

# **ExpressCluster<sup>®</sup> X 2.1 *for Linux***

## Reference Guide

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# Preface

## Who Should Use This Guide

The *ExpressCluster X Reference Guide* is intended for system administrators. Detailed information for setting up a cluster system, function of the product, maintenance related information, and how to troubleshoot the problems are covered in this guide. The guide provides supplemental information to the *Installation and Configuration Guide*.

## How This Guide is Organized

<b>Section I</b>	<b>Detailed reference of ExpressCluster functions</b>
<b>Chapter 1</b>	<b>Functions of the WebManager</b> Provides information on function of the ExpressCluster X WebManager.
<b>Chapter 2</b>	<b>Functions of the Integrated WebManager</b> Provides information on functions of the Integrated WebManager.
<b>Chapter 3</b>	<b>Functions of the Builder</b> Provides information on function of the ExpressCluster X Builder.
<b>Chapter 4</b>	<b>ExpressCluster command reference</b> Provides information on commands available to use in ExpressCluster.
<b>Section II</b>	<b>Resource details</b>
<b>Chapter 5</b>	<b>Group resource details</b> Provides information on group resource which configures a failover group.
<b>Chapter 6</b>	<b>Monitor resource details</b> Provides information on monitor resource which works as a monitoring unit in ExpressCluster.
<b>Chapter 7</b>	<b>Heartbeat resources details</b> Provides information on heartbeat resource.
<b>Chapter 8</b>	<b>Network partition resolution resources details</b> Provides information on heartbeat resource.
<b>Chapter 9</b>	<b>Information on other monitor settings</b> Provides information on other monitoring settings.
<b>Section III</b>	<b>Maintenance information</b>
<b>Chapter 10</b>	<b>The system maintenance information</b> Provides maintenance information for ExpressCluster.
<b>Chapter 11</b>	<b>Troubleshooting</b> Provides instruction on how to troubleshoot the problem.
<b>Chapter 12</b>	<b>Error messages</b> Provides explanation on error messages displayed during ExpressCluster operation.
<b>Appendix</b>	
<b>Appendix A</b>	<b>Supplementary information</b>
<b>Appendix B</b>	<b>Glossary</b>
<b>Appendix C</b>	<b>Index</b>

# ExpressCluster Documentation Set

The ExpressCluster manuals consist of the following four guides. The title and purpose of each guide is described below.

## **Getting Started with ExpressCluster**

This guide is intended for all users. The guide covers topics such as product overview, system requirements, and known problems.

## **Installation and Configuration Guide**

This guide is intended for system engineers and administrators who want to build, operate, and maintain a cluster system. Instructions for designing, installing, and configuring a cluster system with ExpressCluster are covered in this guide.

## **Reference Guide**

This guide is intended for system administrators. The guide covers topics such as how to operate ExpressCluster, function of each module, maintenance-related information, and troubleshooting. The guide is complement to the *Installation and Configuration Guide*.

## **ExpressCluster X Integrated WebManager Administrator's Guide**

This guide is intended for system administrators who manage the cluster system using ExpressCluster with Integrated WebManager and for system engineers introducing the Integrated WebManager. Details on the actual procedures required when introducing cluster system are described in this guide.

## Conventions

In this guide, **Note**, **Important**, **Related Information** are used as follows:

---

**Note:**

Used when the information given is important, but not related to the data loss and damage to the system and machine.

---

---

**Important:**

Used when the information given is necessary to avoid the data loss and damage to the system and machine.

---

---

**Related Information:**

Used to describe the location of the information given at the reference destination.

---

The following conventions are used in this guide.

Convention	Usage	Example
<b>Bold</b>	Indicates graphical objects, such as fields, list boxes, menu selections, buttons, labels, icons, etc.	In <b>User Name</b> , type your name. On the <b>File</b> menu, click <b>Open Database</b> .
Angled bracket within the command line	Indicates that the value specified inside of the angled bracket can be omitted.	<code>clpstat -s[-h <i>host_name</i>]</code>
#	Prompt to indicate that a Linux user has logged in as root user.	<code># clpcl -s -a</code>
Monospace (courier)	Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters.	<code>/Linux/2.1/en/server/</code>
<b>Monospace bold</b> (courier)	Indicates the value that a user actually enters from a command line.	Enter the following: <code># clpcl -s -a</code>
<i>Monospace italic</i> (courier)	Indicates that users should replace italicized part with values that they are actually working with.	<code>rpm -i expressclsbuilder-&lt;version_number&gt;- &lt;release_number&gt;.i686.rpm</code>

## **Contacting NEC**

For the latest product information, visit our website below:

<http://www.nec.co.jp/pfsoft/clusterpro/clp/overseas.html>

# **Section I      Detailed      reference      of ExpressCluster functions**

This section explains the details of ExpressCluster functions. Specifically, the function of the ExpressCluster X WebManager and the Builder is described. It also gives the description of the available commands on ExpressCluster.

- Chapter 1 Functions of the WebManager
- Chapter 2 Functions of the Integrated WebManager
- Chapter 3 Functions of the Builder
- Chapter 4 ExpressCluster command reference



# Chapter 1      Functions of the WebManager

This chapter describes the functions of the WebManager.

This chapter covers:

• Window of the WebManager .....	24
• Checking the status of each object in the tree view of WebManager .....	32
• Checking the cluster status by the WebManager list view .....	52
• Checking alerts using the WebManager .....	59
• Mirror disk helper .....	63
• Manually setting WebManager to stop and start .....	84
• Changing the settings without using the WebManager .....	85
• Setting usage limitations .....	86
• Operating a cluster by using the WebManager .....	90
• Limitations of the WebManager .....	91
• Error messages on the WebManager .....	92

## Window of the WebManager

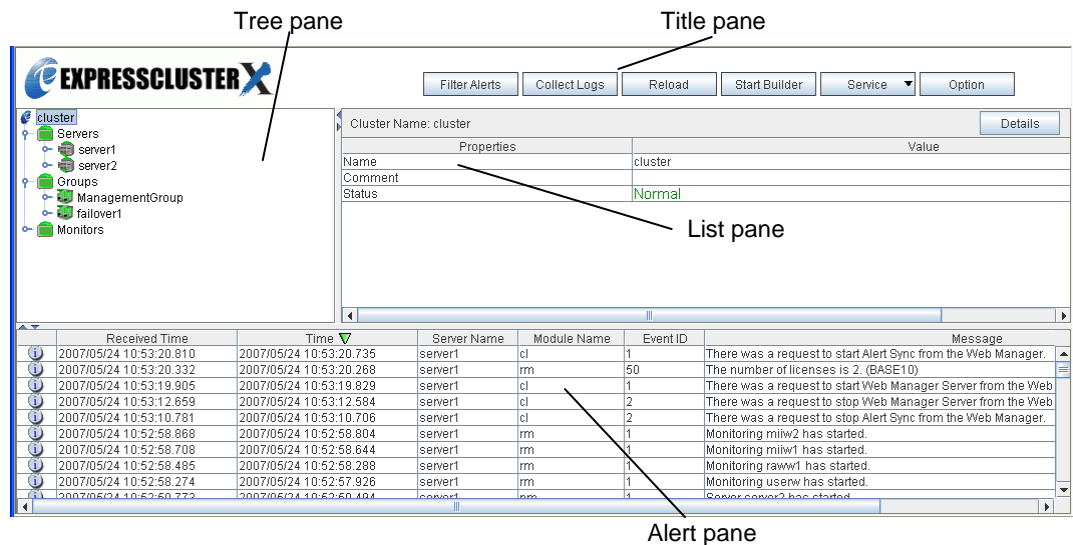
This chapter provides information about the WebManager window.

### Note:

For the language representation on the screen, see “Cluster Info tab” on “Parameter details”.

## Main pane of the WebManager

The WebManager window consists of four panes.



### Title view

Six buttons in this view allow you to:

- ◆ Search for alert logs
- ◆ Display or hide split bars.
- ◆ Collect ExpressCluster operation logs
- ◆ Reload the window.
- ◆ Start the online version Builder
- ◆ Operate services

For more information, see “Title view of the WebManager” on page 25.

### Tree view

Allows you to see a status of each cluster’s resources such as server and group resources. For more information, “Checking the status of each object in the tree view of WebManager” on page 32.

### List view

Provides information on each cluster resource selected in the tree view.

If you click the **Details** button located on the upper right of the view, further information will be displayed in a dialog. For more information, see “Checking the cluster status by the WebManager list view” on page 52.

**Alert view**

Shows messages describing ExpressCluster operating status. For further information, see “Checking alerts using the WebManager” on page 59.

**Title view of the WebManager**

Title view



The buttons in the title view allow you six types of operations.

**Searching for an alert by using the WebManager**

You can search for an alert by using the WebManager. Searching in this method is useful to view only a specific type alert.

**Note:**

For the information on alert logs, see “Checking alerts using the WebManager” on page 59.

1. Start the WebManager.
2. In the title view, click the **Filter Alerts** button to display the window for setting search conditions for an alert.

☒ Display only the specified number of alerts: 50  
☐ Filtering Settings:  
☐ Alert Type: Error ☐ Server Name:   
☐ Module Name:  ☐ Event ID:   
 Filter by Date  
☐ From:         
☐ To:         
 The number of alerts to be displayed per page: 50  
 OK Cancel

**To search only the specified number of past alert logs:**

1. Enter the number of past alert logs to search, and click **OK**.

**Note:**

The maximum value to enter is the number configured in **Max Number to Save Alert Records**. To configure **Max Number to Save Alert Records**, right-click the cluster icon in the Builder and click **Properties** on the shortcut menu. In the properties dialog box click the **Alert Log** tab.

**To search by specifying search conditions:**

1. Click **Select the filter option**.
2. Enter the search conditions in each field and start searching.

**Alert Type:** Select the type of alerts.

**Module Name:** Enter the module type. The values you can enter are as follows.

Module Type	Category
pm	Whole ExpressCluster
rc	Group/resource related
rm	Monitor resource related
nm	Heartbeat resource related
apisv	API related
lanhb	LAN heartbeat resource
lankhb	Kernel mode LAN heartbeat resource
diskhb	DISK heartbeat resource
comhb	COM heartbeat resource
disk	Disk resource
fip	Floating IP resource
vxdg	VxVM disk group resource
vxvol	VxVM volume resource
vip	Virtual IP resource
vipw	VIP monitor resource
userw	User mode monitor resource
md	Mirror disk resource
hd	Hybrid disk resource
mdagent	Mirror agent related
mdadm	Mirror disk related
mdctrl	Mirror disk control command
mdinit	Mirror disk initialization command
hdinit	Hybrid disk initialization command
mdw	Mirror disk monitor resource
hdw	Hybrid disk monitor resource
cl	Cluster control command
cfctrl	Cluster creation, cluster information backup command
cfmgr	Cluster configuration information operation library
logcmd	Message output command

Server Name : Type in the name of a server whose alerts you want to see.

Event ID : Type in an event ID whose alerts you want to see.

Start Time and Stop Time: Specify the **Start Time** and **Stop Time** to narrow down the search condition using the time of the event occurrence.

3. Enter the number of alerts to display on one page in **The number of alerts to be displayed per page:** and click **OK**. Research results are displayed based on the time an alert occurred.



4. If the results of research are displayed on more than one page, move the page by clicking **Back**, **Next**, and **Jump** buttons.

## Changing the screen layout on the WebManager

The screen layout of the WebManager can be changed by clicking the buttons of the split bars or by dragging the bars. This is useful to display only a specific view. Display or hide the split bars by clicking the **Option** button in the title view.

The split bars divide the views in the WebManager.



On the bar, click  to maximize the view. Click  to minimize.

To display or hide the split bars in the WebManager:

1. Start the WebManager.
2. In the title view, click the **Option** button.
3. When using the split bars, select **Display split bar**. When not using split bars, click to clear the check box.
4. Click **OK**.

---

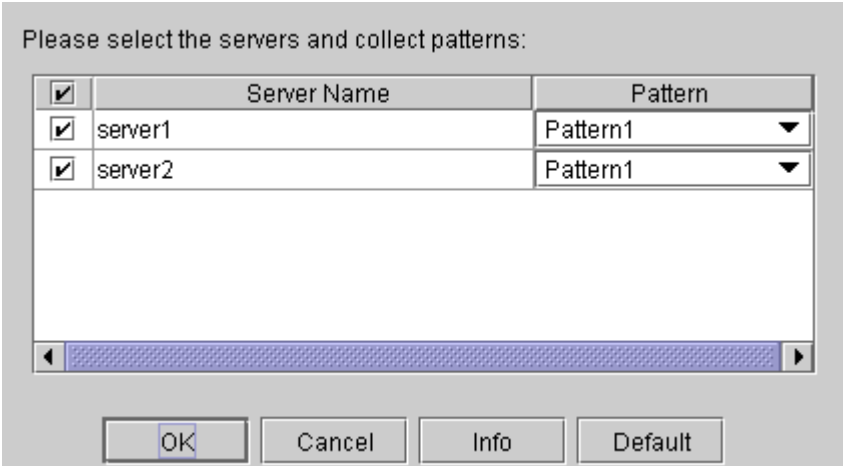
**Note:**

Change the layout by dragging the bars that divide views even if the function of the split bars is turned off.

---

## Collecting logs by using the WebManager

Clicking the **Collect Logs** button opens the log collection dialog box.

The dialog box has a title bar and a main area. The main area contains a table with two columns: 'Server Name' and 'Pattern'. There are two rows of data: 'server1' and 'server2', both with 'Pattern1' selected in the 'Pattern' column. Each row has a check box in the first column, which is checked. Below the table is a large empty text area. At the bottom of the dialog are four buttons: 'OK', 'Cancel', 'Info', and 'Default'.

<input checked="" type="checkbox"/>	Server Name	Pattern
<input checked="" type="checkbox"/>	server1	Pattern1
<input checked="" type="checkbox"/>	server2	Pattern1

**Check box**

Select check boxes of the servers that have the logs you want to collect.

**Pattern**

Select the information to be collected. For information on each pattern, see Chapter 4, “ExpressCluster command reference”.

**Info**

Displays the information on each pattern.

**OK**

Starts log collection and displays the dialog box of log collection progress.

**Cancel**

Closes this dialog box.

**Default**

Resets the selections of servers and collect patterns to default values.

The screenshot shows a dialog box with a table displaying log collection progress for two servers. The table has five columns: Server Name, Connected Address, Status, Progress, and Result. Below the table is a large empty rectangular area, and at the bottom are three buttons: Update, Abort, and Close.

Server Name	Connected Address	Status	Progress	Result
server1	192.168.0.1	Transmitting	71 %	Normal
server2	192.168.0.2	Transmitting	83 %	Normal

Update Abort Close

**Update**

Updates the dialog box of the log collection progress.

**Abort**

Aborts the log collection.

**Close**

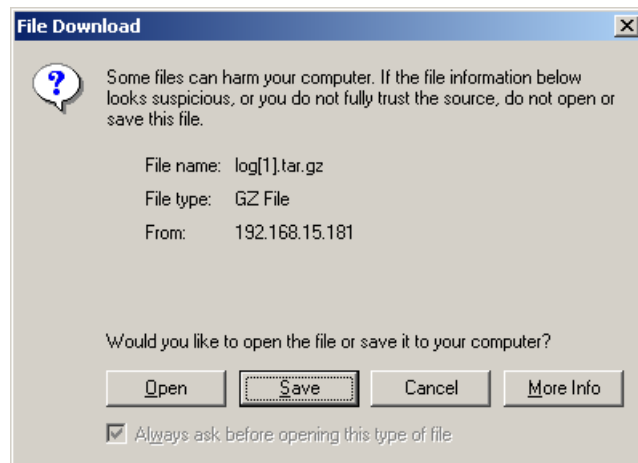
Closes the dialog box of the log collection progress. Log collection is continued.

At this time, the display of the **Collect Logs** button has changed to the **Progress** button. Click the **Progress** button to display the progress of log collection again.

**Collect Logs Results**

Result	Description
Normal	Log collection succeeded.
Abort	Log collection was cancelled by user.
Invalid Parameters	Internal error may have occurred.
Communication Error	Connecting error occurred.
Timeout	Time-out occurred.
Busy	Server is busy.
Compression Error	Error occurred when compressing a file.
File I/O Error	File I/O failed.
Not Enough Free Space	There is not enough available space on the disk.
Unknown Error	File does not exist.

When the log collection completes, the browser displays a dialog box that asks where you want to save the logs. Download the logs to any location.

**Note:**

Logs may not be downloaded properly if nothing is changed for more than 10 minutes.

When you collect logs, the following message may be displayed in the server console.

```
hda: bad special flag: 0x03
ip_tables: (C) 2000-2002 Netfilter core team
```

This will not affect log collection. Ignore this message.

**Note:**

If other modal dialog is displayed while collecting logs, the file saving dialog for the log collection will not be displayed. To display the file saving dialog, close the modal dialog.

## Updating the WebManager information

Update the information displayed in the WebManager by clicking the **Reload** button in the title view in the upper part of the WebManager.

---

**Note:**

When **RealTime** is set for the client data update method, what is displayed for the WebManager is updated automatically

When **Polling** is set for the client data update method, what is displayed for the WebManager is generally updated automatically, however, it does not always display the latest status because of the refresh interval configuration. To display the latest information, click the **Reload** button after performing an operation.

To configure the client data update method, from the shortcut menu, select **Properties**. In the properties dialog box, click the **WebManager** tab. Select the **Client Data Update Method** on **Tuning**.

To configure the automatic reload interval of the WebManager, from the shortcut menu, select **Properties**. In the properties dialog box, click the **WebManager** tab. Configure the **Reload Interval**.

Some objects may be displayed in gray when communications to the connecting destination is disabled or ExpressCluster is not working at the access destination.

---

## Operating a cluster and cluster services on the WebManager

Operate cluster services on the WebManager by clicking the **Service** button in the title view in the upper part of the WebManager.

When you click this button, **Suspend Cluster**, **Resume Cluster**, **Start Cluster**, **Stop Cluster**, **Restart Manager**, **Start Mirror Agent**, **Stop Mirror Agent** are displayed. Clicking these items perform the following operations.

- ◆ **Suspend Cluster**  
Suspends a cluster. This menu can be selected only when all the servers in a cluster are running.
- ◆ **Resume Cluster**  
Resumes a cluster. This menu can be selected only when all the servers in a cluster are suspended.
- ◆ **Start Cluster**  
Starts a cluster. This menu can be selected only when a cluster is stopped.
- ◆ **Stop Cluster**  
Stops a cluster. This menu can be selected only when a cluster is running.
- ◆ **Restart Manager**  
Restarts a manager.
- ◆ **Start Mirror Agent**  
Starts a mirror agent. This menu can be selected when the cluster is stopped regardless of the mirror agent status.
- ◆ **Stop Mirror Agent**  
Stops a mirror agent. This menu can be selected when the cluster is stopped regardless of the mirror agent status.

## Checking the status of each object in the tree view of WebManager

View the status of objects that configure the cluster on the WebManager.

1. Start the WebManager.
2. On the left pane of the window, a tree is displayed. Check the status by icon and object color.

---
























**Note:**

























The configurations of the tree depend on the versions and option products of ExpressCluster.
























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## The colors of the icons displayed in the WebManager tree view

























The following table shows icons and their meanings:



























No.	Icon		Status	Description
(1)	Cluster		-	The icon does not change.
(2)	All servers		Normal	All servers have been started.
			Warning	One or more servers in the cluster are not working.
			-	-
			Unknown	No information is acquired.
(3)	Individual server		Online	The server is running normally.
			Warning	One or more servers in the cluster cannot be accessed.
			Offline or Unknown	The server is not working, or no information is acquired.
(4)	LAN heartbeat resource		Normal	The resource can communicate with all servers.
			Warning	One or more servers in the cluster cannot be accessed.
			Error	The resource is not working normally.
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.
(5)	Kernel-mode LAN heartbeat resource		Normal	The resource can communicate with all servers.
			Warning	One or more servers in the cluster cannot be accessed.
			Error	The resource is not working normally.
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.
(6)	Disk heartbeat resource		Normal	The resource can communicate with all servers.
			Warning	One or more servers in the cluster cannot be accessed.
			Error	The resource is not working normally.
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.

(7)	COM heartbeat resource		Normal	The resource can communicate with all servers.
			Warning	One or more servers in the cluster cannot be accessed.
			Error	The resource is not working normally.
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.
(8)	PING network partition resolution resource		Normal	A response to ping command is sent from a ping target.
			Warning	-
			Error	A response to ping command is not sent from a ping target.
			Unknown	No information is acquired.
			Not Used	The ping network partition resolution resource is not registered.
(9)	All groups		Normal	All groups are running normally.
			Warning	One or more groups are not running normally.
			Error	No groups are working normally.
			Unknown	No information is acquired.
(10)	Individual group		Online	The group has been started.
			Error	The group has an error.
			Offline or Unknown	The group is stopped, or no information is acquired.
(11)	Disk resource		Online	The disk resource has been started.
			Error	The disk resource has an error.
			Offline or Unknown	The disk resource is stopped, or no information is acquired.
(12)	EXEC resource		Online	The Exec resource has been started.
			Error	The Exec resource has an error.
			Offline or Unknown	The Exec resource is stopped, or no information is acquired.
(13)	Floating IP resource		Online	The floating IP resource has been started.
			Error	The floating IP resource has an error.
			Offline or Unknown	The floating IP resource is stopped/ no information is acquired.


























(14)	Mirror disk resource		Online	The mirror disk resource has been started.
			Error	The mirror disk resource has an error.
			Offline or Unknown	The mirror disk resource is stopped, or no information is acquired.
(15)	Hybrid disk resource		Online	The hybrid disk resource has been started.
			Error	The hybrid disk resource has an error.
			Offline or Unknown	The hybrid disk resource is stopped, or no information is acquired.
(16)	NAS resource		Online	The NAS resource has been started.
			Error	The NAS resource has an error.
			Offline or Unknown	The NAS resource is stopped, or no information is acquired.
(17)	Raw resource		Online	The raw resource has been started.
			Error	The raw resource has an error.
			Offline or Unknown	The raw resource is stopped, or no information is acquired.
(18)	VxVM disk group resource		Online	The VxVM disk group resource has been started.
			Error	The VxVM disk group resource has an error.
			Offline or Unknown	The VxVM disk group resource is stopped, or no information is acquired.
(19)	VxVM volume resource		Online	The VxVM volume resource has been started.
			Error	The VxVM volume resource has an error.
			Offline or Unknown	The VxVM volume resource is stopped, or no information is acquired.
(20)	Virtual IP resource		Online	The virtual IP resource has been started.
			Error	The virtual IP resource has an error.
			Offline or Unknown	The virtual IP resource is stopped, or no information is acquired.
(21)	All monitor resources		Normal	All monitor resources are running normally.
			Warning	One or more monitor resources have an error, or monitoring is suspended on a












				server.
			Error	All monitor resources have errors.
			Unknown	No information is acquired.
(22)	Disk monitor resource		Normal	The disk is running normally.
			Warning	There are one or more servers with disk problems, or monitoring is suspended on a server.
			Error	All servers have disk errors.
			Unknown	No information is acquired.
(23)	IP monitor resource		Normal	The IP address of a target has no error.
			Warning	One or more servers cannot communicate with the IP address of the target, or monitoring is suspended on a server.
			Error	No servers can communicate with the IP address of the target.
			Unknown	No information is acquired.
(24)	NIC Link Up/Down monitor resource		Normal	The NIC of a target has no error.
			Warning	One of servers has a problem with the NIC of the target, or monitoring is suspended on a server.
			Error	All servers have errors with the NIC of the target.
			Unknown	No information is acquired.
(25)	Mirror disk connect monitor resource		Normal	The mirror disk connect is running normally.
			Warning	One of the servers has mirror disk connect problems, or monitoring is suspended on a server.
			Error	A mirror disk connect error has occurred on both servers.
			Unknown	No information is acquired.
(26)	Mirror disk monitor resource		Normal	The mirror disk is running normally.
			Warning	Mirroring is now being recovered, or monitoring is suspended on a server.
			Error	The mirror disk has an error. Mirror recovery is needed.
			Unknown	No information is acquired.
(27)	Hybrid disk		Normal	Hybrid disk connect is running normally.

	connect monitor resource		Warning	One of the servers has hybrid disk connect problems, or monitoring is suspended on a server.
			Error	Hybrid disk connect error has occurred on both servers.
			Unknown	No information is acquired.
(28)	Hybrid disk monitor resource		Normal	Hybrid disk is running normally.
			Warning	Mirroring for hybrid disk is now being recovered, or monitoring is suspended on a server.
			Error	Hybrid disk is not working normally. Mirror recovery must be performed.
			Unknown	No information is acquired.
(29)	PID monitor resource		Normal	AP is running normally.
			Warning	There are one or more servers on which monitoring is suspended.
			Error	AP is not working normally.
			Unknown	No information is acquired.
(30)	Raw monitor resource		Normal	There is no error on disk
			Warning	One of the servers has a disk error, or monitoring is suspended on a server.
			Error	Disk is not working in all servers.
			Unknown	No information is acquired.
(31)	User mode monitor resource		Normal	User space is normally monitored.
			Warning	User space is not working on one or more servers, or monitoring is suspended on a server.
			Error	User space is not working on all servers.
			Unknown	No information is acquired.
(32)	VxVM daemon monitor resource		Normal	The VxVM daemon monitor resource is running normally.
			Warning	The VxVM daemon is not working in one or more servers, or monitoring is suspended on a server.
			Error	The VxVM daemon is not operating on all servers.
			Unknown	No information is acquired.
(33)	VxVM volume		Normal	The VxVM volume monitor resource is running normally.

	monitor resource		Warning	Monitoring is suspended on a server.
			Error	The VxVM volume has an error.
			Unknown	No information is acquired.
(34)	Multi target monitor resource		Normal	Multi target monitor resource is running normally.
			Warning	Monitoring is suspended on a server, or one or more monitor resources registered in the multi target monitor resource have errors.
			Error	Multi target has an error.
			Unknown	No information is acquired.
(35)	Virtual IP monitor resource		Normal	Virtual IP monitor resource is running normally.
			Warning	-
			Error	Virtual IP monitor resource has an error.
			Unknown	No information is acquired.
(36)	ARP monitor resource		Normal	ARP monitor resource is running normally.
			Warning	-
			Error	ARP monitor resource has an error.
			Unknown	No information is acquired.
(37)	Custom monitor resource		Normal	Custom monitor resource is running normally.
			Warning	-
			Error	Custom monitor resource has an error.
			Unknown	No information is acquired.
(38)	Oracle monitor resource		Normal	Oracle is running normally.
			Warning	Oracle monitor resource is suspended.
			Error	Oracle has an error.
			Unknown	No information is acquired.
(39)	DB2 monitor resource		Normal	DB2 is running normally.
			Warning	DB2 monitor resource is suspended.
			Error	DB2 has an error.

			Unknown	No information is acquired.
(40)	PostgreSQL monitor resource		Normal	PostgreSQL is running normally.
			Warning	PostgreSQL monitor resource is suspended.
			Error	PostgreSQL has an error.
			Unknown	No information is acquired.
(41)	MySQL monitor resource		Normal	MySQL is running normally.
			Warning	MySQL monitor resource is suspended.
			Error	MySQL has an error.
			Unknown	No information is acquired.
(42)	Sybase monitor resource		Normal	Sybase is running normally.
			Warning	Sybase monitor resource is suspended.
			Error	Sybase has an error.
			Unknown	No information is acquired.
(43)	Samba monitor resource		Normal	Samba is running normally.
			Warning	The Samba is not working in one or more servers, or monitoring is suspended on a server.
			Error	Samba has an error.
			Unknown	No information is acquired.
(44)	NFS monitor resource		Normal	NFS is running normally.
			Warning	The NFS is not working in one or more servers, or monitoring is suspended on a server.
			Error	NFS has an error.
			Unknown	No information is acquired.
(45)	HTTP monitor resource		Normal	HTTP is running normally.
			Warning	The PostgreSQL is not working in one or more servers, or monitoring is suspended on a server.
			Error	HTTP has an error.
			Unknown	No information is acquired.

(46)	FTP monitor resource		Normal	FTP is running normally.
			Warning	FTP is not working in one or more servers, or monitoring is suspended on a server.
			Error	FTP has an error.
			Unknown	No information is acquired.
(47)	SMTP monitor resource		Normal	SMTP is running normally.
			Warning	The SMTP is not working in one or more servers, or monitoring is suspended on a server.
			Error	SMTP has an error.
			Unknown	No information is acquired.
(48)	POP3 monitor resource		Normal	POP3 is running normally.
			Warning	POP3 is not working in one or more servers, or monitoring is suspended on a server.
			Error	POP3 has an error.
			Unknown	No information is acquired.
(49)	IMAP4 monitor resource		Normal	IMAP4 is running normally.
			Warning	IMAP4 is not working in one or more servers, or monitoring is suspended on a server.
			Error	IMAP4 has an error.
			Unknown	No information is acquired.
(50)	Tuxedo monitor resource		Normal	Tuxedo is running normally.
			Warning	Tuxedo monitor resource is suspended.
			Error	Tuxedo has an error.
			Unknown	No information is acquired.
(51)	WebSphere monitor resource		Normal	WebSphere is running normally.
			Warning	WebSphere monitor resource is suspended.
			Error	WebSphere has an error.
			Unknown	No information is acquired.
(52)	WebLogic		Normal	WebLogic is running normally.

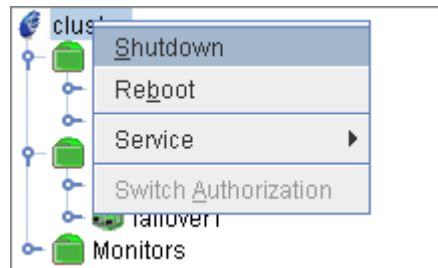
	monitor resource		Warning	WebLogic monitor resource is suspended.
			Error	WebLogic has an error.
			Unknown	No information is acquired.
(53)	WebOTX monitor resource		Normal	WebOTX is running normally.
			Warning	WebOTX monitor resource is suspended.
			Error	WebOTX has an error.
			Unknown	No information is acquired.
(54)	OracleAS monitor resource		Normal	OracleAS is running normally.
			Warning	OracleAS monitor resource is suspended.
			Error	OracleAS has an error.
			Unknown	No information is acquired.

## Operations from the WebManager

You can operate a cluster by right-clicking (1) Cluster, (3) Individual server or (10) Individual group and choosing an operation.

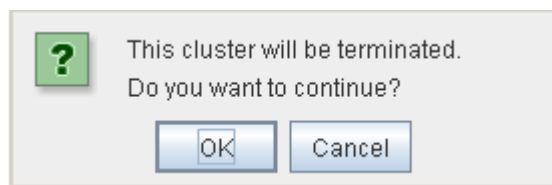
### Objects of the cluster

When you right-click the **cluster** object, the following shortcut menu is displayed.



- ◆ Shut down

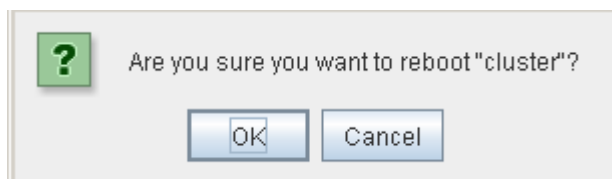
Shuts down all running servers. When you select **Shutdown**, the following dialog box is displayed for confirmation.



Note that servers that cannot be accessed from the server to which the WebManager is connected (for example, servers that all LAN heartbeat resources are stopped) will not be shut down.

- ◆ Reboot

Reboots all running servers. When you select **Reboot**, the following dialog box is displayed for confirmation.



- ◆ Service

Clicking **Service** displays **Suspend Cluster**, **Resume Cluster**, **Start Cluster**, **Stop Cluster**, **Start Mirror Agent** and **Stop Mirror Agent**.

- ◆ Switch Authorization

Change the authorization of the WebManager. For this operation, see “Switch authorization of the WebManager” on page 88.

## Servers object

When you right-click the **servers** object, the following shortcut menu is displayed.



### ◆ Mirror Disks

If you select this menu, the following dialog box that all the mirror disk resources and hybrid disk resources are listed is displayed.

NMP Name	Synchronization Mode	Synchronization Data	Difference Copy	server1	server2
md1	Synchronous	On	--	Normal(Active)	Normal

Update Details Close

### • Details

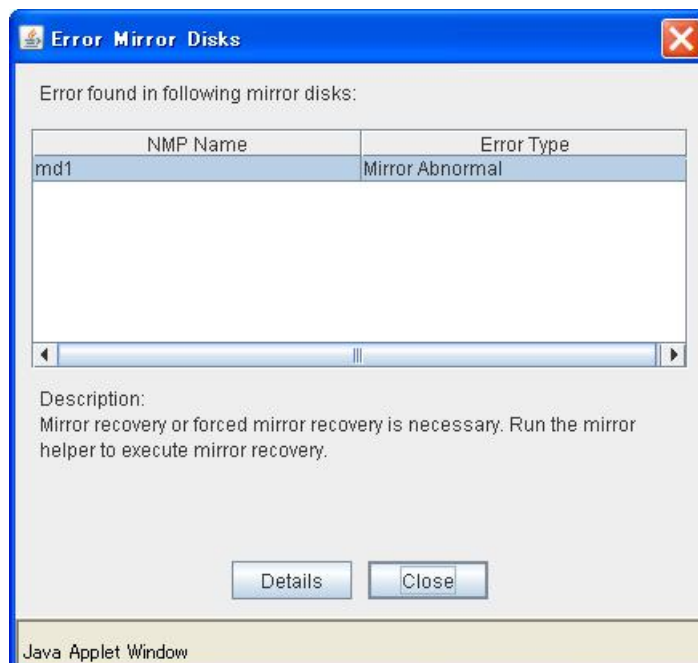
Starts the **Mirror Disk Helper** dialog box for the selected mirror disk resource or hybrid disk resource.



For information on using the Mirror Disk Helper, see “Mirror disk helper.”

◆ Error Mirror Disks

Lists mirror disk resources and hybrid disk resources with an error in a dialog box.



If there is any mirror disk or hybrid disk with an error listed below in the cluster, the above dialog box will be displayed.

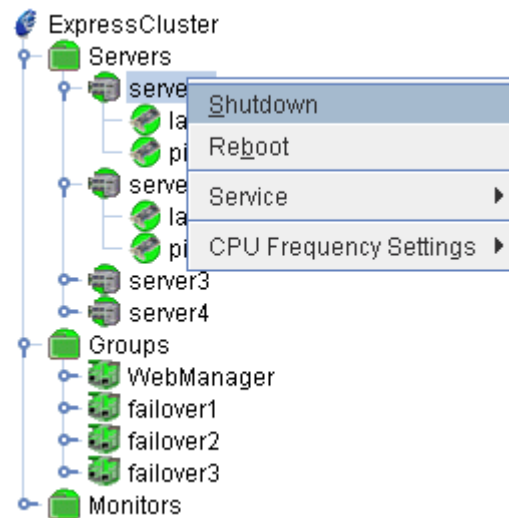
The description provides what you should do to correct an error on the mirror disk or hybrid disk.

Error type	Description
Mirror Error	Mirror recovery or forced mirror recovery is necessary. Run the Mirror Helper and perform mirror recovery.
Mirror Error (Single Server Run)	Only one server is running, and the latest data of a mirror disk/hybrid disk is not completed. To continue the operation, run the Mirror Helper and execute mirror recovery. Be careful since the server that is currently running will be the latest data when the mirror recovery is executed.

When you select **Details**, the Mirror Disk Helper is activated.

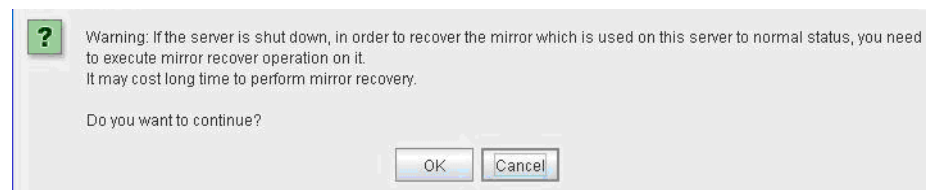
### Individual server objects

When you right-click an individual server object, the following shortcut menu is displayed.



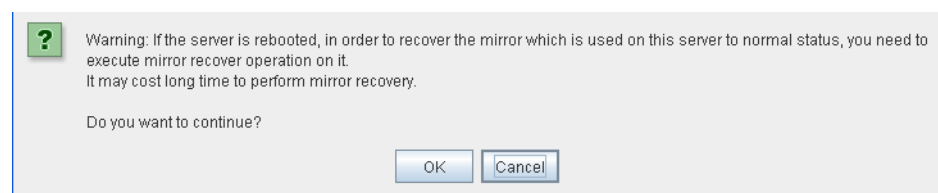
#### ◆ Shut down

Shuts down the selected server. When you select this operation, the following dialog box is displayed for confirmation.



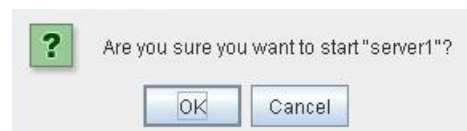
#### ◆ Reboot

Reboots the selected server. When you select this operation, the following dialog box is displayed for confirmation.

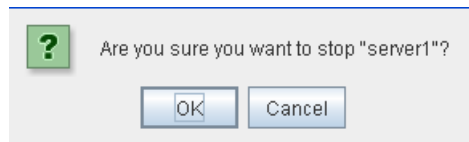


#### ◆ Service

When you click **Start** on **Service**, the selected server is started. When you select this operation, the following dialog box is displayed for confirmation.



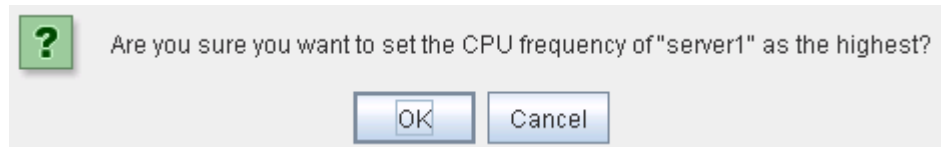
When you click **Stop** on **Service**, the selected server is stopped. When you select this operation, the following dialog box is displayed for confirmation.



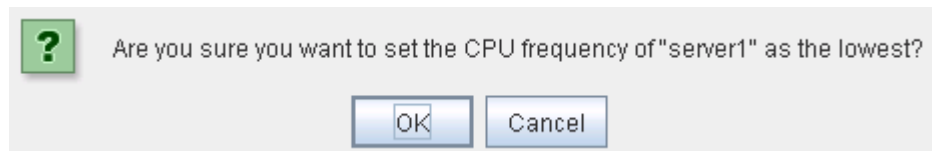
### ◆ CPU Frequency Settings

Configures the CPU frequency control function of the selected server.

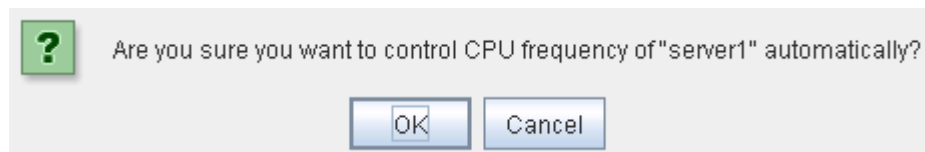
- Highest Frequency  
Sets the CPU frequency to high.



- Low Frequency  
Lowers the frequency to turn it to power-saving mode.



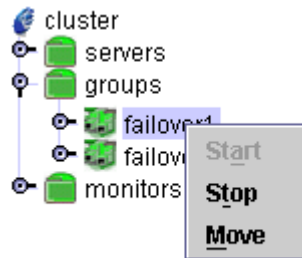
- Auto  
Restores the CPU frequency control to the control by ExpressCluster.



This function cannot be used when the checkbox of "Use CPU Frequency Control" is not selected in the power saving settings in cluster properties.

### Individual group objects

When you right-click an individual group object, the following shortcut menu is displayed.



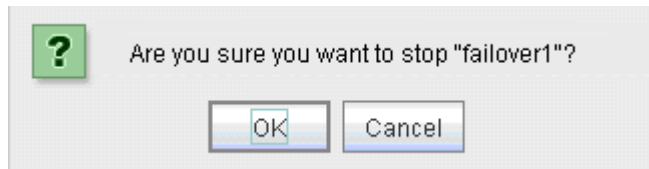
- ◆ Start (enabled only when the group is stopped)

Starts up the selected group. The dialog box for choosing a server that starts up the selected group is displayed.



- ◆ Stop (enabled only when the group has been started up or when it has an error)

Stops the selected group. When you select this operation, the following dialog box is displayed for confirmation.



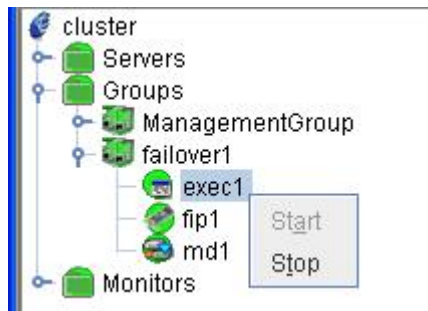
- ◆ Move (enabled only when the group has been started up)

Moves the selected group. The dialog box for choosing a server to which you want to move the selected group is displayed.



**Individual group resource objects (except mirror disk resources and hybrid disk resources)**

When you right-click an individual group resource object, the following shortcut menu is displayed.



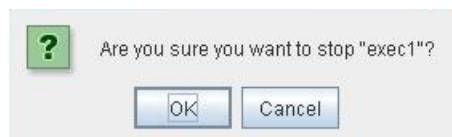
- ◆ Start (enabled only when the group is stopped)

Starts up the selected group resource. When you select this operation, the following dialog box for confirmation is displayed.



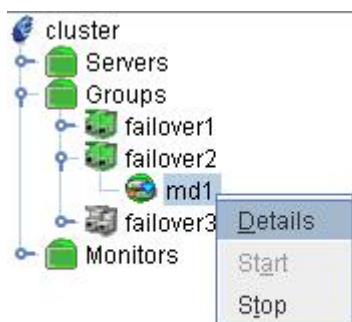
- ◆ Stop (enabled only when the group is running or it has an error)

Stops the selected group. When you select this operation, the following dialog box for confirmation is displayed.



### Mirror disk resource object and hybrid disk resource object

When you right-click a mirror disk resource object, the following shortcut menu is displayed.



