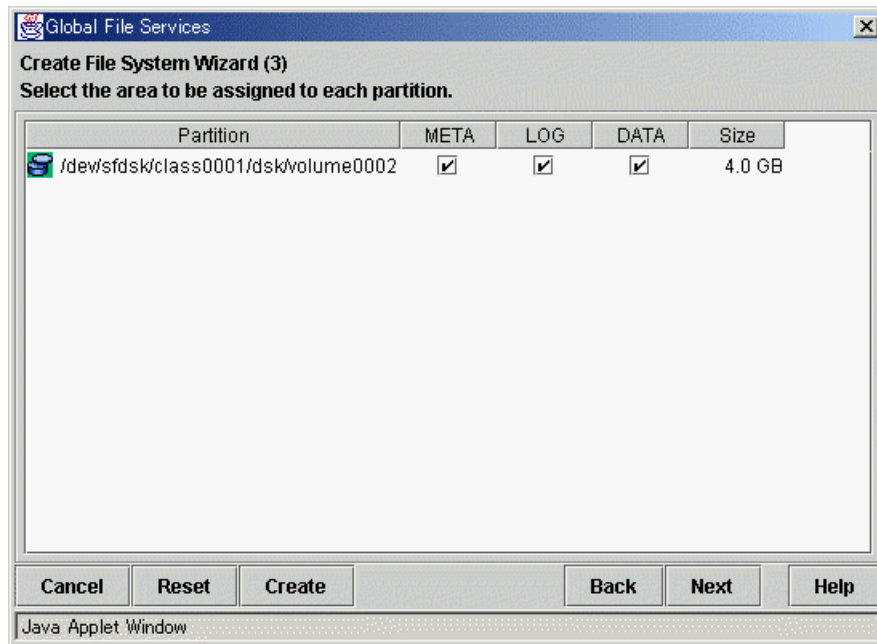
After the partition has been selected, click the *Next* button to open the “Create File System Wizard (3).”

To return to the “Create File System Wizard (1),” click the *Back* button.

To abandon file system creation, click the *Cancel* button.

4. Set up the partition information.

Using the “Create File System Wizard (3),” select the meta, log, and data areas that are to be allocated to each of the partitions selected with the “Create File System Wizard (2).” The partition to which the meta data area is allocated is used as the representative partition.



After setting the above information, click the *Next* button to open the “Create File System Wizard (4).”

No information can be set with the “Create File System Wizard (4).” Go to the “Create File System Wizard (5).”

To return each setup item to its default value, click the *Reset* button.

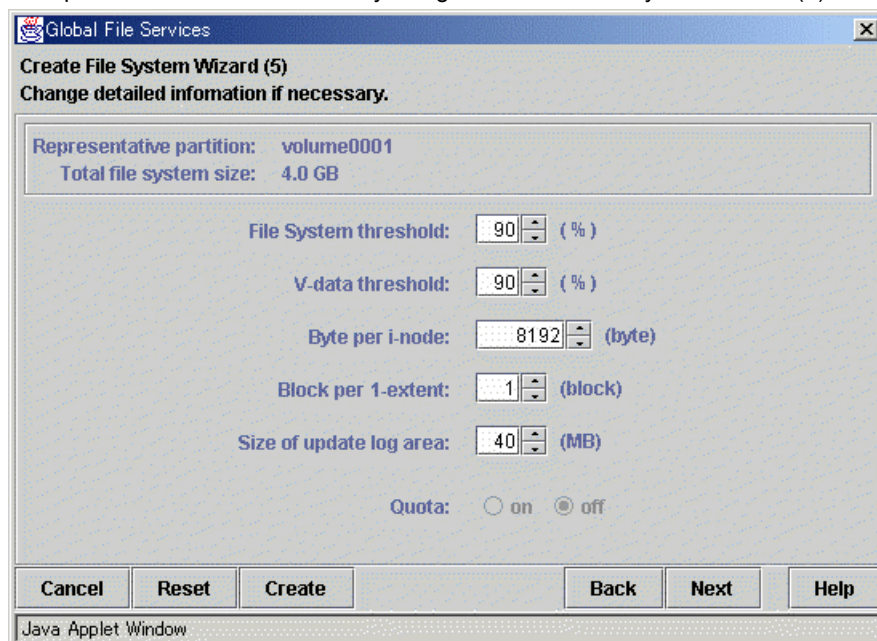
To return to “Create File System Wizard (2),” click the *Back* button.

To abandon file system creation, click the *Cancel* button.

To create the file system while leaving the default settings of the extended, detailed, and mount information as is, click the *Create* button.

- Set up the detailed information.

Set up the “Detailed information” by using the “Create File System Wizard (5).”



After setting the above information, click the *Next* button to open the “Create File System Wizard (6).”

To return each setup item to its default value, click the *Reset* button.

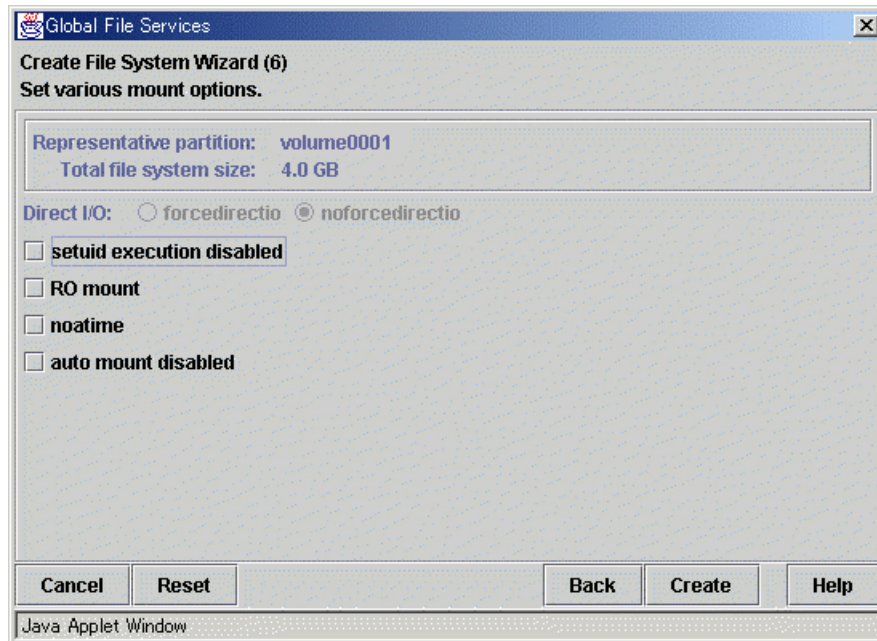
To return to the “Create File System Wizard (4),” click the *Back* button.

To abandon file system creation, click the *Cancel* button.

To create the file system while leaving the default setting of the mount information as is, click the *Create* button.

6. Set up the mount information.

Set up the “Mount information” by using the “Create File System Wizard (6).”



After setting the above information, click the *Create* button to create the file system. To return each setup item to its default value, click the *Reset* button.

To return to the “Create File System Wizard (5),” click the *Back* button.

To abandon file system creation, click the *Cancel* button.

6.5 Setting Up the Application Environment

Configure an environment for the applications to be used in the PRIMECLUSTER system.

The environment configuration for the individual applications may involve registering resources to the PRIMECLUSTER system.

There are also products that require you to set up an environment that uses the shared disk units and takeover networks that were set in this chapter.



[See](#)

See the manuals for the individual applications

6.6 Setting Up Online/Offline Scripts

Create Online and Offline scripts to start and stop ISV applications and user applications in line with the userApplication state transition.

Set the created scripts as Cmdline resources and set those resources in userApplication. For details, see 6.7.3.1 "Setting Up Cmdline Resources."

An Online script is started when userApplication is switched to Online.

An Offline script is started when userApplication is switched to Offline.

A Check script is used to monitor the state of the resource that is started or stopped with an Online or Offline script.

This section presents script examples and describes notes on script creation.

■ Sample scripts

This section shows samples of the Online and Offline scripts, which are set as Cmdline resources.

Start script/Stop script

```
#!/bin/sh
#
# Script.sample
#   Sample of Online/Offline Script
#
# Copyright(c) 2003 FUJITSU LIMITED.
# All rights reserved.
#
# $1 -c : OnlineScript
#   -u : OfflineScript

if [[ $1 = "-c" ]]; then
    # Start your application
elif [[ $1 = "-u" ]]; then
    # Stop your application
else
    # Default operation
    exit 1 # Error
fi
exit 0
```

The above script sample covers both the Start script and the Stop script.

An example of Check script is shown below:

Check script

```
#!/bin/sh
#
# Script.sample.check
#   Sample of Check script
#
# Copyright(c) 2003 FUJITSU LIMITED.
# All rights reserved.
#
# Check the current state of target resource.

# If status is Online:
    exit 0

# If status is not Online:
    exit 1
```

Set up the above scripts in the Cmdline resource as shown below:

- Start script \$FULL_PATH/Script.sample -c
- Stop script \$FULL_PATH/Script.sample -u
- Check script \$FULL_PATH/Script.sample.check

For information on how to set up these scripts, see 6.7.3.1 "Setting Up Cmdline Resources."

■ Notes on script creation

● Hot-standby operation

To enable hot-standby operation of the Cmdline resources, the following must be prepared:

- Online/Offline/Check scripts that support hot-standby operation.
 - The setting of attributes for the Cmdline resources
1. Create the Online, Offline, and Check scripts to support hot-standby operation. The sample scripts are shown below.

Start script/Stop script (hot-standby operation)

```

#!/bin/sh
#
# Script.sample
#   Sample of Online/Offline Script
#
# Copyright(c) 2003 FUJITSU LIMITED.
# All rights reserved.
#
# $1 -c : OnlineScript
#   -u : OfflineScript

if [[ $1 = "-c" ]]; then
    if [ ${HV_LAST_DET_REPORT} = "Offline" ]; then
        if [ ${HV_INTENDED_STATE} = "Standby" ]; then
            # commands for Offline -> Standby
        else
            # commands for Offline -> Online
        fi
    else
        # commands for Standby -> Online
    fi
elif [[ $1 = "-u" ]]; then
    if [ ${HV_LAST_DET_REPORT} = "Standby" ]; then
        # commands for Standby -> Offline
    else
        # commands for Online -> Offline
    fi
else
    # Default operation
    exit 1 # Error
fi
exit 0

```

The following example shows Check script that supports hot-standby operation.

Check script (hot-standby operation)

```
#!/bin/sh
#
# Script.sample.check
#   Sample of Check script
#
# Copyright(c) 2003 FUJITSU LIMITED.
# All rights reserved.
#
# Check the current state of target resource.
# If status is Online:
#   exit 0
# If status is Standby:
#   exit 4
# If status is Faulted:
#   exit 2
# If status is Offline:
#   exit 1
```

2. Setting attributes for the Cmdline resources

Enable the STANDBYCAPABLE and the ALLEXITCODES attributes.

For details, see 6.7.3.1 "Setting Up Cmdline Resources."

● Online/Offline script exit code

The state transition process of userApplication changes according to the exit code of the Online/Offline script:

0: Normal exit

The system assumes that the state transition of the Cmdline resource was processed normally, and state transition processing of the userApplication continues. If all the resources of the userApplication are processed normally, the state transition of the userApplication is also processed normally.

Other than 0: Abnormal exit

The system assumes that an error occurred during the state transition of the Cmdline resources and interrupts state transition processing of the userApplication.

● Check script exit code

The state of the Cmdline resource is determined by the exit code of Check script. The exit code and the Cmdline resource are associated each other as follows:

0: Indicates the Online state.

Other than 0: Indicates the Offline state.

When ALLEXITCODES variables of the Cmdline resources are enabled, Check script will provide more detailed state of the resource. The exit code and Cmdline resource are associated each other as follows:

0: Indicates the Online state.

1: Indicates the Offline state.

2: Indicates the Fault state.

3: Indicates the Unknown state.
 4: Indicates the Standby state.
 For details, see "HELP."

- **Timeout**

If script processing is not completed within the specified time, a timeout occurs, script processing is interrupted by the SIGTERM signal, and state transition ends with an error.

Default: 300 seconds

The timeout value can be specified with the TIMEOUT flag value of the Cmdline resources.

When creating the Cmdline resource, you need to set up a timeout value in "Change the attribute" of 6.7.3.1 "Setting Up Cmdline Resources." If a timeout occurs when a Cmdline resource is used, change the timeout value to an appropriate value according to the instructions in 8.1 "Changing the Cluster Configuration."

- **Environment variables**

When the script is executed, the environment variables shown in the table below are set.

Environment variable	Outline
HV_APPLICATION	This variable sets the userApplication name that the resource belongs to. Example) app1
HV_AUTORECOVER	This variable sets the AUTORECOVER value. For details on AUTORECOVER, see "13 Appendix - Attributes" in " <i>PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide.</i> " 0: No is set. 1: Yes is set.
HV_FORCED_REQUEST	This variable sets a value that indicates whether or not forced failover was requested by operator intervention. 0: Forced failover was not requested. 1: Forced failover was requested.
HV_NODENAME	This variable contains the resource name. Example) Cmdline0
HV_OFFLINE_REASON	This variable sets the trigger for bringing the resource Offline. SWITCH: The resource was set to Offline because of a userApplication switchover request (hvswitch). STOP: The resource was set to Offline because of a userApplication stop request (hvutil -f) FAULT: The resource was set to Offline because of a resource fault. DEACT: The resource was set to Offline because of a userApplication deactivate request (hvutil -d) SHUT: The resource was set to Offline because of an RMS stop request (hvshut)
HV_SCRIPT_TYPE	This variable sets the type of script that was executed. Online: Online script Offline: Offline script
HV_LAST_DET_REPORT	This variable sets the state of the current resources. Online: Online state Offline: Offline state Standby: Standby state Faulted: Faulted state Warning: Warning state
HV_INTENDED_STATE	This variable sets the resource state that is expected after state transition is completed. Online: Online state Offline: Offline state Standby: Standby state Faulted: Faulted state Warning: Warning state

Environment variable	Outline
NODE_SCRIPTS_TIME_OUT	This variable sets the timeout duration (seconds) of the script. Example) 300

RMS also has other environment variables. For information on the other environment variables, see the files below.

File Names	Contents
hvenv	Environment variable file to be defined in the entire cluster system
hvenv.local	Environment variable file to be defined only in that node



[See](#)

- For details on the RMS environment variable files (hvenv and hvenv.local), see "2.9 Environment variables" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."
- For details on the RMS environment variables, see "14 Appendix – Environment variables" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

6.7 Setting Up Cluster Applications

This section explains how to set up a cluster application.

You can use any one of the nodes of the cluster system for the settings described in this section.

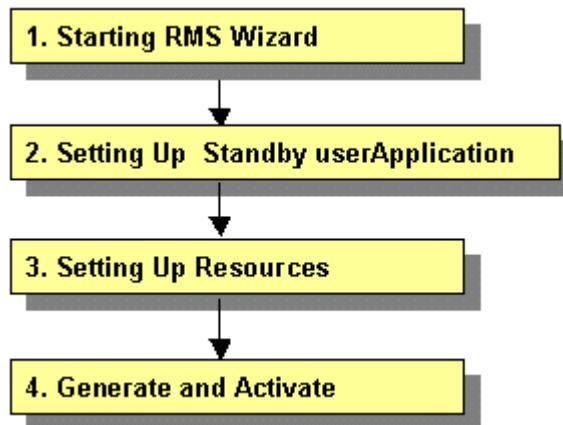
■ Cluster application setup flow

The setup flow for a cluster application is explained for each topology, below.

For information on these topologies, see 2.3 "Determining the Cluster System Operation Mode."

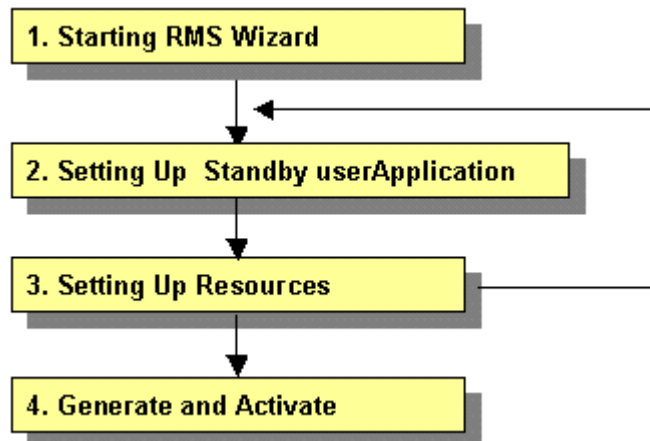
1) 1:1 standby for standby operation

Set up 1:1 standby for standby operation as follows.



2) Mutual standby for standby operation

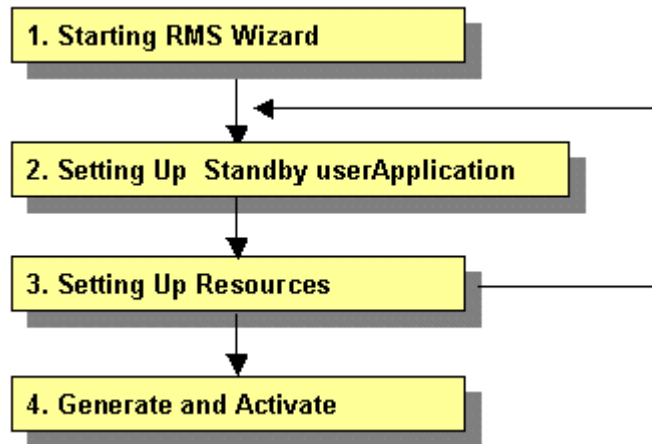
Set up mutual standby for standby operation as follows.



- To create two cluster applications, repeat steps 2. to 3.

3) N:1 standby for standby operation

Set up N:1 standby for standby operation as follows.

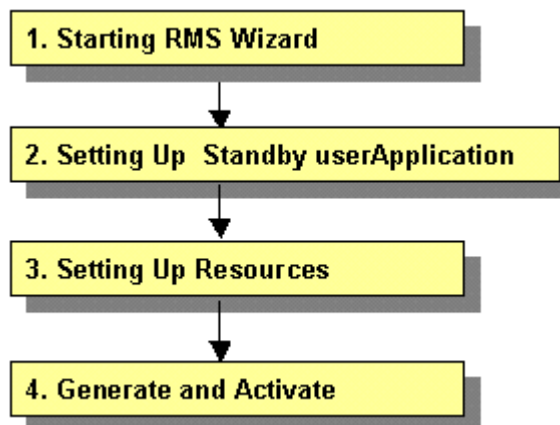


- To create two or more cluster applications, repeat steps 2. and 3.

Example) For 2:1 standby, repeat steps 2. and 3. two times, to create two cluster applications.

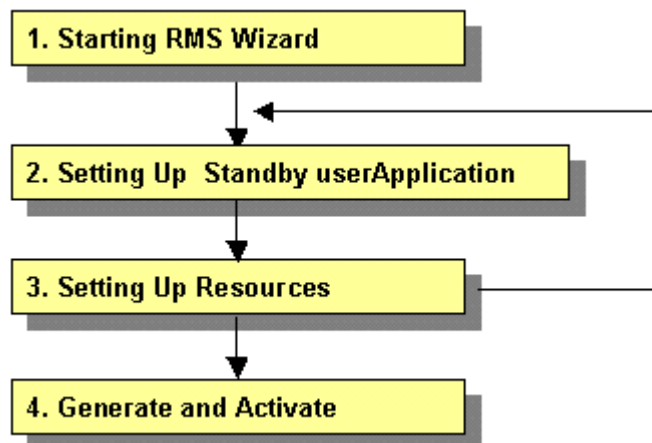
4) Cascaded standby operation

Set up cascaded standby operation as follows.



5) Priority transfer of standby operation

Set up the priority transfer of standby operation as follows.



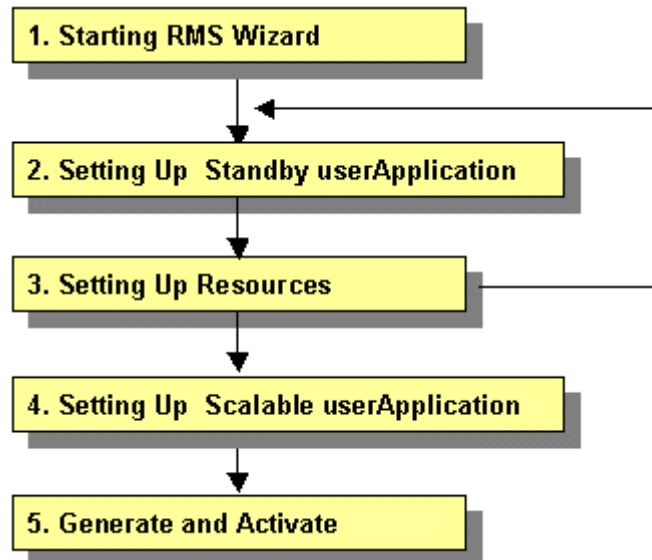
- To create two or more cascade cluster applications, repeat steps 2. and 3.
- Establish an exclusive relationship between the cluster applications.

For details on exclusive relationships, see 6.7.6 "Exclusive Relationships Between Cluster Applications."

Example) For priority transfer with two cascade cluster applications, repeat steps 2. and 3. two times to create two cascade cluster applications.

6) Scalable operation

Set up a scalable operation as follows.



- Before you create cluster applications as part of scalable operation, create cluster applications in standby operation that act as the constituent factors of the cluster applications in scalable operation. To create cluster applications in standby operation, repeat steps 2. to 3.

Example 1) For scalable operation with three nodes, repeat steps 2. and 3. three times to create three cluster applications of standby operation.

Example 2) For high-availability scalable 1:1 standby (standby operation), repeat steps 2. and 3. once to create 1:1 standby cluster applications.



Information

- After you finish setting up the cluster application, start the cluster applications. For instructions on starting the application, see 7.2.2.1 "Starting a Cluster Application."
- For instructions on changing a cluster application, see 8.1 "Changing the Cluster Configuration." For instructions on deleting a cluster application, see 8.7 "Deleting a Cluster Application."



Note

- Set up the cluster application and resources based on the cluster application and resource information in the A.10 "Cluster Application Worksheet," which was created in the planning stage. If you need to change the cluster application after it is created, the worksheet is helpful.
- You cannot share one resource with multiple userApplication.
- Generate and Activate process fail if RMS is running. Using Cluster Admin or hvdisp,

you need to confirm that RMS has not started before creating a cluster application. If RMS has already started, stop RMS from Cluster Admin or execute the "hvshut" command to stop RMS on all the nodes of the cluster system. For details on hvdisp(8) and hvshut, see the pages of these commands respectively.

- Set up "remote file copy" and "remote command execution" for the RMS Wizard. See the notes on 5.1.1 "Setting Up CF and CIP."

If the cluster interconnect is not protected by security, cancel the "remote file copy" and "remote command execution" settings on all the cluster nodes after setting up the cluster applications.

6.7.1 Starting RMS Wizard

Execute the "hvw" command.

The following is an example of starting the RMS Wizard with the configuration file name (testconf):

```
# /opt/SMAW/SMAWRrms/bin/hvw -n testconf
```

6.7.2 Setting Up userApplication

This section explains how to configure a cluster application.

There are two types of cluster applications, namely, standby operation and scalable operation.

Note that the term "userApplication" has the same meaning as "cluster application."

6.7.2.1 Creating Standby Cluster Applications

This section explains how to configure a cluster application for standby operation.

◆ Operation Procedure:

1. Select "Application-Create" from the "Main RMS management menu."

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                      11) Configuration-Freeze
3) Application-Create        12) Configuration-Thaw
4) Application-Edit          13) Configuration-Edit-Global-Settings

5) Application-Remove        14) Configuration-Consistency-Report
6) Application-Clone         15) Configuration-ScriptExecution
7) Configuration-Generate    16) RMS-CreateMachine
8) Configuration-Activate    17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action: 3
```

2. Select "CRM" from the "Application type selection menu."

```
Creation: Application type selection menu:
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) CRM
6) GENERIC
7) SYMFOWARE
Application Type: 5
```

3. Next, "turnkey wizard CRM" will be output. Select "Machines+Basics" and then set up userApplication.

```
Settings of turnkey wizard "CRM"
1) HELP                      4) REMOVE+EXIT                7) Machines+Basics(-)
2) NO-SAVE+EXIT             5) ApplicationName=APP1
3) SAVE+EXIT                6) BeingControlled=no
Choose the setting to process: 7
```

4. The userApplication setup page will appear. Set up the following for the userApplication:
 - Nodes that constitute the userApplication
 - Attributes of the userApplication

Set up the nodes that constitute userApplication by selecting "Machines[number]" and then a SysNode name on the subsequent screen that is displayed.

The procedure for setting up the nodes that constitute a userApplication is explained for each topology, below.

Topology	How to set up userApplication configuration nodes
1:1 standby	<ul style="list-style-type: none"> • In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. • In "Machines[1]," specify a SysNode that is in standby status or offline when the userApplication first starts up

Topology	How to set up userApplication configuration nodes
Mutual standby	<p>(For the first userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. In "Machines[1]," specify a SysNode that is in standby status or offline when the userApplication first starts up. <p>(For the second userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. For this SysNode, specify the SysNode specified for "Machines[1]" when the first userApplication was set up. In "Machines[1]," specify a SysNode that is in standby status or offline when the userApplication first starts up. Specify the SysNode specified in "Machines[0]" when the first userApplication was set up.
N:1 standby	<p>(For the first userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. In "Machines[1]," specify a SysNode that is in standby status or offline when the userApplication first starts up. <p>(For the second or subsequent userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. For this, specify a SysNode other than that previously specified for "Machines[0]" or "Machines[1]" when the userApplication was set up. In "Machines[1]," specify a SysNode that is in standby status or offline when the userApplication first starts up. For this, specify the same SysNode as that previously specified in "Machines[1]" when the userApplication was set up.
Cascaded	<ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. For "Machines[1]" or later, specify a SysNode that is in standby status or offline when the userApplication first starts up. <p>State transition occurs in ascending order of the numbers specified for "Machines[number]."</p> <p>Example) When there are four nodes, state transition occurs in the order shown below:</p> <p>"Machines[0]" -> "Machines[1]" -> "Machines[2]" -> "Machines[3]"</p>
Priority transferring	<p>(For the first userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. For "Machines[1]" or later, specify a SysNode that is in standby status or offline when the userApplication first starts up. <p>(For the second or subsequent userApplication)</p> <ul style="list-style-type: none"> In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. For this, specify a SysNode other than that previously specified in "Machines[0]" when the userApplication was set up. For "Machines[1]" or later, specify a SysNode that is in standby status or offline when the userApplication first starts up. <p>State transition occurs in ascending order of the numbers specified in "Machines[number]."</p> <p>Example) When there are four nodes, state transition occurs in the order shown below:</p> <p>"Machines[0]" -> "Machines[1]" -> "Machines[2]" -> "Machines[3]"</p>

Set up the attributes of the userApplication as follows:

Attribute	Setup value	Contents	Remark
AutoStartUp	yes	Automatically starts up the cluster application when RMS is started.	To create a cluster application in standby operation that constitutes scalable operation, set "AutoStartUp" to "no." For information on how to create scalable cluster applications, see 6.7.2.2 "Creating Scalable Cluster Applications."
AutoSwitchOver	HostFailure ResourceFailure Shutdown	Automatically performs failover if a node or resource fails or when the node is stopped.	-
HaltFlag	yes	Applies corrective action if a further error occurs during failover (double errors).	To ensure safe operation, always set "yes."
StandbyTransitions	ClearFaultRequest StartUp SwitchRequest	Monitor the states of the resources on the standby node performing standby operation.	This setting must be made when you are monitoring the states of the GLS resources on the standby node by using the redundant line control function of GLS.
LicenseToKill	yes	Sets up an exclusive relationship between cluster applications.	For information on exclusive relationships, see the following.
AutoBreak	yes	Cancels an exclusive relationship between cluster applications.	

To set up exclusive relationships between cluster applications, you must set up the following.

For details on exclusive relationships between applications, see 6.7.6 "Exclusive Relationships Between Cluster Applications."

Create multiple cluster application groups between which an exclusive relationship can be established. Exclusive control is established between the cluster applications within a single group.

Up to 52 groups of A to Z or a to z can be specified. "20X" and "10X" are fixed values. Therefore, you must always specify either "20X" or "10X" after the group.

- Example) When the cluster application is included in group A and the job priority is high

A20X

- Example) When the cluster application is included in group A and the job priority is low

A10X



Note

Exclusive relationships between cluster applications can be established only when the operation is being performed with two or more cluster applications. When the operation is to be performed with a single cluster application, do not set up any relationships between cluster applications.

- When a cluster application with a high job priority is to be used
Select "LicenseToKill" and then enter the following into ">>" that is output after "FREECHOICE" has been selected.

```
Group 20X
```

- When a cluster application with a low job priority is to be used
Select "LicenseToKill" and then enter the following into ">>" that is output after "FREECHOICE" has been selected.

```
Group 10X
```

- When an exclusive relationship is to be cancelled, set up the following:

```
"LicenseToKill" : "no"
```

```
"AutoBreak"      : "yes"
```

For details on the attributes, see "13 Appendix - Attributes" in the *"PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."*

After the completion of setup, select "SAVE+EXIT."



Note

Operator intervention requests and error resource messages are displayed only when the AutoStartUp and PersistentFault attributes are set to yes(1). When the operator intervention and error resource messages are to be displayed, set yes(1) for the AutoStartUp and PersistentFault attributes. For information on the operator intervention and error resource messages, see D.4 "Operator Intervention Messages."

5. Confirm if the setup information is correct, and then select "SAVE+EXIT."

```
Machines+Basics (app1:consistent)
 1) HELP
 2) -
 3) SAVE+EXIT
 4) REMOVE+EXIT
 5) AdditionalMachine
 6) AdditionalConsole
 7) Machines[0]=node1RMS
 8) Machines[1]=node2RMS
 9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=1)
21) (StandbyTransitions=ClearFaultRequest|Startup|SwitchRequest)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (HaltFlag=yes)
25) (PartialCluster=0)
26) (ScriptTimeout=)
Choose the setting to process: 3
```

6.7.2.2 Creating Scalable Cluster Applications

This section explains how to register a cluster application in scalable operation.

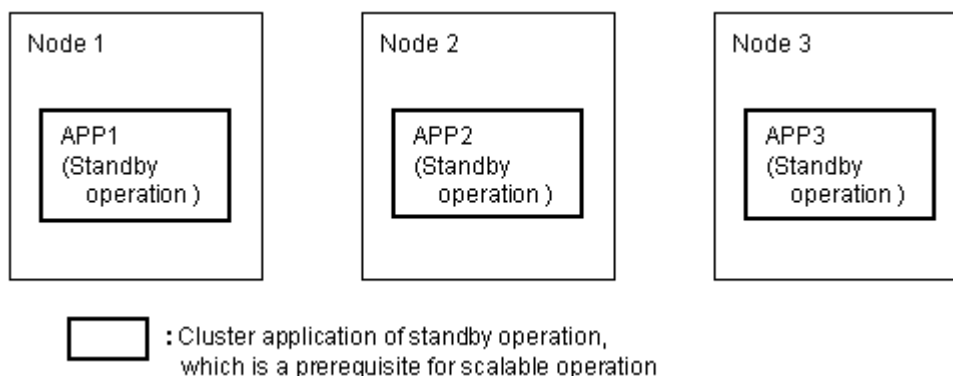
■ Preparing standby cluster applications

The scalable cluster application performs scalable operation by interconnecting multiple standby cluster applications. Before creating a scalable cluster application, you have to create the standby cluster applications that constitute the components of the scalable cluster application.

● Example 1) Preparing for scalable operation

When you create a cluster application in a scalable operation, you must first create a cluster application in a standby operation, which is a prerequisite for scalable operation.

If the cluster application of scalable operation is to run on three nodes, create a cluster application of standby operation on each of those nodes (the node is for operation only and has no standby).

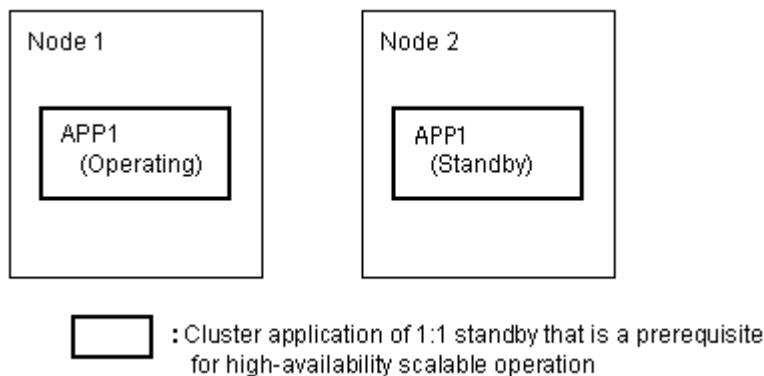


When you create a cluster application for standby operation, which is a prerequisite for scalable operation, set up only "Machines[0]."

● Example 2) Preparing for high-availability scalable operation

To create a high-availability scalable cluster application, you must first create a cluster application for standby operation, which is a prerequisite for high-availability scalable operation.

If the cluster application for high-availability scalable operation is 1:1 standby, create a cluster application for 1:1 standby.



**Note**

To create a cluster application in standby operation that constitutes scalable operation, set "AutoStartUp" to "no." To start the cluster applications automatically when you start RMS, set the value of "AutoStartUp" to "yes" when you create a cluster application as part of scalable operation.

The procedure for setting up the node of a cluster application in a standby operation, which is a prerequisite for scalable operation, is as shown below.

Topology	How to set up userApplication configuration nodes
Scalable	In "Machines[0]," specify a SysNode that is online when the userApplication first starts up. Since standby is not included, you do not need to set up "Machines[1]" and any subsequent items.
High-availability scalable	Note that the set-up method varies depending on the topology of the standby operation that is a constituent factor of the cluster application in scalable operation. For information on making this setting, see how to set up the topology of each standby operation.

For information on how to create standby cluster applications, see 6.7.2.1 "Creating Standby Cluster Applications."

After you complete the setup of standby operation, which is a prerequisite for scalable operation, you must create the cluster application of scalable operation as explained below.

■ Creating scalable cluster applications

◆ Operation Procedure:

1. Select "Application-Create" from the "Main RMS management menu."

```
node1: Main configuration menu, current configuration: testconf
No RMS active in the cluster
 1) HELP
 2) QUIT
 3) Application-Create
 4) Application-Edit
 5) Application-Remove
 6) Application-Clone
 7) Configuration-Generate
 8) Configuration-Activate
 9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) RMS-CreateMachine
17) RMS-RemoveMachine
Choose an action: 3
```

2. Select "OPTIONS" from the "Application type selection menu."

```
Creation: Application type selection menu:
 1) HELP
 2) QUIT
 3) RETURN
 4) OPTIONS
 5) CRM
 6) GENERIC
 7) SYMFOWARE
Application Type: 4
```

3. Select "ShowAllAvailableWizards" from "Set menu options."

```
Creation: Set menu options:
 1) ShowAllAvailableWizards
 2) ShowTurnKeyWizardsOnly
Application Type: 1
```

- Select "Controller" from the "Application type selection menu."



Information

If "Controller" is not displayed, select "NEXT."

```
Creation: Application type selection menu:
1) HELP                9) Controller          17) Rawdisk
2) QUIT                10) Crm                18) SYMFOWARE
3) RETURN              11) Fsystem            19) Symfoware
4) OPTIONS             12) GENERIC            20) SystemState2
5) Application          13) Gds                21) SystemState3
6) BasicApplication    14) GlS                22) foreign-code
7) CRM                 15) Ippaddress         23) generic
8) Cmdline             16) Lvm
Application Type: 9
```

- Select "ControlPolicy" from "Settings of application type."

```
Settings of application type "Controller" (not yet consistent)
1) HELP                5) AdditionalAppToControl
2) NO-SAVE+EXIT        6) (InParallel=)
3) ApplicationName=Controller  7) (FaultScript=)
4) ControlPolicy=FOLLOW
Choose the setting to process: 4
```

- Select "SCALABLE."

```
1) HELP
2) RETURN
3) FOLLOW
4) SCALABLE
Choose the control policy: 4
```

- Select "AdditionalAppToControl" from "Settings of application type."

```
Settings of application type "Controller" (not yet consistent)
1) HELP                5) AdditionalAppToControl
2) NO-SAVE+EXIT        6) (FaultScript=)
3) ApplicationName=Controller  7) (ApplicationSequence=)
4) ControlPolicy=SCALABLE  8) (StateChangeScript=)
Choose the setting to process: 5
```

- Select a cluster application (standby operation) that allows scalable operation.



Information

All of a cluster application of standby operation is displayed with lowercase characters.

```
1) HELP
2) RETURN
3) FREECHOICE
4) app1
5) app2
Choose an application to control: 4
```

- Select "SAVE+RETURN" from "Set global flags for scalable."

```
Set global flags for scalable (sub) applications: app1
Currently set: TIMEOUT (T180)
1) HELP                4) DEFAULT              7) TIMEOUT(T)
2) -                    5) MONITORONLY(M)
3) SAVE+RETURN         6) AUTORECOVERCLEANUP(P)
Choose one of the flags: 3
```


10. To allow scalable operation with multiple cluster applications (standby operation), repeat steps 7. to 9.
11. Set up the order in which cluster applications are started up (standby operation). When stopping, you must stop the cluster applications in order starting from the smallest startup sequence number. Cluster applications with the same startup sequence number must start up or stop in parallel.

**Note**

If you do not need to set up a startup sequence number, you do not have to perform the procedure described below.

- 1) Select "(ApplicationSequence=)" from "Settings of application type."

```
Settings of application type "Controller" (consistent)
1) HELP                               7) Controllers[0]=T180:app1
2) NO-SAVE+EXIT                       8) Controllers[1]=T180:app2
3) SAVE+EXIT                          9) (FaultScript=)
4) ApplicationName=Controller         10) (ApplicationSequence=)
5) ControlPolicy=SCALABLE            11) (StateChangeScript=)
6) AdditionalAppToControl
Choose the setting to process: 10
```

- 2) Select "FREECHOICE."

```
1) HELP
2) RETURN
3) NONE
4) FREECHOICE
Set the application sequence: 4
```

- 3) Enter the startup sequence number, and then press the return key.
 - Enter the cluster application with the highest startup sequence number first.
 - If the startup sequence numbers are different, input a single colon (:) between the cluster applications.
 - If the startup priority numbers are the same, input a single space between the cluster applications.

**Note**

The cluster application for standby operation must be entered entirely in lowercase characters.

The following is an example in which the startup sequence of app1 is the first, followed by app2 and then app3 (app2 and app3 have the same startup sequence number).

```
1) HELP
2) RETURN
3) NONE
4) FREECHOICE
Set the application sequence: 4
>> app1:app2 app3
```

12. Select "SAVE+EXIT" from "Settings of application type."

```

Settings of application type "Controller" (consistent)
 1) HELP                               7) Controllers[0]=T180:app1
 2) NO-SAVE+EXIT                       8) Controllers[1]=T180:app2
 3) SAVE+EXIT                          9) (FaultScript=)
 4) ApplicationName=Controller         10) (ApplicationSequence=app1:app2)
 5) ControlPolicy=SCALABLE            11) (StateChangeScript=)
 6) AdditionalAppToControl
Choose the setting to process: 3
    
```

13. Select "Application-Create" from the "Main configuration menu."

```

node1: Main configuration menu, current configuration: testconf
No RMS active in the cluster
 1) HELP                               10) Configuration-Remove
 2) QUIT                               11) Configuration-Freeze
 3) Application-Create                 12) Configuration-Thaw
 4) Application-Edit                   13) Configuration-Edit-Global-Settings
 5) Application-Remove                 14) Configuration-Consistency-Report
 6) Application-Clone                  15) Configuration-ScriptExecution
 7) Configuration-Generate             16) RMS-CreateMachine
 8) Configuration-Activate             17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action: 3
    
```

14. Select "generic" from the "Application type selection menu."



If "generic" is not displayed, select "NEXT."

```

Creation: Application type selection menu:
 1) HELP                               9) Controller                17) Rawdisk
 2) QUIT                               10) Crm                      18) SYMFOWARE
 3) RETURN                             11) Fsystem                  19) Symfoware
 4) OPTIONS                             12) GENERIC                  20) SystemState2
 5) Application                         13) Gds                      21) SystemState3
 6) BasicApplication                   14) GlS                      22) foreign-code
 7) CRM                                15) Ipaddress                23) generic
 8) Cmdline                             16) Lvm
Application Type: 23
    
```

15. Select "AdditionalMachine" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
 1) HELP                               15) (FaultScript=)
 2) NO-SAVE+EXIT                       16) (AutoStartup=no)
 3) ApplicationName=generic            17) (AutoSwitchOver=No)
 4) AdditionalMachine                 18) (PreserveState=no)
 5) AdditionalConsole                 19) (PersistentFault=0)
 6) AdditionalSubApplication           20) (ShutdownPriority=)
 7) Machines[0]=fuji01RMS             21) (OnlinePriority=)
 8) (HostSpecificSubApplication=no)    22) (StandbyTransitions=)
 9) (PreCheckScript=)                 23) (LicenseToKill=no)
10) (PreOnlineScript=)                 24) (AutoBreak=yes)
11) (PostOnlineScript=)                 25) (HaltFlag=no)
12) (PreOfflineScript=)                 26) (PartialCluster=0)
13) (PostOfflineScript=)                 27) (ScriptTimeout=)
14) (OfflineDoneScript=)
Choose the setting to process: 4
    
```

16. On the node on which the cluster application is running, select a node that is not shown in "Machines[*]" on the screen in step 15.

```

1) HELP
2) RETURN
3) fuji01RMS
4) fuji02RMS
Choose a machine for this application: 3

```

17. Repeat steps 15. to 16. until all those nodes on which cluster applications are operating appear in "Machines[*]" on the screen shown in step 15.
18. Select "(PartialCluster=0)" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
1) HELP                                15) (OfflineDoneScript=)
2) NO-SAVE+EXIT                        16) (FaultScript=)
3) ApplicationName=generic             17) (AutoStartUp=no)
4) AdditionalMachine                   18) (AutoSwitchOver=No)
5) AdditionalConsole                   19) (PreserveState=no)
6) AdditionalSubApplication             20) (PersistentFault=0)
7) Machines[0]=fuji01RMS               21) (ShutdownPriority=)
8) Machines[0]=fuji02RMS               22) (OnlinePriority=)
9) (HostSpecificSubApplication=no)     23) (StandbyTransitions=)
10) (PreCheckScript=)                  24) (LicenseToKill=no)
11) (PreOnlineScript=)                 25) (AutoBreak=yes)
12) (PostOnlineScript=)                 26) (HaltFlag=no)
13) (PreOfflineScript=)                 27) (PartialCluster=0)
14) (PostOfflineScript=)
Choose the setting to process: 27

```

19. Select "1."

```

1) HELP
2) RETURN
3) 0
4) 1
Set the PartialCluster mode: 4

```

20. Select "AdditionalSubApplication" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
1) HELP                                15) (OfflineDoneScript=)
2) NO-SAVE+EXIT                        16) (FaultScript=)
3) ApplicationName=generic             17) (AutoStartUp=no)
4) AdditionalMachine                   18) (AutoSwitchOver=No)
5) AdditionalConsole                   19) (PreserveState=no)
6) AdditionalSubApplication             20) (PersistentFault=0)
7) Machines[0]=fuji01RMS               21) (ShutdownPriority=)
8) Machines[0]=fuji02RMS               22) (OnlinePriority=)
9) (HostSpecificSubApplication=no)     23) (StandbyTransitions=)
10) (PreCheckScript=)                  24) (LicenseToKill=no)
11) (PreOnlineScript=)                 25) (AutoBreak=yes)
12) (PostOnlineScript=)                 26) (HaltFlag=no)
13) (PreOfflineScript=)                 27) (PartialCluster=1)
14) (PostOfflineScript=)
Choose the setting to process: 6

```

21. Select "Controller."

```

1) HELP
2) RETURN
3) FREECHOICE
4) NONE
5) Controller
Choose an sub-application to be controlled: 5

```

22. Select "(AutoSwitchOver=No)" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
 1) HELP
 2) NO-SAVE+EXIT
 3) SAVE+EXIT
 4) ApplicationName=generic
 5) AdditionalMachine
 6) AdditionalConsole
 7) AdditionalSubApplication
 8) Machines[0]=fuji01RMS
 9) Machines[0]=fuji02RMS
10) SubApplications[0]=Controller
11) (HostSpecificSubApplication=no)
12) (PreCheckScript=)
13) (PreOnlineScript=)
14) (PostOnlineScript=)
15) (PreOfflineScript=)
16) (PostOfflineScript=)
17) (OfflineDoneScript=)
18) (FaultScript=)
19) (AutoStartUp=no)
20) (AutoSwitchOver=No)
21) (PreserveState=no)
22) (PersistentFault=0)
23) (ShutdownPriority=)
24) (OnlinePriority=)
25) (StandbyTransitions=)
26) (LicenseToKill=no)
27) (AutoBreak=yes)
28) (HaltFlag=no)
29) (PartialCluster=1)
Choose the setting to process: 20
    
```

23. Select "HOSTFAILURE(H)," "RESOURCEFAILURE(R)," and "SHUTDOWN(S)."

```

Set flags for AutoSwitchOver: Currently set: NO (N)
 1) HELP
 2) -
 3) SAVE+RETURN
 4) DEFAULT
 5) NO(N)
 6) HOSTFAILURE (H)
 7) RESOURCEFAILURE (R)
 8) SHUTDOWN (S)
Choose one of the flags:
    
```

24. Check if the following setting has been made, and then select "SAVE+RETURN."

```

Set flags for AutoSwitchOver: Currently set: HOSTFAILURE,RESOURCEFAILURE,
SHUTDOWN (HRS)
 1) HELP
 2) -
 3) SAVE+RETURN
 4) DEFAULT
 5) NO(N)
 6) NOT:HOSTFAILURE (H)
 7) NOT:RESOURCEFAILURE (R)
 8) NOT:SHUTDOWN (S)
Choose one of the flags:
    
```

25. Specify the automatic startup of cluster applications when the cluster starts up.



Note

If automatic startup is not to be performed, this procedure is unnecessary.

- 1) Select "(AutoStartUp=no)" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
 1) HELP                                     17) (OfflineDoneScript=)
 2) NO-SAVE+EXIT                             18) (FaultScript=)
 3) SAVE+EXIT                                 19) (AutoStartUp=no)
 4) ApplicationName=generic                   20) (AutoSwitchOver=HostFailure|
ResourceFailure|ShutDown)
 5) AdditionalMachine                         21) (PreserveState=no)
 6) AdditionalConsole                         22) (PersistentFault=0)
 7) AdditionalSubApplication                  23) (ShutdownPriority=)
 8) Machines[0]=fuji01RMS                     24) (OnlinePriority=)
 9) Machines[0]=fuji02RMS                     25) (StandbyTransitions=)
10) SubApplications[0]=Controller             26) (LicenseToKill=no)
11) (HostSpecificSubApplication=no)           27) (AutoBreak=yes)
12) (PreCheckScript=)                         28) (HaltFlag=no)
13) (PreOnlineScript=)                       29) (PartialCluster=1)
14) (PostOnlineScript=)
15) (PreOfflineScript=)
16) (PostOfflineScript=)
Choose the setting to process: 19

```

2) Select "yes."

```

 1) HELP
 2) RETURN
 3) yes
 4) no
Set the AutoStartUp mode: 3

```

26. Select "SAVE+EXIT" from "Settings of application type."

```

Settings of application type "generic" (not yet consistent)
 1) HELP                                     17) (OfflineDoneScript=)
 2) NO-SAVE+EXIT                             18) (FaultScript=)
 3) SAVE+EXIT                                 19) (AutoStartUp=no)
 4) ApplicationName=generic                   20) (AutoSwitchOver=HostFailure|
ResourceFailure|ShutDown)
 5) AdditionalMachine                         21) (PreserveState=no)
 6) AdditionalConsole                         22) (PersistentFault=0)
 7) AdditionalSubApplication                  23) (ShutdownPriority=)
 8) Machines[0]=fuji01RMS                     24) (OnlinePriority=)
 9) Machines[0]=fuji02RMS                     25) (StandbyTransitions=)
10) SubApplications[0]=Controller             26) (LicenseToKill=no)
11) (HostSpecificSubApplication=no)           27) (AutoBreak=yes)
12) (PreCheckScript=)                         28) (HaltFlag=no)
13) (PreOnlineScript=)                       29) (PartialCluster=1)
14) (PostOnlineScript=)
15) (PreOfflineScript=)
16) (PostOfflineScript=)
Choose the setting to process: 3

```

When two or more cluster applications for scalable operation are to be created, repeat steps 1. to 26.



Note

When you set up a second or subsequent cluster application for scalable operation, note the following:

- Change ApplicationName in step 5. to one (for example, to "Controller1" from "Controller") that is not used in a cluster application for scalable operation, as set up earlier.
- Change ApplicationName in step 15. to one (for example, to "generic1" from "generic") that is not used in the cluster application of scalable operation, as set up earlier.

To change the name, select "ApplicationName=" and then enter the name to be

used after the change into ">" that is output after "ApplicationName=" and then "FREECHOICE" are selected.

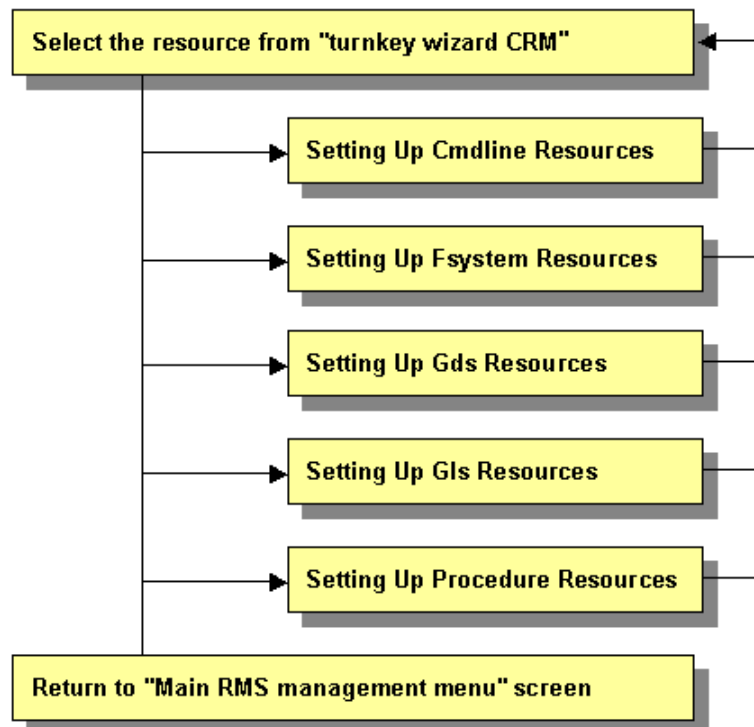
6.7.3 Setting Up Resources

This section explains how to register resources to the userApplication that was set up in the previous section.