#### ◆ Details

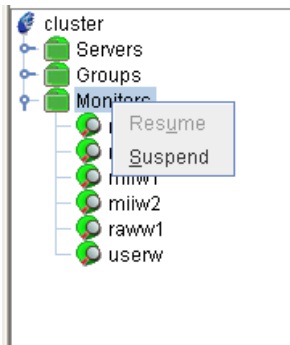
Starts up the Mirror Disk Helper for the selected mirror disk resource or hybrid disk resource, and the following dialog box for the Mirror Disk Helper is displayed.



For information on using the Mirror Disk Helper, see “Mirror disk helper.”

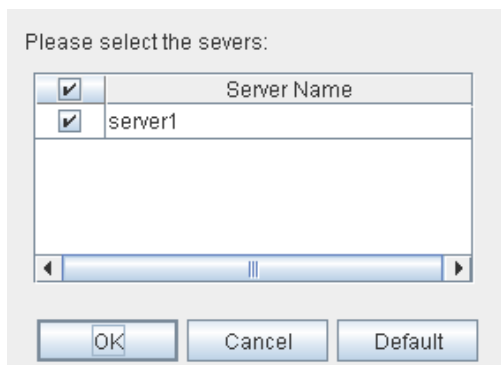
### Monitors object

When you right-click the **Monitors** object, the following shortcut menu is displayed.



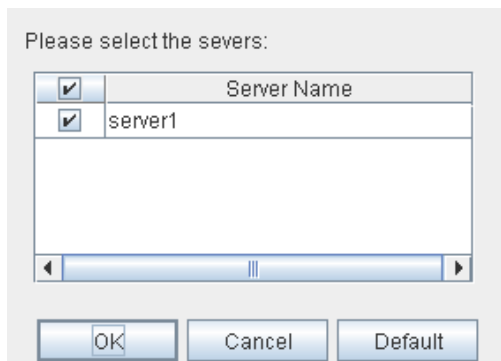
- ◆ Resume (enabled only when the monitor is suspended)

Resumes all the monitor resources that are configured. This operation is not performed on the monitor resources where suspending/resuming the monitoring is not possible. The following dialog box for selecting the server where monitor resources are resumed is displayed.



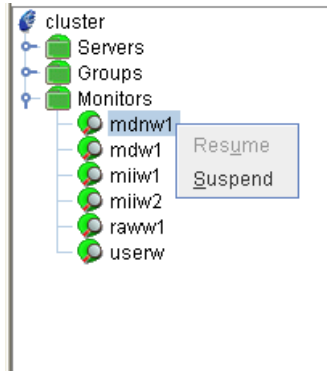
- ◆ Suspend (enabled only when the monitor is running)

Suspends all the monitor resources that are configured. This operation is not performed on the monitor resources where suspending/resuming the monitoring is not possible. The following dialog box for selecting the server where monitor resources are suspended is displayed.



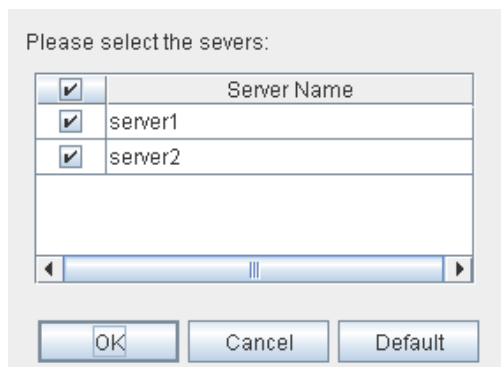
### Individual monitor resource objects

When you right-click an individual monitor resource object, the following shortcut menu is displayed.



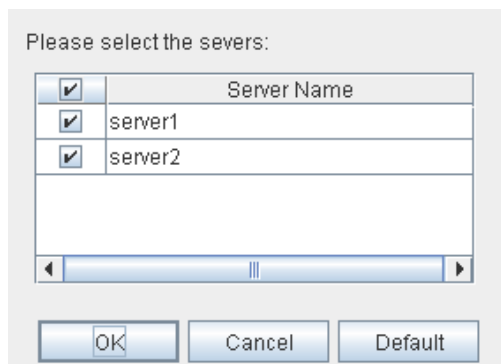
- ◆ Resume (enabled only when the monitor is suspended)

Resumes a selected monitor resource. This operation is not performed on the monitor resources where suspending/resuming the monitoring is not possible. The following dialog box for selecting the server where a selected monitor resource is resumed is displayed.



- ◆ Suspend (enabled only when the monitor is running)

Suspends a selected monitor resource. This operation is not performed on the monitor resources where suspending/resuming the monitoring is not possible. The following dialog box for selecting the server where a selected monitor resource is suspended is displayed.



## Checking the cluster status by the WebManager list view

The detailed information on the selected object in the tree view of WebManager can be displayed.

### To display information on the whole cluster

1. Start the WebManager.
2. In this tree view, click the object icon  for the cluster. In the list view in the right pane of the window, **Name** and **Comment** are displayed.
3. In the following dialog box, click the **Details** button to display the following information.

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Server Sync Wait Time (sec)			300			
Heartbeat Timeout (msec)			90000			
Heartbeat Interval (msec)			3000			
Server Internal Timeout (sec)			180			
Timeout Ratio			1			

Server Sync Wait Time (sec): Time to wait for the other servers to start up (in seconds)

Heartbeat Timeout (msec): Heartbeat time-out (in milliseconds)

Heartbeat Interval (msec): The interval for sending heartbeats (in milliseconds)

Server Internal Timeout (sec): Internal communication time-out (in seconds)

Timeout Ratio: Current time-out ratio

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Server Internal Port Number			29001			
Data Transfer Port Number			29002			
Heartbeat Port Number			29002			
Kernel Mode Heartbeat Port Number			29006			
WebManager HTTP Port Number			29003			
Alert Sync Port Number			29003			

Server Internal Port Number: Port number for internal communication

Data Transfer Port Number: Port number for data transfer

Heartbeat Port Number: Port number for heartbeat

Kernel Mode Heartbeat Port Number: Port number for kernel-mode heartbeat

WebManager HTTP Port Number: Port number for WebManager

Alert Sync Port Number: Port number for alert synchronization

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Communication Method for Internal Logs			UNIX Domain			
Port Number			0			

Communication method for Internal Logs:

Communication method used for logs

Port Number:

Port number used for logs

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Shutdown Monitor			On			
Shutdown Monitoring Method			softdog			
Action			RESET			
Enable SIGTERM Handler			On			
Use HB Timeout			On			
Timeout (sec)			90			

Shutdown Monitor:

Whether or not to monitor shutdown

Shutdown Monitoring Method:

Method for monitoring shutdown

Action:

Operation at time-out

Enable SIGTERM Handler:

Whether or not to enable SIGTERM

Use HB Timeout:

Whether or not to use HB time-out

Timeout (sec):

Timeout (in seconds)

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Heartbeat Delay Warning			80			
Monitor Delay Warning			80			

Heartbeat Delay Warning:

Heartbeat delay warning (%)

Monitor Delay Warning:

Monitor delay warning (%)

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
E-mail Address						
Use Network Warning Light			Off			
Use Alert Extension			Off			
Use Chassis Identify			Off			
Enable Alert Setting			Off			

E-mail Address:

Destination e-mail address for sending alerts

Use Network Warning Light:

Whether or not to use a network warning light

Use Alert Extension:

Whether or not to use an alert extension function

Use Chassies Identify

Whether or not to use a chassis identify function

Enable Alert Setting

Whether or not to use the alert setting

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Mount,Umount Exclusion			On			

Mount, Umount Exclusion:

Whether or not to exclude mount or unmount command

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties			Value			
Server Down Notification			On			

Server Down Notification

Server down notification

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties				Value		
Max Reboot Count				0		
Max Reboot Count Reset Time (min)				0		
Use Forced Stop				Off		
Forced Stop Action				BMC Reset		
Forced Stop Timeout (sec)				3		

**Max Reboot Count:** Maximum reboot count

**Max Reboot Count Reset Time (min):**

Maximum reboot count reset time (in minutes)

**Use forced stop**

Whether or not to use a forced stop function

**Max Reboot Count:**

Maximum reboot count

**Forced stop timeout**

Wait time till the activation of failover group is started after a forced stop function is performed (in seconds)

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties				Value		
Use CPU Frequency Control				On		

**Use CPU Frequency Control**

Whether or not to use CPU frequency control

### When Replicator and/or Replicator DR are used:

Only the information which is different from that of ExpressCluster X (above) is described below.

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties				Value		
Mirror Agent Port Number				29004		

**Mirror Agent Port Number:** Port number used by a mirror agent


Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties				Value		
Auto Mirror Recovery				On		
Receive Timeout (sec)				10		
Send Timeout (sec)				120		
Recovery Data Size (kbyte)				4096		
Recovery Retry Count				0		
Start Wait Time (sec)				10		
Cluster Partition I/O Timeout (sec)				30		

**Auto Mirror Recovery:** Whether or not to perform auto mirror recovery  
**Receive Timeout (sec):** Receive time-out (in seconds)  
**Send Timeout (sec):** Send time-out (in seconds)  
**Recovery Data Size (kbyte):** Recovery data size (in kilobytes)  
**Recovery Retry Count:** Recovery retry count  
**Start Wait Time (sec)** Wait time for sstarts of servers in a server group. (sec)  
**Cluster Partition I/O Timeout (sec)** I/O timeout (sec) of the cluster partition

Mirror Agent	Mirror Driver	Exclusion	Heartbeat I/F	Recovery	Power Saving	
Timeout	Port No.	Port No.(Log)	Port No.(Mirror)	Monitor	Delay Warning	Alert Service
Properties				Value		
Request Queue Maximum Number				2048		
Bitmap Update Interval (sec)				100		


**Request Queue Maximum Number:** Maximum number of request queues  
**Bitmap Update Interval (sec):** Interval for updating bitmap (in seconds)

## Checking the whole status of the server in the WebManager list view

1. Start the WebManager.
2. In the list view, select the object icon . In the right pane of the window, **Server Name**, **Type**, and **Status**.

## Checking the status of individual server in the WebManager list view

1. Start the WebManager.

In the tree view, select the object of an individual server . The **Server Name**, **Comment**, **Product**, **Version**, **Edition**, **Platform**, **IP address**, **Status** of the server, the **Heartbeat Name** and **Status** of heartbeat status and the **Network Partition Resolution Name** and **Status** of network partition resolution are displayed.

Server Name: server1		Details
Properties		Value
Name	server1	
Comment		
Product	EXPRESSCLUSTER X 2.0 for Linux	
Version	2.0.0-1	
Edition	X	
Platform	Red Hat Enterprise Linux AS release 4 (Nahant Update 4)	
IP Address	10.0.0.1	
Status	Online	
Heartbeat Status		
Heartbeat Name		Status
lanhb1	Normal	
Network Partition Resolution Status		
Network Partition Resolution Name		Status
pingnp1	Normal	

Name:	Server name
Comment:	Comment for the server
Product:	Product name
Version:	Version (identical to the RPM version value)
Edition:	Edition
Platform:	Platform
IP Address:	IP address of public LAN address
Status:	Status of the server
Heartbeat Name:	Heartbeat resource name
Status:	Heartbeat resource status

When you click the **Details** button, the following information is displayed.

Properties	Value
Mirror Disk Connect IP Address mdc[1]	192.168.0.1
Network Warning Light IP Address	
Disk I/O Lockout Device	
BMC IP Address	

Mirror Disk Connect IP Address mdc[1] <sup>1</sup>	IP address of mirror disk connect
Network Warning Light IP Address	IP address of network warning light
Disk I/O Lockout Device	Name of disk device which locks disk IO
BMC IP Address	IP address of BMC
CPU Frequency Status	Current setting status of CPU frequency control

---

<sup>1</sup> The number in brackets represents the mirror disk connect I/F number.  
 Section I Detailed reference of ExpressCluster functions

## Checking the status of the whole monitor in the WebManager list view

1. Start the WebManager.
2. In the tree view, select the object icon . The **Monitor Name** and **Status** are displayed in the list view.

## Checking alerts using the WebManager

You can view alerts in the bottom part of the WebManager.

Each field of the alert view is configured as follows.

	Receive Time	Time ▼	Server Name	Module Name	Event ID	Message
	2005/09/14 11:11:08.123	2005/09/14 11:11:06.367	server1	rm	26	Status of mdw1 changed normally.
	2005/09/14 11:11:03.197	2005/09/14 11:11:02.962	server1	rm	26	Status of mdw1 changed normally.
	2005/09/14 11:11:04.327	2005/09/14 11:11:01.857	server1	rm	26	Status of mdw2 changed normally.
	2005/09/14 11:10:59.204	2005/09/14 11:10:58.917	server1	nm	3	Resource lankb2 of server server2 up.
	2005/09/14 11:11:01.680	2005/09/14 11:10:58.917	server1	nm	3	Resource comhb1 of server server2 up.
	2005/09/14 11:11:01.607	2005/09/14 11:10:58.917	server1	nm	3	Resource lankb1 of server server2 up.
	2005/09/14 11:10:59.844	2005/09/14 11:10:57.460	server1	mdadmn	6	Building of switch mirror disk has finished successfully.(Device: md2)
	2005/09/14 11:10:59.394	2005/09/14 11:10:56.902	server1	nm	3	Resource lankb2 of server server2 up.
	2005/09/14 11:10:57.139	2005/09/14 11:10:56.902	server1	nm	1	Server server2 up.
	2005/09/14 11:10:57.283	2005/09/14 11:10:56.902	server1	nm	3	Resource lankb1 of server server2 up.
	2005/09/14 11:10:57.024	2005/09/14 11:10:56.807	server1	mdadmn	6	Building of switch mirror disk has finished successfully.(Device: md1)
	2005/09/14 11:10:52.258	2005/09/14 11:10:53.485	server1	mdw	7	Recovery mode is FAST mode.(Device: md1)
	2005/09/14 11:10:53.007	2005/09/14 11:10:51.593	server1	mdw	7	Recovery mode is FAST mode.(Device: md2)
	2005/09/14 11:10:51.713	2005/09/14 11:10:51.577	server1	mdw	17	Recovery started.(Device: md2)
	2005/09/14 11:10:51.130	2005/09/14 11:10:50.838	server1	mdw	17	Recovery started.(Device: md1)
	2005/09/14 11:09:57.655	2005/09/14 11:09:57.317	server1	rm	1	Monitor pidw2 start.

For meanings of alert messages, see Chapter 12, “Error messages.” For information about searching alert messages, see “Searching for an alert by using the WebManager” in this chapter.

### Alert view fields

The meaning of each of the fields in the alert view of the WebManager are the following.

- (1) Alert type icon

Alert type	Description
	Informational message
	Warning message
	Error message

- (2) Alert received time

The time the alert was received. The time in the server to which the WebManager connects is applied.

- (3) Alert sent time

The time the alert was sent from a server. The time in the alert sender server is used.

- (4) Alert sender server

The name of a server that sent the alert.

- (5) Alert sender module

The type of a module that sent the alert.

Module type	Category
pm	ExpressCluster in general
rc	Group/resource related
rm	Monitor resource related
nm	Heartbeat resource related
apisv	API related
lanhb	LAN heartbeat resource
lankhb	Kernel mode LAN heartbeat resource
diskhb	Disk heartbeat resource
comhb	COM heartbeat resource
disk	Disk resource
fip	Floating IP resource
vxdg	VxVM disk group resource
vxvol	VxVM volume resource
vip	Virtual IP resource
vipw	Virtual IP monitor resource
userw	User mode monitor resource
md	Mirror disk resource
hd	Hybrid disk resource
mdagent	Mirror agent related
mdadm	Mirror disk related
mdctrl	Mirror disk control command
mdinit	Mirror disk initialization command
hdinit	Hybrid disk initialization command
mdw	Mirror disk monitor resource
cl	Cluster start, stop command
cfmgr	Cluster configuration data operation library
logcmd	Message output command

(6) Event ID

The event ID number set to each alert.

(7) Alert message

The alert messages.

## Alert view operation

By clicking an item on the bar showing name of each field, you can change the alert order.

	Receive Time ▲	Time	Server Name	Module Name	Event ID	Message
--	----------------	------	-------------	-------------	----------	---------

Whenever you select an item, the ▲ or ▼ mark is displayed in each field.

Mark	Purpose
▲	Sorts alerts in the ascending order of the selected field.
▼	Sorts alerts in the descending order of the selected field.

By default, alerts are displayed in the **Time** descending order.

When you right-click this bar, the following pop-up window is displayed so that you can select the items to be displayed. All items are selected by default.

	Received Time	Time ▼	Server Name
2008/09/22 21:16:10.733		42:30.704	server4
2008/09/22 21:16:10.637	42:38.972		server4
2008/09/22 21:16:10.569	42:37.653		server4
2008/09/22 21:15:55.830	42:15.595		server4
2008/09/22 21:15:55.725	42:15.586		server4
2008/09/22 21:15:55.614	42:12.644		server4
2008/09/22 21:15:55.555	42:12.633		server4
2008/09/22 20:42:09.602	42:09.494		server1
2008/09/22 20:41:44.408	41:44.088		server1
2008/09/22 20:41:44.310	41:44.074		server1
2008/09/22 20:41:43.571	2008/09/22 20:41:43.440		server1

When you double-click the displayed alert, the following window is displayed where you can check the detail of the alert.

**Alert Log Detail Information**

Detail Information

Type: Error ▲

Received Time: 2008/09/22 21:16:10.637 ▼

Time: 2008/09/22 20:42:38.972

Server Name: server4

Module Name: rm

Event ID: 9

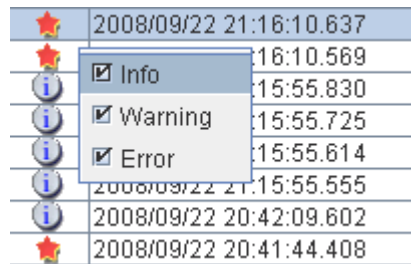
Message:

Detected an error in monitoring hdnw1. (99 : monitor was timeout)

Close

Java Applet Window

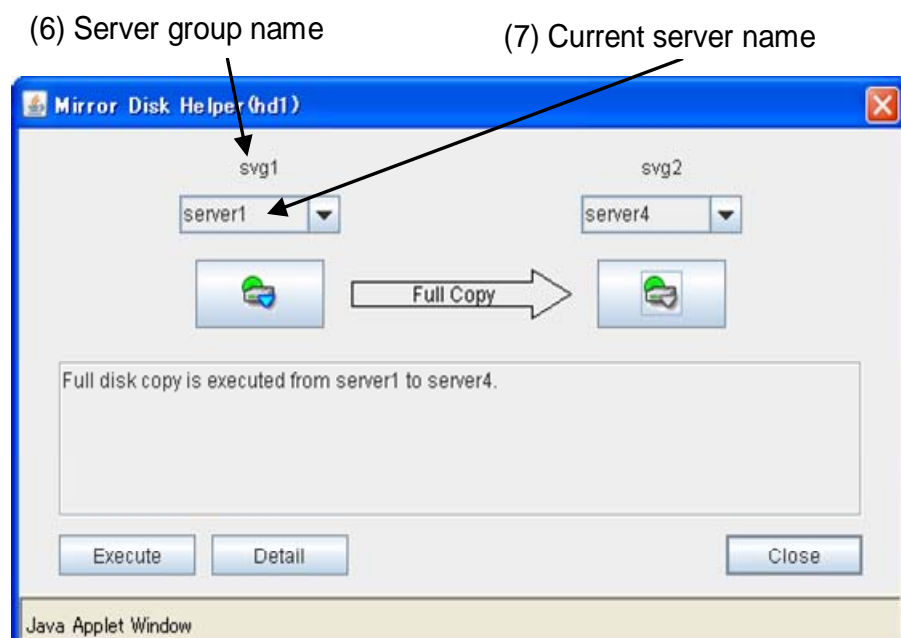
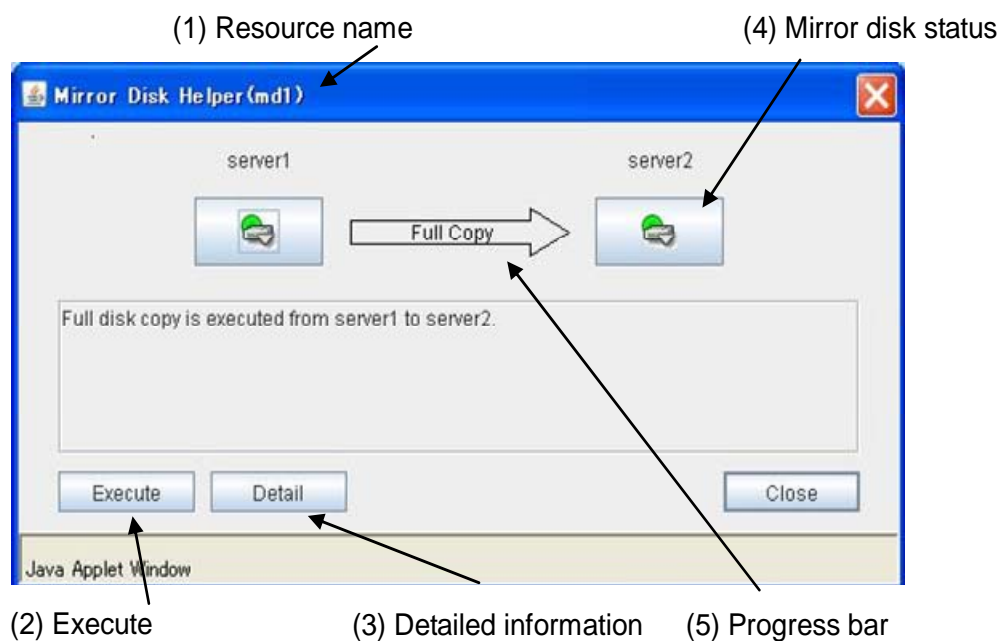
When you right-click the alert, the following pop-up window is displayed where you can select the type of the alert to be displayed. All items are selected by default.



# Mirror disk helper

## Overview of the mirror disk helper

The Mirror Disk Helper is a tool to help recovery process of mirror disk/hybrid disk from the WebManager. The following shows the layout of the Mirror Disk Helper.



The Mirror Disk Helper can be started by the mirror disk list or mirror disk resource/hybrid disk resource of a group.

The following is the description of the each field of the Mirror Disk Helper.

(1) Resource name

Displays the name of a mirror disk resource/hybrid disk resource.

(2) Mirror recovery

You can perform various operations by clicking the mirror disk status icon. The **Execute** button is enabled when you select the operation. For available operations, see “Operating Mirror Disk Helper.”

(3) Detailed information

When you click **Details**, detailed information is displayed.

The screenshot shows the Mirror Disk Helper interface with two server panels, server1 and server2. Each panel contains a table of properties and their values/statuses. Below the tables is a message box and buttons for Execute, Simple, and Close.

Property	Value (Status)
Server Name	server1
Diff Status	Normal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dew/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Property	Value (Status)
Server Name	server2
Diff Status	Normal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dew/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Mirror disk is in the normal status now.  
Both of the servers are not using the mirror disk.  
Click the icon to select the operation you want to execute.

Execute Simple Close











Server Name:	Server name
Diff Status:	Difference status of the mirror disk device
Activation Status:	Active status of the mirror disk device on the server
Media Error:	Media error of the mirror disk resource
Mirror Break Occurred at:	Error break time
Last Update:	The time that the data was updated the last time
Device Name:	The name of the mirror disk device
Diff Percent:	Difference rate
NMP Size:	The partition size of DP (MB)
Disk Size:	The size of the mirror disk device (MB)

**Last Data Update Time** is displayed when only one of the servers is updated. **Mirror Break Time** is displayed when mirror disk connect is disconnected.

If the size of the DP partition is different depending on a server, the smaller partition size is NMP Size.

## (4) Mirroring disk status

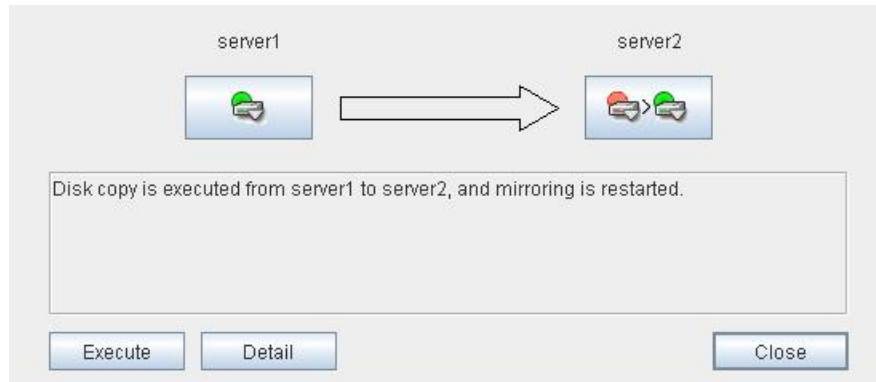
The following table shows the mirroring disk status of servers:

Icon	Mirroring disk status	Mirror color*
	Mirroring status of the server is normal. A mirror disk resource is inactive.	Green
	Mirroring status of the server is normal. A mirror disk resource is active. The server is in the normal mirroring status and has the latest data. It may not be synchronized with the other server.	Green
	Mirror recovery or forced mirror recovery is underway. A mirror disk resource is inactive.	Yellow
	Mirror recovery or forced mirror recovery is underway. A mirror disk resource is active.	Yellow
	The server has an error. Mirror recovery is required.	Red
	The server has an error. Limiting accesses to a mirror disk has been released.	Red
	Suspended. Determining the server with the latest data is suspended.	Orange
	The server is stopped or its status is unknown. Information on the server status cannot be acquired.	Gray
	Both systems are active.	Blue
	Cluster partition has an error.	Black

- To see the mirror color, run the clpmdstat command or clphdstat command.

(5) Progress bar

When performing the mirror recovery or forced mirror recovery, the progress bar shows an arrow from a source server with the latest data to copy to the destination server.



How far the mirror recovery or forced mirror recovery has progressed and expected time required for copying are displayed in the progress bar.



(6) Server Group Name

Displays the name of server group.

(7) Current Server Name

Displays the name of current server. For information on the procedures for replacing the current server, see “Changing a current server (Only for hybrid disk resource).”

## Operating Mirror Disk Helper

Available operations on the Mirror Disk Helper window differ depending on the mirror status of servers. Consider what you want to operate referring to this guide before starting the operation. The operation is executed by clicking **Execute** with the desired operation selected. The dialog boxes shown in this section are the ones taken from the mirror disk resource.

### Note:

Figures in the following description are simplified. Those differ from the actual Mirror Disk Helper screens.

The following description is for operating mirror disk status icon on server1. When operating the icon on server2, replace server1 with server2.

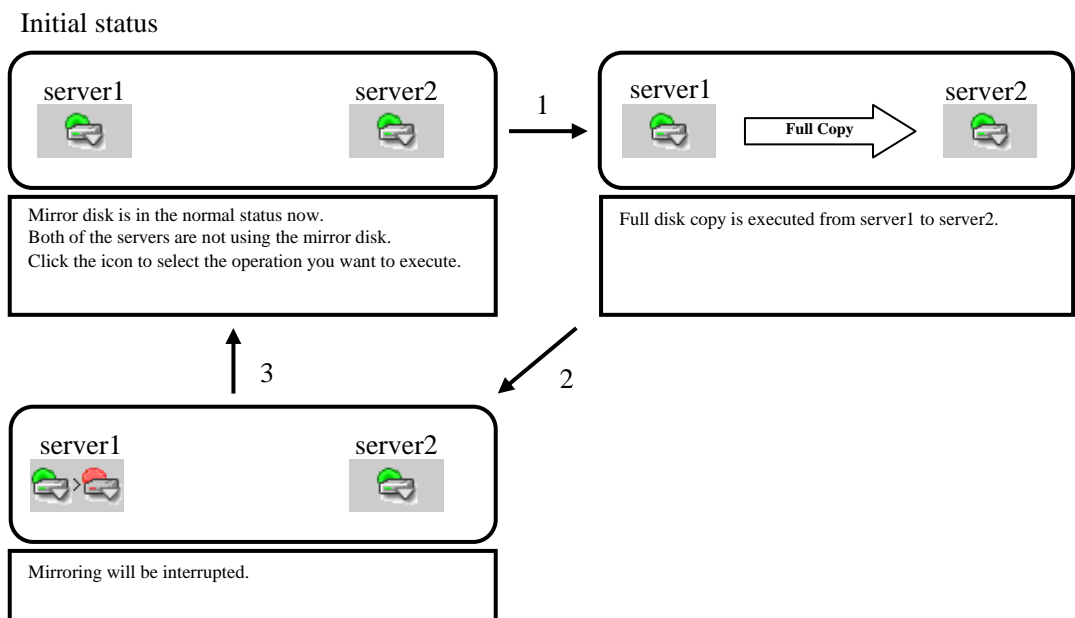
### (1) Operation available when server1 is normal

#### Note:

The following operation is available only when server1 is normal and mirror disk resource/hybrid disk resource is inactive. It cannot be performed on the server where any mirror disk resource/hybrid disk resource is activated normally.

1. When server2 is normal and mirror disk resources/hybrid disk resources are inactive

The following describes the operations which can be performed when mirror disk resources/hybrid disk resources are inactive on both servers. The figure on the upper left indicates the initial screen. Allows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.



1. Mirror recovery

Recovers a mirror from server1 to server2. Full mirror recovery can be performed.

2. Mirror disk disconnection

Disconnects a mirror disk of server1. Mirror synchronization is not performed when any mirror disk resource/hybrid disk resource is activated on server2.

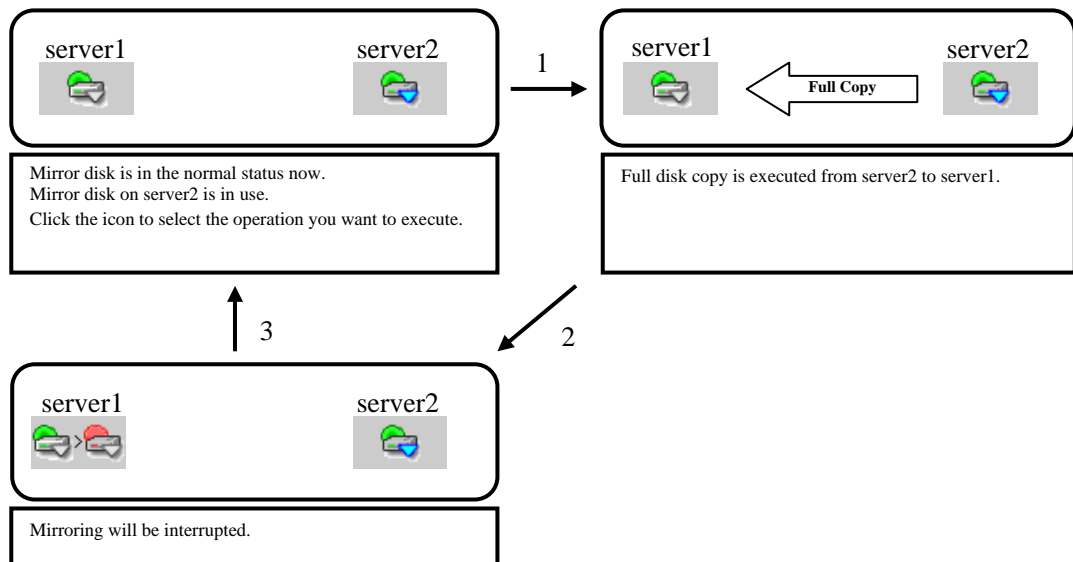
3. Initialization

Returns to the initial status.

2. When server2 is normal and any mirror disk resource/hybrid disk resource is active

The following describes the operations which can be performed when any mirror disk resource/hybrid disk resource is active on server2. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status



1. Mirror recovery

Recovers a mirror from server2 to server1. Full mirror recovery can be performed.

2. Mirror disk disconnection

Disconnects a mirror disk resource/hybrid disk resource of server1. Mirror synchronization is suspended.

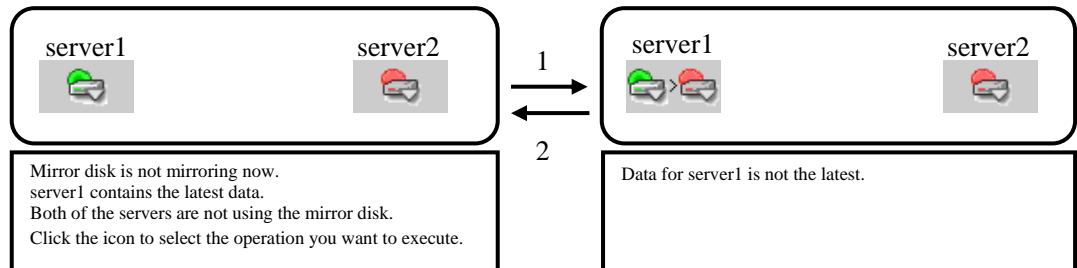
3. Initialization

Returns to the initial status.

### 3. When server2 is not normal

The following describes the operations which can be performed when mirror disk resource/hybrid disk resource is inactive on server1. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status



#### Note:

In the figure above, server2 is in abnormal status. Same transitions are made when the status of server2 is not normal.

#### 1. Mirror disk disconnection

Disconnects a mirror disk/hybrid disk of server1.

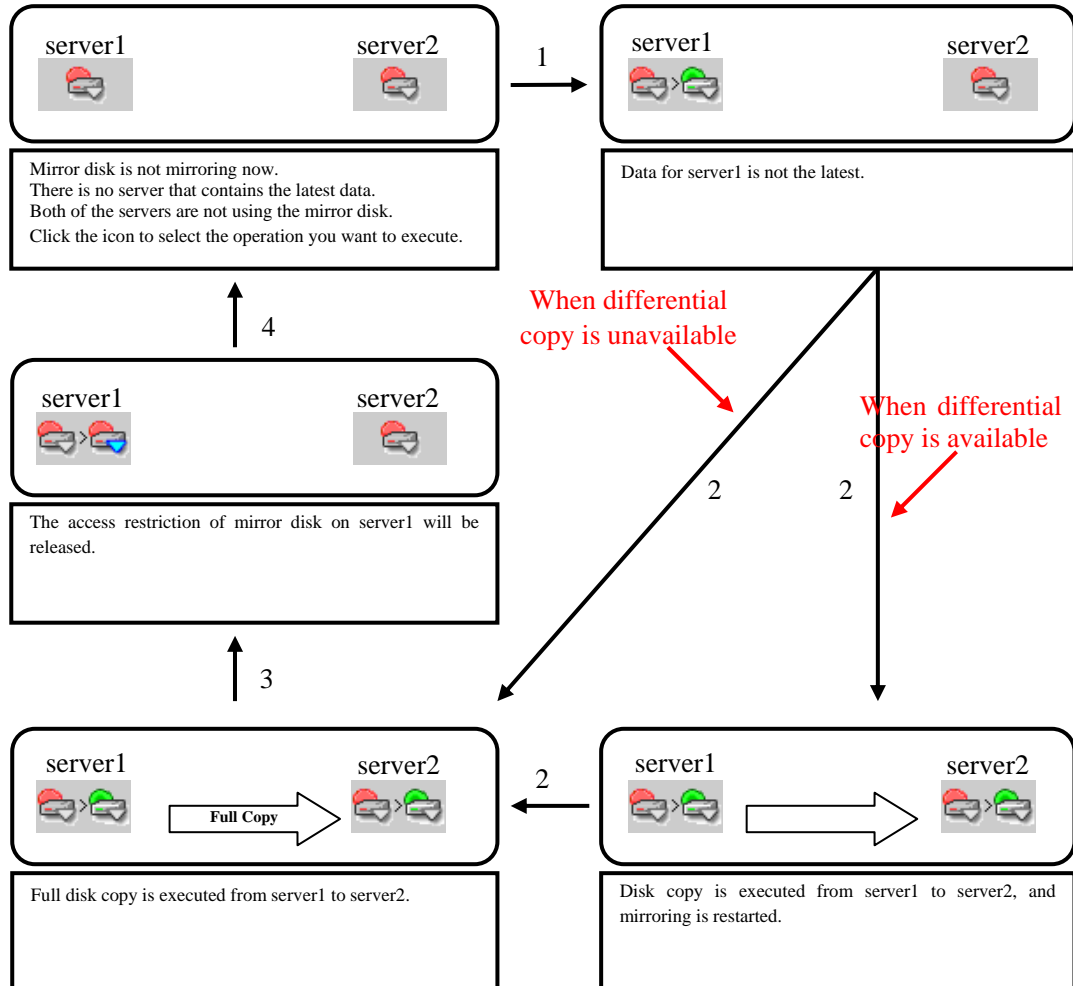
#### 2. Initialization

Returns to the initial status.

**(2) Operation available when server1 is abnormal****1. When server2 is abnormal**

The following describes the operations which can be performed when both servers are abnormal. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status

**1. Forcible mirror recovery on only server1**

Makes the status of a mirror disk/hybrid disk normal forcibly.

When the status of a mirror disk/hybrid disk becomes normal, mirror disk resource/hybrid disk resource can be activated on server1.

**2. Mirror recovery**

Recovers a mirror from server1 to server2. If differential copy can be performed, differential or full mirror recoveries are available. Mirror disk resource/hybrid disk resource cannot be activated while a mirror is being recovered.

**3. Access restriction cancellation**

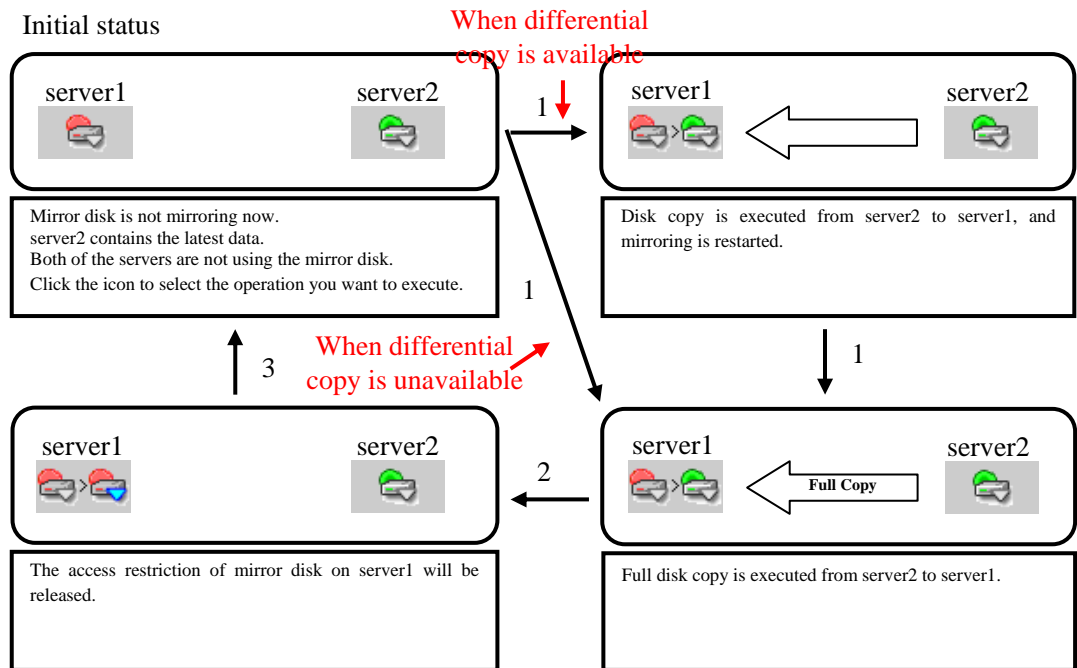
Cancels the access restriction for a mirror disk/hybrid disk on server 1 and then mount a file system. Mirror data is not synchronized even if any writes are made.

## 4. Initialization

Returns to the initial status.

## 2. When server2 is normal

The following describes the operations which can be performed when mirror disk resource/hybrid disk resource is inactive on server2. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

**Note:**

In the figure above, mirror disk resource/hybrid disk resource is inactive. Same transitions are made when a mirror disk resource/hybrid disk resource is active.

## 1. Mirror recovery

Recovers a mirror from server2 to server1. If differential copy can be performed, differential or full mirror recoveries are available. Mirror disk resource/hybrid disk resource cannot be activated while a mirror is being recovered.

## 2. Access restriction cancellation

Cancels the access restriction for a mirror disk/hybrid disk resource on server1 and then mount a file system. Mirror data is not synchronized even if any writes are made.

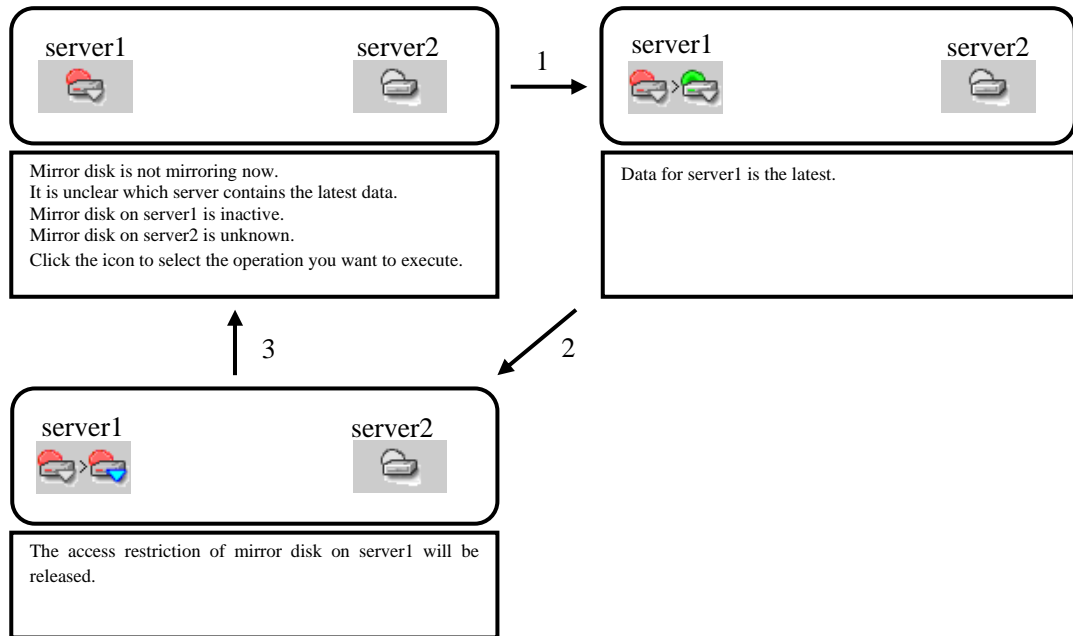
## 3. Initialization

Returns to the initial status.

## 3. When the status of server2 is unknown

The following describes the operations which can be performed when the status of server2 cannot be checked. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status



## 1. Forcible mirror recovery on only server1

Makes the status of a mirror disk/hybrid disk on server1 normal forcibly. When the status of a mirror disk/hybrid disk becomes normal, mirror disk resource/hybrid disk resource can be activated on server1.

## 2. Access restriction cancellation

Cancels the access restriction of a mirror disk resource/hybrid disk resource on server1 and then mount a file system. Mirror data is not synchronized even if any writes are made.

## 3. Initialization

Returns to the initial status.

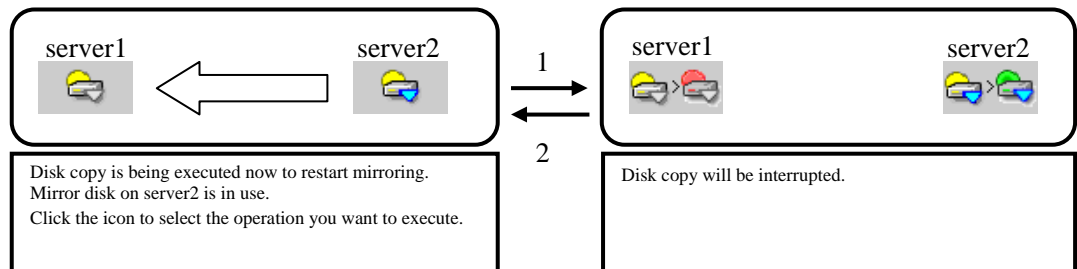
### (3) Operation available while a mirror is being recovered

#### Note:

The following operations can be performed only when mirror disk resource/hybrid disk resource is not activated on server1.

The following describes the operations which can be performed when mirror has been recovered. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status



#### Note:

In the figure above, mirror disk resource/hybrid disk resource is active on server2. Same transitions are made when mirror disk resource/hybrid disk resource is inactive on server2.

#### 1. Mirror recovery suspension

Suspends a mirror recovery. When the recovery is suspended, the status of a copy source mirror becomes normal and of a copy destination mirror becomes abnormal.

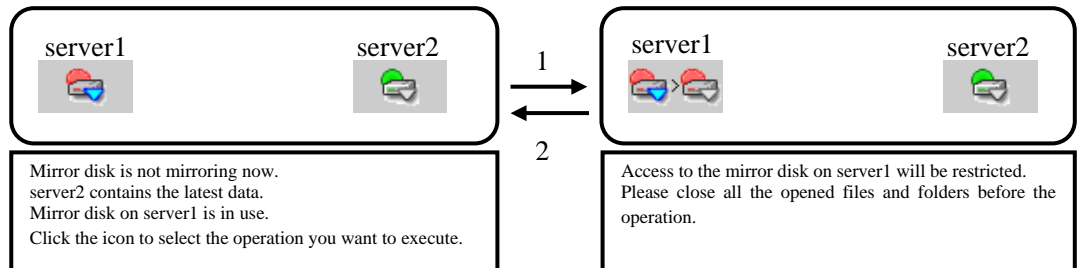
#### 2. Initialization

Returns to the initial status.

**(4) Operation available when the access restriction is cancelled**

The following describes the operations which can be performed when the access restriction of a mirror disk/hybrid disk is cancelled. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status

**Note:**

In the figure above, a mirror disk/hybrid disk on server2 are normal. Same transitions are made regardless of its status.

**1. Access restriction**

Restricts access to a mirror disk/hybrid disk on server1. Unmount the mounted file system.

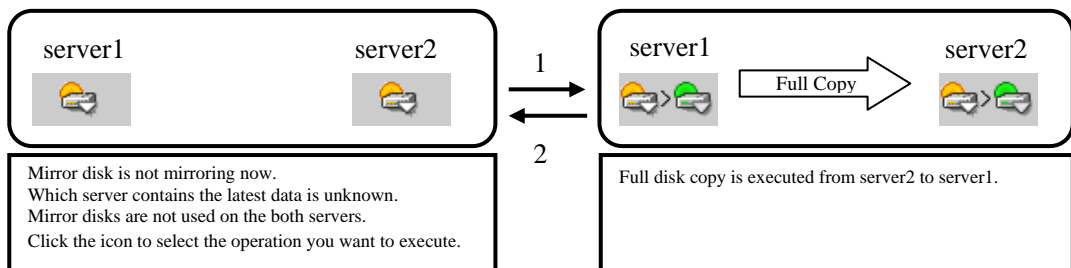
**2. Initialization**

Returns to the initial status.

**(5) Operation available when server1 is suspended.****1. When the server2 is suspended:**

The following describes the operations which can be performed when the hybrid disks on the both servers are suspended. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

Initial status

**1. Mirror recovery**

Recovers a mirror from server1 to server2. Full mirror recovery is performed. Hybrid disk resource cannot be activated while mirror is being recovered.

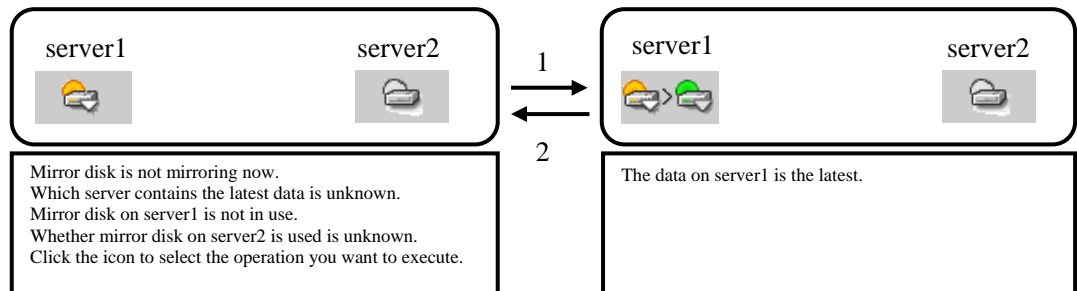
**2. Initialization**

Returns to the initial status.

## 2. When the status of server2 is unknown:

The following describes the operations which can be performed when the status of server2 cannot be checked. The figure on the upper left indicates the initial screen. Arrows in the figure indicates transitions made when the mirror disk status icon of server1 is clicked.

### Initial status



### 1. Forcible mirror recovery on only server1

Makes the status of a hybrid disk normal forcibly.

When the status of a hybrid disk becomes normal, hybrid disk resource can be activated on server1.

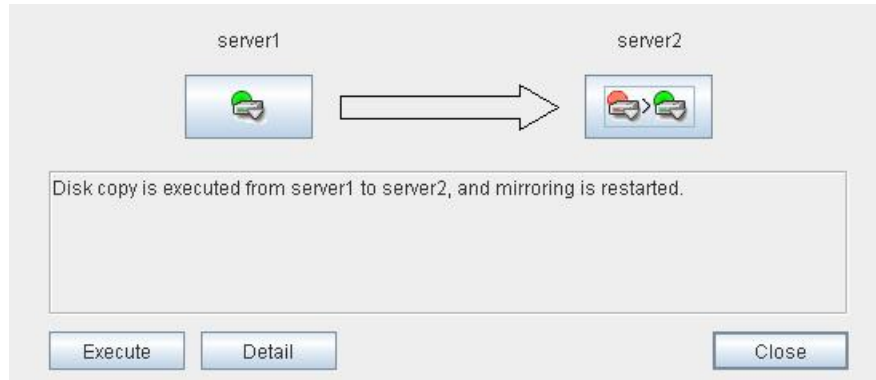
### 2. Initialization

Returns to the initial status.

## Recovering a mirror (forcefully)

### 1. Mirror recovery

**If there is a difference between the mirror disks on both servers:**

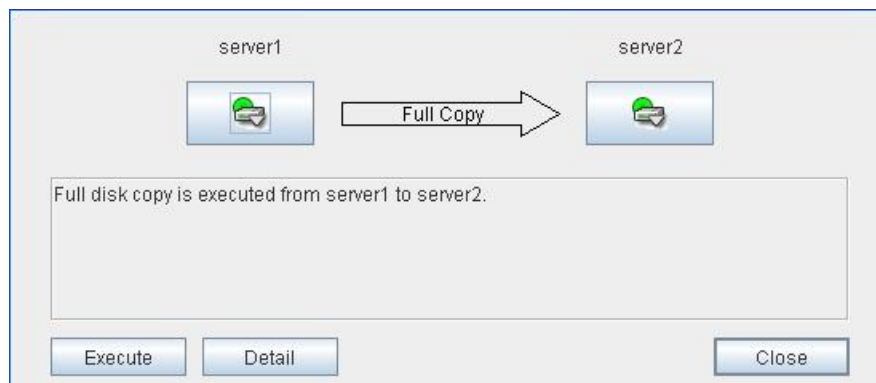


If there is a difference between the mirror disks on both servers, and one of the servers has an error, the progress bar direction is fixed. When you click **Execute**, mirror recovery starts.

When you click **Execute**, mirror recovery of only differences is performed. If any group is active, the server with the active group becomes the copy source server.

**If there is no difference between the mirror disks on both servers:**

If there is no difference, full copy is performed to recover a mirror.




If there is no difference between the mirror disks of both servers, and both servers are running normally, the progress bar arrow is displayed when a source server is specified in the dialog box above.

When you click **Execute**, forced mirror recovery starts. If any group is active, the server with the active group becomes the source server.

## 2. Forced mirror recovery


If both servers have errors, click **Details** to determine a source server. When you click **Details**, the following detailed information is displayed.

server1



Property	Value (Status)
Server Name	server1
Diff Status	Abnormal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

server2



Property	Value (Status)
Server Name	server2
Diff Status	Abnormal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Mirror disk is not mirroring now.  
 There is no server that contains the latest data.  
 Both of the servers are not using the mirror disk.  
 Click the icon to select the operation you want to execute.

Execute
Simple
Close

Check the **Last Data Update Time**, and choose a server with the latest data as the source server. Note that the time you see here is of the OS.

If you select an icon whose status is mirrored disk as the source, the progress bar is displayed. Click **Execute** to start forced mirror recovery.

### 3. Forced mirror recovery only for a single server

When one server has an error while the other is in the unknown status or stopped, the Mirror Disk Helper is displayed.

server1

server2

Property	Value (Status)
Server Name	server1
Diff Status	Abnormal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Property	Value (Status)
Server Name	server2
Diff Status	Unknown
Activation Status	Unknown
Media Error	--
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	--
NMP Size (M bytes)	--
Disk Size (M bytes)	--

Mirror disk is not mirroring now.  
It is unclear which server contains the latest data.  
Mirror disk on server1 is inactive.  
Mirror disk on server2 is unknown.  
Click the icon to select the operation you want to execute.

Execute Simple Close

Click the icon of the server with an error to display the following:

server1

server2

Property	Value (Status)
Server Name	server1
Diff Status	Abnormal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Property	Value (Status)
Server Name	server2
Diff Status	Unknown
Activation Status	Unknown
Media Error	--
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	--
NMP Size (M bytes)	--
Disk Size (M bytes)	--

Data for server1 is the latest.

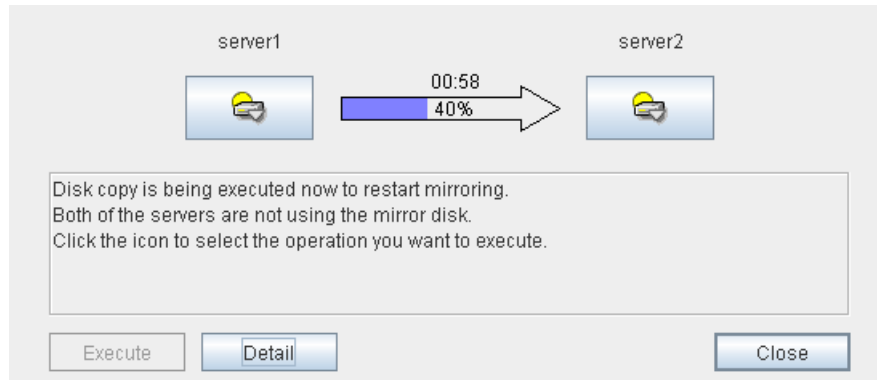
Execute Detail Close

When you click **Execute**, the following dialog box is displayed. Clicking **OK** starts forced recovery only for one of the servers.

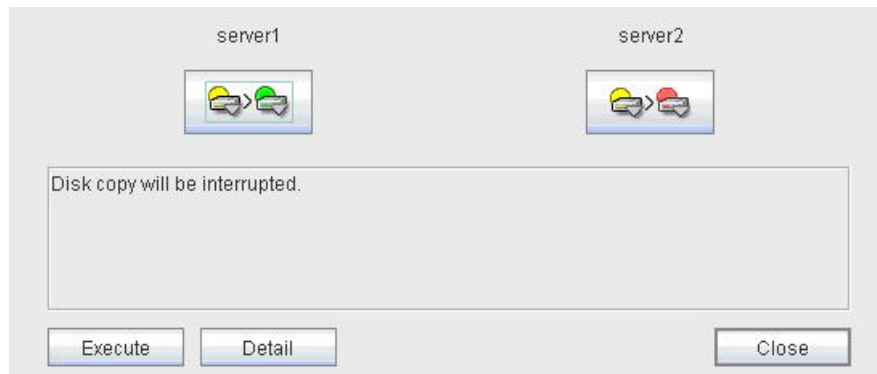


## Stopping mirror recovery

What is similar to the following is displayed during mirror recovery:



When you click the icon of the server where data will be copied to or from, the following is displayed:



When you click **Execute**, the following dialog box is displayed. If you click **OK**, mirror recovery stops. The server where data is copied from becomes normal status and copied to become error status:



## Canceling access restriction

Canceling the access restriction can be performed only when the status of server is error. When the status of one server is normal and other server is error, the following is displayed:



Click the icon of the server with an error a few times to display the following:



When you click **Execute**, access restriction is cancelled in the server with an error and a file system is mounted. Mirror data is not synchronized even when any writes are made.

To perform mirror recovery, click the icon of the server where access restriction is cancelled, perform access restriction, and follow the procedures in "Recovering a mirror (forcefully)."

## Disconnecting a mirror disk

Disconnecting a mirror disk can be performed on the server where a mirror disk is not activated and its status is normal. Mirror is not synchronized while a mirror disk is disconnected.

When the status of one server is normal and another is error, the following is displayed:



Click the icon of a server in normal status a few times to display the following:



When you click **Execute**, a mirror disk on the selected server is disconnected.

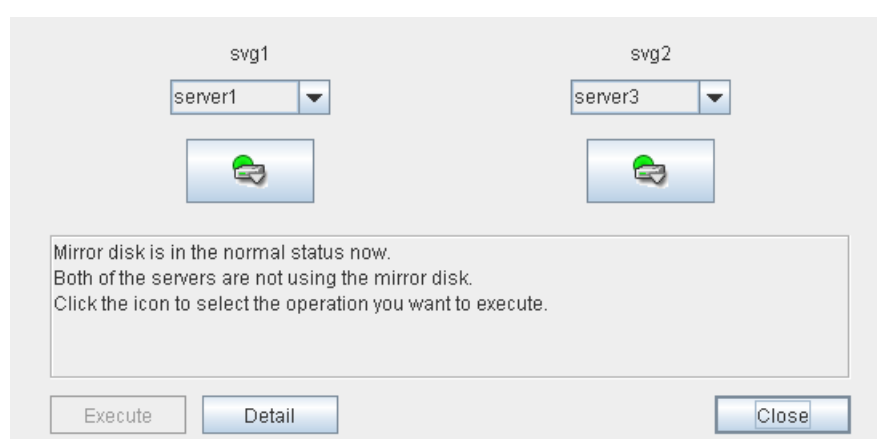
## Changing a current server (Only for hybrid disk resource)

You can change a current server on the status like below.

Hybrid disk status		Whether or not current server can be changed		Possible operation	
Server group 1	Server group 2	Server group 1	Server group 2	Server group 1	Server group 2
normal/inactive	normal/inactive	Yes	Yes	1	1
normal/dinactive	error/ inactive	Yes	Yes	1	1, 3
normal/active	error/ inactive	No	Yes	-	1, 3
error/ inactive	error/ inactive	Yes	Yes	1,3	1, 3
error/ inactive	error/forcibly activated	Yes	No	3	-
error/ inactive	Unknown	Yes	No	3	-
suspended/inactive	suspended/inactive	Yes	Yes	1	1

1	Recovering mirror (differential/entire data)
2	Forcefully recovering mirror on one server
3	Cancelling access restriction (Forcible activation)
4	Disconnecting a mirror disk

When the both servers are normal or inactive, the servers are indicated as follows:



Select the operation to be executed and a name of the target server from the list box of server group containing the current server, and then select **Execute**. The current server will be switched.

## Manually setting WebManager to stop and start

After ExpressCluster is installed, the WebManager on servers is configured to start up or stop as the OS starts up or stops.

Run the following commands from the server console to stop and start the WebManager manually.

### To stop

```
[root@server1 root]# /etc/init.d/clusterpro_alertsync stop
Shutting down clusterpro webalert: OK
[root@server1 root]# /etc/init.d/clusterpro_webmgr stop
Shutting down clusterpro webmanager server: OK
```

### To start

```
[root@server1 root]# /etc/init.d/clusterpro_webmgr start
Starting clusterpro webmanager server: OK
[root@server1 root]# /etc/init.d/clusterpro_alertsync start
Starting clusterpro webalert: OK
```

---

### Note:

For the above commands, only type the bold characters.

---

## Changing the settings without using the WebManager

If you do not want to use the WebManager for security reasons, change the settings of your OS or that of the Builder not to start the WebManager.

You can use the `chkconfig` command to control startup and stop of the WebManager-related daemon.

### To prevent WebManager from starting up

```
[root@server1 root]# chkconfig --del clusterpro_alertsync  
[root@server1 root]# chkconfig --del clusterpro_webmgr
```

### To get WebManager to start up

```
[root@server1 root]# chkconfig --add clusterpro_webmgr  
[root@server1 root]# chkconfig --add clusterpro_alertsync
```

---

### Note:

For the above commands, only type the bold characters.

---

The WebManager can be configured on the **WebManager** tab in **Cluster Properties** of the Builder. For information on how to configure and reflect the settings, see “WebManager tab” in the Chapter 3 Functions of the Builder.

## Setting usage limitations

The limitation in connection and operation of the WebManager can be configured in **Cluster Properties** in the Builder. For details, see Chapter 3, “Functions of the Builder”.

### Type of limitation

There are two ways to set usage limitations:

- ◆ Limiting the access by using client IP addresses
- ◆ Limiting the operation by using a password

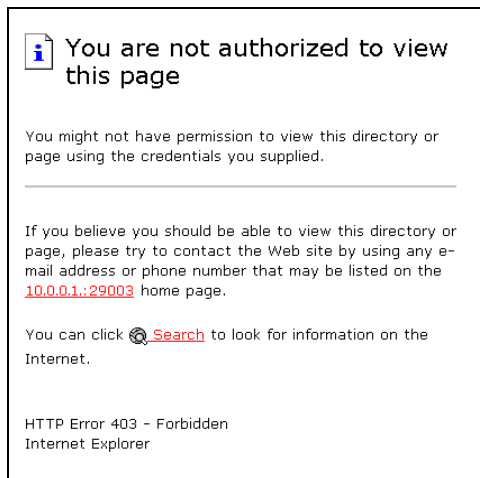
#### Limiting the access by using client IP addresses

This function limits clients who can access the WebManager and operations on the WebManager by using client IP addresses.

Add IP addresses to **IP Addresses of the Accessible Clients** on the **WebManager** tab in the **Cluster Properties** of the Builder. See “WebManager tab” in Chapter 3 “Functions of the Builder”.

When setting the limitation of the connection of the WebManager, if you attempt to access to the WebManager from the IP address that is not added to **IP Addresses of the Accessible Clients** , the following error messages are displayed.

Example: when using the Internet Explorer



The following **Reference Only** message is displayed to the WebManager that is connected from the client registered to limit the operation.



If you limit operations, you cannot perform the following operations from the WebManager.

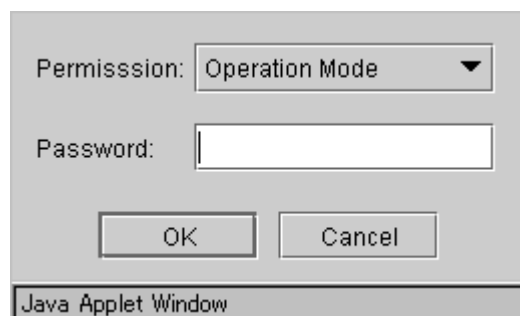
- ◆ Shutdown and shutdown reboot of a cluster
- ◆ Shutdown and shutdown reboot of servers
- ◆ Starting, stopping, and moving of groups
- ◆ Operation using the Mirror Disk Helper (only when the Replicator/Replicator DR is used)
- ◆ Starting up Builder

### The limitation by using a password

This function limits viewing and operations on the WebManager by using a password.

To configure this limitation: in **Cluster Properties** of the Builder, click the **WebManager** tab and then **Control connection by using password**. See “WebManager tab” for detailed information.

Once password limitation of the WebManager is set, the following authorization dialog box is displayed when trying to access the WebManager by setting a password.



You can log on to the WebManager by selecting **Operation Mode** or **Reference Only** in **Authorization** and entering a correct password.

- ◆ The authorization dialog box is not displayed when the password limitation is not configured (you can log on to the WebManager without authorization).
- ◆ You cannot log on to the WebManager if you enter a wrong password three consecutive times.

When you log on with a reference-only authorization, the following **Reference Only** message is displayed.



The following operations cannot be performed from the WebManager when operations are limited.

- ◆ Shutdown and shutdown reboot of a cluster
- ◆ Shutdown and shutdown reboot of servers
- ◆ Starting, stopping, and moving of groups
- ◆ Operation using the Mirror Disk Helper (only when the Replicator or Replicator DR is used)
- ◆ Starting of the Builder

For the information on switching the authorization after log on and/or log out, “Switch authorization of the WebManager” in Chapter 3 “Functions of the Builder”.

### Combination of the IP address and password

The operational limitations when using both IP addresses and passwords are the following:

	Password limitation		
Client IP address limitation	Operable mode	Reference only	Unable to operate/view (authorization failed)
Operable Mode	Operable mode	Reference only	UNAVAILABLE
Reference Only	Reference only*	Reference only	Unavailable
Cannot Access	Cannot access	Cannot access	Cannot access

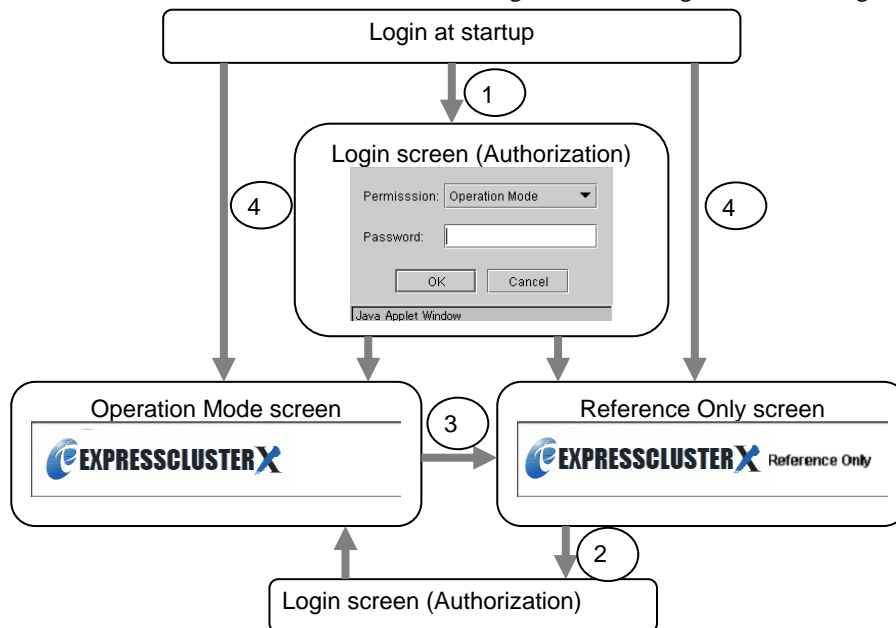
\* Authorization cannot be selected.

#### Note:

Changing the configuration data with the online version Builder is possible only when the WebManager is on the operable mode.

## Switch authorization of the WebManager

The chart below describes the flow of accessing the WebManager and switching authorization.



1. Log on to the WebManager

The log on authorization dialog box is displayed when a password for operation mode or reference only is set. You can log on to the WebManager by selecting the authorization of either **Operation Mode** or **Reference Only** and entering the correct password.

2. Switch the authorization from the reference only screen to the operation mode screen

The dialog box for password authorization is displayed. You can log on by entering the correct password. When password limitation is not configured, log on without entering a password.

3. Switch the authorization from the operation screen to the reference only screen

Authorization can be switched without authentication. You can do so even when the password limitation is configured.

4. Log on when a password for both operation mode and reference only is not set

Log on by following the client IP limitation. If the client IP limitation is not configured, log on to the WebManager whose authorization is in the operation mode. In this case, you cannot switch the authorization to reference only.

## **Operating a cluster by using the WebManager**

### **Cluster shutdown and cluster shutdown reboot**

For the information on performing cluster shutdown and cluster shutdown reboot from the WebManager, see “Objects of the cluster.”

### **Mirror disk resource, hybrid disk resource and mirror disk helper**

For the information on how to use the mirror disks, hybrid disk resources and Mirror Disk Helper from the WebManager, see “Server object” or “Mirror disk resource object.”

### **Shutting down and rebooting an individual server**

For the information on how to shut down and reboot an individual server from the WebManager, see “Individual server objects.”

### **Starting, stopping, and moving an individual group**

For the information on how to start, stop and move an individual group from the WebManager, see “Individual server objects.”

### **Starting and stopping an individual resource**

For the information on how to start and stop an individual resource from the WebManager, see “Individual group resource objects ” and “Mirror disk resource object and hybrid disk resource object.”

### **Suspending and resuming a monitor resource**

For the information on how to suspend and resume a monitor resource from the WebManager, see “Monitors object.”

### **Suspending and resuming an individual monitor resource**

For the information on how to suspend and resume an individual monitor resource from the WebManager, see “Individual monitor resource objects.”

## Limitations of the WebManager

- ◆ Information displayed by the WebManager does not always reflect the latest status. To acquire the latest information, click the **Reload** button.
- ◆ If a server fails while the WebManager is acquiring information, the information acquisition fails, which may result in the failure to show some objects.  
You can either wait until the next auto refresh starts or click the **Reload** button to acquire the latest information.
- ◆ If you use a Linux browser, some window manager combinations may put a dialog box behind other windows. Switch windows by pressing the **ALT + TAB** keys or by other means.
- ◆ The ExpressCluster logs cannot be collected from two or more WebManagers simultaneously.
- ◆ If you work on the WebManager when no connectivity is established, it may take a while to regain control.
- ◆ While the mouse pointer is the hourglass which indicates that the OS is processing something, moving the cursor outside the browser may return to the arrow icon even if the process is still underway.
- ◆ When you collect logs, the following message may be displayed in a server console:  

```
hda: bad special flag: 0x03  
ip_tables: (C) 2000-2002 Netfilter core team
```

  
You can ignore this message because it does not affect log collection.
- ◆ If a proxy server is used, configure the proxy server so that the port number of the WebManager can be relayed.
- ◆ When you update ExpressCluster, close the browser. Clear the cache of Java and restart the browser.

## Error messages on the WebManager

The following is a list of error messages displayed when using the WebManager.

Level	Message	Cause	Solution
Error	Could not start the group because necessary responses have not been made.	No status is acquired because ExpressCluster is now being started up.	Try reloading the status later.
Error	Could not connect to the server.	Connecting the WebManager to the ExpressCluster server failed.	Check if the destination server is running.
Error	Connection Timeout	Internal time-out occurred.	Internal time-out may occur when a time-consuming task is performed. Check the status after the time-out and if there is no problem, you can continue your operations.
Error	Connection is terminated.	The connection between the WebManager and the ExpressCluster is disconnected.	Check if the connection destination server has failed.
Error	Could not activate some resources.	Failed to start some resources under the group.	Solve the problem that caused the resource error.  See the alert log for the detailed information on the error.
Error	Could not deactivate some resources.	Failed to stop some resources under the group.	Solve the problem that caused a resource error.  For the detailed information on the error, see the alert log.
Error	Failed to collect logs from the server.	Failed to collect logs.  Some servers may have been shut down during the log collection.  There is a possibility that there is an error and some servers cannot be accessed.	Retry log collection.  If logs from a certain server cannot be collected, run the <code>clplogcc</code> command on the server to collect logs.
Error	Failed to connect to server(%1 : %2)	Failed to connect to the WebManager.	Check if the WebManager is running on the server.
Error	Failed to find group online server.	Failed to detect the server whose group is online.	The server status may have changed during the operation. Reload the status.
Error	Failed to get data for the cluster tree view from the server.	Failed to acquire the cluster configuration.	Check if ExpressCluster is running on the server by using a command.

Level	Message	Cause	Solution
Error	Failed to get the latest alert log.	1) The alertlog.alt file does not exist or is corrupted. 2) The number of the alert viewer records in the cluster configuration data is over the limitation. (Up to 999)	1) Temporarily store all the files under the /installation_path/alert/log on the server, and then restart the alert synchronization service. 2) Check the maximum number of the alert view records set in the Builder.
Error	Failed to get property from the server.	Failed to acquire a cluster property value.	Run a command on the server to check if ExpressCluster is running.
Error	Failed to search the alert logs.	Failed to open alert log files on a server.	Temporarily store the files under the /installation_path/alert/log on the server, and then restart the alert synchronization service.
Error	The response content is invalid.	Connection to the server is disconnected.	Check the server operating status and network connectivity.
Error	Failed to move group "Group Name" to server "Server Name".	Moving the group failed. [Group Name] group_name [Server Name] server_name	Solve the problem causing the failure of moving a group.  For the detailed information on the error, see the alert log.
Error	The group is already started.	The target group has already been started up.  Other manager or command on the server may have performed operations to the same group.	Try reloading the group status later to update it, and then perform operations to the group.
Error	The group is already stopped.	The target group has already been stopped.  Other manager or command on the server may have performed operations to the same group.	
Error	Group is updating its status.	The status of the target group is changing.  Other manager or command on the server may have performed operations to the same group.	
Error	Internal error.	An internal error of the WebManager occurred.	Perform reloading.  If the same error occurs even after reloading, restart the WebManager daemon.

Level	Message	Cause	Solution
Error	Invalid configuration data.	Failed to acquire the cluster configuration data.	Check the information on the cluster configuration.
Error	Invalid group name.	An internal error of the WebManager occurred.	Perform reloading. If the error occurs even after reloading, restart the WebManager daemon.
Error	Invalid group name or server name.	An internal error of the WebManager occurred.	
Error	Invalid parameter.	An internal error of the WebManager occurred.	
Error	Invalid server name.	An internal error of the WebManager occurred.	
Error	An error occurred in server or group operation.	Some operations failed.	Run a command to check the server status. If there is no problem, you can continue your operations.
Error	Operatable group does not exist.	The operation to the group failed.	Solve the problem that caused the failure of the operation to the group.  For the detailed information on the error, see the alert log.
Error	Enter the number of alert logs displayed on each page.	The number of the alert log filter result to be displayed (for example, the number of logs in a window) is not set.	Specify the number of the alert log filter result to be displayed.
Error	Enter the event ID.	The ID for alert log search is not set.	Specify the ID for alert log search.
Error	Enter the module name.	The name of the module for the alert log search is not set.	Specify the name of a module for the alert log search.
Error	Enter the number of searches.	The number of alert logs to be searched is not set.	Specify the number of alert logs to be searched for.
Error	Enter the page number.	The page to show the results of the alert log research is not set.	Specify the page to show the results of the alert log research.
Error	Enter the server name.	The name of a server for alert log search is not set.	The name of the target server for the alert log search is not specified.
Error	Specified server is not active.	The server that initiated the operation is not active.	Wait for a while to perform reloading to update the group, and then perform the operation the group.
Error	Specified server is not active.	The server that initiated the operation is not active.	Wait for a while to perform reloading to update the group, and then perform the operation.

Level	Message	Cause	Solution
Warning	The cluster tree obtained from the server may not be completed.	An error occurred while acquiring the server's status.	Try reloading later.
Error	The number of alert logs per page you have entered is not in the specified range (1 to 300).	The specified number of alert log filter results displayed per page is out of the range.	Specify a value between 1 and 300.
Error	The value in "To" is incorrect. Enter the correct value.	The time specified for end of alert log search is invalid.	Set a correct time.
Error	Event ID entered is less than 1.	The ID set for the target of the alert log search is smaller than one.	Specify a value of 1 or greater.
Error	There are no groups that can be started.	Failed to start up a group.	Solve the problem that caused the failure of the operation to the group.  For the detailed information on the error, see the alert log.
Error	There are no groups that can be stopped.	Failed to stop the group.	Solve the problem that caused the failure of the operation to the group.  For the detailed information on the error, see the alert log.
Error	There are groups that failed to start.	Some operations failed.	Run a command to check the server status. If there is no problem, you can continue your operations.
Error	There are groups that failed to stop.	Some operations have failed.	Run a command to check the server status. If there is no problem, you can continue your operations.
Warning	The number of searches entered is less than 1.	The ID set for alert log search is smaller than one.	Specify a value of 1 or greater.
Error	Page number entered is less than 1.	The number of pages specified for the alert log search is smaller than one.	Specify a value of 1 or greater.
Error	The page number entered is greater than the total page number.	The number of pages specified for alert log search is greater than the number of total pages.	Specify the number that is smaller than the number of the total pages.
Warning	The properties got from server may not be completed.	Some information acquisition failed.	Try reloading later.

Level	Message	Cause	Solution
Error	There are groups that failed to stop.	There is a server that may have failed to shut down the cluster.	Check if the server has failed. If it has not failed, make sure that ExpressCluster is running.
Error	The value in "From" is incorrect. Enter the correct value.	The time set for start of alert log search is invalid.	Set a correct time.
Error	The value set in "From" is later than the value in "To".	The time set for start of the alert log search is later than the time set for end.	Set a correct time.
Info	The total number of pages has been changed. The server alert log will be updated.	The number of total pages of alert log filter results is updated. New alerts may have been issued while the search results were being displayed.	To reflect added alerts to the search results, close the window displaying the search results and perform search again.
Error	Failed to get mirror disk list from the server.	An internal error of the Mirror Agent occurred. Communication from the WebManager server to the Mirror Agent failed. The process on the server timed out.	Make sure that the Mirror Agent is working. If the Mirror Agent is not started, reboot the server.
Error	Failed to get mirror status.	The Mirror Agent failed to acquire mirror disk status. An internal error of the Mirror Agent occurred. Communication from the WebManager server to the Mirror Agent has failed. The process in the server timed out.	Check if the Mirror Agent is active. If the Mirror Agent is not started, reboot the server.
Error	Failed to recover the mirror since mirror status has changed.	An error occurred while performing mirror recovery.	Make sure that the Mirror Agent is operating. If the Mirror Agent is not started, restart the server.
Confirmation	Data on two disks are identical. Do you want to execute a mirror recovery?	The mirror disks on both servers have no difference.	-
Confirmation	%1 is recovering now. Are you sure you want to stop?	It was requested to stop during recovering.	-
Error	The local applet version does not match the server's. Close the browser and clear the applet cache.	A mismatch between the applet and the server occurred because the browser cache remains.	Exit the browser. Clear the cache of Java and restart the browser.

Level	Message	Cause	Solution
Error	Failed to get server list.	Failed to get a server list.	Check if other log collections are performed.  Retry after others are completed.
Error	Server is collecting logs. Try again after log collection is completed.	The server is collecting logs.	Try again after other log collections are completed.
Error	Failed to collect logs from the server.	An error occurred while acquiring logs.	Check the result in dialog box showing the progress of log collection (see "Collecting logs")
Error	Failed to log on (Internal error)	An internal error occurred when logging on to the WebManager.	Try logging on to WebManager again. Start the WebManager daemon if the error still occurs.
Error	Failed to log on	Incorrect password was entered three consecutive times.	Try logging on to WebManager again with a correct password.
Error	Incorrect password.	Incorrect password was entered.	Enter a correct password.
Error	Authorization failed.	Password was changed when accessing the WebManager.	Try logging on to WebManager again.
Error	Authorization failed. (Internal error.)	An internal error occurred when accessing to the WebManager.	Try logging on to WebManager again. Reboot the WebManager daemon if the error still occurs.
Error	Failed to connect to the server.	Failed to access to the WebManager.	Check if the WebManager is running on the server.  Check if the WebManager can be connected to the server successfully.
Error	Failed to get the list of mirror disk error.	The Mirror Agent failed to acquire the mirror disk information.  An internal error of the Mirror Agent occurred.  Failed to access from the WebManager server to the Mirror Agent.  The process timed out on the server.	Check if the Mirror Agent is working. If not, restart the server.

Level	Message	Cause	Solution
Confirmation	Could not obtain the status of the other server. \nAre you sure you want to execute a forced recovery?	Forced mirror recovery was performed.	-
Confirmation	This cluster will be terminated. Do you want to continue?	The confirmation message for shutting down the cluster.	-
Confirmation	Are you sure you want to suspend "{0}"?	The confirmation message for suspending the cluster. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure you want to resume "{0}"?	The confirmation message for resuming the cluster. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure you want to start "{0}"?	The confirmation message for starting the cluster daemon. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure you want to stop "{0}"?	The confirmation message for stopping the cluster daemon. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure to restart the manager daemon?	The confirmation message for restarting the server-side service of WebManager.	-
Confirmation	Are you sure to start the mirror agent daemon?	The confirmation message for starting the mirror agent.	-
Confirmation	Are you sure to stop the mirror agent daemon?	The confirmation message for stopping the mirror agent.	-
Confirmation	Are you sure to suspend the cluster?	The confirmation message for suspending the cluster.	-
Confirmation	Are you sure to resume the cluster?	The confirmation message for resuming the cluster.	-
Confirmation	Are you sure to start the cluster?	The confirmation message for starting the cluster daemon.	-
Confirmation	Are you sure to stop the cluster?	The confirmation message for stopping the cluster daemon.	-

Level	Message	Cause	Solution
Confirmation	Warning: If the server is shut down, in order to recover the mirror which is used on this server to normal status, you need to execute mirror recover operation on it. \nIt may cost long time to perform mirror recovery.\n\nDo you want to continue?	The confirmation message for shutting down some of the servers in the cluster. {0} is where the name of the server is described.	-
Confirmation	Warning: If the server is rebooted, in order to recover the mirror which is used on this server to normal status, you need to execute mirror recover operation on it. \nIt may cost long time to perform mirror recovery. \n\nDo you want to continue?	The confirmation message for rebooting some of the servers in the cluster. {0} is where the name of the server is described.	-
Confirmation	Are you sure you want to start "{0}"?	The confirmation message for starting a cluster daemon of some of the servers in the cluster. {0} is where the name of the server is described.	-
Confirmation	Are you sure you want to stop "{0}"?	The confirmation message for stopping a cluster daemon of some of the servers in the cluster. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure you want to start "{0}"?	The confirmation message for starting some of the resources in the fail over group. {0} is where the name of the resource is described.	Note that the resources in dependency are also started.
Confirmation	Are you sure you want to stop "{0}"?	The confirmation message for stopping some of the resources in the fail over group. {0} is where the name of the resource is described.	Note that the resources in dependency are also stopped.

Level	Message	Cause	Solution
Confirmation	The file system of mirror disk on {0} maybe abnormal. Are you sure to execute a force recovery?	<p>Mirror recovery has stopped while performing the last mirror recovery. This disk was where to be copied.</p> <p>The mirror disk data of this server may be going to be abnormal when the mirror disk is forcibly recovered. If you execute a mirror recovery, this data is taken as the latest one.</p> <p>The name of the mirror resource is displayed where {0} is represented.</p>	It is recommended to forcibly recover a mirror disk of the other server.
Confirmation	The file system of mirror disk on {0} maybe abnormal. Could not obtain the status of the other server. Are you sure to execute a forced recovery?	<p>Mirror recovery has stopped while performing the last mirror recovery. This disk was where to be copied.</p> <p>The status of the other server cannot be obtained.</p> <p>The mirror disk data of this server may be going to be abnormal when the mirror disk is forcibly recovered. If you execute a mirror recovery or forcible recovery, this data is taken as the latest one.</p> <p>The name of the mirror resource is displayed where {0} is represented.</p>	It is recommended to forcibly recover a mirror disk of the other server.
Confirmation	The file system of mirror disk on {0} may have an error. Are you sure to connect to the mirror disk?	<p>Displayed when a mirror disk is manually performed to be active.</p> <p>Mirror recovery has stopped while performing the latest mirror recovery. This disk was where to be copied.</p> <p>The mirror disk data of this server may be abnormal.</p>	It is not recommended to continue activating a mirror disk because the file system of this disk may not be normal.
Error	Error Cause:{0}	Failed in operations for mirror. For specific cause, refer to the descriptions in where {0} represents.	Refer to the description in where {0} represents.
Error	Failed to communication with mirror disk agent.	Failed to communicate between WebManager and mirror agent.	Make sure the mirror agent is running on each server in the cluster. If not running, restart a server.