You can register the following resources:

- **Cmdline resources**
You can use Cmdline resources to set up script files or commands as resources. The Cmdline resources are required to generate the state transition of userApplication along with the stop of user applications, and conversely, to start or stop ISV applications or user applications along with the state transition of the userApplication.
- **Fsystem resources**
Used when you mount a file system along with userApplication startup.
- **Gds resources**
Used when you set up a disk class that is to be defined in a userApplication with Global Disk Services (GDS).
- **Gls resources**
Used when you set up a takeover IP address that is to be defined in a userApplication with the redundant line control function, or when you set a takeover IP address in a userApplication with the single line control function.
- **Procedure resources**
Used when you register a state transition procedure in the userApplication.

■ Resource setup flow



6.7.3.1 Setting Up Cmdline Resources

This section describes the procedure for creating Cmdline resources.

◆ **Operation Procedure:**

1. Select "CommandLines" from "turnkey wizard CRM."

```
Settings of turnkey wizard "CRM"
1) HELP                               10) LocalFileSystems(-)
2) -                                   11) RemoteFileSystems(-)
3) SAVE+EXIT                           12) IpAddresses(-)
4) -                                    13) Gds:Global-Disk-Services(-)
5) ApplicationName=APP1                14) Gls:Global-Link-Services(-)
6) Machines+Basics(appl)
7) CommandLines(-)
8) Controllers(-)
9) CRM(-)
Choose the setting to process: 7
```

2. "CommandLines" will appear. Select "AdditionalStartCommand."

```
CommandLines (Cmd_APP1:not yet consistent)
1) HELP                               4) REMOVE+EXIT
2) -                                   5) AdditionalStartCommand
3) SAVE+EXIT                           6) (ReturnCodes)
Choose the setting to process: 5
```

3. Select "FREECHOICE" and then enter the full path of the StartCommand. If you need to specify arguments, delimit them with blanks.

StartCommand is executed during Online processing to start user applications.

[StartCommand exit codes]

StartCommand has the following exit codes:

0: Normal exit. The Online processing is successfully done.

Other than 0: Abnormal exit. The Online processing fails. When the script exits with the cord other than 0, the resource will enter Faulted.

```
1) HELP
2) RETURN
3) FREECHOICE
Set a start command: 3
>>
```

4. "CommandLines" will appear. If you need to stop the user programs, select "StopCommands."

StopCommand is executed during Online processing to stop user applications.

You do not always have to set up the StopCommand.

[StopCommand exit codes]

StopCommand has the following exit codes:

0: Normal exit. The Online processing is successfully done.

Other than 0: Abnormal exit. The Offline processing fails. When the script exits with the cord other than 0, the resource will enter Faulted.

If you do not use StopCommand, start from step 6.


```

CommandLines (Cmd_APP1:consistent)
1) HELP                      6) StartCommands[0]='xxxx'
2) -                          7) StopCommands[0]=none
3) SAVE+EXIT                  8) CheckCommands[0]=none
4) REMOVE+EXIT                9) Flags[0]=D
5) AdditionalStartCommand     10) (ReturnCodes)
Choose the setting to process:

```

5. Select "FREECHOICE" and then enter the full path of StopCommand. If you need to specify arguments, delimit them with blanks.

```

1) HELP
2) RETURN
3) FREECHOICE
4) NONE
Set a start command: 3
>>

```

6. "CommandLines" will appear. Select "CheckCommands." CheckCommand is executed periodically to notify RMS of the state of the user applications.

[CheckCommand exit codes]

CheckCommand has the following exit codes:

- 0: Online.
- Other than 0: Offline.

If you enable the ALLEXITCODES attribute, the script that is defined in CheckCommand provides more detailed state of the user applications. Change the attribute in step 8.

```

CommandLines (Cmd_APP1:consistent)
1) HELP                      6) StartCommands[0]='xxxx'
2) -                          7) StopCommands[0]='yyyy'
3) SAVE+EXIT                  8) CheckCommands[0]=none
4) REMOVE+EXIT                9) Flags[0]=D
5) AdditionalStartCommand     10) (ReturnCodes)
Choose the setting to process:

```

7. Select "FREECHOICE" and then enter the full path of the CheckCommand. If you need to specify arguments, delimit them with blanks.

```

1) HELP
2) RETURN
3) FREECHOICE
4) NONE
Set a start command: 3
>>

```

8. Change the attribute. Change the attribute to suit the purpose. To change the attribute, select "Flags[0]." For details on the attribute, see "13 Appendix - Attributes" and "HELP" in the "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."



Note

If you enable the "NULLDETECTOR" attribute, CheckCommand is not started from RMS. For hot-standby operation, enable the following attributes;

- STANDBYCAPABLE

RMS executes Standby processing of the resources on all nodes where the userApplication is Offline.

- ALLEXITCODES

Check script provides the detailed state of the resource with the exit code.

For further details about the hot-standby operation settings, see 6.6 "Setting Up Online/Offline Scripts."

9. Finally, select "SAVE+EXIT."

```
CommandLines (Cmd_APP1:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalStartCommand
6) StartCommands[0]='xxxx'
7) StopCommands[0]=none
8) CheckCommands[0]=none
9) Flags[0]=D
10) (ReturnCodes)
Choose the setting to process:
```

6.7.3.2 Setting Up Fsystem Resources

An Fsystem resource must be set up if you want to mount a file system when userApplication is started.

To control multiple mount points in parent-child relationships, create the file system as one Fsystem resource.

[Prerequisites]

You need to work on the following prerequisites to use an Fsystem resource.

1. Reserving monitoring disk area

Reserve the dedicated monitoring disk area in shared disk device so that shared disk failures and cable failures are detected on each shared disk device.

Reserve the monitoring area in either 1 or 2 unit shown in the table below. Configuration based on the No. 2 is recommended.

No	Reserve monitoring area for each	Range of failure detection	Prerequisites
1	Shared disk device	Failures including cable disconnection are detected in unit of shared disk device.	<ul style="list-style-type: none"> Reserve one monitoring disk area (1LU) per shared disk device when configuring the shared disk after OS is installed. e.g.) /dev/sdf1 Allow about 10 MB for monitoring disk area.
2	Disk area (1LU)	In addition to the above, failures such as LUN errors on shared disk device are detected in unit of shared disk area (operation unit).	<ul style="list-style-type: none"> Reserve one monitoring disk area (1LU) per shared disk area when configuring the shared disk after OS is installed. e.g.) If /dev/sdd1 and /dev/sde1 are used for disk operation, specify /dev/sdd2 and /dev/sde2 as monitoring disks. Allow about 10 MB for monitoring disk area per disk area (1LU).

2. Defining mount points

Define mount points that are used as resources in /etc/fstab on all the nodes where userApplication is configured. Each line must begin with "#RMS#."

Example) When defining (adding) two mount points in /etc/fstab

#RMS#/dev/sdd1	/mnt/swdsk1	ext3	defaults	1 2
#RMS#/dev/sdd2	/mnt/swdsk2	ext3	defaults	1 2
#RMS#/dev/sdd3	/mnt/monitor	ext3	defaults,ro	1 2

If a file system is created in the GDS setting screen, the mount point is also defined.

Each line of the mount point that is set with GDS must begin with "#RMS#."

Example) When two mount points have been defined in /etc/fstab.

#RMS#/dev/sfdsk/class0001/dsk/volume0001	/mnt/swdsk1	ext3	noauto	0 0
#RMS#/dev/sfdsk/class0001/dsk/volume0002	/mnt/swdsk2	ext3	noauto	0 0
#RMS#/dev/sfdsk/class0001/dsk/volume0003	/mnt/monitor	ext3	noauto,ro	0 0



Note

Read Only must be set for the mount attribute of the monitoring-only disk area.

Example:

Example)

```
#RMS#/dev/sdf1 /mnt/monitor ext3 defaults,ro 1 2
```

3. Setting file systems

It is necessary to create file systems on disk partitions that are used as resources.

Example) When creating the ext3 file system

```
# /sbin/mkfs -t ext3 /dev/sdd1
# /sbin/tune2fs -j /dev/sdd1
```

Confirm on each node that the file system can be mounted.

Example) When checking if the file systems can be mounted

```
# /bin/mount -t ext3 /dev/sdd1 /mnt/swdsk1
# /bin/umount /mnt/swdsk1
```



Note

- Set file systems for the monitoring disk area as well.
- Forcible file system check prevention
If ext3 is used for a file system, the file system might forcibly be checked during online processing of a switching file system. It is part of the ext3 specification that file systems are checked when a certain number of mounting has been executed since the last file system check, or a certain period of time has passed. When the file systems are forcibly checked along with node startup or failover, timeout occurs due to file system online processing, and PRIMECLUSTER startup or failover might fail. It is necessary to prevent the file systems from being checked by executing the following command for all the ext3 switching files.

```
# tune2fs -c0 -i0 <device name>
```

Example)

```
# tune2fs -c0 -i0 /dev/sdi1
```

After executing the above command, check if "Maximum mount count :-1", "Check interval:0" is displayed using the following command:

```
# tune2fs -l /dev/sdi1
[snip]
Mount count: 10
Maximum mount count: -1
[snip]
Check interval: 0 (<none>)
[snip]
```

If the forcible file system check is prevented, file systems might corrupt due to failures such as disk errors and kernel bug. These failures cannot be detected through file system logging and journaling. The file system corruption might cause data corruption. To prevent this, execute the "fsck -f" command to enable the file system forcible check during periodic maintenance.

◆ Operation Procedure:

1. Select "LocalFileSystems" from "turnkey wizard CRM."

```
Settings of turnkey wizard "CRM"
1) HELP                      9) CRM(-)
2) -                        10) LocalFileSystems(-)
3) SAVE+EXIT                 11) RemoteFileSystems(-)
4) -                        12) IpAddresses(-)
5) ApplicationName=APPl      13) RawDisks(-)
6) Machines+Basics{appl}    14) LVM-VolumeManagement(-)
7) CommandLines(-)         15) Gds:Global-Disk-Services(-)
8) Controllers(-)          16) Gls:Global-Link-Services(-)
Choose the setting to process: 10
```

2. Select "AdditionalMountPoint."

```
File systems (Lfs_APP1:consistent)
1) HELP                      4) REMOVE+EXIT          7) (Timeout=180)
2) -                        5) AdditionalMountPoint
3) SAVE+EXIT                 6) (Filter=)
Choose the setting to process: 5
```

3. The mount point, which is defined in /etc/fstab, will appear. Select mount points for monitoring-only disks.

```
1) HELP                      6) /mnt/swdsk1
2) RETURN                    7) /mnt/monitor2
3) FREECHOICE                8) /mnt/swdsk2
4) ALL
5) /mnt/monitor1
Choose a mount point: 5
```



Note

Set up mount points for monitoring-only disks before setting disk mount points. If you register multiple mount points, repeat steps 3 to 7 for each mount point.

4. Select "SAVE+RETURN."

```
Set flags for mount point: /mnt/monitor1 Currently set: LOCAL,AUTORECOVER (LA)
1) HELP                      4) DEFAULT              7) SHARE(S)
2) -                        5) SYNC (Y)            8) MONITORONLY(M)
3) SAVE+RETURN               6) NOT:AUTORECOVER(A)
Choose one of the flags: 3
```

5. The mount point, which is defined in /etc/fstab, will appear. Select mount points for disk operation.

```
1) HELP                      6) /mnt/swdsk1
2) RETURN                    7) /mnt/monitor2
3) FREECHOICE                8) /mnt/swdsk2
4) ALL
5) /mnt/monitor1
Choose a mount point: 6
```

6. Select "MONITORONLY", so the "MONITORONLY" attribute will be ON.

```
Set flags for mount point: /mnt/swdsk1 Currently set: LOCAL,AUTORECOVER (LA)
1) HELP                4) DEFAULT              7) SHARE(S)
2) -                   5) SYNC(Y)             8) MONITORONLY(M)
3) SAVE+RETURN         6) NOT:AUTORECOVER(A)
Choose one of the flags: 8
```

7. Select "SAVE+RETURN."

```
Set flags for mount point: /mnt/swdsk1 Currently set:
LOCAL,AUTORECOVER,MONITORONLY (LAM)
1) HELP                4) DEFAULT              7) SHARE(S)
2) -                   5) SYNC(Y)             8) NOT:MONITORONLY(M)
3) SAVE+RETURN         6) NOT:AUTORECOVER(A)
Choose one of the flags: 3
```

8. Select "SAVE+EXIT."

```
File systems (Lfs_APPl:consistent)
1) HELP                6) MountPoints[0]=LA:/mnt/monitor1
2) -                   7) MountPoints[1]=LAM:/mnt/swdsk1
3) SAVE+EXIT          8) (Filter=)
4) REMOVE+EXIT        9) (Timeout=360)
5) AdditionalMountPoint
Choose the setting to process: 3
```

6.7.3.3 Setting Up Gds Resources

[Prerequisites]

If you need to set up a Gds resource, you must first set up a shared volume.

Also, before you make the settings required for the Gds resources, execute the following command on either node. This command notifies the cluster resource management facility (CRM) that the specified Gds resource is being used for the cluster application. In addition, the execution of this command places all the nodes that share this volume in the offline state.

```
# /opt/SMAW/SMAWRrms/bin/hvgdsetup -a [class-name]
```

◆ Operation Procedure:

1. Select "Gds:Global-Disk-Services" from "turnkey wizard CRM."

```
Settings of turnkey wizard "CRM"
1) HELP                               9) CRM(-)
2) -                                  10) LocalFileSystems(-)
3) SAVE+EXIT                          11) RemoteFileSystems(-)
4) -                                  12) IpAddresses(-)
5) ApplicationName=APP2               13) RawDisks(-)
6) Machines+Basics(app2)             14) LVM-VolumeManagement(-)
7) CommandLines(-)                  15) Gds:Global-Disk-Services(-)
8) Controllers(-)                   16) Gls:Global-Link-Services(-)
Choose the setting to process: 15
```

2. Select "AdditionalDiskClass" from "Volume management."

If you want to register multiple resources, repeat steps 2 to 3 for each resource.

Example) When you register the class [CL] of the shared volume in userApplication:

```
Volume management (Gds_APP1:not yet consistent)
1) HELP                               4) REMOVE+EXIT       7) (AutoRecover=no)
2) -                                  5) AdditionalDiskClass 8) (Timeout=1800)
3) SAVE+EXIT                          6) (ClassNameFilter=)
Choose the setting to process: 5
```

3. A list of the cluster resources that can be registered in userApplication appears. Select the cluster resource.

```
1) HELP
2) RETURN
3) FREECHOICE
4) CL
Choose the disk class: 4
```

4. Select "SAVE+EXIT."

```
Volume management (Gds_APP1:consistent)
1) HELP                               4) REMOVE+EXIT       7) (ClassNameFilter=)
2) -                                  5) AdditionalDiskClass 8) (AutoRecover=no)
3) SAVE+EXIT                          6) DiskClasses[0]=CL  9) (Timeout=1800)
Choose the setting to process: 3
```

6.7.3.4 Setting Up GIs Resources

[Prerequisites]

Before setting up the GIs resources, you must first set up the virtual interfaces and takeover virtual interfaces. For details, see “*PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function.*”

◆ Operation Procedure:

1. Select “GIs” from “turnkey wizard CRM.”

```
Settings of turnkey wizard "CRM"
1) HELP                      9) CRM(-)
2) -                        10) LocalFileSystems(-)
3) SAVE+EXIT                11) RemoteFileSystems(-)
4) -                        12) IpAddresses(-)
5) ApplicationName=APPL    13) RawDisks(-)
6) Machines+Basics(appl)  14) LVM-VolumeManagement(-)
7) CommandLines(-)        15) Gds:Global-Disk-Services(-)
8) Controllers(-)         16) GIs:Global-Link-Services(-)
Choose the setting to process: 16
```

2. Select "AdditionalTakeoverIpaddress" and then set the takeover IP address.
If you need to register multiple resources, repeat steps 2 to 4 for each resource.

```
GIs (GIs_APP1:not yet consistent)
1) HELP                      4) REMOVE+EXIT
2) -                        5) AdditionalTakeoverIpaddress
3) SAVE+EXIT                6) (Timeout=60)
Choose the setting to process: 5
```

3. The takeover IP addresses are displayed as options.
Select one.

```
1) HELP
2) RETURN
3) FREECHOICE
4) 192.168.1.100
Choose a takeover IP address for GIs: 4
```

4. Set up the operation mode of the resource.
The operation modes of the resources are “AUTORECOVER(A)” (selective value) and “NOT:AUTORECOVER(N)” (default value). If you select “SAVE+RETURN,” the default value “NOT:AUTORECOVER(N)” will be set. Select “AUTORECOVER(A)” if an attempt to recover the resource is to be made for a given duration (default: 60 seconds) when a resource error occurs, or select “NOT:AUTORECOVER(N)” if switchover to another node is to be performed immediately.

```
Set a flag for takeover IP address: 192.168.1.100
Currently set:
1) HELP                      5) AUTORECOVER(A)
2) -
3) SAVE+RETURN
4) DEFAULT
Choose additionally one of the flags: 3
```


5. To save the GIs resource settings and then exit, select "SAVE+EXIT."
You can change the timeout value of the GIs resource by selecting "(Timeout=60)" and setting any value (seconds).

```
Gls (Gls_APP1:consistent)
1) HELP                5) AdditionalTakeoverIpAddress
2) -                   6) TakeoverIpAddress[0]=N,192.168.1.100
3) SAVE+EXIT           7) (Timeout=60)
4) REMOVE+EXIT
Choose the setting to process: 3
```



[See](#)

By setting up the value in the StandbyTransition attribute when the cluster application is created, GIs resources on the standby node can be switched to the "Standby" state and the state of the GIs resources on the standby node can be monitored. For information on how to make this setting, see 6.7.2.1 "Creating Standby Cluster Applications."

6.7.3.5 Setting Up Procedure Resources

The procedure resource setting is used to register the state transition procedure resource of the products supported by PRIMECLUSTER in userApplication.

[Prerequisites]

To create a procedure resource, you must first create a state transition procedure and register the procedure to the resource database.

For details, see E.1 "Registering a Procedure Resource."

◆ Operation Procedure:

1. Select "CRM" from "turnkey wizard CRM."

```
Settings of turnkey wizard "CRM"
1) HELP                      10) LocalFileSystems(-)
2) -                          11) RemoteFileSystems(-)
3) SAVE+EXIT                  12) IpAddresses(-)
4) -                          13) Gds:Global-Disk-Services(-)
5) ApplicationName=APP1      14) Gls:Global-Link-Services(-)
6) Machines+Basics(appl)
7) CommandLines(-)
8) Controllers(-)
9) CRM(-)
Choose the setting to process: 9
```

2. "Crm" will appear. Select the resource class of the resource.

When the cluster resource is to be registered in the userApplication, select the resource class name for the cluster resource.

The following shows an example of registering a cluster resource of the BasicApplication class in the userApplication:

```
Crm (CRM_APP1:not yet consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) SystemState2(-)
6) SystemState3(-)
7) BasicApplication(-)
8) Application(-)
Choose the setting to process: 7
```

3. Select "AdditionalResource" from "Application detail Resource wizard."

To register multiple resources, execute steps 3 to 5 for each resource.

```
Application detail Resource wizard
1) HELP
2) NO-SAVE+RETURN
3) -
4) REMOVE+RETURN
5) AdditionalResource
Choose the setting to process: 5
```

4. The list of cluster resources will appear. Select one.



Note

If a cluster resource does not appear on this screen, it indicates that the cluster resource has not been registered in the resource database. Confirm whether the cluster resource has been registered on each node of the userApplication, which is designed with 6.7.2 "Setting Up userApplication." Register cluster resources if they

are not registered. For details on the "clgettree" command, see the manual pages of this command. For details on registering the cluster resource in the resource database, see E.1 "Registering a Procedure Resource."

```
1) HELP
2) RETURN
3) -
4) rscl
Choose the resource: 4
```

5. You can change the following on this screen. If necessary, select "SAVE+RETURN" from "Application detail Resource wizard" after that.
- Timeout value of the state transition procedure
The default value is 1,800 seconds. If you use a machine that requires more than 1800 seconds for timeout, you need to change the value by selecting "Flags[0]=OT1800."
 - Priority within the resource class
The default value is specified by -p option when the state transition procedure resource is registered with the "claddprocrsc" command. If the -p option is not specified, 65535 is used as the default value. If you register multiple resources of the same class in the cluster application and specify the order of online and offline, change this value by selecting "Priority[0]=65535" from the following screen. The resources will be online in the ascending order, and will be offline in the descending order.

```
Application detail Resource wizard
1) HELP
2) NO-SAVE+RETURN
3) SAVE+RETURN
4) REMOVE+RETURN
5) AdditionalResource
6) ResourceName[0]=rscl
7) Flags[0]=OT1800
8) Priority[0]=65535
Choose the setting to process: 3
```

6.7.4 Generate and Activate

This section explains how to execute Generate and Activate. You need to confirm first that the cluster application has been correctly created.

◆ Operation Procedure:

1. Select "Configuration-Generate" from the "Main RMS management menu."

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                      11) Configuration-Freeze
3) Application-Create        12) Configuration-Thaw
4) Application-Edit          13) Configuration-Edit-Global-Settings
5) Application-Remove        14) Configuration-Consistency-Report
6) Application-Clone         15) Configuration-ScriptExecution
7) Configuration-Generate    16) Configuration-Push-Disabled
8) Configuration-Activate    17) RMS-CreateMachine
9) Configuration-Copy        18) RMS-RemoveMachine
Choose an action: 7

```

2. Select "Configuration-Activate" from the "Main RMS management menu."

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                      11) Configuration-Freeze
3) Application-Create        12) Configuration-Thaw
4) Application-Edit          13) Configuration-Edit-Global-Settings
5) Application-Remove        14) Configuration-Consistency-Report
6) Application-Clone         15) Configuration-ScriptExecution
7) Configuration-Generate    16) Configuration-Push-Disabled
8) Configuration-Activate    17) RMS-CreateMachine
9) Configuration-Copy        18) RMS-RemoveMachine
Choose an action: 8

```

6.7.5 Attributes



See

For information on the attributes, see "13 Appendix - Attributes" in the "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

6.7.6 Exclusive Relationships Between Cluster Applications

Set up exclusive relationships for the cluster applications to prevent cluster applications with exclusive relationships from operating simultaneously. An exclusive relationship can be set up only between standby cluster applications. If failover occurs, determine the cluster applications that should continue operating by using the job priority of the cluster applications between which an exclusive relationship is set.

Exclusive control is established between cluster applications within a single group.



Information

- To set up an exclusive relationship, create a group of cluster applications between which

an exclusive relationship is to be set. Up to 52 groups can be created.

- For information on setting up an exclusive relationship, see 6.7.2.1 "Creating Standby Cluster Applications."

The operation of cluster applications, between which an exclusive relationship is set up, during failover can be explained in the following two cases:

- When the job priorities are different
- When the job priorities are the same

The example below explains the exclusive relationship between cluster applications within a single group. Even when there are multiple groups, the operation within a single group is the same.

■ When the job priorities of the cluster applications with an exclusive relationship are different

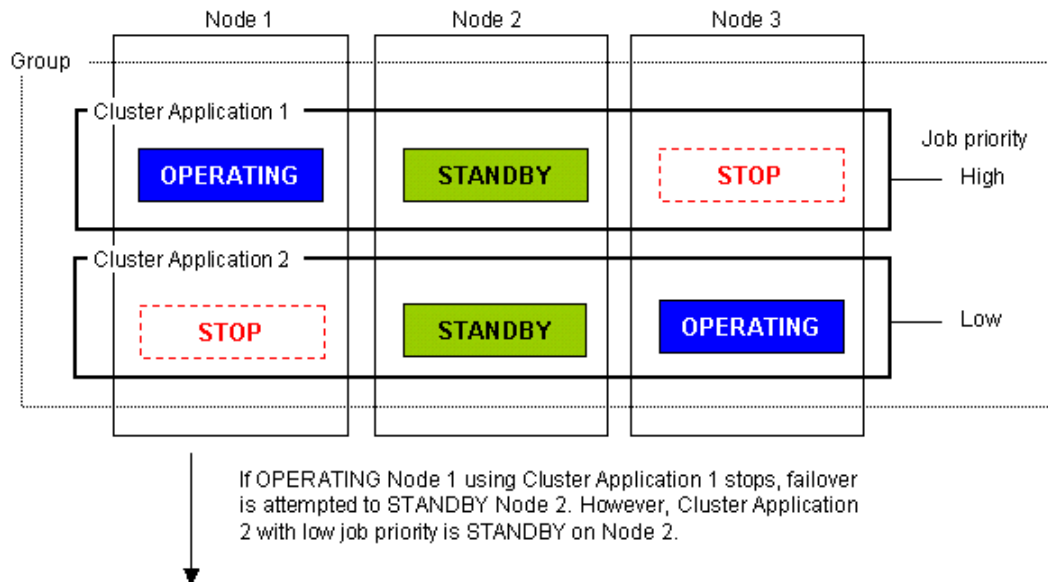
Cluster applications with the highest job priority take the top priority for startup on the nodes on which the cluster applications with high job priority are running or on the nodes to which the cluster applications with high job priority are failed over. Therefore, cluster applications with low priorities under a startup will be forcibly exited.

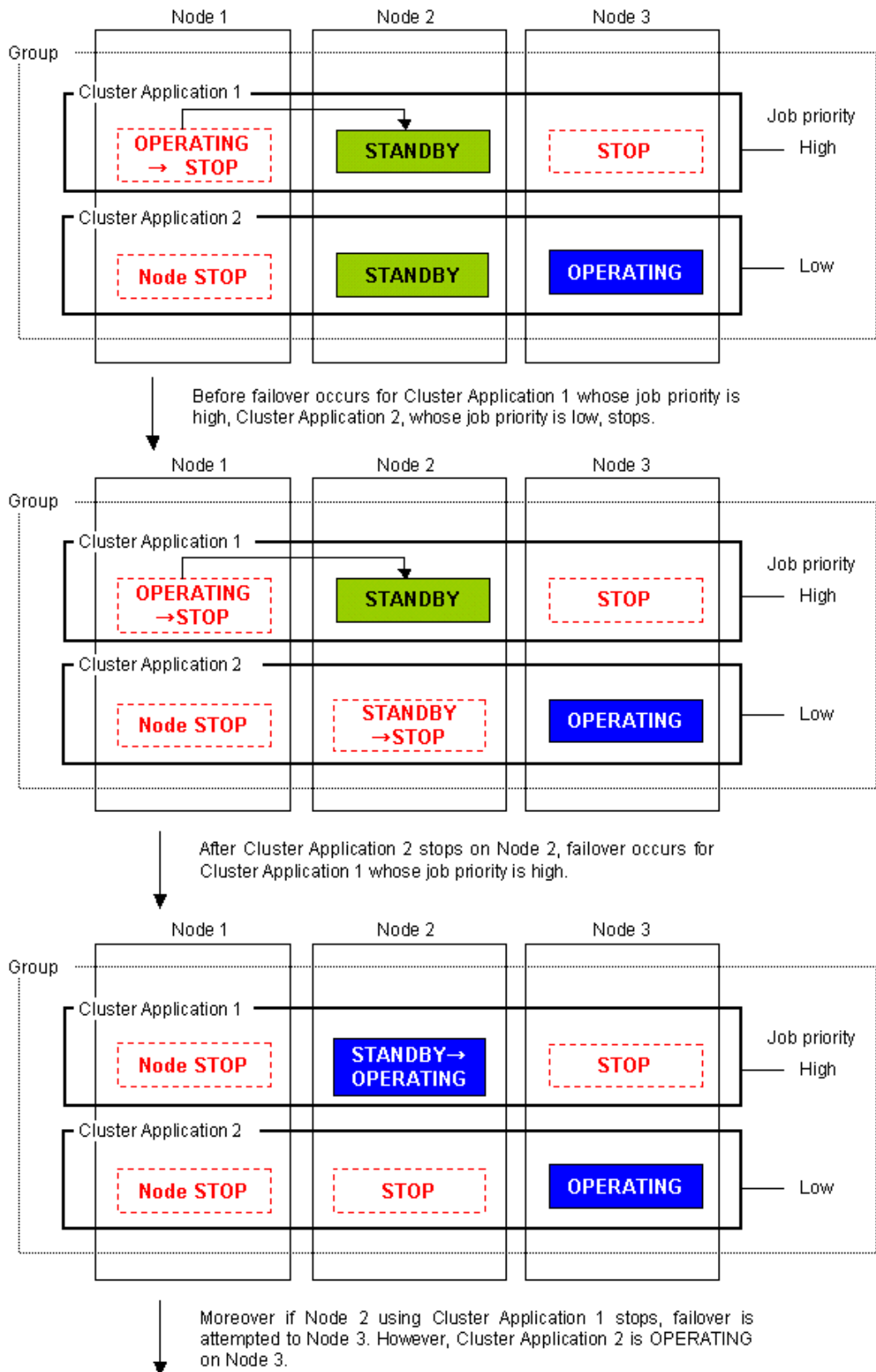
The states indicated in the following figure are as follows:

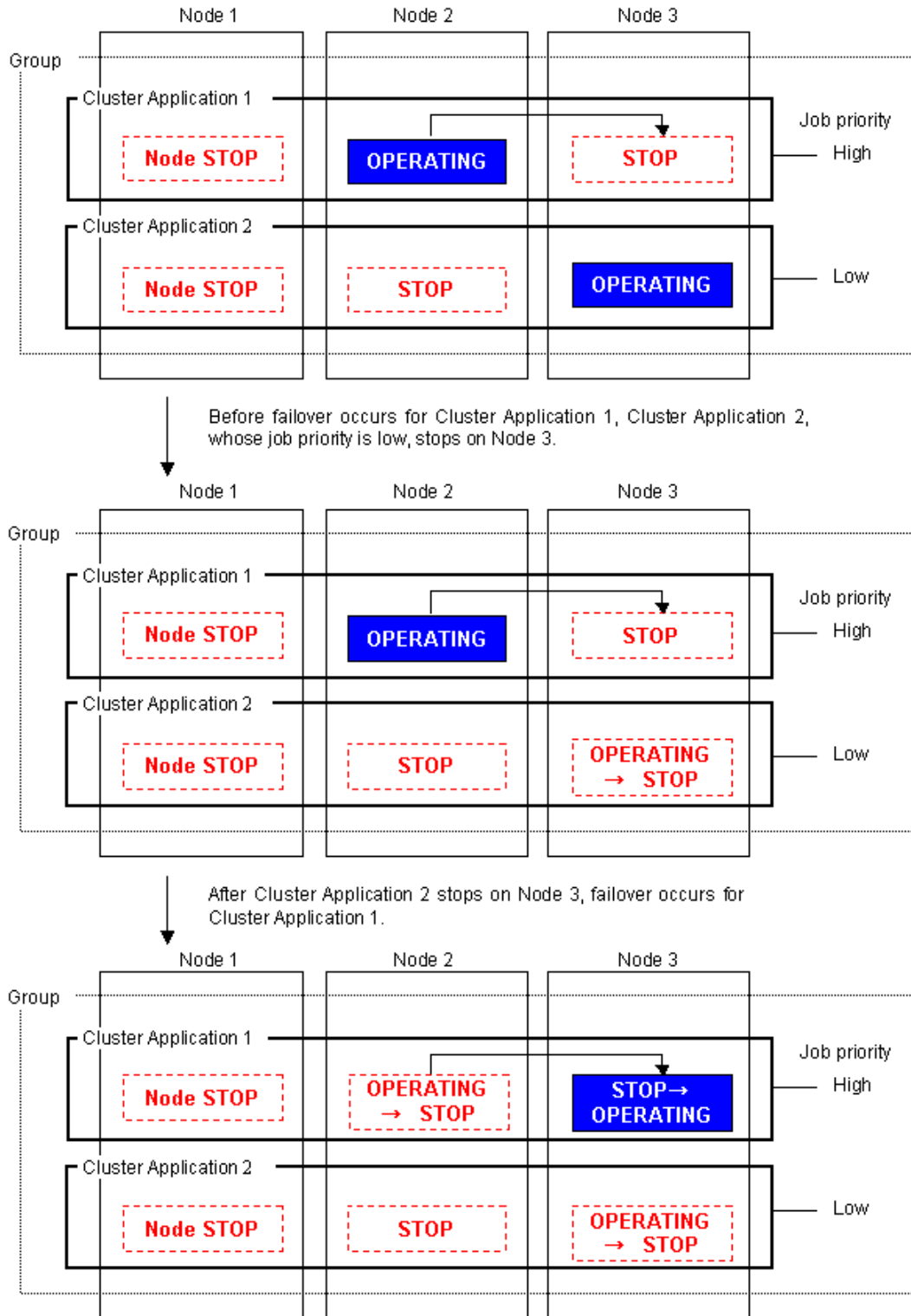
- OPERATING: The cluster application is in the Online state.
- STANDBY: The cluster application is in the Standby state.
- STOP: The cluster application is in the Offline state.

● Failover of the cluster application with a high job priority

If failover occurs in a cluster application with a high job priority, the cluster application with the high job priority will always be in the operating state.

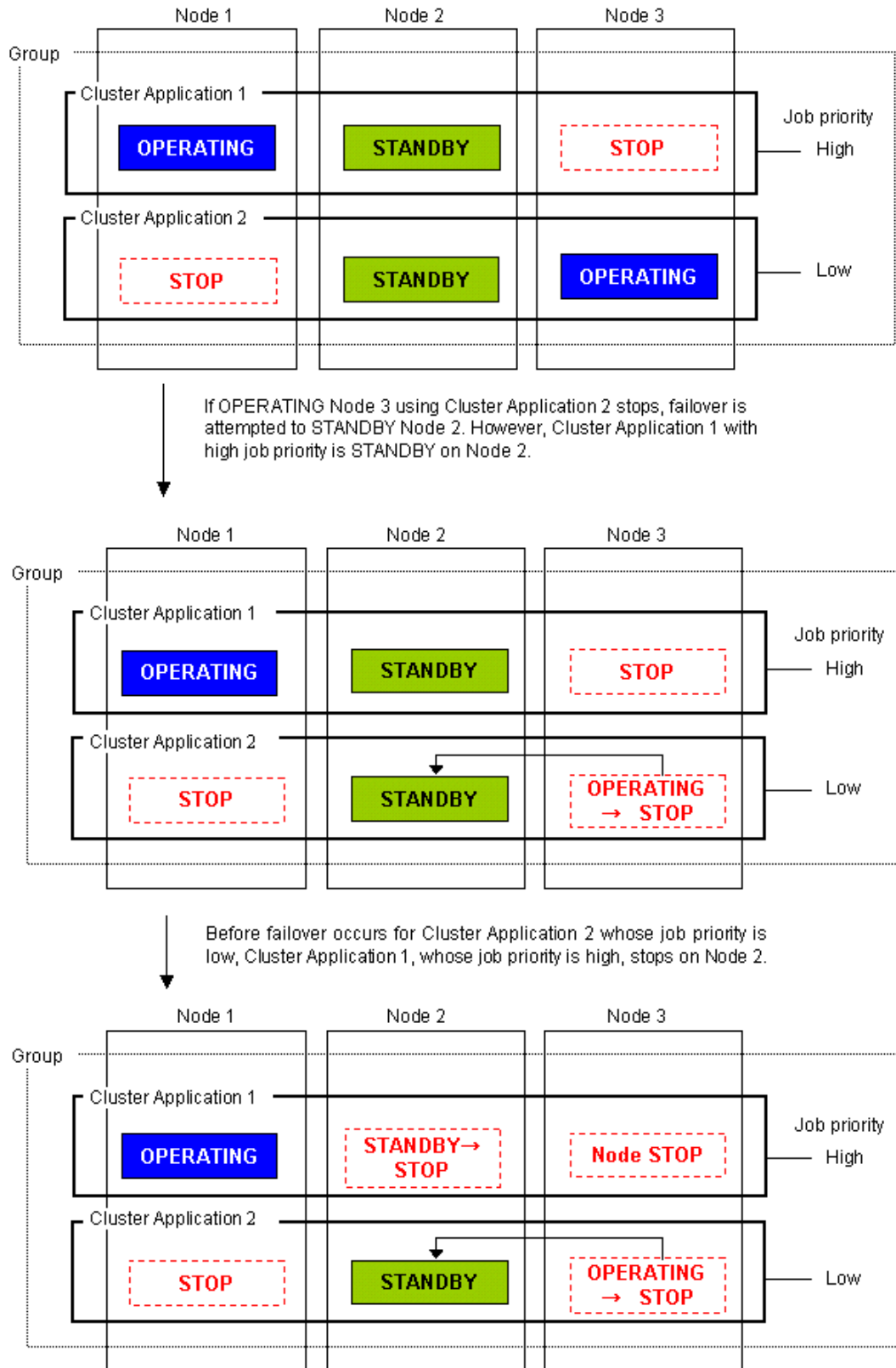


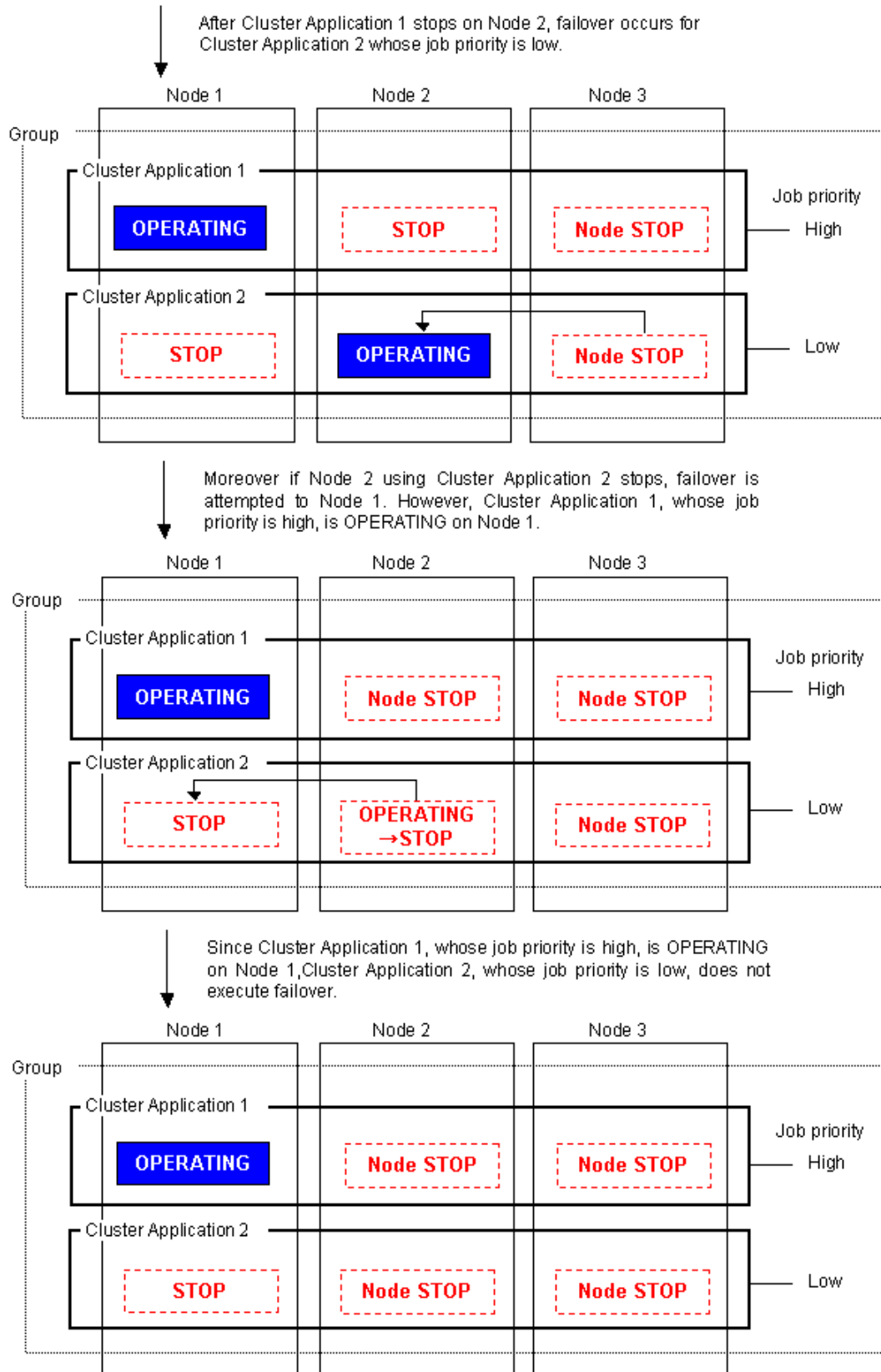




- **Failover of the cluster application with a low job priority**

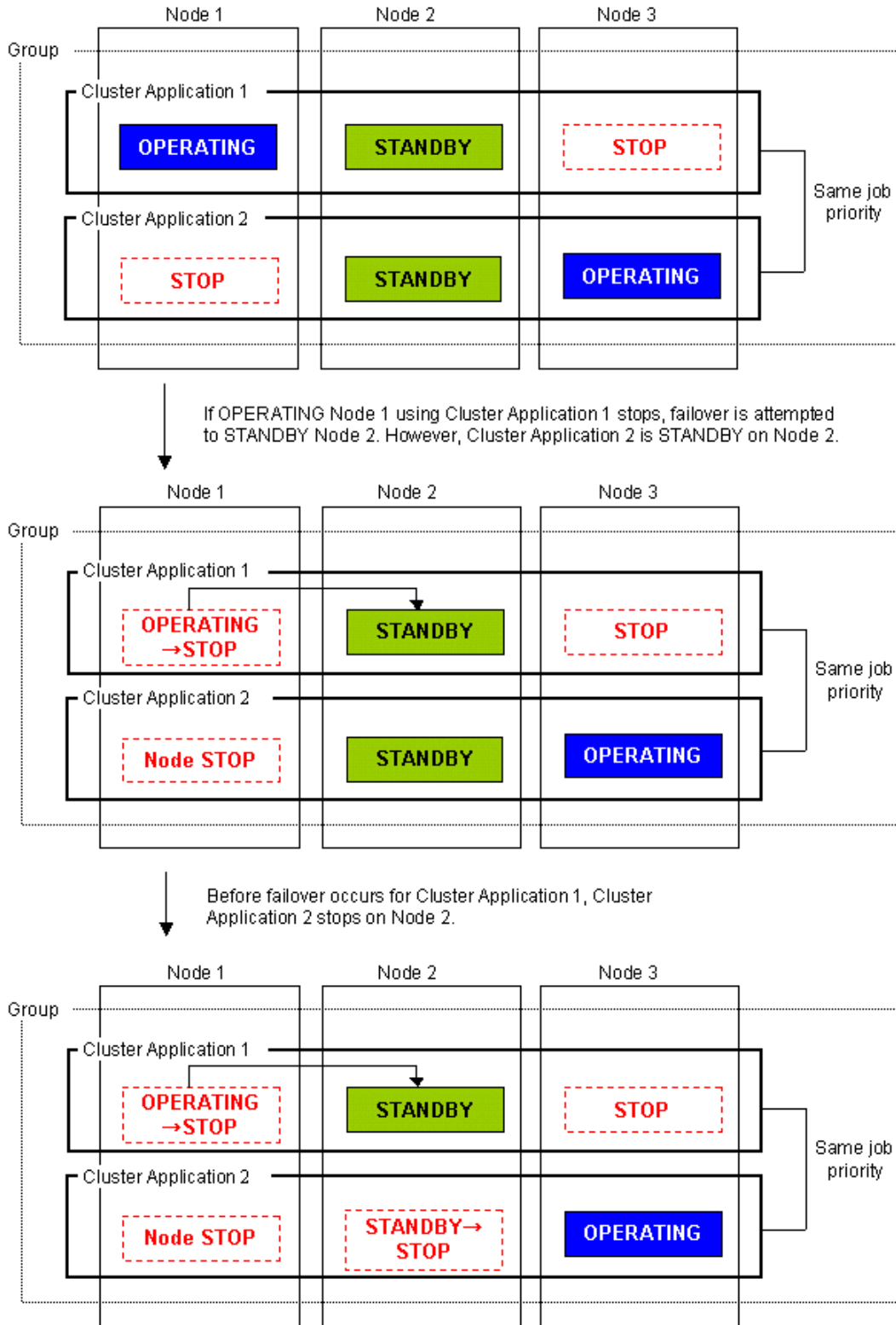
Failover occurs for a cluster application with a low job priority only when there is no cluster application with a high job priority included on the node to which the cluster application with a low job priority is to be failed over.

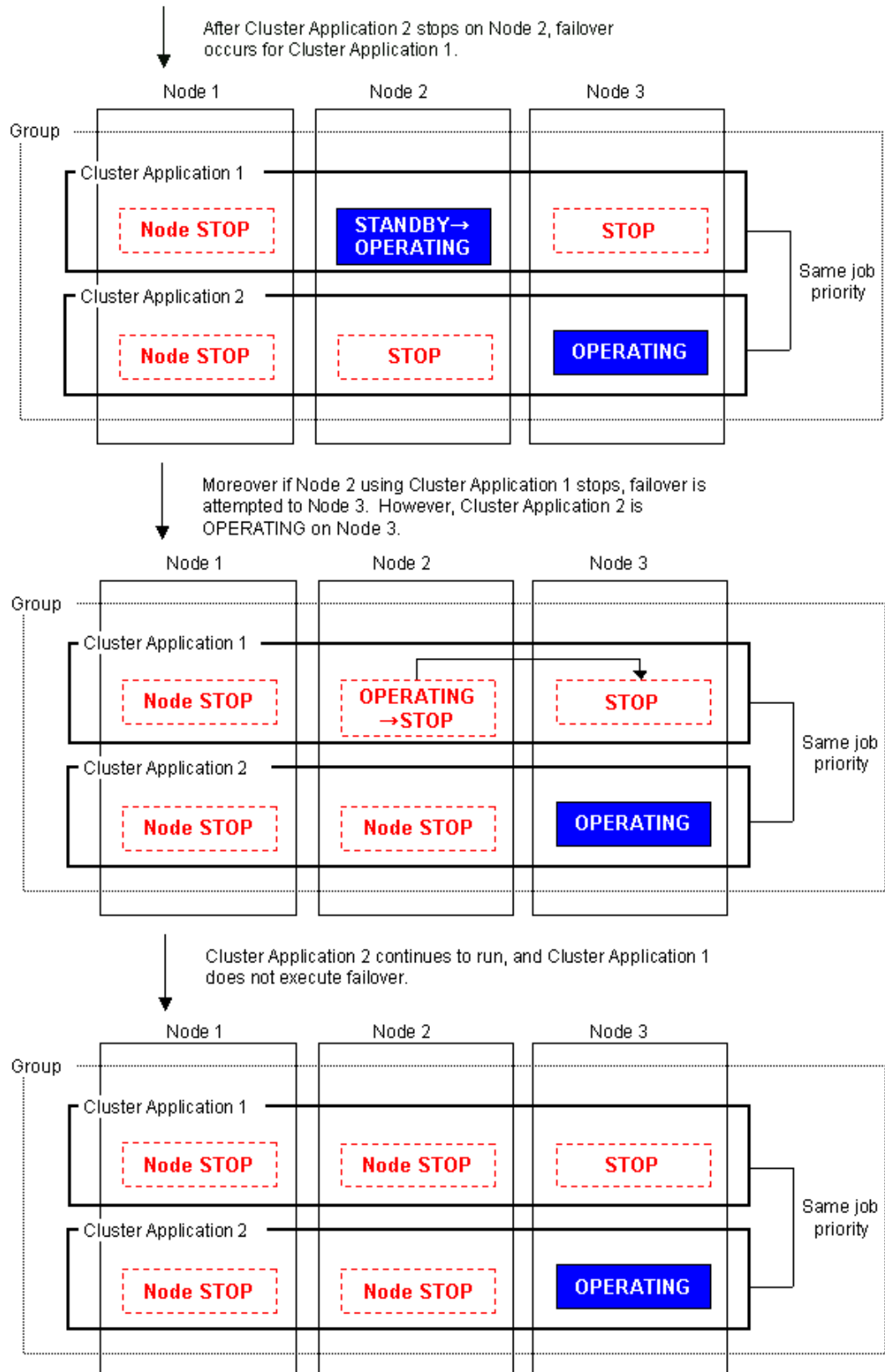




■ **When the job priorities of cluster applications with an exclusive relationship are the same**

The operation of the cluster applications that are already running will be continued. On the node on which cluster applications are already running, cluster applications that subsequently start up will be stopped.





Part 3 Operations

Chapter 7 Operations

This chapter describes the functions that manage PRIMECLUSTER system operations.
The following user groups are allowed to do each specific operation:

Operation	Target
Referring the operation management screens	All user groups
Operations	wvroot, clroot, cladmin
Monitoring	All user groups
Corrective actions for resource failures	wvroot, clroot, cladmin

7.1 Viewing the PRIMECLUSTER System Operation Management Screens

PRIMECLUSTER provides GUIs for viewing and performing cluster system operations.

- CF main window
Use this screen to set up the configuration of the nodes that make up the cluster, manage the nodes, and display the node state.
- CRM main window
The states of the resources that are managed with the cluster resource management facility are displayed.
- RMS main window
Use this screen to monitor the state of the cluster system and to manage cluster applications and resources.
- MSG main window
This screen displays messages for cluster control.

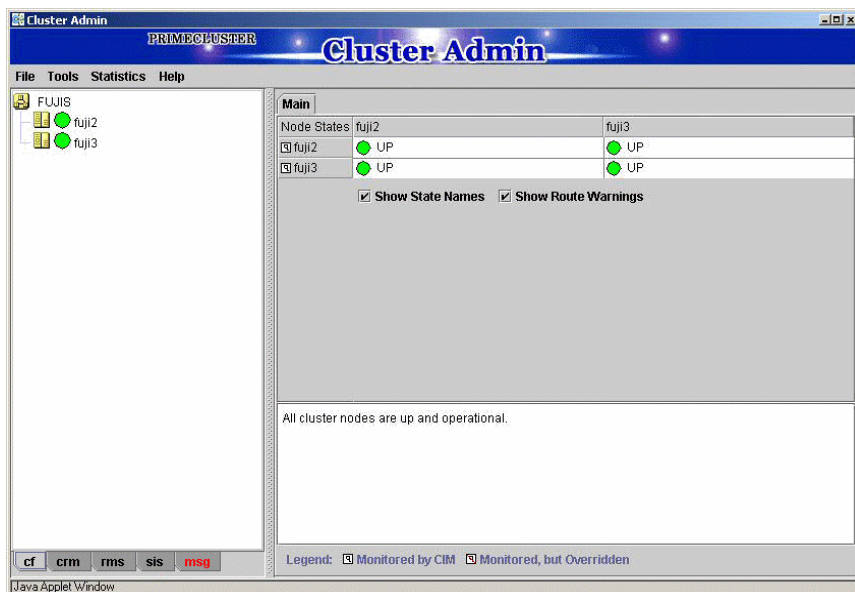


See

For instructions on displaying each screen, see 4.5.3 "Cluster Admin Functions."