Level	Message	Cause	Solution
Error	Communication between mirror disk agent timeout.	Timeout has occurred in communication between WebManager and the mirror agent.	Make the values of send/receive timeout of mirror agent of the cluster property larger.  When the load is temporarily high, change the ratio of timeout using the clptoratio command.
Error	Internal error.	Failed to allocate the memory, attach the shared memory or perform ioctl () to the mirror driver.	Make sure that the setting value related to the mirror disk is properly configured.  Shut down and reboot the cluster.
Error	Invalid mirror disk alias.	The specified mirror disk is not found.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to get mirror disk information.	Failed to acquire the mirror disk information from the mirror agent.	Make sure that the setting value related to mirror disk is properly configured.  Shut down and reboot the cluster.
Error	Specified server name was not found.	The specified server is not found.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to get the diff percent of mirror disk.	Failed to acquire difference information of mirror disk from the mirror agent.	Make sure that the setting value related to mirror disk is properly configured.  Shut down and reboot the cluster.
Error	Invalid license.	Failed in operation because the registered license is invalid or expired.	Confirm the license.  Make sure the valid date when using a license for trial.
Error	Mirror disk has already been mounted.	The status of mirror activation operation from another WebManager or by the clpmdctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to get mirror disk status.	Failed to acquire the mirror disk status from the mirror agent.	Make sure that the setting value related to mirror disk is properly configured.  Shut down and reboot the cluster.

Level	Message	Cause	Solution
Error	Mirror disk status is not proper.	Possible cause is that the status of mirror is not reflected on the display when any operation or transmission that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to read date for cluster partition.	Failed to access a cluster partition.	Make sure that the cluster partition of mirror disk is properly configured.  Make sure the partition device set as a cluster partition is normal.
Error	Failed to write date to cluster partition.	Failed to access a cluster partition.	Make sure that the cluster partition of mirror disk is properly configured.  Make sure the partition device that set as a cluster partition is normal.
Error	Mirror disk is not mounted.	Failed in operation because a mirror disk is not mounted.  Possible cause is that the status of mirror deactivation operation from another WebManager or by the clpmdctrl command is not reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to create mount point.	An error has occurred in the process of creating mount point when a mirror resource is being activated.	Make sure that setting value of mount point of mirror resource is properly configured.
Error	Failed to activate mirror disk, because mirror disk size of both server are not same.	The size of partition set to data partition is not the same between the both servers. Default mirror configuration is not operated in the specified direction.	Follow the steps below. 1. Inactivate the failover group that the mirror resource belongs to. 2. Make sure the data partition size of both servers. 3. Make sure that the server data with small size of data partition is the latest. 4. Operate a mirror recovery from the server with the small size of data partition to the server with the big size of data partition. 5. Activate the failover groups that the mirror resource belongs to.

Level	Message	Cause	Solution
Error	Failed to recover mirror disk in force mode.	Failed to forcibly recover the mirror disk.	<p>Make sure that mirror disk setting (especially cluster partition, port number) is not wrong.</p> <p>Make sure that the partition device set as a cluster partition is normal.</p>
Error	Failed to set mirror disk.	Failed in mirror disk-related operation.	<p>Make sure that mirror disk setting (especially cluster partition, port number) is not wrong.</p> <p>Make sure that the partition device set as a cluster partition is normal.</p> <p>Shut down and reboot a cluster.</p>
Error	Failed to get server list.	Failed to acquire the server list.	<p>Make sure that the setting of mirror disk does not contain any error.</p> <p>Shut down and reboot a cluster.</p>
Error	Mirror driver is abnormal.	Failed in operation due to a failure of driver of the mirror disk.	<p>Make sure that the driver of mirror disk (liscal) is loaded on each server by executing the lsmod command.</p> <p>Make sure the version information of kernel supported by Replicator option/Replicator DR option and kernel version being used by referring to the startup guide.</p> <p>Shut down and reboot a cluster.</p>
Error	Failed to mirror driver status.	Failed in operation due to the failure of driver.	<p>Make sure that the driver of mirror disk (liscal) is loaded on each server by executing the lsmod command.</p> <p>Make sure the version information of kernel supported by Replicator option/Replicator DR option and kernel version being used by referring to the startup guide.</p> <p>Shut down and reboot a cluster.</p>

Level	Message	Cause	Solution
Error	Specified recovery mode is invalid.	Failed to operate the mirror recovery because the specified reconfiguration mode is invalid.  Possible cause is that the status of mirror is not reflected on the display when any operation or transition that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to send recovery data.	Failed in mirror recovery because sending a recovery data failed.	Make sure the setting of mirror disk does not contain any error (especially in mirror connect).  Make sure that the network set to mirror connect is in normal state.
Error	Detected disk error while recovering the mirror.	Failed in mirror recovery because the disk error is detected.	Replace an error disk, and then try again.
Error	Failed to cancel recovery of mirror disk.	Failed to stop the process of mirror recovery.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to get sector number of mirror disk.	Failed in operation because acquiring the sector number of mirror disk failed.	Make sure that the setting of mirror disk (especially in partition) does not contain any error.
Error	Specified mirror disk is recovering now.	Failed in operation due to mirror recovery.  The status of mirror activation operation from another WebManager or by the clpmdctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of the cluster.
Error	Mirror disk status is normal, it is not needed to recover.	Mirror recovery is not needed.  The status of mirror may not be reflected on the display when any operation or transition that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of the cluster.
Error	Failed to fork process.	Failed in mirror recovery, because generating the process required for mirror recovery failed.	Confirm the status of the server where mirror is to be recovered.

Level	Message	Cause	Solution
Error	Recovery direction is not correct.	Failed in mirror recovery, because a direction of mirror recovery is invalid.  The status of mirror may not be reflected on the display when any operation or transition that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Mirror disk has not been initial constructed.	Failed in operation, because default mirror is not configured for mirror disk.  The status of mirror may not be reflected on the display when any operation or transition that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Recovery is canceled.	The status of mirror active operation from another WebManager or by the clpmdctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to recover mirror disk, because recovery source does not contain the latest data.	Failed in mirror recovery, because the disk which is a source of mirror recovery does not have the latest data.  The status of mirror may not be reflected on the display when any operation or transition that would affect its status occurred.	Click the <b>Reload</b> button to display the latest status of a cluster, and change a source of reconfiguration and reconfigure it.
Error	Failed to recover since NMP size of recovery target is smaller than recovery source.	Failed in mirror recovery, because the size of data partition of mirror target is smaller than the one of recovery source.	This message is usually not displayed because the size of data partition is automatically adjusted at the time of initial mirror configuration.
Error	Failed to read configuration.	Failed in operation due to the error of cluster configuration information file.	Make sure that setting of mirror disk does not contain any error.
Error	System command return error.	Failed in operation, because the execution result of the command that is performed from mirror agent is error.  There is no ExpressCluster executable file to be executed from mirror agent.	Make sure that the bin/clprelpath file is stored under the install directory of ExpressCluster.
Error	Command(fsck) timeout.	Failed in operation, because timeout has occurred in executing the command (fsck).	Set a larger value for the fsck timeout of mirror resource.

Level	Message	Cause	Solution
Error	Command(mount) timeout.	Failed in operation, because timeout has occurred in executing the command (mount).	Set a larger value for the mount timeout of mirror resource.
Error	Command(umount) timeout.	Failed in operation, because timeout has occurred in executing the command (umount).	Set a larger value for the umount timeout of mirror resource.
Error	Command(clprelpath) timeout.	Failed in operation, because timeout has occurred in executing the command (clprelpath).	System is highly loaded. Take the cause of high load off.
Error	Command(mount) return error.	Failed in operation, because an error occurred in executing the mount command.	Make sure that mount option of mirror resource is properly configured.  Make sure that mount option that is supported by file system is configured.  Make sure that the directory of mount point of the mirror resource exists.
Error	Command(umount) return error.	Failed in operation, because an error occurred in executing the umount command.	Make sure that the directory of mount point of the mirror resource exists.
Error	Command(fsck) return error.	Failed in operation, because an error occurred in executing the fsck command.	Make sure that fsck option of mirror resource is properly configured.  Make sure that the fsck option supported by file system exists.
Error	Mirror disk is busy in activate.	Failed in operation, because the mirror disk is now being activated.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to get the diff bitmap of mirror disk.	Failed to acquire the difference information of mirror disk from the mirror agent.	Make sure that the setting value related to the mirror disk is not wrong.  Shut down and reboot a cluster.
Error	Failed to get the device size of mirror disk.	Failed in operation, because acquiring the device size of mirror disk failed.	Make sure that mirror disk setting (especially in data partition) does not contain any error.

Level	Message	Cause	Solution
Error	Failed to start the cluster "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.</p> <p>The name of the cluster is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to stop the cluster "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.</p> <p>The name of the cluster is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to suspend the cluster "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.</p> <p>The name of the cluster is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to resume the cluster "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster at when being operated from another WebManager or by the clpcl command may not be reflected on the display.</p> <p>The name of the cluster is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to restart the manager service. Click the Reload button, or try again later.	An error occurred on the data transfer server of ExpressCluster.	Check the status of the data transfer server of ExpressCluster.

Level	Message	Cause	Solution
Error	Failed to start the server "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of cluster at when the cluster is operated from other WebManager, or the status of server is changed may not be reflected.</p> <p>The name of the server is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to stop the server "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of cluster at when the cluster is operated from other WebManager, or the status of server is changed may not be reflected.</p> <p>The name of the server is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to suspend the monitor "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.</p> <p>The name of the monitor resource is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to resume the monitor "{0}". Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.</p> <p>The name of the monitor resource is displayed where {0} is represented.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to suspend the monitor. Click the Reload button, or try again later.	<p>The status of a cluster may not be the latest.</p> <p>The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.</p>	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
Error	Failed to resume the monitor. Click the Reload button, or try again later.	The status of a cluster may not be the latest.  The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to update the data in real time. Trying to connect to the server again.	Connection may have already reached the maximum number.	Change the setting on <b>IP Addresses of the Accessible Client</b> of WebManager.  Terminate the unneeded WebManager.
Error	Failed to start the resource "{0}". Click the Reload button, or try again later.	The status of a cluster may not be the latest.  The status of the cluster when being operated from another WebManager may not be reflected on the display.  The name of the resource is displayed where {0} is represented.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to stop the resource "{0}". Click the Reload button, or try again later.	The status of a cluster may not be the latest.  The status of the cluster when being operated from another WebManager may not be reflected on the display.  The name of the monitor resource is displayed where {0} is represented.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to suspend any monitor. Click the Reload button, or try again later.	The status of a cluster may not be the latest.  The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to resume any monitor. Click the Reload button, or try again later.	The status of a cluster may not be the latest.  The status of the cluster when being operated from another WebManager or by the clpmonctrl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
Error	Failed to start mdagent.\nClick the Reload button, or try again later.	ExpressCluster daemon is not started.  The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.	Make sure the ExpressCluster daemon of each server is up and running.  Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Failed to stop mdagent.\nClick the Reload button, or try again later.	The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	Could not start the group because it has recovering mirror disk.\nTry again after mirror recovery is completed.	Starting failover group will be stopped because there is a mirror disk resource processing mirror recovery on the failover group.	Perform the same operation after mirror recovery is completed.
Error	Could not move the group because it has recovering mirror disk.\nTry again after mirror recovery is completed.	Moving failover group will be stopped because there is a mirror disk resource processing mirror recovery on the failover group.	Perform the same operation after mirror recovery is completed.
Error	Could not start the mirror disk because it is recovering now.\nTry again after mirror recovery is completed.	Starting a resource will be stopped because the mirror disk resource is processing mirror recovery.	Perform the same operation after mirror recovery is completed.
Error	An internal error occurred.	A memory shortage, network error, file system capacity shortage or other OS resource shortage occurred on the server where the WebManager is connected to.	Make sure that there is enough space of OS resource, network or file system in the server.
Error	Mirror Agent service is not running.	Mirror agent daemon is not started.	Start the mirror agent daemon, and then try it again.
Error	The operation timeout period has expired.	Timeout has occurred when the WebManager is collecting data from the mirror agent.	The system is highly loaded. Take the cause of high load off.  When the system is temporarily in high load, change the ratio of timeout using the clptoratio command.

Level	Message	Cause	Solution
Error	Because server "{0}" has I/O error in accessing cluster partition, the action you selected cannot be executed. Please select another server.	The I/O error has occurred in connecting the cluster partition at the server; {1}.	<ul style="list-style-type: none"> <li>- Select the other server.</li> <li>- Check the shared disk.</li> </ul>
Error	Because server "{0}" has I/O error in accessing cluster partition, the action you selected cannot be executed. Please select another server.	The I/O error has occurred in connecting the cluster data partition at the server; {1}.	<ul style="list-style-type: none"> <li>- Select the other server.</li> <li>- Check the shared disk.</li> </ul>
Warning	The mirror disk list data may have not been fully obtained from the server.	An error has occurred in acquiring the failed mirror disk list data.	Check to see the status of mirror disk agent, and then, perform the reload.
Error	Failed to start mdagent. Check the cluster and mdagent status. Click the Reload button, or try again later.	ExpressCluster daemon/mirror agent is already started.  The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.	<ul style="list-style-type: none"> <li>Check to see the status of the cluster and mirror disk agent.</li> <li>Click the <b>Reload</b> button to display the latest status of a cluster, and try again.</li> </ul>
Error	Failed to stop mdagent. Check the cluster status. Click the Reload button, or try again later.	The ExpressCluster daemon is up and running.  The status of the cluster when being operated from another WebManager or by the clpcl command may not be reflected on the display.	<ul style="list-style-type: none"> <li>Check to see the status of the cluster and mirror disk agent.</li> <li>Click the <b>Reload</b> button to display the latest status of a cluster, and try again.</li> </ul>
Error	Failed to change to current server.	Failed to change the current right.	<ul style="list-style-type: none"> <li>Check to see the status of the mirror agent.</li> <li>Click the <b>Reload</b> button to display the latest status of a cluster, and try again.</li> </ul>
Error	Cannot get the current server information.	An error has occurred in acquiring the current server information.	Check to see the status of mirror agent, and try again.
Error	This server is not current server. Cannot perform this action.	The server you specified is not the current server.	Click the <b>Reload</b> button to display the latest status of a cluster, and try again.
Error	A server is changing the current server. This action cannot be performed.	A server is changing the current server.	Wait for a while, and try again.



## Chapter 2      Functions of the Integrated WebManager

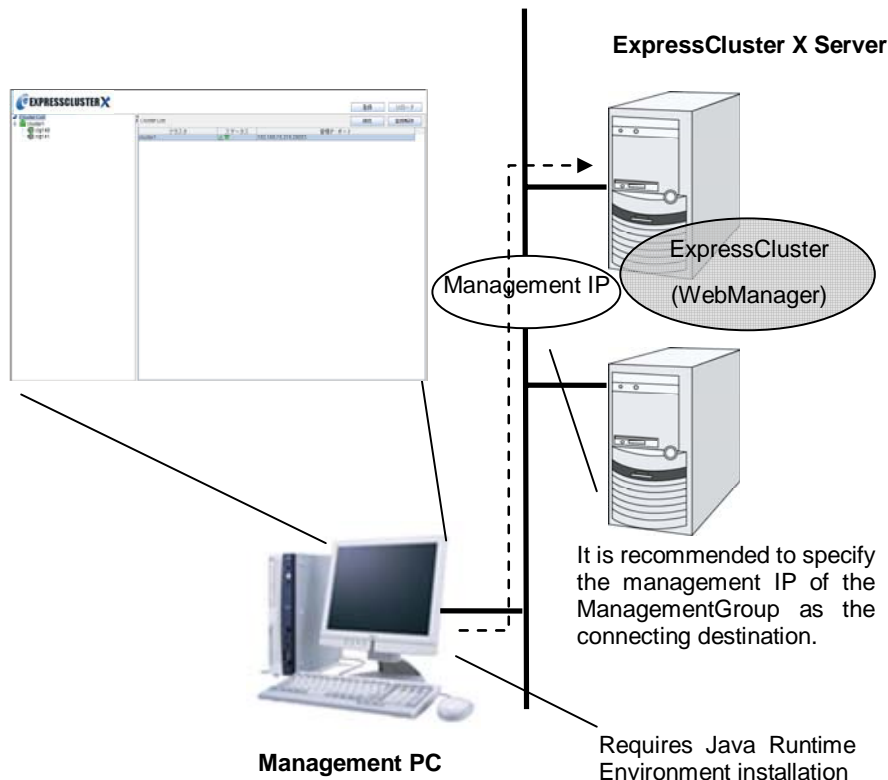
This chapter provides information on functions of the Java Applet version Integrated WebManager. Refer to “ExpressCluster® X Integrated WebManager Administrator’s Guide” for the Java application version. Integrated WebManager.

This chapter covers:

- What is the Integrated WebManager? ..... 114
- Access to the Integrated WebManager ..... 115
- The window of the Integrated WebManager ..... 116
- Error messages on the Integrated WebManager ..... 121

## What is the Integrated WebManager?

The Integrated WebManager is a function that collectively manages and monitors multiple cluster systems through the network. The following diagram shows the overview of the Integrated WebManager.

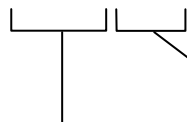


There are two types of the Integrated WebManager: One is the Java applet version that operates on a Web browser, and the other is the Java application version that can be operated by installing on a management PC and executed on Java Runtime Environment (JRE). This guide describes the functions on Java applet version of Integrated WebManager. Refer to the "ExpressCluster® X Integrated WebManager Administrator's Guide" for the Java application version of Integrated WebManager.

## Access to the Integrated WebManager

You can access to the Integrated WebManager from a management PC or from an ExpressCluster-installed server by entering the following URL in the browser.

`http://10.0.0.3:29003/clusterlist.htm`



The port number for the WebManager. (Default value 29003).

Specify the actual IP address of the ExpressCluster Server-installed server or the management IP.

## The window of the Integrated WebManager

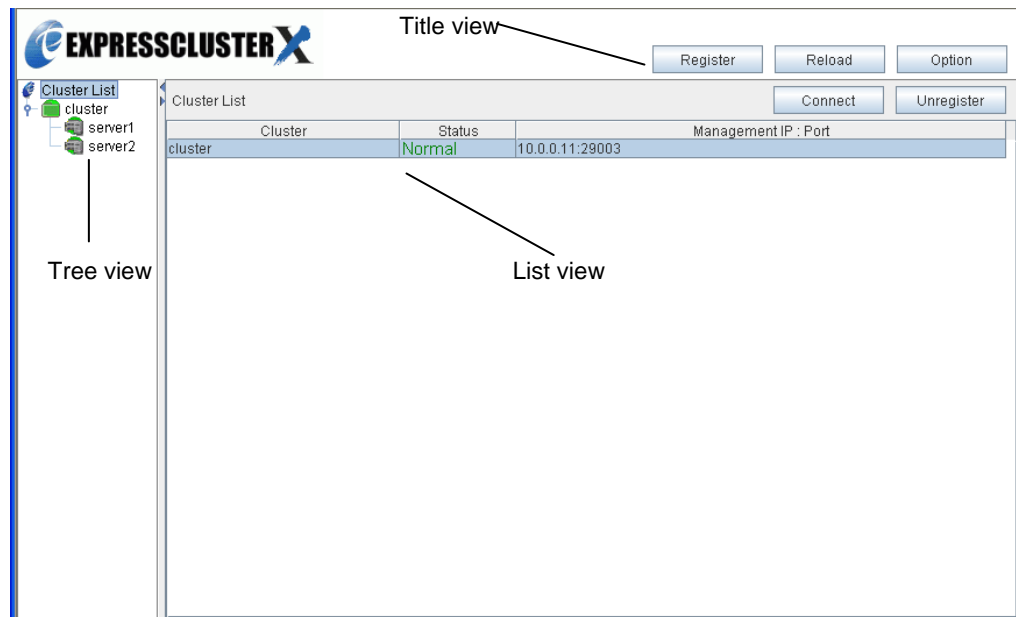
This section provides information on the window of the Integrated WebManager.

### Note:

The windows of the Integrated WebManager used in this explanation are based on the display in the English environment.

## The main window of the WebManager

The window of the Integrated WebManager consists of three views.



### Title view

The following operations can be performed by using two buttons.

- ◆ Register
- ◆ Reload
- ◆ Option (setting if replacing the management IP address with the public LAN IP address)

### Tree view

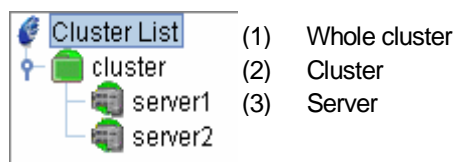
Information on the cluster or server selected here is displayed on the List view area.









### List view

The information on the cluster and/or server selected in the tree view is displayed.

## How to verify the status of each object in the tree view of the Integrated WebManager

You can visually verify the status of each object that consists of a cluster on the Integrated WebManager. The following shows the status of each object.



No.	Icon	Status	Description
(1)	Whole cluster		- No status
(2)	Cluster		Normal All servers have been started.
			Warning One or more server is down or in the suspended status.
			Error All servers are down or in the suspended status (isolated) .
			Unknown No information is acquired.
(3)	Server		Online The server is running normally.
			Warning Some servers cannot communicate.
			Offline or Unknown The server is not working, or no information is acquired.

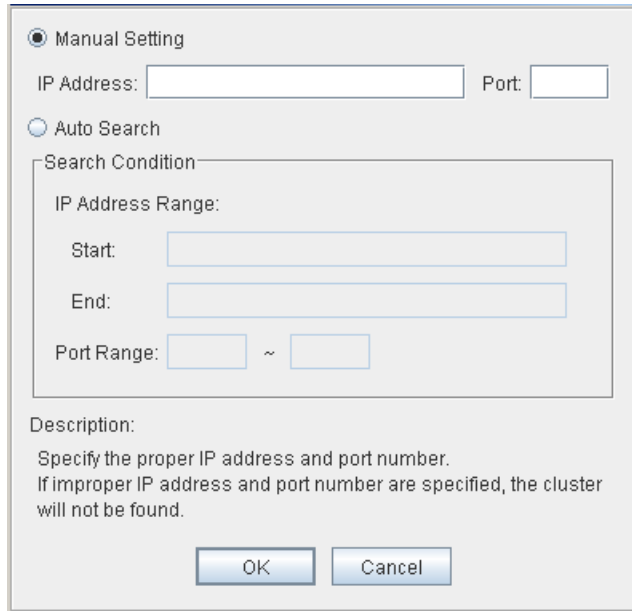
## The title view of the Integrated WebManager

You can perform two types of operation by clicking the buttons on the title view.



## How to register a cluster to the Integrated WebManager

In the title view on the top of the Integrated WebManager window, click **Register** to register a cluster to the Integrated WebManager. **Register Cluster** dialog box is displayed.



The **Register Cluster** dialog box is shown with the **Manual Setting** radio button selected. It contains fields for **IP Address** and **Port**. Below these is the **Auto Search** radio button and a **Search Condition** section. The **Search Condition** section includes **IP Address Range** with **Start** and **End** fields, and **Port Range** with two fields separated by a tilde (~). At the bottom, there is a **Description** text box with instructions: "Specify the proper IP address and port number. If improper IP address and port number are specified, the cluster will not be found." and **OK** and **Cancel** buttons.

### Manual Setting

Enter the management IP or the actual IP address of the cluster server and the port number of the WebManager to register the cluster to the Integrated WebManager.

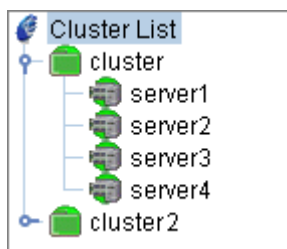
#### IP address

Enter the management IP of the cluster or the actual IP address of the cluster server.

#### Port

Enter the port number of the WebManager (default value 29003).

Click **OK**. If an IP address and/or port number is registered successfully, a cluster icon is added to the tree view. If it is not registered successfully, no icon is added. Check if IP address and Port are specified correctly and if a cluster is started.



**Auto Search**

Detects clusters on the network and registers it to the Integrated WebManager automatically,.

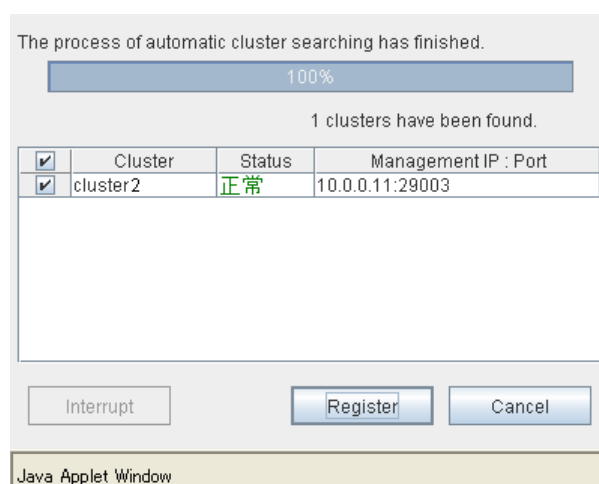
**IP Address Range:**

The range where you want to search the IP addresses is specified by entering an IP address for both **Start:** and **End:**.

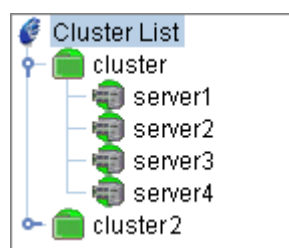
**Port Range:**

Enter the range of the port number that is a target of the search.

To start a search, click **OK**. When the search completes, the result will be displayed.



Select the cluster you wish to register to the Integrated WebManager and click **Register**. The cluster will be displayed in the tree view.



## How to update the information on the Integrated WebManager

In the title view on the top of the Integrated WebManager window, click **Reload** to update the information displayed on the Integrated WebManager.

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### Note:

Although what is displayed on the Integrated WebManager is automatically updated, it does not always display the latest status because of the refresh interval configuration. To display the latest information, click the **Reload** button after performing an operation.

To configure the automatic reload interval of the WebManager, from the shortcut menu, select **Properties**. In the properties dialog box, click the **WebManager** tab. Then click on **Turning** and point to **Screen Data Refresh Interval**.

Some objects may be displayed in gray when connection to the server that the objects belong has some error or ExpressCluster on the server is not working.

---

## How to start up a WebManager from the Integrated WebManager

There are the following two ways to start up the WebManager from the Integrated WebManager.

### Start the WebManager by using the management IP

From the tree view of the Integrated WebManager, right-click on a cluster you want its WebManager to start. From the menu displayed, select **Connect to Management IP**.

### Start the WebManager by using an actual IP address of a server

#### ◆ Using **Connect**

From the tree view of the Integrated WebManager, select a cluster or a cluster server you want its WebManager to start. From the list view, click **Connect**.

#### ◆ Using the right-click menu

From the tree view of the Integrated WebManager, right-click on a cluster you want its WebManager to start. From the menu displayed, select **Connect to XXX.XXX.XXX.XXX**, where xxx...represents the IP address of the actual IP address of the server.

## How to remove a cluster from the Integrated WebManager

#### ◆ Using **Unregister**

From the tree view of the Integrated WebManager, select the icon to remove. In the list view, click **Unregister**.

\* Clusters are deleted in the order that is displayed on the tree view.

#### ◆ Using the right-click menu

Select the cluster to be deleted from the tree view of the Integrated WebManager, and right-click. Select **Unregister** from the right-click menu.

## Error messages on the Integrated WebManager

The following is a list of error messages displayed when using the Integrated WebManager:

Level	Message	Cause	Solution
Error	The local applet version does not match the server's. Close the browser and clear the applet cache.	Versions of Java applet and server do not match because Java cache remains.	Terminate the browser. Clear the cache of Java and restart the browser.
Error	The local applet version does not match the server's. Close the browser and clear the applet cache.	Failed to get the cluster information of the destination server.	Check if ExpressCluster is operating in destination server by using the clpstat command.
		Failed to get all cluster information in the cluster tree view.	Check if all cluster management IPs in the cluster tree are operating properly.
Error	Another user is performing auto-search now. Try it again later.	Other WebManager has already performed auto-search.	Perform auto-search after waiting for a while.
Error	Internal error.	Internal error has occurred in the WebManager.	Perform auto-search again.
			If this error occurs again, restart the WebManager service.
Warning	Failed to obtain a part of the cookie data.	Cookie file corresponding to the IP address of the server connected to the browser is corrupted.	Delete the cookie file, close the browser, and then restart the browser.
Warning	Could not save the cluster list because cookie is not allowed. Make cookie settings enabled to display the list of clusters, and then restart your browser.	Use of cookie is prohibited by the browser.	Allow cookie on your browser.
Error	The specified cluster "{0}" has been registered.	Same cluster name already exists in the cluster tree view.	-
Info	The cluster "{0}" has been successfully registered.	Specified cluster is registered to the tree.	-
Error	The cluster cannot be unregistered now because it is being updated to the latest data. Try again later.	Getting the latest information from the WebManager Server.	Try again after the update is completed.
Error	Failed to find this cluster. Check that	The cluster was not found by the IP address and	Check if the IP address and port number is correct.

Level	Message	Cause	Solution
	the IP address or port number is correct, and that the cluster is started.	port number that you have entered.	Check if the cluster that you want to find is operating.
Confirmation	Are you sure to unregister "{0}"?	Are you sure to delete the selected cluster?	-
Error	Specify the IP address.	The IP address is not set.	Close the error dialog box and configure the IP address of the cluster.
Error	Specify the port number.	The port number is not set.	Close the error dialog box and set the port number of the cluster.
Error	The specified IP address is invalid.	The specified IP address is invalid.	Close the error dialog box and set the correct IP address.
Error	The specified IP address range is invalid.	The value of start IP address is larger than stop IP address.	Specify the correct IP address range.
Error	Specify the value of 1 - 65535 to the port number.	The value of port number is outside of the range.	Specify the value between 1 through 65535.
Error	The specified port range is invalid.	The value of start port number is larger than stop port number.	Specify the correct range of port number.
Error	The version of the specified IP Addresses is not same.	The IP versions are different between start IP address and stop IP address.	Specify the correct range of IP addresses.
Error	The first 64 bits of specified start IP Address is different from the first 64 bits of end IP Address.	The first 64 bits of IPV6 are different.	Specify the correct range of IP addresses.
Error	The server which the integrated WebManager is connected to does not support IPv6.	The OS of a server to which the integrated viewer is connecting does not support IPv6.	Specify the IP address of IPv4.
Error	The server which the integrated WebManager is connected to does not support IPv4.	The OS of a server to which the integrated viewer is connecting does not support IPv4.	Specify the IP address of IPv6.
Error	You have specified multicast type of IP Addresses.	Multicast address is specified.	Specify the correct IP address.

## Chapter 3      Functions of the Builder

This chapter provides information on functions of the ExpressCluster X Builder.

This chapter covers:

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## Overview of the Builder

The ExpressCluster X Builder is a tool for creating and changing the cluster configuration data (config and scripts).

There are two versions of the Builder; online version and offline version.

- ◆ Online version  
With the online version Builder, you can connect to the server directly to create a cluster, change its configuration and distribute the cluster configuration data.
- ◆ Offline version  
With the offline version Builder, you can create or change the cluster configuration data on the machine which cannot connect to a server.  
To distribute the cluster configuration data, you need to use the clpcfctrl command.

---

**Note:**

“Linux version” in this guide represents the Builder that runs on the Linux browser. “Windows version” represents the Builder that runs on the Windows browser. “Host name” in this guide represents the short name that excludes the domain name from a frequently qualified domain name (FQDN).

---

## Considerations for using the Builder

- ◆ The following products' cluster configuration data is not compatible.  
The Builder of other than the ExpressCluster X 2.0/2.1 for Linux
- ◆ If you close the Web browser (by clicking **Exit** from the menu or clicking **X** at the top right-hand corner of the window frame), the changes made will be discarded. Even when you changed the configuration data, no dialog box asks if you need to save the changes. To save the changes, click **File** from the menu bar on the Builder and then click **Save** before you exit.
- ◆ If you reload data on the Web browser (by selecting **Refresh** from the menu or clicking **Reload** on the toolbar), the changes you made will be discarded. Even when you changed the configuration data, no dialog box asks if you need to save the changes. To save the changes, click **File** from the menu bar on the Builder and click **Save** before you reload.
- ◆ Do not specify a number smaller than 30 seconds for **Reload Interval** in the **WebManager** tab (See “WebManager tab” on page 174 for details). If you have to set a smaller number for this field than the default value, test thoroughly to see if it works properly before you start the operation.
- ◆ When creating the cluster configuration data using the Builder, do not enter the value starting with 0 on the text box. For example, if you want to set 10 seconds for a timeout value, enter “10” but not “010.”

## Limitations on using the Builder

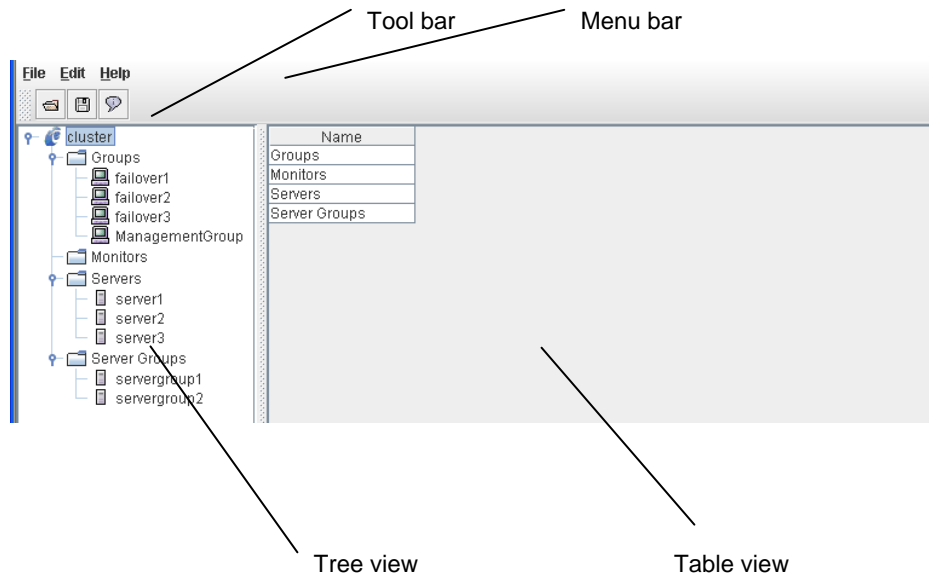
- ◆ If you change the screen resolution while the Builder is running, the Java VM stack trace (example: NullPointerException) may be logged on the Java console. The Builder can keep running.
- ◆ If you press **Esc** while a pull-down menu of your browser is displayed, the Java VM stack trace (example: NullPointerException) may be logged on the Java console. The Builder can keep running.
- ◆ In some cases, you cannot use the keyboard because the keyboard focus of the Builder becomes disabled (the focus changes to the Web browser). Click the Builder window and get the focus back to the Builder.
- ◆ When you are using the multi-display function, do not run the Builder on the secondary display. Otherwise, it may not work properly. For example, the screen is not displayed. Use the Builder on the primary display.
- ◆ When using the browser on Linux, depending on the combination with the Window Manager, the dialog may be placed behind other windows. Switch the window with **ALT + TAB**.
- ◆ When opening or saving the cluster configuration data on Linux, general users cannot use a 1.44MB FAT (VFAT) formatted floppy disk. If you want to handle the cluster configuration data on the Builder running on the Windows Web browser as well, log on as a root user.
- ◆ On the **Alert Log** tab (see “Alert Log tab” on page 179), for **Max. Number to Save Alert Records**, if you set a number smaller than the current one, all alert logs will be deleted. Take into account the available disk space, and specify the number before you start the operation.
- ◆ In the environment where both Microsoft Windows Vista™ and Internet Explorer 7 are used, disable **Protected Mode** on the security setting of Internet Explorer 7.
- ◆ The JIS 2004-unique characters supported by Microsoft Windows Vista™ are not supported. Thus, you cannot enter or view the characters added by JIS 2004.

## Details on the Builder screen

This topic explains the Builder screen layout.

### Overview of the ExpressCluster X Builder









The screen layout of the Builder is displayed below.



The tree view on the left pane shows the cluster objects in the hierarchical order. If you select an object from the tree view, its subordinate objects are displayed in the table view on the right pane.

### Tree view

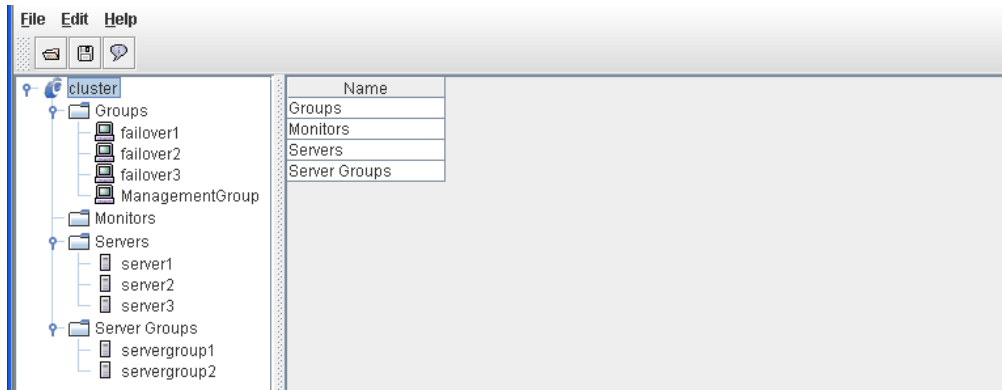
The following objects are displayed in the tree view:

Hierarchy	Object	Contents	Table view when the object is selected
1		Represents the cluster.	Displays cluster names.
2	 Groups	Represents a set of groups in the clusters	Displays groups.
3		Represents each group.	Displays group names.
2	 Monitors	Represents a set of monitor resources in the clusters	Displays monitors.
2	 Servers	Represents a set of servers in the clusters	Displays servers.
3		Represents an individual server.	Displays server names.
2	 Server Groups	Represents a set of server groups in the clusters	Displays server groups.
3		Represents a server group	Displays the server group name.

## Table view

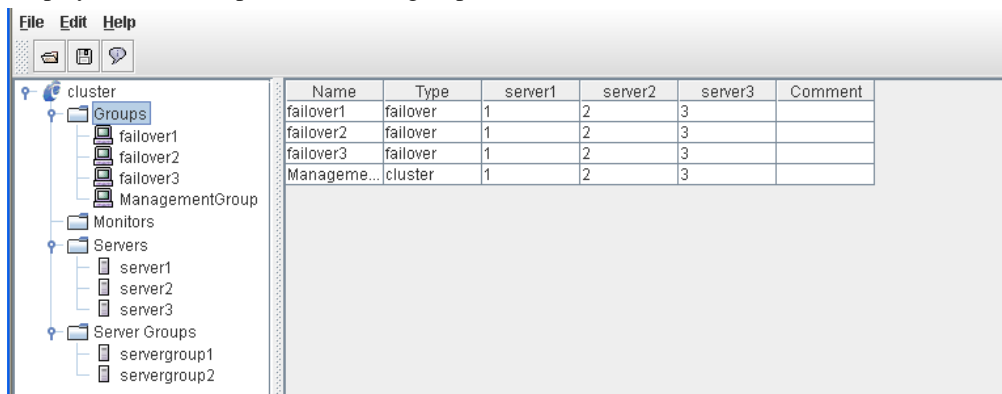
### Table for cluster name selection

Displays objects under the root hierarchy.



### Table for group selection

Displays the failover priorities of the groups.

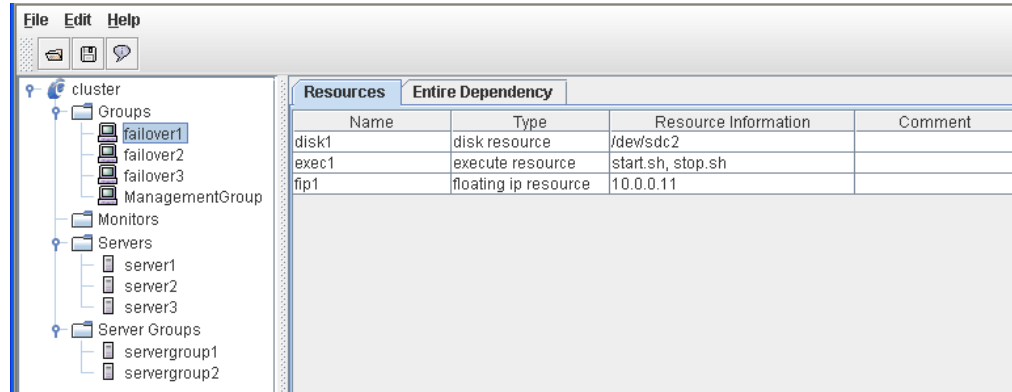


Column name	Overview
Name	Displays the group names in alphanumerical order.
Type	Displays the group type.
Server names (The number of columns dynamically increases or decreases according to the number of servers)	Represents the startup order of groups on the servers displayed by column names. The top priority is represented with "1."
Comment	Displays comments specified for the groups.

## Table for group name selection

### Resources

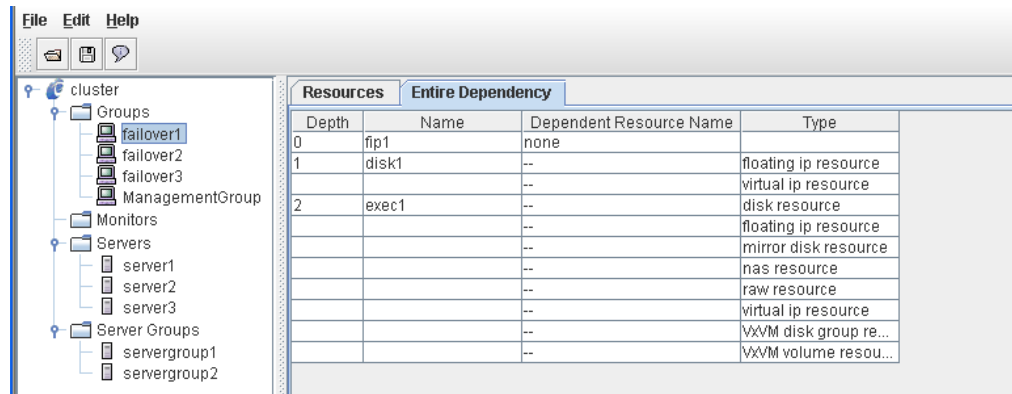
Group resources in the selected group are listed.



Column name	Overview
Name	Displays group resource names in alphanumerical order.
Type	Displays a group resource type.
Resource Information	Displays objects to be activated or deactivated for the group resource.
Comment	Displays comments specified for the group resource.

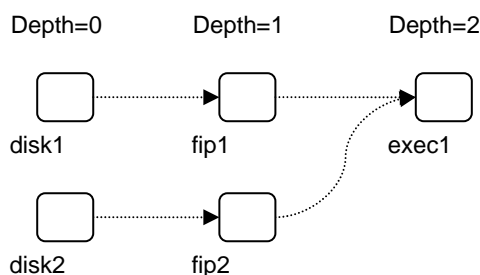
### Dependency List

Dependency among group resources in a selected group is listed.