7.1.1 CF Main Window

The CF main window allows you to set up the configuration of the cluster nodes in the cluster, manage the nodes, and display the node state.



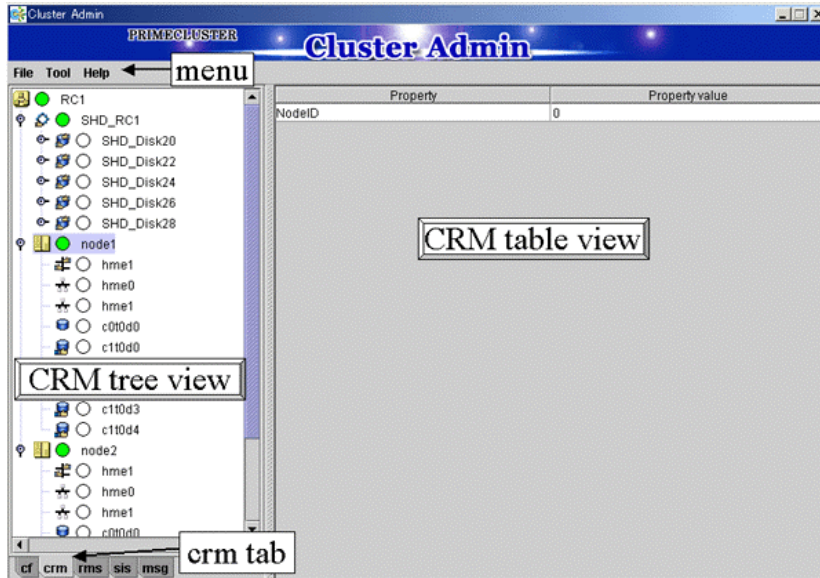
See

For details, see "5 GUI administration" in "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."

7.1.2 CRM Main Window

When you monitor the state of the PRIMECLUSTER system, the CRM main window allows you to view the states of the resources managed by the cluster resource management facility and identify failed hardware.

This section describes resource states and operation methods related to hardware resources.



The CRM main window is a screen of the cluster resource monitoring facility. See "crm" in 4.5.3 "Cluster Admin Functions."


7.1.2.1 Displayed Resource Types








This section shows the resources associated with the hardware resources that are displayed in the CRM main window.




The detailed resource information lists the icons that are used in the CRM main window.

7.1.2.1.1 Resource Icons

This section describes the icons that are displayed in the CRM tree view.

Items that are related to resources under shared resources are displayed with overlapping  .

Icon	Resource
	Shared resource
	DISK class managed by Global Disk Services
	Local disk
	Shared disk device
	IP address
	Network interface
	Takeover network




Icon	Resource
	Resource that is not a multi-tiered resource under a shared resource Resource that is not related to a shared resource under a node and is not a multi-tiered resource
	Cluster
	Node

7.1.2.1.2 Resource States

In the CRM main window, the displayed icon types and states differ for each resource class. For each resource, an icon that indicates a failure (OFF-FAIL or ON-FAILOVER) is displayed if there is a fault in a subordinate resource. In the CRM tree view, expand the icons sequentially from cluster icon to node icons to subordinate resource icons, and identify the faulted resource. If the resource state is OFF-FAIL or ON-FAILOVER, see 7.4 "Corrective Actions for Resource Failures," and take corrective actions. If the resource state is ON, OFF-STOP, or UNKNOWN, you don't need to take any corrective actions.







Cluster states

The following cluster states are displayed.

Icon	Icon color	Outline	Details
	 Green	ON	All nodes and shared resources are operating normally.
	 Red	OFF-FAIL	One of the nodes in the state other than the ON state, or a shared resource is in the OFF-FAIL state.

Node states

The following node states are displayed.

Icon	Icon color	Outline	Details
	 Green	ON	The node has been started normally.
	 Green with vertical red lines	ON-FAILOVER	One of the resources under the node is in the Faulted state.
	 Blue	OFF-STOP	The cluster resource management facility is stopped.
	 Red	OFF-FAIL	A failure has occurred in the node.
	 White	UNKNOWN	The node has not been monitored or controlled.






Note

- If a node is LEFTCLUSTER in CF, it becomes ON in the CRM tree view.
- After you execute the "clinitreset" command to initialize the resource database, the resource states displayed in the CRM main window differ according to the actual resource states. Execute "clinitreset", reboot the nodes, and then close the browser and redisplay the screen. Execute the "clinitreset" command after removing a cluster application.






■ **Shared resource states**

The following states are displayed for shared resources.

Icon	Icon color	Outline	Details
	 Green	ON	The sub-resource under the shared resource is ON, OFF-STOP, or UNKNOWN.
	 Red	OFF-FAIL	One of the sub-resources under the shared resource is OFF-FAIL.

■ **Other resource states**

The following states are displayed for other resources.

Icon color	Outline	Details
 Green	ON	The resource is operating normally.
 Green with vertical red lines	ON-FAILOVER	The resource is operating normally, but some devices or resources that are multiplexed and managed internally are in the Faulted state.
 Blue	OFF-STOP	The resource has been stopped normally.
 Red	OFF-FAIL	The resource is in the Faulted state.
 White	UNKNOWN	The resource has not been monitored or controlled.

7.1.2.1.3 Operations

You can perform the operations described below on the CRM main window.

In the table below, "Selection resource" is the resource class name of the selectable resource. For details on resource class names, see 7.1.2.2 "Detailed Resource Information."

Operations of the CRM main window

Feature	Operation method		Target group
	Menu	Selection resource	
Build CRM resource database	<i>Tool - Initial setup</i>	None (*1)	wvroot clroot
Request Resource activation	<i>Tool - Start</i>	SDX_DC (*2)	wvroot clroot cladmin
Request Resource deactivation	<i>Tool - Stop</i>	SDX_DC (*2)	wvroot clroot cladmin
Exit Cluster Admin screen	<i>File - Exit</i>	All No selection	All
View Help	<i>Help - Content</i> (*3)	All No selection	All
View version	<i>Help - About</i>	All No selection	All

*1 Set Initial Configuration menu can be selected only if the resource database has not been set up. This menu item is not displayed in the pop-up menu.

*2 Only the disk resources that are registered to Global Disk Services are enabled.

*3 Help for the CRM main window is displayed with a separate browser from the browser that displays Help for CF, RMS, and SIS.



Note

- Only available menus are displayed in the pop-up menu.
- If there are no available menu items for the resource selected from the CRM tree view, "None" is displayed in the pop-up menu. Selecting this item will not initiate any operation.
- For information about user groups, see 4.3.1 "Assigning Users to Manage the Cluster."

- **Initial setup**

Select this item to set up the resource database to be managed by the cluster resource management facility. Select *Tool -> Initial setup* to display the Initial Configuration Setup screen. The initial configuration setup cannot be operated simultaneously from multiple clients. See 5.1.3.1 "Initial Configuration Setup."

- **Start**

This menu item activates the selected resource. The start operation is executed during maintenance work. If the selected resource is registered to a cluster application, the start operation can be executed only when that cluster application is in the Deact state. Use the RMS main window to check the cluster application state.



Note

- After completing the maintenance work, be sure to return the resource that you worked on to its state prior to the maintenance.
- If the resource that was maintained is registered to a cluster application, be sure to stop the resource before clearing the Deact state of the application.
- **Yes button**
Executes resource start processing.
- **No button**
Does not execute resource start processing.

- **Stop**

This menu item deactivates the selected resource. The stop operation is executed during maintenance work. If the selected resource is registered to a cluster application, the startup operation can be executed only when that cluster application is in the Deact state. Use the RMS main window to check the cluster application state.



Note

- After completing the maintenance work, be sure to return the resource that you worked on to its state prior to the maintenance.
- If the resource that was maintained is registered to a cluster application, be sure to stop the resource before clearing the Deact state of the application.
- **Yes button**
Executes resource stop processing.
- **No button**
Does not execute resource stop processing.



Note

If a message is displayed during operating at the CRM main window and the frame title of





the message dialog box is "Cluster resource management facility," then see the following references for information:



- "PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide"
 - "10.10 Resource Database messages"
- Appendix D in this manual
 - D.5.2 "Failed Resource and Operator Intervention Messages (GUI)"

7.1.2.2 Detailed Resource Information

This section describes the resource attributes that are defined in the CRM main window.

Detailed resource information

Icon/ resource class name	Attributes	Meaning/attribute value (Top: Meaning, Bottom: Attribute value)
 Node	NodeID	Node identifier number.
		Node identifier number (0 to 127).
 DISK	Disk_Attr	This item indicates the physical connection mode and usage mode of a disk that can be used from the cluster system.
		<p>LOCAL Local disk that can be accessed only from one node</p> <p>SHD_DISK The disk is physically shared, but the usage mode (shared disk or switchover disk) is not specified.</p> <p>SHD_SHARE Shared disk that can be accessed from multiple nodes</p> <p>SHD_SWITCH Switching disk that is used exclusively between two nodes</p> <p>Blank The disk connection or usage mode is not set up.</p>
 SHD_DISK, SHD_MPD isk	Disk_Attr	This item indicates the physical connection mode and usage mode of a disk that can be used from the cluster system.
		<p>SHD_DISK The disk is physically shared, but the usage mode (shared disk or switchover disk) is not specified.</p> <p>SHD_SHARE Shared disk that can be accessed from multiple nodes</p> <p>SHD_SWITCH Switching disk that is used exclusively between two nodes</p>
 SDX_DC, SDX_SHD DC	Disk_Attr	This class indicates the physical connection mode and usage mode of a GDS-managed disk class that can be used from the cluster system.
		<p>SHD_DISK The disk is physically shared, but the usage mode (shared disk or switchover disk) is not specified.</p> <p>SHD_SHARE Shared disk class that allows access from multiple nodes</p> <p>SHD_SWITCH Switching disk class for exclusive use between two nodes</p>

Icon/ resource class name	Attributes	Meaning/attribute value (Top: Meaning, Bottom: Attribute value)
 Ethernet	node_name	This item indicates the name of the node in which this LAN board is set. The node name is set.
	WebView	This item indicates the network interface to be used by Web-Based Admin View. If Web-Based Admin View is being used, USE is set. If not, UNUSE is set.
 SHD_Host	ip_addr	This item indicates the takeover IP address. The takeover IP address information is set in the format XXX.XXX.XXX.XXX. If IP address takeover has not been set, this item is blank.

7.1.3 RMS Main Window

The RMS main window consists of the following elements:

- RMS tree
- Configuration information or object attributes
- Switchlogs and application logs

7.1.3.1 RMS Tree

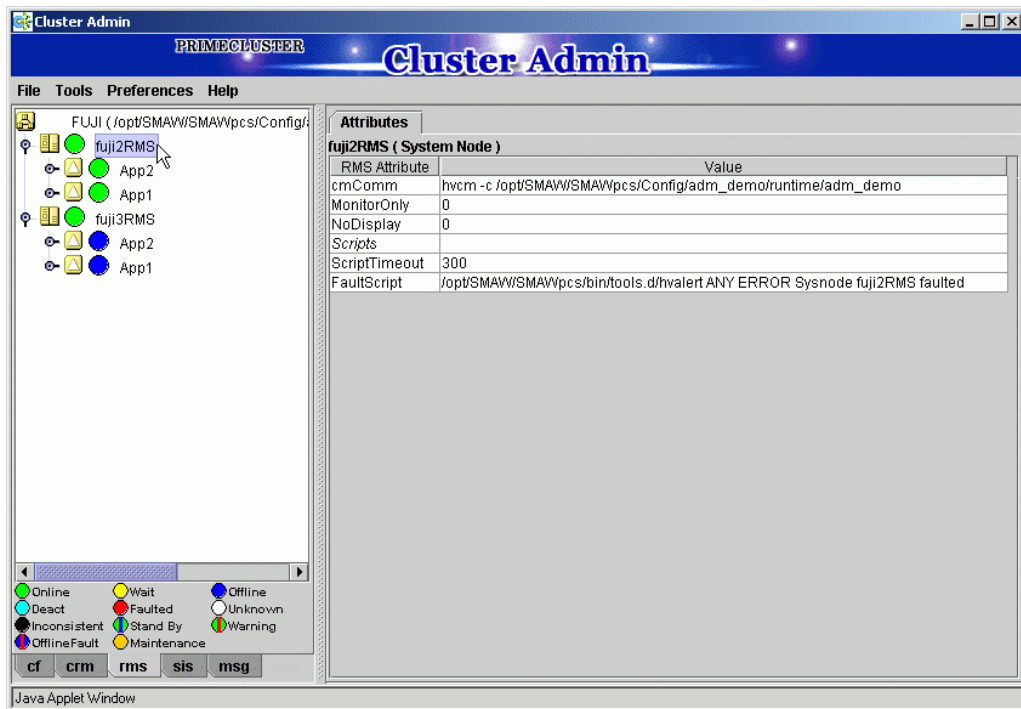
The RMS tree displays the configuration information of the cluster in a hierarchical format. The tree has the following levels:

- Root of the tree - Represents the cluster.
- First level - Represents the system nodes in the cluster.
- Second level - Represents the userApplication objects running on each of the system nodes.
- Third level - Represents the sub-applications (an aggregation of objects if any exist).
- Fourth level - Represents the resources required for each of the sub-applications.

If an application has sub-applications, the fourth level represents resources used by that sub-application. If an application does not have sub-applications, then the third level represents all the resources used by userApplication.

Dependency relationships between cluster applications are indicated by controller objects in the RMS tree.

RMS main window



■ Meanings of object icons

Icon	Meaning
	Represents the cluster.
	Represents a node.
	Represents a parent object (cluster application) that has a child object.
	Represents a child object (cluster application or resource).
	Represents a leaf object (cluster application or resource). A leaf object is an object that cannot have a child object.
	Represents a controller object (cluster application). This object controls an object of another cluster application.

■ Meanings of state display icons






On the right side of the object icons shown above is displayed a color-coded circle that indicates the state of each object. This section describes the meaning of the colored circles (state display icons).



State display icons are not displayed in cluster icons. Instead, the RMS cluster table can be displayed. For details, see 7.3.3 "Concurrent Viewing of Node and Cluster Application States."














◆ **Node state display**

The state icons that are displayed in nodes are shown below.

Icon	Icon color	Outline	Details
 Node	 Green	Online	Node is enabled and ready for use.
	 Blue	Offline	Node is enabled but RMS is disabled.
	 Red	Faulted	Node is disabled. <ul style="list-style-type: none"> • If the node is shutdown normally, "Shutdown" appears in the SysNode state detailed information (as the value of the StateDetails attribute). • If the node is shutdown abnormally, "Killed" appears in the SysNode state detailed information (as the value of the StateDetails attribute).
	 Yellow	Wait	Node is undergoing a state transition.

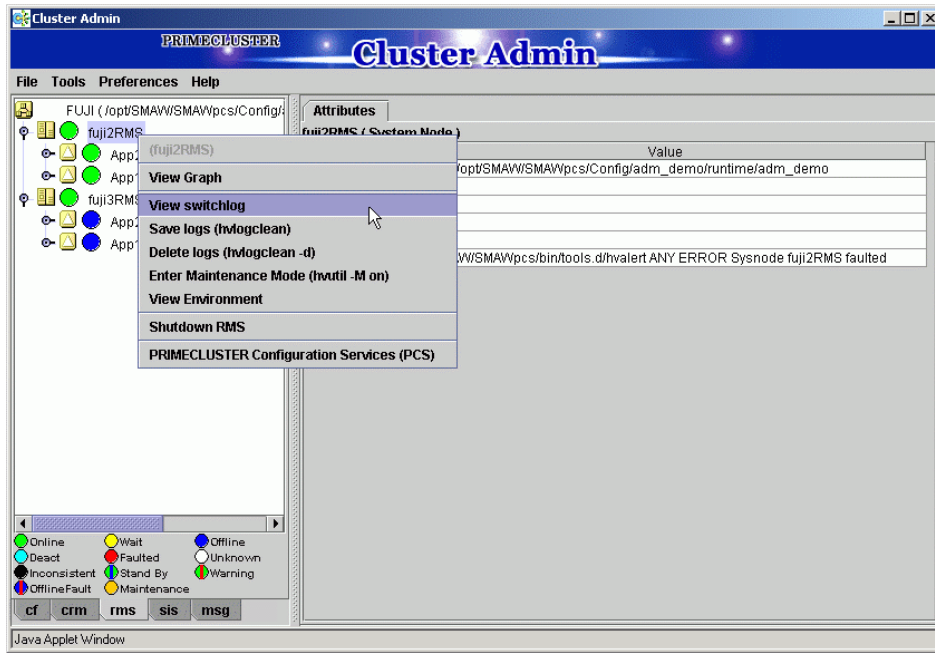
◆ **State display of other objects**

The following state icons are displayed with object icons that fall under parent objects.

Icon	Icon color	Outline	Details
 Parent object	 Green	Online	Object is enabled and ready for use.
	 Green with vertical red lines	Warning	Object has exceeded some warning threshold.
 Child object	 Blue	Offline	Object is disabled and should not be used.
	 Red	Faulted	Object encountered an error condition.
 Controller object	 White	Unknown	Monitoring and control are not being executed for the object.
	 Yellow	Wait	Node is undergoing a state transition.
 Leaf object	 Sky blue	Deact	Node is deactivated because of maintenance, etc.
	 Black	Inconsistent	Node state is inconsistent.
	 Green with vertical blue lines	Stand By	Object is in such a state that it can be quickly brought Online when needed.

■ **Pop-up menu**

If you right-click an object in the RMS tree, a pop-up menu lists the operations for that object. You can also use this menu for monitoring the state.



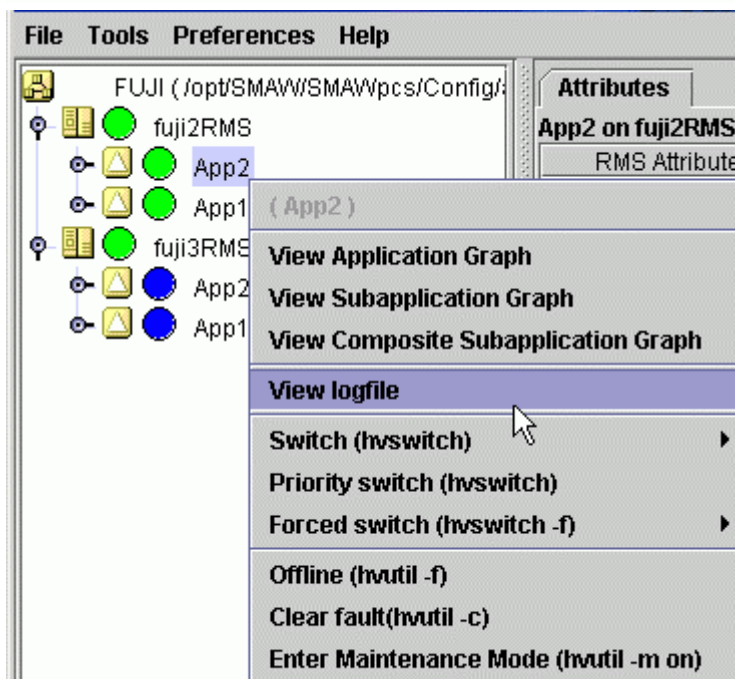
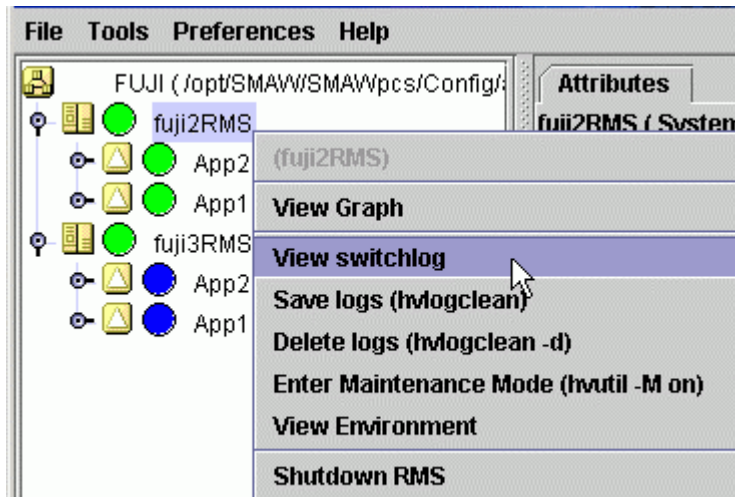
7.1.3.2 Configuration information or object attributes

View the configuration information for the individual objects by left-clicking the object in the RMS tree. The properties are displayed in a tabular format on the right-hand side panel of the RMS main window.

7.1.3.3 Switchlogs and application logs

Each node has a log file referred to as the switchlog. In this file, switchover requests and node failures are recorded. The switchlog is displayed in a tab on the right-side panel.

Display the application log by right-clicking on an application on the RMS tree and choosing *View Application Log*.



7.2 Operating the PRIMECLUSTER System

7.2.1 RMS Operation

To monitor RMS, RMS needs to be activated.

To stop multiple nodes at the same time, you must stop the user applications and RMS.



Note

To stop two or more nodes at the same time, it is necessary to first stop RMS.

Note that the user application is also stopped when you stop RMS. For instructions on stopping RMS, see 7.2.1.2 "Stopping RMS."

The sections below explain how to start and stop RMS.

7.2.1.1 Starting RMS

This section explains how to start RMS.

◆ Operation Procedure:

From the top screen of Web-Based Admin View, open Cluster Admin according to the following procedure:

1. Select Global Cluster Services.
2. Click *Cluster Admin* to switch to the cluster menu.
3. Select the *rms* tab.
4. Start RMS.
 - 1) Use the *Tools* pull-down menu of the RMS main window, and click *Start RMS -> all available nodes*. When the confirmation screen is displayed, click *Ok*.
 - 2) To specify an option for the RMS start command, click the *Option* box.

You can also start RMS on one or all nodes using the command pop-up as follows:

- 1) Choose either one node or all the nodes from the pop-up window.
- 2) To specify an option for the RMS start command, click the *Option* box.



See

See "4.14 Starting RMS" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

7.2.1.2 Stopping RMS

This section explains how to stop RMS.

◆ Operation Procedure:

1. Use the *Tool* pull-down menu on the RMS main window or right-click the system node, and then select the shutdown mode on the screen that appears next.
 - 1) Choose either a specific node or all the nodes.
 - 2) Choose to stop all cluster applications, leave the applications running, or forcibly shutdown the node(s).



See

See "4.1 Stopping RMS" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

7.2.2 Cluster Application Operations

This section explains how to change the operation state of the PRIMECLUSTER system. The operations include starting and stopping a cluster application.

7.2.2.1 Starting a Cluster Application

The procedure for starting a cluster application is described below.

◆ **Operation Procedure:**

1. On the RMS tree in the RMS main window, right-click the cluster application to be started, and select *Online* from the pop-up menu that is displayed.
The cluster application will start.



Information

You can also display the pop-up menu by right-clicking the target icon in an RMS graph or the RMS cluster table. For details on RMS graphs and the RMS cluster table, see 7.3.5 "Viewing Detailed Resource Information" and 7.3.3 "Concurrent Viewing of Node and Cluster Application States."

7.2.2.2 Stopping a Cluster Application

The procedure for stopping a cluster application is described below.

◆ **Operation Procedure:**

1. On the RMS tree in the RMS main window, right-click the cluster application to be stopped, and select *Offline* from the displayed pop-up menu.
The cluster application will stop.



Information

You can also display the pop-up menu by right-clicking the target icon in an RMS graph or the RMS cluster table. For details on RMS graphs and the RMS cluster table, see 7.3.5 "Viewing Detailed Resource Information" and 7.3.3 "Concurrent Viewing of Node and Cluster Application States."

7.2.2.3 Switching a Cluster Application

The procedure for switching a cluster application is described below.

◆ **Operation Procedure:**

1. Right-click on the application object and select the *Switch* menu option.
A pull-down menu appears listing the available nodes for switchover.
2. Select the target node from the pull-down menu to switch the application to that node.

**Information**

You can also display the pop-up menu by right-clicking the target icon in an RMS graph or the RMS cluster table. For details on RMS graphs and the RMS cluster table, see 7.3.5 "Viewing Detailed Resource Information" and 7.3.3 "Concurrent Viewing of Node and Cluster Application States."

7.2.2.4 Bringing Faulted Cluster Application to Online State

The procedure for bringing a Faulted cluster application to Online is described below

◆ **Operation Procedure:**

1. Right-click on the cluster application object in the RMS tree, and select *Clear Fault*.
If you clear Fault while the cluster application is Online, RMS brings the faulted resource Online.
If you clear Fault while the cluster application is Offline, RMS brings the faulted resource Offline.

**Information**

You can also display the pop-up menu by right-clicking the target icon in an RMS graph or the RMS cluster table. For details on RMS graphs and the RMS cluster table, see 7.3.5 "Viewing Detailed Resource Information" and 7.3.3 "Concurrent Viewing of Node and Cluster Application States."

7.2.2.5 Clearing the Wait State of a Node

The procedure for clearing the Wait state of a node is described below.

◆ **Operation Procedure:**

1. Right-click on the system node and select the "Online" or "Offline" option from the pop-up menu.

**Note**

If you clear the Wait state of a system node manually with the GUI, hvutil -u SysNode, or cftool -k, then RMS, SF, and CF assume that you have already checked that the target node is stopped.

If you clear the Wait state when the node has not been stopped, this may lead to the data corruption.

**Information**

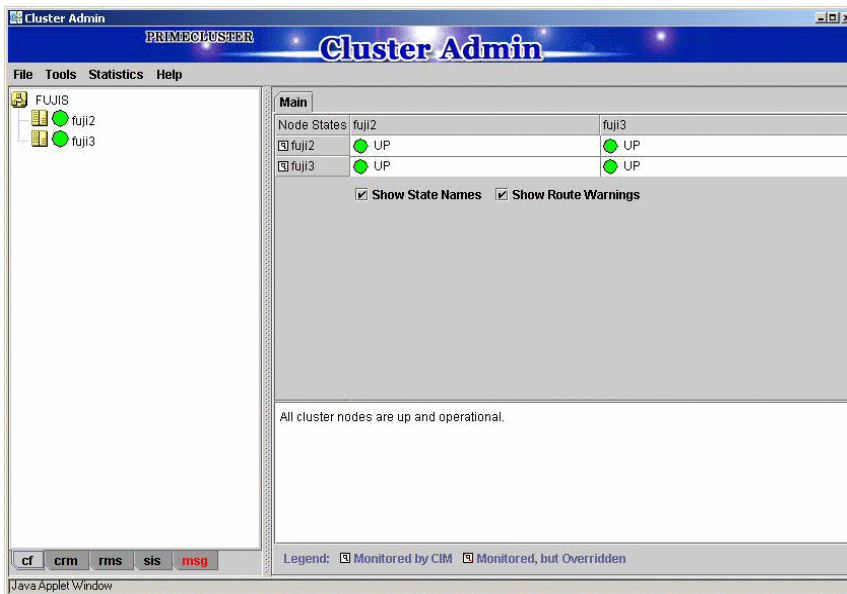
You can also display the pop-up menu by right-clicking the target icon in an RMS graph or the RMS cluster table. For details on RMS graphs and the RMS cluster table, see 7.3.5 "Viewing Detailed Resource Information" and 7.3.3 "Concurrent Viewing of Node and Cluster Application States."

7.3 Monitoring the PRIMECLUSTER System





This section describes how to monitor the state of a cluster application or node from the Cluster Admin screen.

7.3.1 Monitoring the State of a Node

Click a node on the CF tree. The node state will appear in the right panel.

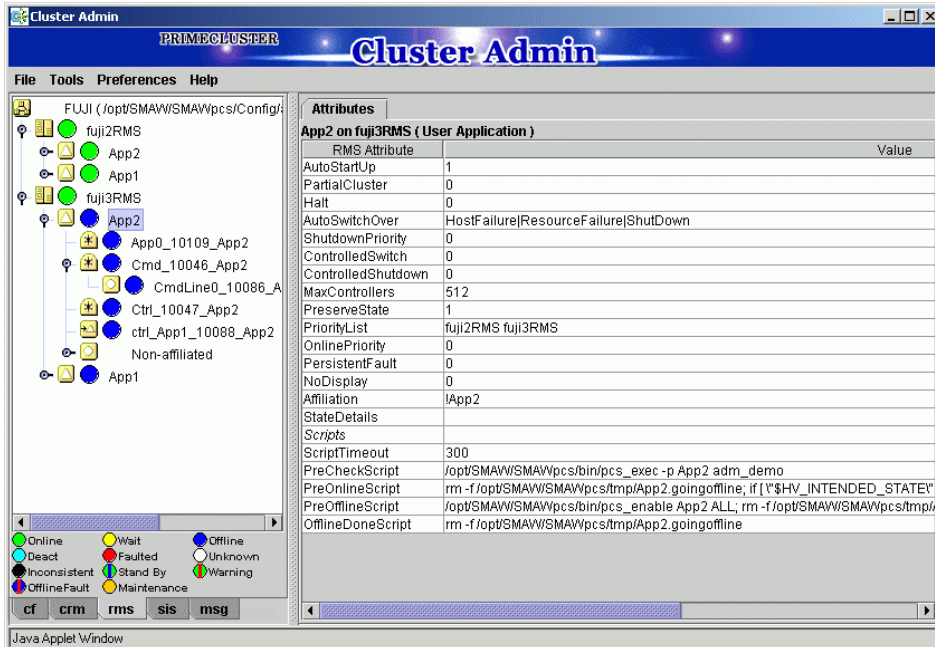


The node indicates one of the following states:

CF state	Description
 Green	UP The node is up and part of this cluster.
 Blue	DOWN The node is down and not in the cluster.
 White	UNKNOWN The reporting node has no opinion on the reported node.
 Red	LEFTCLUSTER The node has left the cluster unexpectedly, probably from a crash. To ensure cluster integrity, it will not be allowed to rejoin until marked DOWN.

7.3.2 Monitoring the State of a Cluster Application

When you display a cluster application in an RMS tree, the cluster application state appears to the right of the icon. The right panel displays the properties of the cluster application.



The screenshot shows the Cluster Admin application window. The left pane displays the RMS tree with a cluster application selected. The right pane shows the 'Attributes' for the selected application, 'App2 on fuji3RMS (User Application)'. Below the attributes is a table with the following data:

RMS Attribute	Value
AutoStartUp	1
PartialCluster	0
Halt	0
AutoSwitchOver	HostFailure ResourceFailure ShutDown
ShutdownPriority	0
ControlledSwitch	0
ControlledShutdown	0
MaxControllers	512
PreserveState	1
PriorityList	fuji2RMS fuji3RMS
OnlinePriority	0
PersistentFault	0
NoDisplay	0
Affiliation	!App2
StateDetails	
Scripts	
ScriptTimeout	300
PreCheckScript	/opt/SMAW/SMAWpcs/bin/pcs_exec -p App2 adm_demo
PreOnlineScript	rm -f /opt/SMAW/SMAWpcs/tmp/App2.goingoffline; if ["\$HV_INTENDED_STATE" = "Offline"]; then
PreOfflineScript	/opt/SMAW/SMAWpcs/bin/pcs_enable App2 ALL; rm -f /opt/SMAW/SMAWpcs/tmp/
OfflineDoneScript	rm -f /opt/SMAW/SMAWpcs/tmp/App2.goingoffline

At the bottom of the window, there is a legend for application states: Online (green circle), Deact (cyan circle), Inconsistent (black circle), OfflineFault (red circle), Wait (yellow circle), Faulted (red circle), Stand By (green circle), Maintenance (yellow circle), Offline (blue circle), Unknown (white circle), and Warning (red circle). Below the legend are buttons for 'cf', 'crm', 'rms', 'sis', and 'msg'.

The cluster application shows one of the following states:

- Online
- Offline
- Unknown
- Wait
- Deact
- Inconsistent
- Faulted
- Stand By



See

See "State display of other objects" in 7.1.3.1 "RMS Tree."

7.3.3 Concurrent Viewing of Node and Cluster Application States

To view the states of the nodes and cluster applications concurrently, display the RMS cluster table.

Right-click the cluster icon on the RMS tree, and select *View Cluster Wide Table* from the displayed pop-up menu. The RMS cluster table is displayed as shown below.

- **RMS clusterwide table**

Applications	fuji2	fuji3
app1		
app2		

Show State Names

The first line shows the names of the nodes that RMS is managing (fuji2 and fuji3 in the example above). To the left of each node name is a state display icon that shows the state of that node.

The second and subsequent lines show the names of all cluster applications that RMS is managing and the states of those applications.

The RMS cluster table enables you to display the states of nodes and cluster applications in one table.

- **Viewing the RMS Cluster Table**

If the background color of the cluster application name is the same as that of the background of the window

It indicates that the cluster application is online.

If the background of the cluster application name is pink

This condition indicates that the cluster application is in the Faulted state and a failure has occurred in one or more SysNode.

If the background of the cluster application name is sky blue

This condition indicates that the cluster application is in the Offline state.

If the state display icon of a cluster application is enclosed in a rectangle

This condition indicates that the node has the highest priority among those nodes that configure the cluster application. If the cluster application is started after creating the cluster application, the node in a rectangle will be in the Online state.

Displaying/hiding state names

Select the *Show State Names* checkbox to display state names to the right of the state display icons.



See

For details on the RMS cluster table, see "5.2.6 RMS clusterwide table" in

"PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."

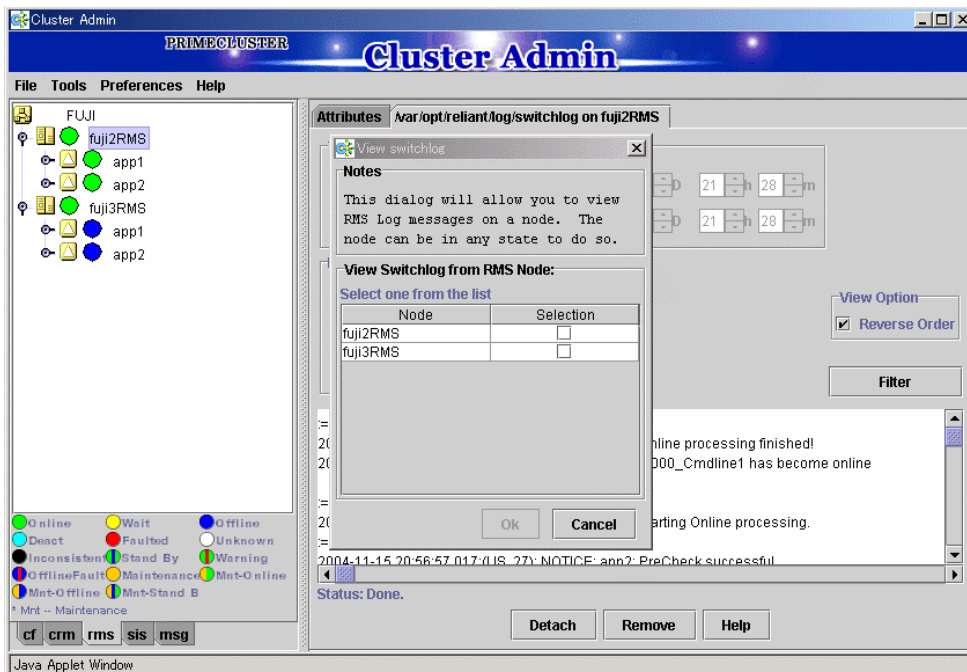
7.3.4 Viewing Logs Created by the PRIMECLUSTER System

There are two types of logs that can be viewed in the PRIMECLUSTER system:

- Switchlog
The switchover requests or failures that occur in nodes are displayed.
- Application log
The operation log of the cluster application is displayed.

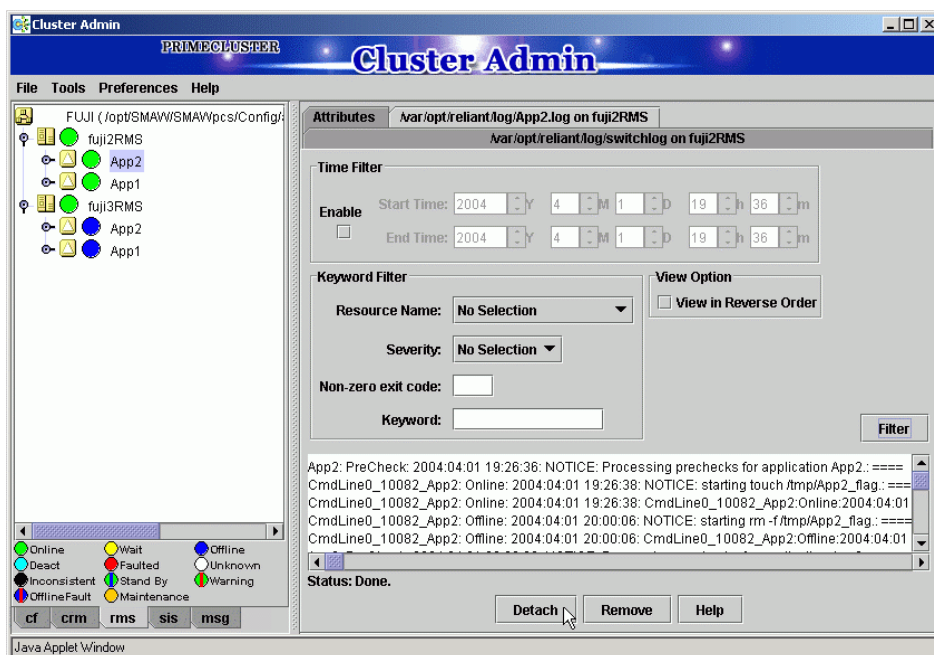
7.3.4.1 Viewing switchlogs

Right-click the system node and select the *View Switchlog* option from the pop-up menu. The switchlog is displayed on the right side of the screen.



7.3.4.2 Viewing application logs

Right-click an application on the RMS tree and choose *View Log File*. The application log for that application will be displayed on the right side of the screen.



Information

The following display formats are enabled for the log. For details, see "5 Administration" in *"PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."*

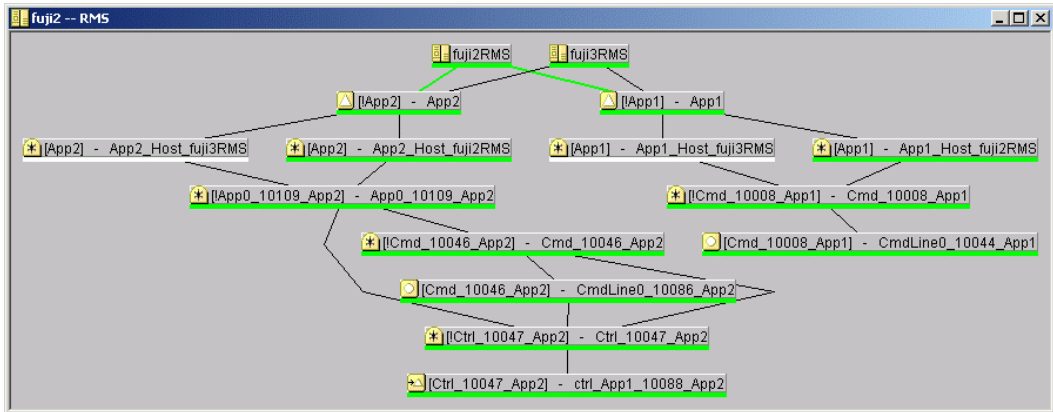
- Narrow the log by date or keyword.
- Scroll or jump to any entry.
- Search by keyword, date range, error message significance, or exit code other than 0 to exclude unrelated entries.

7.3.5 Viewing Detailed Resource Information

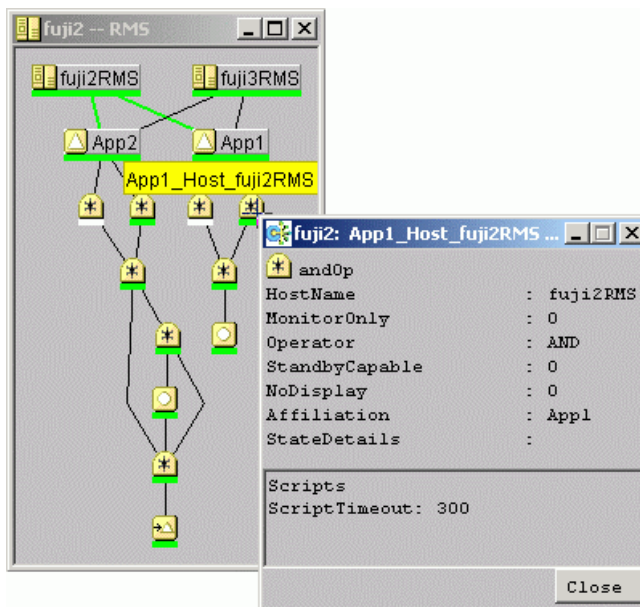
Use RMS graphs to display detailed resource information for each cluster application. There are four types of RMS graphs. Each type can be displayed from the menu when you right-click an object on the RMS tree.

- Full graph
Displays the configuration of the entire cluster system in which RMS is running.
- Application graph
Shows all objects used by the specified application. You can check the details of the specific object using this graph.
- Sub-application graph
Lists all sub-applications used by a given application and shows the connections between the sub-applications.
- Composite sub-applications graph
Shows all sub-applications that the application depends on directly or indirectly.

■ RMS graphs



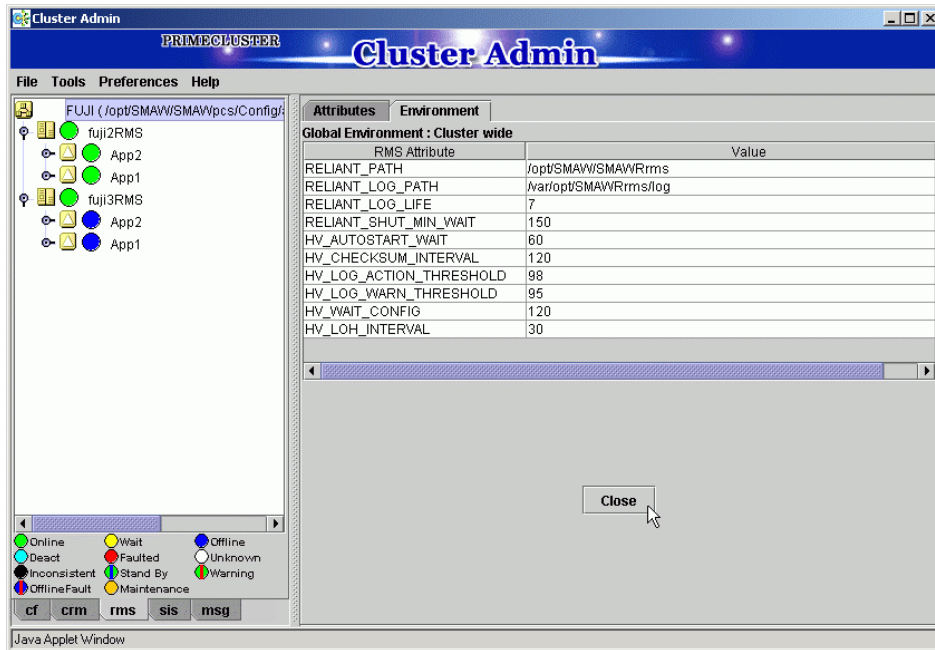
If you left-click the target object, the attributes of the object will be displayed on a pop-up screen.



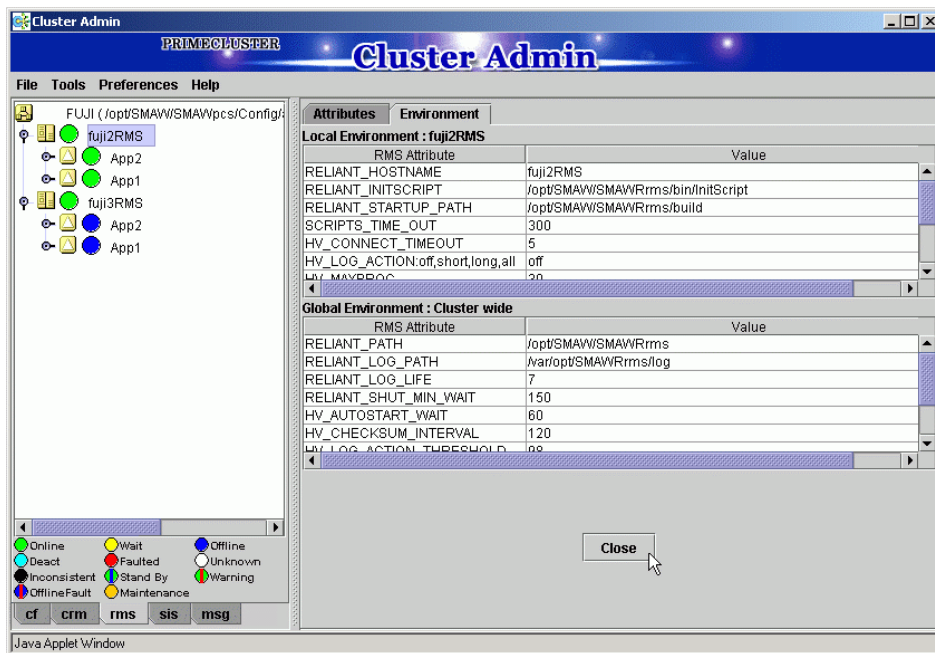
See "5.5 Using RMS graphs" in "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."

7.3.6 Displaying environment variables

Right-click a cluster in the RMS tree window and select *View Environment*. The local and global variables are displayed.



Right-click a node in the RMS tree, and select *View Environment*. The local variables are displayed.



7.3.7 Monitoring Cluster Control Messages

Select the *msg* tab, which is found at the bottom of the tree panel. If a new message was added to the text area since the last time the area was displayed, this tab is displayed in red. You can clear the message text area or isolate it from the main panel.

7.4 Corrective Actions for Resource Failures

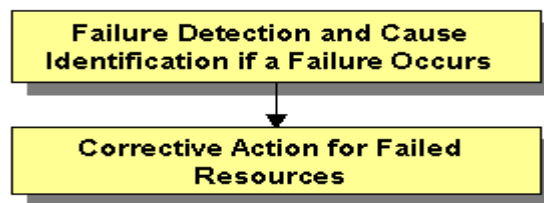
A hardware or software failure might occur while the cluster system is running. If a failure occurs in a resource, a message indicating that a failure occurred is displayed in the console screen. Based on this message, you need to identify the faulted resource using the CF and RMS main window and take corrective actions to maintain high availability in the cluster system.

This section describes the actions to be taken for the following cases:

- If the resource state became failed.

7.4.1 Corrective Action in the event of a resource failure

This section describes the corrective actions to take when a resource failure occurs.



7.4.1.1 Failure Detection and Cause Identification if a Failure Occurs

If a failure occurs in a resource, you can use the functions of PRIMECLUSTER and the operating system to detect the failure and identify the faulted resource that caused the failure.

The descriptions given in (a) to (g) below are relevant to the "Failure confirmation features list" given below:

◆ Failure detection

Normally, the RMS main window (a) is used to monitor the cluster applications.

- If a failure occurs in a resource or the system
Failover of the userApplication or node panic will occur.
In such a case, you can detect the failure by observing the following conditions:
 - The color of the icons in the RMS main window (a) changes.
 - A message is output to the msg main window (c), Syslog(f), and the console (g).
- If a warning-level failure occurs in the system
If a warning-level failure (for example, insufficient disk space or insufficient swap area) occurs in the system, you can detect the failure by observing the following conditions:
 - A message is output to Syslog(f) and the console (g).
- If RMS fails to start on all the nodes, the userApplication will not start. You can start the userApplication by executing the "creply" command.
 - By executing the "creply" command, you can confirm an operator intervention request to which no response has been entered and start up the userApplication by responding to it. For information on the "creply" command, see the manual pages.
 - The operator intervention request message will be output to Syslog(f) and the console (g). By responding to the operator intervention request message, you can start the userApplication.

For further details, see D.4 "Operator Intervention Messages."

**Note**

If there are multiple operator intervention request messages for which no response has yet been entered, you need to respond to each of them.

In addition, you can use the features described in "Failure confirmation features list" to detect the failure.

◆ **Cause identification**

You can also use the function that detected the failure and the features listed in "Failure confirmation features list" below to identify the faulted resource that caused the failure.

◆ **Failure confirmation features list**

Failure confirmation features		Manual reference
(a)	RMS main window The RMS tree and the RMS cluster table can be used from this screen.	7.1.3 "RMS Main Window"
(b)	CF main window The CF tree can be used from this screen.	7.1.1 "CF Main Window"
(c)	MSG main window The cluster control messages can be viewed in this screen. To display this screen, select the msg tab in the Cluster Admin screen.	-
(d)	Application log	7.3.4.2 "Viewing application logs"
(e)	switchlog	7.3.4.1 "Viewing switchlogs"
(f)	Syslog	-
(g)	Console * Messages that are displayed on the console can be checked. Viewing the "console problem" information on the console can help you identify the fault cause.	Appendix D "Messages"
(h)	GDS GUI	"PRIMECLUSTER Global Disk Services Configuration and Administration Guide."

**Note Console**

- The operator intervention request messages (message numbers: 1421, 1423), incurred when RMS is not started on all nodes, are displayed only when yes(1) is set for the AutoStartUp attribute of the userApplication. For information on the userApplication attribute, see "8 Appendix - Object types" in the "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."
- The operator intervention request messages (message numbers: 1422, 1423) and the error resource messages incurred after a resource or system error occurs are displayed only when yes(1) is set for the PersistentFault attribute of the userApplication. For information on the userApplication attribute, see "8 Appendix - Object types" in the "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."
- The operator intervention request and error resource messages are displayed by

using the “clwatchlogd” daemon to monitor switchlog. You need to send the SIGHUP signal to clwatchlogd when you change the value of RELIANT_LOG_PATH that is defined in the “hvenv.local” file. When clwatchlogd receives this signal, clwatchlogd acquires the latest value of RELIANT_LOG_PATH. After you change RELIANT_LOG_PATH, you must start RMS.

7.4.1.2 Corrective Action for Failed Resources

Take the following steps for failed resources:

1. Correct the faulted resource
Correct the problem in the failed resource. For details, see "2 Troubleshooting" in *"PRIMECLUSTER Reliant Monitor Services (RMS) Troubleshooting Guide."*



Note

If you are using an operation management product other than a PRIMECLUSTER product, you may need to take corrective actions prescribed for that product. For details, see the manual provided with each operation management product.
(Example) Symfoware

2. Recover the cluster application
At the RMS main window, check the state of the cluster application to which the corrected resource is registered. If the cluster application is in the Faulted state, execute the Fault clear operation.
For details on the Fault clear operation, see 7.2.2.4 "Bringing Faulted Cluster Application to Online State."

Part 4 System

Configuration

Modification

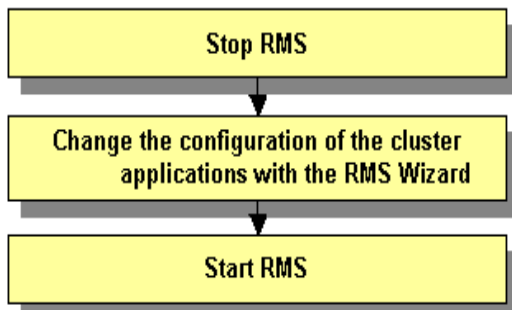
Chapter 8 Changing the Operation Configuration

This chapter explains how to add nodes and cluster applications to the PRIMECLUSTER system and change the configuration contents.