Column name	Overview
Depth	Represents the target activation order of group resources in the name cells. If a group resource does not depend on any group resource, "0" is displayed. Group resources are displayed in the depth order.
Name	Displays the group resource name.
Dependent Resource Name	Displays the group resource names that the group resources in the name cells depend on. If a group resource does not depend on any group resource, "none" is displayed. When following the default dependency, "--" is displayed. If there are multiple dependent resources, they are displayed in separate rows.
Type	Displays the group resource type in Dependent Resource Name. When following the default dependency, the dependent type is displayed.

The levels of depth are illustrated below. Arrows (->) in the figure represent the group resource activation order.

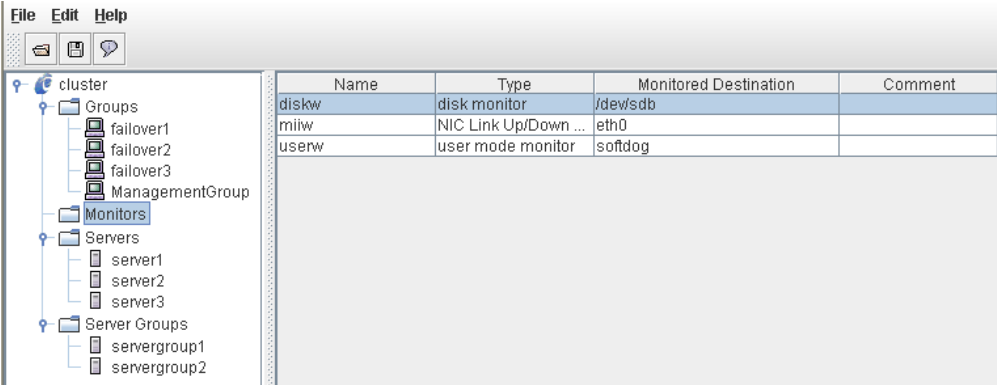


The dependencies in this figure are listed below. These are not the default dependencies, but specified with resource names.

Depth	Name	Dependent Resource Name	Type
0	disk1	none	
0	disk2	none	
1	fip1	disk1	disk resource
1	fip2	disk2	disk resource
2	exec1	fip1	floating ip resource
		fip2	floating ip resource

## Table for monitor resource selection

Displays the list of monitor resources.

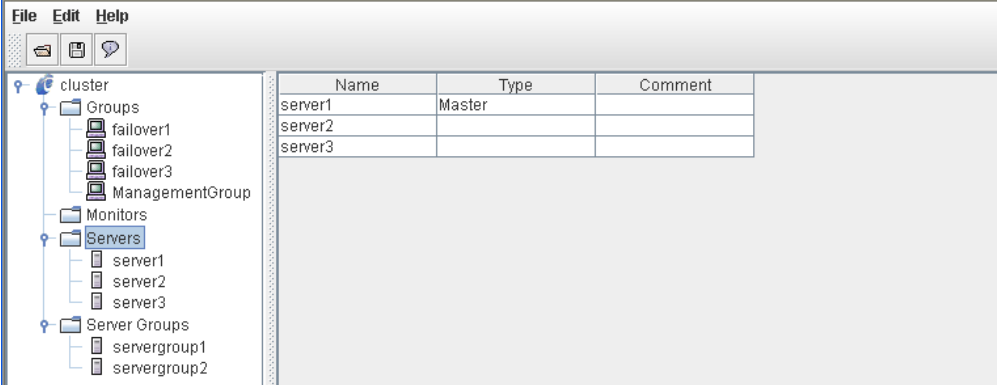


Name	Type	Monitored Destination	Comment
diskw	disk monitor	/dew/sdb	
miw	NIC Link Up/Down ...	eth0	
userw	user mode monitor	softdog	

Column name	Overview
Name	Displays monitor resource names in alphanumerical order.
Type	Displays the monitor resource type.
Monitored Destination	Displays the monitor resource to be monitored.
Comment	Displays comments specified for the monitor resource.

## Table for server selection

Displays the list of servers.

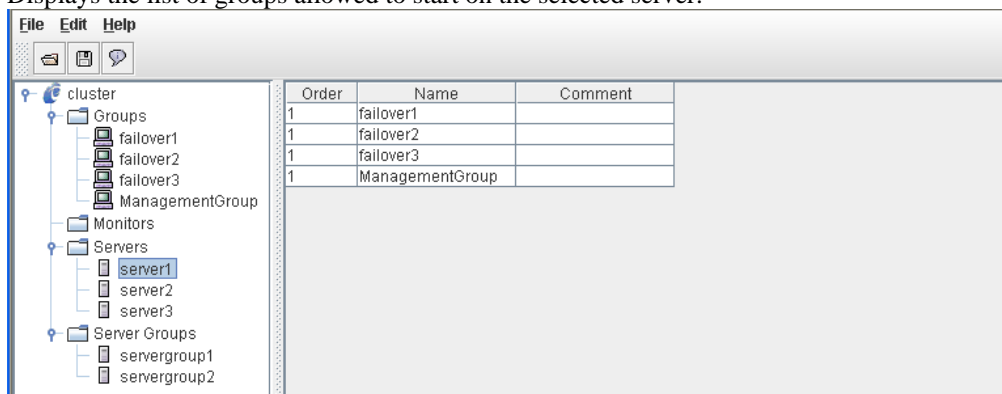


Name	Type	Comment
server1	Master	
server2		
server3		

Column name	Overview
Name	Displays server names in alphanumerical order.
Type	If the server is specified as the master server, "Master" is displayed.
Comment	Displays comments specified for the server.

## Table for server name selection

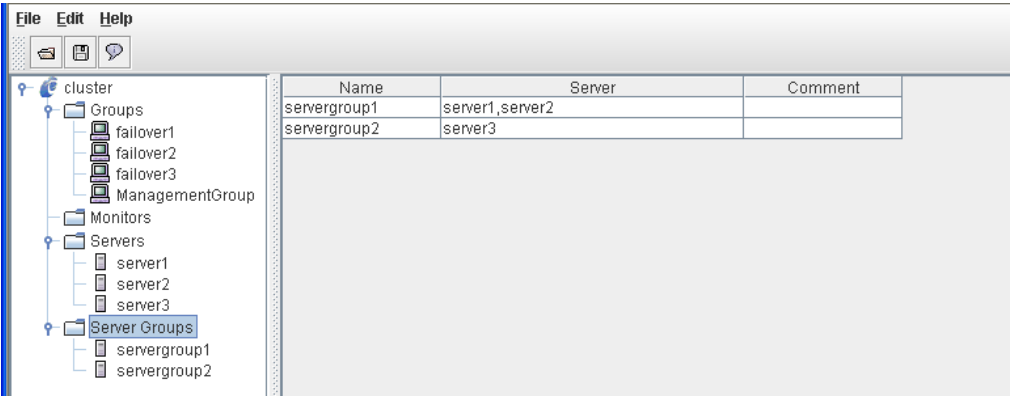
Displays the list of groups allowed to start on the selected server.



Column name	Overview
Order	Displays the server priority. The groups in the name cells start on servers in this order. "1" is displayed for the top priority. This list is displayed in the descending order of priority.
Name	Displays the group name.
Comment	Displays comments specified for the group.

# Table for server groups selection

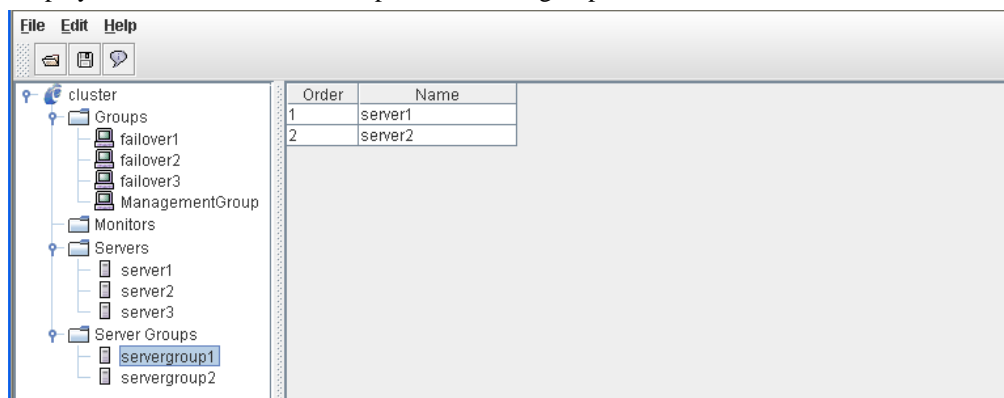
Displays the list of server groups.



Column name	Overview
Name	Displays server group names in alphanumerical order.
Server	Displays names of servers contained in the server group.
Comment	Displays comments specified for the server group.

## Table for server group names selection










Displays the list of servers in the specified server group.



Column name	Overview
Order	Displays the server priority.
Server	Displays names of servers in the server group.

## Pop-up menu

Pop-up menus are displayed by right-clicking a tree object or table row.

If select	Displayed menu	Refer to
 <i>no_cluster_name</i>	Cluster Generation Wizard	Creating a new cluster (on page 137)
 <i>cluster_name</i>	Remove Cluster	Removing an object(on page 148)
	Rename Cluster	Renaming an object (on page 149)
	Properties	Properties (on page 150)
 Servers	Add Server	Adding an object (on page 147)
	Properties	Properties (on page 150)
 <i>server_name</i>	Remove Server	Removing an object(on page 148)
	Rename Server	Renaming an object (on page 149)
	Properties	Properties (on page 150)
 Monitor Resources	Add monitor resource	Adding an object (on page 147)
 Groups	Add Group	Adding an object (on page 147)
	Add Group for WebManager	Chapter 5 “Creating the cluster configuration data using the Builder” in the <i>Installation and Configuration Guide</i>
 <i>group_name</i>	Add Resource	Adding an object (on page 147)
	Remove Group	Removing an object(on page 148)
	Rename Group	Renaming an object (on page 149)
	Properties	Properties (on page 150)
<i>group_resource_name</i>	Remove Resource	Removing an object(on page 148)
	Rename Resource	Renaming an object (on page 149)
	Properties	Properties (on page 150)
<i>monitor_resource_name</i>	Remove Monitor Resource	Removing an object(on page 148)
	Rename Monitor Resource	Renaming an object (on page 149)
	Properties	Properties (on page 150)
 Server Groups	Add server groups	Adding an object(On page 147)
 <i>server_group_name</i>	Remove Server Group	Removing an object(On page 148)
	Rename Server Group	Renaming an object(On page 149)
	Properties	Properties(On page 150)

## Using a tool bar of the Builder

The Builder provides a toolbar:






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**Note:**

Drag and drop the left corner of the bar to move it.

---

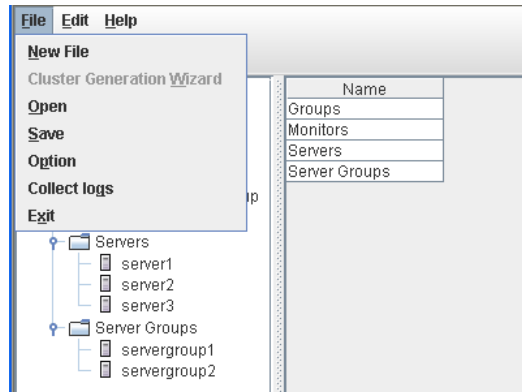
If you click the three icons on the toolbar, you can perform the same operations as some functions of the pull-down menu displayed on the top of the screen.

Button	Function	Refer to
	Opens a file. This is the same as clicking <b>File</b> from the menu bar and then selecting <b>Open</b> .	"Opening the configuration file" (on page 138)
	Saves a file. This is the same as clicking <b>File</b> from the menu bar and then selecting <b>Save</b> .	"Saving the configuration file" (on page 139)
	Displays the version information. This is the same as clicking <b>Help</b> from the menu bar and then selecting <b>Version Information</b> .	"Checking the version information of the Builder" (on page 150)

## Using the menu bar of the Builder

You can perform various operations by using the menu bar of the Builder. This topic explains the operations to be executed using the menu bar.

### File menu



### Creating a new cluster

Create a new cluster using the Builder.

---

**Important:**

If you create a new cluster, the cluster configuration data that has been edited will be discarded. Be sure to save the required data before you create a new cluster.

---

1. On the menu bar, click **File** and then click **Create New File**.
2. If you made changes in the cluster configuration data, a dialog box asks if you want to save them before they are discarded. Click **Yes** to save the changes. A dialog where you can specify a folder to save the cluster configuration data is displayed. If you do not want to save the changes, click **No**. For how to save the data, see “Saving the configuration file” on page 139.
3. Right-click the cluster icon on the tree view on the left pane, click **Cluster Generation Wizard** to create a cluster using a wizard.

For details on the cluster generation wizard, refer to Chapter 5, “Creating the cluster configuration data using the Builder” in the *Installation and Configuration Guide*.

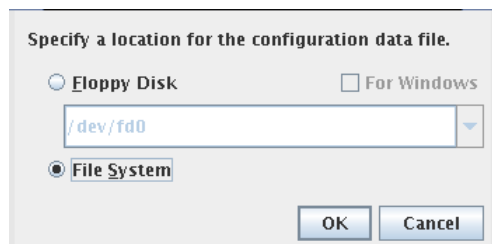
## Opening the configuration file

Select **Open** to open the saved cluster configuration data. A tree view is displayed by the configuration file that has been read.

Select this to restart editing a temporary file saved while editing the configuration data.

### How to use:

#### ◆ For Linux



#### Floppy Disk

If your floppy disk contains the cluster configuration data, select **Floppy Disk**. Select the floppy disk device from the combo box. If you cannot find it in the combo box, type the device path.

#### For Windows

This is enabled when **Floppy Disk** is selected. To open a cluster configuration data that was made by the Builder running on the Windows browser, select **For Windows**.

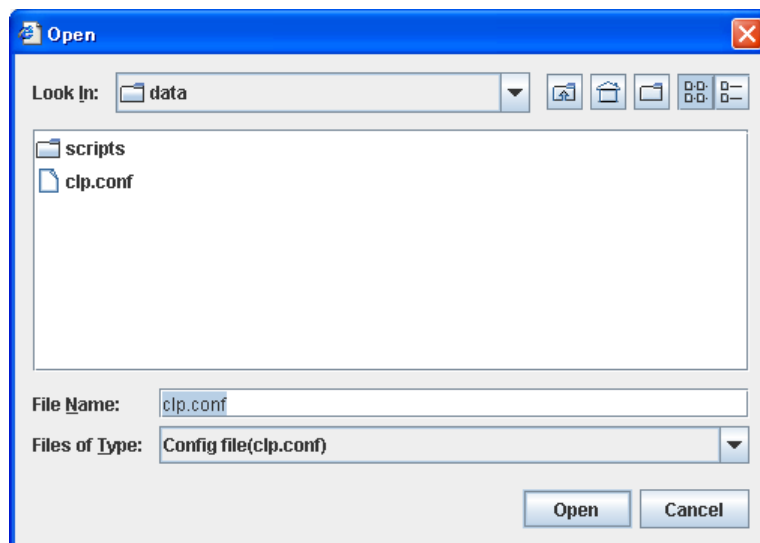
This function is available only for root users.

The Builder mounts or unmounts the floppy disk.

#### File System

Select this to read a cluster configuration data temporarily saved on the file system. Click **OK** to move to the “For Windows” screen.

#### ◆ For Windows



For **File Name**, select or type “clp.conf.”

## Saving the configuration file

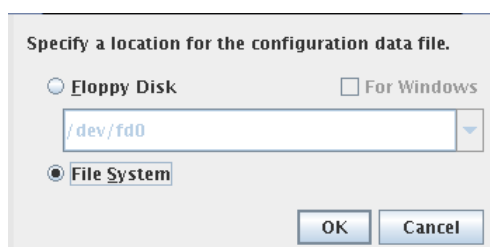
Click **Save** to save the cluster configuration data you are editing. This menu becomes available if you have created a cluster configuration data. Save the file as “clp.conf.”

To save a cluster configuration data, the following conditions should be satisfied.

- ◆ The server exists.
- ◆ LAN heartbeat resource or kernel-mode LAN heartbeat resource exists.

### How to use:

- ◆ For Linux



### Floppy Disk

To save the cluster configuration data in a floppy disk, click **Floppy Disk**. Select the floppy disk device from the combo box. If you cannot find it in the combo box, type the device path.

### For Windows

This is enabled when **Floppy Disk** is selected. If you want to edit the data also by the Builder running on the Windows browser, select **For Windows**. This function is available only for root users. The Builder mounts or unmounts a floppy disk. Prepare a Windows FAT (VFAT)-format 1.44-MB floppy disk.

### File System

Select this to save the cluster configuration data on the file system. Click **OK** to move to the “For Windows” screen.

---

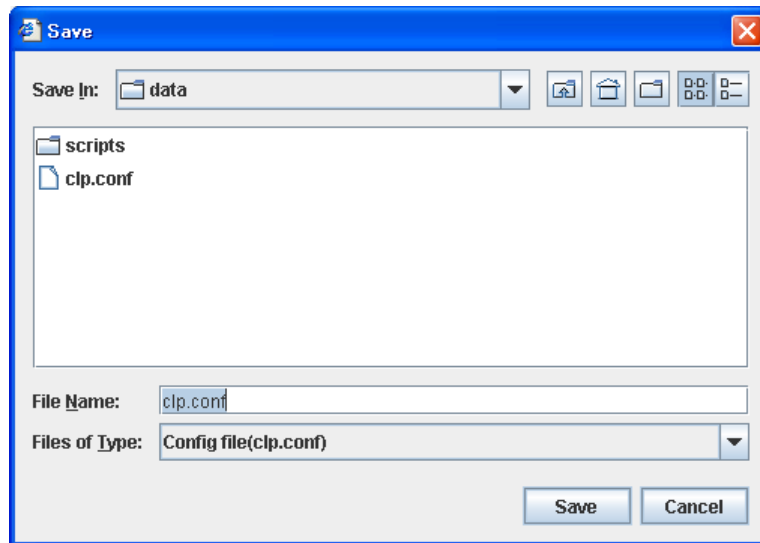
### Note:

When using Builder on the server on which ExpressCluster is operated, do not edit `/opt/nec/clusterpro/etc/clp.conf` on the server directory. Otherwise, messages regarding how to reflect the changes are not properly displayed, and/or ExpressCluster may not work properly. Save the file on a different directory temporarily.

When uploading is performed by using the `clpcfctrl` command, specify the directory where the file is saved by using the `-x` option.

---

◆ For Windows



For **File Name**, select or type “clp.conf.” The server reads this file by “clp.conf.”

## Downloading the configuration file (online version only)

Download the cluster configuration data set to the connected server. Tree view is displayed according to the downloaded configuration file,

If any changes have been made in the data which is being edited, a dialog box that asks if you want to save the data is displayed.

Click **Yes** to save the changes. A dialog where you can specify a folder to save the cluster configuration data is displayed. For how to save the data, see “Saving the configuration file” on page 139.

If you do not need to save the changes, click **No**. The cluster configuration that is being edited is discarded and the configuration file is downloaded.

If you want to cancel downloading, click **Cancel**.

## Uploading the configuration file (online version only)

Upload the cluster configuration data that is being edited to the connected server. You can select this menu when you open a valid cluster configuration file.

The following conditions must be satisfied to upload the configuration file.

- ◆ The ExpressCluster data transfer (clusterpro\_trn) in all the servers in the cluster is properly operated.
- ◆ A LAN heartbeat resource is configured.

---

### Note:

If this condition is not met, connecting to other server fails, so uploading the cluster configuration data fails. In this case, you can only upload the cluster configuration data to a server that can be connected to. For the details, see “Creating a cluster and backing up configuration data (clpcfctrl command)” in Chapter 4 “ExpressCluster command reference”.

---

The following message is displayed while uploading the cluster configuration data. If the uploading the data fails, take an action according to the error message, and upload the data again.

Message	Solution
The upload is completed successfully.	-
The upload is completed successfully. To start the cluster, refer to "How to create a cluster" in the Installation and Configuration Guide.	-
The upload is completed successfully. To apply the changes you made, shutdown and the reboot the cluster.	-
The upload is completed successfully. To apply the changed you made, restart the WebManager from the Service menu.	-
The upload was stopped. To upload the configuration file, suspend the cluster from the Service menu.	Since the cluster has not been stopped, uploading the cluster configuration data has been cancelled. Stop the cluster first, and then upload the data again.
The upload was stopped. To upload the configuration file, stop the groups to which you made changes.	Since the cluster has not been suspended, uploading the cluster configuration data has been cancelled. Suspend the cluster first, and then upload the data again.
The upload was stopped. To upload the configuration file, stop the resources to which you made changes.	Since the group whose settings have been changed has not been stopped, uploading the cluster configuration data has been cancelled. Stop the group whose settings have been changed, or the group to which the resource whose settings have been changed belongs, and then upload the data again.
The upload was stopped. To upload the cluster configuration data, stop the Mirror Agent from the Service menu.	Since the mirror disk agent has not been stopped, uploading the cluster configuration data has been stopped. Stop the mirror disk agent, and then upload the data again.
The upload was stopped. Applying the cluster configuration file failed in one or more servers.	Since the resource whose settings have been changed has not been stopped, uploading the cluster configuration data has been cancelled. Stop the resource whose settings have been changed, and then upload the data again.
The upload was stopped. Applying the cluster configuration file failed in one or more servers.	Since there is a server that failed to send the cluster configuration data, uploading the cluster configuration data has been cancelled. Upload the data again.
The upload was stopped. There is one ore more servers that cannot be connected to. To apply cluster configuration information forcibly, run the clpcfctrl command on the server.	Since there is a server that cannot be connected to exist in the cluster, uploading the cluster configuration data has been cancelled. Make sure that all the servers in the cluster have been started, and then upload the cluster configuration data. Even if a server that cannot be connected to exists in the cluster, to upload the cluster configuration data forcibly, refer to "Creating a cluster and backing up configuration data (clpcfctrl command)" in Chapter 4 "ExpressCluster command reference."

Message	Solution
An error occurred when applying data to the cluster. Cfctrl (%0)	Since an error has occurred while performing processing, uploading the cluster configuration data has been cancelled. Upload the data again.

**Related Information:**

If a server that cannot be connected to exists in the cluster, the cluster configuration data cannot be uploaded from the Builder. In this case, by running the clpcfctrl command, you can forcibly upload the cluster configuration data only on the server that can be connected to.

Follow the steps below to forcibly upload the cluster configuration data.

- (1) Save the cluster configuration data to an appropriate directory of the local disk from the Builder.

Example) Save the configuration data to C:\config

- (2) Save the cluster configuration data that you have saved on a server in the cluster.

Example) Save the data in C:\config that you have saved in step (1) in the /root/tmp directory on a server in the cluster.

- (3) Run the following command on the server where the cluster configuration data has been saved.

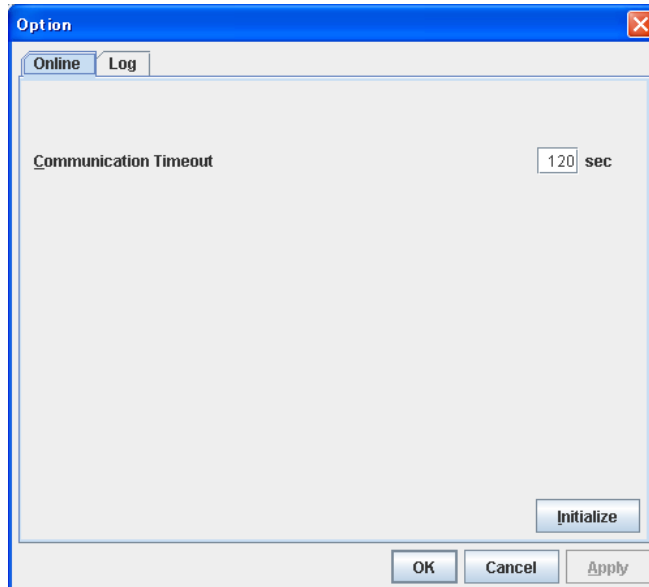
```
clpcfctrl --push -x "Directory where the cluster configuration data
has been saved" --force
```

Example) Run the following command on the server where step (2) has been performed.

```
clpcfctrl --push -x "/root/tmp" --force
```

## Changing communication settings

Select **Option** and **Online** to change settings for server communications. This settings are not recognized in the offline version.

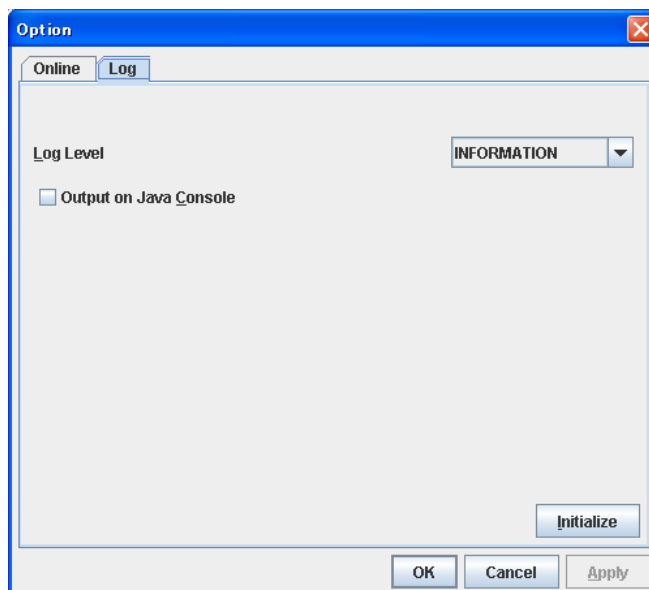


### Communication Timeout (0 to 999)

This is the time-out value when accessing a server.

## Changing the log level settings of Builder

Select **Option** and **Log** to change the log level of Builder.



**Log Level**

Configures the level of internal logs that Builder produces during operation.

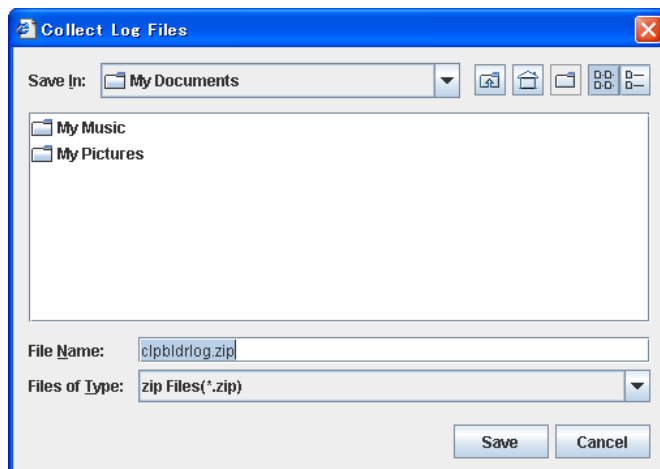
- **ERROR**  
Select this to read only error-level logs.
- **WARNING**  
Select this to read warning-level and error-level logs.
- **INFORMATION**  
Select this to read information-level, warning-level, and error-level logs.
- **TRACE1,2,3**  
Select this to read logs of internal trace, and those from the information, warning and error levels. The greater the number is, more detailed the trace is.

**Output on JAVA Console**

Click this to configure whether or not to output on JAVA console.

## Collecting Builder log

Select **Collect Logs** to collect the Builder logs.



Specify the destination to store logs, and select **Save**.

## Exiting from the Builder

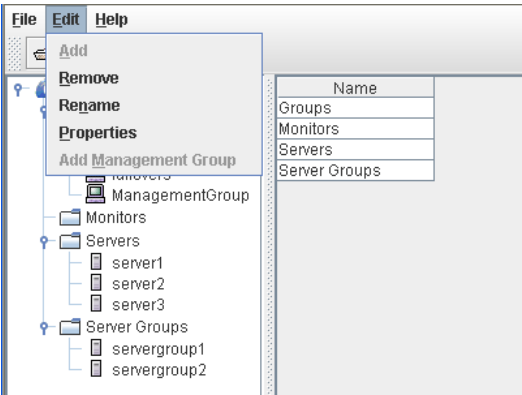
Exit from the Builder by selecting **Exit**. Do not exit from your Web browser.

If any change was made in the cluster configuration data, a dialog box asks if you want to save the changes.

Select **Yes** to save the changes. You see a dialog box where you can specify a folder to save the file. For how to save the file, see “Saving the configuration file” on page 139. Select **No** if you do not need to save the changes. Exit from the Builder discarding the changes you made in the cluster configuration data.

# Edit menu






To open the **Edit** menu: on the menu bar, click **Edit**.



## Adding an object

Displays the wizard for adding a cluster, server, group, group resource, monitor resource, or server group. For details, see Chapter 5, “Creating the cluster configuration data using the Builder” in the *Installation and Configuration Guide*.

What you can add varies depending on what you select as shown below.

If select	Object to be added
 Groups	Group Management group
 <i>group_name</i>	Group resource
 Monitor Resources	Monitor resource
 Servers	Server
 Servers Groups	Server Group

**Note:**

If Auto Failback is set to **Failback Attribute** in **Group Properties**, a mirror disk resource/hybrid disk resource cannot be added. Set **Failback Attribute** to **Manual Failback** and add a mirror disk resource/hybrid disk resource.

## Removing an object

Displays a dialog box that asks if you want to remove the selected cluster, server, group, group resource, monitor resource or server group. Select **Yes** for removing and **No** for not removing it.

To remove a cluster, follow the same procedures described in “Creating a new cluster.”

You cannot remove an object if any of the following conditions is met:

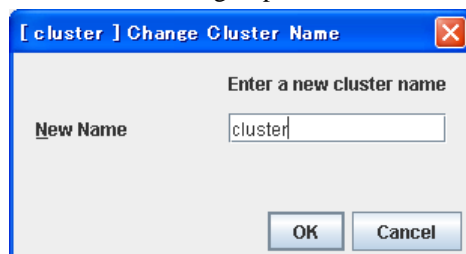
If select	Conditions	How to change
Cluster Name	None	
Server Name	<ul style="list-style-type: none"><li>- There is no other server.</li><li>- The server is the only server where the group can start up.</li><li>- The server is registered with a server group.</li></ul>	Cluster stop, start
Group Name	<ul style="list-style-type: none"><li>- A recovery target of monitor resource<sup>1</sup>.</li><li>- Has group resources.</li></ul>	Cluster stop, start
Group Resource Name	<ul style="list-style-type: none"><li>- A recovery target of monitor resource<sup>1</sup>.</li><li>- A target object of monitor resource monitoring timing<sup>1</sup>.</li><li>- Other group resources in the same group depend on it.</li></ul>	For other than mirror disk resources/hybrid disk resource: Cluster stop, start For mirror disk resources/hybrid disk resources: Cluster stop Mirror agent stop Mirror agent start Cluster start
Monitor Resource Name	<ul style="list-style-type: none"><li>- <b>Auto Mirror Recovery</b> is selected on the <b>Mirror Agent</b> tab of <b>Cluster Properties</b> for mirror disk monitor resource.</li><li>- A virtual IP monitor resource</li></ul>	Cluster suspend, resume
Server Group Name	<ul style="list-style-type: none"><li>- The server group is registered as a server group of failover group.</li></ul>	Cluster stop Mirror agent stop Mirror agent start Cluster start

---

<sup>1</sup> A message asks if you want to delete the specified object's monitor resources. If you select **Yes** (delete), the specified object's monitor resources will be deleted, and the object will be deleted.

## Renaming an object

Displays a dialog box for renaming the selected cluster, server, group, group resource, monitor resource, or server group.



The following are restrictions for each of the objects.

If select	Naming rules	How to change
Group Name	<ul style="list-style-type: none"> <li>-Only alphanumeric characters, hyphen (-), underscore (_) and space are allowed for names.</li> <li>-Up to 31 characters (31 bytes)</li> <li>-Names cannot start or end with a hyphen (-) or space.</li> </ul>	Cluster stop, start
Group Resource Name		For other than mirror disk resource/hybrid disk resource. Cluster stop, start For mirror disk resource/hybrid disk resource Cluster stop Mirror agent stop Mirror agent start Cluster start
Cluster Name Monitor Resource Name		Cluster suspend, resume
Server Name	<ul style="list-style-type: none"> <li>-There are naming rules that are the same as the host name of TCP/IP that can be set by the OS. It should be completely the same as the name set to the server.</li> <li>- Up to 255 characters (255 bytes)</li> <li>- Neither hyphen (-) nor space can be the first or last letter in names.</li> <li>- A name consisting of only numbers is not allowed.</li> <li>- "localhost" cannot be used as a server name.</li> </ul>	When changing a server name, you have to be careful. For the procedure of change, see Chapter 10, "The system maintenance information" in the Reference Guide.
Server Group Name	<ul style="list-style-type: none"> <li>- The naming conventions the same as the host name of TCP/IP that can be set by the OS.</li> <li>- Up to 31 characters (31 bytes)</li> <li>- Neither hyphen (-) nor space can be the first or last letter in names.</li> <li>- A name consisting only of numbers is not acceptable.</li> </ul>	Cluster stop Mirror agent stop Mirror agent start Cluster start

Names should be unique (case-insensitive) by categories such as cluster, server, server group, group, group resource and monitor resource.

## Properties

Displays properties of a selected cluster, server, group, group resource, monitor resource, server group.

For details, see “Parameter details” on page 151.

## Checking the version information of the Builder

To check the version information of the Builder, click the Help icon on the toolbar, or click **Help** in the menu bar and select **Version Information**.

The versions of the main unit and of the Builder are displayed.

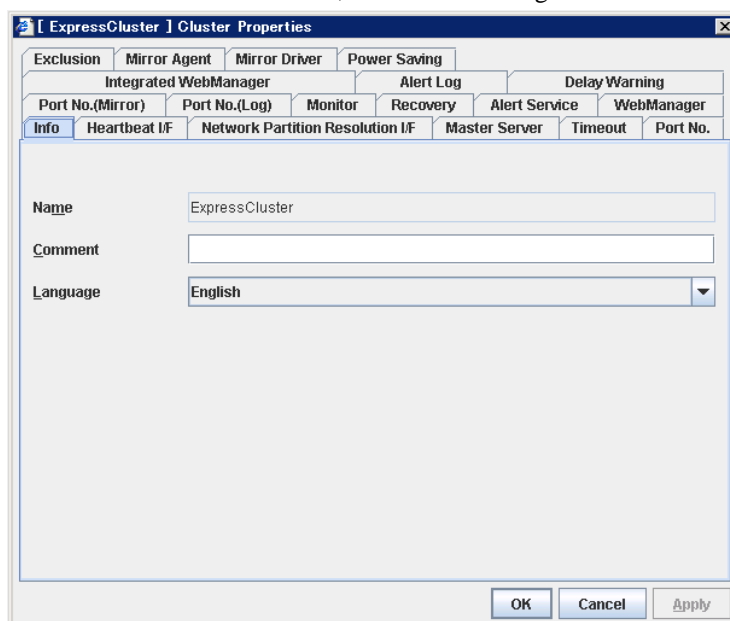
## Parameter details

### Cluster properties

In **Cluster Properties**, you can view and change the cluster's settings.

#### Info tab

You can view the cluster name, and enter or change a comment for this cluster.



#### Name

The cluster name is displayed. You cannot change the name here.

#### Comment (Within 127 bytes)

You can enter a comment for the cluster. Only alphanumeric characters are allowed.

#### Language

Select a language for cluster from the following. Set the language (locale) of OS on which the WebManager runs.

- ◆ English
- ◆ Japanese

The list below indicates the **Language** setting on the cluster properties and the language displayed by the clpstat command.

		Language setting on the cluster properties	
		Japanese	English
clpstat command display		<b>Japanese *</b>	<b>English</b>
WebManager display	OS on management terminal: Japanese	<b>Japanese</b>	<b>English</b>
	OS on management terminal: English	<b>Some parameters cannot be displayed properly</b>	<b>English</b>

---

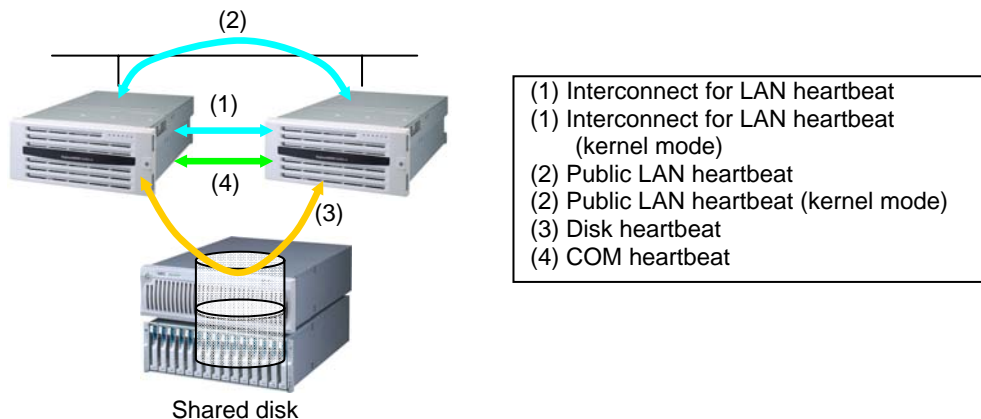
\* Run the clpstat command in the environment where Japanese font is displayed.

On the console which is connected to a server directly, setting a frame buffer is required.  
When logging on to the server remotely using ssh, a terminal emulator which can display Japanese may be needed.

---

## Heartbeat I/F tab

You can add, delete and change heartbeat interfaces. Heartbeat interfaces used by ExpressCluster are listed in **Heartbeat I/F Priority**. Heartbeat interfaces that are not in use are listed in **Available I/F**. Types of heartbeat devices are as follows:



Heartbeat devices types are displayed on this tab as follows:

Heartbeat device type	Type	How to display in Available I/F <sup>2</sup>
Interconnect for LAN heartbeat	LAN	Add to "Interconnect LAN I/F tab."
Public LAN heartbeat		
Interconnect for LAN heartbeat (kernel mode)	KLAN	
Public LAN heartbeat (kernel mode)		
COM heartbeat	COM	Add to "COM I/F tab."
Disk heartbeat	DISK	Add to "Disk I/F tab."

- ◆ If one or more servers are defined, you have to define at least one LAN interface in **Heartbeat I/F Priority**. It is recommended to specify two or more LAN interfaces. It is also recommended to set LAN interface and KLAN interface at the same time.
- ◆ The priority order of the LAN heartbeat for interconnect should be set higher than that of public LAN heartbeat. You can adjust the order by using the **Up** and **Down** buttons after adding the priority order of the LAN heartbeat for interconnect to the **Heartbeat I/F Priority**.
- ◆ Two or more kernel mode LAN heartbeat resources and shared kernel mode LAN heartbeat resources for interconnect and public are recommended to be specified.

### Important:

Whether or not kernel mode LAN heartbeat resource can be used depends on the distribution and kernel version. Refer to Chapter 3, "Installation requirements for ExpressCluster" in the *Getting Started Guide* before you configure the settings.

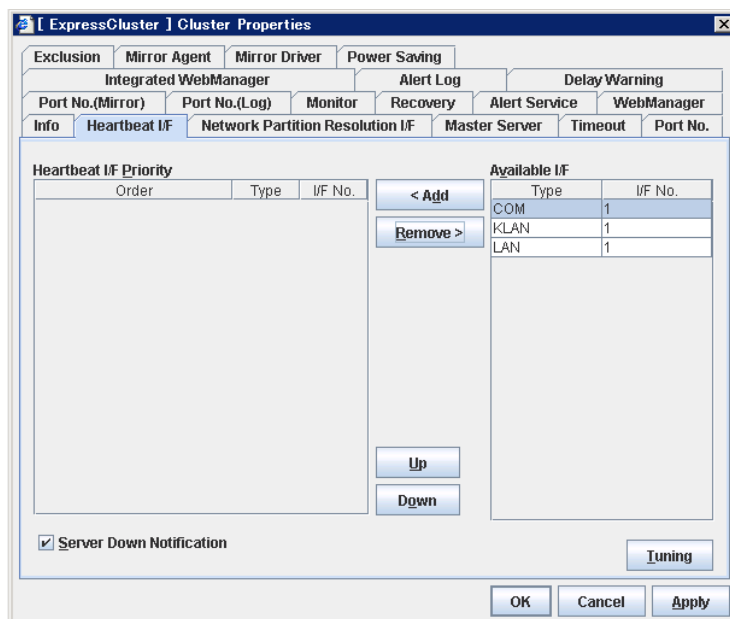
- ◆ Define interfaces for disk heartbeat and COM heartbeat based on the following rules:

<sup>2</sup> Numbers you see in **I/F No.** cells are those you specified on each tab in **Server Properties**.

If you use shared disks:	[One or two servers] Basically, COM I/F mode and Disk I/F mode [Three or more servers] Disk I/F mode
If you do not use shared disks:	[One or two servers] COM I/F mode <sup>3</sup>

### Add

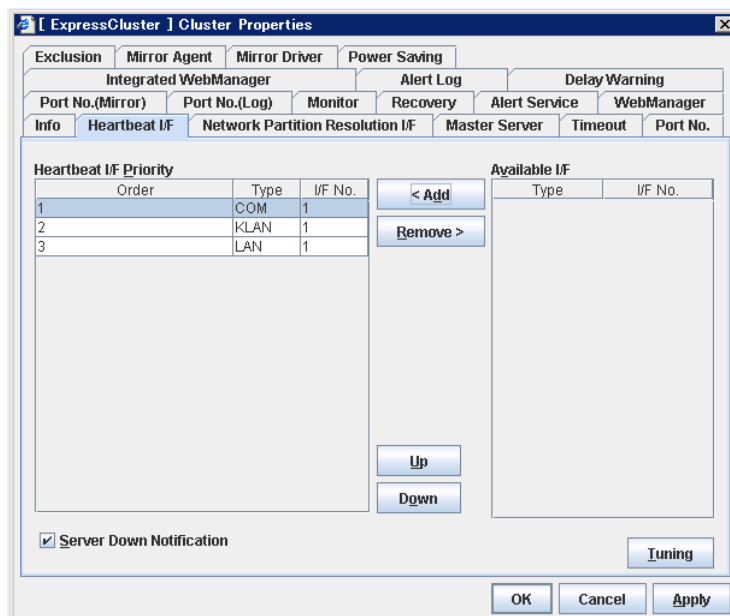
Use **Add** to add a heartbeat interface. Select a heartbeat interface from **Available I/F**, click **Add**, and then it will be added in **Heartbeat I/F Priority**.