8.1 Changing the Cluster Configuration

This section explains how to modify a cluster configuration by following operations:

◆ Operation flow



◆ Operation Procedure:

1. Stop RMS.
If RMS is running, see 7.2.1.2 "Stopping RMS" and stop RMS.
2. Change the configuration of the cluster applications with the RMS Wizard.
 - 1) Log in to any one of the cluster nodes using system administrator access privileges.
 - 2) Start up the RMS Wizard.
Execute the "hvw -n *configuration* file" command. Specify the name of the configuration file in which the configuration is defined.
The following example shows how to start up RMS Wizard with the configuration file name "testconf."

```
# /opt/SAW/SAWRrms/bin/hvw -n testconf
```

- 3) Select "Application-Edit" from the "Main RMS management menu."

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP
2) QUIT
3) Application-Create
4) Application-Edit
5) Application-Remove
6) Application-Clone
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 4
  
```

When a cluster application that is performing standby operation is to be changed

- 1- Select the userApplication that needs modification of configuration from "Application selection menu." The following example shows how to select "APP1."

```

Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APPL
Application Name: 5
  
```

- 2- When "turnkey wizard" appears, select what you want to change from the following table.

Contents to be changed	Selection item
Name of the userApplication	"ApplicationName"
Attribute of the userApplication	"Machines+Basics"
Cmdline resource configuration	"CommandLines"
Fsystem resource configuration	"LocalFileSystems"
Gds resource configuration	"Gds:Global-Disk-Services"
Gls resource configuration	"Gls:Global-Link-Services"
Procedure resource configuration	"CRM"

For details on the operation when you select above items, see 6.7 "Setting Up Cluster Applications." Select "SAVE+EXIT" to return to the "Main RMS management menu."

```
Settings of turnkey wizard "CRM"
1) HELP                      9) CRM(CRM_APP1)
2) -                          10) LocalFileSystems(-)
3) SAVE+EXIT                  11) RemoteFileSystems(-)
4) -                          12) IpAddresses(-)
5) ApplicationName=APP1      13) RawDisks(-)
6) Machines+Basics(appl)    14) LVM-VolumeManagement(-)
7) CommandLines(-)         15) Gds:Global-Disk-Services(-)
8) Controllers(-)          16) Gls:Global-Link-Services(-)
Choose the setting to process:
```

The following example shows how to change the attribute of "AutoStartUp" of the userApplication setting from "no" to "yes":

- 1- Select "Machines+Basics" from "turnkey wizard."
- 2- Select "AutoStartUp."

```
Machines+Basics (appl:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalMachine
6) AdditionalConsole
7) Machines[0]=node1RMS
8) Machines[1]=node2RMS
9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=no)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=0)
19) (ShutdownPriority=)
20) (OnlinePriority=)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
Choose the setting to process: 15
```

- 3- Select "yes."

```
1) HELP
2) RETURN
3) yes
4) no
Set the AutoStartUp mode: 3
```

- 4- Confirm that "AutoStartUp" is changed to "yes," and then select "SAVE+EXIT."

```
Machines+Basics (appl:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalMachine
6) AdditionalConsole
7) Machines[0]=node1RMS
8) Machines[1]=node2RMS
9) (PreCheckScript=)
10) (PreOnlineScript=)
11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=yes)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=0)
19) (ShutdownPriority=)
20) (OnlinePriority=)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
Choose the setting to process: 3
```

- 5- Select "SAVE+EXIT" from "turnkey wizard."

```
Settings of turnkey wizard "CRM"
1) HELP
2) -
3) SAVE+EXIT
4) -
5) ApplicationName=APPL
6) Machines+Basics(appl)
7) CommandLines(-)
8) Controllers(-)
9) CRM(CRM_APP1)
10) LocalFileSystems(-)
11) RemoteFileSystems(-)
12) IpAddresses(-)
13) RawDisks(-)
14) LVM-VolumeManagement(-)
15) Gds:Global-Disk-Services(-)
16) Gls:Global-Link-Services(-)
Choose the setting to process: 3
```

- 6- Select "RETURN" from the "Application selection menu."

```
Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APPL
Application Name: 3
```

When a cluster application in a scalable operation is to be changed



Note

For information on how to change a cluster application performing standby operation and which forms part of a cluster application in a scalable operation, see "When a cluster application that is performing standby operation is to be changed."

- 1- Select "OPTIONS" from "Application type selection menu."

```
Creation: Application type selection menu:
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) CRM
6) GENERIC
7) SYMFOWARE
Application Type: 4
```

- 2- Select "ShowAllAvailableWizards" from "Set menu options."

```

Edit: selection criteria:
1) HELP                      6) ApplicationsOnly
2) RETURN                    7) SearchPattern
3) NONE                      8) ShowSubApplications
4) ShowTurnkeyWizardsOnly   9) FlagApplications
5) ShowAllAvailableWizards
Set selection criteria: 5
    
```

- 3- Select a Controller resource or generic resource.
 This Controller resource indicates a resource registered in step 4., "Selecting "Controller" from the "Application type selection menu"" in 6.7.2.2 "Creating Scalable Cluster Applications."
 A generic resource indicates a resource registered in step 14., "Selecting "generic" from the "Application type selection menu"" in 6.7.2.2 "Creating Scalable Cluster Applications."
 The relationships between the contents to be changed and the resource to be selected are as described below:

Contents to be changed	Resource to be selected
Resource name of Controller	Controller resource
Startup sequence of cluster application in standby operation	
Deleting an application in standby operation	
Resource name of generic	generic resource
Automatic startup yes/no	

The following is an example in which a generic resource, "genelic," has been selected.

```

Edit: Application selection menu:
1) HELP                      6) APP2              11) app1
2) QUIT                     7) CRM APP1         12) app2
3) RETURN                   8) CRM APP2
4) OPTIONS                  9) Controller
5) APP1                     10) genelic
Application Name: 10
    
```

- 4- "Settings of application type" will appear. Select the following depending on the contents to be changed.

Contents to be changed	Selection item	Selected resource
Resource name of Controller	"ApplicationName"	Controller resource
Startup sequence of cluster application in standby operation	"ApplicationSequence"	
Deleting an application in standby operation	"Controllers[*]"	
Resource name of generic	"ApplicationName"	generic resource
Automatic startup yes/no	"AutoStartUp"	

[Supplement]

A number is specified in the "*" mark included in "Controllers[*]". Select the

cluster application in a standby operation that you want to delete. You can delete a cluster application in a standby operation by specifying "NONE" on the screen after the selection.



Note

If you change the name of a Controller resource, you must also change the generic resource "SubApplications" to the modified Controller resource name.

For details on the operation to be performed after making the above selection, see "Setting Up Cluster Applications." After you change the configuration, select "SAVE+EXIT" and then return to the "Main RMS management menu."

The following is an example in which the "AutoStartUp" attribute of the generic resource is changed to "yes" from "no."

- 1- Select "(AutoStartUp=no)" from "Settings of application type."

```
Settings of application type "generic" (consistent)
 1) HELP                               17) (OfflineDoneScript=)
 2) NO-SAVE+EXIT                       18) (FaultScript=)
 3) SAVE+EXIT                          19) (AutoStartUp=no)
 4) ApplicationName=generic             20) (AutoSwitchOver=HostFailure|
ResourceFailure|ShutDown)
 5) AdditionalMachine                  21) (PreserveState=no)
 6) AdditionalConsole                  22) (PersistentFault=0)
 7) AdditionalSubApplication           23) (ShutdownPriority=)
 8) Machines[0]=fuji01RMS              24) (OnlinePriority=)
 9) Machines[0]=fuji02RMS              25) (StandbyTransitions=)
10) SubApplications[0]=Controller      26) (LicenseToKill=no)
11) (HostSpecificSubApplication=no)    27) (AutoBreak=yes)
12) (PreCheckScript=)                 28) (HaltFlag=no)
13) (PreOnlineScript=)                 29) (PartialCluster=1)
14) (PostOnlineScript=)
15) (PreOfflineScript=)
16) (PostOfflineScript=)
Choose the setting to process: 19
```

- 2- Select "yes."

```
 1) HELP
 2) RETURN
 3) yes
 4) no
Set the AutoStartUp mode: 3
```

- 3- Confirm that "AutoStartUp" is changed to "yes," and then select "SAVE+EXIT."

```
Settings of application type "generic" (not yet consistent)
 1) HELP                               17) (OfflineDoneScript=)
 2) NO-SAVE+EXIT                       18) (FaultScript=)
 3) SAVE+EXIT                          19) (AutoStartUp=yes)
 4) ApplicationName=generic             20) (AutoSwitchOver=HostFailure|
ResourceFailure|ShutDown)
 5) AdditionalMachine                  21) (PreserveState=no)
 6) AdditionalConsole                  22) (PersistentFault=0)
 7) AdditionalSubApplication           23) (ShutdownPriority=)
 8) Machines[0]=fuji01RMS              24) (OnlinePriority=)
 9) Machines[0]=fuji02RMS              25) (StandbyTransitions=)
10) SubApplications[0]=Controller      26) (LicenseToKill=no)
11) (HostSpecificSubApplication=no)    27) (AutoBreak=yes)
12) (PreCheckScript=)                 28) (HaltFlag=no)
13) (PreOnlineScript=)                 29) (PartialCluster=1)
14) (PostOnlineScript=)
15) (PreOfflineScript=)
16) (PostOfflineScript=)
Choose the setting to process: 3
```


- 4- Select "RETURN" from the "Application selection menu."

```

Edit: Application selection menu:
1) HELP                6) APP2                11) app1
2) QUIT                7) CRM APP1           12) app2
3) RETURN              8) CRM APP2
4) OPTIONS             9) Controller
5) APP1                10) generic
Application Name: 3

```

3. Select "Configuration-Generate" from the "Main RMS management menu."

```

nodal: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                10) Configuration-Remove
2) QUIT                11) Configuration-Freeze
3) Application-Create  12) Configuration-Thaw
4) Application-Edit    13) Configuration-Edit-Global-Settings
5) Application-Remove  14) Configuration-Consistency-Report
6) Application-Clone   15) Configuration-ScriptExecution
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy  16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 7

```

4. Select "Configuration-Activate" from the "Main RMS management menu."

```

nodal: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                10) Configuration-Remove
2) QUIT                11) Configuration-Freeze
3) Application-Create  12) Configuration-Thaw
4) Application-Edit    13) Configuration-Edit-Global-Settings
5) Application-Remove  14) Configuration-Consistency-Report
6) Application-Clone   15) Configuration-ScriptExecution
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy  16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 8

```

5. Select "QUIT" from the "Main RMS management menu."

```

nodal: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                10) Configuration-Remove
2) QUIT                11) Configuration-Freeze
3) Application-Create  12) Configuration-Thaw
4) Application-Edit    13) Configuration-Edit-Global-Settings
5) Application-Remove  14) Configuration-Consistency-Report
6) Application-Clone   15) Configuration-ScriptExecution
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy  16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 2

```

6. Start RMS.

Start RMS as described in 7.2.1.1 "Starting RMS."

8.2 Changing an IP Address on the Public LAN

This section explains how to change the IP address setting if the IP address of a public LAN or administrative LAN changes after the PRIMECLUSTER system is installed. Note that when you change an IP address, do not change the host name.

◆ Operation Procedure:

1. Execute the following command on one of the cluster nodes to stop RMS operation:

```
# hvshut -a
```
2. Execute the following commands on all nodes to start the system in single-user mode.

```
# /sbin/shutdown now
```
3. Mount the local file system on all nodes.
 (Example)

```
/sbin/mount -a -t ext3
```
4. Edit the "/etc/hosts" file, and change the IP address on each node.
5. Change the IP address of the public LAN.
 (Example)

```
/usr/sbin/netconfig --ip=10.20.30.40 --netmask=255.255.255.0 -d eth0
```
6. If the IP address, used by the remote service mode, must be changed at the same time as the public/administrative LAN (when the IP address of the remote service board is changed after installation or when the IP address is changed due to transfer of the node), correct the "/etc/opt/SMAW/SMAWsf/SA_rsb.cfg" file on each node.



See

For details, see 5.1.2 "Setting Up the Shutdown Facility."

7. On each node, change the IP address of the public LAN used by Web-Based Admin View.



See

For details, see "7.1 Network address," "7.3 Management server," and "7.5 Multi-network between server and client by classified use" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1*."

8. If a takeover IP address must be changed (when the takeover IP address is changed after installation, or when the takeover IP address is changed due to transfer of the node), correct the IP address being used as the takeover IP address in the "/etc/hosts" file of each node.
9. If a GLS resource is created, edit the "/opt/SMAW/SMAWRrms/bin/hvenv.local" file of each cluster node as shown below so that RMS does not start automatically when the node is rebooted.

```
# vi /opt/SMAW/SMAWRrms/bin/hvenv.local <Return>
```

```
export HV_RCSTART=0
```

10. Restart the system on all nodes.

```
# /sbin/shutdown -r now
```
11. If the takeover IP address is defined by GLS, see "3.2.2 Changing configuration Information" in the "*PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function*."
12. If you edited the "/opt/SMAW/SMAWRrms/bin/hvenv.local" file in Step 9, return the file to

its previous setting.



Note

If a takeover IP address has been defined by GLS and if the takeover IP address is specified directly with an IP address value, not a host name, in the GLS environment settings and the Gls resource settings, first delete the Gls resource. Then change /etc/hosts and the GLS environment settings, and register the Gls resource.

For details, see 6.2.1 "GLS Setup," 6.7.3.4 "Setting Up Gls Resources," and "5.4 Deleting configuration for Cluster System" in the *"PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function."*

8.3 Changing a CIP Address

This section describes how to change the IP address if the IP address of interconnect is changed after installation of the PRIMECLUSTER system.

◆ **Operation Procedure:**

1. Start all the nodes that constitute the cluster system.
If the nodes are already operating, you do not need to restart them.
2. Stop CF on all nodes that constitute the cluster system.
For information on how to stop CF, see "5.7 Starting and stopping CF" in the *"PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide."*
3. While referring to the cip.cf file, confirm the CIP name to change the IP address.
For details on the cip.cf file, see "2.2 CIP configuration file" in the *"PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide"* and the manual page describing cip.cf.
4. Change the IP address of the CIP name that is defined in the hosts(5) file.
Perform this procedure on all the nodes constituting the cluster system.
5. Start CF on all the nodes constituting the cluster system.
For instructions on how to start CF, see "5.7 Starting and stopping CF" in the *"PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide."*
6. Use the ciptool command to confirm that the IP address of CIP was changed.

```
# ciptool -a
```



See

For details on the "ciptool" command, see the manual page describing "ciptool".

8.4 Changing a Node Name

The following explains how to change the node name after building a PRIMECLUSTER system.



Note

Changing a node name may have a serious impact on the system. Therefore, make this change only when it is absolutely necessary.

◆ Operation Procedure:

1. Stop the CF on the node whose node name is to be changed.
For information on how to stop CF, see "5.6 Starting and stopping CF" in the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."
2. Change the old host name of the `/etc/hosts` file to a new host name.
(Example)

```
10.20.30.40  nodel
↓ Correction
10.20.30.40  nodeA
```

3. Change the old host name of the `/etc/sysconfig/network` file to a new host name.
(Example)

```
HOSTNAME=nodel
↓ Correction
HOSTNAME=nodeA
```

4. Reboot the system.

```
# /sbin/shutdown -r now
```

After rebooting the system, execute the following procedure for the other node.

5. Change the old host name of the `/etc/hosts` file to a new host name.
6. Restart Web-Based Admin View.



See

For information on how to restart Web-Based Admin View, see the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1*."

8.5 Changing the Operation Attributes of a userApplication

PRIMECLUSTER allows operation attributes to be set by CUI operation, according to the needs of the user. Change the operation attributes to match the desired operation.

- Operation attribute types
For further details about the operation attribute of the userApplication, see "9 Appendix - Attributes" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."
- Change methods
 - 8.5.1 "Changing Operation Attributes (CUI)"
Explains how to change the operation attributes of the userApplication.
 - 8.6 "Changing PRIMECLUSTER Operation Attributes"
Explains how to change the RMS environment variables.



Note

Be sure to stop RMS before you change the operation attributes of userApplication. For instructions on stopping RMS, see 7.2.1.2 "Stopping RMS."

8.5.1 Changing Operation Attributes (CUI)

This section explains how to change the userApplication attributes with CUI.

For further details about the operation attribute specified in step 8, see "9 Appendix - Attributes" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."

◆ Operation Procedure:



Note

"Application" on the CU screen indicates a cluster application.

1. Log in to any one of the cluster nodes using system administrator access privileges.
2. Stop RMS.
If RMS is running, see 7.2.1.2 "Stopping RMS" and stop RMS.
3. Execute the "hvw" command.

```
# /opt/SMAW/SMAWRrms/bin/hvw -n <configuration file>
```

Specify an optional Configuration file name in <configuration file>.

4. Select "Application-Edit" from the main menu of CUI. Enter a number and then press the *Enter* key.

Main menu

```

apple: Main RMS management menu, current configuration: config
No RMS active in the cluster
 1) HELP                               10) Configuration-Remove
 2) QUIT                                11) Configuration-Freeze
 3) Application-Create                  12) Configuration-Thaw
 4) Application-Edit                    13) Configuration-Edit-Global-Settings
 5) Application-Remove                  14) Configuration-Consistency-Report
 6) Application-Clone                   15) Configuration-ScriptExecution
 7) Configuration-Generate              16) RMS-CreateMachine
 8) Configuration-Activate              17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action:

```

5. Select the userApplication for which you want to change the operation attributes from the "Application selection menu."

The following example shows how to select "APP1."

Cluster application selection menu

```

Edit: Application selection menu (restricted):
 1) HELP
 2) QUIT
 3) RETURN
 4) OPTIONS
 5) APP1
Application Name: 5

```

6. When turnkey wizard CRM appears, select "Machines+Basics" and then change the operation attributes of the userApplication.

turnkey wizard "CRM"

```

Settings of turnkey wizard "CRM"
 1) HELP                               9) CRM(CRM APP1)
 2) READONLY                           10) LocalFileSystems(-)
 3) SAVE+EXIT                           11) RemoteFileSystems(-)
 4) -                                    12) IpAddresses(-)
 5) ApplicationName=APP1                 13) RawDisks(-)
 6) Machines+Basics(app1)               14) LVM-VolumeManagement(-)
 7) CommandLines(-)                     15) Gds:Global-Disk-Services(-)
 8) Controllers(-)                       16) Gls:Global-Link-Services(-)
Choose the setting to process: 6

```

7. Select the operation attribute that you want to change from "Machines+Basics."

Machines+Basics

```

Machines+Basics {appl:consistent}
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalMachine
6) AdditionalConsole
7) Machines[0]=chagne1RMS
8) Machines[1]=chagne2RMS
9) {PreCheckScript=}
10) {PreOnlineScript=}
11) {PostOnlineScript=}
12) {PreOfflineScript=}
13) {OfflineDoneScript=}
14) {FaultScript=}
15) {AutoStartUp=yes}
16) {AutoSwitchOver=HostFailure|ResourceFailure|ShutDown}
17) {PreserveState=no}
18) {PersistentFault=0}
19) {ShutdownPriority=}
20) {OnlinePriority=}
21) {LicenseToKill=no}
22) {AutoBreak=yes}
23) {HaltFlag=no}
Choose the setting to process:

```

To change the value:

Select the item that you want to change. Enter a number and then press the *Enter* key.

(Example)

Choose the setting to process: 20 <RETURN>

The "Value setup menu," as shown in step 8, will be displayed.

Select "SAVE+EXIT." Enter a number and then press the *Enter* key.

Choose the setting to process: 3 <RETURN>

"turnkey wizard "CRM" of step 9 will be displayed."

8. Set up the value from the value setup menu.

Value setup menu (Example of OnlinePriority)

```

1) HELP
2) RETURN
3) 0
4) 1
Enable Online Priority (Active Standby) feature for this application:

```

Select a setup value. Enter a number and then press the *Enter* key.



Point

Select "RETURN" to return to the previous menu.

If there are multiple attributes to be changed, repeat steps 7 and 8 for each attribute.

If the attribute is other than "OnlinePriority," the menu number in step 8 will be different from that in this example.

9. Select "SAVE+EXIT" from the "Machines+Basics" screen to return to the turnkey wizard "CRM."

turnkey wizard "CRM"

```

Settings of turnkey wizard "CRM"
1) HELP                      9) CRM(-)
2) -                          10) LocalFileSystems(-)
3) SAVE+EXIT                  11) RemoteFileSystems(-)
4) -                          12) IpAddresses(Adr APP1)
5) ApplicationName=APP1      13) RawDisks(-)
6) Machines+Basics(app1)    14) LVM-VolumeManagement(-)
7) CommandLines(-)          15) Gds:Global-Disk-Services(-)
8) Controllers(-)           16) Gls:Global-Link-Services(-)
Choose the setting to process:

```

Select "SAVE+EXIT" to return to the cluster application selection menu.

10. Select "RETURN" to return to the main menu.

Cluster application selection menu

```

Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APP1
Application Name: 3

```

11. Select "Configuration-Generate" and then "Configuration-Activate" from the main menu.
Content changes will be enabled on all the cluster nodes.

Main menu

```

apple: Main RMS management menu, current configuration: config
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                       11) Configuration-Freeze
3) Application-Create         12) Configuration-Thaw
4) Application-Edit           13) Configuration-Edit-Global-Settings
5) Application-Remove         14) Configuration-Consistency-Report
6) Application-Clone          15) Configuration-ScriptExecution
7) Configuration-Generate     16) RMS-CreateMachine
8) Configuration-Activate     17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action:

```

```

apple: Main RMS management menu, current configuration: config
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                       11) Configuration-Freeze
3) Application-Create         12) Configuration-Thaw
4) Application-Edit           13) Configuration-Edit-Global-Settings
5) Application-Remove         14) Configuration-Consistency-Report
6) Application-Clone          15) Configuration-ScriptExecution
7) Configuration-Generate     16) RMS-CreateMachine
8) Configuration-Activate     17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action:

```

Configuration distribution (Example of executing Configuration-Activate)

```

About to activate the configuration config ...
Testing for RMS to be up somewhere in the cluster ... done
Arranging sub applications topologically ... done.
Check for all applications being consistent ... done.
Running overall consistency check ... done.
Generating pseudo code [one dot per (sub) application]: .... done
Generating RMS resources..... done
hvbuild using /usr/opt/reliant/build/wizard.d/config/config.us
About to distribute the new configuration data to hosts:
test node1RMS,test node2RMS
The new configuration was distributed successfully.
About to put the new configuration in effect ... done.
The activation was finished successfully.
Hit CR to continue
    
```



Note

When the processing is successfully done, the message “The activation was finished successfully” appears. If this message is not displayed, the modified information contains incorrect settings. Check and correct the settings.

12. Press the *Enter* key to return to the main menu.

Main menu

```

apple: Main RMS management menu, current configuration: config
No RMS active in the cluster
 1) HELP                10) Configuration-Remove
 2) QUIT                11) Configuration-Freeze
 3) Application-Create  12) Configuration-Thaw
 4) Application-Edit    13) Configuration-Edit-Global-Settings
 5) Application-Remove  14) Configuration-Consistency-Report
 6) Application-Clone   15) Configuration-ScriptExecution
 7) Configuration-Generate  16) RMS-CreateMachine
 8) Configuration-Activate  17) RMS-RemoveMachine
 9) Configuration-Copy
Choose an action:
    
```

13. Select "QUIT" to terminate the processing.
14. Start up RMS and userApplication from Cluster Admin.



Information

For instructions on starting RMS, see 7.2.1.1 "Starting RMS."
 For instructions on starting the cluster application, see 7.2.2.1 "Starting a Cluster Application."

8.6 Changing PRIMECLUSTER Operation Attributes

This section explains how to change RMS environment variables.

The environment variables are configured in the following RMS environment files. You can change the environment variables by editing the files directly and set or change the values. You can also check the currently set values.

File Names	Contents
/opt/SMAW/SMAWRrms/bin/hvenv	Global environment variable The environment variable file that contains the variables used in the entire cluster
/opt/SMAW/SMAWRrms/bin/hvenv.local	Local environment variable The environment variable file that contains the variables defined only on the node



See

- For details on the RMS environment variable files (hvenv and hvenv.local), see "2.9 Environment variables" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."
- For details on the RMS environment variables, see "10 Appendix – Environment variables" in "*PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide*."
- Create the "hvenv.local" file as required. See the manual pages of hvenv.local.

8.7 Deleting a Cluster Application

This section explains how to delete a cluster application and its resources.



Note

Be sure to stop RMS before deleting a cluster application and its resources. For instructions on stopping RMS, see 7.2.1.2 "Stopping RMS."

8.7.1 Deleting a Resource

This section explains how to delete a resource.

◆ Operation Procedure:

1. Log in to any one of the cluster nodes using system administrator access privileges.
2. Start the RMS Wizard.

Execute the "hvw *-n configuration file*" command. Specify the name of the configuration file in which the resource is defined.

The following example shows how to start RMS Wizard with the configuration file name "testconf."

```
# /opt/SMAW/SMAWRrms/bin/hvw -n testconf
```

3. Select "Application-Edit" from the "Main RMS management menu."

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
 1) HELP                10) Configuration-Remove
 2) QUIT                11) Configuration-Freeze
 3) Application-Create  12) Configuration-Thaw
 4) Application-Edit    13) Configuration-Edit-Global-Settings
 5) Application-Remove  14) Configuration-Consistency-Report
 6) Application-Clone  15) Configuration-ScriptExecution
 7) Configuration-Generate 16) Configuration-Push-Disabled
 8) Configuration-Activate 17) RMS-CreateMachine
 9) Configuration-Copy   18) RMS-RemoveMachine
Choose an action: 4
```

4. Select the userApplication in which the resource is registered from the "Application selection menu." The following example shows how to select "APP1."

```
Edit: Application selection menu (restricted):
 1) HELP
 2) QUIT
 3) RETURN
 4) OPTIONS
 5) APP1
Application Name: 5
```

5. Use the "turnkey wizard" to select the resource.
Select "REMOVE+EXIT" from the screen after selecting the resource.
Then, select "SAVE+EXIT" to return to the "Main RMS management menu."

```

Settings of turnkey wizard "CRM"
1) HELP                      9) CRM(CRM_APP1)
2) -                          10) LocalFileSystems(-)
3) SAVE+EXIT                  11) RemoteFileSystems(-)
4) -                          12) IpAddresses(-)
5) ApplicationName=APP1      13) RawDisks(-)
6) Machines+Basics(appl)    14) LVM-VolumeManagement(-)
7) CommandLines(Cmd_APP1)  15) Gds:Global-Disk-Services(-)
8) Controllers(-)           16) Gls:Global-Link-Services(-)
Choose the setting to process:

```

6. Select "Configuration-Generate" from the "Main RMS management menu."

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                       11) Configuration-Freeze
3) Application-Create         12) Configuration-Thaw
4) Application-Edit           13) Configuration-Edit-Global-Settings
5) Application-Remove         14) Configuration-Consistency-Report
6) Application-Clone          15) Configuration-ScriptExecution
7) Configuration-Generate     16) Configuration-Push-Disabled
8) Configuration-Activate     17) RMS-CreateMachine
9) Configuration-Copy         18) RMS-RemoveMachine
Choose an action: 7

```

7. Select "Configuration-Activate" from the "Main RMS management menu."

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                       11) Configuration-Freeze
3) Application-Create         12) Configuration-Thaw
4) Application-Edit           13) Configuration-Edit-Global-Settings
5) Application-Remove         14) Configuration-Consistency-Report
6) Application-Clone          15) Configuration-ScriptExecution
7) Configuration-Generate     16) Configuration-Push-Disabled
8) Configuration-Activate     17) RMS-CreateMachine
9) Configuration-Copy         18) RMS-RemoveMachine
Choose an action: 8

```

8. Select "QUIT" from the "Main RMS management menu" to exit from the RMS Wizard.

```

node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
1) HELP                      10) Configuration-Remove
2) QUIT                       11) Configuration-Freeze
3) Application-Create         12) Configuration-Thaw
4) Application-Edit           13) Configuration-Edit-Global-Settings
5) Application-Remove         14) Configuration-Consistency-Report
6) Application-Clone          15) Configuration-ScriptExecution
7) Configuration-Generate     16) Configuration-Push-Disabled
8) Configuration-Activate     17) RMS-CreateMachine
9) Configuration-Copy         18) RMS-RemoveMachine
Choose an action: 2

```



Note

- When deleting a Gds resource, you need to bring the Gds volume Online. See 8.7.1.1 "Settings made when deleting a Gds resource."
- When deleting a procedure resource, first delete the procedure resource from the cluster resource management facility after deleting the procedure resource from the cluster application. For details on how to delete a procedure resource from the cluster resource management facility, see E.3 "Deleting a Procedure Resource."

8.7.1.1 Settings made when deleting a Gds resource

When the Gds resource is to be deleted, you must also notify the cluster resource management facility (CRM) that the Gds resources can no longer be used for the cluster application.

◆ **Operation Procedure:**

Execute the following command on the node on which you want to delete resources.

```
# /opt/SMAW/SMAWRrms/bin/hvgsdsetup -d [class-name]
```

8.7.2 Deleting the Hardware Resource

This section explains how to delete the resources of the following hardware.

- Shared disk device
- Network interface card

◆ **Procedure**

1. Stop RMS.
If RMS is activated, stop RMS as explained in 7.2.1.2 "Stopping RMS."
2. Delete the hardware resource.
Use "cldelrsc" command to delete the hardware resource that was registered.
See the relevant manual pages for details on this command.



Note

- If you have deleted an available network interface card by mistake, reregister the resources for the accidentally deleted network interface card by executing the "clautoconfig" command.
- If you have deleted other than the correct network takeover resource, reregister the deleted network takeover resource. See F.2 "Associating Resources to a Cluster Service Instance."
- To delete the shared disk resource that is used on GDS, unconfigure the GDS, then delete the shared disk resource.

8.7.3 Deleting a userApplication

This section explains how to delete the userApplication.



Note

- If you delete a userApplication, all the resources registered to the userApplication will also be deleted.
- If Gds resources are registered to the userApplication to be deleted, bring the Gds volume online. See 8.7.1.1 "Settings made when deleting a Gds resource."

◆ **Operation Procedure:**

1. Log in to any one of the cluster nodes using system administrator access privileges.
2. Start the RMS Wizard.
Execute the "hvw -n *configuration file*" command. Specify a name of the configuration file in which the userApplication is defined.
The following example shows how to start RMS Wizard with the configuration file name "testconf."

```
# /opt/SMAW/SMAWRrms/bin/hvw -n testconf
```

3. Select "Application-Remove" from the "Main RMS management menu."

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
 1) HELP                      10) Configuration-Remove
 2) QUIT                      11) Configuration-Freeze
 3) Application-Create        12) Configuration-Thaw
 4) Application-Edit          13) Configuration-Edit-Global-Settings
 5) Application-Remove        14) Configuration-Consistency-Report
 6) Application-Clone         15) Configuration-ScriptExecution
 7) Configuration-Generate    16) Configuration-Push-Disabled
 8) Configuration-Activate    17) RMS-CreateMachine
 9) Configuration-Copy        18) RMS-RemoveMachine
Choose an action: 4
```

4. Select "OPTIONS" from the "Application selection menu".

```
Removal: Application selection menu:
 1) HELP
 2) QUIT
 3) RETURN
 4) OPTIONS
 5) APP1
Application Name: 4
```

5. Select "ShowTurnKeyWizardsOnly" from the "Set menu options".

```
Creation: Set menu options:
 1) ShowAllAvailableWizards
 2) ShowTurnKeyWizardsOnly
Application Name: 2
```

6. Select the userApplication that you want to delete from the "Application selection menu." The following example shows how to select APP2.

```
Edit: Application selection menu (restricted):
 1) HELP
 2) QUIT
 3) RETURN
 4) OPTIONS
 5) APP1
 6) APP2
Application Name: 6
```

Enter "yes" in response to the following message.

```
About to remove all data of APP2,
Please confirm this by typing yes: yes
```



Note

When deleting a cluster application that is performing standby operation as a component of the cluster application in scalable operation, change the resources of the Controller after deleting the cluster application that is performing standby operation. For details on how to change the resource of the Controller, see 8.1 "Changing the Cluster Configuration."

7. Select "Configuration-Generate" from the "Main RMS management menu."

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
 1) HELP
 2) QUIT
 3) Application-Create
 4) Application-Edit
 5) Application-Remove
 6) Application-Clone
 7) Configuration-Generate
 8) Configuration-Activate
 9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 7
```

8. Select "Configuration-Activate" from the "Main RMS management menu."

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
 1) HELP
 2) QUIT
 3) Application-Create
 4) Application-Edit
 5) Application-Remove
 6) Application-Clone
 7) Configuration-Generate
 8) Configuration-Activate
 9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 8
```

9. Select "QUIT" from the "Main RMS management menu" to exit from the RMS Wizard.

```
node1: Main RMS management menu, current configuration: testconf
No RMS active in the cluster
 1) HELP
 2) QUIT
 3) Application-Create
 4) Application-Edit
 5) Application-Remove
 6) Application-Clone
 7) Configuration-Generate
 8) Configuration-Activate
 9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) Configuration-Push-Disabled
17) RMS-CreateMachine
18) RMS-RemoveMachine
Choose an action: 2
```


Part 5 Maintenance

This part explains the procedure for maintaining the PRIMECLUSTER system.

Chapter 9 Maintenance of the PRIMECLUSTER System

This chapter explains items and procedures related to maintenance of the PRIMECLUSTER system.

9.1 Maintenance Types

The maintenance of the PRIMECLUSTER system is divided as described below, depending on whether maintenance is performed while the job is stopped:

Stop maintenance

Maintenance that is performed while the entire cluster system is stopped.

Job hot maintenance

Maintenance that is performed while the maintenance target node is detached from the cluster by state transition of the cluster application (failover or degeneration), while the job is allowed to continue operating.

Of these, the type to be performed depends on the location and contents of the failure. Determine the maintenance that is to be performed after consulting with your Fujitsu systems engineer (SE).

9.2 Maintenance Flow

Your Fujitsu customer engineer (CE) shall perform parts replacement. The flow of maintenance is as follows:

- **When stop maintenance is to be performed**
 1. All nodes of the running PRIMECLUSTER system shall be stopped by the administrator of the PRIMECLUSTER system.
 2. Pass the operation over to your Fujitsu customer engineer (CE).
 3. Your Fujitsu customer engineer (CE) shall then perform maintenance of the erroneous location (repair or replacement). Confirm that the system operates normally by running a test program, etc.
 4. After the completion of maintenance by your Fujitsu customer engineer (CE), check the relevant equipment and then boot the PRIMECLUSTER system.
- **When job hot maintenance is to be performed**
 1. The administrator of the PRIMECLUSTER system shall shut down the node that contains the target equipment, so as to separate it from the operation, and then pass the operation over to your Fujitsu customer engineer (CE).
For details on how to separate the node from the operation, see 9.2.1 "Detaching Resources from Operation."
 2. Your Fujitsu customer engineer (CE) shall confirm the target equipment and perform maintenance of the erroneous equipment (repair or replacement). Operation shall be confirmed by using a test program, etc.
 3. After your Fujitsu customer engineer (CE) completes the maintenance and confirms the operation of the relevant equipment, boot the node and then execute standby restoration for the operation.
For details on standby restoration for the operation, see 9.2.2 "Executing Standby Restoration for an Operating Job."

9.2.1 Detaching Resources from Operation

Execute the following for the node that you are going to shut down.

- **Cluster application failover**
If the relevant node is operating, you must first execute failover operation with the "hvswitch" command.



For details on how to determine whether the relevant node is operating, see 7.1.3.1 "RMS Tree."

- **Stopping RMS**
After confirming that the relevant node is in either the Offline or Standby state, stop RMS running on the relevant node by executing the "hvshut" command.



For details on how to stop RMS, see "4.1 Stopping RMS" in "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide."

- **Stopping a node**

Execute the "shutdown(8)" command to stop the relevant node.

9.2.2 Executing Standby Restoration for an Operating Job

Perform standby restoration for an operating job, as described below.

◆ **Procedure**

1. Power on the relevant node.
2. Perform standby restoration for the relevant node (if necessary, subsequently execute failback).



[See](#)

For details on how to execute cluster application standby restoration, see 7.2.2.1 "Starting a Cluster Application." For details on how to execute failback, see 7.2.2.3 "Switching a Cluster Application."

9.3 Software Maintenance

This section provides notes on intensive correction and formal repair, as well as the procedure for applying them to the PRIMECLUSTER system.

9.3.1 Notes on Applying Corrections to the PRIMECLUSTER System

Note the following when you apply intensive correction to the cluster system.

- Back up the system environment before you attempt to apply a correction.
- The software version to be installed on each node must be the same on all nodes in the cluster system. Also, the corrections must be the same on all the nodes constituting the system. Note, however, that this is not always true when rolling update, described below, is allowed.
- To apply an intensive correction, you must stop the node temporarily. This means that the job must be stopped, albeit temporarily. You should consider a maintenance plan to ensure that the maintenance is completed within a specified period. You must also examine the time and duration of the maintenance to minimize the impact on a job.
- **Rolling update** is a method by which software is updated while the job continues to operate by executing job failover for a node in a cluster to separate the standby node from the operation in order to apply corrections to the node one by one.

If you apply this method, the job stop time required for software update can be minimized. To perform update with this method, however, you must satisfy the prerequisites for rolling update (the items to be corrected must be correctible with rolling update).

To apply this method, you must confirm the contents of the README file for the relevant patch and then contact your Fujitsu systems engineer (SE).

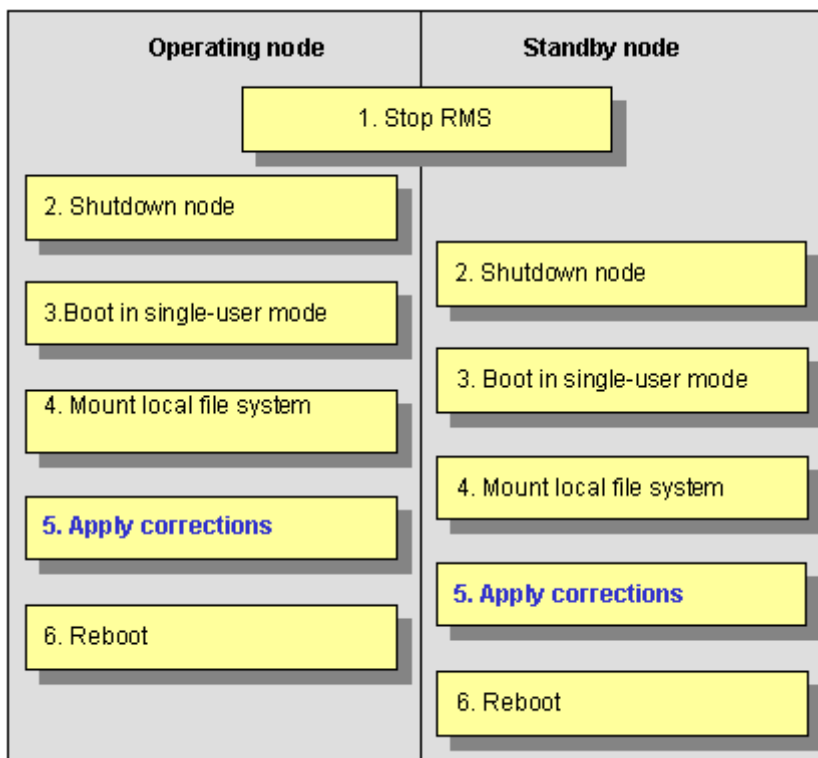
9.3.2 Overview of the Correction Application Procedure

This section provides an overview of the procedure for applying corrections such as an intensive correction to a cluster system. The procedure explained here is a general procedure.

9.3.2.1 Procedure for Applying Corrections by Stopping an Entire System

This section explains the procedure for applying corrections by stopping the entire cluster system. An example of a two-node 1:1 standby configuration is used here.

◆ Flow of operation



◆ Procedure

Copy the correction to be applied to each node to the local file system in advance.

1. Stop RMS.
Execute **hvshtut -a** on either cluster node to stop the operation of RMS.
2. Shut down all nodes.
3. Boot in single-user mode.
Boot all the nodes that were shut down in single-user mode.
4. Mount the local file system.
Mount the required local file system on all the nodes.
5. Apply corrections.
Apply the corrections that were copied to the local file system in advance.
6. Reboot.
After applying the corrections, boot the nodes by using **shutdown -r**.



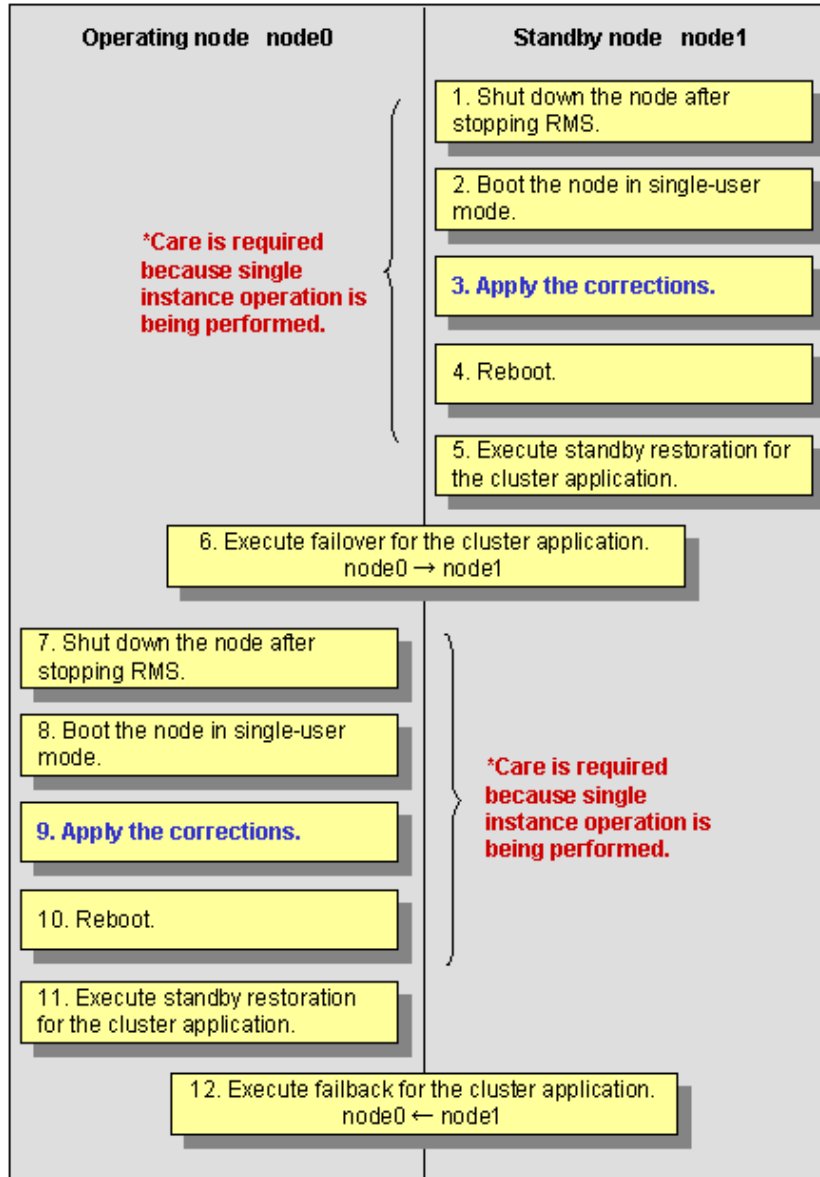
Note

- For details on the corrections, refer to the manuals provided with the corrections.
- For details on the standby restoration of cluster applications, see 7.2.2.1 "Starting a Cluster Application." For details on fallback, see 7.2.2.3 "Switching a Cluster Application."

9.3.2.2 Procedure for Applying Correction by Rolling Update

This section explains the procedure for applying corrections by rolling update. An example of two-node 1:1 standby configuration is used for this explanation.

◆ Flow of operation



◆ Procedure

- Shut down the standby node (node1).
To apply corrections to the standby node (node1), shut down the node after stopping RMS.
Note that, as a result of this shutdown, a cutoff state transition occurs and dual instance operation is disabled until standby restoration is performed.
- Boot the standby node (node1) in single-user mode.
Boot in single-user mode.
- Apply corrections.
Apply the necessary corrections.
- Reboot the standby node (node1).

- Reboot the node.
5. Execute standby restoration for the standby node (node1).
Since the shutdown node (node1) to which corrections have been applied is cut off from the cluster system, execute standby restoration for the node.
 6. Execute failover of the cluster application.
To apply corrections to the operating node (node0), switch the cluster application with the **"hvswitch"** command.
 7. Shut down the operating node (node0).
After the completion of failover, stop RMS, and then shut down the node.
 8. Boot the operating node (node0) in single-user mode.
Boot the node in single-user mode.
 9. Apply corrections.
Apply the necessary corrections.
 10. Reboot the operating node (node0).
Reboot the node to apply the corrections to the system.
 11. Execute standby restoration for the operating node.
Since the shutdown node (node0) to which corrections were applied is cut off from the cluster system, execute standby restoration for the node.
 12. Execute failback.
Restore the state of the standby layout defined at installation by executing failback operation, as required.



Note

- For details on the corrections, refer to the manuals provided with the corrections.
- For details on standby restoration of cluster applications, see 7.2.2.1 "Starting a Cluster Application." For details on failback, see 7.2.2.3 "Switching a Cluster Application."

Part 6 PRIMECLUSTER Products

This section explains the PRIMECLUSTER products.

- PRIMECLUSTER Product List
- PRIMECLUSTER Wizard for Oracle
- PRIMECLUSTER Wizard for NAS
- PRIMECLUSTER Wizard for MailServer
- PRIMECLUSTER Wizard for WebServer
- Interstage Application Server Enterprise Edition
- Systemwalker Centric Manager
- Systemwalker Operation Manager

Chapter 10 PRIMECLUSTER Product List

The following lists the version levels of PRIMECLUSTER products and the range of support:

Table 10-1 PRIMECLUSTER Product List

Product name	Operation mode	Standby operation					Scalable operation		Notes
	System Configuration	Standby		Mutual standby	Cascade	Priority transfer	Scalable	High-availability scalable	
		1:1	N:1						
RHEL-AS2.1/ES2.1	PRIMECLUSTER Wizard for Oracle 4.1 A30	○	○	○	○	○	○	×	
	Oracle Real Application Clusters 10g 10.1.0	×	×	×	×	×	○	×	Wizard for Oracle required
	Oracle Database Enterprise Edition 10.1.0	○	○	○	○	○	×	×	
	Oracle Database Standard Edition 10.1.0	○	○	○	○	○	×	×	
	Oracle Standard Edition One 10.1.0	○	○	○	○	○	×	×	
	Oracle9i Real Application Cluster 9.2.0	×	×	×	×	×	○	×	
	Oracle Database Enterprise Edition 9.2.0	○	○	○	○	○	×	×	
	Oracle Database Standard Edition 9.2.0	○	○	○	○	○	×	×	
	Oracle Standard Edition One 9.2.0	○	○	○	○	○	×	×	
	PRIMECLUSTER Wizard for NAS 4.1 A20	○	○	○	○	○	○	×	
	PRIMECLUSTER Wizard for Mailserver 4.1 A20	○	×	×	×	×	×	×	
	PRIMECLUSTER Wizard for Webserver 4.1 A20	○	○	○	○	○	○	×	
	PRIMECLUSTER Wizard for PowerGres Plus 4.1 A20	○	×	×	×	×	×	×	
	Interstage Application Server Enterprise Edition V5.0L20	○	×	×	×	×	×	×	
	Symfoware Server V5.0	○	×	×	×	×	×	×	
Symfoware Server Hot Standby Option V5.0	○	×	×	×	×	×	×		
Systemwalker CentricMGR-A EE V10.0L20	○	×	×	×	×	×	×		
apache	○	○	○	○	○	○	×	Wizard for Webserver required	
sendmail, pop, imap	○	×	×	×	×	×	×	Wizard for Mailserver required	

Chapter 10 PRIMECLUSTER Product List

Product name	Operation mode System Configuration	Standby operation					Scalable operation		Notes
		Standby		Mutual standby	Cascade	Priority transfer	Scalable	High-availability scalable	
		1:1	N:1						
RHEL-AS3.0/ES3.0	PRIMECLUSTER Wizard for Oracle 4.1 A30	○	○	○	○	○	○	×	Wizard for Oracle required
	Oracle Real Application Clusters 10g 10.1.0	×	×	×	×	×	○	×	
	Oracle Database Enterprise Edition 10.1.0	○	○	○	○	○	×	×	
	Oracle Database Standard Edition 10.1.0	○	○	○	○	○	×	×	
	Oracle Standard Edition One 10.1.0	○	○	○	○	○	×	×	
	Oracle9i Real Application Cluster 9.2.0	×	×	×	×	×	○	×	
	Oracle Database Enterprise Edition 9.2.0	○	○	○	○	○	×	×	
	Oracle Database Standard Edition 9.2.0	○	○	○	○	○	×	×	
	Oracle Standard Edition One 9.2.0	○	○	○	○	○	×	×	
	PRIMECLUSTER Wizard for NAS 4.1 A20	○	○	○	○	○	○	×	
	PRIMECLUSTER Wizard for Mailserver 4.1 A20	○	×	×	×	×	×	×	
	PRIMECLUSTER Wizard for Webserver 4.1 A20	○	○	○	○	○	○	×	
	PRIMECLUSTER Wizard for PowerGres Plus 4.1 A20	○	×	×	×	×	×	×	
	Interstage Application Server Enterprise Edition V6.0L10	○	×	×	×	×	×	×	
	Symfoware Server V6.0	○	×	×	×	×	×	×	
	Symfoware Server Hot Standby Option V6.0	○	×	×	×	×	×	×	
Systemwalker Centric Manager Enterprise Edition Server License (for manager) V11.0	○	×	×	×	×	×	×		
Systemwalker Centric Manager Enterprise Edition Server License (for agent) V11.0	○	×	×	○	×	×	×		
Systemwalker Operation Manager Enterprise Edition Server License V11.0	○	○	○	×	×	×	×		
apache	○	○	○	○	○	○	×	Wizard for Webserver required	
sendmail, pop, imap	○	×	×	×	×	×	×	Wizard for Mailserver required	

Notes:

The "○" and "×" marks in the above table indicate the range of PRIMECLUSTER-supported products. For details, see the manuals for the product.

10.1 PRIMECLUSTER Operation Modes

This section explains the cluster operation mode.

◆ Cluster operation mode

Cluster operation mode	Description
1:1 standby	A single standby cluster application runs on a system that consists of two nodes. One is an operating node, and the other is a standby node.
N:1 standby	"N" standby cluster applications run on a system consisting of "N+1" nodes. One application runs on each operating node. Two or more applications stand by on one node.
Mutual standby	One cluster application runs, and the other cluster application stands by on each node. Generally, a cluster system consists of 2 nodes. This is referred to as two-node mutual standby.
Cascade	One operating node has two or more standby nodes. Even when one node stops, the cluster application assures its redundancy by using other node. This operation mode is effective for maintaining the availability of a cluster application during maintenance.
Priority transfer	Topology applied from N:1 standby Effective in maintaining availability during maintenance because the restored node becomes a standby node through the transfer of the standby node, even after the standby node stops and the cluster application can adopt a redundant configuration.
Scalable	Topology that is best suited for parallel job execution because one or more cluster applications operate together.
High-availability scalable	Topology in which standby operation is performed for each cluster application that constitutes a scalable configuration.

◆ Cluster operation mode

Cluster operation mode	Description
Standby operation mode	General names for the five operation modes are 1:1 standby, N:1 standby, mutual standby, cascade, and priority transfer.
Scalable operation mode	One scalable cluster application consists of two or more operating nodes. If one node stops in the event of a failure, ongoing operations are continued on other operating nodes. Each operating node can be configured to be in the standby operation mode.

● Public LAN takeover function

Public LAN takeover function	Description
IP address takeover of GLS	Refers to the function for taking over one or more IP addresses from an old operating node to a new operating node if failover occurs during standby operation (this function can also be applied to two or more target network interface cards).

Chapter 11 PRIMECLUSTER Wizard for Oracle

11.1 Functional Overview

PRIMECLUSTER Wizard for Oracle is a software product that facilitates cluster operation management for Oracle operating on a PRIMECLUSTER system.

This is required for scalable operation and standby operation for a cold-standby Oracle instance. The scalable operation requires Oracle Real Application Clusters ("RAC" or "Oracle RAC 10g" hereafter). The standby operation does not require Oracle RAC, but requires Oracle cold-standby instead.

Startup and stop control

In line with the state transition of the userApplication, scripts automatically start or stop an Oracle instance or an Oracle listener. These scripts first check and then start up the Oracle instance. If damage has occurred, the scripts automatically recover the Oracle instance. For example, if the Oracle instance fails during online backup, the scripts automatically execute "end backup" to start up the Oracle instance. (When the AutoRecover is set to "Yes".) When stopping the Oracle instance, the scripts stop it in the immediate mode (default). If this does not occur properly, the scripts stop the instance in the abort mode. This means operational node switchover can be performed at high-speed.

In the operation of Oracle RAC 10g, starting and stopping of Oracle services are also controlled.

Monitoring

A detector monitors an Oracle instance and an Oracle listener. The detector connects itself to Oracle using system user. Then, this enables the detector periodically to create, update and delete a dummy table, which should be generated in the system user's default table space, by executing an SQL command. Consequently, a logical failure can be detected as well as the process of the Oracle instance being active or inactive. Oracle OR-XXXX errors are detected after the SQL command is executed, failover and restart of Oracle instance are automatically initiated according to the error level. When the Oracle instance hangs, and if the SQL command is not returned within a specified time, the detector times out and notifies a user of the failure. The two types of monitoring of the Oracle listener are process detection and the "tnsping" command.

In the operation of Oracle RAC 10g, monitoring of the Oracle service, Oracle instance, and Oracle listener are carried, while recovery and degeneration in the event of failures are performed by Oracle RAC 10g CRS (Cluster Ready Services).

Environment setup

The environment setup tool provides an "ORACLE" Wizard that generates userApplications in the RMS configuration by executing the "hvw" command of PRIMECLUSTER RMS Wizard.

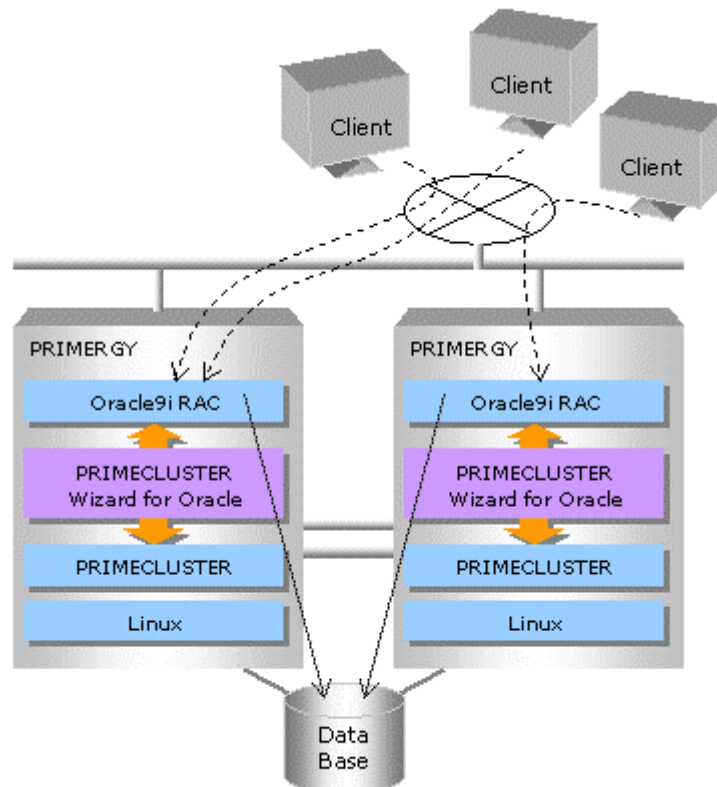
11.2 Operation Environment

11.2.1 System Configuration

System configuration figures are shown below:

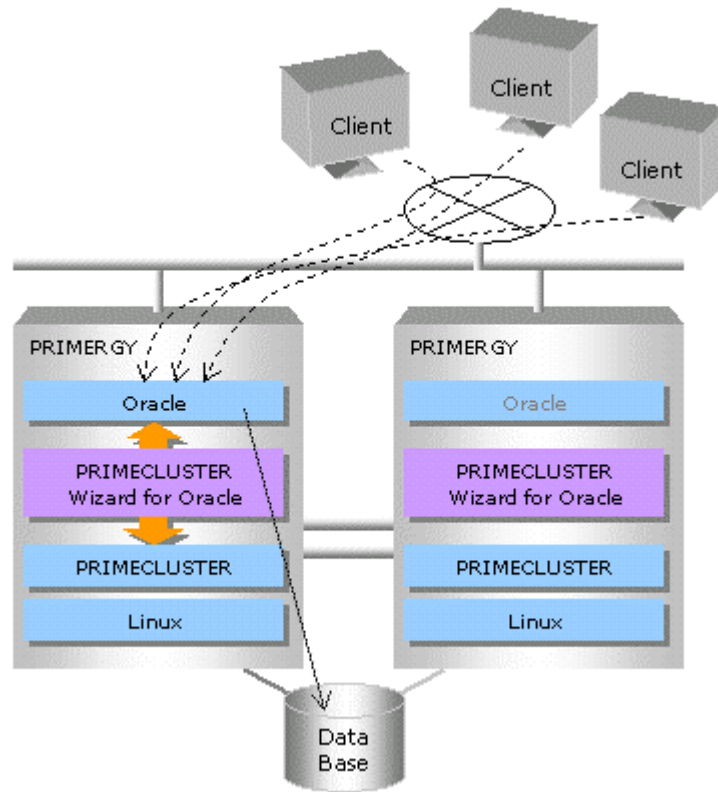
Scalable operation

In scalable operation with RAC, Oracle is operated on all nodes. A client can use a database that is connected to either node.



Standby operation

In standby operation, a cluster system consists of an operational node and standby nodes. On the operational node, Oracle applications, a logical IP address and shared disks are active. On the standby nodes, these resources are inactive. In the event of a failure, production operation is switched to one of the standby nodes, and the resources in this standby node are activated. The client can connect to the running node using the logical IP address without configuration changes.



11.2.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

11.2.3 Overview of Cluster System Support

The PRIMECLUSTER Wizard for Oracle provides the environment setup wizard that is used to build Oracle on the cluster system, the start/stop script, and the state-monitoring detector. It also supports scalable operation using RAC and Oracle RAC 10g standby operation.

11.3 Notes

For details on the environment setup, etc., see the *“PRIMECLUSTER Wizard for Oracle Configuration and Administration Guide,”* which is attached to the PRIMECLUSTER Wizard for Oracle.

Chapter 12 PRIMECLUSTER Wizard for NAS

12.1 Functional Overview

PRIMECLUSTER Wizard for NAS is a software product that must be installed when the ETERNUS NR1000F series (NetApp™ Filer: Refers to the disk device manufactured by Network Appliance Inc. Hereinafter abbreviated to NAS device.) is being used as the PRIMECLUSTER shared disk device. This software releases the NFS file lock that can cause a problem upon the occurrence of a node down or application error, and then performs failover.

Startup and stop control

According to the state transition of userApplication, automatic control of export/unexport is allowed for the volume of the network attached storage (NAS) device. For standby operation, the file lock, retained by the old operation node, is released at startup.

Monitoring

PRIMECLUSTER Wizard for NAS does not monitor errors in the NAS device. Other resources, however, support error detection and failover control.

- PRIMECLUSTER GLS monitors the access path to the NAS device.
- The RemoteFileSystem resource, which allows remote file system mounting control, monitors accesses to the volume.

Environment setup

The environment setup wizard for running a NAS device as a shared disk on PRIMECLUSTER allows you to configure a cluster environment based on a NAS device easily and safely.

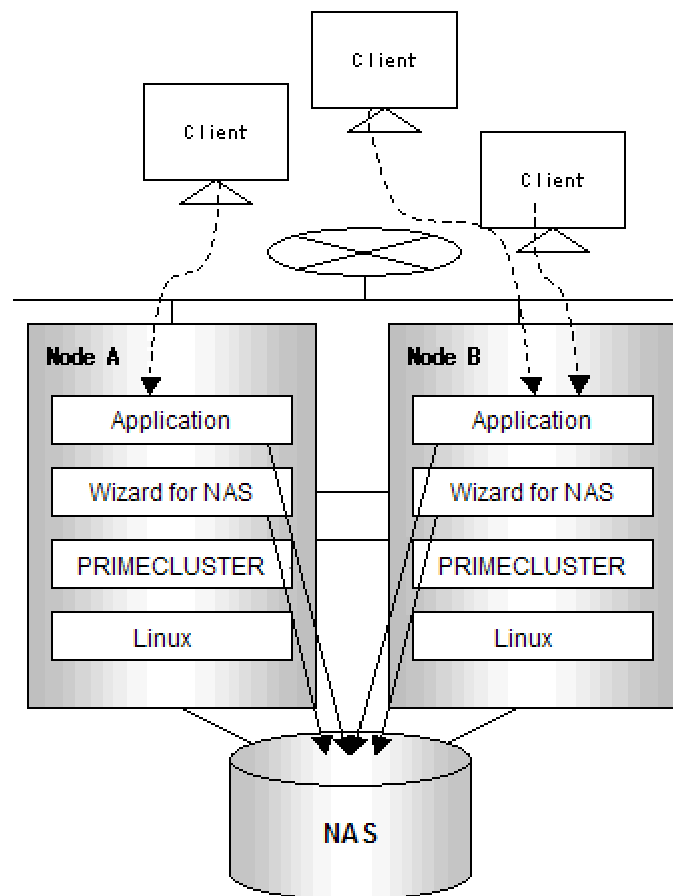
12.2 Operation Environment

12.2.1 System Configuration

System configuration figures are shown below:

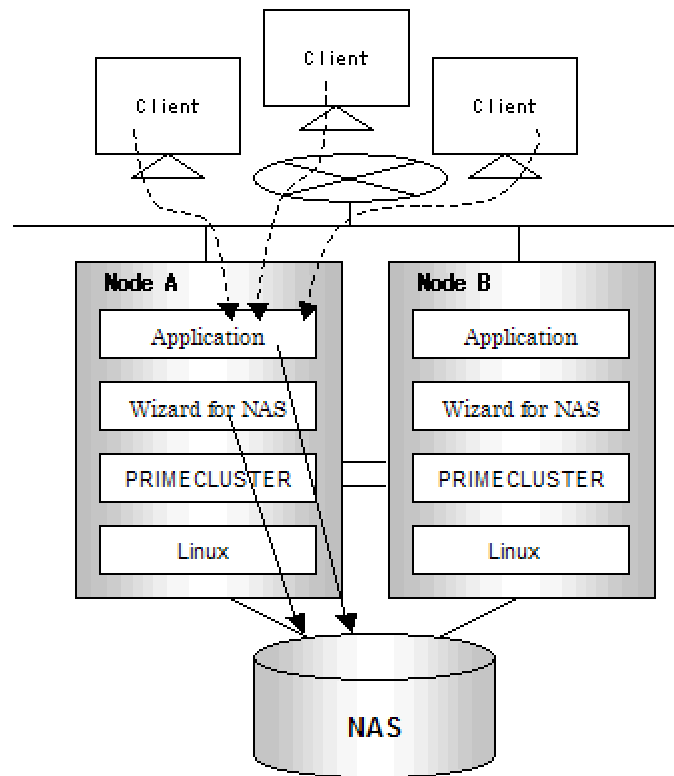
Scalable operation

In scalable operation, the volumes of a NAS device can be mounted from any node. Also, the shared disk can be used from every node.



Standby operation (cold-standby)

In standby operation, a cluster system consists of an operational node and standby nodes. With a NAS device, however, a connection is established only on the operational node and that is inactive on the standby node. In the event of a failure, production operation is switched to one of the standby nodes, after which a connection to the standby node is established after the operational node lock on the NAS device is released.



Hot-standby is not supported.

12.2.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

12.2.3 Overview of Cluster System Support

The PRIMECLUSTER Wizard for NAS provides the environment setup wizard to enable the use of the NAS device as a shared disk of the cluster system, the start/stop script, the detector, etc. and supports an environment allowing the combined use of PRIMECLUSTER and NAS devices.

12.3 Notes

For details on the environment setup, etc., see the “*PRIMECLUSTER Wizard for NAS Configuration and Administration Guide*,” which is attached to the PRIMECLUSTER Wizard for NAS.

Chapter 13 PRIMECLUSTER Wizard for MailServer

13.1 Functional Overview

PRIMECLUSTER Wizard for MailServer is a software product that enables the use of the mail server (sendmail) on a PRIMECLUSTER system. This software monitors the mail server and allows for automatic rebooting of the mail server or failover of the operational node if an error is detected.

Startup and stop control

PRIMECLUSTER Wizard for MailServer enables the automatic start and stop of sendmail, imap, and pop according to the state transition of the cluster application.

Monitoring

The sendmail, imap, and pop processes can be monitored.

Also, by establishing a connection with the network port that is used by sendmail, imap, and pop, the availability of communication can be monitored.

Environment setup

The environment setup wizard for running mail server on PRIMECLUSTER allows you to configure a mail server cluster environment easily and safely.

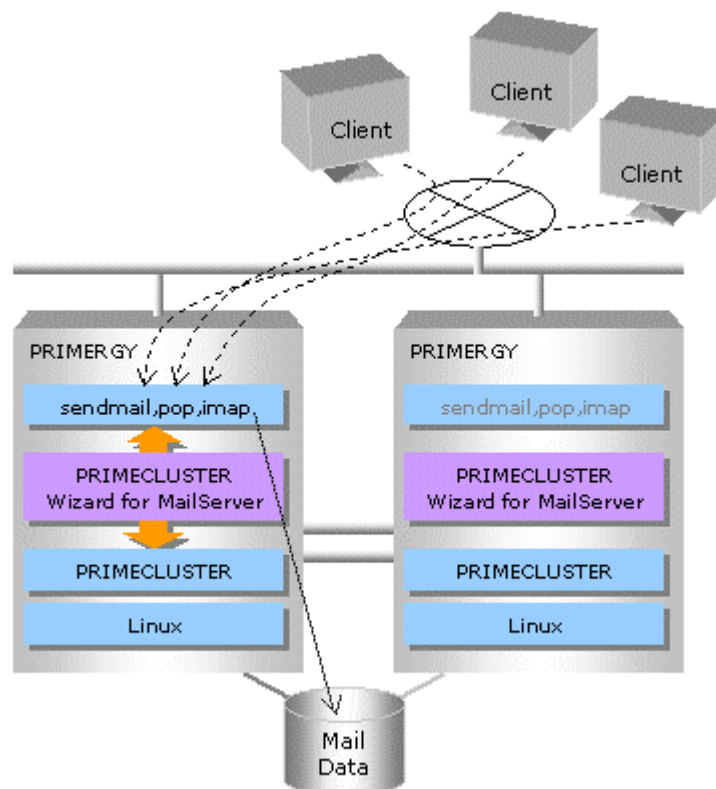
13.2 Operation Environment

13.2.1 System Configuration

The system configuration is shown below:

Standby operation (cold-standby)

In standby operation, a cluster system consists of an operational node and standby nodes. On the operational node, a mail server, a logical IP address and shared disks are active. On the standby nodes, these resources are inactive. In the event of a failure, production operation is switched to one of the standby nodes, and the resources in this standby node are activated. The client can connect to the running node using the logical IP address without configuration changes.



Hot-standby is not supported.

13.2.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

13.2.3 Overview of Cluster System Support

PRIMECLUSTER Wizard for MailServer provides the environment setup wizard that is used to build a mail server on the cluster system, the start/stop script, and the state-monitoring detector. It also supports cold-standby operation of the mail server.

13.3 Notes

For details on the environment setup, etc., see the "*PRIMECLUSTER Wizard for MailServer Configuration and Administration Guide*," which is attached to the PRIMECLUSTER Wizard for MailServer.

Chapter 14 PRIMECLUSTER Wizard for WebServer

14.1 Functional Overview

PRIMECLUSTER Wizard for WebServer is a software product that supports cluster operation with WebServer (apache) on PRIMECLUSTER system. This software enables scalable operation and standby operation (cold-standby) with apache on PRIMECLUSTER.

Startup and stop control

PRIMECLUSTER Wizard for WebServer enables the automatic start and stop of apache according to the state transition of the cluster application.

Monitoring

The apache process can be monitored.

Also, by establishing a connection with the network port that is used by apache, the availability of communications can be monitored.

Environment setup

The environment setup wizard for running WebServer on PRIMECLUSTER allows you to configure an apache cluster environment easily and safely.

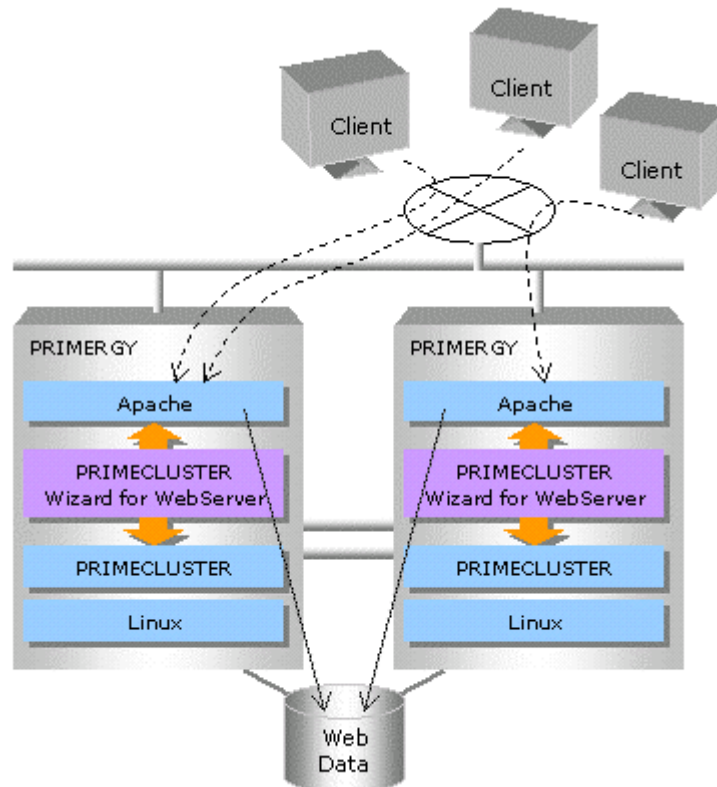
14.2 Operation Environment

14.2.1 System Configuration

The system configuration is shown below:

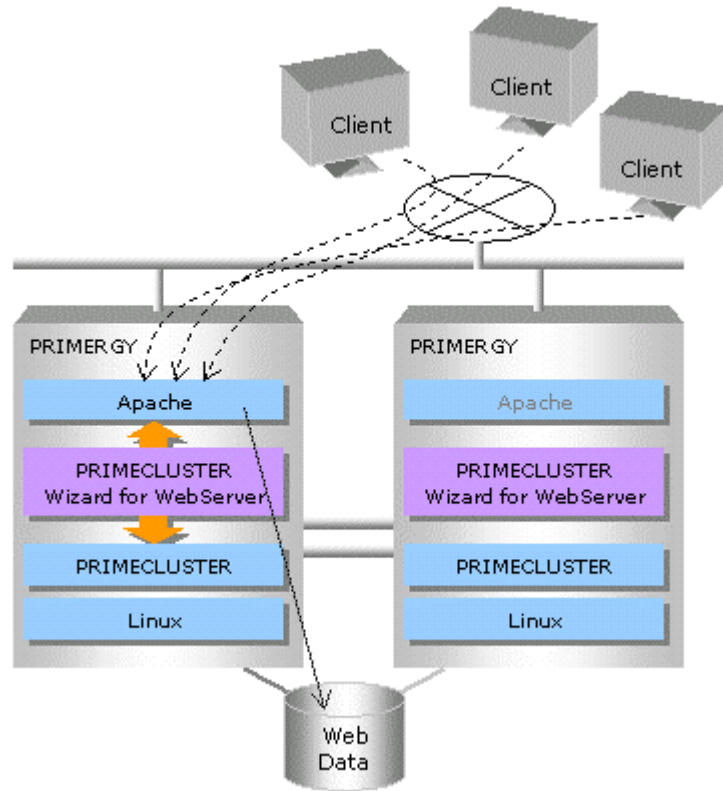
Scalable operation

In scalable operation, apache is operated on all nodes. A client can use the HTML data on the shared disk by connecting to either node.



Standby operation (cold-standby)

In standby operation, a cluster system consists of an operational node and standby nodes. On the operational node, apache, a logical IP address and shared disks are active. On the standby nodes, these resources are inactive. In the event of a failure, production operation is switched to one of the standby nodes, and the resources in this standby node are activated. The client can connect to the running node using the logical IP address without configuration changes.



14.2.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

14.2.3 Overview of Cluster System Support

PRIMECLUSTER Wizard for WebServer provides the environment setup wizard that is used to build apache on the cluster system, the start/stop script, and the state-monitoring detector. It also supports apache scalable operation and cold-standby operation.

14.3 Notes

For details on the environment setup, etc., see the "*PRIMECLUSTER Wizard for WebServer Configuration and Administration Guide*," which is attached to the PRIMECLUSTER Wizard for WebServer.

**Chapter 15 Interstage Application Server
Enterprise Edition**

15.1 Functional Overview

The Interstage Application Server is a high-reliability, high-performance application server that supports a simple Web system, large-scale E-commerce, and business-to-business enterprise systems.

Interstage Application Server Enterprise Edition is the most advanced version of Interstage Application Server. Interstage Application Server Enterprise Edition supports hot standby and load balancing, and is the most appropriate choice for large-scale systems that must provide stable responses and round-the-clock non-stop operation.

15.1.1 Overview of Cluster System Support

The Interstage Application Server realizes high availability (HA) by enabling the configuration of a cluster system.

This high availability is supported by an operation mode called 1:1 standby.

A server having the same configuration as the currently operating server is provided as a standby.

If the operation server experiences a failure, the standby server takes over so that the transactions can be restarted swiftly.

15.1.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

15.1.3 Notes

For details on the cluster system configuration, see the "*Interstage Application Server High-Reliability System Operation Guide*."

Chapter 16 Systemwalker Centric Manager

16.1 Functional Overview

Systemwalker Centric Manager is an integrated operation management tool that has been designed to be used in an enterprise environment. Systemwalker Centric Manager provides an optimum means of enabling simple operation from anywhere, be it in a client/server environment, for which multiple servers are used, or a business environment, for which the Internet is used.

16.1.1 Overview of Cluster System Support

(1) Monitoring a cluster system

The Job Servers running on cluster system can be managed.

Multiple node cluster servers (Job Servers) configured using Microsoft Cluster Service and PRIMECLUSTER can be also monitored.

(2) Supporting of a cluster with the management server

The management facility of Systemwalker can operate on the cluster system.

High-availability monitoring can be realized because, even if an error occurs in either the Operation Management Server or the Section Management Server, the monitoring works can be taken over by another node.



For details, see the cluster setup guides for Systemwalker Centric Manager.

16.1.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

Chapter 17 Systemwalker Operation Manager

17.1 Functional Overview

Systemwalker Operation Manager enables the automatic operation of a server/client system that is distributed over a network, the scheduling of routine batch jobs and online jobs, the control of job execution, the monitoring of the state of execution, and the provision of an achievement management function to fully support a business.

Furthermore, the use of Systemwalker Operation Manager greatly reduces the system administrator's workload.

17.1.1 Overview of Cluster System Support

High availability for batch job execution can be realized through the use of a cluster system.



For details, see the cluster setup guides for Systemwalker Operation Manager.

17.1.2 Supported Modes

For details, see the Table 10-1 "PRIMECLUSTER Product List."

Appendix A PRIMECLUSTER System Design Worksheets

A.1 Worksheet Purpose

The PRIMECLUSTER System Design Worksheets allow you to determine necessary parameters before you configure the PRIMECLUSTER system. Filling out all items in the worksheet will enable you to proceed smoothly with the PRIMECLUSTER installation work.

The worksheets consist of the following:

■ Overall Design Worksheet

This worksheet is used to design basic items for the PRIMECLUSTER system.

■ CE Instruction Worksheet

This worksheet compiles necessary information for installation and configuration, and is used to communicate instructions to the Fujitsu technician (CE).

■ Cluster Installation Environment Setup Worksheet

Use this worksheet to configure the environment before you install Linux(R), PRIMECLUSTER, and other required or related software. Also use the worksheet to configure the PRIMECLUSTER system using Web-Based Admin View. This worksheet facilitates the installation of software products.

■ Kernel Parameter Worksheet

This worksheet allows you to determine the fundamental PRIMECLUSTER values for estimating the kernel parameters. After installing the Linux(R) software and PRIMECLUSTER packages, configure the new values for the kernel parameters, as necessary.

■ Cluster Configuration Worksheet

This worksheet organizes the necessary items for configuring the PRIMECLUSTER system with Web-Based Admin View. Using this worksheet and determining the parameter values beforehand will enable you to smoothly set up operations using Web-Based Admin View.

■ Cluster Application Configuration Worksheets

This worksheet is used to design how the application should operate when building a cluster application. There are individual worksheets for configuring RMS, GFS, GLS, GDS, and cluster applications.

■ Cluster Application Setting Worksheet

This worksheet is used for configuring cluster applications and resources.

A.2 Notes on Worksheet Creation

Note the following points when creating PRIMECLUSTER design worksheets.

- Specify appropriate values in the blank sections of each design sheet. For instructions on specifying each item, see the point explanations.
- Items marked with "<>" are selection items. Select one of the items written in the box.
- Items marked with "[]" are selection items. You can select multiple items written in the box.
- Different values can be specified depending on the model in which PRIMECLUSTER is to be installed. Read the point explanations before specifying values.

A.3 Overall Design Worksheet

Select the operation mode of the cluster system.



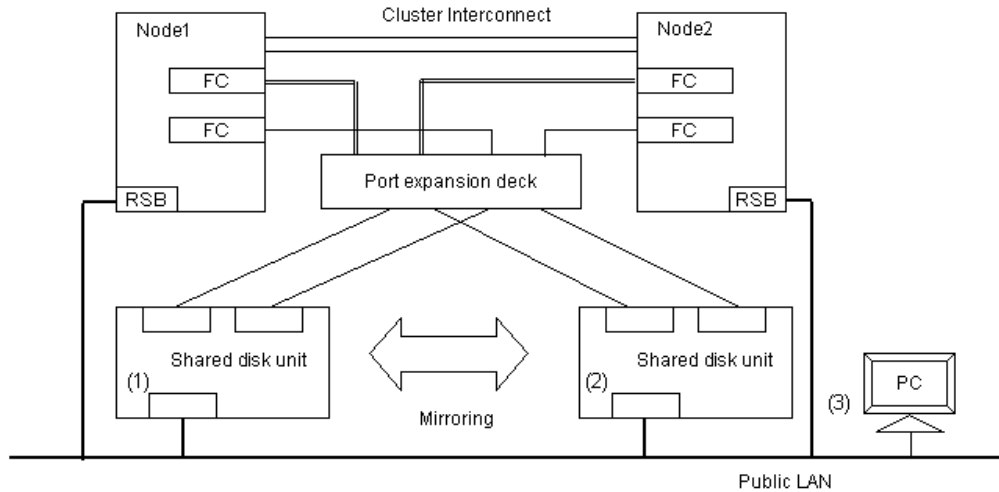
See A.11 "System Design Examples" when determining values for the setup items in the Overall Design Worksheet.

Cluster :	
System requirement	Selective product/function/configuration
Cluster system topology	
(1) Installation objective	<>Standby operation
()Improvement of availability	()1:1 standby
()Improvement of performance	()Mutual standby
(2) Operation after failover	()N:1 standby
()Degenerate operation enabled	()Cascade
()Degenerate operation disabled	()Priority transfer
(3) Intersystem shared DB	<>Scalable operation
()Provided	
()Not provided	
(4) Node count	
()2 nodes	
()3 or more nodes	
(5) Web-Based Admin View operation modes	
()2-layer model	<>1 PC required
()3-layer model	<>Operation management server and 1 PC required
(6) Shared disk units selection	
1)2-layer model	
<>RAID	[] Multipath disk control facility
<>Interface	<>GRMPD (GR multipath driver)
<>Fibre Channel	[] GDS (Global Disk Services)
<>Path	
<>Single path	
<>Path duplex switchover	
<>Manage disk cabinet	
2)Switchover file system selection	
<>ext2, ext3	[] GFS (Global File Services)
<>High reliability above ext2, ext3	
<>Simultaneous sharing	
<>File system	
<>RAW	
(7)NTP	
1)Cluster topology	<>NTP broadcast
()No existing NTP network.	<>Place NTP server on the cluster node
()Existing NTP network.	<>Synchronous with the NTP server outside the cluster
2)NTP network setting	Host name IP address
()When there is an NTP server outside the cluster system	
()NTP setting within the cluster system	
Primary NTP server	
Secondary NTP server	
(8)Crash dump collection	
()LKCD	<>1LU is necessary for the shared disk.
()netdump	<>single node exclusively for the Netdump server is necessary.

A.4 CE (FE for North America) Instruction Worksheet

The CE Instruction Worksheet indicates information required for hardware installation for a Fujitsu customer engineer (CE). This worksheet is also used for specifying information that was configured by the CE.

For information on hardware installation in the field, see the cluster field installation operation procedure.



Shared RAID unit	IP address (1)	__ . __ . __ . __
	IP address (2)	__ . __ . __ . __
	Gateway	__ . __ . __ . __
	Subnet mask	__ . __ . __ . __
ServerView management machine	IP address (3)	__ . __ . __ . __

A.5 Cluster Installation Environment Worksheet



Note

Use a single primary management server of Web-Based Admin View to monitor a single cluster system.

The Cluster Installation Environment Worksheet organizes items related to installation of Linux(R) software, PRIMECLUSTER, required and related software. Create the Cluster Installation Environment Worksheet.

The Cluster Installation Environment Worksheet contains initial configuration items related to the entire PRIMECLUSTER system. Configure a system on each node according to the information specified here.

Cluster system name:		Cluster Installation Environment Worksheet			
Node name:					
Settings		Notes			
(1) Software to be installed	<input type="checkbox"/> Optional software	<input type="checkbox"/> GRMPD (GR multipath driver)			
(2) Version of Linux	<> Red Hat Enterprise Linux ES (v. 2.1) <> Red Hat Enterprise Linux AS (v. 2.1) <> Red Hat Enterprise Linux ES (v. 3) <> Red Hat Enterprise Linux AS (v. 3) Use the same version on all nodes.				
(3) Partition information		Logical path	Size	Configuration should be synchronized on all nodes	
	/boot				
	/var				
	/				
	/opt				
	/var/crash				
	/usr				
	/home				
	/var/opt				
	/etc/opt				
/tmp					
(4) System locale	<> C <> Ja <> Other ()				
(5) Time zone	<> Japan <> Other ()				
(6) Node information					
Node name					
IP					
(7) Web-Based Admin View					
	Node name	IP	Access I/F	Http port number	RMI port number
Primary management server	_____	_____	_____	_____	_____
Secondary management server	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____

A.6 Kernel Parameter Worksheet

When you build the PRIMECLUSTER system, the default values for the kernel parameters of the Linux(R) may be inadequate. The Kernel Parameter Worksheet shows the kernel parameter values used for PRIMECLUSTER. If the values have been set in `/etc/sysctl.conf`, you need to edit the values (Defined values + kernel parameter values used for PRIMECLUSTER). If the values have not been set, you need to set the values (Linux(R) default values + the kernel parameter values used for PRIMECLUSTER.)

The kernel parameter values differ depending upon:

- CF configuration
- RMS configuration



Note

- The values used by products and user applications that operate in the PRIMECLUSTER system must also be included in the kernel parameter values.
- To enable values that have been changed, you must restart the system after the installation.
- If a kernel parameter value is already maximized, the change will not be added to the system.

A.6.1 CF Configuration

To enable the resource database, you must change the default value of the Linux(R) kernel parameter.

The kernel parameters can be configured with the `sysctl (8)` utility when they are executed. The procedures for changing the kernel parameters and setting up a new kernel parameter are explained below.

The value of `SHMMAX` can be changed as follows:

- Edit the `/etc/sysctl.conf` file.
- Add the following entry. `kernel.shmmax =value`

Change the semaphore parameter values as follows:

```
kernel.sem = value1 value2 value3 value4
```

Define the original values as follows:

```
value1 = value of SEMMSL
value2 = value to SEMMNS
value3 = value of SEMOPM
value4 = value of SEMMNI
```

As the resource manager does not use `SEMMSL` or `SEMOPM`, you do not need to change these values. If you execute the following commands, the original parameter values will be displayed.

```
#sysctl -a | grep sem
#sysctl -a | grep shm
```

If you execute the following command, each parameter will be changed.