<sup>3</sup> For servers which do not have COM, multiple LAN I/F connections are recommended.

## Remove

Use **Remove** to remove a heartbeat interface. Select a heartbeat interface from **Heartbeat I/F Priority**, click **Remove**, and then it will be added in **Available I/F**.



## Up & Down

Use **Up** and **Down** to change the priority of the selected heartbeat interface. Select a heartbeat interface from **Heartbeat I/F Priority**, click **Up** or **Down**, and then the selected row moves accordingly.

## Server Down Notification

When a server stops successfully (including shutdown and reboot), the failed server is notified to other servers in the cluster. You can perform failover faster by notifying it in advance.

When failing to deactivate groups when a server stops (including shutdown and reboot), or when other abnormalities occur, other servers are not notified of the failed server regardless of the settings of failed server notification.

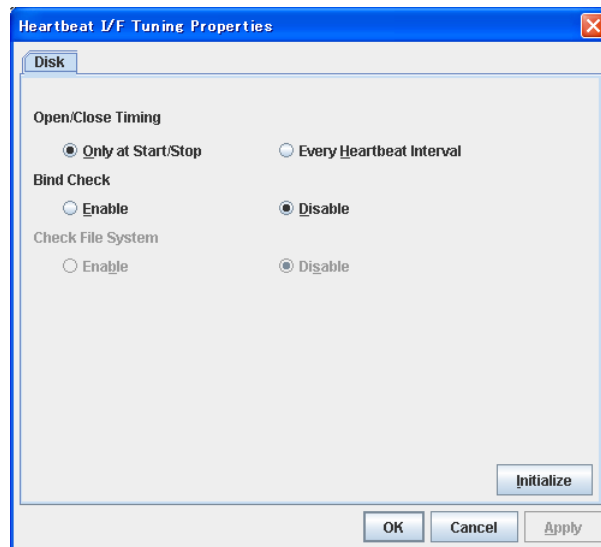
- ◆ When selected:  
Server down will be notified.
- ◆ When cleared:  
Server down will not be notified.

## Note:

When using hybrid disk resource, do not use the server down notification.

### Tuning

Use **Tuning** to tune a heartbeat I/F. If the **Tuning** button is selected, the **Heartbeat I/F Tuning Properties** dialog box is displayed.



#### Open/Close Timing

- ◆ **Only at Start/Stop**  
Opens raw device when a cluster starts and close it when a cluster stops. Performs only reads and writes of raw device at each heartbeat interval.
- ◆ **Every Heartbeat Interval**  
Opens raw device when a cluster starts, and closes it when a cluster stops. Performs open, reads, writes and close of raw device at each heartbeat interval.

#### Bind Check

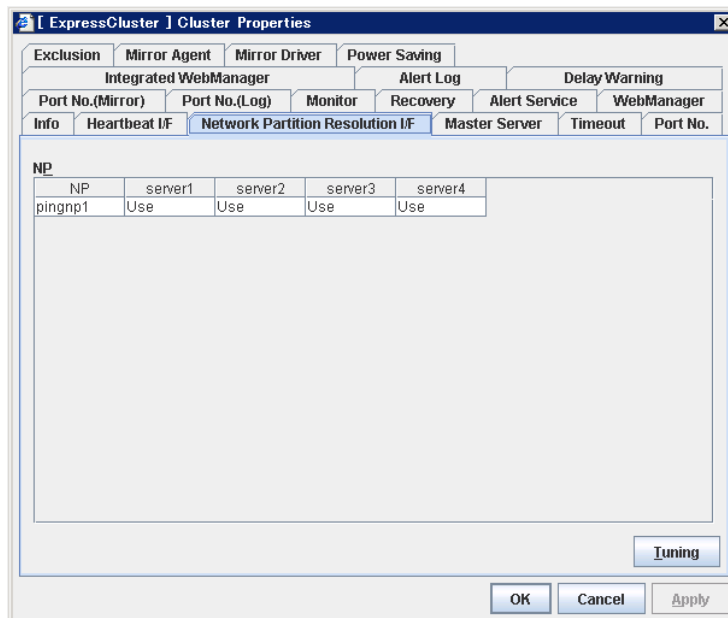
- ◆ **Enable**  
Checks if raw device for disk heartbeat is not bound to the actual device other than for disk heartbeat. Binding raw device is not performed if it is bound to the actual device other than for disk heartbeat. When binding a disk is not performed, the status of disk heartbeat resource becomes offline.
- ◆ **Disable**  
Does not check if raw device for disk heartbeat is not bound to the actual device other than for disk heartbeat. If raw device is bound to the actual device other than for disk heartbeat, the bind is cancelled and raw device is bound to the actual device for disk heartbeat.

#### Check File System

This cannot be used with this version.

## Network Partition Resolution I/F tab

Change the setting of the network partition interface. The network partition resolution interface used for ExpressCluster is displayed on the **NP**.

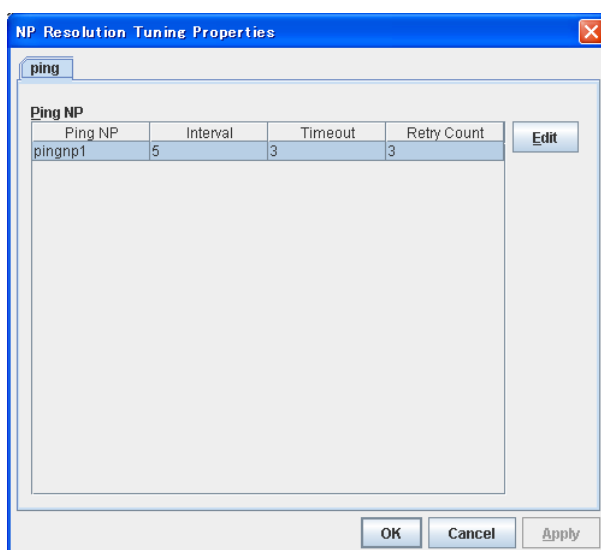


### Tuning

This tab is used to tune the network partition I/F. Click **Tuning** to display the **NP Resolution Tuning Properties** dialog box.

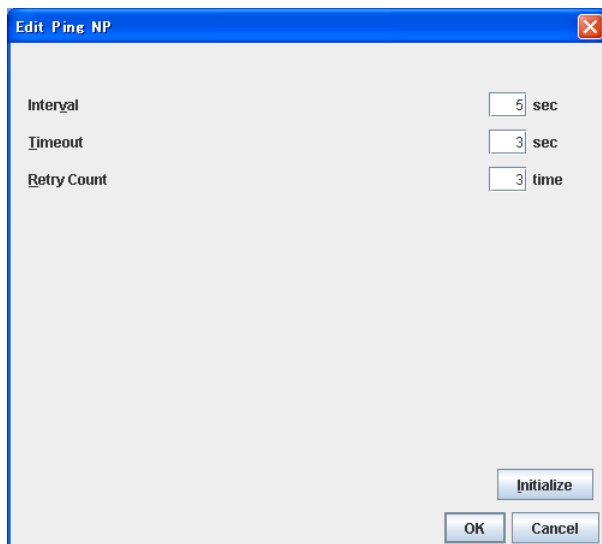
### Ping tab

The detailed setting about the ping method is displayed. The ping NP used for ExpressCluster is displayed on the **Ping NP**.



## Edit

This operation is used to edit the detailed setting of the ping NP. Select the Ping NP that you want to edit from the **Ping NP**, and select **Edit**.



- ◆ Interval (2 to 999)  
This value indicates an interval to issue the ping command.
- ◆ Timeout (1 to 999)  
This value indicates the time-out of the ping command.
- ◆ Retry Interval (1 to 999)  
This value indicates the times to reissue the ping command.

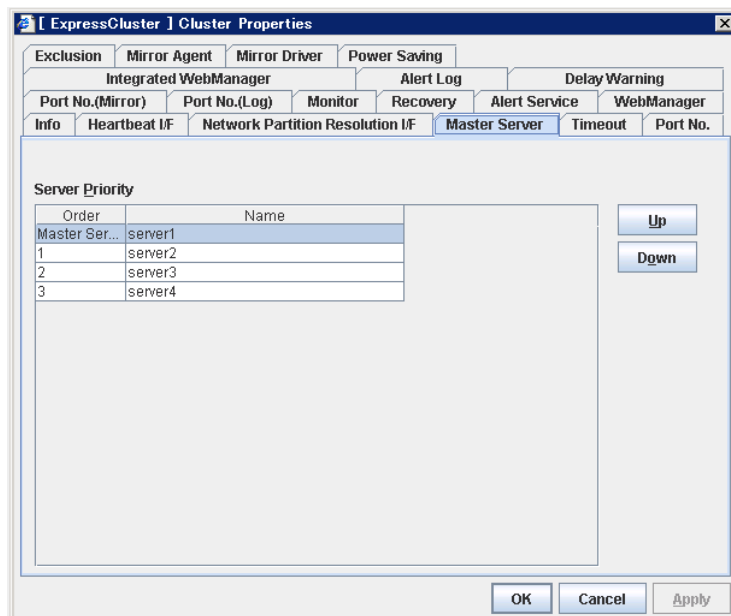
\*Set each value according to the following requirements.

Requirement 1: Heartbeat Timeout > Interval x Retry Count + Timeout

Requirement 2: Interval > Timeout

## Master Server tab

Define the priorities of servers on this tab. All registered servers are listed here. Master server is the server that contains the master of the cluster configuration data. This is the top priority server.

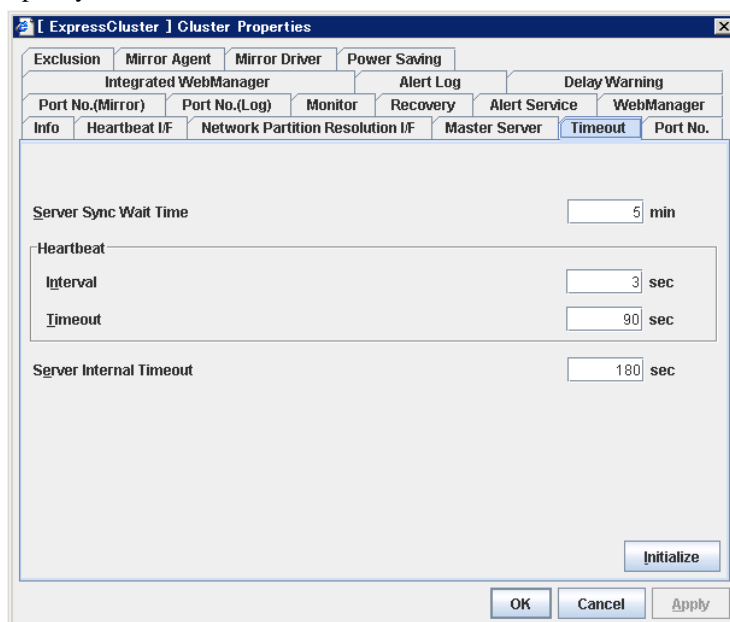


### Up & Down

Use this to change the priority of a selected server. Select a server name whose priority you want to change from **Server Priority**, click **Up** or **Down**, and then the selected row moves accordingly.

## Timeout tab

Specify values such as time-out on this tab.



### Server Sync Wait Time (0 to 99)

For the time specified here, the server will wait at startup until other servers are started.

### Heartbeat

Heartbeat interval and heartbeat time-out.

#### ◆ Interval (1 to 99)

Interval of heartbeats

#### ◆ Timeout (2 to 9999)

A failed server is determined if there is no response for the time specified here.

- This time-out should be longer than the interval.
- To perform the shutdown monitoring (see Port No. tab on page 161), this time-out should be longer than the time it takes to shut down applications and the operating system.
- When a hybrid disk resource is used, the time-out value must be longer than the value specified at the cluster partition I/O time-out in the mirror agent tab.

### Server Internal Timeout (1 to 9999)

The time-out to be used in the ExpressCluster Server internal communications

### Initialize

Used for initializing the value to the default value. Click the **Initialize** button to initialize all the items to the default value.

## Port No. tab

Specify TCP port numbers and UDP port numbers.

The screenshot shows the 'ExpressCluster Cluster Properties' dialog box with the 'Port No.' tab selected. The dialog is divided into two main sections: TCP and UDP. Under the TCP section, there are three input fields: 'Server Internal Port Number' (29001), 'Data Transfer Port Number' (29002), and 'WebManager HTTP Port Number' (29003). Under the UDP section, there are three input fields: 'Heartbeat Port Number' (29002), 'Kernel Mode Heartbeat Port Number' (29006), and 'Alert Sync Port Number' (29003). At the bottom right, there is an 'Initialize' button. At the very bottom, there are 'OK', 'Cancel', and 'Apply' buttons.

### TCP

No TCP port numbers can be overlapped. When the Replicator is used, TCP port numbers on the **Port No.(Mirror)** tab and any mirror data port number of any mirror disk resources/hybrid disk resources cannot be overlapped.

- ◆ **Server Internal Port Number** (1 to 65535<sup>4</sup>)

This port number is used for internal communication.

- ◆ **Data Transfer Port Number** (1 to 65535<sup>4</sup>)

This port number is used for transactions such as reflecting and backing up the cluster configuration data, sending and receiving the license data and running commands.

- ◆ **WebManager HTTP Port Number** (1 to 65535<sup>4</sup>)

This port number is used for a browser to communicate with the ExpressCluster Server.

### UDP

No UDP port numbers can be overlapped. When the communication method for internal logs is UDP on the **Port No.(Log)** tab, UDP port numbers cannot be overlapped with the port numbers.

- ◆ **Heartbeat Port Number** (1 to 65535<sup>4</sup>)

This port number is used for heartbeat.

- ◆ **Kernel Mode Heartbeat Port Number** (1 to 65535<sup>4</sup>)

This port number is used for kernel mode heartbeat.

- ◆ **Alert Sync Port Number** (1 to 65535<sup>4</sup>)

This port number is used for synchronizing alert messages among servers.

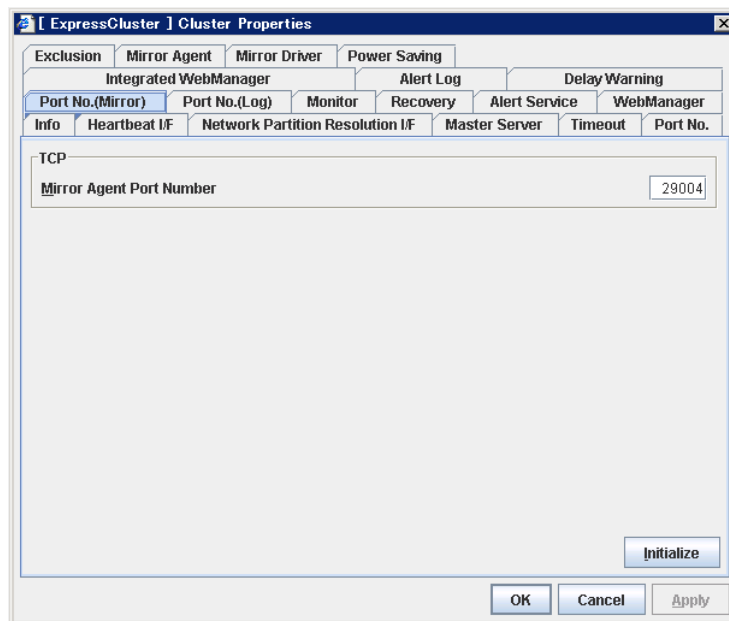
<sup>4</sup> It is strongly recommended not to use well-known ports, especially reserved ports from 1 to 1023.  
Section I Detailed reference of ExpressCluster functions

**Initialize**

This is used for initializing the value to the default value. Click the **Initialize** button to initialize all the items to the default value.

**Port No. (Mirror) tab ~ For the Replicator/Replicator DR ~**

Specify TCP port numbers.

**TCP**

No TCP port numbers can be overlapped. TCP port numbers on the **Port No.** tab and any mirror data port number of any mirror disk resources/hybrid disk resources cannot be overlapped.

**Note:**

Port numbers are not used when mirror disk resource/hybrid disk resource is not used.

- ◆ Mirror Agent Port Number (1 to 65535<sup>4</sup>)

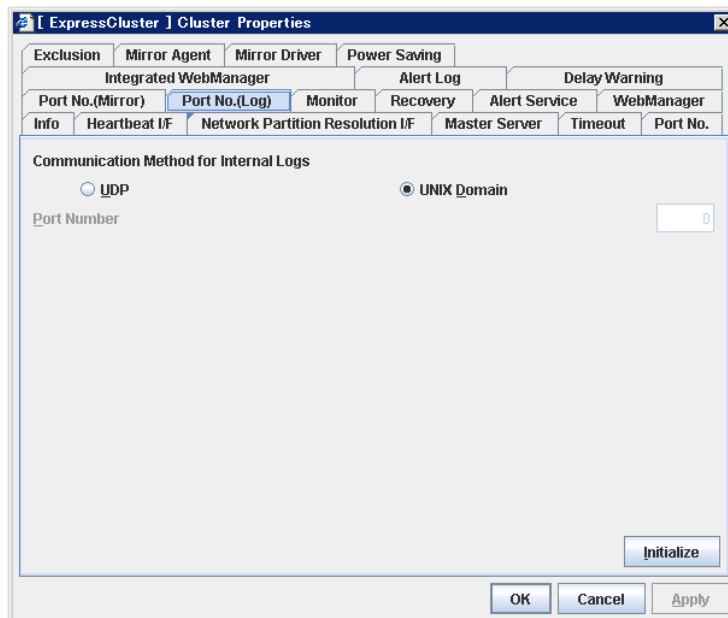
Mirror agent is a user mode module for controlling mirror disk resource/hybrid disk resource. The Mirror Agent uses this port number to communicate with servers.

**Initialize**

Used for initializing the value to the default value. Click the **Initialize** button to initialize all the items to the default value.

## Port No. (Log) tab

Specify the communication method for internal logs.



### Communication Method for Internal Logs

- ◆ UDP  
Use UDP for the communication method for internal logs.
- ◆ UNIX Domain  
Use UNIX Domain for the communication method for internal logs.

### Port No.(1 to 65535<sup>5</sup>)

This is the port number used when UDP is selected for the communication method for internal logs.

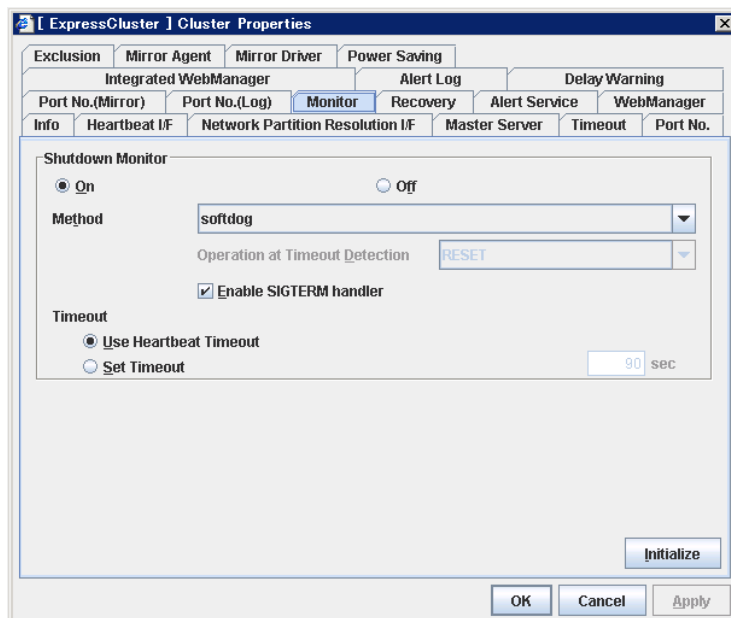
### Initialize

Used for initializing the value to the default value. Click the **Initialize** button to initialize all the items to the default value.

<sup>5</sup> It is strongly recommended not to use well-known ports, especially reserved ports from 1 to 1023.  
Section I Detailed reference of ExpressCluster functions

## Monitor tab

Configure the settings for monitoring. For details on the shutdown monitor and reboot limit, see Chapter 6, “Monitor resource details.”



### Shutdown Monitor

Monitors whether or not the operating system is stalling when an ExpressCluster command to shut down the cluster or servers is run. The cluster daemon forcibly resets the operating system or performs a panic of the operating system if it determines the OS stall. Server panic can be set when the monitoring method is keepalive.

#### On:

If selected, the shutdown monitor is performed. Specify a longer time for the heartbeat time-out than the time required to shut down applications and the operating system (see “Timeout tab”). If you use shared disks or mirror disks, it is recommended to select **On**.

#### Off:

If selected, the shutdown monitor is not performed.

- **Method**

Select the shutdown monitor method from:

- softdog
- ipmi
- keepalive

For the details on the monitor method, see “Shutdown monitoring method” in Chapter 9, “Information on other monitor settings.”

- **Operation at Timeout Detection**

Selects the operation performed when the operating system is determined to be stalled. This can be set only when the monitoring method is keepalive.

- **RESET**  
Resets the server.
- **PANIC**  
Performs a panic of the server.

- **Enable SIGTERM handler**

Select this to enable SIGTERM handler when performing the shutdown monitor. For details on SIGTERM settings, see “Setting of SIGTERM” in Chapter 9, “Information on other monitor settings.”

---

**Note:**

If you select ipmi in **Method** and set **Enable SIGTERM handler** to **Off**, this may be reset even if the operating system is successfully shut down.

---

- **Use Heartbeat Timeout**

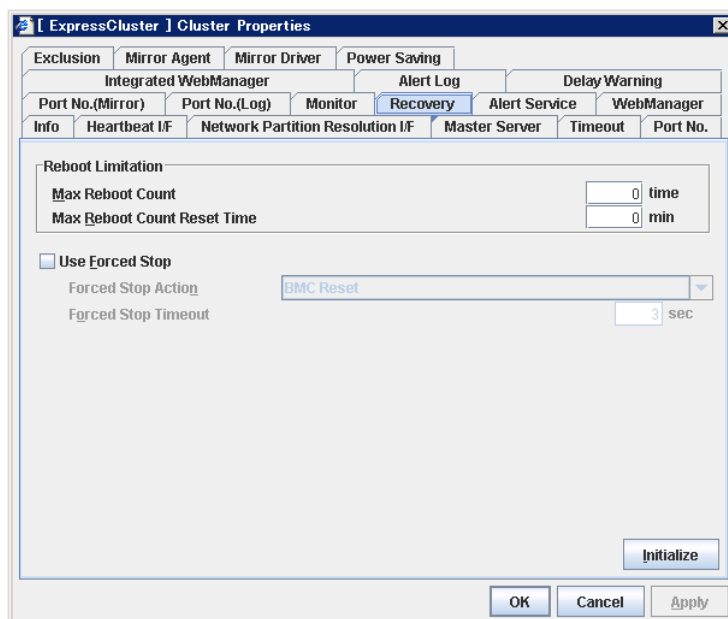
Select this for heartbeat time-out to work in conjunction with shutdown monitoring time-out.

- **Timeout (2 to 9999)**

Specify a time-out when the heartbeat time-out value is not used as shutdown monitoring time-out.

## Recovery tab

Configure the settings for cluster recovery.



### Reboot Limitation

You can specify the **Reboot OS** or **Shut down OS** as the final action at abnormality detection for group resources and monitor resources. If either of them is selected, reboot may be repeated infinitely. By setting the reboot limit, you can prevent repeated reboots.

#### ◆ Max Reboot Count (0 to 99)

Specify how many times the operating system can reboot. The number specified here is separately counted for group resource and monitor resource.

#### ◆ Max Reboot Count Reset Time (0 to 999)

When the max reboot count is specified, if the operation keeps running normally for the time specified here, the reboot count is reset. The time specified here is separately counted for group resource and monitor resource.

### Note:

If **Max Reboot Count** is set to 1 or greater, set **Max Reboot Count Reset Time** also to 1 or greater.

### Use Forced Stop

Use this to select whether or not to enable the forced stop.

- On

If selected, the forced stop function is enabled.

When you use the forced stop function, configure the **BMC** tab of server property as well..

- Off

If selected, the forced stop function is disabled.

**Forced Stop Action**

Specify an action of the forced stop.

- **BMC Reset**  
Use this to perform a hardware reset of the server by using the hwreset command or the ipmitool command.
- **BMC Power off**  
Use this to power off the server by using the hwreset command or the ipmitool command. The OS may be shut down depending on how the ACPI of OS is configured.
- **BMC Power Cycle**  
Use this to perform the Power Cycle (powering on/off) by using the hwreset command or the ipmitool command. The OS may be shut down depending on how the ACPI of OS is configured.
- **BMC NMI**  
Use this to generate NMI by using the hwreset command or the ipmitool command. The performance after the generation of NMI depends on the OS setting.

**Forced Stop Timeout (0 to 99)**

Configure the timeout value when performing Forced Stop. After the above commands are executed, activating failover groups starts when the time specified elapses

## Alert Service tab

Configure the settings for the mail report function, the network warning light and the report destination.

To use the mail report function, register the Alert Service license.

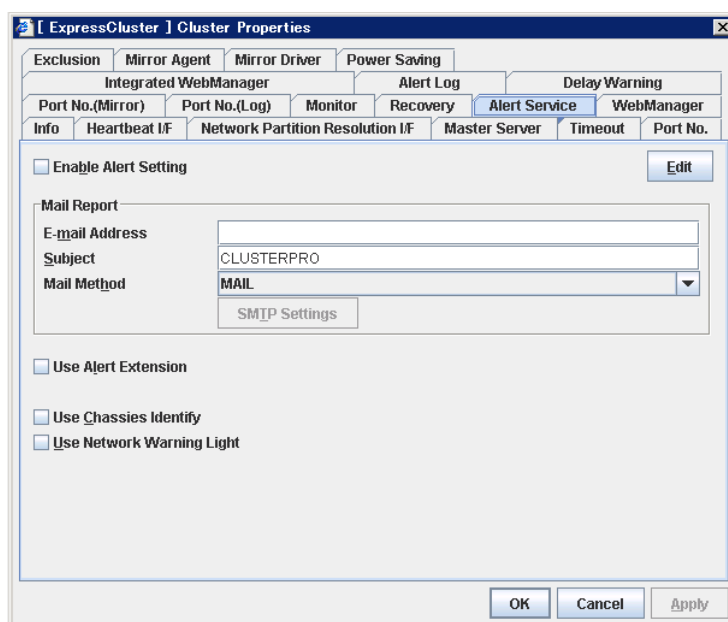
To use the network warning light, register the Alert Service license.

---

### Note:

To use the mail report function and the network warning light, purchase the ExpressCluster X Alert Service 2.1 for Linux.

---



### Enable Alert Setting

Configure whether to modify the alert destination from the default value. For modifying it, click **Edit** to configure the address.

By cancelling **Enable Alert Setting**, the modified destination turns to the default value temporarily.

For information on the default alert destination, refer to “Messages reported by syslog, alert and mail.”

### E-mail Address (Within 255 bytes)

Enter the e-mail address to which the report is sent. If more than two e-mail addresses are set, delimit the address by semicolon.

### Subject (Within 127 bytes)

Enter the subject title for the e-mail message.

### Mail Method

Configure the methods to send mail.

- **MAIL**  
This method uses the mail command. Check that a mail is sent to the mail address by using the mail command in advance.

- SMTP

This method allows for sending mail by directly communicating with the P server.

#### **Use Alert Extension**

Configure whether or not to execute an optional command when ExpressCluster sends an alert. For using Alert Extension function, select **Enable Alert Setting**, and click **Edit** to configure the command.

By canceling **Enable Alert Setting**, the configured command is temporarily disabled

#### **Use Chassis Identify**

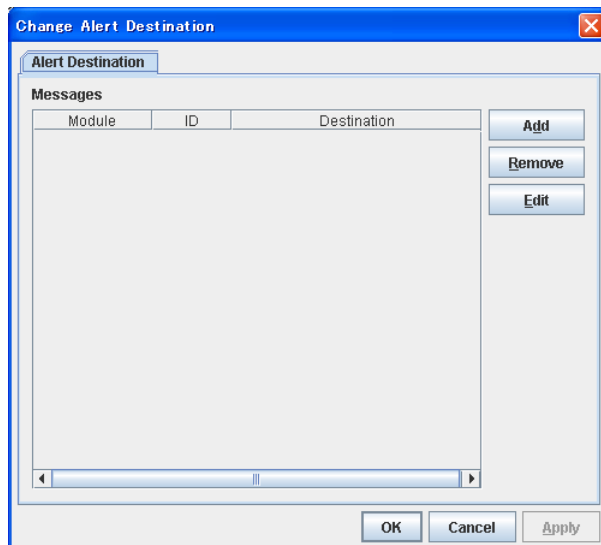
Configure whether or not to enable **Use Chassis Identify**.

#### **Use Network Warning Light**

Specify whether to use a network warning light (specified by NEC) controlled by network. Enter an IP address in server properties.

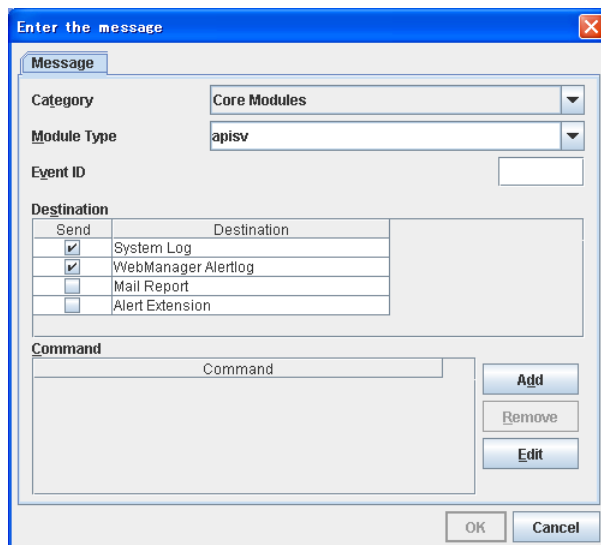
### Change Alert Destination

Select **Edit** to display the **Change Alert Destination** dialog box.



### Add

Click this to select the event ID and the module type for which you want to customize the report destinations. Click **Add** to open the **Enter the Message** dialog box.



### Category

Select a major category of the module type.

### Module Type (Within 31 bytes)

Select the name of module type that you want to change the destination address.

### Event ID

Enter the event type of the module type for which you want to change the destination address. For information on event ID, refer to “Messages reported by syslog, alert and mail.”

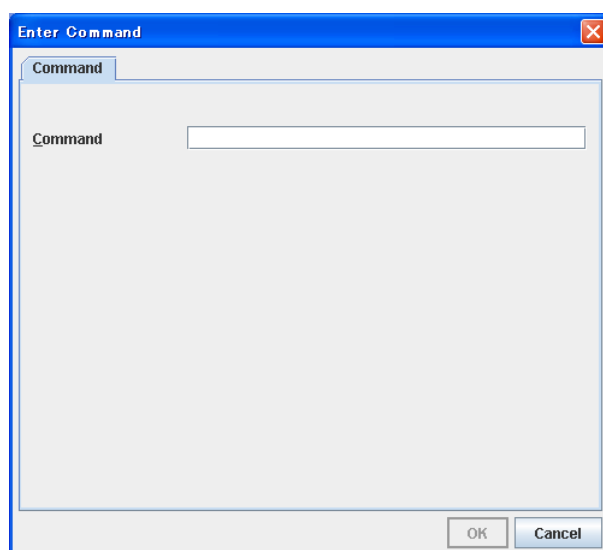
### Destination

Select the destination.

- **System Log**  
This sends message to syslog of the OS.
- **WebManager Alertlog**  
This sends message to the alert view of the Web manager.
- **Mail Report**  
This sends message by using the mail report function.
- **Alert Extension**  
This sends message by the Alert Extension function. Modify the extension settings using the **Add** button and the **Edit** button.

### Add

Add a command of the alert extension function. Click **Add** to open the **Enter Command** window. Up to 4 commands can be registered with one event ID.



### Command (Within 511 bytes)

Enter a command such as SNMP trap to execute reporting with the absolute path. The execution results of the specified command cannot be shown.

- **Keyword**  
If you specify **%%MSG%%**, the body message of the target event ID is inserted. You cannot specify multiple **%%MSG%%** for one command. Configure within 511 bytes including the description of **%%MSG%%**.

#### Configuration example

```
/usr/local/bin/snmptrap -v1 -c HOME 10.0.0.2 0 10.0.0.1 1 0 ' 1 s "%%MSG%%"
```

### **Remove**

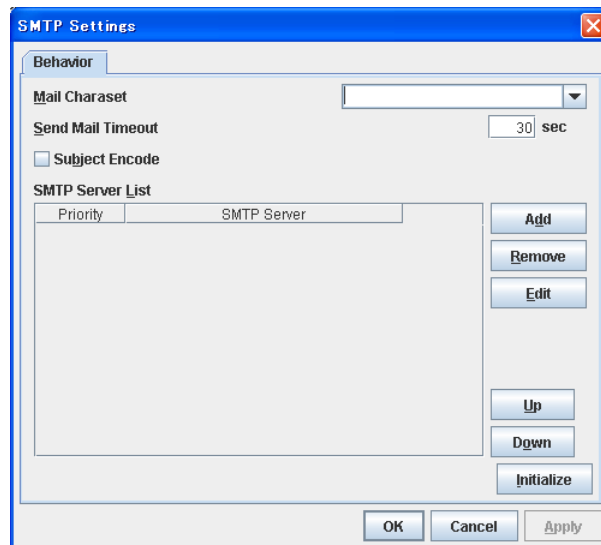
Click this to remove a command of alert extension function. Select the command, and then, click **Remove**.

### **Edit**

Click this to modify a command of alert extension function. Select the command, and then, click **Edit**.

## **SMTP Settings**

Click this to display the **SMTP Settings** dialog box.



### **Mail Charaset (Within 127 bytes)**

Configure the character set of the e-mails sent for mail report.

### **Send Mail Timeout (1 - 999)**

Configure the timeout value for communicating with the SMTP server.

### **Subject Encode**

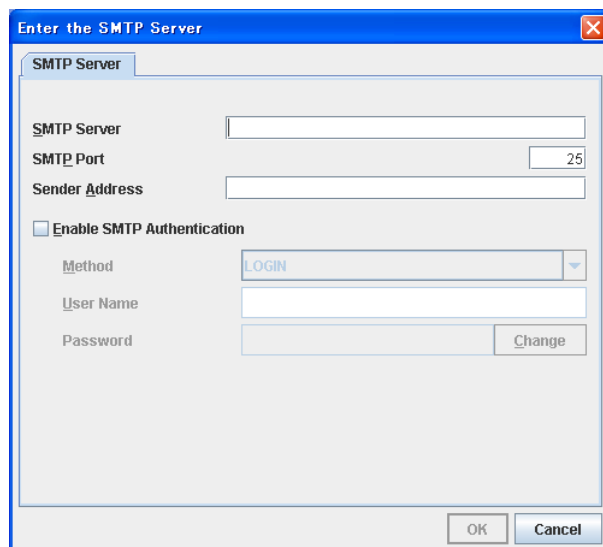
Select whether or not to encode the subject of e-mails.

### **SMTP Server List**

Use this button to display a SMTP server that is configured. Only one SMTP server can be configured in this version.

### **Add**

Use this button to add a SMTP server. Click **Add** to open the **Enter the SMTP Server** dialog box.

**SMTP Server (Within 255 bytes)**

Configure the IP address of the SMTP server.

**SMTP Port (1-65535)**

Configure the port number of the SMTP server.

**Sender Address (Within 255 bytes)**

Configure the address from which an e-mail of mail report is sent.

**Enable SMTP Authentication**

Configure whether or not to enable SMTP authentication.

**Method**

Select a method of SMTP authentication.

**User Name (Within 255 bytes)**

Configure the user name used for SMTP authentication.

**Password (Within 255 bytes)**

Configure the password used for SMTP authentication.

**Remove**

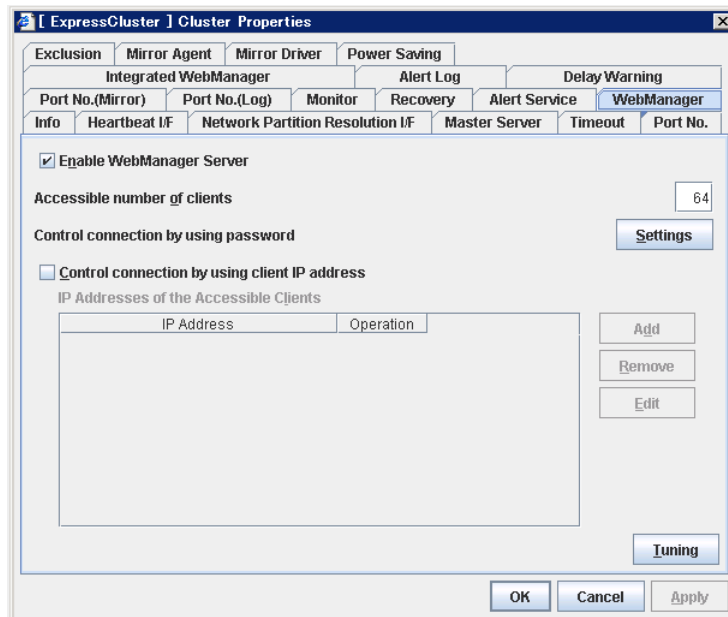
Select this to remove the SMTP server.

**Edit**

Use this button to modify the settings of SMTP server.

## WebManager tab

Use this tab to configure the settings for the WebManager.



### Enable WebManager Server

Enables the WebManager Server.

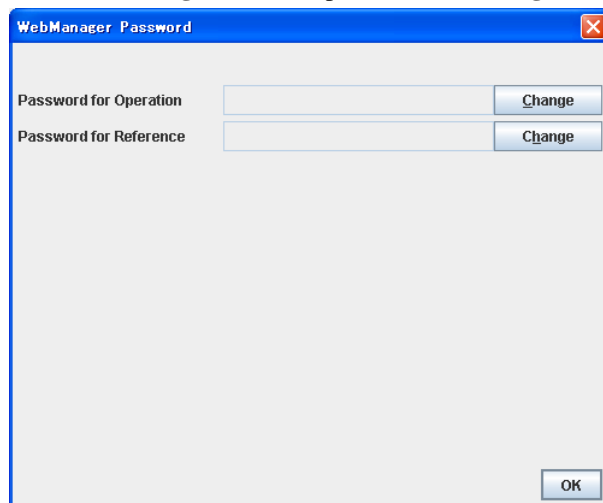
- ◆ When selected:  
The WebManager server is enabled.
- ◆ When cleared:  
The WebManager server is disabled.

### Accessible number of clients (1 to 999)

Specify the number of client machines that can be connected.

### Control connection by using password

Click the **Settings** button to open the **WebManager Password** dialog box.

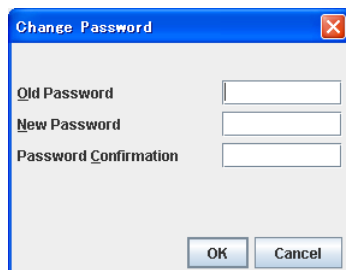


#### ◆ Password for Operation

Set a password to connect to the WebManager in the operation mode. Click **Change** to display the **Change Password** dialog box.

#### ◆ Password for Reference

Set a password to connect to the WebManager in the reference mode. Click **Change** to display the **Change Password** dialog box.



- **Old Password: (Within 255 bytes)**  
Enter the current password. If the password is not set, leave it blank.
- **New Password: (Within 255 bytes)**  
Enter a new password. When deleting the old password, leave it blank.
- **Password Confirmation: (Within 255 bytes)**  
Enter the password again which you entered in **New Password**.

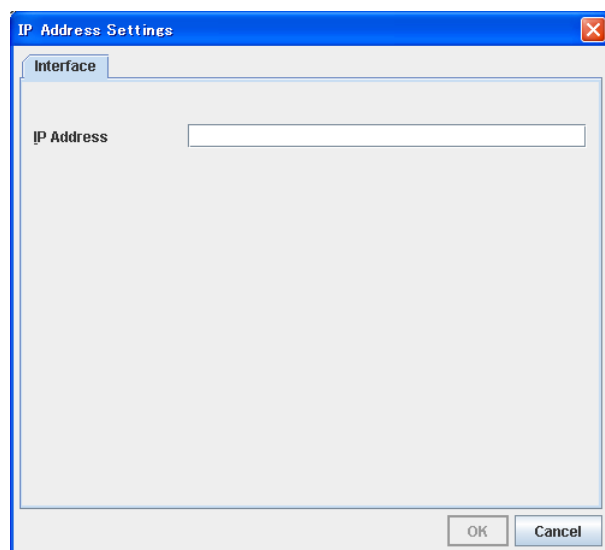
**Control connection by using client IP address**

If selected, accesses are controlled by client IP addresses.

- ◆ When selected:
  - Add**, **Remove** and **Edit** buttons are enabled.
- ◆ When cleared:
  - Add**, **Remove** and **Edit** buttons are disabled.

**Add**

Use **Add** to add an IP address in **IP Addresses of the Accessible Clients**. By clicking **Add**, the **IP Address Settings** dialog box is displayed to enter an IP address. Newly added IP addresses have the rights for the operation.



- ◆ **IP Address (Within 80 bytes)**
  - Specify a client IP address that can be connected.
  - IP address: 10.0.0.21
  - Network address: 10.0.1.0/24

**Remove**

Use **Remove** to remove an IP address from **IP Addresses of the Accessible Clients**. Select an IP address you want to remove in **IP Addresses of the Accessible Clients** and click **Remove**.

**Edit**

Use **Edit** to edit an IP address. Select an IP address you want to edit in **IP Addresses of the Accessible Clients** and click **Edit**. A dialog box where the specified IP address is preset is displayed. The rights for operating the edited IP addresses remain the same.