```
#sysctl -p filename (the default value of filename is /etc/sysctl.conf)
```

This command enables the value of /etc/sysctl.conf for the kernel. You do not have to reconfigure the kernel.

To change the kernel parameter while the OS is running, use sysctl (8). For details on the operation of sysctl, see the manual pages describing sysctl (8).

Kernel parameter	Minimum value	Comments (parameter description)
kernel.semmsni	20	Value required for resource database
kernel.semmsns	90	Value required for resource database
kernel.shmmax	1048576+ Value required for the resource database *	Value required for resource database
kernel.shmmsni	30	Value required for resource database

*

Estimate the value required for resource database according to the following equation:

$$\text{Value required for resource database} = 2776 \times \text{number of resources}$$

Estimate the number of resources according to the following equation:

$$\text{Number of resources} = \text{Number of disks in shared system devices} \times (\text{number of shared nodes} + 1) \times 2$$

Specify the following in "Number of disks in shared system devices":

- For a disk array unit, specify the number of logical units (LUN).
- For other than a disk array unit, specify the number of physical units.

Specify the number of nodes connected to the shared disk in "number of shared nodes."



Note

For system expansion, if you increase the logical disks, you need to re-estimate the resources and restart each node in the cluster system. If you add disks to the cluster after installation, you must then calculate the resources required for the total number of logical disks after addition.

A.6.2 RMS Configuration

The table below shows the values of the kernel parameters required for the RMS configuration. If the kernel parameters do not come up to the following minimum values when RMS is installed, they will be automatically changed to the minimum values. The adjustable kernel values shown below will be replaced by the value of /etc/system.

Kernel parameter	Minimum value	Comments (parameter description)
kernel.msgmnb	4194304	Byte size of the message queue
kernel.msgmax	16384	Maximum size of the message text
kernel.msgmsni	8192	Maximum number of message queues for the entire system



Note

If you uninstall the RMS package from /etc/sysctl.conf by executing the "rpm -e" command, you need to restart the system after uninstallation.

A.7 Cluster Configuration Worksheet

The Cluster Configuration Worksheet is required for building a cluster.

Use this worksheet to organize the items before using Web-Based Admin View to set up the PRIMECLUSTER system.



For information on the setup items for this worksheet, see Chapter 5 "Building a Cluster." Also see the A.11.1 "Cluster Building Worksheet" in the A.11 "System Design Examples."

Item		Setting		Remarks	
Product type		<=>PRIMECLUSTER Enterprise Edition <=>PRIMECLUSTER HA Server <=>PRIMECLUSTER Clustering Base			
Shared disk unit: Type 1	Interface				
	Path				
	File system selection				
Shared disk unit: Type 2	Interface				
	Path				
	File system selection				
NTP	Operation mode				
	Protocol (only when broadcast is specified)				
	Network configuration	External NTP servers	Host name		
			IP address		
		NTP server settings in cluster	Primary NTP server	Host name	
				IP address	
		Secondary NTP server	Host name		
		IP address			
Operation management topology	Web-Based Admin View operation mode		layer		
	Public LAN				
	Primary management server IP				
	Secondary management server IP				
User group	Group name	User name			
		<=>wvroot			
		<=>clroot			
		<=>cladmin			
		<=>clmon			

Cluster name					
Node information	CIP	Number of subnets			
		Subnet IP			
		Net mask			
	Node 1	Node name (uname -n)			
		CF node name			
		Public LAN	Network interface name		
			IP address		
			Net mask		
			Gateway		
		Cluster interconnect	Path 0 NIC name		
			Path 1 NIC name		
		weight			Node weight (priority if cluster partition occurs) used by SF Note: See setup policy for survival priority if cluster partition occurs.
		RSB	IP address		
			User ID		
Password					
Panic status notification disk name			When LKCD is to be used		
IP address for netdump			When netdump is to be used		
Node in CF quorum set		<=>[Yes] <=>No	Do not change the default setting.		

	Node 2	Node name (uname -n)				
		CF node name				
		Public LAN	Network interface name			
			IP address			
			Net mask			
			Gateway			
		Cluster interconnect	Path 0 NIC name			
			Path 1 NIC name			
		weight			Node weight (priority if cluster partition occurs) used by SF Note: See setup policy for survival priority if cluster partition occurs.	
		RSB	IP address			
			User ID			
			Password			
		Panic status notification disk name			When LKCD is to be used	
		IP address for netdump			When netdump is to be used	
		Node in CF quorum set		<=>[Yes] <=>No	Do not change the default setting.	
	Node 3	Node name (uname -n)				
		CF node name				
		Public LAN	Network interface name			
			IP address			
			Net mask			
			Gateway			
		Cluster interconnect	Path 0 NIC name			
			Path 1 NIC name			
		weight			Node weight (priority if cluster partition occurs) used by SF Note: See setup policy for survival priority if cluster partition occurs.	
		RSB	IP address			
			User ID			
			Password			
		Panic status notification disk name			When LKCD is to be used	
		IP address for netdump			When netdump is to be used	
		Node in CF quorum set		<=>[Yes] <=>No	Do not change the default setting.	
	Node 4	Node name (uname -n)				
		CF node name				
		Public LAN	Network interface name			
			IP address			
			Net mask			
			Gateway			
		Cluster interconnect	Path 0 NIC name			
			Path 1 NIC name			
		weight			Node weight (priority if cluster partition occurs) used by SF Note: See setup policy for survival priority if cluster partition occurs.	
		RSB	IP address			
			User ID			
			Password			
		Panic status notification disk name			When LKCD is to be used	
		IP address for netdump			When netdump is to be used	
		Node in CF quorum set		<=>[Yes] <=>No	Do not change the default setting.	
CF remote service usage		[]jcfc (CF file copy) []jcfs (CF remote command execution)				
IP interconnect setup		<=>[Not used] <=>Used (IP interconnect count)				
CIP		<=>[Used by RMS] <=>[Not used by RMS] Suffix:				
Cluster resource management facility	Hardware device to be registered in the resource database		[]Network device *1 []Disk unit *2	*1) Required when public LAN takeover is used *2) Required when GDS and GFS are used		
	Means of stopping a node forcibly		Means []RSB	Remote service port		
Shutdown facility (SF)		Operation after stop <=>[Stop] <=>Reboot				

Note: Values enclosed in brackets ([]) are default values.



For information on the "setup policy for survival priority if cluster partition occurs" in the Remarks column for weight, see "Survival scenarios" in 5.1.2 "Setting Up the Shutdown Facility."

A.8 Cluster Application Configuration Worksheets

Use the Cluster Application Configuration Worksheet to organize the items before building a cluster application.

The following worksheets are required for building a cluster application.

- A.8.1 RMS Setup Worksheet
- A.8.2 GFS Shared File System Setup Worksheet
- A.8.3 GLS Setup Worksheet
- A.9 GDS Setup Worksheets
- A.10 Cluster Application Worksheets



For information on the setup items for this worksheet, see Chapter 6 "Building Cluster Applications."

A.8.1 RMS Setup Worksheet

You can follow the RMS setup worksheet to configure RMS.



For information on the setup items in this worksheet, see 6.1 "Initial RMS Setup."

Item	Environment variable (global)	Setup value	Remark (specified value using CUI)
RMS automatic startup	HV_RCSTART	<>[No] <>Yes	[0] * 1

* To set up automatic startup of RMS when one of the nodes is started, select "Yes."

A.8.2 GFS Shared File System Setup Worksheet

If you plan to use a GFS (Global File Services) Shared File System, use the GFS Shared File System Setup Worksheet to organize the input items beforehand.



For information on the setup items in this worksheet, see 6.4 "Initial GFS Setup." Also see A.11.2 "GFS Shared File System Setup Worksheet" in A.11 "System Design Examples."

Item		Setting
GFS Shared File System settings	Device name	
	Mount point	
	Device name	
	Mount point	

A.8.3 GLS Setup Worksheet

If you will be using Global Link Services (GLS), use the GLS Setup Worksheet to organize the input items beforehand.

This section describes the worksheet settings for the following typical duplexing modes:

- **NIC switching mode** (logical IP takeover)
- **NIC switching mode** (physical IP takeover I)
- **NIC switching mode** (physical IP takeover II)
- **Fast switching mode**



See

- For configuration instructions for other duplexing modes, see "Appendix B Examples of Setting Up" in the *"PRIMECLUSTER Global Link Services Configuration and Administration Guide 4.1 : Redundant Line Control Function."*
- For information on the items in this sheet, see the explanation at the bottom of the sheet and 6.2 "Initial GLS Setup." Also see A.11.3 "GLS Setup Worksheet" in A.11 "System Design Examples."

■ NIC switching mode (Logical IP Takeover)

Item		Setting		
GLS settings	Switching mode		<Y>NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name			
		Takeover virtual IP address (or host name)		
		Subnet mask		
	Node name (1)			
	Configuration information	Virtual interface name		
		Primary physical interface name		
		Secondary physical interface name		
		Physical IP address (or host name)		
	Monitoring destination	Logical IP address (or host name)		
		IP address (or host name) of primary		
	Optional function	IP address (or host name) of secondary		
		Standby NIC patrol		<>Disable <>Enable
	Node name (2)			
	Configuration information	Virtual interface name		
		Primary physical interface name		
		Secondary physical interface name		
		Physical IP address (or host name)		
	Monitoring destination	Logical IP address (or host name)		
		IP address (or host name) of primary		
Optional function	IP address (or host name) of secondary			
	Standby NIC patrol		<>Disable <>Enable	

[Setup items]

- Switching mode
Specify a redundant operation type for GLS; Fast switching mode, NIC (Network Interface Card) switching mode, or RIP mode.
Add d (logical IP takeover of the NIC switching mode) to the "-m" option of the "hanetconfig create" command.
- Takeover virtual interface name

Specify the name of the virtual interface for cluster switchover.

The virtual interface is automatically created under the name of shaX:NN (X and NN are numbers) as a result of executing the "hanethvsc create" command.

- Takeover virtual IP address (or host name)
Specify the IP address (or host name) for cluster switchover.
The same logical IP address (or host name) that was set in nodes (1) and (2) is set as a result of executing the "hanethvsc create" command.
- Subnet mask
Specify the subnet mask for the takeover virtual IP address by using the "hanetmask create" command.
This value is applied to all physical IP address and logical IP address.
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.
- Virtual interface name
Specify the virtual interface name to be assigned to the physical interface to be duplexed.
Specify shaX (X is a number) to the "-n" option of the "hanetconfig create" command.
Set the same name for node (1) and node (2).
- Primary physical interface name
Specify the name of the interface to be first activated among the duplexed physical interfaces(e.g. eth0, eth1, etc.)
Specify the name to the "-t" option of the "hanetconfig create" command.
- Secondary physical interface name
Among the duplexed physical interfaces, specify the name of the interface to be activated after switchover from the primary physical interface(e.g. eth0, etc.). Specify the name to the "-t" option of the "hanetconfig create" command.
- Physical IP address (or host name)
Specify the physical IP address (or host name) to be assigned to the physical interface to be duplexed.
Specify the value to the "-e" option of the "hanetconfig create" command.
Specify different values for node (1) and node (2).
- Logical IP address (or host name)
Specify the logical IP address (or host name) to be assigned to the physical interface to be duplexed.
Specify the value to the "-i" option of the "hanetconfig create" command. Specify the same value for node (1) and node (2).
At the logical IP address, specify an IP address with the same network number as the physical IP address.
- Primary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the primary physical interface is used.
Specify the value to the "-p" option of the "hanetpoll create" command.
- Secondary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the secondary physical interface is used.
Specify the value to the "-p" option of the "hanetpoll create" command.
- Standby NIC patrol
When monitoring the standby NIC, specify p for standby patrol (automatic switchback in the event of a failure) or q for standby patrol (immediate automatic switchback) to the -m option of the "hanetconfig create" command.

■ NIC switching mode (physical IP takeover I)

Item		Setting	
GLS settings	Switching mode	< >NIC switching mode (logical IP takeover) <Y>NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name		
	Takeover virtual IP address (or host name)		
	Subnet mask		
	Node name (1)		
	Configuration information	Virtual interface name	
		Primary physical interface name	
		Secondary physical interface name	
		Physical IP address (or host name)	
		Logical IP address (or host name)	
	Monitoring destination	IP address (or host name) of primary	
		IP address (or host name) of secondary	
	Optional function	Standby NIC patrol	<>Disable <>Enable
	Node name (2)		
	Configuration information	Virtual interface name	
		Primary physical interface name	
		Secondary physical interface name	
		Physical IP address (or host name)	
Logical IP address (or host name)			
Monitoring destination	IP address (or host name) of primary		
	IP address (or host name) of secondary		
Optional function	Standby NIC patrol	<>Disable <>Enable	

[Setup items]

- Switching mode
Specify a redundant operation type for GLS; Fast switching mode, NIC (Network Interface Card) switching mode, or RIP mode.
Add e (physical IP takeover of the NIC switching mode) to the "-m" option of the "hanetconfig create" command.
- Takeover virtual interface name
Specify the name of the virtual interface for cluster switchover.
The virtual interface is automatically created under the name of shaX:NN (X and NN are numbers) as a result of executing the "hanethvsrc create" command.
- Takeover virtual IP address (or host name)
Specify the IP address (or host name) for cluster switchover.
The same logical IP address (or host name) that was set in nodes (1) and (2) is set as a result of executing the "hanethvsrc create" command.
- Subnet mask
Specify the subnet mask for the takeover virtual IP address by using the "hanetmask create" command.
This value is applied to all physical IP address and logical IP address.
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.
- Virtual interface name
Specify the virtual interface name to be assigned to the physical interface to be duplexed.
Specify shaX (X is a number) to the "-n" option of the "hanetconfig create" command.
Set the same name for node (1) and node (2).
- Primary physical interface name
Specify the name of the interface to be first activated among the duplexed physical interfaces (e.g. eth0, etc.)
Specify the name to the "-t" option of the "hanetconfig create" command.
- Secondary physical interface name
Among the duplexed physical interfaces, specify the name of the interface to be activated

after switchover from the primary physical interface (e.g. eth0, etc.). Specify the name to the "-l" option of the "hanetconfig create" command.

- Physical IP address (or host name)
Specify the physical IP address (or host name) to be assigned to the physical interface to be duplexed.
Specify the value to the "-e" option of the "hanetconfig create" command.
Specify different values for node (1) and node (2).
- Logical IP address (or host name)
Specify the logical IP address (or host name) to be assigned to the physical interface to be duplexed.
Specify the value to the "-i" option of the "hanetconfig create" command. Specify the same value for node (1) and node (2).
At the logical IP address, specify an IP address with the same network number as the physical IP address.
- Primary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the primary physical interface is used.
Specify the value to the "-p" option of the "hanetpoll create" command.
- Secondary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the secondary physical interface is used.
Specify the value to the "-p" option of the "hanetpoll create" command.
- Standby NIC patrol
When monitoring the standby NIC, specify p for standby patrol (automatic switchback in the event of a failure) or q for standby patrol (immediate automatic switchback) to the -m option of the "hanetconfig create" command.

■ NIC switching mode (physical IP takeover II)

Item		Setting		
GLS settings	Switching mode		< >NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) <Y>NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name			
		Takeover virtual IP address (or host name)		
		Subnet mask		
	Node name (1)			
	Configuration information	Virtual interface name		
		Primary physical interface name		
		Secondary physical interface name		
		Logical IP address (or host name)		
	Monitoring destination	IP address (or host name) of primary		
		IP address (or host name) of secondary		
	Optional function	Standby NIC patrol	<>Disable <>Enable	
	Node name (2)			
	Configuration information	Virtual interface name		
		Primary physical interface name		
		Secondary physical interface name		
		Logical IP address (or host name)		
	Monitoring destination	IP address (or host name) of primary		
		IP address (or host name) of secondary		
	Optional function	Standby NIC patrol	<>Disable <>Enable	

[Setup items]

- Switching mode
Specify a redundant operation type for GLS; Fast switching mode, NIC (Network Interface Card) switching mode, or RIP mode.
Add e (physical IP takeover of the NIC switching mode) to the "-m" option of the

“hanetconfig create” command.

- Takeover virtual interface name
Specify the name of the virtual interface for cluster switchover.
The virtual interface is automatically created under the name of shaX:NN (X and NN are numbers) as a result of executing the “hanethvsc create” command.
- Takeover virtual IP address (or host name)
Specify the IP address (or host name) for cluster switchover.
The same logical IP address (or host name) that was set in nodes (1) and (2) is set as a result of executing the “hanethvsc create” command.
- Subnet mask
Specify the subnet mask for the takeover virtual IP address by using the "hanetmask create" command.
This value is applied to logical IP address.
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.
- Virtual interface name
Specify the virtual interface name to be assigned to the physical interface to be duplexed.
Specify shaX (X is a number) to the “-n” option of the “hanetconfig create” command.
Set the same name for node (1) and node (2).
- Primary physical interface name
Specify the name of the interface to be first activated among the duplexed physical interfaces (e.g. eth0, etc.)
Specify the name to the “-t” option of the “hanetconfig create” command.
- Secondary physical interface name
Among the duplexed physical interfaces, specify the name of the interface to be activated after switchover from the primary physical interface (e.g. eth0, etc.). Specify the name to the “-t” option of the “hanetconfig create” command.
- Logical IP address (or host name)
Specify the logical IP address (or host name) to be assigned to the physical interface to be duplexed.
Specify the value to the “-i” option of the “hanetconfig create” command. Specify the same value for node (1) and node (2).
- Primary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the primary physical interface is used.
Specify the value to the “-p” option of the “hanetpoll create” command.
- Secondary monitoring-destination IP address (or host name)
Specify the IP address (or host name) of the switching hub to be monitored when the secondary physical interface is used.
Specify the value to the “-p” option of the “hanetpoll create” command.
- Standby NIC patrol
When monitoring the standby NIC, specify p for standby patrol (automatic switchback in the event of a failure) or q for standby patrol (immediate automatic switchback) to the -m option of the "hanetconfig create" command.

■ Fast switching mode

Item		Setting	
GLS settings	Switching mode	< >NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) <Y>Fast switching mode	
	Takeover virtual interface name		
	Takeover virtual IP address (or host name)		
	Subnet mask		
	Node name (1)		
	Configuration information	Virtual interface name	
		Physical interface name (1)	
		Physical interface name (2)	
		Virtual IP address (or host name)	
		Subnet mask	
		Physical IP address (1)	
		Subnet mask	
		Physical IP address (2)	
	Subnet mask		
	Node name (2)		
	Configuration information	Virtual interface name	
		Physical interface name (1)	
		Physical interface name (2)	
		Virtual IP address (or host name)	
		Subnet mask	
Physical IP address (1)			
Subnet mask			
Physical IP address(2)			
Subnet mask			

[Setup items]

- Switching mode
Specify a redundant operation type for GLS; Fast switching mode, NIC (Network Interface Card) switching mode, or RIP mode.
Add t (Fast switching mode) to the "-m" option of the "hanetconfig create" command.
- Takeover virtual interface name
Specify the name of the virtual interface for cluster switchover.
The virtual interface is automatically created under the name of shaX:NN (X and NN are numbers) as a result of executing the "hanethvrsc create" command.
- Takeover virtual IP address (or host name)
Specify the IP address (or host name) for cluster switchover.
Specify the value to the "-i" option of the "hanethvrsc create" command.
At the takeover IP address, specify an IP address with the same network number as the virtual IP address.
- Subnet mask
Specify the subnet mask that is to be applied to the takeover virtual IP address. Specify this with the "hanetmask create" command.
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.
- Virtual interface name
Specify the virtual interface name to be assigned to the physical interface to be duplexed.
Specify shaX (X is a number) to the "-n" option of the "hanetconfig create" command.
Set the same name for node (1) and node (2).
- Physical interface name (1) and (2)
Specify the name of the interface to be first activated among the duplexed physical interfaces (e.g. eth0, eth1, etc.)
Specify the name to the "-t" option of the "hanetconfig create" command.
- Virtual IP address (or host name)
Specify the virtual IP address (or host name) to the "-i" option of the "hanetconfig create" command.
Specify different values for node (1) and node (2).

At the virtual IP address, specify the IP address with a network number that is different from the physical IP address.

- Subnet mask
Specify the value of the subnet mask that is to be applied to the virtual IP address. Specify this with the "hanetmask create" command. This value must be identical to the value of the subnet mask that is to be applied to the takeover virtual IP.
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.
- Physical IP address (1) and (2)
Specify the physical interface name to be assigned to the physical interface to be duplexed.
This value must be specified in the /etc/sysconfig/network-scripts/ifcfg-ethX file (ethX indicates a physical interface name).
At physical IP addresses (1) and (2), specify IP addresses with different network numbers.
- Subnet mask
Specify the value of the subnet mask that is to be applied to the physical IP address.
This value must be specified in the /etc/sysconfig/network-scripts/ifcfg-ethX file (ethX indicates a physical interface name).
Note that if the IPv6 address is used and if a subnet is not used for the IPv4 address, you do not need to specify this value.

A.9 GDS Setup Worksheets

You can follow the GDS setup worksheets to configure GDS (Global Disk Services) with this worksheet. This sheet includes the GDS Configuration Worksheet that is used for the shared disk setup.



See

- Before setting up the GDS configuration, you need to know basic information from reading "*PRIMECLUSTER Global Disk Services Configuration and Administration Guide*."
- For information on the items in this worksheet, see 6.3.2 "GDS Configuration Setup."



Note

The class name should be unique in the cluster system.

A.9.1 Shared Disk Setup Worksheet

If you are setting up shared disks, you must determine the GDS configuration beforehand. Use the Shared Disk Setup Worksheet to organize the GDS configuration beforehand.



See

- Before setting up the GDS configuration, you need to know basic information from reading "*PRIMECLUSTER Global Disk Services Configuration and Administration Guide*."
- For information on the items in this worksheet, see 6.3.2.1 "Setting Up Shared Disks." Also see A.11.4 "GDS Configuration Worksheet" in A.11 "System Design Examples."

■ GDS Configuration Worksheet

		Item	Setting		
GDS configuration	Class 1	Class name			
		Class scope (node name)	Node 1		
			Node 2		
		Spare disk 1 (*1)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
		Single disk 1 (*2)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
			Single volume 1	Volume name	
				Size	
			Single volume 2	Volume name	
		Size			
		Single disk 2 (*2)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
			Single volume 1	Volume name	
				Size	
Single volume 2	Volume name				
	Size				

	Disk 1 to be connected to group (*3)	SDX disk name	
		Physical disk name in node 1	
		Physical disk name in node 2	
	Disk 2 to be connected to group (*3)	SDX disk name	
		Physical disk name in node 1	
		Physical disk name in node 2	
	Low-order group 1 (*4)	Group name	
		Group type	
		Stripe width (*6)	
		Disk /low-order group name	Disk /low-order group 1
	Disk /low-order group 2		
	Low-order group 2 (*4)	Group name	
		Group type	
		Stripe width (*6)	
Disk /low-order group name		Disk /low-order group 1	
	Disk /low-order group 2		

		Highest-order group 1 (*5)	Group name		
			Group type		
			Stripe width (*6)		
			Disk /low-order group name	Disk /low-order group 1	
				Disk /low-order group 2	
			Volume 1	Volume name	
				Size	
		Volume 2	Volume name		
			Size		
		Highest-order group 2 (*5)	Group name		
			Group type		
			Stripe width (*6)		
			Disk /low-order group name	Disk /low-order group 1	
				Disk /low-order group 2	
Volume 1	Volume name				
	Size				
Volume 2	Volume name				
	Size				

	Class 2	Class name			
		Class scope (node name)	Node 1		
			Node 2		
		Spare disk 1 (*1)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
		Single disk 1 (*2)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
			Single volume 1	Volume name	
				Size	
			Single volume 2	Volume name	
		Size			
		Single disk 2 (*2)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
			Single volume 1	Volume name	
				Size	
			Single volume 2	Volume name	
		Size			
		Disk 1 to be connected to group (*3)	SDX disk name		
			Physical disk name in node 1		
			Physical disk name in node 2		
Disk 2 to be connected to group (*3)	SDX disk name				
	Physical disk name in node 1				
	Physical disk name in node 2				

	Low-order group 1 (*4)	Group name		
		Group type		
		Stripe width (*6)		
		Disk /low-order group name	Disk /low-order group 1	
			Disk /low-order group 2	
	Low-order group 2 (*4)	Group name		
		Group type		
		Stripe width (*6)		
		Disk /low-order group name	Disk /low-order group 1	
			Disk /low-order group 2	
	Highest-order group 1 (*5)	Group name		
		Group type		
Stripe width (*6)				
Disk /low-order group name		Disk /low-order group 1		
			Disk /low-order group 2	
Volume 1		Volume name		
		Size		
Volume 2		Volume name		
	Size			
Highest-order group 2 (*5)	Group name			
	Group type			
	Stripe width (*6)			
	Disk /low-order group name	Disk /low-order group 1		
			Disk /low-order group 2	
	Volume 1	Volume name		
		Size		
	Volume 2	Volume name		
	Size			

(*1) This item can be defined only if mirroring is performed.

(*2) This item must be defined only if a single volume is to be created.

(*3) This item must be defined only if mirroring, striping, or concatenation is performed.

(*4) This item must be defined only if the groups are to be arranged into a hierarchy.

(*5) This item must be defined only if mirroring, striping, or concatenation is performed.

(*6) This item must be defined only if the group type is stripe.

A.10 Cluster Application Worksheets

The Cluster Application Worksheets are necessary for setting up cluster applications and resources.

The following worksheets are available:

- ◆ **Resource configuration:**
 - Cmdline Resource Worksheet
 - Fsystem Resource Worksheet
 - Gds (Global Disk Services) Resource Worksheet
 - Gls (Global Link Services) Resource Worksheet
 - Procedure Resource Worksheet
- ◆ **Cluster application configuration:**
 - Cluster Application Setup Worksheet
- ◆ **Global Settings in Configuration Setup:**
 - Configuration Global Settings Setup Worksheet

A.10.1 Cmdline Resource Worksheet

The Cmdline Resource Setup Worksheet is used for configuring a Cmdline resource.

Item			Setting value	
Cmdline resource	Script to be controlled	Object	Start script	
			Stop script	
			Check script	
		Flag	NULLDETECTOR	<>Yes <>[No]
			ALLEXITCODES	<>Yes <>[No]
			LIEOFFLINE	<>Yes <>[No]
			CLUSTEREXCLUSIVE	<>[Yes] <>No
			AUTORECOVER	<>[Yes] <>No
			MONITORONLY	<>Yes <>[No]
			STANDBYCAPABLE	<>Yes <>[No]
		REALTIME	<>Yes <>[No]	
		TIMEOUT	(Range: 45 to 31535999) [300]	

Note: Values enclosed in brackets ([]) are default values.

A.10.2 Fsystem Resource Worksheet

The Fsystem Resource Worksheet is used for configuring an Fsystem resource.

Item				Setting value
Fsystem resource			Timeout	(Range: 45 to 3600) [180]
	Mount point to be controlled 1	Object	Mount point	
		Flag	AUTORECOVER	<>[Yes] <>No
			SHARE	<>Yes <>[No]
	Mount point to be controlled 2	Object	Mount point	
		Flag	AUTORECOVER	<>[Yes] <>No
			SHARE	<>Yes <>[No]
	Mount point to be controlled 3	Object	Mount point	
		Flag	AUTORECOVER	<>[Yes] <>No
			SHARE	<>Yes <>[No]

Note: Values enclosed in brackets ([]) are default values.

A.10.3 Gds Resource Worksheet

The Gds Resource Worksheet is used for configuring a Gds (Global Disk Services) resource.

Item				Setting value
Gds resource	Resource operation	Attribute	Usage	Exclusive use <>[Enable] Hot Standby operation <>Enable <>[Disable] <>Disable
			AutoRecover	<>Yes <>[No]
			Timeout	(Range: 5 to 3600) [1800]
	Disk class to be controlled 1	Object	Disk Class	
	Disk class to be controlled 2	Object	Disk Class	
	Disk class to be controlled 3	Object	Disk Class	

Note: Values enclosed in brackets ([]) are default values.

A.10.4 GIs Resource Worksheet

The GIs Resource Worksheet is used for configuring a GIs (Global Link Services) resource.

Item				Setting value
GIs resource	Resource operation	Attribute	Timeout	(Range: 5 to 300) [60]
	Takeover IP address to be controlled 1	Object	Takeover IP address(IPv4)	
			Takeover IP address(IPv6)	
		Flag	AUTORECOVER	<>Yes <>[No]
	Takeover IP address to be controlled 2	Object	Takeover IP address(IPv4)	
			Takeover IP address(IPv6)	
		Flag	AUTORECOVER	<>Yes <>[No]
	Takeover IP address to be controlled 3	Object	Takeover IP address(IPv4)	
			Takeover IP address(IPv6)	
		Flag	AUTORECOVER	<>Yes <>[No]

Note: The values enclosed in brackets ([]) are the default values.

A.10.5 Procedure Resource Worksheet

The Procedure Resource Worksheet is used for configuring a procedure resource.

Item				Setting value
Procedure resource	Resource name			
	Resource operation	Attribute	SCRIPTTIMEOUT	(Range: 45 to 31535999) [1800]
	Procedure resource to be controlled	Procedure class		<>Application <>BasicApplication <>SystemState2 <>SystemState3 <>()
			Procedure resource	

Note: Values enclosed in brackets ([]) are default values.

A.10.6 Cluster Application Worksheet

The Cluster Application Worksheet is used for configuring a cluster application.

Item		Setting value	Remarks (value specified with GUI/CUI)			
Cluster application settings	Configuration name					
	Cluster application name					
	Operating node	SysNode (Priority 1: High)				
		SysNode (Priority 2)				
		SysNode (Priority 3)				
		SysNode (Priority 4: Low)				
	Attribute	Start	Operating node at startup	OnlinePriority <=>[According to cluster application] <=>Operating node when RMS stopped [0] 1		
			Automatic startup	AutoStartUp <=>[Manual] <=>Automatic [No] Yes		
		Switchover	Switchover operation	AutoSwitchOver	<=>[Manual] <=>Automatic (more than one of the following can be selected) []At node failure []At resource failure []When RMS stops [No] HostFailure ResourceFailure ShutDown	
				Standby	Trigger to be Standby	StandbyTransitions <=>[Manual] <=>Automatic (more than one of the following can be selected) []At startup []At switchover []When fault is cleared [NONE] StartUp SwitchRequest ClearFaultRequest
				Operation in the event of a failure	Operation when RMS fails to control 2	HaltFlag <=>[Do not forcibly stop node] <=>Forcibly stop node [No] Yes
		Exclusivity	Exclusivity setup	Handling of failed node	PersistentFault <=>[Use if fault is not detected when RMS is restarted] <=>Use after operator clears fault [0] 1	
				Operation if cluster interconnect fails	ShutdownPriority <=>[NONE] <=>Priority () [NONE] Priority (0 to 20) * Higher number indicates higher priority.	
				LicenseToKill	AutoBreak	<=>No exclusivity setup <=>Cluster application with high job priority <=>Cluster application with low job priority [No] Group 20X Group 10X *Specify either A to Z or a to z in Group.
		AutoBreak	<=>No exclusivity setup <=>Cluster application with high job priority <=>Cluster application with low job priority [Yes] Group 20X Group 10X *If you set up a value in LicenseToKill, either Group 20X or Group 10X will be automatically set up in AutoBreak.			
		Configuration	Resource		Specified resource name	

Note: Values enclosed in brackets ([]) are default values.

A.10.7 Configuration Global Settings Worksheet

This worksheet is used for configuring the Global Settings in the Configuration.

		Item	Setting value		
Global Settings in the Configuration		PreCheck Timeout	(Range: 5 to 2147483647) [300]		
		First Available Detector	(Range: 0 to 127) [0]		
		Last Available Detector	(Range: 0 to 127) [127]		
	Detector Details	Monitoring Intervals	hwdet_execbin	(Range: 5 to 2147483647) [10]	
			hwdet_ckhost	(Range: 5 to 2147483647) [10]	
			hwdet_ddm	(Range: 5 to 2147483647) [19]	
			hwdet_glbassrt	(Range: 5 to 2147483647) [10]	
			hwdet_gmount	(Range: 5 to 2147483647) Used for Fsystem. [10]	
			hwdet_icmp	(Range: 5 to 2147483647) Used for Ippaddress. [10]	
			hwdet_locassrt	(Range: 5 to 2147483647) Used for userApplication. [10]	
			hwdet_lvm	(Range: 5 to 2147483647) [18]	
			hwdet_nfs	(Range: 5 to 2147483647) Used for Fsystem. [10]	
			hwdet_rcfs	(Range: 5 to 2147483647) Rcfs. [9]	
			hwdet_rcvm	(Range: 5 to 2147483647) Rcvm. [33]	
			hwdet_read	(Range: 5 to 2147483647) Used for Rawdisk. [10]	
			hwdet_srdf	(Range: 5 to 2147483647) Used for Srdf. [60]	
			hwdet_stopcint	(Range: 5 to 2147483647) Used for Fsystem. [10]	
			hwdet_system	(Range: 5 to 2147483647) Used for Cmdline, Fsystem, userApplication. [10]	
			hwdet_vwm	(Range: 5 to 2147483647) Used for Vwm. [30]	
			ForeignDetectors	(Range: 5 to 2147483647) Used for foreign-code. [30]	
				Log level (MemoryLevel)	(Range: 0 to 2147483647) [1]
				Detector logging	(Range: 0 to 2147483647) [0]

*1) Values enclosed in brackets ([]) are default values.

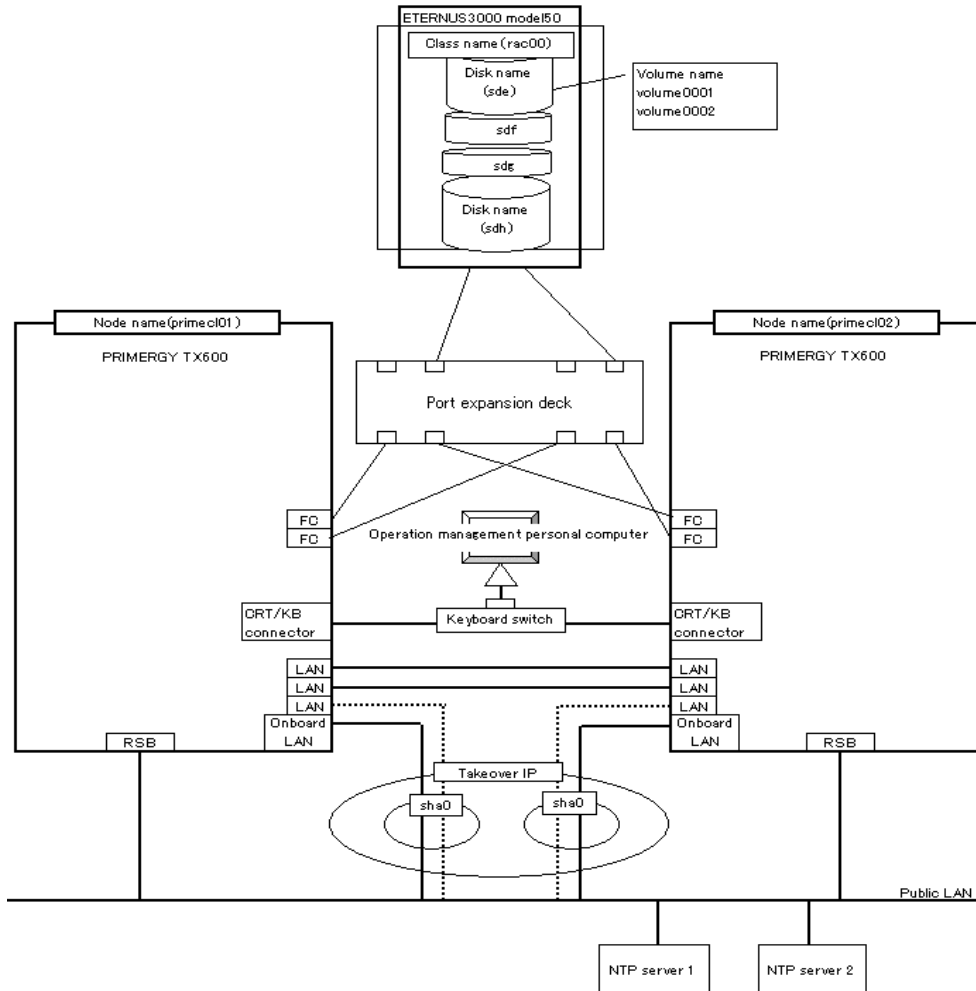
Note: If the settings for items need to be changed, please contact Fujitsu systems engineer (SE). However, no changes may be necessary for the normal operation.

A.11 System Design Examples

This section shows design examples of the PRIMECLUSTER system. Refer to these examples when designing the PRIMECLUSTER system.

■ System configuration

System configuration example



Note: The NTP server should be set to one of the following operation mode;

- Maintains time that is reliable for special hardware devices such as time units and GPS units.
- Uses another server that maintains time that is reliable for special hardware devices such as time units and GPS units, and uses NTP for time synchronization.

■ Used hardware

- PRIMERGY TX600 x 2
- Port expansion deck x 1 unit
- LAN card x 6
- Fibre channel card x 4
- Disk array unit (ETERNUS3000 model50) x 1

■ Used software

- Red Hat Enterprise Linux ES / Red Hat Enterprise Linux AS
- PRIMECLUSTER 4.1A20

- Multipath driver
- Netscape Communicator 4.7x (installed in the operation management personal computer)
- Java™ 2 Runtime Environment Standard Edition v1.3.1(installed in the operation management personal computer)
- IBM(R) Runtime Environment for Linux(R), Java™2 Technology Edition, Version 1.3.1, 32-bit version (Installed when Linux(R) is used as the operation management client.)

■ Shared disk array settings

Device name:	Number of LU	Number of RAID groups	RAID level	Size
ETERNUS3000 model50 (FC)	4	1	5	248.2GB
Device name: Expansion file unit (FC) x 2	-	-	-	18.2GB

A.11.1 Cluster Building Worksheet

Shown below is an example of creating the Cluster Building Worksheet.

Item		Setting			
Product type		<>EE <>HA <>Clustering Base			
Shared disk unit: Type 1	Interface	ETERNUS3000 model50			
	Path	Fibre channel			
	File system selection	multipath			
Shared disk unit: Type 2	Interface	GFS Local File System			
	Path	Expansion file unit			
	File system selection	SCSI			
NTP	Operation mode		-		
	Protocol (only when broadcast is specified)		-		
	Network configuration	External NTP servers	Host name	-	
		NTP server settings in cluster	IP address	-	
			Primary NTP server	Host name	primecl01
			Secondary NTP server	Host name	10.34.214.181
	IP address	primecl02			
	IP address	10.34.214.182			
Operation management topology	Web-Based Admin View operation mode		2 layers		
	Public LAN				
	Primary management server IP	10.34.214.181			
	Secondary management server IP	10.34.214.182			
User group	Group name	User name			
	<Y>wwroot	root			
	<Y>clroot	root			
	<>cladmin				
	<>clmon				
Cluster name		PRIMECLUSTER			

Node information	CIP	Number of subnets		
		Subnet IP		192.168.1.0
		Net mask		255.255.255.0
	Node 1	Node name (uname -n)		primecl01
		CF node name		primecl01
		Public LAN	Network interface name	eth0/eth3
			IP address	10.34.214.181
			Net mask	255.255.255.0
			Gateway	-
		Cluster interconnect	Path 0 NIC name	/dev/eth1
			Path 1 NIC name	/dev/eth2
		weight		
		RSB	IP address	10.34.214.183
			User ID	
			Password	
		Panic status notification disk name		/dev/sde
		IP address for netdump		
		Node in CF quorum set		<Y>[Yes] <>No
	Node 2	Node name (uname -n)		primecl02
		CF node name		primecl02
		Public LAN	Network interface name	eth0/eth3
			IP address	10.34.214.182
			Net mask	255.255.255.0
			Gateway	-
		Cluster interconnect	Path 0 NIC name	/dev/eth1
			Path 1 NIC name	/dev/eth2
		weight		
RSB		IP address	10.34.214.183	
		User ID		
		Password		
Panic status notification disk name		/dev/sde		
IP address for netdump				
Node in CF quorum set		<Y>[Yes] <>No		

	Node 3	Node name (uname -n)			
		CF node name			
		Public LAN	Network interface name		
			IP address		
			Net mask		
		Gateway			
		Cluster interconnect	Path 0 NIC name		
			Path 1 NIC name		
		weight			
		RSB	IP address		
	User ID				
	Password				
	Panic status notification disk name				
	IP address for netdump				
	Node in CF quorum set		<>[Yes] <>No		
	Node 4	Node name (uname -n)			
		CF node name			
		Public LAN	Network interface name		
			IP address		
Net mask					
Gateway					
Cluster interconnect		Path 0 NIC name			
		Path 1 NIC name			
weight					
RSB		IP address			
	User ID				
	Password				
Panic status notification disk name					
IP address for netdump					
Node in CF quorum set		<>[Yes] <>No			
CF remote service usage		[] cfcp (CF file copy) [] cfsh (CF remote command execution)			
IP interconnect setup		<>[Not used] <>Used (IP interconnect count)			
CIP		<>[Used by RMS] <>Not used by RMS Suffix:			
Cluster resource management facility	Hardware device to be registered in the resource database	<Y>Network devices (*1) <Y>Disk units (*2)			
Shutdown facility (SF)	Means of stopping a node forcibly	Means	Operation after stop		
		[]RSB	<>[Stop] <>Reboot		

Note: Values enclosed in brackets ([]) are default values.

In each node, specify /etc/ntp.conf as shown below.

```
server 10.34.214.100
server 10.34.214.101
server 127.127.1.0

fudge 127.127.1.0 stratum 9

enable auth monitor
disable pll
driftfile /var/ntp/drift
statsdir /var/ntp/ntpstats/
```

```
filegen peerstats file peerstats type day enable
filegen loopstats file loopstats type day enable
filegen clockstats file clockstats type day enable
```

A.11.2 GFS Shared File System Setup Worksheet

Shown below is an example of creating the GFS Shared File System Setup Worksheet.

Item		Setting
GFS Shared File System	Device name	class0001:volume0001
	Mount point	/disk1
GFS Shared File System	Device name	class0001:volume0002
	Mount point	/disk2

A.11.3 GLS Setup Worksheet

Shown below are examples of creating the GLS Setup Worksheet.

■ NIC switching mode (Logical IP Takeover)

Item		Setting	
GLS settings	Switching mode	<Y>NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name	sha0:65	
	Takeover virtual IP address (or host name)	10.34.214.185	
	Subnet mask	255.255.255.0	
	Node name (1)	primecl01	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Physical IP address (or host name)	10.34.214.181
	Monitoring destination	Logical IP address (or host name)	10.34.214.185
		IP address (or host name) of primary	10.34.214.188
	Optional function	IP address (or host name) of secondary	10.34.214.189
		Standby NIC patrol	<>Disable <Y>Enable
	Node name (2)	primecl02	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Physical IP address (or host name)	10.34.214.182
	Monitoring destination	Logical IP address (or host name)	10.34.214.185
		IP address (or host name) of primary	10.34.214.188
	Optional function	IP address (or host name) of secondary	10.34.214.189
		Standby NIC patrol	<>Disable <Y>Enable

■ NIC switching mode (physical IP takeover I)

Item		Setting	
GLS settings	Switching mode	< >NIC switching mode (logical IP takeover) <Y>NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name	sha0:65	
	Takeover virtual IP address (or host name)	10.34.214.185	
	Subnet mask	255.255.255.0	
	Node name (1)	primecl01	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Physical IP address (or host name)	10.34.214.181
		Logical IP address (or host name)	10.34.214.185
	Monitoring destination	IP address (or host name) of primary	10.34.214.188
		IP address (or host name) of secondary	10.34.214.189
	Optional function	Standby NIC patrol	<>Disable <Y>Enable
	Node name (2)	primecl02	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Physical IP address (or host name)	10.34.214.182
		Logical IP address (or host name)	10.34.214.185
	Monitoring destination	IP address (or host name) of primary	10.34.214.188
		IP address (or host name) of secondary	10.34.214.189
	Optional function	Standby NIC patrol	<>Disable <Y>Enable

■ NIC switching mode (physical IP takeover II)

Item		Setting	
GLS settings	Switching mode	< >NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) <Y>NIC switching mode (physical IP takeover II) < >Fast switching mode	
	Takeover virtual interface name	sha0:65	
	Takeover virtual IP address (or host name)	10.34.214.185	
	Subnet mask	255.255.255.0	
	Node name (1)	primecl01	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Logical IP address (or host name)	10.34.214.185
		IP address (or host name) of primary	10.34.214.188
	Monitoring destination	IP address (or host name) of secondary	10.34.214.189
		Standby NIC patrol	<>Disable <Y>Enable
	Node name (2)	primecl02	
	Configuration information	Virtual interface name	sha0
		Primary physical interface name	eth0
		Secondary physical interface name	eth1
		Logical IP address (or host name)	10.34.214.185
		IP address (or host name) of primary	10.34.214.188
	Monitoring destination	IP address (or host name) of secondary	10.34.214.189
		Standby NIC patrol	<>Disable <Y>Enable

■ Fast switching mode

Item		Setting	
GLS settings	Switching mode	< >NIC switching mode (logical IP takeover) < >NIC switching mode (physical IP takeover I) < >NIC switching mode (physical IP takeover II) <Y>Fast switching mode	
	Takeover virtual interface name	sha0:65	
	Takeover virtual IP address (or host name)	10.34.214.185	
	Subnet mask	255.255.255.0	
	Node name (1)	primecl01	
	Configuration information	Virtual interface name	sha0
		Physical interface name (1)	eth0
		Physical interface name (2)	eth1
		Virtual IP address (or host name)	10.34.214.181
		Subnet mask	255.255.255.0
		Physical IP address (1)	10.34.215.181
		Subnet mask	255.255.255.0
		Physical IP address (2)	10.34.216.181
	Subnet mask	255.255.255.0	
	Node name (2)	primecl01	
	Configuration information	Virtual interface name	sha0
		Physical interface name (1)	eth0
		Physical interface name (2)	eth1
		Virtual IP address (or host name)	10.34.214.182
		Subnet mask	255.255.255.0
Physical IP address (1)		10.34.215.182	
Subnet mask		255.255.255.0	
Physical IP address (2)		10.34.216.182	
Subnet mask	255.255.255.0		

A.11.4 GDS Configuration Worksheet

Shown below are examples of creating the GDS Configuration Worksheet.

■ **System configuration example**

For a system configuration example, set up the worksheet as shown below.

		Item	Setting		
GDS configuration	Class 1	Class name		rac00	
		Class scope (node name)	Node 1	primecl01	
			Node 2	primecl02	
		Single disk 1	SDX disk name		disk0001
			Physical disk name in node 1		sde
			Physical disk name in node 2		sde
			Single volume 1	Volume name	volume0001
				Size	1024 MB
			Single volume 2	Volume name	volume0002
		Size		1024 MB	
		Single disk 2	SDX disk name		disk0002
			Physical disk name in node 1		sdf
			Physical disk name in node 2		sdf
		Single disk 3	SDX disk name		disk0003
			Physical disk name in node 1		sdg
			Physical disk name in node 2		sdg
		Single disk 4	SDX disk name		disk0004
			Physical disk name in node 1		sdh
Physical disk name in node 2			sdh		

Examples of creating the GDS Configuration Worksheet are provided below.

■ **Example 1. Managing a disk as a single disk:**

In this example, single volumes Volume1 and Volume2 are created in physical disk sdj.

Item		Setting		
Class 1	Class name		Class1	
	Class scope (node name)	Node 1	Node1	
		Node 2	Node2	
	Single disk 1	SDX disk name		Disk1
		Physical disk name in node 1		sdi
		Physical disk name in node 2		sdj
		Single volume 1	Volume name	Volume1
			Size	1024 blocks
		Single volume 2	Volume name	Volume2
	Size		1024 blocks	

■ **Example 2. If a disk is not mirrored but may be changed to a mirror configuration later:**

In this example, mirror group Group1, which consists only of physical disk sdi, is created, and single volumes Volume1 and Volume2 are created in Group1.

Since Group1 consists of only one disk, Volume1 and Volume2 are not mirrored. If another disk is added to Group1, then Volume1 and Volume2 can be changed to a mirror configuration.

Item		Setting		
Class 1	Class name		Class1	
	Class scope (node name)	Node 1	Node1	
		Node 2	Node2	
	Disk 1 connected to group	SDX disk name		Disk1
		Physical disk name in node 1		sdi
		Physical disk name in node 2		sdj
	Highest-order group 1	Group name		Group1
		Group type		mirror
		Stripe width		-
		Disk/low-order group name	Disk/low-order group 1	Disk1
		Volume 1	Volume name	Volume1
			Size	1024 blocks
		Volume 2	Volume name	Volume2
Size	1024 blocks			

■ **Example 3. If disk mirroring is to be executed:**

In this example, mirror group Group1, which consists of physical disks sdk and sdl, is created, and mirrored volumes Volume1 and Volume2 are created in Group1.

Item		Setting		
Class 1	Class name		Class1	
	Class scope (node name)	Node 1	Node1	
		Node 2	Node2	
	Spare disk 1	SDX disk name		Disk3
		Physical disk name in node 1		sdi
		Physical disk name in node 2		sdj
	Disk 1 connected to group	SDX disk name		Disk1
		Physical disk name in node 1		sdk
		Physical disk name in node 2		sdl
	Disk 2 connected to group	SDX disk name		Disk2
		Physical disk name in node 1		sdm
		Physical disk name in node 2		sdn
	Highest-order group 1	Group name		Group1
		Group type		mirror
		Stripe width		-
		Disk/low-order group name	Disk/low-order group 1	Disk1
			Disk/low-order group 2	Disk2
		Volume 1	Volume name	Volume1
			Size	1024 blocks
		Volume 2	Volume name	Volume2
Size	1024 blocks			

■ **Example 4. If disk striping is to be executed:**

In this example, striping group Group1, which consists of physical disks sdi and sdj, is created, and striped volumes Volume1 and Volume2 are created in Group1.

Item		Setting		
Class 1	Class name		Class1	
	Class scope (node name)	Node 1	Node1	
		Node 2	Node2	
	Disk 1 connected to group	SDX disk name		Disk1
		Physical disk name in node 1		sdi
		Physical disk name in node 2		sdj
	Disk 2 connected to group	SDX disk name		Disk2
		Physical disk name in node 1		sdk
		Physical disk name in node 2		sdl
	Highest-order group 1	Group name		Group1
		Group type		stripe
		Stripe width		32
		Disk/low-order group name	Disk/low-order group 1	Disk1
			Disk/low-order group 2	Disk2
		Volume 1	Volume name	Volume1
			Size	1024 blocks
Volume 2		Volume name	Volume2	
	Size	1024 blocks		

■ **Example 5. If disk concatenation is to be executed:**

In this example, concatenation group Group1, which consists of physical disks sdi and sdk, is connected, and volumes Volume1 and Volume2 are created in Group1.

Item		Setting		
Class 1	Class name	Class1		
	Class scope (node name)	Node 1	Node1	
		Node 2	Node2	
	Disk 1 connected to group	SDX disk name	Disk1	
		Physical disk name in node 1	sdi	
		Physical disk name in node 2	sdj	
	Disk 2 connected to group	SDX disk name	Disk2	
		Physical disk name in node 1	sdk	
		Physical disk name in node 2	sdl	
	Highest-order group 1	Group name	Group1	
		Group type	concat	
		Stripe width	-	
		Disk/low-order group name	Disk/low-order group 1	Disk1
			Disk/low-order group 2	Disk2
		Volume 1	Volume name	Volume1
Size			1024 blocks	
Volume 2	Volume name	Volume2		
	Size	1024 blocks		

■ **Example 6. If disk striping and mirroring are to be executed:**

In this example, mirror group Group1, which consists of striping group Group2 and striping group Group3, is created, and volumes Volume1 and Volume2 are created in Group1. Striping group Group2 consists of physical disks sde and sdi, and striping group Group3 consists of physical disks sdk and sdm.

Item		Setting	
Class 1	Class name	Class1	
	Class scope (node name)	Node 1	Node1
		Node 2	Node2
	Spare disk 1	SDX disk name	Disk5
		Physical disk name in node 1	sde
		Physical disk name in node 2	sdf
	Disk 1 connected to group	SDX disk name	Disk1
		Physical disk name in node 1	sde
		Physical disk name in node 2	sdh
	Disk 2 connected to group	SDX disk name	Disk2
		Physical disk name in node 1	sdi
		Physical disk name in node 2	sdj
	Disk 3 connected to group	SDX disk name	Disk3
		Physical disk name in node 1	sdk
		Physical disk name in node 2	sdl
	Disk 4 connected to group	SDX disk name	Disk4
		Physical disk name in node 1	sdm
		Physical disk name in node 2	sdn
	Low-order group 1	Group name	Group2
		Group type	stripe
		Stripe width	32
		Disk/low-order group name	Disk/low-order group 1
	Disk/low-order group 2		Disk2
	Low-order group 2	Group name	Group3
		Group type	stripe
		Stripe width	32
		Disk/low-order group name	Disk/low-order group 1
	Disk/low-order group 2		Disk4
Highest-order group 1	Group name	Group1	
	Group type	mirror	
	Stripe width	-	
	Disk/low-order group name	Disk/low-order group 1	Group2
		Disk/low-order group 2	Group3
	Volume 1	Volume name	Volume1
		Size	1024 blocks
Volume 2	Volume name	Volume2	
	Size	1024 blocks	

Appendix B Manual Pages

This appendix provides online manual page lists for CF, CIP, operator intervention, PAS, cluster resource management facility, RMS, shutdown facility (SF), tracing failed resource, SIS, Web-Based Admin View, procedure resource, and the RMS wizards.

To view a manual page, enter the following command:

```
$ man man_page_name
```

Note:

To view these manual pages, you must set the MANPATH environment variable so that `/etc/opt/FJSVcluster/man` is included.

To print a hard copy of a manual page, enter the following command:

```
man man_page_name | col-b | lpr
```



Note

In some cases, "(1M)" may be output as the section number of the manual page that is displayed with the man command.

Should this occur, assume the section number to be "(8)."

B.1 CF

- System administrator

Command	Function
cfconfig	Configures or deconfigures a node for a PRIMECLUSTER cluster.
cfregd	CF registry synchronization daemon
cfset	Applies or modifies <code>/etc/default/cluster.config</code> entries into the CF module.
cftool	Prints the node communications state of a node or the cluster.
changeng	Replaces a node group definition.
deleteng	Deletes a node group.
descng	Replaces a node group explanation.
detailng	Displays the dynamic expansion of a node group.
newng	Creates a new node group.
rcqconfig	Configures or starts the quorum operation of a cluster system.
rcqquery	Acquires the state of consistency (quorum) of the cluster.
showng	Displays the name and definition of the node group.

B.2 CIP

- System administrator

Command	Function
cipconfig	Starts or stops CIP 2.0.
ciptool	Retrieves CIP information about local and remote nodes in the cluster.

- **File format**

File	Format
<code>cip.cf</code>	CIP configuration file format

B.3 Operator Intervention

- **System administrator**

Command	Function
<code>clreply</code>	Responds to an operator intervention request message.

B.4 PAS

- **System administrator**

Command	Function
<code>mipcstat</code>	MIPC statistics

B.5 Cluster Resource Management Facility

- **System administrator**

Command	Function
<code>clautoconfig</code>	Executes automatic resource registration.
<code>clbackuprdb</code>	Saves the resource database.
<code>clinitreset</code>	Resets the resource database.
<code>clrestorerdb</code>	Restores the resource database.
<code>clsetparam</code>	Checks the connections of shared disk units and sets up the operation for automatic resource registration.
<code>clsetup</code>	Sets up the resource database.
<code>clstarttrsc</code>	Activates a resource (GDS only).
<code>clstoprsc</code>	Deactivates a resource (GDS only).
<code>clsyncfile</code>	Distributes a file between cluster nodes.

- **User command**



Point

There is also a "clgettree" command in the Web-Based System Administration tool WSA.

Command	Function
<code>clgettree</code>	Outputs tree information for the resource database.

B.6 RMS

- **System administrator**

Command	Function
hvassert	Asserts (tests for) an RMS resource state.
hvcn	Starts the RMS configuration monitor.
hvconfig	Displays or saves the RMS configuration file.
hvdisp	Displays RMS resource information.
hvdist	Distributes RMS configuration files.
hvdump	Collects debugging information about RMS.
hvgdmake	Compiles an RMS custom detector.
hvlogclean	Cleans the RMS log files.
hvlogcontrol	Controls the size of the log disk.
hvrclv	Changes the default startup execution level of RMS.
hvreset	Initializes the graph of the RMS user jobs on the nodes in the RMS configuration.
hvshut	Shuts down RMS.
hvswitch	Switches control of an RMS user application resource to another host.
hvthrottle	Prevents multiple RMS scripts from running simultaneously.
hvutil	Manipulates the availability of an RMS resource.

- **File format**

File	Format
config.us	Format of the RMS node configuration file
hvenv.local	RMS local environment configuration file

B.7 Shutdown Facility (SF)

- **System administrator**

Command	Function
sdtool	Interface tool for shutdown daemon
rcsd	Shutdown daemon for shutdown manager

- **File format**

File	Format
rcsd.cfg	Configuration file for shutdown daemon
SA_rsb.cfg	Configuration file for Remote Service Board Shutdown Agent

B.8 Tracing Failed Resource

- **System administrator**

Command	Function
cldispfaultrsc	Outputs a list of the current failed resources

B.9 SIS

- **System administrator**

Command	Function
<code>dtcpadmin</code>	Starts the SIS administration utility.
<code>dtcpd</code>	Starts the SIS daemon for configuring VIPs.
<code>dtcpdbg</code>	Displays SIS debugging information.
<code>dtcpstat</code>	Displays state information on SIS.

B.10 Web-Based Admin View

- **System administrator**

Command	Function
<code>fjsvwvbs</code>	Stops Web-Based Admin View.
<code>wvCntl</code>	Starts, stops, or gets debugging information for Web-Based Admin View.
<code>wvGetparam</code>	Displays the Web-Based Admin View environment variables.
<code>wvSetparam</code>	Sets the Web-Based Admin View environment variables.
<code>wvstat</code>	Displays the operating state of Web-Based Admin View.

B.11 Procedure Resource

- **System administrator**

Command	Function
<code>claddprocrsc</code>	Registers an application resource that uses a state transition procedure.
<code>cldelproc</code>	Deletes a state transition procedure.
<code>cldelprocrsc</code>	Deletes an application resource that uses state transition procedure.
<code>clgetproc</code>	Gets a state transition procedure.
<code>clsetproc</code>	Registers a state transition procedure.
<code>clsetprocrsc</code>	Changes the registered information of an application resource that uses a state transition procedure.

- **User command**

Command	Function
<code>cldspproc</code>	Outputs information on the resource that uses the state transition procedure.

B.12 RMS Wizards

RMS Wizards and RMS Application Wizard

The RMS Wizard manual will be saved in the following directory when the SMAWRhvd package is installed.

`/usr/doc/packages/SMAWRhv-do/wizards.en`

Appendix C Troubleshooting

This appendix explains how to collect troubleshooting information if an error occurs in the PRIMECLUSTER system.

C.1 Collecting Troubleshooting Information

If an error occurs in the PRIMECLUSTER system, collect the information required for the error investigation from all nodes that construct the cluster and the cluster management servers. Then, contact your customer support representative.

1. PRIMECLUSTER investigation information
 - Use `pclsnap` to collect information.
 - Retrieve the system dump.
 - Collect the Java Console on the clients.
See "Appendix B.2.2 Java console" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"
 - Collect a hard copy of the client screens.
See "Appendix B.2.3 Screen hard copy" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"
2. Investigation information for the failed application
3. Crash Dump

If the failed node is restartable, manually collect a crash dump before restarting it. Crash dump will be useful for troubleshooting if the failure is OS related.

Example) If the failover occurred due to an unexpected resource failure

After the failover of the cluster application is complete, collect a crash dump on the node where the resource failure occurred.

For details on the crash dump, see C.1.2 "Crash Dump."
4. Error reproduction procedure description if the error can be reproduced



Information

- When reporting a problem, collect the information required for an error investigation. If you do not provide information for problem checking and error reproduction execution, it may take a long time to reproduce and diagnose the problem or it may become impossible to do so.
- Collect investigation material promptly from all nodes of the PRIMECLUSTER system. Necessary information may become lost if a long time elapses after the error occurs. This applies especially to information collected by `pclsnap`.

C.1.1 Executing the `pclsnap` Command

The "`pclsnap`" command is a tool with which you can collect information for troubleshooting of PRIMECLUSTER. If a failure occurs in the PRIMECLUSTER system, this tool enables you to collect required information to pursue an investigation into the cause of the problem. You can execute this command as follows:

1. Log in with system administrator authority.
2. Execute the "`pclsnap`" command.
`/opt/FJSP/pclsnap/bin/pclsnap -a output`
or

```
/opt/FJSVpclsnap/bin/pclsnap -h output
```

- If -a is specified, the amount of data becomes large because all detailed information is collected. If -h is specified, only cluster control information is collected.
- Specify a special file name or an output file name (ex: /dev/st0) to output information. The specified name is the file to which collected information is output when the "pclsnap" command is executed.



See

For details on the "pclsnap" command, see the "README" file, which is the README file included in the "FJSVsnap" package.



Information

Execution timings for the pclsnap command

- For problems that occur during operation, for example, if an error message is output, execute the "pclsnap" command immediately after the problem occurs.
- If the "pclsnap" command cannot be executed because the system hangs, collect a crash dump. Then start the system in single user mode, and execute the "pclsnap" command.
For information on how to collect a crash dump, see C.1.2 "Crash Dump."
- After an error occurs, if a node restarts automatically (the node could not be started in single-user mode) or if the node is mistakenly started in multi-user mode, execute the "pclsnap" command.
- If investigation information cannot be collected because the "pclsnap" command results in an error or the "pclsnap" command does not return, then collect a system dump.



Information

Free space required for the execution of the pclsnap command

The approximate amount of free space required for the execution of the "pclsnap" command is listed in the following table:

	Default directory	Free space (approximate) (MB)
Output directory	Current directory during the execution of the command	300
Temporary directory	/tmp	500



Note

The listed values for the amount of free space (300 MB, 500 MB) may be insufficient depending on the system environment.

If troubleshooting information cannot be collected successfully due to there being insufficient directory space, the "pclsnap" command outputs an error message or a warning message upon the termination of the execution. In this case, re-execute the command according to the corrective action given below:

Corrective action when the amount of free space in the output directory is insufficient

The "pclsnap" command outputs the error message shown below when the creation of the output file has failed:


```
ERROR: failed to generate the output file "xxx".  
DIAG: ...
```

Corrective action:

Change the output directory to one with a large amount of free space, and then re-execute the command.

Example:

When the output directory is be changed to `/var/crash`

```
# /opt/FJSVpclsnap/bin/pclsnap -a /var/crash/output
```

When there is insufficient free space in the temporary directory

The "pclsnap" command may output the following warning message upon the termination of the command execution:

```
WARNING: The output file "xxx" may not contain some data files.  
DIAG: ...
```

The output of this warning message indicates that the output file of the "pclsnap" command has been created. However, part of the information to be collected may not be included in the output file.

Corrective action:

Change the temporary directory to one with sufficient free space, and then re-execute the command.

Example:

When the temporary directory is to be changed to `/var/crash`

```
# /opt/FJSVpclsnap/bin/pclsnap -a -T/var/crash output
```

If the same warning message continues to be output even after you change the temporary directory, the error may be caused by one of the following:

- (1) A timeout occurs for a specific information collecting command due to the state of the system.
- (2) The file from which information is to be collected is larger than the amount of free space in the temporary directory.

In the case of (1), the log of timeout occurrence is recorded in the `pclsnap.elog` file that is contained in the `pclsnap` output file. If possible, collect a crash dump from the `pclsnap.elog` file and from the `pclsnap` output file.

In the case of (2), confirm that the sizes of (a) and (b), below, are not larger than the amount of free space in the temporary directory:

(a) Log file size

- `/var/log/messages`
- Log files (`SMAWsf/log/rcsd.log` etc.) placed under
- `/var/opt/SMAW*/log/`

(b) Total size of the core files

- GFS core file
`/var/opt/FJSVsfdfs/cores/*`
- GDS core file