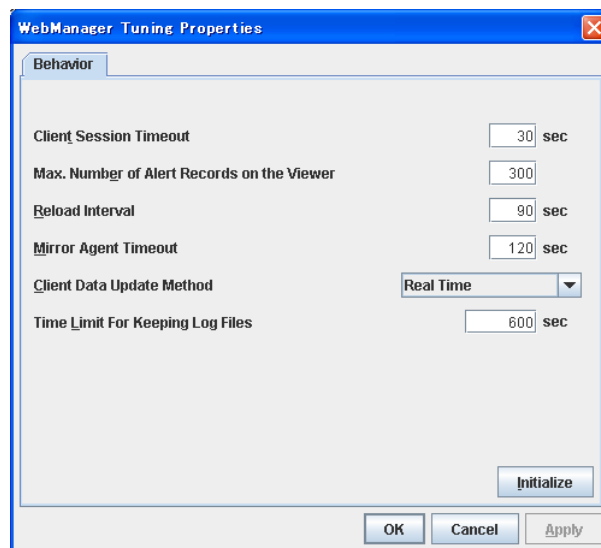
### Control connection by using client IP address

Sets the operation rights for IP addresses that are registered in **IP Addresses of the Accessible Clients**.

- ◆ When selected:  
A client can operate a cluster and display its status.
- ◆ When cleared:  
A client can only view the status of a cluster.

### Tuning

Use **Tuning** to tune the WebManager. Clicking **Tuning** opens the **WebManager Tuning Properties** dialog box.



- ◆ **Client Session Timeout** (1 to 999)  
Specify the client session time-out. A time-out is determined if the time specified here elapses after the last communication between the WebManager Server and the WebManager.
- ◆ **Max. Number of Alert Records on Viewer** (1 to 999)  
Specify the maximum number of alert viewer records to display on the Alert Viewer of the WebManager.
- ◆ **Reload Interval** (0 to 999)  
Specify the screen data update interval. At this time interval, the WebManager screen is refreshed.
- ◆ **Mirror Agent Timeout** (1 to 999)  
Set the data waiting time output from the mirror agent.

◆ **Client Data Update Method**

Specify how to update the data on a screen from the following options:

- **Polling**  
Updates the data regularly.
- **RealTime**  
Updates the data in real time.

◆ **Time Limit For Keeping Log Files** (60 to 43200)

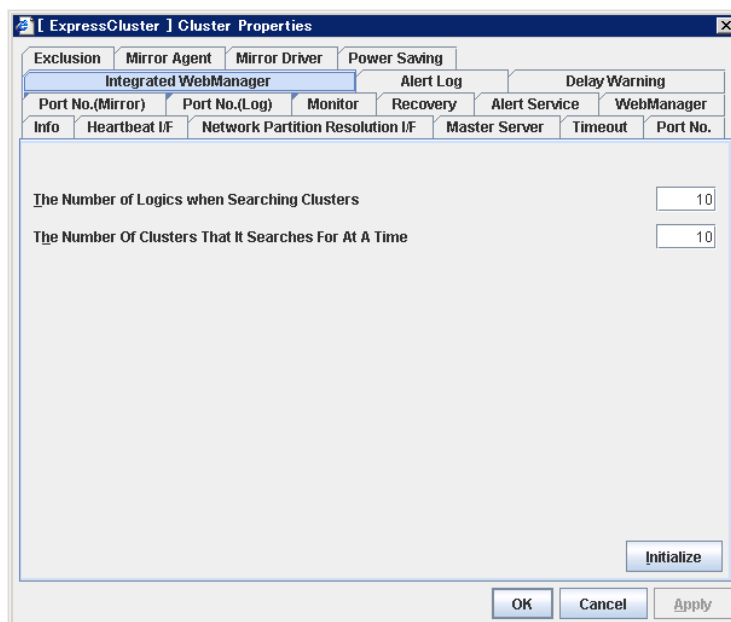
Specify the expiration period for deleting log collection information that is temporarily stored on a server. Log information on a server will be deleted if the expiration period is exceeded after the dialog box prompting saving log collection information is displayed.

◆ **Initialize**

Click **Initialize** to reset all settings on this dialog to default.

## Integrated WebManager tab

Use this tab to configure the settings for the integrated WebManager.



### The Number of Logics when Searching Clusters (1~100)

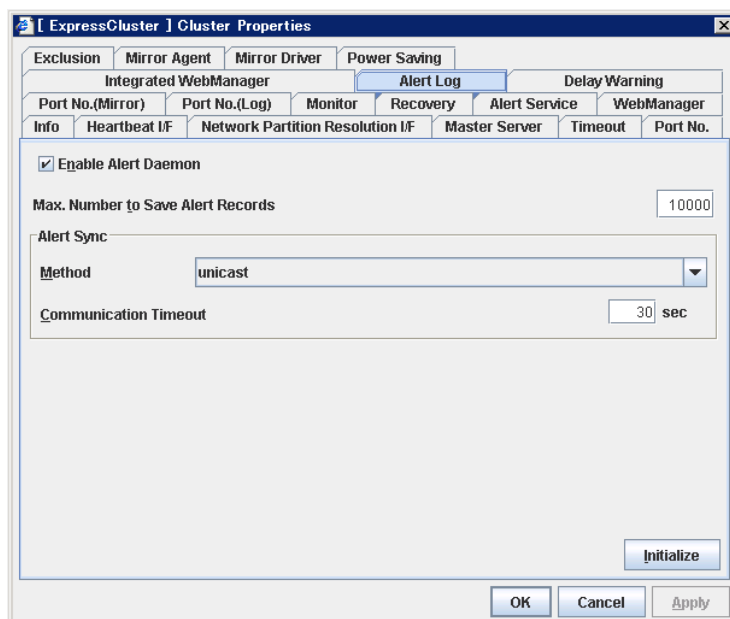
Set the number of logics when the Integrated WebManager searches for cluster.

### The Number Of Clusters That It Searches For At A Time (1~20)

Set the number of clusters when updating the cluster information at once.

## Alert Log tab

Configure the settings for the alert log.



### Enable Alert Daemon

Select this to start alert daemon for the server.

- ◆ When selected:  
Alert daemon is enabled.
- ◆ When cleared:  
Alert daemon is disabled.

### Max. Number to Save Alert Records (1 to 99999)

Specify the maximum number of alert records that can be retained. Alert daemon for server can retain alert messages up to this number.

### Alert Sync: Method

This communication mode is used for Alert Log synchronization. Only unicast is available in **Method** list box for this version.

### Alert Sync: Communication Timeout (1 to 300)

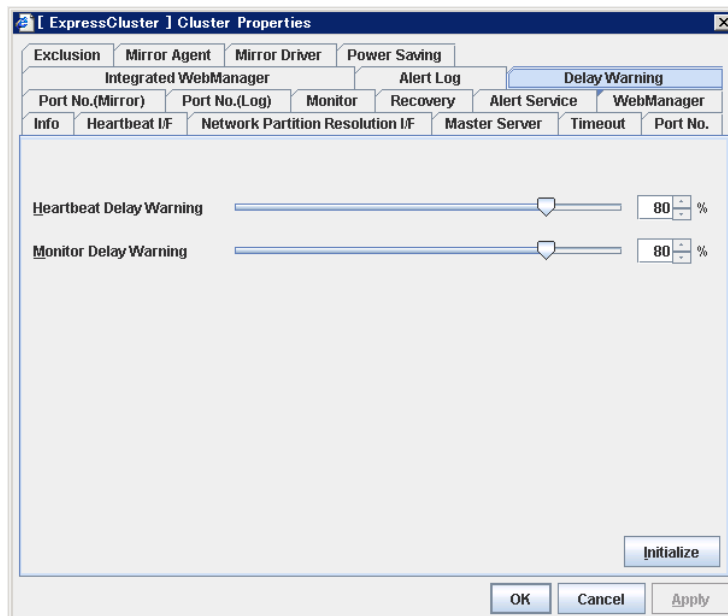
Specify a communication time-out. A communication time-out is determined if the time specified here elapses after the last communication between Alert daemon and servers.

### Initialize

Click **Initialize** to reset all settings on this tab to default.

## Delay Warning tab

Configure the settings for Delay Warning on this tab. See “Delay warning of monitor resources” in Chapter 6, “Monitor resource details” for more information.



### Heartbeat Delay Warning (0 to 100)

Set a percentage of heartbeat time-out at which the heartbeat delay warning is issued. If the time for the percentage passes without any heartbeat response, the warning will be produced in an alert log. If you set 100, the warning will not be issued.

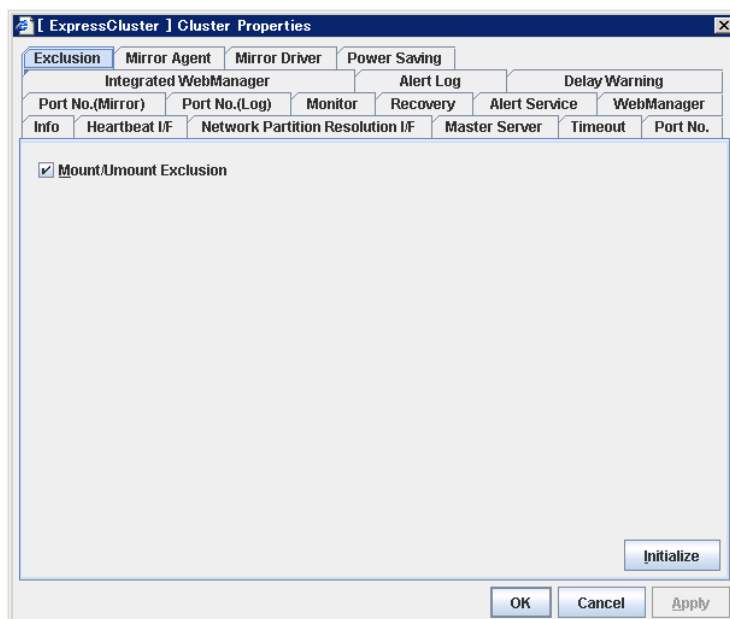
### Monitor Delay Warning (0 to 100)

Set a percentage of monitor time-out at which the monitor delay warning is issued. If the time for the percentage passes without any monitor response, the warning will be produced in an alert log. If you set 100, the warning will not be issued.

### Note:

If you specify 0% for the delay warning, an alert log is shown in every heartbeat interval and monitor interval. Setting 0% allows you to see the time spent for monitoring. This will be helpful particularly in a test operation. Make sure not to set low values such as 0% in the production environment.

## Exclusion tab



### Mount/Unmount Exclusion

Specify the exclusion of mount and unmount of the file systems executed in disk resource, mirror disk resource, hybrid disk resource, NAS resource and VxVOL resource. If this option is selected, problems such as mount or unmount command failure can be avoided due to the /etc/mounttab lock. It may take time to activate and deactivate a resource if there are many resources because mount and unmount processes are executed in order.

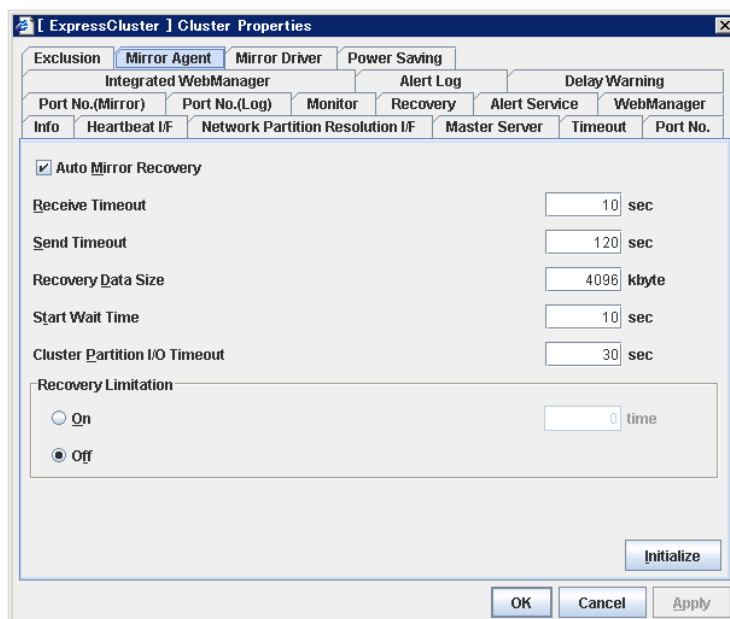
- ◆ When selected:  
The exclusion is performed.
- ◆ When cleared:  
The exclusion is not performed.

### Initialize

Use **Initialize** to reset the values to the default value. Clicking the **Initialize** button resets the value of all items to the default value.

## Mirror Agent tab ~ For the Replicator/Replicator DR~

Configure the settings for the Mirror Agent on this tab.



### Auto Mirror Recovery

When selected, the mirror recovery is automatically performed if there is any difference between mirror disks on both servers. In some cases, you cannot perform the auto-mirror recovery even if this is selected. For details, see “Automatically recovering from mirroring” in Chapter 11, “Troubleshooting.”

- ◆ When selected:  
The mirror recovery is automatically performed.
- ◆ When cleared:  
The mirror recovery is not automatically performed.

### Receive Timeout (1 to 600)

Set the time-out for the Mirror Agent waiting to receive data after establishing the connection.

### Send Timeout (1 to 600)

Set the time-out for the Mirror Agent to send data to the Mirror Agent of the other server and wait it to be processed.

### Recovery Data Size (64 to 32768)

Specify the recovery data size.

---

### Note:

A large portion of kernel memory is used if a large size of recovery data is set.

---

### **Start wait time (10 to 600)**

For using a hybrid disk resource in a shared disk, set the waiting time to synchronize the starts of the servers connected to the shared disk. If another server does not start within the time configured here, the current right is obtained temporarily.

### **Cluster partition I/O timeout (5 to 300)**

For using hybrid disk resource, set the timeout value for accessing the cluster partition.

- The time-out value must be smaller than the heartbeat time-out specified at the **Timeout** tab.

### **Recovery Limitation**

Specify the retry count to perform mirror recovery again if the data has been updated during a mirror recovery.

#### ◆ On (1 to 100)

The mirror recovery retry is performed the times specified on the box.

#### ◆ Off

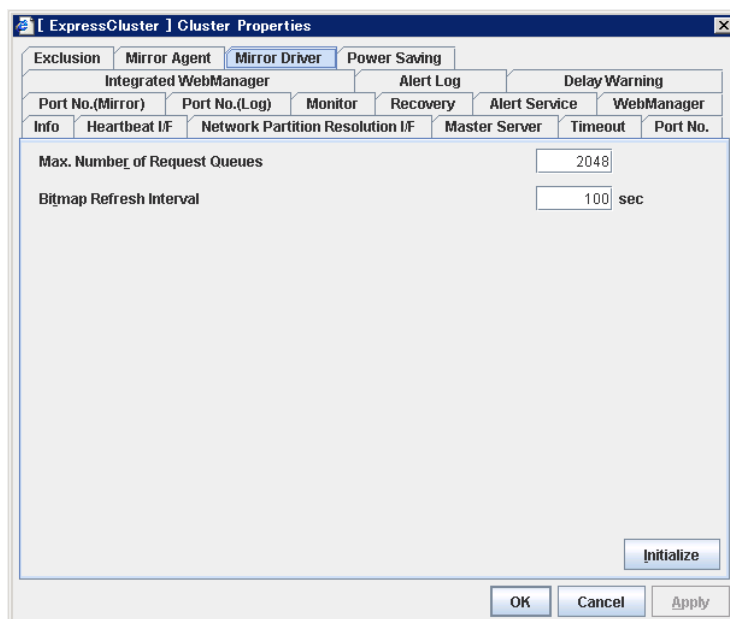
When there is update data, mirror recovery is performed until there is no difference.

### **Initialize**

This is used to reset the values to the default value. Clicking the **Initialize** button resets the value of all items to the default value.

## Mirror driver tab ~ For Replicator/Replicator DR ~

Configure the settings for the mirror driver on this tab.



### Max. Number of Request Queues (256 to 65535)

Set the number of queues for mirror disk driver for queuing I/O requests from the upper system.

### Bitmap Refresh Interval (1 to 600)

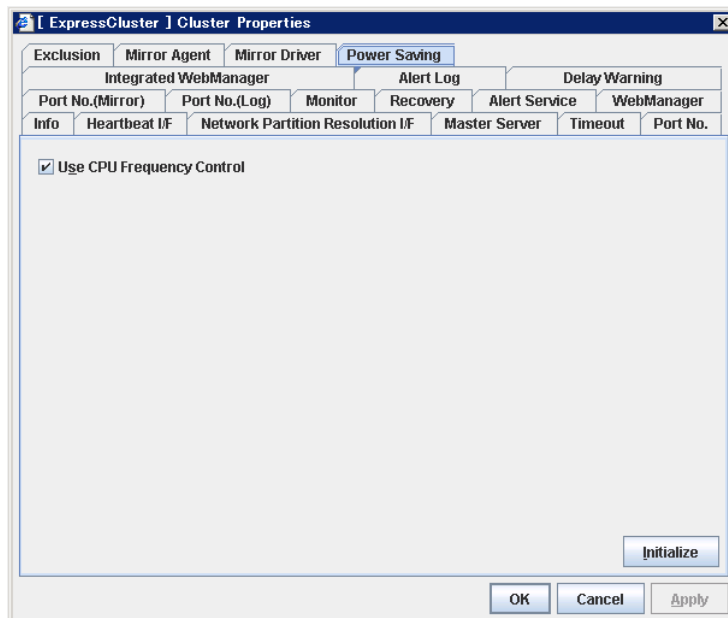
Set the interval to check if the standby system writes the bitmap difference.

### Initialize

Use **Initialize** to reset the values to the default value. Click the **Initialize** button to reset the value of all items to the default value.

## Power saving tab

Configure whether or not to use the function to turn it to power-saving mode by controlling the CPU frequency of the standby server.



### Use CPU Frequency Control

Select the checkbox when you use CPU frequency control.

When CPU frequency control is used, the CPU frequency of the server where a failover group is activated is set to high, and that of the server where a failover group is stopped is set to low.

When CPU frequency control is performed by a command or WebManager, the settings changed by the command or WebManager are given higher priority regardless of whether the failover group is started or stopped. Note that the settings changed by the command or WebManager is discarded after the cluster is stopped/started or suspended/resumed, so that CPU frequency is controlled by the cluster.

- ◆ When the checkbox is selected  
CPU frequency control is performed.
- ◆ When the checkbox is cleared  
CPU frequency control is not performed.

### Initialize

Use this to restore the initial value. By selecting **Initialize**, initial values are configured for all items.

### Note:

For using CPU frequency control, it is required that the frequency is changeable in BIOS settings and the CPU supports the frequency control by OS power management function and that kernel is supported.

## Server properties

On the **Server Properties** dialog box, add, remove or edit interfaces such as IP address and device that are used on each server in a cluster. Configure the settings for the same number of interfaces (hereinafter referred to as I/F) on each server. I/F No. represents the registration order by the Builder. This is irrelevant to the number set by the OS.

From the aspect of network environment, IP addresses have the following restrictions:

- ◆ One server cannot have two or more IP addresses that belong to the same network address. Likewise, containment is not allowed as follows.
  - IP address: 10.1.1.10, Subnet mask: 255.255.0.0
  - IP address: 10.1.2.10, Subnet mask: 255.255.255.0

## Interface of each server

If two or more servers are defined, the Builder gives the same number of interfaces for each server. Click **OK** or **Apply**. The Builder confirms the number of interfaces, and works as follows:

### When an interface was added:

The Builder automatically adds the interface of the same type and number to the other servers. On the other servers, the settings are all blank.

### When an interface was removed:

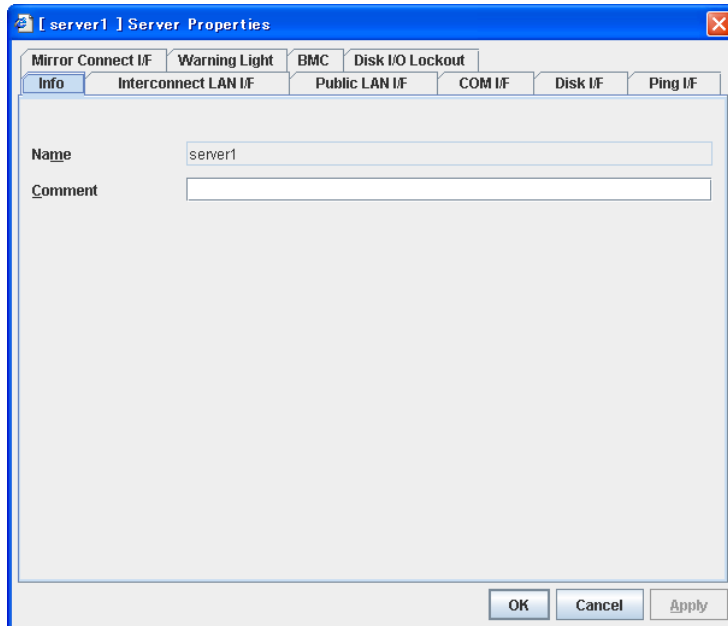
The following message is displayed for confirmation. If you removed a public LAN interface on a server, you see the following message. If you removed another type of interface, you see the corresponding message.



- ◆ When **Yes** is selected:  
The interface of the same type and the last number will automatically be removed from the other servers so that all servers have the same number of interfaces.
- ◆ When **No** is selected:  
The interface of the same type and the last number will not be removed from the other servers. On the server where you have removed an interface, its I/F No. will not be removed, but set to blank.

## Info tab

You can display the server name and make a change to a comment on this tab.



### Name

The selected server name is displayed. You cannot change the name here.

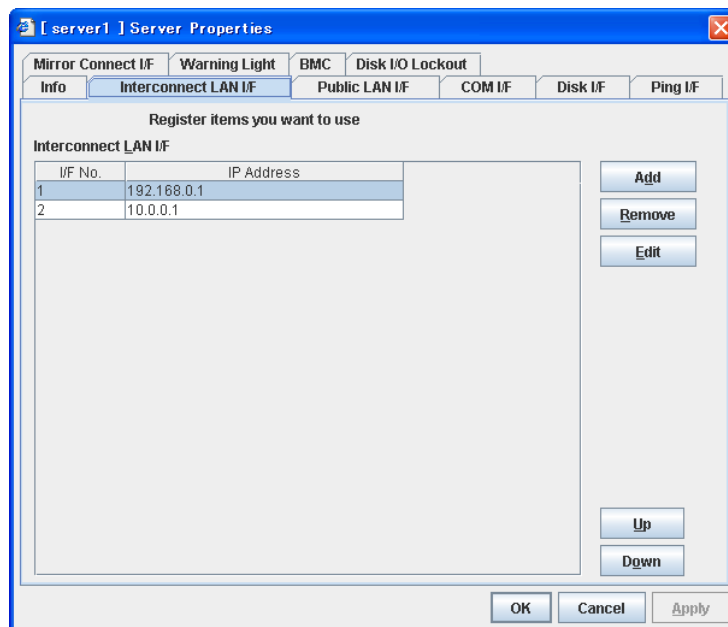
### Comment (Within 127 bytes)

You can specify a comment for the server. Only alphanumeric characters are allowed.

## Interconnect LAN I/F tab

You can add, remove and edit an interconnect LAN interface to be used for interconnect LAN heartbeat. Registered I/F No. and IP addresses are listed in **Interconnect LAN I/F**.

You have to specify more than one interconnect LAN interface.



### Note:

When the Replicator is used, see also “Mirror connect I/F tab ~ for Replicator/Replicator DR ~.” If there are two or more interconnect LAN interfaces, it is required to take into account the IP address to be used for mirror disk connect interface and specify the interconnect LAN interface.

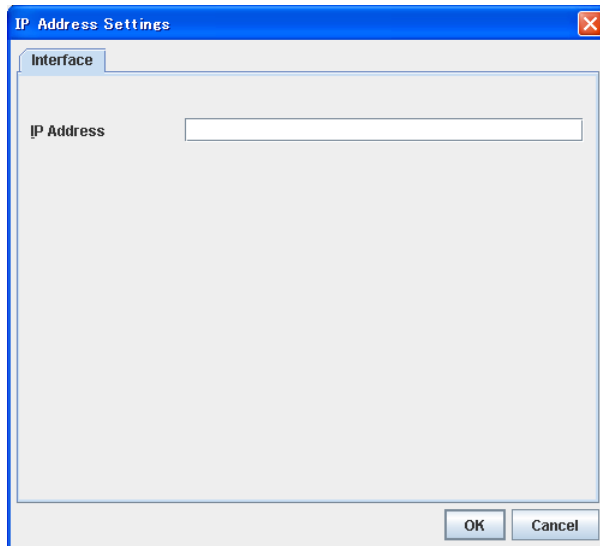
You must follow the steps below to remove the interconnect LAN I/F after setting the heartbeat I/F.

1. Remove all heartbeat I/Fs in the cluster properties.
2. Remove the interconnect LAN I/F in the server properties.
3. Reset the heartbeat I/F in the cluster properties.

Be careful when you change an IP address of the server. For how to change the IP addresses, see “Changing the server IP address” in Chapter 10, “The system maintenance information.”

### Add

Use **Add** to add an interface. Clicking **Add** opens the **IP Address Settings** dialog box.



◆ **IP Address (Within 80 bytes)**

Enter an IP that is actually used for interconnect LAN.

### Remove

Use **Remove** to remove an interface. Select an interface you want to remove from the interface list and click **Remove**. You cannot remove the I/F No. specified for the heartbeat interface. To remove it, change the heartbeat interface settings first.

### Edit

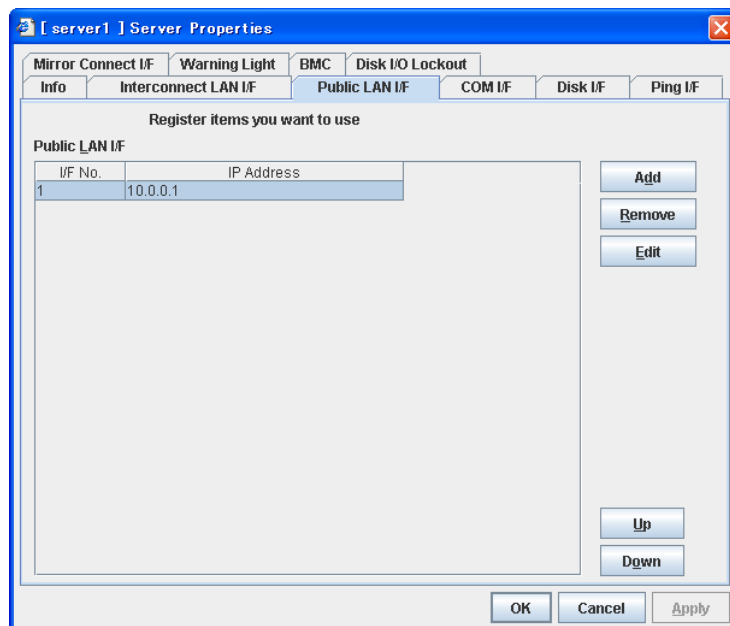
Use **Edit** to edit an IP address. Select an interface you want to edit from the interface list, and click **Edit**. The **IP Address Settings** dialog box where the selected IP address is preset is displayed.

### Up & Down

Use **Up** and **Down** to change I/F No. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

## Public LAN I/F tab

You can add, remove and edit a public LAN interface. Registered I/F No. and IP addresses are listed in **Public LAN I/F**. For details of heartbeat, see Chapter 7, “Heartbeat resources.”

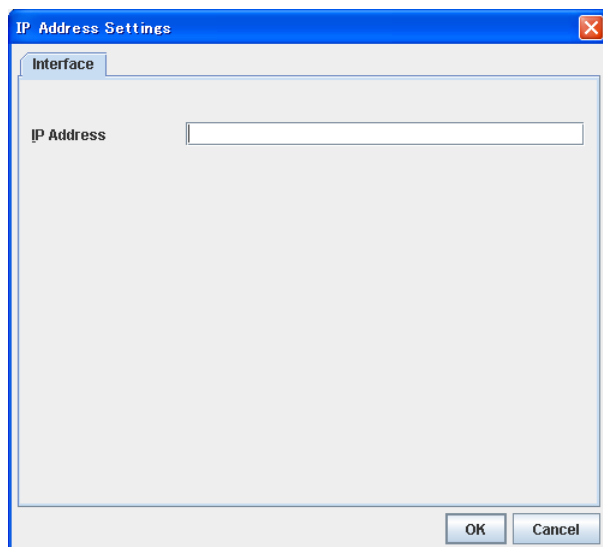


### Note:

Be careful when you change an IP address of the server. For how to change the IP addresses, see “Changing the server IP address” in Chapter 10, “The system maintenance information.”

**Add**

Use **Add** to add an interface. Clicking **Add** opens the **IP Address Settings** dialog box.



◆ **IP Address (Within 80 bytes)**

Enter an IP that is actually used for public LAN.

**Remove**

Use **Remove** to remove an interface. Select an interface you want to remove from the interface list and click **Remove**.

**Edit**

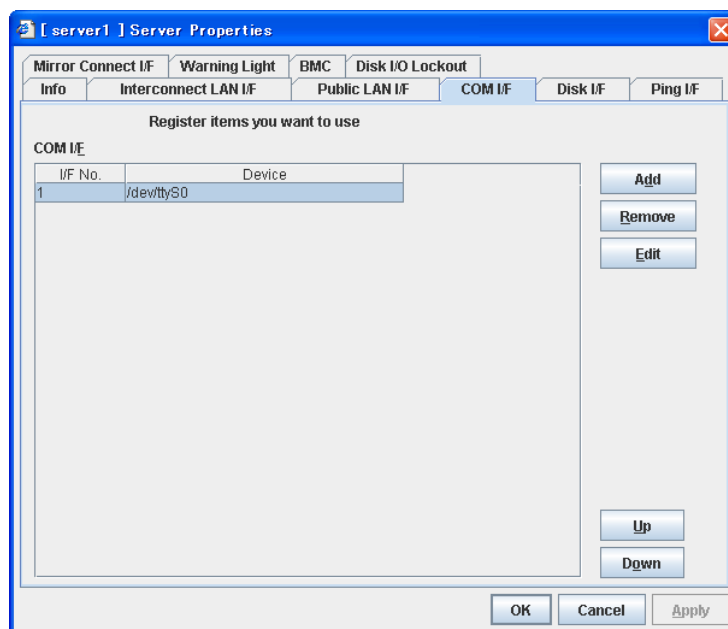
Use **Edit** to remove an IP address. Select an interface you want to edit from the interface list and click **Edit**. The **IP Address Settings** dialog box where the selected IP address is preset is displayed.

**Up & Down**

Use **Up** and **Down** to change I/F No. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

## COM I/F tab

You can add, remove and edit a COM interface to be used for COM heartbeat. Registered I/F No. and devices are listed in **COM I/F**. This is used for 2-node cluster. For details of heartbeat, see Chapter 7 “Heartbeat resources.”



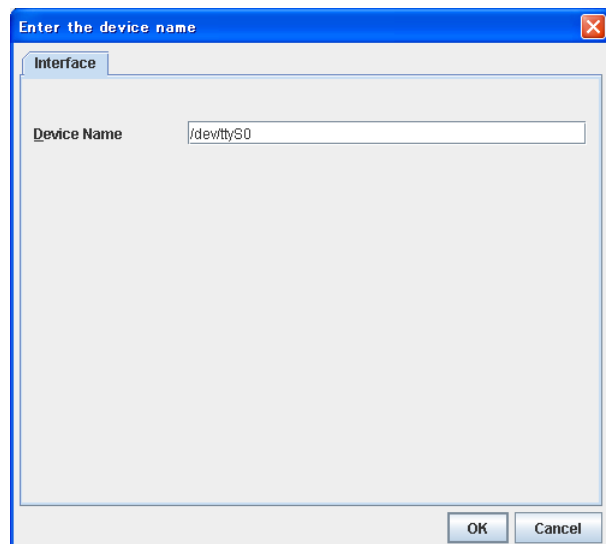
### Note:

You must follow the steps below to remove the COM I/F after setting the heartbeat I/F.

1. Remove all heartbeat I/Fs in the cluster properties.
2. Remove the COM I/F in the server properties.
3. Reset the heartbeat I/F in the cluster properties.

### Add

Use **Add** to add an interface. Clicking **Add** opens the **Enter the device name** dialog box. The default device name is preset.



◆ **Device Name (Within 1023 bytes)**

Enter an actual device name for the COM port. You cannot register a device name that is registered in **COM I/F**. The name should begin with “/.”

### Remove

Use **Remove** to remove an interface. Select the interface that you want to remove from the interface list and click **Remove**. However, you cannot delete the I/F number that is set to heartbeat I/F.

### Edit

Use **Edit** to edit a device. Select a device you want to edit from the interface list and click **Edit**. The **Enter the device name** dialog box where the name of selected COM device is preset is displayed.

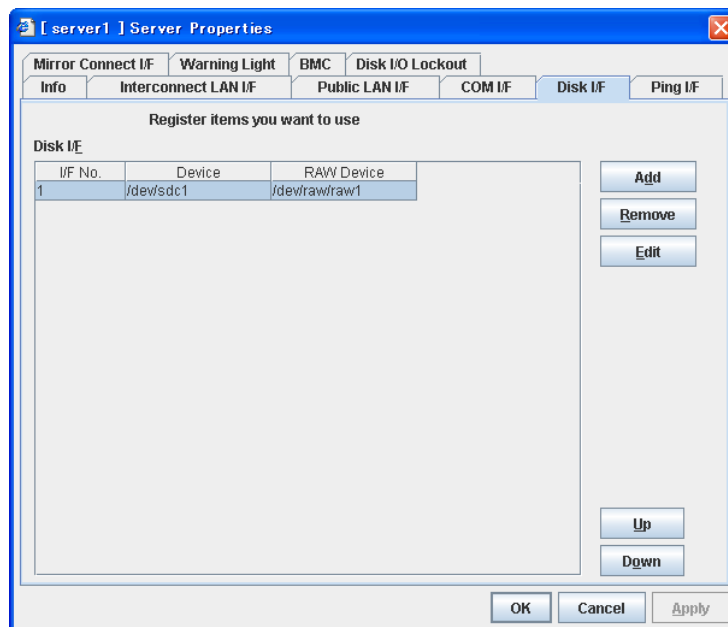
### Up & Down

Use **Up** and **Down** to change the I/F number. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

## Disk I/F tab

You can add, remove and edit a disk interface to be used for the disk heartbeat. The I/F numbers, device names, and raw devices currently registered in **Disk I/F** are listed.

For details of heartbeat, see Chapter 7, “Heartbeat resources.”



---

**Note:**

You must follow the steps below to remove the disk I/F after setting the heartbeat I/F.

1. Remove all heartbeat I/Fs in the cluster properties.
  2. Remove the disk I/F in the server properties.
  3. Reset the heartbeat I/F in the cluster properties.
- 

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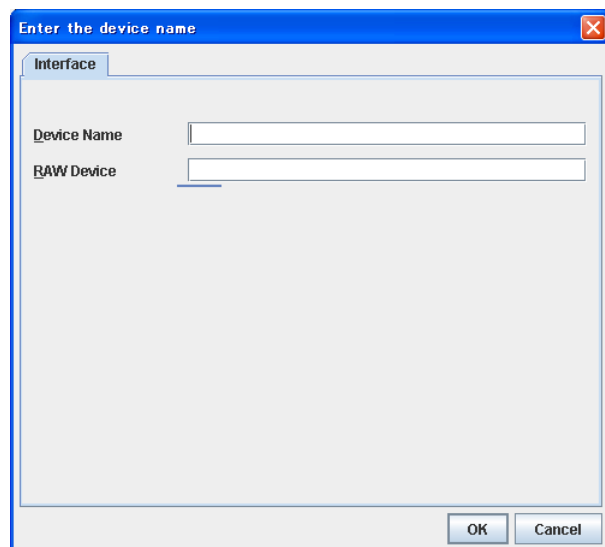
**Note:**

Do NOT set both device name and raw device name for a server does not have disk heartbeat resource.

---

## Add

Use **Add** to add an interface. Clicking **Add** opens the **Enter the device name** dialog box.



◆ **Device Name (Within 1023 bytes)**

Enter an actual device name for the partition device to be used for the disk heartbeat on shared disks. You cannot use the partition device you specify here for disk resources. The name should begin with “/.”

◆ **Raw Device (Within 1023 bytes)**

Enter a device name for raw accessing. ExpressCluster uses it, relating this to the actual device name. You cannot register a raw device that is already registered in **Disk I/F**, **Raw Resource**, **Raw Monitor Resource** or **VxVM Volume Resource**.

For details of the raw device of VxVM volume resource, see “Understanding VxVM related resource” in Chapter 5, “Group resource details.”

If you use an application that uses a raw device such as database, be careful that raw devices do not collide. The name should begin with “/.”

## Remove

Use **Remove** to remove an interface. Select an interface you want to remove from the interface list and click **Remove**. You cannot remove the I/F number specified for the heartbeat interface. To remove it, change the heartbeat interface settings first.

## Edit

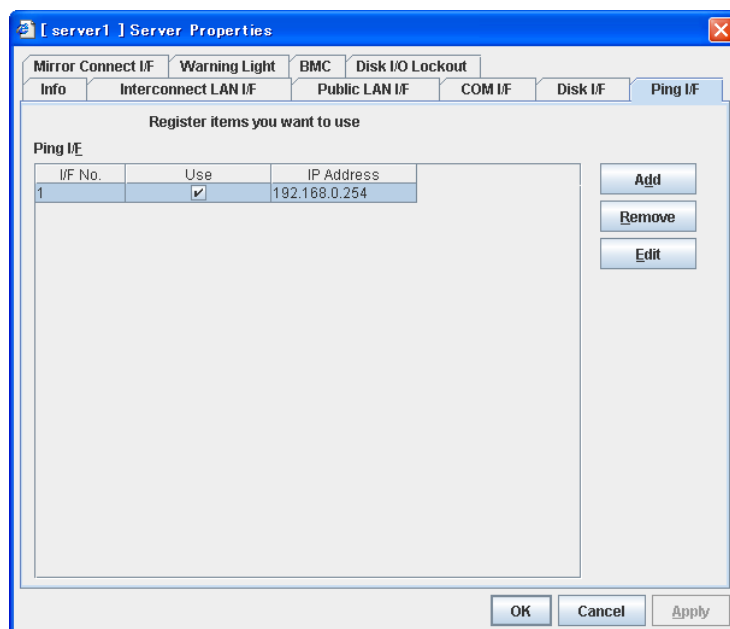
Use **Edit** to edit a device or raw device. Select a device or raw device you want to edit from the interface list. Clicking **Edit** opens the **Enter the device name** dialog box where the selected device name and raw device are preset.

## Up & Down

Use **Up** and **Down** to change the I/F number. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

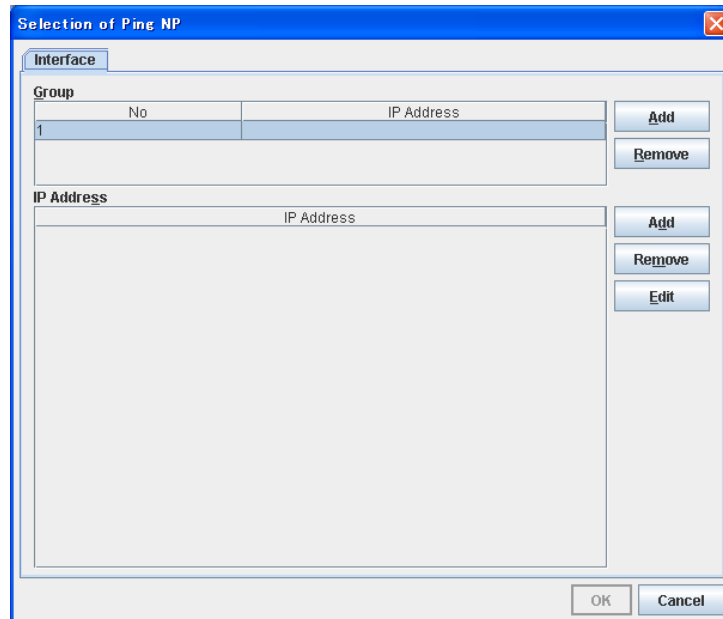
## Ping I/F tab

You can add, remove and edit the IP address to be used for the network partition resolution in the Ping method. The currently registered interface number, whether to use any interface number and the IP address to be used are displayed on the Ping I/F List. Configure whether to use with the check box within the **Ping I/F**.



### Add

Use **Add** to add an interface. Click **Add** to open the **Selection of Ping NP** dialog box.



#### ◆ Group

Register a group of the Ping method. If multiple groups are registered and one of the groups detects an error, it is determined that the interface has an error.

#### ◆ IP Addresses

Register the IP address to be grouped in one of the groups with the Ping method. The IP address of the group selected in the **Group** is displayed. If multiple groups are registered and one of the groups detects an error, it is determined that the group has an error.

### Remove

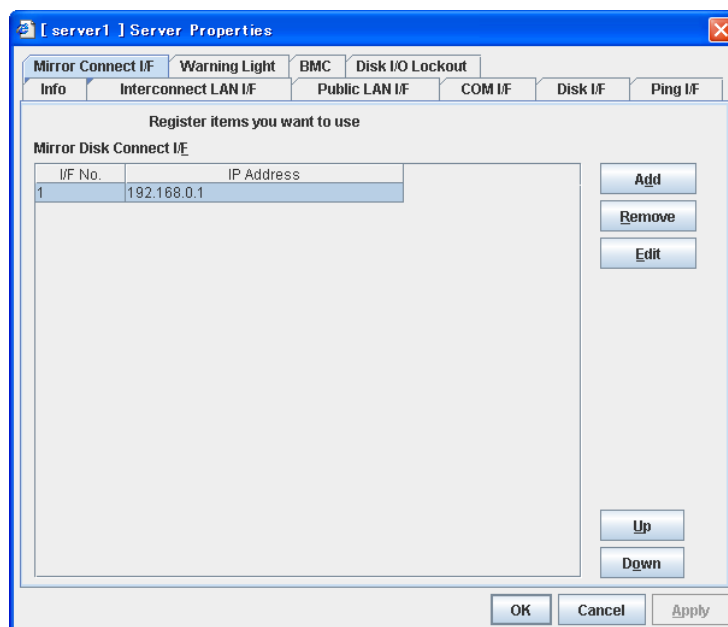
Use **Remove** to remove an interface. Select an interface you want to remove from the I/F list and click **Remove**.