```
/var/opt/FJSVsdx/*core/*
```

If these are larger than the amount of free space in the temporary directory, move the relevant files to another partition that contains neither the output directory nor the temporary directory, and then re-execute the "pclsnap" command. Do not delete the moved files. Instead, save them.

C.1.2 Crash Dump

Check the crash dump directory for a crash dump created after the switchover had occurred. The time the dump was written can be found by referring to the time stamp using, for example, "ls(1)" command.

- If a crash dump after the switchover is found
Save the crash dump.
- If a crash dump after the switchover is not found
If the failed node is restartable, manually collect a crash dump before restarting it.



Information

Crash dump directory

Crash dumps are stored as files on a node on which an error has occurred (LKCD) or on the netdump server (netdump). They are stored in /var/crash directory.

C.2 Detecting a Failed Resource

If a failure occurs in a resource, you can specify the resource by referring to the following:

- The message displayed if a failure occurs in the resource
- Resource Fault History
- Fault Resource List



Note

To use the history function of the failed resource, the resource database must be set up correctly. Also, the "AutoStartUp" and "PersistentFault" attributes of userApplication must be set to yes(1).

For information on the resource database settings, see the "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."

To use the detection function of the failed resources, you must enable an operator intervention request. For information on the use of the operator intervention request, see 5.2 "Setting Up Fault Resource Identification and Operator Intervention Request."

The operator intervention function and the failed resource history function are both dependent on the "clwatchlogd" daemon. This daemon can be started automatically with the "rc" script in multi-user mode. The "clwatchlogd" daemon uses the "RELIANT_LOG_PATH" environment variable of RMS. The value of this variable is set when the "rc" script starts up for the first time.

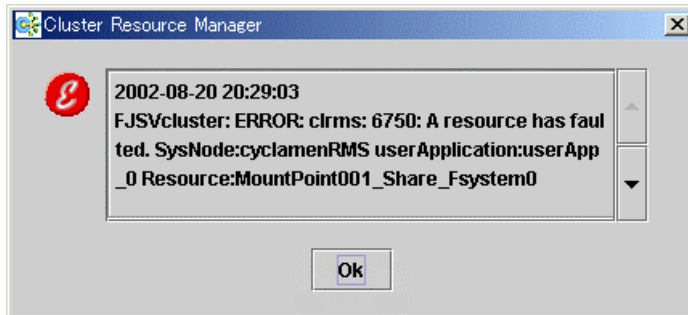
When this value is changed, you need to send the "SIGHUP" signal to clwatchlogd. When clwatchlogd receives this signal, clwatchlogd acquires the latest value of RELIANT_LOG_PATH. After completing the above processing, start RMS.

This manual is installed in the /etc/opt/FJSVcluster/man directory.

Before executing the "man (1)" command, add this directory to the beginning of MANPATH. Usually, a directory name is added to the line beginning with "setenv MANPATH" within the ".cshrc" file or the line beginning with "export MANPATH" within the ".profile" file.

C.2.1 Failed Resource Message

If a resource failure or recovery is detected, a message screen pops up as the Cluster Admin popup screen. An example of failed resource message screen is shown below:



If a message frame title says “Cluster resource management facility,” refer to the following:

- “PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide”
 - “10.10 Resource Database messages”
- Appendix D in this manual
 - D.5.2 “Failed Resource and Operator Intervention Messages (GUI)”

The severity icon is defined as follows:

Icon	Meaning
	Notice
	Warning
	Error
	Other

Respond to the failed resource message screen as follows:

◆ Procedure

1. Click on the OK button to respond to the message.
2. Click the up arrow mark or down arrow mark to go to the previous or next message. Then, a message appears to remind you that you have not yet entered a response or confirmed the displayed message.

If you subsequently enter a response, the message is cleared and the next message appears. If the next message does not appear and the message prior to that for which a response was entered is still available, the previous message will appear. If there is any message for which confirmation or a response has not yet been entered, the message screen closes. For information on the message contents, refer to “Failed Resource and Operator Intervention Messages” and for information on how to display previous messages, refer to “Resource Fault History.”



Note

If you close Web-Based Admin View or Cluster Admin after this message is displayed, a fault resource message with the same contents will not be displayed. Therefore, you are recommended to confirm the message contents if a fault resource message is displayed for the first time. After you have closed the message, refer to the fault history on the "Resource Fault History" screen. For information on the message display language, refer to 4.3.3.3 "Setting the Web-Based Admin View Language."

If the Cluster Admin screen is not displayed on the client PC when the fault resource message is displayed, the message is transmitted only to the client to which the management server was first connected.

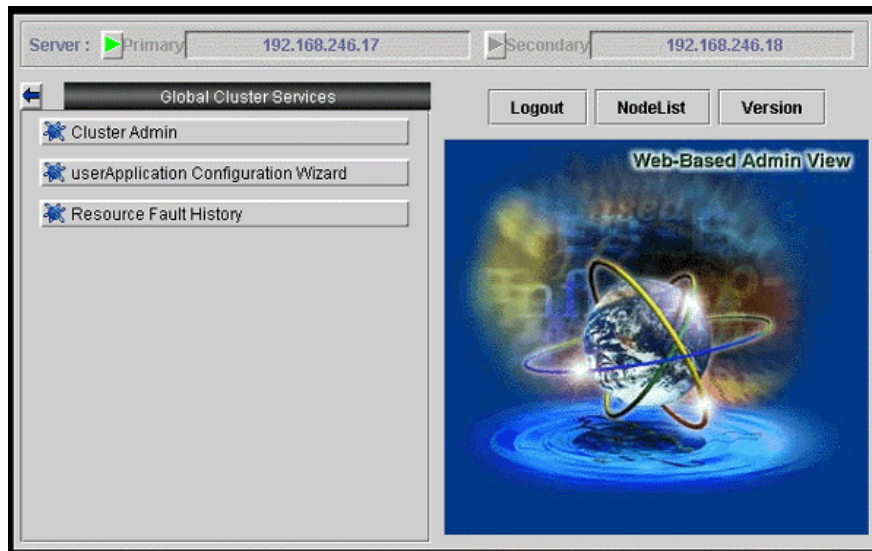
Each management server administers its fault resource messages. If you change the management server after confirming the message, the same message will be displayed again. To delete these messages, select *Cluster Admin* by using the GUI of *Web-Based Admin View* after closing *Cluster Admin*, and then open *Cluster Admin* again.

C.2.2 Resource Fault History

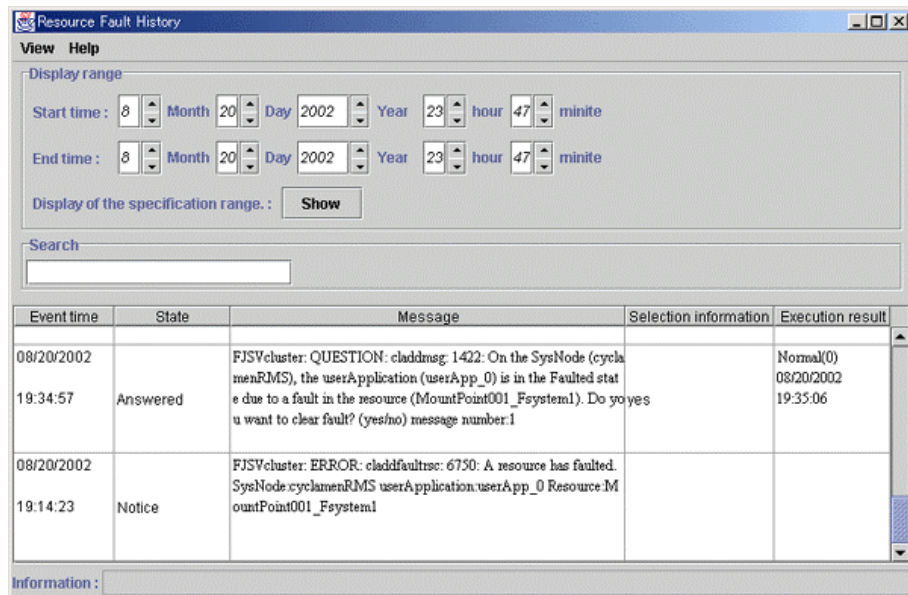
Display the "Resource Fault History" screen, in which the resource fault history is displayed, in the following procedure.

◆ Procedure

1. Open the "Web-Based Admin View" screen and then select *Global Cluster Services*.
2. Choose *Resource Fault History*.



The "Resource Fault History" will be displayed.



Note

The "Resource Fault History" cannot be displayed automatically. To display the latest history information, select *View -> Update* menu.

■ **Menu of the fault resource list screen**

The "Resource Fault History" screen contains the following menu items:

Menu	Function
View -> Update latest information	The duration is initialized to the present time and date. A maximum of 100 of the latest history resources are displayed.
View -> Fault Resource List	A list of resources in which failures are present is displayed (see C.2.3 "Fault Resource List").
View -> Exit	The "Resource Fault History" screen is cleared.
Help -> Help	The GUI help screen is displayed.

■ **Setting the range of time**

A fault resource history listing can be displayed by specifying a date and time.

- *Start time* – A start time is set up.
- *End time* – An end time is set up.

If you click the *View* button after setting up the required values, a maximum of 100 of the most recently failed resources within the specifiable range can be displayed.

■ **Search with a keyword**

The fault resource history list can be narrowed by specifying "*Keyword*".

If a duration is set, the history of up to the 100 latest failed resources that satisfy both conditions can be displayed.

■ **How to read the list**

The following information is displayed on the "Resource Fault History" screen.

- *Event time* – The time at which the RMS detected a resource failure is displayed.
- *State* – One of the following statuses is indicated.

- Responded – The operator has already responded the message.
- Not responded – The operator has not responded to the message for which a response is required.
- Responding – The operator is currently responding to the message.
- Confirm – Notification message for which no response is required.
- Message – The message is displayed.
- Selection information – Operator intervention message information from the client that is connected to the management server is displayed. If the message is canceled or if a response to the message is entered by executing the “clreply” command, nothing will be displayed.
- Execution result – The result and time of the response processing are displayed.

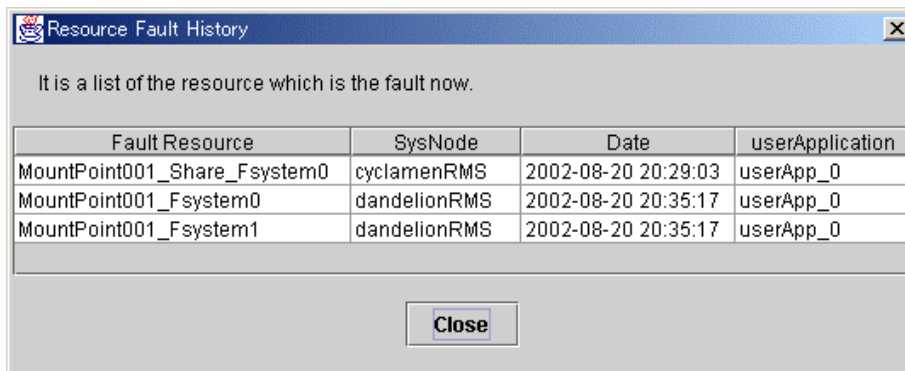
■ Information field

The information related to error detection during the acquisition or read-in of the history files is displayed. The following items will be displayed:

- Processing – History data is being collected from the management server.
- An error is included in the specified duration. – The specified duration is incorrect. Correct it and then click the *View* button.
- Part of the data acquisition failed. – Parts of the history files could be damaged. This will not disrupt ongoing operation, but the corrupted data will not be displayed.

C.2.3 Fault Resource List

If you select *View* → *Fault Resource List* on the “Resource Fault History” screen, the fault resource list is displayed as follows:



The screenshot shows a window titled "Resource Fault History" with a close button in the top right corner. Below the title bar, there is a text label: "It is a list of the resource which is the fault now." Below this is a table with four columns: "Fault Resource", "SysNode", "Date", and "userApplication". The table contains three rows of data. At the bottom of the window, there is a "Close" button.

Fault Resource	SysNode	Date	userApplication
MountPoint001_Share_Fsystem0	cyclamenRMS	2002-08-20 20:29:03	userApp_0
MountPoint001_Fsystem0	dandelionRMS	2002-08-20 20:35:17	userApp_0
MountPoint001_Fsystem1	dandelionRMS	2002-08-20 20:35:17	userApp_0

The following information is displayed on the fault resource list screen:

- Fault Resource – The name of the fault resource is displayed.
- SysNode – The SysNode to which the fault resource belongs is displayed.
- Date – The date and time at which the RMS detected a resource failure are displayed.
- userApplication – The name of userApplication to which the failed resource belongs is displayed.

If you click *Close*, the failed resource list screen is closed.

The list of resources that are currently in the failed state can be displayed by executing the “cldispfaultsrc” command.

Appendix D Messages

This appendix explains how to search for the reference relating to the following messages, as well as the corresponding corrective actions.

For other than GUI messages, first refer to D.1 "Searching for a Message."

- Information messages
- Warning messages
- Error messages
- Operator intervention messages
- GUI Messages
 - Messages Related to CRM View
 - Failed resource and operator intervention messages
- Messages Related to the Setting of the Shutdown Facility

D.1 Searching for a Message

This section explains the procedure for searching for a message reference.

The PRIMECLUSTER display formats are classified into five types. Determine the reference according to the format of the displayed message.

■ Display format 1

FJSVcluster:severity:program:message-number:message

severity:

Indicates the message severity level.

There are five message severity levels. Stop (HALT), Information (INFO), Warning (WARNING), Error (ERROR), and Question (QUESTION).

program:

Indicates the name of the program that outputs this message.

message-number:

Indicates the message number.

message:

Indicates the message text.

◆ Search procedure

After confirming the *severity* and *message-number*, determine the reference by referring to the table below.

severity	message-number	Reference
Stop (HALT)	0100, 0101, 0102	<i>CF Configuration and Administration Guide</i> 10.10.1 HALT Messages
Information (INFO)	2620, 2621, 2622, 2700, 2701	D.2 Information Messages
	2100, 2200, 2201, 2202, 2203, 2204, 2205, 3200, 3201, 3202, 3203, 3204, 3205, 3206	<i>CF Configuration and Administration Guide</i> 10.10.2 INFORMATION messages
Warning (WARNING)	5200	<i>CF Configuration and Administration Guide</i> 10.10.3 WARNING messages

severity	message-number	Reference
Error (ERROR)	6000, 6001, 6002, 6003, 6004, 6009, 6208, 6615, 6616, 6617, 6618, 6619, 6621, 6623, 6624, 6651, 6680, 6750, 6751, 6752, 6753, 6754, 6755, 6817	D.3 Error Messages
	6000-10, 6021, 6025, 6200-23, 6226, 6300-1, 6600-4, 6606-8, 6611, 6614-16, 6653, 6661, 6665, 6668, 6675, 6680, 6900-4, 6910-1, 7500-22, 7535-43, 7545-6	<i>CF Configuration and Administration Guide</i> 10.10.4 ERROR messages
Question (QUESTION)	1421, 1422, 1423	D.4 Operator Intervention Messages

■ **Display format 2**

command-name:*message*

command-name:

Indicates the command name.

message:

Indicates the message (describing the phenomenon, message number, reason, etc.).

◆ **Search procedure**

Messages of display format 2 are described in the *CF Configuration and Administration Guide*.

Confirm *command-name*, and then determine the reference by referring to the following table:

Function	<i>command-name</i>	Reference in the CF Configuration and Administration Guide
Cluster node configuration	cfconfig	10.1 cfconfig message
CIP2.0 start/stop	cipconfig	10.2 cipconfig message
Outputting the node communication state	cftool	10.3 cftool message
Outputting and manipulating quorum information	rcqconfig	10.4 rcqconfig message
	rcquery	10.5 rcquery message
CF execution	CF	10.6 CF runtime messages

■ **Display format 3**

(*SMAWsf, number1, number2*):*message*

number1, number2:

Indicates the message number.

message:

Indicates the message.

◆ **Search procedure**

Messages of display format 3 are described in *CF Configuration and Administration Guide*.

Confirm *number1* and *number2*, and then determine the reference by referring to the table below.

Operation	(<i>number1-number2</i>)	Reference location in CF Configuration and Administration Guide
Shutdown facility	(10, 2)-(10, 12) (10, 15)-(10, 17), (10, 19), (10, 20) (10, 23), (10, 101) (30, 2)-(30, 10), (30, 12)-(30, 17) (50, 3)-(50, 4), (50, 6), (50, 9)	10.11 Shutdown Facility

■ Display format 4

(*err-code, message-number*) : *message*

err-code:

Indicates the error code.

message-number:

Indicates the message number.

message:

Indicates the message.

◆ Search procedure

Messages of display format 4 are described in the "PRIMECLUSTER Reliant Monitor Service (RMS) with Wizard Tools Configuration and Administration Guide." Confirm *err-code* and *message-number*, and then determine the reference by referring to the table below.

Operation/state	<i>err-code</i>	<i>message-number</i>	Reference location in RMS Troubleshooting Guide
switchlog	ADC	1, 2, 3, 4, 5, 15, 17, 18, 20, 25, 27, 30, 31, 32, 33, 34, 35, 37, 38, 39, 41, 43, 44, 45, 46, 47, 48, 49, 57, 58, 59, 60, 61, 62, 63	3 Non-fatal error messages
	ADM	55, 57, 58, 59, 60, 62, 63, 67, 70, 95, 96	
	BM	8, 14, 52, 54, 68	
	CML	11, 12, 17, 18, 19, 20, 21	
	CRT	1, 2, 3, 4	
	CUP	2, 3, 5, 7, 8	
	DET	1, 3, 4, 5, 6, 7, 12, 13, 14, 24, 28, 33	
	GEM	4	
	INI	1, 9	
	QUE	13	
	SCR	8, 20	
	SWT	4, 20, 25, 26, 45	
	SYS	1, 8, 13, 14, 15, 17, 48, 49, 50, 84, 90, 93, 94, 97, 98	
	UAP	1, 5, 6, 7, 8, 9, 15, 16, 19, 21, 22, 23, 24, 27, 28, 29, 32, 33, 35, 41, 42	
US	5, 6, 31		
WLT	1, 3		

Operation/state	err-code	message-number	Reference location in RMS Troubleshooting Guide
	WRP	3, 4, 9, 11, 12, 14, 15, 16, 17	
RMS error	ADC	16, 21	4 Fatal error messages
	ADM	1, 2	
	BM	3, 49, 51, 58, 67	
	CML	14	
	CMM	1, 2, 3	
	DET	8, 9, 16	
	HVC	14	
	INI	7	
	MIS	4	
	QUE	1, 2, 5, 6, 11, 12	
	SCR	4, 5, 10, 12, 13, 15, 18	
	SYS	33, 52	
	UAP	36	
	US	1	

■ **Display format 5 (other)**

If the display format is other than display format 1 to 4, see the following:

- See "10.7 CF Reason Code Table" in the "*PRIMECLUSTER CF Configuration and Administration Guide*."
- See "10.8 Error messages for different systems" in the "*PRIMECLUSTER CF Configuration and Administration Guide*."
- See "5 Console error messages" in the "*PRIMECLUSTER Reliant Monitor Service (RMS) Troubleshooting Guide*."
- See "Appendix E GDS Messages" in the "*PRIMECLUSTER Global Disk Services Configuration and Administration Guide*."
- See "Appendix E List of Messages" in the "*PRIMECLUSTER Global File Services Configuration and Administration Guide*."
- See "Appendix A List of Error Messages" in the "*PRIMECLUSTER Global Link Services Configuration and Administration Guide: Redundant Line Control Function*."

D.2 Information Messages

2620 On the SysNode "SysNode", the userApplication "userApplication" transitioned to state state . Therefore, message " number" has been canceled.

Content:

Since the userApplication state has changed, the message has been cancelled. You do not need to respond to the operator intervention message.

SysNode indicates the name of SysNode in which the userApplication state has been changed. userApplication indicates the name of userApplication whose status has been changed. state indicates the userApplication state. number indicates the message number.

2621 The response to the operator intervention message " *number*" was action.**Content:**

The response to the operator intervention message has been made.
number indicates the number of the operator intervention message to which you responded.
 action indicates with or without response by yes or no.

2622 There are no outstanding operator intervention messages.**Content:**

There are no operator intervention messages that have yet to be processed.

2700 The resource failure has been recovered. SysNode:SysNode**userApplication:userApplication Resource:resource****Content:**

The resource recovered from the failure.
SysNode indicates the name of SysNode whose resource has been recovered. *userApplication* indicates the name of the userApplication to which the recovered resource belongs. *resource* indicates the name of the resource that has recovered from the error state.

2701 A failed resource has recovered. SysNode:SysNode**Content:**

SysNode that was in the Faulted state due to a node panic entered the Online state.
SysNode indicates a recovered SysNode.

<h2>D.3 Error Messages</h2>

If an error message is output, analyze the log of the time zone in which the message was output from the "/var/log/messages" message to check if any other error message had been output before that. If you found another error message, you need to take corrective action for this error message first.

6000 An internal error occurred. (function: *function detail* :*code1-code2-code3-code4*)**Content:**

An internal error occurred in the program. *function*, *code1*, *code2*, *code3*, and *code4* indicate the debugging information for error diagnosis.

Corrective action:

Collect the debugging information. Then, contact your Fujitsu systems engineer (SE). See Appendix C "Troubleshooting."

code1, *code2*, *code3*, and *code4* indicate the information that is required by your Fujitsu systems engineer (SE).

6001 Insufficient memory. (detail:*code1-code2*)**Corrective action:**

One of the following could be the case:

- The memory resources are insufficient.
- The kernel parameter has incorrect settings.

Collect information required for troubleshooting. For details on how to collect information, see Appendix C "Troubleshooting."

Reexamine the estimation of the memory resources that are required for the entire system. For

information on the amount of memory required for cluster control, see the “*PRIMECLUSTER Installation Guide*,” which is provided with each product.

If you still have the problem, confirm that the kernel parameter setting is correct by referring to the A.6.1 “CF Configuration.”

Change the settings if necessary, and then reboot the system. If above actions do not help you solve the problem, contact your Fujitsu systems engineer (SE).

code1 and *code2* indicate the information required for troubleshooting.

6002 Insufficient disk or system resources. (detail:*code1-code2*)

Corrective action:

One of the following could be the case:

- The disk resources are insufficient.
- The kernel parameter has incorrect settings.

Collect the information required for troubleshooting. For details on how to collect information, see Appendix C “Troubleshooting.”

Confirm that there is sufficient disk space to enable the operation of PRIMECLUSTER. If necessary, delete any unnecessary files to create sufficient free space and then restart the system. For information on the amount of required disk space, see the “*PRIMECLUSTER Installation Guide*,” which is provided with each product.

If you still have the problem, confirm that the kernel parameter settings are correct by referring to the A.6.1 “CF Configuration.” Change the settings if necessary, and then reboot the system.

If above actions do not help you solve the problem, contact your Fujitsu systems engineer (SE).

code1 and *code2* indicate the information required for troubleshooting.

6003 Error in option specification. (option:*option*)

Corrective action:

Specify the option correctly, and then re-execute the operation.

option indicates an option.

6004 No system administrator authority.

Corrective action:

Re-execute the process with system administrator’s authority.

6009 If option *option1* is specified, option *option2* cannot be specified.

Content:

Two options specified with the command conflict.

Corrective action:

Re-execute the command by specifying either one of the options.

6208 Access denied (*target*).

Corrective action:

Collect debugging information and then contact your Fujitsu systems engineer (SE). For details on how to collect information, see Appendix C “Troubleshooting.”

target indicates a command name.

6615 The cluster configuration management facility is not running.(detail:*code1-code2*)

Corrective action:

Reboot the node on which this message is displayed and then reactivate the resource database.

If this message appears again, collect debugging information and then contact your Fujitsu systems engineer (SE). For details on how to collect information, see Appendix

C "Troubleshooting."

code1 and *code2* indicate the debugging information required for your Fujitsu systems engineer (SE).

6616 Cluster configuration management facility: error in the communication routine.(detail:*code1-code2*)

Corrective action:

Collect debugging information, and then contact your Fujitsu systems engineer (SE). For details on how to collect information, see Appendix C "Troubleshooting."

code1 and *code2* indicate the debugging information required for your Fujitsu systems engineer (SE).

6617 The specified state transition procedure file does not exist.

Corrective action:

Specify the state transition procedure file correctly, and then re-execute.

If the problem cannot be solved with this corrective action, collect debugging information and then contact your Fujitsu systems engineer (SE). For details on collecting debugging information, see Appendix C "Troubleshooting."

6618 The state transition procedure file could not be written. A state transition procedure file with the same name already exists.

Corrective action:

To overwrite the state transition procedure file, specify the "-o" option and then re-execute.

6619 The state transition procedure file could not be written. There was an error in the resource class specification.

Corrective action:

Specify the resource class correctly, and then re-execute. The available resource classes are file names under */etc/opt/FJSVcluster/classes*.

Confirm that the character string specified as the resource class contains no errors.

**6621 Could not perform file operation on state transition procedure file.
(detail:*code1-code2*)**

Corrective action:

- Confirm the disk resource from which the state transition procedure is retrieved or the node resource of the file system is sufficient by executing the "df(1)" command. Correct the insufficient resource problem or change the location from which the state transition procedure is retried, and do the operation again.
- Confirm the disk resource on which the cluster system is installed or the node resource of the file system is sufficient by executing the "df(1)" command. Correct the insufficient resource problem, and do the operation again.

If the problem cannot be solved even by applying the corrective actions, collect debugging information and then contact your Fujitsu systems engineer (SE). For details on debugging information, see Appendix C "Troubleshooting."

code1 indicates debugging information while *code2* indicates error number.

6623 Cannot delete the specified state transition procedure file.

Corrective action:

You can delete only the state transition procedure file that was defined by a user. For information on how to delete it, refer to the manual of the product that provides the state transition procedure file.

6624 The specified resource does not exist in cluster service. (resource:resource rid:rid)

Corrective action:

A procedure resource that is registered to the cluster application is not in the resource database. This message is not output if the cluster application was registered by using the userApplication Configuration Wizard(GUI) and executing the "hvw" command. However, if this occurs, collect debugging information and contact your Fujitsu system engineer. For details on collecting debugging information, see Appendix C "Troubleshooting."

If hvw was used to register the procedure resource to the cluster application by FREECHOICE, check that the procedure resource displayed in the message text is not registered to the resource database by executing the "clgettree" command. For details on the "clgettree" command, see the manual page for clgettree.

If the procedure resource is not registered to the resource database, register the procedure resource displayed in the message to the resource database. See Part 6 "PRIMECLUSTER Products."

If the procedure resource is registered to the resource database, collect debugging information and contact your Fujitsu system engineer. For details on collecting debugging information, see Appendix C "Troubleshooting."

Resource indicates the resource name that is not registered to the resource database, and *rid* indicates the resource ID of the resource that is not registered to the resource database.

6651 The specified instruction contains an error.

Content:

This message will not be displayed on a client system on which a browser is active. This message is displayed on the standard output when you respond to the operator intervention message with the CLI command (clreply). If a string other than yes or no is to be entered, this message will be displayed.

Corrective action:

Specify the option correctly, and then re-execute the processing.

6680 The specified directory does not exist.

Corrective action:

Specify a correct directory, and then re-execute.

6750 A resource has failed. SysNode:SysNode userApplication:userApplication

Resource:resource

Corrective action:

Confirm the state of userApplication in which the corrected resource is registered by using the RMS main window or executing the "hvdisp" command. You can also confirm the userApplication state by responding to the operator intervention message that is displayed after RMS is started. If userApplication is Faulted, you need to clear the Fault by using the RMS main

window or specifying the “-c” option of the “hvutil” command.

SysNode indicates the name of SysNode in which a resource has failed. *userApplication* indicates the name of userApplication to which the failed resource belongs. *resource* indicates the name of the resource that has failed.

6751 A SysNode has failed. SysNode:SysNode

Corrective action:

Respond to the operator intervention message that is displayed after the node is started or confirm the state of userApplication running on the node in which the failure occurred, by using the RMS main window or executing the “hvdisp” command. If userApplication is Faulted, you need to clear the Fault by using the RMS main window or specifying the “-c” option of the “hvutil” command.

SysNode indicates the SysNode in which a failure occurred.

6752 The processing was canceled due to the following error.

Error message from RMS command

Content:

If you execute the RMS command (hvdisp) to enable the history function for the failed resource or the operation intervention function, and this fails, an error message will be displayed. Examine this error message and, after taking an appropriate correction, execute the required processing again.

Corrective action:

Confirm the contents of this message and, after taking the required corrective action, re-execute the processing.

6753 Failed to process the operator intervention message due to the following error.(message number:*number* response:*action* command :*command*)

Error message from RMS command

Content:

Since the RMS command ended abnormally, the operator intervention function for the message failed.

Corrective action:

Note the contents of this message and, after applying an appropriate correction, re-execute the required processing.

number indicates the operator intervention message for which processing failed. *action* indicates the first response to the message from the operator with either yes or no. *command* indicates the RMS command which ended abnormally. “Error message from RMS command” indicates an error message that the RMS command transmits when a standard error occurs.

6754 The specified message number (*number*) does not exist.

Corrective action:

- This message is output in the following situations:
The operator specified a nonexistent message number when executing the “clreply” command. This problem can be solved by specifying a message number that is included in the unfinished message list.
- The message for which a response was entered has been canceled. This occurs when the message gets old since the application state has been changed. You do not have to take any action.

- The operator intervention function has automatically replaced the message for which a response has been entered with other message. For example, when the operator intervention function's message number 1422 is replaced by the message number 1423 and vice versa. In such a case, the operator intervention function responds to the first message, displays another message, and advises a user that the message number has been changed.

number indicates the number of operator intervention messages.

6755 Failed to respond to the operator intervention message due to the SysNode

(SysNode) stop.(message number:*number* response : *action*)

Content:

Since the node indicated by SysNode has stopped, the response to the operator intervention message failed.

Corrective action:

Reboot the node, and then confirm that RMS is running.

SysNode indicates the SysNode name of the node that is stopped. *number* indicates the number of the operator intervention messages that failed to respond. *action* indicates the operator's response by yes or no.

6817 An error occurred during state transition procedure execution. (error

procedure:procedure detail:code1-code2-code3-code4-code5-code6-code7)

Corrective action:

The possible causes are as follows:

- The state transition procedure (*procedure*) is not a Bourne shell script.
- The state transition processes for the individual arguments (*code1* to *code6*) of the state transition procedure (*procedure*) returned an error. The control program of the procedure resource determines the success or failure of the state transition processes based on the exit code (exit function) of the state transition procedure.

Exit code 0: The control program determines that the state transition process is normal.

Exit code other than 0: The control program determines that the state transition process failed.

Collect debugging information and contact your Fujitsu system engineer. For details on collecting debugging information, see Appendix C "Troubleshooting."

Take the following actions:

- Obtain the state transition procedure, and check that the state transition procedure (*procedure*) is a Bourne shell script. If the procedure is not a Bourne shell script, specify the following in the first line of the state transition procedure, and then register the state transition procedure again:

```
#!/bin/sh
```

To obtain the state transition procedure, execute the "clgetproc" command. To register the state transition procedure, execute the "clsetproc" command. For details on each command, see the corresponding manual page.

- Check the return value of the state transition process for each argument (*code1* to *code6*). If there is no process that sets up an exit code (exit function), you need to add this exit code process. If there is no process, the execution result of the last command in the state transition procedure becomes the return value.

If the problem is not resolved by the above action, contact your Fujitsu system engineer.

procedure indicates the state transition procedure in which the error occurred. If the state transition procedure indicated by *procedure* was created, see the subsequent information, and correct the state transition procedure.

code1, *code2*, *code3*, *code4*, *code5*, and *code6* indicate the state transition instruction that resulted in an error. *code7* represents debugging information.

- code1: the first argument (state transition instruction type)
- code2: the second argument (cluster service instance type)
- code3: the third argument (state transition instruction timing)
- code4: the fourth argument (resource ID)
- code5: the fifth argument (state transition event type)
- code6: the sixth argument (state transition event detail)

error indicates the error cause. The error causes include the following:

- procedure file exit error

D.4 Operator Intervention Messages

1421 The userApplication "*userApplication*" did not start automatically because not all of the nodes where it can run are online.

Do you want to force the userApplication online on the SysNode "*SysNode*"?

Message No.:*number*

Do you want to do something? (no/yes)

Warning:Forcing a userApplication online ignores potential error conditions. Used improperly, it can result in data corruption. You should not use it unless you are certain that the userApplication is not running anywhere in the cluster.

Corrective action:

This operator intervention message is displayed when userApplication cannot be online because RMS is inactive on some of the nodes that are designed to execute applications. Use the "creply" command to respond from the command prompt. For details on the "creply" command, see the manual pages.

If you select yes, the operator intervention function will execute the "hvswitch" command and userApplication will go online. Confirm whether userApplication is in the online state by using Cluster Admin or executing the "hvdisp" command. For details on the "hvdisp" command, see the manual pages.

If you select no, the RMS command that is used to change the userApplication state cannot be executed.

userApplication indicates userApplication that is not online in any node.

SysNode indicates SysNode on which userApplication will be online if you select yes.

number indicates a message number.



Note

If this message is output to the console and /var/log/messages, “month day time node name” might be output to the beginning of the second and subsequent lines of the message independently of the text of the message. You can ignore it.

1422 On the SysNode "SysNode", the userApplication "userApplication" is in the Faulted state due to a fault in the resource "resource". Do you want to clear fault?

Message No.:number

Do you want to do something? (yes/no)

Corrective action:

Confirm that the resource indicated by *resource* has recovered. If you need to reply from CLI, execute the “clreply” command.

If you select yes, the operator intervention function will execute the “hvutil” command by specifying the clear option in the “hvutil” command and also brings userApplication Offline. Confirm that userApplication has gone Offline by executing the “hvdisp” command.

If you select no, the operator intervention function does not execute the RMS command to bring userApplication Offline.

SysNode indicates the name of SysNode on which the failure occurred. *userApplication* indicates the name of userApplication in which the failure occurred. *resource* indicates the name of the resource that caused a failure in userApplication. *number* indicates a message number.

1423 On the SysNode "SysNode", the userApplication "userApplication" has the faulted resource "resource". The userApplication "userApplication" did not start automatically because not all of the nodes where it can run are online.

Do you want to force the userApplication online on the SysNode "SysNode"?

Message No.:number

Do you want to do something? (no/yes)

Warning:Forcing a userApplication online ignores potential error conditions. Used improperly, it can result in data corruption. You should not use it unless you are certain that the userApplication is not running anywhere in the cluster.

Corrective action:

Confirm that the resource indicated by *resource* has recovered. If you need to reply from CLI, execute the “clreply” command.

If you select yes, the operator intervention function will execute the “hvswitch” command and userApplication will go Online. Confirm that userApplication has gone Online by executing the “hvdisp” command.

If you select no, the operator intervention function will not execute the RMS command to bring userApplication Online.

SysNode indicates the name of SysNode in which the failure occurred. *userApplication* indicates the name of userApplication in which the failure occurred. *resource* indicates the name of the resource that caused the failure in userApplication. *number* indicates the message number.



Note

If this message is output to the console and /var/log/messages, “month day time node name” might be output to the beginning of the second and subsequent lines of the message independently of the text of the message. You can ignore it.

D.5 GUI Messages

The section explains GUI messages.

- Messages related to the CRM view.
- Failed resource and operator intervention messages

D.5.1 Messages Related to CRM View

This section explains the messages related to the CRM view.

If a message of the following display format is displayed, take corrective action by referring to the following manual.

■ Display format

If a message is displayed during operation of the CRM view or if a message whose frame title in the message dialog box is “Cluster resource management facility” is displayed:

■ Reference manual

For the above display format, see the following:

- D.5.2 "Failed Resource and Operator Intervention Messages (GUI)"

D.5.2 Failed Resource and Operator Intervention Messages (GUI)

The messages displayed on the GUI in the event of a failed resource, as well as the operator intervention messages, are described below:

■ Information Messages

0701 There is no failed resource.

Content:

The results output by the "cldispfaultsrc" command do not contain any failed resources.

■ Error Messages

0765 Communication with the management server failed.

Content:

A communication error occurred between the browser and the Web-Based Admin View management server. This error occurs when the client's browser attempts to respond to an operator intervention message.

Corrective action:

Click *OK* to close the error message screen.

If an error occurs even when you re-execute, use the "clreply" command to reply. If a message that is output by Web-Based Admin View is displayed, follow the instructions for that message.

If the problem cannot be solved through the above method, collect the maintenance information and then contact your Fujitsu systems engineer (SE). For information on collecting maintenance information, see "B.2 Troubleshooting information collection" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

For details on messages 0001 to 0099, see "Appendix A Message" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

0766 The command terminated abnormally.

Content:

The "clidispatchtrsc" command or the "clreply" command ended abnormally.

Corrective action:

Follow the corrective action shown in the message.

0767 Command execution failed.

Content:

The "clreply" command cannot be executed while accessing the node.

Corrective action:

If SysNode that cannot be referenced in the detailed information appears, you can respond to the operator intervention message by executing the "clreply" command on SysNode. To respond through with the GUI, restart Web-Based Admin View on SysNode.

In all other cases, restart Web-Based Admin View on the node that serves as the management server of Web-Based Admin View. For information on how to restart Web-Based Admin View, see "6.2 Restart" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

If the failure cannot be solved, collect maintenance information and then contact your Fujitsu systems engineer (SE).

For details on the maintenance information, see "B.2 Troubleshooting information collection" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

0790 An error occurred while collecting the fault resources.

Content:

Node connection failed while the resource data was being collected.

Corrective action:

Reboot the management server of Web-Based Admin View for the affected client. For details, see the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

If the problem still cannot be solved, collect maintenance information and then contact your Fujitsu systems engineer (SE). For details on maintenance information, see "B.2 Troubleshooting information collection" in the "*PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.*"

0791 You do not have the access authority to respond to this message.

Content:

The user account that logged on to Web-Based Admin View does not have the execute permission to respond to this operator intervention message.

Corrective action:

Log out from Web-Based Admin View. Retry to log in as root or as a user belonging to wvroot, clroot, or cladmin, and then respond to the operator intervention message.

0792 The error occurred while accessing the management server. Select [Continue], and then end the Resource Fault History.

Content:

An error occurred while accessing the management server of Web-Based Admin View.

Corrective action:

Click the *Continue* button to close the “Fault Resource List” screen. If the network between the browser and the management server is merely temporarily disconnected, select the *Continue* button to close the “Fault Resource List” screen. (For example, you need to select *Connect* when rebooting or when a LAN cable is temporarily disconnected). If a message output by Web-Based Admin View is displayed, follow the instructions for that message. If no message is output by Web-Based Admin View, choose *Fault Resource List* from the top menu to restart.

If the problem cannot be corrected by clicking the *Continue* button to reconnect, collect the maintenance information and then contact your Fujitsu systems engineer (SE). For information on collecting maintenance information, see “B.2 Troubleshooting information collection” in the “PRIMECLUSTER Web-Based Admin View Operation Guide 4.1.”

D.6 Messages Related to the Setting of the Shutdown Facility

D.6.1 Notes on the Setting of the Shutdown Facility

■ **Notes on installing the LKCD shutdown agent**

When you failed to execute the “panicinfo_setup” command and reboot any one of the cluster nodes, you need to confirm that the “/etc/opt/FJSVcllkcd/etc/SA_lkcd.idx” file is MYINDEX –1. If not, reboot the node after editing the file using an editor.

■ **Notes related to post-installation of the LKCD shutdown agent**

If the LKCD shutdown agent is installed on a node, the panic status of the node will be cleared during node startup. If the node fails to clear the panic status, the node will start up in single user mode to avoid joining the cluster system.

In such a case, you need to recover the failed node using the following steps:

◆ **Operation Procedure:**

1. Confirm the index value (NODEID) and the disk that notifies the panic status of the node.

(Example)

```
# /sbin/panicinfo -g
NODEID: 1
DEVICE: /dev/sdf
```

2. Clear the panic status of the local node.

(Example)

```
# /sbin/panicinfo -s -I 1
```

3. Shift to the default run level by pressing Ctrl-d.

If the above procedure fails, you must determine the cause of the error, and then go through the procedure again.

Possible causes are as follows:

- A disk that is not the one that notifies the panic status is output with the “/sbin/panicinfo -g” command.
Corrective action
Specify a correct device name in the NOTIFY_DEV variable of the “/etc/sysconfig/dump” file.
- The area where the panic status is notified is not initialized.
Corrective action
Execute the following command.

```
# /sbin/panicinfo -i -n <the number of cluster nodes>
```
- The I/O path of the shared disk is disconnected.
Corrective action
Reconnect the I/O path.
- A failure occurs in the disk that notifies the panic status.
Corrective action
Disable the LKCD shutdown agent.
Prepare other disk that notifies the panic status, and then set up the LKCD shutdown agent again.

To boot the node at the default run level even when you cannot determine the cause of the error, you need to disable the LKCD shutdown agent.

◆ Disable the LKCD shutdown agent

If you edit the “/etc/opt/FJSVcllkcld/etc/SA_lkcd.idx” file as MYINDEX -1, you can avoid the panic status clear processing during node startup.



Note

To avoid the above panic status clear processing and, at the same time, continue the cluster operation, edit the “/etc/opt/FJSVcllkcld/etc/SA_lkcd.idx” file as MYINDEX -1 on all other nodes of the cluster system. If any INDEX rows are included, delete them all.

The LKCD shutdown agent will be disabled by editing the “/etc/opt/FJSVcllkcld/etc/SA_lkcd.idx” file as MYINDEX -1 on all the cluster nodes.

In this case, the crash dump processing function, as explained in 3.1.4 “Setting Up the Cluster High-Speed Failover Function,” will be disabled. However, cluster operation with the RSB shutdown agent can be continued.

◆ Enable the LKCD shutdown agent

Enable the LKCD shutdown agent

To enable the LKCD shutdown agent, execute “Setting up the LKCD shutdown agent” and “Starting up the shutdown agent” in 5.1.2 “Setting Up the Shutdown Facility.”

D.6.2 Error Messages

If panicinfo_setup fails, the following messages will be output to the standard error output according to the cause.

ERROR: <command> failed

Content:

Execution of the <command> command failed.

Corrective action:

Check the command and execute it again.

ERROR: <command> failed on <node>

Content:

The <command> command failed on the <node> node.

Corrective action:

Check the command and execute the <command> command on the <node> node again.

ERROR: <command> timeout

Content:

Execution of the <command> command timeout.

Corrective action:

Check the command and execute the <command> command on the <node> node again.

ERROR: failed to distribute index file to <node>

Content:

Distribution of the index file to <node> node failed.

Corrective action:

Confirm that the CF services (CFSH, CFCP) have started normally.

ERROR: failed to distribute /etc/panicinfo.conf file to <node>

Content:

Distribution of the panicinfo definition file to <node> node failed.

Corrective action:

Confirm that the CF services (CFSH, CFCP) have started normally.

ERROR: /etc/sysconfig/netdump is invalid on <node>

ERROR: Cannot find the Netdump client's IP address for <device> on <node>

Content:

Reading of the Netdump client settings on the <node> node failed.

Corrective action:

Confirm that Netdump is normally set up.

WARNING: /etc/panicinfo.conf file already exists.

(I)initialize, (C)opy or (Q)uit (I/C/Q) ?

Content:

The panicinfo configuration file already exists.

Corrective action:

Enter "I" to initialize the panicinfo configuration file, "C" to distribute the panicinfo configuration file on the command execution node, and "Q" to terminate the command.

ERROR: failed to change mode of index file on <node>

Content:

Changing of the index file mode on <node> node failed.

Corrective action:

Confirm that the "chmod" command can be executed normally on <node> node for the "/etc/opt/FJSVcllkd/etc/SA_lkcd.idx" file, and then re-execute the command.

ERROR: failed to patch rcsd.cfg on <node>

Content:

Updating of rcsd.cfg failed on the <node> node.

Corrective action:

Confirm that the "/etc/opt/SMAW/SMAWsf/rcsd.cfg" file is included in the <node> node and then, re-execute the command.

ERROR: failed to change owner of index and rcsd.cfg file on <node>

Content:

Changing of the owner on the <node> node failed.

Corrective action:

Confirm that the "chown" command can be executed for the "/etc/opt/FJSVcllkd/etc/SA_lkcd.idx" file and for the "/etc/opt/SMAW/SMAWsf/rcsd.cfg" file on the <node> node, and then re-execute the command.

ERROR: failed to change group of index and rcsd.cfg file on <node>

Content:

Changing of the owner group on the <node> node failed.

Corrective action:

Confirm that the "chgrp" command can be executed for the "/etc/opt/FJSVcllkd/etc/SA_lkcd.idx" file and for the "/etc/opt/SMAW/SMAWsf/rcsd.cfg" file on the <node> node, and then re-execute the command.

ERROR: failed to change mode of /etc/panicinfo.conf file on <node>

Content:

Changing of the panicinfo configuration file mode on <node> node failed.

Corrective action:

Confirm that the "chmod" command can be executed normally on <node> node for the "/etc/panicinfo.conf" file, and then re-execute the command.

ERROR: failed to change owner of /etc/panicinfo.conf file on <node>

Content:

Changing of the owner on the <node> node failed.

Corrective action:

Confirm that the "chmod" command can be executed normally for the "/etc/panicinfo.conf" file on the <node> node, and then re-execute the command.

ERROR: failed to change group of /etc/panicinfo.conf file on <node>

Content:

Changing of the owner group on the <node> node failed.

Corrective action:

Confirm that the "chgrp" command can be executed normally for the "/etc/panicinfo.conf" file on the <node> node, and then re-execute the command.

ERROR: internal error, ...

Content:

Internal error.

Corrective action:

Copy this message, and then contact your Fujitsu systems engineer (SE).

ERROR: The Shutdown Facility configuration cannot be found.

Content:

The Shutdown Facility configuration file is not found. You might not have completed configuring the Shutdown Facility.

Corrective action:

Confirm that Shutdown Facility configuration is completed then execute the command again.

ERROR: Reading the Shutdown Facility configuration failed.

Content:

Reading Shutdown Facility configuration failed. You might have set the Shutdown Facility incorrectly.

Corrective action:

Confirm that Shutdown Facility configuration is correct then execute the command again.

ERROR: The RSB Shutdown Agent configuration cannot be found.

Content:

The RSB Shutdown Agent configuration file is not found. You might not have completed configuration the RSB Shutdown Agent.

Corrective action:

Confirm that RSB Shutdown Agent configuration is completed then execute the command again.

ERROR: Reading the Shutdown Agent configuration failed.

Content:

Reading Shutdown Agent configuration failed. You might have set the Shutdown Agent incorrectly.

Corrective action:

Confirm that Shutdown Agent configuration is correct then execute the command again.

ERROR: <File name> generation failed.

Content:

Creation of the <file name> file failed.

Corrective action:

Confirm that the <file name> file can be created then execute the command again.

Appendix E Registering, Changing, and Deleting State Transition Procedure Resources for PRIMECLUSTER Compatibility

To use a procedure resource in a cluster application, you must register the procedure resource before setting up the cluster application.

This appendix explains how to register, change, and delete procedure resources.

E.1 Registering a Procedure Resource

This section explains how to register a procedure resource.

Take the following steps to register a procedure resource on all nodes where the procedure resource needs to be registered.

◆ Operation Procedure:

1. Log in with the system administrator authority to the node in which the procedure resource is to be registered.
2. Execute the "clsetproc" command to register the state transition procedure.



See

For details on the "clsetproc" command, see the manual page.



Example

To register the "/tmp/program" state transition procedure as program (file name) to the BasicApplication class

```
# /etc/opt/FJSVcluster/bin/clsetproc -c BasicApplication -m  
program /tmp/program
```



Point

To overwrite a state transition procedure that is already registered, specify the -o option.

3. Registering the procedure resource
Execute the "claddprocrsc" command to register the procedure resource.



See

For details on the "claddprocrsc" command, see the manual page for claddprocrsc .



Example

When registering a procedure resource, this procedure resource has to meet the following conditions;

- The resource key of the procedure resource is SDISK,
- The procedure name is program,
- This procedure resource uses the state transition procedure registered in the BasicApplication class,

- The procedure resource is registered in the node (NODE1), and
- The state transition procedure receives the requests of START RUN AFTER and STOP RUN BEFORE

```
# /etc/opt/FJSVcluster/bin/claddprocrsc -k SDISK -m program -c
BasicApplication -s NODE1 -K AFTER -S BEFORE
```

E.2 Changing a Procedure Resource

This section explains how to change a procedure resource.

■ Changing a state transition procedure

Take the following steps to change the state transition procedure on all nodes where it needs to be changed.

◆ Operation Procedure:

1. Log in with the system administrator authority to the node in which the state transition procedure is to be changed.
2. Execute the "clgetproc" command to retrieve the state transition procedure.



See

For details on the "clgetproc" command, see the manual page.



Example

When retrieving a state transition procedure, this procedure resource has to meet the following conditions;

- The state transition procedure is retrieved to the "/tmp" directory.
- The file name registered in the BasicApplication class is program.

```
# /etc/opt/FJSVcluster/bin/clgetproc -c BasicApplication -f
/tmp/program program
```

3. Modifying the state transition procedure
Using a text editor such as vi(1), modify the state transition procedure that was retrieved in Step 2.
4. Registering the state transition procedure
For instruction on registering the procedure, see Step 2 of E.1 "Registering a Procedure Resource"

■ Changing registration information of a procedure resource

Take the following steps to change the registration information of the procedure resource on all nodes where the state transition procedure needs to be changed.

◆ Operation Procedure:

1. Log in with the system administrator authority to the node in which the state transition procedure of the procedure resource is to be changed.
2. Execute the "clsetprocrsc" command to change the registration information of the procedure resource.



See

For details on the "clsetprocrsc" command, see the manual page.



Example

When the procedure resource with the following conditions receives a state transition request of START RUN BEFORE in addition to START RUN AFTER and STOP RUN BEFORE;

- The resource key of the procedure resource is SDISK,
- This procedure resource uses the state transition procedure registered in the BasicApplication class, and
- The procedure resource is registered in the node (NODE1)

```
# /etc/opt/FJSVcluster/bin/clsetprocrsc -n SDISK -c
BasicApplication -s NODE1 -K BEFORE,AFTER -S BEFORE
```

E.3 Deleting a Procedure Resource

Take the following steps to delete a procedure resource on all nodes where the procedure resource needs to be changed.

◆ Operation Procedure:

1. Log in with the system administrator authority to the node from which the procedure resource is to be deleted.
2. Execute the "cldelprocrsc" command to delete the procedure resource.



See

For details on the "cldelprocrsc" command, see the manual page.



Example

When deleting a procedure resource, the procedure resource needs to meet the following conditions;

- The resource key of the procedure resource is SDISK,
- This procedure resource uses the state transition procedure registered in the BasicApplication class, and
- The node identification name is NODE1

```
# /etc/opt/FJSVcluster/bin/cldelprocrsc -n SDISK -c
BasicApplication -s NODE1
```

3. Deleting the state transition procedure

If a state transition procedure becomes unnecessary after all procedure resources that use that state transition procedure have been deleted, execute the "cldelproc" command to delete the state transition procedure.



See

For details on the "cldelproc" command, see the manual page.



Example

When deleting a procedure resource, the procedure resource needs to meet the following conditions;

- The procedure name is program, and
- This procedure resource uses the state transition procedure registered in the BasicApplication class

```
# /etc/opt/FJSVcluster/bin/cldelproc -c BasicApplication  
program
```


Appendix F Registering PRIMECLUSTER-compatible Resources

This section explains how to register a resource of the product that supports PRIMECLUSTER.



See

See F.3 "Deleting a Cluster Service" only if the userApplication configuration was changed.

F.1 Registering a Cluster Service

If you use the CUI to set up userApplication, you need to register a cluster service and a cluster service instance resource of the products that support PRIMECLUSTER in the resource database.

Register a cluster service and a cluster service instance resource of the product that supports PRIMECLUSTER using the following steps:

◆ Operation Procedure:



Note

Carry out Steps 1 and 2 in any one of the nodes that make up userApplication. The nodes refer to all nodes that were set to "Machines" in "(5)" of "CRM.htm."

1. Log in with the system administrator authority to any node of the cluster system.
2. Execute the "claddrsc" command in the format shown below. If the registration is successful, the resource ID of the cluster service is output to standard output.

```
# /etc/opt/FJSVcluster/sys/claddrsc -c ClusterService -k
ApplicationName-of-userApplication (*) -p 0 -t nocontroler -s -1 -d
self -e service
```

* For "ApplicationName-of-userApplication," specify, using lower-case characters, the application name of the user application that was set to "(4)" of "CRM.htm."

(Example) If the application name of userApplication is "generic."

```
# /etc/opt/FJSVcluster/sys/claddrsc -c ClusterService -k generic -p
0 -t nocontroler -s -1 -d self -e service
100
```



Note

Carry out Steps 3 to 5 in all nodes that make up userApplication.

3. Log in with the system administrator authority to the node.
4. Obtain the node identification number of the local node.
Execute the "clgetnode" command in the format shown below, and check the node

identification number of the local node. If `clgetnode` execution is successful, the node identification number of the local node is output to standard output.

```
# /etc/opt/FJSVcluster/bin/clgetnode -i
```

In the following example, the node identification number of the local node is "0."

```
# /etc/opt/FJSVcluster/bin/clgetnode -i
0
```

5. Register the cluster service instance resource.

Execute the "claddrsc" command in the format shown below. If the registration is successful, the resource ID of the cluster service instance is output to standard output.

```
# /etc/opt/FJSVcluster/sys/claddrsc -c AndBinding -k
ApplicationName-of-userApplication (*) -p
resource-ID-of-cluster-service (**) -t nocontroler -s
node-identification-number-of-local-node (***) -d self -e service
* For "ApplicationName-of-userApplication," specify, using lower-case characters,
the application name of the user application that was set to "(4)" of "CRM.htm."
** For "resource-ID-of-cluster-service," specify the resource ID of the cluster
service that was registered in Step 2.
*** For "node-identification-number-of-local-node," specify the node identification
number that was obtained in Step 4 for the local node.
```

(Example) If the application name of userApplication is "generic," the resource ID of the cluster service is "100," and the node identification number of the local node is "0."

```
# /etc/opt/FJSVcluster/sys/claddrsc -c AndBinding -k generic -p 100
-t nocontroler -s 0 -d self -e service
101
```



Note

Carry out Steps 6 and 7 in any one of the nodes that make up userApplication.

6. Log in with the system administrator authority to any one of the nodes that make up the cluster system.
7. Set up the operation sequence of the cluster service instances.

Execute the "clsetinsorder" command in the format shown below, and set the operation sequence of the cluster service instances.

```
# /etc/opt/FJSVcluster/bin/clsetinsorder -s
resource-ID-of-cluster-service(*) -r
resource-ID-of-cluster-service-instance ...(**) -S
* For "resource-ID-of-cluster-service," specify the resource ID of the cluster
service that was registered in Step 2.
** For "resource-ID-of-cluster-service-instance," specify the resource ID of the
cluster service instance that was registered in Step 5 for each node. Specify the
resource IDs of the cluster service instances in the "Machines" sequence that was
set in "(5)" of "CRM.htm."
```

(Example) If the resource ID of the cluster service is "100," and the Machines sequence is as follows: The resource ID of the cluster service instance in the narcissus node is "101" and the resource ID of the cluster service instance in the sweetpea node is "102."

```
Machines[0] narcissusRMS
Machines[1] sweetpeaRMS
```

```
# /etc/opt/FJSVcluster/bin/clsetinsorder -s 100 -r 101,102 -S
```

8. Check if cluster services and cluster service instance resources are registered using the "clgettree" command as follows:

```
# /etc/opt/FJSVcluster/bin/clgettree -s
```

Check the following:

- The cluster services are displayed.
The cluster service resource class is "Standby" or "Scalable".
- The cluster service instances are displayed.
The cluster service instance resource class is "AndBinding".
- The order of operating cluster service instances is displayed.
The order is "()" in the cluster service instance resources. The first cluster service instance will be "RUN", and the remaining instances will be "WAIT".

Example) In the following example, the cluster service resource ID is "100", and the cluster service instance resource IDs are "101 and "102".

```
# /etc/opt/FJSVcluster/bin/clgettree -s
Standby 100 generic STOP REJECT
      AndBinding 101 genelic STOP UNDEFINED(RUN) narcissus
      AndBinding 102 genelic STOP UNDEFINED(WAIT) sweetpea
```

F.2 Associating Resources to a Cluster Service Instance

This section explains how to associate resources with a cluster service instance of the product that supports PRIMECLUSTER.

◆ Operation Procedure:

1. Log in with the system administrator authority.
Log in with the system administrator authority to one of the nodes of the cluster system.



Note

Perform Step 2 only if userApplication was set up with the CUI and IP address takeover was set during userApplication setup. If userApplication was set up with the GUI or if IP address takeover was not set during userApplication setup, Step 2 is unnecessary.

2. Register the IP address takeover resources.
 - Execute the "clgettree" command in the format shown below, and check the resource IDs of the PublicLAN resources in all nodes that execute IP address takeover. The resource class of PublicLAN resources is "Ethernet."

```
# /etc/opt/FJSVcluster/bin/clgettree
```

(Example) In the following case, the resource ID of the PublicLAN resource in the narcissus node is "25" and the resource ID of the PublicLAN resource in the sweetpea node is "26."

```
# /etc/opt/FJSVcluster/bin/clgettree
```

```
Cluster 1 /
      Domain 2 RC9
      Shared 7 SHD_RC9
      Node 3 narcissus ON
            Psd 21 hme1 ON
```

```

Psd 22 hme2 ON
Ethernet 25 hme0 ON
DISK 19 c0t0d0 UNKNOWN
SytemState2 40 FJSVndbs UNKNOWN
Node 5 sweetpea ON
Psd 23 hme1 ON
Psd 24 hme2 ON
Ethernet 26 hme0 ON
DISK 20 c0t0d0 UNKNOWN
SytemState2 41 FJSVndbs UNKNOWN
    
```

- Execute the "clcreate-iprsc" command in the format shown below, and register the IP address takeover resources.

```

# /etc/opt/FJSVcluster/sys/clcreate-iprsc -p
resource-ID-of-PublicLAN-resource... (*)
takeover-IP-address(**)
    
```

* For "resource-ID-of-PublicLAN-resource...", specify the resource IDs of the PublicLAN resources of all nodes that were confirmed with the previous "clgettree" command.

** For "takeover-IP-address," specify the takeover IP address that was specified during userApplication setup.

(Example) If the resource IDs of the PublicLAN resources are "25," "26" and the takeover IP address is "192.168.246.1"

```

#/etc/opt/FJSVcluster/sys/clcreate-iprsc -p 25,26 192.168.246.1
    
```

3. Associate the resources to cluster service instances.

Associate the following resources to cluster service instances:

- IP address takeover resources (*)
 - * If IP address takeover resources were registered in Step 2, associated them to cluster service instances.
- "Interstage Traffic Director" resources

- 1) Execute the "clgettree" command in the format shown below, and check the resource IDs of the resources to be associated to cluster service instances. The resource class of IP address takeover resources is "IP_Address." The resource name of the Interstage Traffic Director resource is "FJSVndbs."

```

# /etc/opt/FJSVcluster/bin/clgettree
    
```

(Example) For the "clgettree command execution example" described below, the resource IDs for the IP address takeover and Interstage Traffic Director resources are as follows:

Node	Resource ID of IP address takeover resource	Resource ID of Interstage Traffic Director resource
narcissus	27	40
sweetpea	28	41

[Execution example of clgettree command]

```

# /etc/opt/FJSVcluster/bin/clgettree
    
```

```

Cluster 1 /
    
```

```

Domain 2 RC9
Shared 7 SHD_RC9
SHD_Host 29 192.168.246.1 UNKNOWN
IP_Address 27 hme0:1 UNKNOWN narcissus
    
```

```

                IP_Address 28 hme0:1 UNKNOWN sweetpea
Node 3 narcissus ON
        Psd 21 hme1 ON
        Psd 22 hme2 ON
        Ethernet 25 hme0 ON
                IP_Address 27 hme0:1 UNKNOWN
        DISK 19 c0t0d0 UNKNOWN
        SytemState2 40 FJSVndbs UNKNOWN
Node 5 sweetpea ON
        Psd 23 hme1 ON
        Psd 24 hme2 ON
        Ethernet 26 hme0 ON
                IP_Address 28 hme0:1 UNKNOWN
        DISK 20 c0t0d0 UNKNOWN
        SytemState2 41 FJSVndbs UNKNOWN

```

- 2) Using the format shown below, execute the "clrepparent" command for each node in the userApplication configuration, and associate the IP address takeover and Interstage Traffic Director resource to cluster service instances.

```

# /etc/opt/FJSVcluster/sys/clrepparent -s
resource-IDs-of-IP-address-takeover-and-Interstage-Traffic
Director-resources(*) -t
resource-ID-of-cluster-service-instance(**)

```

- * Specify the resource IDs of the IP address takeover and Interstage Traffic Director resources that were obtained with the "clgettree" command in each node.

**

If userApplication was set up with the CUI

Specify the resource ID of the cluster service instance that was registered in each node according to Step 5 "Register the cluster service instance" in F.1 "Registering a Cluster Service."

If userApplication was set up with the GUI

Execute the "clgettree" command in the format shown below, and check the resource ID of the cluster service instance in each node. The resource class for cluster service instances is "AndBinding." The node name to which the cluster service instance belongs is displayed at the end of the line for the "AndBinding" resource class.

```
# /etc/opt/FJSVcluster/bin/clgettree -s
```

In the following example, the resource ID of the cluster service instance in the narcissus node is "101," and the resource ID of the cluster service instance in the sweetpea node is "102."

```

# /etc/opt/FJSVcluster/bin/clgettree -s
Standby 68 Service1 STOP AVAILABLE
        AndBinding 101 Instance1_Of _narcissus STOP STOP(RUN)
narcissus
        AndBinding 102 Instance1_Of _sweetpea STOP STOP(RUN)
sweetpea

```

- (Example) When the resource ID of the cluster service instance in the narcissus node is "101" and the resource ID of the cluster service instance in the sweetpea node is "102" and the following resources are registered in each node:

Node	Resource ID of IP address takeover resource	Resource ID of Interstage Traffic Director resource
narcissus	27	40
sweetpea	28	41

```
# /etc/opt/FJSVcluster/sys/clrepparent -s 27,40 -t 101
```

```
# /etc/opt/FJSVcluster/sys/clrepparent -s 28,41 -t 102
```

F.3 Deleting a Cluster Service

This section describes the procedure to be performed in the following cases:

- If userApplication is deleted

After carrying out the procedure indicated in this section, perform the F.1 "Registering a Cluster Service" and F.2 "Associating Resources to a Cluster Service Instance" operations in the following cases:

- If the number of nodes configuring userApplication is changed
- If the ApplicationName of userApplication is changed
- If a new IP address takeover is to be executed or if an IP address takeover is to be discontinued
- If a takeover IP address is changed

◆ Operation Procedure:

1. Log in with the system administrator authority.

Log in with the system administrator authority to one of the nodes of the cluster system.

2. Check the resource ID of the cluster service.

Execute the "clgettree" command in the format shown below, and check the cluster service resource. The resource class of the cluster service is "Standby" or "Scalable." The cluster service is output in the first line.

```
# /etc/opt/FJSVcluster/bin/clgettree -s
```

(Example) In the example below, the resource ID of the cluster service is "68."

```
# /etc/opt/FJSVcluster/bin/clgettree -s
```

```
Standby 68 Service1 STOP AVAILABLE
```

```
AndBinding 101 Instance1_Of _narcissus STOP STOP(RUN) narcissus
```

```
AndBinding 102 Instance1_Of _sweetpea STOP STOP(RUN) sweetpea
```

3. Delete the cluster service resource.

Execute the "cldelrsc" command in the following format, and delete the cluster service resource.

```
# /etc/opt/FJSVcluster/bin/cldelrsc -r
```

```
resource-ID-of-cluster-service(*)
```

* For "resource-ID-of-cluster-service," specify the resource ID of the cluster service that was obtained in Step 2.

(Example) To delete the cluster service that has resource ID "68."

```
# /etc/opt/FJSVcluster/bin/cldelrsc -r 68
```

4. Delete the IP address takeover resources.

- Execute the "clgettree" command in the format shown below, and check the resource IDs of the IP address takeover resources. The resource classes of the IP address takeover resources are "SHD_Host" and "IP_Address." If resources of

the "SHD_Host" and "IP_Address" resource classes are not output, the execution of the subsequent steps is unnecessary because there are no IP address takeover resources.

```
# /etc/opt/FJSVcluster/bin/clgettree
```

(Example) In the following case, the resource IDs of the IP address takeover resources are "29," "27" and "28."

```
# /etc/opt/FJSVcluster/bin/clgettree
```

```
Cluster 1 /
  Domain 2 RC9
  Shared 7 SHD_RC9
    SHD_Host 29 192.168.246.1 UNKNOWN
    IP_Address 27 hme0:1 UNKNOWN narcissus
    IP_Address 28 hme0:1 UNKNOWN sweetpea
  Node 3 narcissus ON
    Psd 21 hme1 ON
    Psd 22 hme2 ON
    Ethernet 25 hme0 ON
    IP_Address 27 hme0:1 UNKNOWN
    DISK 19 c0t0d0 UNKNOWN
    SytemState2 40 FJSVndbs UNKNOWN
  Node 5 sweetpea ON
    Psd 23 hme1 ON
    Psd 24 hme2 ON
    Ethernet 26 hme0 ON
    IP_Address 28 hme0:1 UNKNOWN
    DISK 20 c0t0d0 UNKNOWN
    SytemState2 41 FJSVndbs UNKNOWN
```

- If the previous procedure indicates that there is an IP address takeover resource, execute the "cldelrsc" command in the format shown below, and delete the IP address takeover resource. Execute this step only if there is an IP address takeover resource.

```
# /etc/opt/FJSVcluster/bin/cldelrsc -r
```

```
resource-ID-of-IP-address-takeover-resource(*)
```

- * For "*resource-ID-of-IP-address-takeover-resource*," specify all resource IDs of IP address takeover resources that were obtained with the previous "clgettree" command.

(Example) If the resource IDs of the IP address takeover resources are "29," "27" and "28."

```
# /etc/opt/FJSVcluster/bin/cldelrsc -r 29,27,28
```


Appendix G Changes in Each Version

This chapter explains the changes made to the specifications of PRIMECLUSTER 4.1A30. The changes are listed in the following table.

List of changes

Category	Item	Version
Incompatible commands	clgettree(1) command	(Before change) PRIMECLUSTER 4.1A20 or earlier (After change) PRIMECLUSTER 4.1A30
	hvdisp command	(Before change) PRIMECLUSTER 4.1A20 or earlier (After change) PRIMECLUSTER 4.1A30
Incompatible functions	Posting Notification of a Resource Failure or Recovery	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	Operator Intervention Function	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	Shutdown Facility	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	Setting Up Cluster Applications	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	Changing the Cluster Application	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	State of the main CF table	(Before change) PRIMECLUSTER 4.0A20 (After change) PRIMECLUSTER 4.1A30
	Node state	(Before change) PRIMECLUSTER 4.1A20 or earlier (After change) PRIMECLUSTER 4.1A30

G.1 Changes in PRIMECLUSTER 4.1A30 from 4.0A20

■ Incompatible commands

The following commands of PRIMECLUSTER 4.1A30 are incompatible with PRIMECLUSTER 4.0A20.

- G.1.1 clgettree(1) command
- G.1.2 hvdisp command

■ Incompatible functions

The following functions of PRIMECLUSTER 4.1A30 are incompatible with PRIMECLUSTER 4.0A20.

- G.1.3 Posting Notification of a Resource Failure or Recovery
- G.1.4 Operator Intervention Function
- G.1.5 Shutdown Facility
- G.1.6 Setting Up Cluster Applications
- G.1.7 Changing the Cluster Application
- G.1.8 State of the Main CF Table
- G.1.9 Node state

G.1.1 clgettree(1) command

■ **Details on incompatibilities**

Cluster class resource names, which are output with the "clgettree(1)" command, are changed.

■ **Changes**

● **Before upgrading**

A fixed string "cluster" is displayed when the resource management facility is configured.

● **After upgrading**

The cluster class uses the same name as the CF cluster when the resource management facility is configured.

■ **Note**

None.

G.1.2 hvdisp command

■ **Details on incompatibilities**

The number of characters in "Type" in the resources that are displayed with "hvdisp -a" or "hvdisp -u" has been changed.

■ **Changes**

● **Before upgrading**

The entire contents of "Type" in the resource are displayed.

● **After upgrading**

The contents of "Type" in the resource may not be completely displayed. Use "hvdip <resource-name>" to check the whole contents of "Resource Type."

■ **Note**

None.

G.1.3 Posting Notification of a Resource Failure or Recovery

■ **Details on incompatibilities**

If a failure occurs in the resource or if the resource recovers from a failure, the failure or recovery of the resource can be posted by sending the message shown below to syslogd. The default setting at installation is that notification of a resource failure or recovery is not posted with PCL4.1A30. For details, see 5.2 "Setting Up Fault Resource Identification and Operator Intervention Request."

Message No	Message overview
2700	Recovering from a resource failure
2701	Recovering from a node failure
6750	Resource failure
6751	Node failure

■ **Changes**

● **Before upgrading**

Notification of a resource failure or recovery will be posted.

- **After upgrading**

A resource failure or recovery will be posted only when the AppWatch parameter is set to ON with csetparam. The default value of AppWatch at cluster installation is OFF and notification of the resource failure or recovery will not be posted.

- **Note**

After you have changed the AppWatch parameter with csetparam, you have to reboot all the nodes to validate the setting.

G.1.4 Operator Intervention Function

- **Details on incompatibilities**

To enable the operator intervention function, you have to set the AppWatch parameter to ON with csetparam. With the default settings made when the cluster was installed, the operator intervention function is disabled. For details, see 5.2 "Setting Up Fault Resource Identification and Operator Intervention Request."

- **Changes**

- **Before upgrading**

The operator intervention function is always enabled.

- **After upgrading**

The operator intervention function is enabled only when the AppWatch parameter is set to ON with csetparam. The default value of AppWatch set when the cluster was installed is set to OFF, and the operator intervention function will not work with this default value.

- **Note**

After you have changed the AppWatch parameter with csetparam, you have to reboot all the nodes to validate the setting.

G.1.5 Shutdown Facility

- **Details on incompatibilities**

"SF node weight" is added as a new setting item for the shutdown facility of PRIMECLUSTER 4.1A30. For the same survival priority as PRIMECLUSTER 4.0A20, specify 1 in "SF node weight" for all the nodes. For details, see 5.1.2 "Setting Up the Shutdown Facility."

- **Changes**

- **Before upgrading**

Survival priority is determined by "ShutdownPriority of userApplication."

- **After upgrading**

Survival priority is determined by "ShutdownPriority of userApplication" and "SF node weight."

- **Note**

None.

G.1.6 Setting Up Cluster Applications

- **Details on incompatibilities**

If a cluster application for a standby operation is used with PRIMECLUSTER 4.0A20, set up "ClearFaultRequest|StartUp|SwitchRequest" to the StandbyTransition attribute. With this setting,

a standby state transition can be performed in the same way as PRIMECLUSTER 4.0A20 for the following cases:

- When a cluster application in the Faulted state is set to operating state
- When a cluster application is started up
- When a cluster application is switched

For details on the settings of the cluster application, see 6.7 "Setting Up Cluster Applications."

■ Changes

● Before upgrading

If a resource for support hot-standby operation is available, a standby state transition will be made.

● After upgrading

A standby state transition will be performed only when a resource to support hot-standby operation is available and "ClearFaultRequest|StartUp|SwitchRequest" is set to the StandbyTransition attribute.

■ Note

None.

G.1.7 Changing the Cluster Application

■ Details on incompatibilities

If the "hvw" command is executed while RMS is running, the following menus, that could be displayed with PRIMECLUSTER 4.0A20, cannot be displayed.

- Application-Create
- Application-Edit
- Application-Remove
- Configuration-Activate

To change the cluster application, you have to stop RMS before you execute the "hvw" command. This is the same with PRIMECLUSTER 4.0A20.

If you execute the "hvw" command after stopping RMS, the same menus as PRIMECLUSTER 4.0A20 will be displayed.

■ Changes

● Before upgrading

If you execute the "hvw" command while RMS is running, the following menus will be displayed.

- Application-Create
- Application-Edit
- Application-Remove
- Configuration-Activate

● After upgrading

If you execute the "hvw" command while RMS is running, the following menus will not be displayed.

- Application-Create
- Application-Edit
- Application-Remove
- Configuration-Activate

■ Note

To change the cluster application, you need to stop RMS before you execute the "hvw" command.

This is the same with PRIMECLUSTER 4.0A20.

For details on changing the cluster application, see 8.1 "Changing the Cluster Configuration."

G.1.8 State of the Main CF Table

■ Details on incompatibilities

"INVALID" is added to PRIMECLUSTER 4.1A30 as a new state of the local node in the main CF table.

For details on the main CF table, see "5 GUI Management" in "*PRIMECLUSTER Cluster Foundation (CF) Configuration and Administration Guide*."

■ Changes

● Before upgrading

If the configuration of the node is invalid, "UNCONFIGURED" or "UNKNOWN" will be displayed as the state of the local node on the main CF table.

● After upgrading

If the node configuration is invalid, "INVALID" will be displayed as the state of the local node on the main CF table.

■ Note

None.

G.1.9 Node state

■ Details on incompatibilities

If a node is stopped with the "shutdown(8)" command, the state of a node (SysNode), which is output to the RMS main window with the "hvdisp" command, is changed.

■ Changes

● Before upgrading

If a node is stopped with the "shutdown(8)" command, it enters Offline.

● After upgrading

If a node is stopped with the "shutdown(8)" command, it enters Faulted.

You can check this by referring to the SysNode detailed information (the value of the StateDetails attribute) via the RMS main window of Cluster Admin GUI or "hvdisp(1M)" command.

	State	StateDetails
Normal shutdown by shutdown	Faulted	Shutdown
Abnormal shutdown by panic. etc	Faulted	Killed

■ Note

None.

G.2 Changes in PRIMECLUSTER 4.1A30 from 4.1A20

■ Incompatible commands

The following commands of PRIMECLUSTER 4.1A30 are incompatible with PRIMECLUSTER 4.1A20.

- clgettree(1) command
- hvdisp command

■ Incompatible functions

The following functions of PRIMECLUSTER 4.1A30 are incompatible PRIMECLUSTER 4.1A20.

- Node state

G.2.1 clgettree(1) command

■ Details on incompatibilities

Cluster class resource names, which are output with the "clgettree(1)" command, are changed.

■ Changes

● Before upgrading

A fixed string "cluster" is displayed when the resource management facility is configured.

● After upgrading

The cluster class uses the same name as the CF cluster when the resource management facility is configured.

■ Note

None.

G.2.2 hvdisp command

■ Details on incompatibilities

The number of characters in "Type" in the resources that are displayed with "hvdisp -a" or "hvdisp -u" has been changed.

■ Changes

● Before upgrading

The entire contents of "Type" in the resource are displayed.

● After upgrading

The contents of "Type" in the resource may not be completely displayed. Use "hvdip <resource-name>" to check the whole contents of "Resource Type."

■ Note

None.

G.2.3 Node state

■ Details on incompatibilities

If a node is stopped with the "shutdown(8)" command, the state of a node (SysNode), which is output to the RMS main window with the "hvdisp" command, is changed.

■ Changes

● Before upgrading

If a node is stopped with the "shutdown(8)" command, it enters Offline.

● After upgrading

If a node is stopped with the "shutdown(8)" command, it enters Faulted.

You can check this by referring to the SysNode detailed information (the value of the StateDetails attribute) via the RMS main window of Cluster Admin GUI or "hvdisp(1M)" command.

	State	StateDetails
Normal shutdown by shutdown	Faulted	Shutdown
Abnormal shutdown by panic. etc	Faulted	Killed

■ **Note**

None.

Glossary

AC

See *Access Client*.

Access Client

GFS kernel module on each node that communicates with the Meta Data Server and provides simultaneous access to a shared file system.

See also *Meta Data Server*.

API

See *Application Program Interface*.

application (RMS)

A resource categorized as userApplication used to group resources into a logical collection.

Application Program Interface

A shared boundary between a service provider and the application that uses that service.

application template (RMS)

A predefined group of object definition value choices used by RMS Wizard kit to create object definitions for a specific type of application.

attribute (RMS)

The part of an object definition that specifies how the base monitor acts and reacts for a particular object type during normal operations.

automatic switchover (RMS)

The procedure by which RMS automatically switches control of userApplication over to another host after specified conditions are detected.

See also *directed switchover*, *failover*, *switchover*, and *symmetrical switchover*.

availability

Availability describes the need of most enterprises to operate applications via the Internet 24 hours a day, 7 days a week. The relationship of the actual to the planned usage time determines the availability of a system.

base cluster foundation (CF)

This PRIMECLUSTER module resides on top of the basic OS and provides internal interfaces for the CF (Cluster Foundation) functions that the PRIMECLUSTER services use in the layer above.

See also *Cluster Foundation*.

BM (base monitor)(RMS)

The RMS module that maintains the availability of resources. The base monitor is supported by daemons and detectors. Each host being monitored has its own copy of the base monitor.

BMC (Baseboard Management Controller)

A dedicated processor for monitoring and diagnosis of environmental factors (e.g. temperature, voltage) and parts and units.

CF

See *Cluster Foundation*.

child (RMS)

A resource defined in the configuration file that has at least one parent. A child can have multiple parents, and can either have children itself (making it also a parent) or no children (making it a leaf object).

See also *resource*, *object*, *parent*, and *leaf object*.

class (GDS)

See *disk class*.

cluster

A set of computers that work together as a single computing source. Specifically, a cluster performs a distributed form of parallel computing.

See also *RMS configuration*.

Cluster Foundation

The set of PRIMECLUSTER modules that provides basic clustering communication services.

See also *base cluster foundation*.

cluster interconnect (CF)

The set of private network connections used exclusively for PRIMECLUSTER communications.

cluster partition

The state in which communication with some of the nodes that constitute the cluster has been stopped.

Cluster Resource Management facility

Facility that manages hardware units that are shared among multiple nodes.

concatenated virtual disk

Concatenated virtual disks consist of two or more pieces on one or more disk drives. They correspond to the sum of their parts. Unlike simple virtual disks where the disk is subdivided into small pieces, the individual disks or partitions are combined to form a single large logical disk. (Applies to transitioning users of existing Fujitsu Siemens products only.)

See also *simple virtual disk*, *striped virtual disk*.

concatenation (GDS)

The linking of multiple physical disks. This setup allows multiple disks to be used as one virtual disk that has a large capacity.

configuration file (RMS)

The RMS configuration file that defines the monitored resources and establishes the interdependencies between them. The default name of this file is *config.us*.

Crash dump collection facility

The facility that collects crash dumps if an OS error (panic, etc.) occurs. The crash dump collection facility includes LKCD and Netdump.

custom detector (RMS)

See *detector*.

custom type (RMS)

See *generic type*.

daemon

A continuous process that performs a specific function repeatedly.

database node (SIS)

Nodes that maintain the configuration, dynamic data, and statistics in a SIS configuration.

See also *gateway node*, *service node*, *Scalable Internet Services*.

detector (RMS)

A process that monitors the state of a specific object type and reports a change in the resource state to the base monitor.

directed switchover (RMS)

The RMS procedure by which an administrator switches control of userApplication over to another host.

See also *automatic switchover*, *failover*, *switchover*, and *symmetrical switchover*.

disk class (GDS)

Collection of SDX objects. The shared type disk class is also a resource unit that can be used by the PRIMECLUSTER system. A disk class is sometimes simply called a "class."

disk group (GDS)

A collection of disks or low-order groups that become the unit for mirroring, striping, or concatenation. Disk and low-order groups that belong to the same disk group are mutually mirrored, striped, or concatenated according to the type attribute (mirror, stripe, or concatenation) of that disk group.

A disk group is sometimes simply called a "group."

DOWN (CF)

A node state that indicates that the node is unavailable (marked as down). A LEFTCLUSTER node must be marked as DOWN before it can rejoin a cluster.

See also *UP*, *LEFTCLUSTER*, *node state*.

ENS (CF)

See *Event Notification Services*.

environment variable (RMS)

Variables or parameters that are defined globally.

error detection (RMS)

The process of detecting an error. For RMS, this includes initiating a log entry, sending a message to a log file, or making an appropriate recovery response.

Ethernet

LAN standard that is standardized by IEEE 802.3. Currently, except for special uses, nearly all LANs are Ethernets. Originally the expression Ethernet was a LAN standard name for a 10 megabyte per second type LAN, but now it also used as a general term that includes high-speed Ethernets and gigabyte Ethernets.

Event Notification Services (CF)

This PRIMECLUSTER module provides an atomic-broadcast facility for events.

failover (RMS, SIS)

The process by which a user application automatically transfers processes and data inherited from an operating system to a standby system because some failure has occurred.

With SIS, this process switches a failed node to a backup node. With RMS, this process is known as switchover.

See also *automatic switchover*, *directed switchover*, *switchover*, *symmetrical switchover*.

Fast switching mode

One of the LAN duplexing modes presented by GLS.

This mode uses a multiplexed LAN simultaneously to provide enhanced communication scalability between Linux(R) servers and high-speed switchover if a LAN failure occurs.

fault tolerant network

A network with the ability to withstand faults (fault tolerant). Fault tolerant is the ability to

maintain and continue normal operation even if a fault occurs in part of the computer system. A fault tolerant network is therefore a network that can continue normal communication even if a flat occurs in part of the network system.

gateway node (SIS)

Gateway nodes have an external network interface. All incoming packets are received by this node and forwarded to the selected service node, depending on the scheduling algorithm for the Service.

See also *service node*, *database node*, *Scalable Internet Services*.

See *disk group*.

GDS

See *Global Disk Services*.

generic type (RMS)

An object type which has generic properties. A generic type is used to customize RMS for monitoring resources that cannot be assigned to one of the supplied object types.

See also *object type*.

GFS

See *Global File Services*.

GFS local file system

A local file system that features high-speed file access and file system switchover after a system failure. High-speed file access is available through the serial block allocation to file data, and file system switchover is assured through a file system consistency recovery function.

A GFS local file system is used by one node or by two nodes, in which case the file system is used as a switchover file system.

GFS shared file system

A shared file system that allows simultaneous access from multiple Linux(R) systems that are connected to shared disk units, while maintaining data consistency, and allows processing performed by a node to be continued by other nodes even if the first node fails.

A GFS shared file system can be mounted and used concurrently from multiple nodes.

Global Disk Services

This optional product provides volume management that improves the availability and manageability of information stored on the disk unit of the Storage Area Network (SAN).

Global File Services

This optional product provides direct, simultaneous accessing of the file system on the shared storage unit from two or more nodes within a cluster.

Global Link Services

This PRIMECLUSTER optional module provides network high availability solutions by multiplying a network route.

GLS

See *Global Link Services*.

graph (RMS)

See *system graph*.

graphical user interface

A computer interface with windows, icons, toolbars, and pull-down menus that is designed to be simpler to use than the command-line interface.

group (GDS)

See *disk group*.

GUI

See *graphical user interface*.

high availability

This concept applies to the use of redundant resources to avoid single points of failure.

highest-order group (GDS)

Group that does not belong to another group. A volume can be created in the highest-order group.

hub

Star-type wiring device used for LAN or fibre channels.

interconnect (CF)

See *cluster interconnect*.

Internet Protocol address

A numeric address that can be assigned to computers or applications.

See also *IP aliasing*.

internode communication facility

Communication function between cluster nodes that are used by PRIMECLUSTER CF. Since this facility is designed especially for communication between cluster nodes, the overhead is less than that of TCP/IP, and datagram communication services that also guarantee the message arrival sequence can be carried out.

IP address

See *Internet Protocol address*.

IP aliasing

This enables several IP addresses (aliases) to be allocated to one physical network interface. With IP aliasing, the user can continue communicating with the same IP address, even though the application is now running on another host.

See also *Internet Protocol address*.

keyword (reserved words)

A word that has special meaning in a programming language. For example, in the configuration file, the keyword `node` identifies the kind of definition that follows.

LAN

See *public LAN*.

latency (RMS)

Time interval from when a data transmission request is issued until the actual response is received.

leaf object (RMS)

A bottom object in a system graph. In the configuration file, this object definition is at the beginning of the file. A leaf object does not have children.

LEFTCLUSTER (CF)

A node state that indicates that the node cannot communicate with other nodes in the cluster. That is, the node has left the cluster. The purpose for the intermediate LEFTCLUSTER state is to avoid the network partition problem.

See also *UP, DOWN, network partition, node state*.

link (RMS)

Designates a child or parent relationship between specific resources.

local area network

See *public LAN*.

local host

The host from which a command or process is initiated.

See also *remote host*.

log file

The file that contains a record of significant system events or messages. The base monitor, wizards, and detectors can have their own log files.

logical volume (GDS)

General term for a virtual disk device that the user can access directly. The user can access a logical volume in the same way as accessing a physical disk slice (partition). A logical volume is sometimes simply called a "volume." low-order group (GDS)

Group that belongs to another group. A volume cannot be created in a low-order group.

MAC address

Address that identifies the office or node that is used by the MAC sublayer of a local area network (LAN).

MDS

See *Meta Data Server*.

message

A set of data transmitted from one software process to another process, device, or file.

message queue

A designated memory area which acts as a holding place for messages.

Meta Data Server

GFS daemon that centrally manages the control information of a file system (meta-data).

mirrored volume (GDS)

A volume that is created in a mirror group. Data redundancy is created by mirroring.

mirror group (GDS)

A disk group of the mirror type. This is a collection of mutually mirrored disks or low-order groups.

mirroring (GDS)

A setup that maintains redundancy by writing the same data to multiple slices. Even if an error occurs in some of the slices, this setup allows access to the volume to continue as long as a normal slice remains.

monitoring agent

Component that monitors the state of a remote cluster node and immediately detects if that node goes down. This component is separate from the SA function.

mount point

The point in the directory tree where a file system is attached.

native operating system

The part of an operating system that is always active and translates system calls into activities.

network adapter

A LAN network adapter.

network interface card

See *network adapter*.

network partition (CF)

This condition exists when two or more nodes in a cluster cannot communicate over the interconnect; however, with applications still running, the nodes can continue to read and write to a shared device, compromising data integrity.

NIC switching mode

LAN duplexed mode that is provided by GLS. The duplexed NIC is used exclusively, and LAN monitoring between the Linux(R) server and the switching HUB, and switchover if an error is detected are implemented.

node

A host which is a member of a cluster. A computer node is a computer.

node state (CF)

Every node in a cluster maintains a local state for every other node in that cluster. The node state of every node in the cluster must be either UP, DOWN, or LEFTCLUSTER.

See also *UP*, *DOWN*, *LEFTCLUSTER*.

object (RMS)

In the configuration file or a system graph, this is a representation of a physical or virtual resource.

See also *leaf object*, *object definition*, *node state*, *object type*.

object definition (RMS)

An entry in the configuration file that identifies a resource to be monitored by RMS. Attributes included in the definition specify properties of the corresponding resource. The keyword associated with an object definition is *object*.

See also *attribute*, *object type*.

object type (RMS)

A category of similar resources monitored as a group, such as disk drives. Each object type has specific properties, or attributes, which limit or define what monitoring or action can occur. When a resource is associated with a particular object type, attributes associated with that object type are applied to the resource.

See also *generic type*.

online maintenance

The capability of adding, removing, replacing, or recovering devices without shutting or powering off the host.

operating system dependent (CF)

This module provides an interface between the native operating system and the abstract, OS-independent interface that all PRIMECLUSTER modules depend upon.

OPS

See *Oracle Parallel Server*.

Oracle Parallel Server

Oracle Parallel Server allows access to all data in the database to users and applications in a clustered or MPP (massively parallel processing) platform.

OSD (CF)

See *operating system dependent*.

parent (RMS)

An object in the configuration file or system graph that has at least one child.

See also *child*, *configuration file*, and *system graph*.

patrol diagnosis

A function that periodically diagnoses hardware faults.

physical IP address

IP address that is assigned directly to the interface (for example, hme0) of a network interface card. See also *logical IP address*. For information about the logical interface, see the explanation of logical interface in `ifconfig(1M)`.

primary host (RMS)

The default host on which a user application comes online when RMS is started. This is always the hostname of the first child listed in the userApplication object definition.

PRIMECLUSTER services (CF)

Service modules that provide services and internal interfaces for clustered applications.

private network address

Private network addresses are a reserved range of IP addresses specified by RFC1918. They may be used internally by any organization but, because different organizations can use the same addresses, they should never be made visible to the public internet.

private resource (RMS)

A resource accessible only by a single host and not accessible to other RMS hosts.

See also *resource*, *shared resource*.

public LAN

The local area network (LAN) by which normal users access a machine.

See also *Administrative LAN*.

queue

See *message queue*.

quorum

State in which integrity is maintained among the nodes that configure the cluster system. Specifically, the CF state in all nodes that configure the cluster system is either UP or DOWN (there is no LEFCLUSTER node).

redundancy

This is the capability of one object to assume the resource load of any other object in a cluster, and the capability of RAID hardware and/or RAID software to replicate data stored on secondary storage devices.

Reliant Monitor Services (RMS)

The package that maintains high availability of user-specified resources by providing monitoring and switchover capabilities.

remote host

A host that is accessed through a telecommunications line or LAN.

See also *local host*.

remote node

See *remote host*.

reporting message (RMS)

A message that a detector uses to report the state of a particular resource to the base monitor.

resource (RMS)

A hardware or software element (private or shared) that provides a function, such as a mirrored disk, mirrored disk pieces, or a database server. A local resource is monitored only by the local host.

See also *private resource*, *shared resource*.

resource database (RMS)

Database that manages information on hardware units that are shared among multiple nodes. The resource database is managed by the cluster resource management facility.

resource definition (RMS)

See *object definition*.

resource label (RMS)

The name of the resource as displayed in a system graph.

resource state (RMS)

Current state of a resource.

RMS

See *Reliant Monitor Services*.

RMS command

Commands that enable RMS resources to be administered from the command line.

RMS configuration

A configuration in which two or more nodes are connected to shared resources. Each node has its own copy of operating system and RMS software, as well as its own applications.

RMS Wizard kit

Each component of the RMS Wizard Kit adds new menu items to the RMS Wizard Tools for a specific application.

See also *RMS Wizard Tools*, *Reliant Monitor Services (RMS)*.

RMS Wizard Tools

A software package composed of various configuration and administration tools used to create and manage applications in an RMS configuration.

See also *RMS Wizard kit*, *Reliant Monitor Services*.

Rolling update

Update method used to fix an application or maintenance within the cluster system. Fix application is enabled by applying fixes to each node sequentially without stopping jobs.

route

In the PRIMECLUSTER Concept Guide, this term refers to the individual network paths of the redundant cluster interfaces that connect the nodes to each other.

SAN

See *Storage Area Network*.

scalability

The ability of a computing system to dynamically handle any increase in work load. Scalability is especially important for Internet-based applications where growth caused by Internet usage presents a scalable challenge.

Scalable Internet Service (SIS)

Scalable Internet Services is a TCP connection load balancer, and dynamically balances network access loads across cluster nodes while maintaining normal client/server sessions for each connection.

scope (GDS)

The range of nodes that can share objects in the shared type disk class.

script (RMS)

A shell program executed by the base monitor in response to a state transition in a resource.

The script may cause the state of a resource to change.

SDX disk (GDS)

General term for disks that GDS manages. Depending on its use, a SDX disk may be called a single disk, a keep disk, a spare disk, or an undefined disk. An SDS disk is sometimes simply called a "disk."

SDX object (GDS)

General term for resources that GDS manages. The resources include classes, groups, SDX disks, and volumes.

service node (SIS)

Service nodes provide one or more TCP services (such as FTP, Telnet, and HTTP) and receive client requests forwarded by the gateway nodes.

See also *database node*, *gateway node*, and *Scalable Internet Services*.

shared disk connection confirmation

Function that checks whether that all shared disk units are turned on and all cable connections are correct when a node is started.

shared resource

A resource, such as a disk drive, that is accessible to more than one node.

See also *private resource*, *resource*.

Shutdown Facility

A facility that forcibly stops a node in which a failure has occurred. When PRIMECLUSTER decides that system has reach a state in which the quorum is not maintained, it uses the Shutdown Facility (SF) to return the cluster system to the quorum state.

shutdown request

Instruction that forcibly stops the specified node so that the quorum is restored.

simple virtual disk

Simple virtual disks define either an area within a physical disk partition or an entire partition.

See also *concatenated virtual disk*, *striped virtual disk*.

single disk (GDS)

SDX disk that does not belong to a group and can be used to create a single volume.

single volume (GDS)

A volume that is created in a single disk that not belong to a group. There is no data redundancy.

SIS

See *Scalable Internet Services*.

spare disk (GDS)

A spare disk for restoring the mirroring state in place of a failed disk.

state

See *resource state*.

state transition procedure

The state transition procedure receives a state transition instruction from the cluster control and controls activation and deactivation of the resource (start and stop of the application).

Storage Area Network

The high-speed network that connects multiple, external storage units and storage units with multiple computers. The connections are generally fiber channels.

striped group (GDS)

A disk group of the stripe type. This is a collection of disks or low-order groups that become striping units.

striped virtual disk

Striped virtual disks consist of two or more pieces. These can be physical partitions or further virtual disks (typically a mirror disk). Sequential I/O operations on the virtual disk can be converted to I/O operations on two or more physical disks. This corresponds to RAID Level 0 (RAID0).

See also *concatenated virtual disk*, *simple virtual disk*.

striped volume (GDS)

A volume that is created in a striped group. Striping allows the I/O load to be distributed among multiple disks. There is no data redundancy.

stripe width (GDS)

The size in which data is divided when striping takes place.

striping (GDS)

Dividing data into fixed-size segments, and cyclically distributing and writing the data segments to multiple slices. This method distributes I/O data to multiple physical disks and issues I/O data at the same time.

switching mode

LAN duplexing mode presented by GLS.

switchover

The process by which a user application transfers processes and data inherited from an operating node to a standby node, based on a user request.

switchover (RMS)

The process by which RMS switches control of userApplication over from one monitored host to another.

See also *automatic switchover*, *directed switchover*, *failover*, and *symmetrical switchover*.

symmetrical switchover (RMS)

This means that every RMS host is able to take on resources from any other RMS host.

See also *automatic switchover*, *directed switchover*, *failover*, and *switchover*.

synchronized power control

When the power of one node is turned in the cluster system configured with PRIMEPOWER, this function turns on all other powered-off nodes and disk array unit that are connected to nodes through RCI cables.

system graph (RMS)

A visual representation (a map) of monitored resources used to develop or interpret the configuration file.

See also *configuration file*.

template

See *application template*.

type

See *object type*.

UP (CF)

A node state that indicates that the node can communicate with other nodes in the cluster.

See also *DOWN*, *LEFTCLUSTER*, *node state*.

user group

A group that limits the environment setup, operation management, and other operations presented by Web-Based Admin View and the Cluster Admin GUI. There are four user groups: wvroot, clroot, cladmin, and clmon. Each user ID is registered in an appropriate user group by the operation system administrator of the management server.

virtual interface (VIP)

Virtual IP address or host name that SIS uses to make multiple nodes of the cluster appear as a single-system image.

volume (GDS)

See *logical volume (GDS)*.

watchdog timer monitoring

Timer value that measures operating system hangs and boot failures.

Web-Based Admin View

This is a common base enabling use of the Graphic User Interface of PRIMECLUSTER. This interface is in Java.

Wizard (RMS)

An interactive software tool that creates a specific type of application using pretested object definitions. An enabler is a type of wizard.

Abbreviations

AC	Access Client
API	application program interface
BM	base monitor
CF	Cluster Foundation or Cluster Framework
CIM	Cluster Integrity Monitor
CIP	Cluster Interconnect Protocol
CLI	command-line interface
CRM	Cluster Resource Management
DLPI	Data Link Provider Interface
EE	Enterprise Edition
ENS	Event Notification Services
GDS	Global Disk Services
GFS	Global File Services
GLS	Global Link Services
GUI	graphical user interface
HA	high availability
ICF	Internode Communication Facility
I/F	Interface
I/O	input/output

Abbreviations

LAN	local area network
MA	Monitoring Agents
MDS	Meta Data Server
MIB	Management Information Base
NIC	network interface card
NSM	Node State Monitor
OPS	Oracle Parallel Server
OSD	operating system dependent
PAS	Parallel Application Services
PS	Parallel Server
RAO	RMS-Add on
RMS	Reliant Monitor Services
SA	Shutdown Agent
SAN	Storage Area Network
SC	Scalability Cluster
SD	Shutdown Daemon
SF	Shutdown Facility
SIS	Scalable Internet Services
VIP	Virtual Interface Provider
WK	Wizard Kit
WT	Wizard Tools

Index

1	
1:1 standby	20
2	
2-tier model	27
3	
3-tier model	28
A	
Activating the Cluster Interconnect	50
Application building procedure and manual reference locations	86
Assigning Users to Manage the Cluster	51
Associating Resources to a Cluster Service Instance	327
Attributes	144
Automatic Configuration of Shared Disks	93
B	
Bringing Faulted Cluster Application to Online State	169
Build Flow	3
Building a cluster	65
Building Cluster Applications	85
C	
Cascade (using one cluster application)	22
CE(FE for North America) Instruction Worksheet	253
CF	62
CF Main Window	156
Changing a CIP Address	192
Changing a Node Name	193
Changing a Procedure Resource	322
Changing an IP Address on the Public LAN	190
Changing operation attributes (CUI)	194
Changing PRIMECLUSTER operation attributes	199
Changing the cluster configuration	184
Changing the operation attributes of a userApplication	194
Changing the operation configuration	183
Checking the cluster worksheet	49
Clear fault	10
Clearing the Wait State of a Node	169
Clients	27
Cluster Admin	61
Cluster Admin functions	61
Cluster Application Configuration Worksheets	259
Cluster Application Operations	168
Cluster Application Worksheet	273
Cluster Application Worksheets	270
Cluster Building Worksheet	276
Cluster Configuration Worksheet	257
Cluster high-speed failover function setup	34
Cluster Installation Environment Worksheet	254
Cluster nodes	27
Cluster states	158
Cmdline Resource Worksheet	270
Common	59
Concurrent Viewing of Node and Cluster Application States	172
Configuration Global Settings Worksheet	274
Configuration information or object attributes	165
Confirming Web-Based Admin View Startup	53
Corrective Action for Failed Resources	179
Corrective Action in the event of a resource failure	177
Crash Dump	294
Creating Scalable Cluster Applications	122
Creating Standby Cluster Applications	117
CRM	62
CRM Main Window	157
D	
Deleting a cluster application	200
Deleting a Cluster Service	330
Deleting a Procedure Resource	323
Deleting a resource	200
Deleting a userApplication	202
Deleting the Hardware Resource	202
Detaching Resources from Operation	209
Detailed resource information	161
Detecting a Failed Resource	295
Determining the Cluster System Operation Mode	19
Determining the Failover Timing of a Cluster Application	30
Determining the Web-Based Admin View Operation Mode	27
Development	8
Disk unit setup	34
Displayed resource types	157
Displaying environment variables	175
E	
Environment variables	111
Error Messages	305
exclusive relationships between cluster applications	144
Executing Standby Restoration for the Operating	

Job	210
Executing the pclsnap Command	291
Exiting the Web-Based Admin View Screen	63

F

Failed Resource and Operator Intervention	
Messages (GUI)	313
Failed Resource Message	296
failover	10
Failure Detection and Cause Identification if a	
Failure Occurs	177
Fault Resource List	299
File System Creation	102
File system setup	99
Flow of Maintenance	209
Fsystem Resource Worksheet	271
Function Selection	17

G

GDS Configuration Setup	93
GDS Configuration Worksheet	267, 282
Gds Resource Worksheet	271
GDS Setup Worksheets	266
Generate and Activate	144
GFS Shared File System	100
GFS Shared File System Setup Worksheet	259, 279
Global Cluster Services menu functions	61
GIs Resource Worksheet	272
GLS setup	88
GLS Setup Worksheet	260, 279
GUI Messages	313

H

Hardware configuration with ServerView	34
--	----

I

Information Messages	304
Initial Cluster Setup	66
Initial Configuration Setup	76
Initial GDS Setup	93
Initial GFS Setup	100
Initial GLS setup	88
Initial RMS Setup	87
Initial setup of the cluster resource management	
facility	75
Initial setup of the operation management server	52
Initial setup of Web-Based Admin View	52
Installation	5
Installation and environment setup of applications	45
Installation and setup of related software	34
Installation procedure and manual reference	
sections	7

Installation script	44
Interstage Application Server Enterprise Edition	245

K

Kernel parameter check and setup	34
Kernel Parameter Worksheet	255

M

Maintenance of the PRIMECLUSTER System	207
Maintenance Types	208
Management server	27
Manual	59
Manual Pages	287
Messages	301
Messages Related to CRM View	313
Messages Related to the Setting of the Shutdown	
Facility	315
MISC	59
Monitoring Cluster Control Messages	176
Monitoring the PRIMECLUSTER System	170
Monitoring the State of a Cluster Application	171
Monitoring the State of a Node	170
Mutual standby	20

N

N:1 standby	21
Network setup	34
Node states	158
Notes on script creation	108
Notes on Worksheet Creation	251
NTP setup	34

O

Operating the PRIMECLUSTER System	167
Operation and Maintenance	13
Operation menu functions	58
Operation Mode Change	14
Operations	155, 159
Operator Intervention Messages	311
Other resource states	159
Overall Design Worksheet	252

P

Planning	4
Preparation Prior to Building a Cluster	47
Preparations for starting the Web-Based Admin	
View screen	51
Preparing the client environment	52
PRIMECLUSTER	58
PRIMECLUSTER Clustering Base	16
PRIMECLUSTER Enterprise Edition	16
PRIMECLUSTER HA Server	16

PRIMECLUSTER Installation	44
PRIMECLUSTER Lite Pack.....	16
PRIMECLUSTER Operation Modes	219
PRIMECLUSTER Product List.....	217
PRIMECLUSTER Product Selection	16
PRIMECLUSTER Products	215
PRIMECLUSTER System Design Worksheets...	251
PRIMECLUSTER Wizard for MailServer	233
PRIMECLUSTER Wizard for NAS.....	227
PRIMECLUSTER Wizard for Oracle.....	221
PRIMECLUSTER Wizard for WebServer	239
Priority transferring (application of N:1 standby)...	23
Procedure Resource Worksheet.....	272
Product Selection	16

R

Registering a Cluster Service	325
Registering a Procedure Resource.....	321
Registering Hardware Devices	78
Registering PRIMECLUSTER-compatible Resources.....	325
Registering, Changing, and Deleting State Transition Procedure Resources for PRIMECLUSTER Compatibility	321
Replacement test.....	11
Resource Fault History	61, 297
Resource icons.....	157
Resource states.....	158
RMS	62
RMS graphs.....	175
RMS Main Window	162
RMS Operation.....	167
RMS Setup Worksheet	259
RMS Tree	162

S

Sample scripts.....	107
Scalable Operation	24
Searching for a Message.....	301
Setting the Web-Based Admin View Language	53
Setting up CF and CIP.....	66
Setting Up Cluster Applications	113
Setting Up Cmdline Resources.....	132
Setting Up Disk Units.....	35
Setting up fault resource identification and operator intervention request	82
Setting Up Fsystem Resources	135
Setting Up Gds Resources	139
Setting Up Gls Resources	140
Setting Up Hardware Monitoring with ServerView	35
Setting Up Online/Offline Scripts	107
Setting Up Procedure Resources	142

Setting Up Resources.....	131
Setting Up Shared Disks	93
Setting Up the Application Environment	106
Setting up the browser.....	54
Setting Up the Cluster High-Speed Failover Function	37
Setting up the Java Plug-in.....	55
Setting Up the Network.....	35
Setting up the shutdown facility	68
Setting Up userApplication	116
Setting up Web-Based Admin View when GLS is used	92
Shared resource states	159
SIS	62
Site Preparation.....	15
Software Installation	33
Software Maintenance.....	211
Standby Operation.....	19
Starting a Cluster Application.....	168
Starting RMS	167
Starting RMS Wizard	116
Starting the Web-Based Admin View screen	56
Startup test	10
Stop	11
Stopping a Cluster Application.....	168
Stopping RMS	167
Survival priority.....	68
Switching a Cluster Application	168
Switchlogs and application logs.....	166
switchover	10
System configuration modification	181
System Design	18
System Design Examples.....	275
Systemwalker Centric Manager.....	247
Systemwalker Operation Manager	249

T

Test.....	9
Troubleshooting.....	291

U

User groups.....	51
userApplication Configuration Wizard.....	61

V

Viewing application logs	173
Viewing Detailed Resource Information.....	174
Viewing Logs Created by the PRIMECLUSTER System.....	173
Viewing switchlogs	173
Viewing the PRIMECLUSTER system operation management screens	156

Volume setup..... 93

W

Web-Based Admin View screen 58

Work process continuity 11

Worksheet purpose 251