### Edit

Use **Edit** to edit an IP address. Select an interface you want to edit from the I/F list and click **Edit**. The **Selection of Ping NP** dialog box where the selected IP address is presser is displayed.

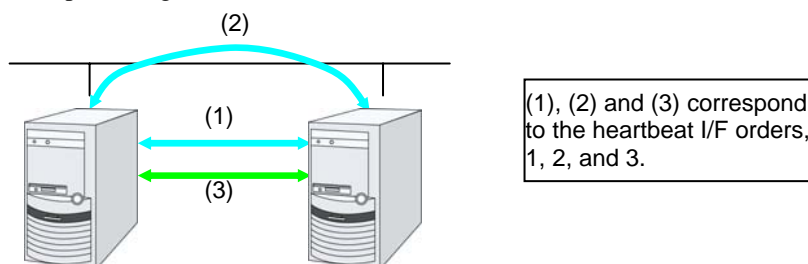
## Mirror connect I/F tab ~ for Replicator/Replicator DR ~

You can add, remove and edit a mirror disk connect interface. The I/F number and the IP addresses currently registered in **Mirror Disk Connect I/F** are listed. You have to specify more than one mirror disk connect interface.



- ◆ Specify the IP address of LAN heartbeat for interconnect.
- ◆ If there are two or more LAN heartbeats for interconnect, specify an IP address of the second or later LAN heartbeat for interconnect.

(Sample configuration)



Order	Type	I/F No.
1	LAN	1
2	LAN	2
3	LAN	3
4	COM	1

LAN heartbeat for interconnect

Public LAN heartbeat

Interconnect dedicated LAN heartbeat

(Heartbeat I/F tab in cluster properties)

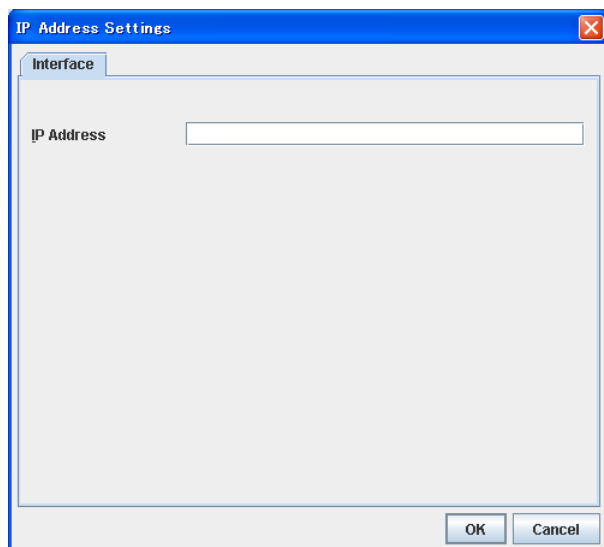
Set this LAN to the mirror disk connect I/F

### Note:

Be careful when you change a server IP address. For how to change an IP address, see “Changing the server IP address” in Chapter 10, “The system maintenance information.”

### Add

Use **Add** to add an interface. Clicking **Add** opens the **IP Address Settings** dialog box.



#### ◆ IP Address (Within 80 bytes)

Enter an actual IP to be used for mirror disk connect.

### Remove

Use **Remove** to remove an interface. Select an interface you want to remove from the interface list and click **Remove**.

You cannot remove an I/F number that is set for the mirror disk resource or the hybrid disk resource. To remove the I/F number, firstly delete the mirror disk resource or the hybrid disk resource that the I/F number is set .

### Edit

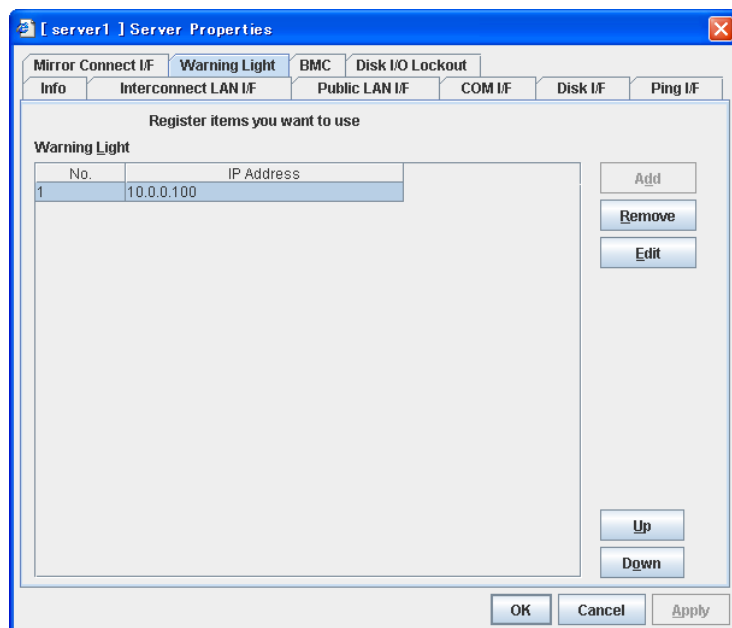
Use **Edit** to remove an IP address. Select an interface you want to edit from the interface list and click **Edit**. The **IP Address Settings** dialog box where the selected IP address is preset is displayed.

### Up & Down

Use **Up** and **Down** to change an I/F number. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

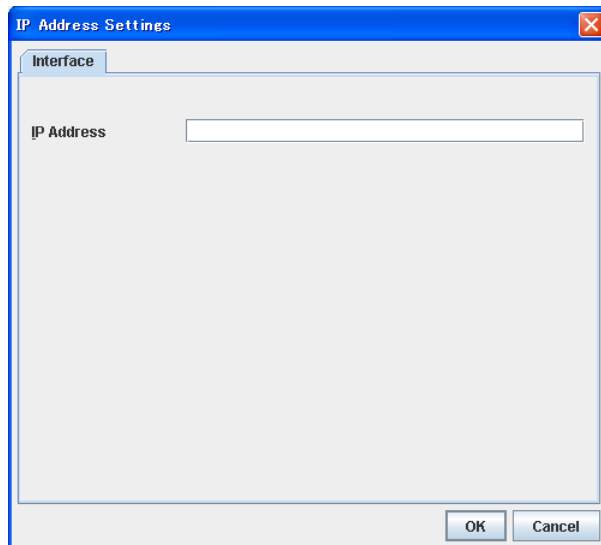
## Warning Light tab

Set an IP address of warning light (specified by NEC) controlled by network.



### Add

Use **Add** to add an interface. Clicking **Add** opens the **IP Address Settings** dialog box.



◆ **IP Address (Within 80 bytes)**

Enter an IP address of the warning light.

---

**Note:**

One warning light is required per one server. Do not set an IP address of the same warning light to multiple servers.

---

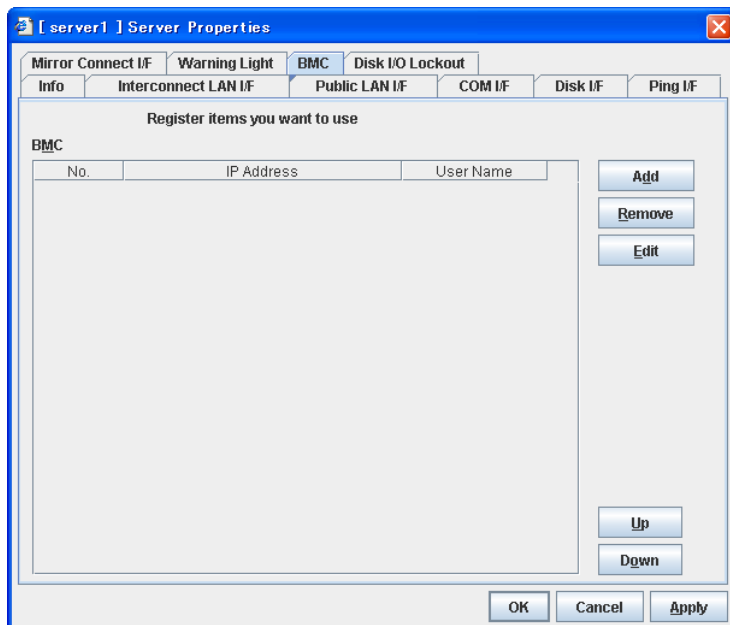
### Edit

Use **Edit** to change an IP address. Click **Edit** and the **IP Address Settings** dialog box is displayed.

## BMC tab

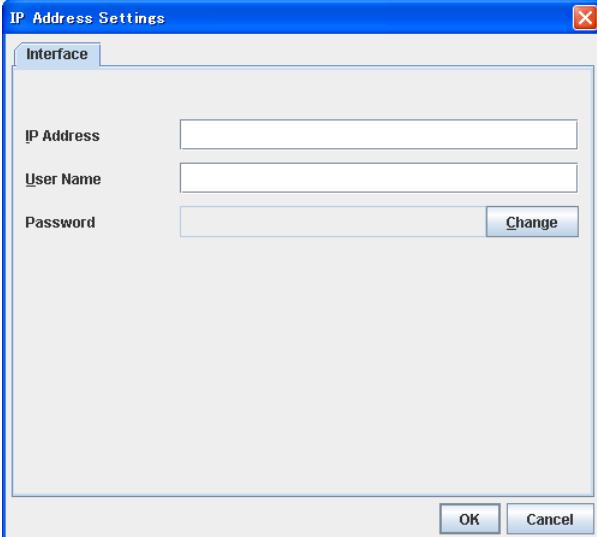
Configure a LAN port for managing BMC when using the forced stop and the chassis identify.

Configure one for each server.



### Add

Use this button to newly configure a server. Click **Add** to opens the **IP Address Settings** dialog box.



The image shows a dialog box titled "IP Address Settings" with a blue title bar and a close button (X) in the top right corner. Inside the dialog, there is a tab labeled "Interface". Below the tab, there are three input fields: "IP Address", "User Name", and "Password". The "Password" field has a "Change" button next to it. At the bottom of the dialog, there are "OK" and "Cancel" buttons.

- ◆ **IP Address (Within 80 bytes)**  
Enter the IP address set for the LAN port for managing BMC.
- ◆ **User Name (Within 255 bytes)**  
Enter the user name with administrator privilege from the user names configured in BMC.  
If you do not enter anything, the argument of user name is not configured when the ipmitool command, the hwreset command, or the alarms command is executed.  
The valid length of user name varies depending on the ipmitool command, hwreset command, alarms command and the specification of BMC of the server.
- ◆ **Password (Within 255 bytes)**  
Enter the password of the user configured above.  
The valid length of password varies depending on the specifications of ipmitool command, hwreset command, alarms command and the BMC of the server.  
For more information on user name and password, refer to the manual of the server.

### Remove

Use this button to remove the settings. Select the target setting, and then, click **Remove**.

### Edit

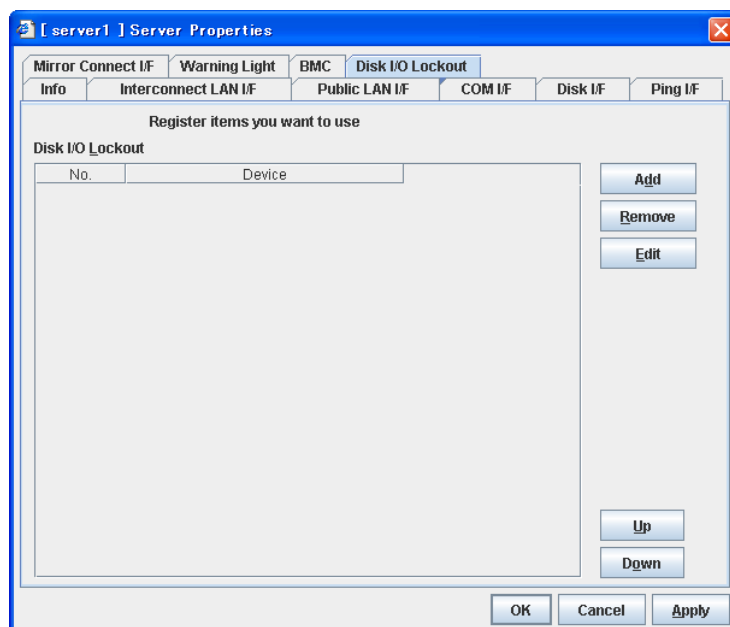
Use this button to modify the settings. Select the target setting, and then, click **Edit**. The **IP Address Settings** dialog box is displayed.

When a cluster consists of the different types of servers and includes a server which does not have BMC function, do not configure the BMC tab for the server.

In such a configuration, if **Chassis Identify** and/or the forced stop function, the alert telling you "failed in the BMC action" is displayed.

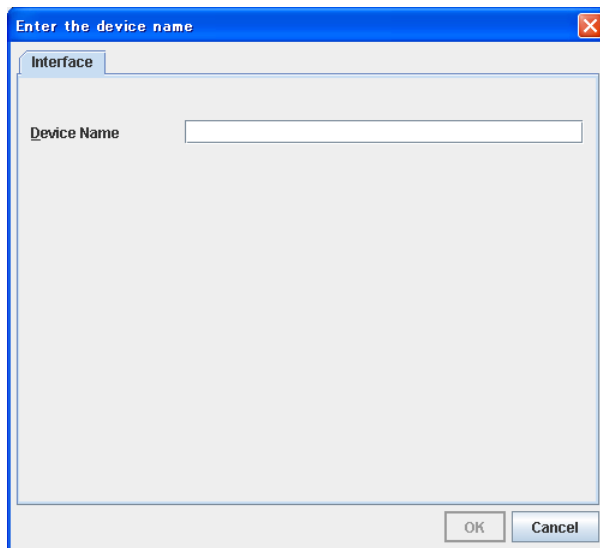
## Disk I/O Lockout tab

Configure the settings for disk I/O lockout devices.



### Add

Use **Add** to add lockout devices. Clicking **Add** opens the **Enter the device name** dialog box.



- ◆ Device Name (**Within** 1023 bytes)

Enter a disk I/O lockout device.

### Remove

Use **Remove** to remove lockout devices. Select the device to remove from the **Disk I/O Lockout** device and then click **Remove**.

### Edit

Use **Edit** to edit disk I/O lockout devices. Clicking **Edit** opens the **Enter the device name** dialog box.

### UP & Down

Use **UP & Down** to change the I/F number. Select the I/F you want to change on the I/F list and then click **Up** or **Down**. The selected row moves up and down accordingly.

## Functional differences of the Builder between Linux and Windows

### **Reading and writing the cluster configuration data**

Only for Linux, you can select a file format to read/write data in a floppy disk.

For details, see “File menu” on page 137.

### **Script editor for exec resources**

The default script editor is vi editor for Linux, and Notepad for Windows. Default settings on Linux use xterm for terminal, therefore, multi-byte characters cannot be properly displayed. For details, see “Displaying and configuring the settings of the exec resource details” in Chapter 5, “Group resource details.”

## Parameters list

Parameters you can specify in the Builder and their default values are listed below.

“How to change [1]-[6]” represents the way you reflect changes of parameters on servers.  
Applicable method is marked with “O.”

Priority	How to reflect	Refer to:
1	Uploading data and shutting down, restarting a cluster	Installation and Configuration Guide Chapter 7 “Modifying the cluster configuration data”
2	Uploading data after stopping a cluster	
3	Uploading data after stopping a mirror agent	
4	Uploading data after suspending a cluster	
5	Uploading data and restarting the WebManager	
6	Uploading data only	

When creating the cluster configuration data for the first time, see Chapter 5 “Creating the Cluster configuration data using the Builder” in the *Installation and Configuration Guide*.

## Cluster

Parameters	Default	How to change					
		1	2	3	4	5	6
<b>Cluster Properties</b>							
<b>Info Tab</b>							
Name	-				O		
Comment	-						O
Language	English				O	O	
<b>Heartbeat I/F Tab</b>							
Order (Up, Down)	-				O	O	
Type (Add, Remove)	-				O	O	
Server Down Notification	On						O
<b>Heartbeat I/F Tuning Properties</b>							
Open/Close Timing	Only at Start/Stop				O		
Bind Check	Disable				O		
<b>Network partition resolution I/F tab</b>							
<b>NP Resolution Tuning Properties</b>							
Ping tab							
Interval	5 seconds				O		
Timeout	3 seconds				O		
Retry Count	3 times				O		
<b>Master Server Tab</b>	-						
Order (Up, Down)	The order you added servers				O	O	
<b>Timeout Tab</b>							
Server Sync Wait Time	5 minutes						O
Heartbeat Interval	3 seconds				O		
Heartbeat Timeout	90 seconds				O		

Parameters	Default	How to change					
		1	2	3	4	5	6
Server Internal Timeout	180 seconds				O		
<b>Port No. Tab</b>							
Server Internal Port Number	29001				O	O	
Data Transfer Port Number	29002	O					
WebManager HTTP Port Number	29003					O	
Heartbeat Port Number	29002				O		
Kernel Mode Heartbeat Port Number	29006				O		
Alert Sync Port Number	29003					O	
<b>Port No. (Mirror) Tab<sup>6</sup></b>							
Mirror Agent Port Number	29004			O			
<b>Port No. (Log) Tab</b>							
Communication Method for Internal Logs	Unix Domain	O					
Port Number	-	O					
<b>Monitor Tab</b>							
Shutdown Monitor	On						O
Method	softdog						O
Operation at Timeout Detection	RESET						O
Enable SIGTERM handler	On						O
Timeout	Use Heartbeat Timeout						O
Set Timeout	90						O
<b>Recovery Tab</b>							
Max Reboot Count	zero				O		
Max Reboot Count Reset Time	0 minute				O		
Use Forced Stop	Off						
Forced Stop Action	BMC reset						
Forced Stop Timeout	3 seconds						
<b>Alert Service Tab</b>							
Enable Alert Setting	Off				O		
E-mail Address	Blank (Function disabled)						O
Subject	EXPRESSCLUSTER						O
Mail Method	MAIL						O
Use Network Warning Light <sup>6</sup>	Off				O		
Use Alert Extension	Off	O					
Use Chassies Identify	Off						O
<b>Alert Destination Tab</b>							
Messages (Add, Remove, Edit)	-						O
<b>Message Tab</b>							
Category	Core Modules						O
Module Type	apisv						O
Event ID	-						O
Destination System Log	On						O
Destination WebManager Alertlog	On						O
Destination Mail Report	Off						O
Destination Alert Extension	Off						O
Command (Add, Remove, Edit)	-						O
<b>SMTP Settings Tab</b>							
Mail Charaset	-						O
Send Mail Timeout	30 seconds						O
Subject Encode	Off						O
SMTP Server (Up, Down)	-						O
SMTP Server List (Add, Remove)	-						O
Enter the SMTP Server							
SMTP Server	-						
SMTP Port	25						
Sender Address	-						

<sup>6</sup> It does not apply to IA64 and PPC64.

Parameters		Default	How to change					
			1	2	3	4	5	6
	Enable SMTP Authentication	Off						
	Authority Method	LOGIN						
	User Name	-						
	Password	-						
<b>WebManager Tab</b>								
	Enable WebManager Server	On					O	
	Accessible number of clients	64					O	
	Control connection by using client IP address	Off					O	
	IP Addresses of the Accessible Clients (Add, Remove, Edit)	-					O	
	Operation	On					O	
<b>Web Manager Password</b>								
	Password for Operation	-						O
	Password for Reference	-						O
<b>WebManager Tuning Properties</b>								
<b>Behavior Tab</b>								
	Client Session Timeout	30 seconds					O	
	Max. Number of Alert Records on Viewer	300					O	
	Reload Interval	90 seconds					O	
	Mirror Agent Tab	120 seconds					O	
	Client Data Update Method	Real Time					O	
	Time Limit For Keeping Log Files	600 seconds					O	
<b>Integrated WebManager Tab</b>								
	The Number of Logics when Searching Clusters	10					O	
	The Number of Clusters That It Searches For At A Time	10					O	
<b>Alert Log Tab</b>								
	Enable Alert Daemon	On					O	
	Max. Number to Save Alert Records	10000					O	
	Alert Sync Method	Unicast (fixed)					O	
	Alert Sync Communication Timeout	30 seconds					O	
<b>Delay Warning Tab</b>								
	Heartbeat Delay Warning	80%				O		
	Monitor Delay Warning	80%				O		
<b>Exclusion Tab</b>								
	Mount/Umount Exclusion	On						O
<b>Power Saving Tab</b>								
	Use CPU Frequency Control <sup>7</sup>	Off						O
<b>Mirror Agent Tab<sup>8</sup></b>								
	Auto Mirror Recovery	On						O
	Receive Timeout	10 seconds			O			
	Send Timeout	120 seconds						O
	Recovery Data Size	4096 kilobytes						O
	Recovery Limitation	Off						O
	Start Wait Time	10 seconds			O			
	Cluster Partition I/O Timeout	30 seconds			O			
<b>Mirror Driver Tab<sup>8</sup></b>								
	Max. Number of Request Queues	2048			O			
	Bitmap Refresh Interval	100 seconds			O			

<sup>7</sup> It does not apply to IA64 and PPC64.

<sup>8</sup> It does not apply to IA64 and PPC64.

## Server

Parameters	Default	How to change					
		1	2	3	4	5	6
Add Server <sup>9</sup>	-						
Remove Server <sup>9</sup>	-						
<b>Server Properties</b>							
<b>Info Tab</b>							
Name <sup>10</sup>	-						
Comment	-						O
<b>Interconnect LAN I/F Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
IP Address (Edit) <sup>10</sup>	-						
IP Address (Up, Down)	-				O		
<b>Public LAN I/F Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
IP Address (Edit) <sup>10</sup>	-						
IP Address (Up, Down)	-				O		
<b>COM I/F Tab <sup>11</sup></b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
Device (Edit, Up, Down)	/dev/ttyS0				O		
<b>Disk I/F Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
Device (Edit, Up, Down)	-	O					
RAW Device (Edit, Up, Down)	-						O
<b>Ping I/F Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
Use	On				O		
IP Address (Edit)	-				O		
<b>Mirror Connect I/F Tab <sup>12</sup></b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
IP Address (Edit) <sup>10</sup>	-						
IP Address (Up, Down)	-			O			
<b>Warning Light Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
IP Address (Edit, Up, Down)					O		
<b>BMC Tab</b>							
No (Add, Remove)	The order you added				O		
IP Address (Edit)	-				O		
User Name	-				O		
Password	-				O		
<b>Disk I/O Lockout Tab</b>							
I/F No. (Add, Remove)	The order you added I/Fs				O		
Device (Edit, Up, Down)	-	O					

<sup>9</sup> For details on how to add or remove a server, see Section III on this guide.

<sup>10</sup> Be careful when you change the host name or IP address of a server. For how to change the host name or IP address, see Section III of this guide.

<sup>11</sup> It does not apply to PPC64.

<sup>12</sup> It does not apply to IA64 and PPC64.

## Server Group

Parameters	Default	How to change					
		1	2	3	4	5	6
Add Server Group	-			O			
Remove Server Group	-			O			
<b>Server Group Property</b>							
<b>Info tab</b>							
Name	-			O			
Comment	-						O
<b>Server group tab</b>							
Order (Up, Down)	The order you added to "Servers that can run the Group"			O			
Add	-			O			
Delete	-			O			

## Group

Parameters	Default	How to change					
		1	2	3	4	5	6
Add Group	-				O		
Remove Group	-		O				
<b>Group Properties</b>							
<b>Info Tab</b>							
Name	failover		O				
Comment	-						O
<b>Startup Server Tab</b>							
Failover is possible at all servers (Changes to On)	On		O				
Failover is possible at all servers (Changes to Off)	On				O		
Order (Up, Down)	The order you added to "Servers that can run the Group."				O		
Name (Add)	-				O		
Name(Delete)			O				
<b>Server Group Tab</b>							
Add, Delete, Up, Down	The order you added to "Servers that can run the Group"			O			
<b>Attributes Tab</b>							
Startup Attribute	Auto Startup				O		
Failover Exclusive Attribute	Off				O		
Failover Attribute	Auto Failover				O		
Failback Attribute	Manual Failback				O		

## Group Resource (Common)

Parameters	Default	How to change					
		1	2	3	4	5	6
Add Group Resource	-		O				
Remove Group Resource	-		O				
Add Group Resource (Mirror Disk Resource, Hybrid Disk Resource)				O			
Remove Group Resource (Mirror Disk Resource, Hybrid Disk Resource)				O			
<b>Group Resource Common Properties</b>							
<b>Info Tab</b>							
Name	Each resource default value		O				
Name (Mirror Disk Resource, Hybrid Disk Resource)	Each resource default value			O			
Comment	-						O

## Exec resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Exec Resource Properties								
Dependence Tab								
Follow the default dependence		On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li><li>disk resources</li><li>mirror disk resources</li><li>hybrid disk resources</li><li>Raw resources</li><li>VxVM disk group resources<sup>13</sup></li><li>VxVM volume resources<sup>13</sup></li><li>NAS resources</li></ul>				O		
Dependent Resources (Add, Remove)		-				O		
Settings Tab								
Retry Count at Activation Failure		zero				O		
Failover Threshold		1 time				O		
Final Action at Activation Failure		No Operation (Not activate next resources)				O		
Execute Script before Final Action		Off						O
Retry Count at Deactivation Failure		zero				O		
Final Action at Deactivation Failure		Stop the cluster daemon and shut down OS.				O		
Execute Script before Final Action		Off						O
Details Tab								
Type (User Application, Script Created with this product)		Script Created with this product						O
User Application	Enter the application path (Edit)	-						O
Script Created with this product	Script codes (Edit)	-						O
Exec Resource Tuning Properties								
Parameter Tab								
Start Script Synchronous, Asynchronous		Synchronous						O
Start Script Timeout		1800 seconds				O		

<sup>13</sup> It does not apply to IA64 and PPC64.

	Stop Script Synchronous, Asynchronous	Synchronous						0
	Stop Script Timeout	1800 seconds				0		
	<b>Maintenance Tab</b>							
	Log Output Path	Blank (/dev/null)						0

## Disk resource

Parameters		Default	How to change					
			1	2	3	4	5	6
<b>Disk Resource Properties</b>								
<b>Dependence Tab</b>								
	Follow the default dependence	On • floating IP resources • virtual IP resources				0		
	Dependent Resources (Add, Remove)	-				0		
<b>Settings Tab</b>								
	Retry Count at Activation Failure	zero				0		
	Failover Threshold	1 time				0		
	Final Action at Activation Failure	No Operation (Not activate next resources)				0		
	Execute Script before Final Action	Off						0
	Retry Count at Deactivation Failure	zero				0		
	Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				0		
	Execute Script before Final Action	Off						0
<b>Details Tab</b>								
	Device Name	-		0				
	Mount Point	-		0				
	File System	-						0
	Disk Type	disk (fixed)		0				
<b>Disk Resource Tuning Properties</b>								
<b>Mount Tab</b>								
	Mount Option	rw						0
	Timeout	60 seconds				0		
	Retry Count	3 times				0		
<b>Unmount Tab</b>								
	Timeout	60 seconds				0		
	Retry Count	3 times				0		
	Forced operation when error is detected	kill						0
<b>Fsck Tab</b>								
	fsck Option	-y						0
	fsck Timeout	1800 seconds				0		
	fsck action before mount	Execute at Specified Count						0
	Count	10 times						0
	fsck Action When Mount Failed Execute	On						0
	Rebuilding of Reiserfs	Off				0		

## Floating IP resource

Parameters		Default	How to change					
			1	2	3	4	5	6
<b>FIP Resource Tuning Properties</b>								
<b>Dependence Tab</b>								
	Follow the default dependence	On (No default is set)				0		
	Dependent Resources (Add, Remove)	-				0		
<b>Settings Tab</b>								
	Retry Count at Activation Failure	5 times				0		
	Failover Threshold	1 time				0		
	Final Action at Activation Failure	No Operation (Next resources are not activated).				0		

Execute Script before Final Action	Off							O
Retry Count at Deactivation Failure	zero				O			
Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				O			
Execute Script before Final Action	Off							O
<b>Details Tab</b>								
IP Address	-		O					
<b>FIP Resource Tuning Properties</b>								
<b>Parameter Tab</b>								
Ifconfig Timeout	60 seconds				O			
ping Interval	1 second				O			
ping Timeout	1 second				O			
ping Retry Count	zero				O			
ping Forced FIP Activation	Off							O
ARP Send Count	1 time				O			
<b>Deactivity Check Tab</b>								
Ipconfig Status at Failure	Not Failure							O
Ping Status at Failure	Not Failure							O

## Virtual IP resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Virtual IP Resource Properties								
Dependence Tab								
	Follow the default dependence	On (No default dependence)				O		
	Dependent Resources (Add, Remove)	-				O		
Settings Tab								
	Retry Count at Activation Failure	1 time				O		
	Failover Threshold	1 time				O		
	Final Action at Activation Failure	No Operation (Next resources are not activated).				O		
	Execute Script before Final Action	Off						O
	Retry Count at Deactivation Failure	1 time				O		
	Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				O		
	Execute Script before Final Action	Off						O
Details Tab								
	IP Address	-		O				
	NIC Alias Name	-		O				
	Destination IP Address	-		O				
	Source IP Address	-		O				
	Send Interval	10 seconds		O				
	User Routing Protocol	-		O				
Virtual IP Resource Tuning Properties								
	Parameter Tab							
	ifconfig Timeout	60 seconds				O		
	Ping Interval	1 second				O		
	Ping Timeout	1 second				O		
	Ping Retry Count	Zero				O		
	Ping Forced VIP Activation	Off						O
	ARP Send Count	1 time				O		
	Deactivity Check Tab							
	ifconfig Status at Failure	Not Failure						O
	ping Status at Failure	Not Failure						O
	RIP Tab							
	Next Hop IP Address	-		O				
	Metric	1		O				
	Port Number	520		O				
	RIPng Tab							
	Metric	1		O				

	Port Number	521		O					
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## NAS resource

Parameters	Default	How to change					
		1	2	3	4	5	6
NAS Resource Properties							
Dependence Tab							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
Settings Tab							
Retry Count at Activation Failure	zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Next resources are not activated).				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero				O		
Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				O		
Execute Script before Final Action	Off						O
Details Tab							
Server Name	-		O				
Shared Name	-		O				
Mount Point	-		O				
File System	nfs						O
NAS Resource Tuning Properties							
Mount Tab							
Mount Option	rw						O
Timeout	60 seconds				O		
Retry Count	3 times				O		
Unmount Tab							
Timeout	60 seconds				O		
Retry Count	3 times				O		
Forced operation when error is detected	kill						O
NAS Tab							
ping Timeout	10 seconds				O		

## RAW resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Raw Resource Properties							
Dependence Tab							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
Settings Tab							
Retry Count at Activation Failure	zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Next resources are not activated).				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero				O		
Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				O		
Execute Script before Final Action	Off						O
Details Tab							

Device Name	-	<input type="radio"/>					
Raw Device Name	-		<input type="radio"/>				
Disk Type	disk (fixed)		<input type="radio"/>				

## VxVM disk group resource

Parameters	Default	How to change					
		1	2	3	4	5	6
<b>VxVM Disk Group Resource Properties</b> <sup>14</sup>							
<b>Dependence Tab</b>							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
<b>Settings Tab</b>							
Retry Count at Activation Failure	zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Next resources are not activated).				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero				O		
Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.				O		
Execute Script before Final Action	Off						O
<b>Details Tab</b>							
Disk Group Name	-		O				
<b>VxVM Disk Group Resource Tuning Properties</b>							
<b>Import Tab</b>							
Import Timeout	60 seconds				O		
Start Volume Timeout	60 seconds				O		
Clear Host ID	On						O
Forced Import	Off						O
<b>Deport Tab</b>							
Stop Volume Timeout	60 seconds				O		
Flush Timeout	60 seconds				O		
Deport Timeout	60 seconds				O		

## VxVM volume resource

Parameters	Default	How to change					
		1	2	3	4	5	6
VxVM Volume Resource Properties <sup>15</sup>							
Dependence Tab							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li><li>VxVM disk group resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
Settings Tab							
Retry Count at Activation Failure	zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Next resources are not activated).				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero				O		

<sup>14</sup> It does not apply to IA64 and PPC64.

<sup>15</sup> It does not apply to IA64 and PPC64.

Final Action at Deactivation Failure	Stop the cluster daemon and shut down OS.					O		
Execute Script before Final Action	Off							O
<b>Details Tab</b>								
Volume Device Name	-			O				
Volume Raw Device Name	-			O				
Mount Point	-			O				
File System	vxfs							O
<b>VxVM Volume Resource Tuning Properties</b>								
<b>Mount Tab</b>								
Mount Option	rw							O
Timeout	60 seconds					O		
Retry Count	3 times					O		
<b>Unmount Tab</b>								
Timeout	60 seconds					O		
Retry Count	3 times					O		
Forced operation when error is detected	kill							O
<b>Fsck Tab</b>								
fsck Option	-y							O
fsck Timeout	1800 seconds					O		
fsck action before mount	Execute at Specified Count							O
Count	10 times							O
fsck Action When Mount Failed	On							O
Execute								O

## Mirror disk resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Mirror Disk Resource Properties <sup>16</sup>							
Dependency Tab							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
Settings Tab							
Retry Count at Activation Failure	Zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Not activate next resource)				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	Zero				O		
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Details Tab							
Mirror Partition Device Name	/dev/NMP1~			O			
Mount Point	-			O			
Data Partition Device Name	-			O			
Cluster Partition Device Name	-			O			
Disk Device Name	-			O			
File System	ext3			O			
Selection of Mirror Disk Connect							
Mirror Disk Connect Tab							
I/F No. (Add, Remove, Up, Down)	Top two I/F No. on the mirror disk connect I/F tab of the server properties			O			
Mirror Disk Resource Tuning Properties							

<sup>16</sup> It does not apply to IA64 and PPC64.

<b>Mount Tab</b>									
Mount Option	rw				O				
Timeout	120 seconds					O			
Retry Count	3 times					O			
<b>Unmount Tab</b>									
Timeout	120 seconds					O			
Retry Count	3 times					O			
Forced operation when error is detected	kill								O
<b>Fsck Tab</b>									
fsck Option	-y								O
fsck Timeout	1800 seconds					O			
fsck action before mount	Execute at Specified Count								O
Count	10 times								O
fsck Action When Mount Failed	Execute								O
Rebuilding of Reiserfs	Off					O			
<b>Mirror Tab</b>									
Execute the initial mirror construction	On (valid only for the initial mirror construction)								
Execute initial mkfs	On (valid only for the initial mirror construction)								
Perform Data Synchronization	On					O			
Mode	Synchronous					O			
Number of Queues	Set Number 2048					O			
<b>Mirror Driver Tab</b>									
Mirror Data Port Number	29051~					O			
Heartbeat Port Number	29031~					O			
ACK2 Port Number	29071~					O			
Send Timeout	30 seconds					O			
Connection Timeout	10 seconds					O			
Ack Timeout	100 seconds					O			
Receive Timeout	100 seconds					O			

## Hybrid disk resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Hybrid Disk Resource Properties <sup>17</sup>							
Dependency Tab							
Follow the default dependence	On <ul style="list-style-type: none"><li>floating IP resources</li><li>virtual IP resources</li></ul>				O		
Dependent Resources (Add, Remove)	-				O		
Settings Tab							
Retry Count at Activation Failure	Zero				O		
Failover Threshold	1 time				O		
Final Action at Activation Failure	No Operation (Not activate next resource)				O		
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	Zero				O		
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Details Tab							
Mirror Partition Device Name	/dev/NMP1~			O			
Mount Point	-			O			
Data Partition Device Name	-			O			
Cluster Partition Device Name	-			O			

<sup>17</sup> It does not apply to IA64 and PPC64.

Disk Device Name	-				O			
File System	ext3				O			
<b>Selection of Mirror Disk Connect</b>								
<b>Mirror Disk Connect Tab</b>								
I/F No. (Add, Remove, Up, Down)	Top two I/F No. on the mirror disk connect I/F tab of the server properties				O			
<b>Hybrid Disk Resource Tuning Properties</b>								
<b>Mount Tab</b>								
Mount Option	rw				O			
Timeout	120 seconds					O		
Retry Count	3 times					O		
<b>Unmount Tab</b>								
Timeout	120 seconds					O		
Retry Count	3 times					O		
Forced operation when error is detected	kill							O
<b>Fsck Tab</b>								
fsck Option	-y							O
fsck Timeout	1800 seconds					O		
fsck action before mount	Execute at Specified Count							O
Count	10 times							O
fsck Action When Mount Failed	Execute							O
Rebuilding of Reiserfs	Off					O		
<b>Mirror Tab</b>								
Execute the initial mirror construction	On (valid only for the initial mirror construction)							
Execute initial mkfs	On (valid only for the initial mirror construction)							
Perform Data Synchronization	On				O			
Mode	Synchronous				O			
Number of Queues	Set Number 2048				O			
<b>Mirror Driver Tab</b>								
Mirror Data Port Number	29051~				O			
Heartbeat Port Number	29031~				O			
ACK2 Port Number	29071~				O			
Send Timeout	30 seconds				O			
Connection Timeout	10 seconds				O			
Ack Timeout	100 seconds				O			
Receive Timeout	100 seconds				O			

## Monitor resource (common)

Parameters	Default	How to change					
		1	2	3	4	5	6
Add monitor resource	-				<input type="radio"/>		
Remove Monitor Resource	-				<input type="radio"/>		
<b>Monitor Resources Common Properties</b>							
<b>Info Tab</b>							
Name	-				<input type="radio"/>		
Name (virtual IP Monitor Resource)			<input type="radio"/>				
Comment	-					<input type="radio"/>	

## Disk monitor resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Disk Monitor Resource Properties								
Monitor Tab								
Interval	60 seconds				<input type="radio"/>			
Timeout	120 seconds				<input type="radio"/>			
Retry Count	zero				<input type="radio"/>			
Wait Time to Start Monitoring	0 second				<input type="radio"/>			
Monitor Timing	Always				<input type="radio"/>			
Target Resource	-				<input type="radio"/>			
Nice Value	0				<input type="radio"/>			
Error Detection Server								
Error Detection Server	All Servers				<input type="radio"/>			
Servers that can run the Group (Add, Remove)	-				<input type="radio"/>			
Error Detection Tab								
Recovery Target	-				<input type="radio"/>			
Reactivation Threshold	3 times (if the recovery target is other than clusters)				<input type="radio"/>			
Failover Threshold	1 time (if the recovery target is other than clusters)				<input type="radio"/>			
Final Action	No Operation				<input type="radio"/>			
Execute Script before Final Action	Off							<input type="radio"/>
Parameter Tab								
Target Device Name	-							<input type="radio"/>
Method	READ							<input type="radio"/>
I/O size	2000000 bytes							<input type="radio"/>

## IP monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
IP Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds				<input type="radio"/>		
Timeout	30 seconds				<input type="radio"/>		
Retry Count	zero				<input type="radio"/>		
Wait Time to Start Monitoring	0 second				<input type="radio"/>		
Monitor Timing	Always				<input type="radio"/>		
Target Resource	-				<input type="radio"/>		
Nice Value	0				<input type="radio"/>		
Error Detection Server							
Error Detection Server	All Servers				<input type="radio"/>		
Servers that can run the Group (Add, Remove)	-				<input type="radio"/>		
Error Detection Tab							
Recovery Target	-				<input type="radio"/>		

Reactivation Threshold	3 times (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O
<b>Parameter Tab</b>							
IP Address (Add, Remove, Edit)	-						O

## Virtual IP monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Virtual IP Monitor Resource Properties <sup>18</sup>							
Monitor Tab							
Interval	3 seconds		O				
Timeout	30 seconds		O				
Retry Count	zero		O				
Wait Time to Start Monitoring	0 second		O				
Monitor Timing	Active (fixed)		O				
Target Resource	Virtual IP resource name		O				
Nice Value	0		O				
Error Detection Tab							
Recovery Target	Virtual IP resource name		O				
Reactivation Threshold	3 times		O				
Failover Threshold	1 time		O				
Final Action	No Operation		O				
Execute Script before Final Action	Off						O

## PID monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Pid Monitor Resource Properties							
Monitor Tab							
Interval	5 seconds				O		
Timeout	60 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All Servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	3 times (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O

<sup>18</sup> You can upload the data if a cluster is suspended. However, you should stop and resume a cluster to reflect the data.

## User space monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
User Space Monitor Resource Properties							
Monitor Tab							
Interval	3 seconds				<input type="radio"/>		
Timeout	90 seconds				<input type="radio"/>		
Error Detection Server							
Error Detection Server	All Servers				<input type="radio"/>		
Servers that can run the Group (Add, Remove)	-				<input type="radio"/>		
Parameter Tab							
Use heartbeat interval and timeout	On				<input type="radio"/>		
Method	softdog				<input type="radio"/>		
Operation at Timeout Detection	RESET				<input type="radio"/>		
Open/Close Temporary File	Off				<input type="radio"/>		
Write	Off				<input type="radio"/>		
Size	10000 bytes				<input type="radio"/>		
Create Temporary Thread	Off				<input type="radio"/>		

## RAW monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Raw Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All Servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	0 times (if the recovery target is other than clusters)				O		
Failover Threshold	0 time (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Target Raw Device Name	-						O
Device Name	-	O					

## VxVM volume monitor resource

Parameters		Default		How to change					
				1	2	3	4	5	6
VxVM Volume Monitor Resource Properties <sup>19</sup>									
Monitor Tab									
Interval	60 seconds					O			

<sup>19</sup> It does not apply to IA64 and PPC64.

Timeout	120 seconds					O		
Retry Count	zero					O		
Wait Time to Start Monitoring	0 second					O		
Monitor Timing	Active (fixed)					O		
Target Resource	-					O		
Nice Value	0					O		
<b>Error Detection Server</b>								
Error Detection Server	All Servers					O		
Servers that can run the Group (Add, Remove)	-					O		
<b>Error Detection Tab</b>								
Recovery Target	-					O		
Reactivation Threshold	3 times (if the recovery target is other than clusters)					O		
Failover Threshold	1 time (if the recovery target is other than clusters)					O		
Final Action	No Operation					O		
Execute Script before Final Action	Off							O
<b>Parameter Tab</b>								
Monitor Target	-							O

## VxVM daemon monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
<b>VxVM Daemon Monitor Resource Properties</b> <sup>20</sup>							
<b>Monitor Tab</b>							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always				O		
Target Resource	-				O		
Nice Value	0				O		
<b>Error Detection Server</b>							
Error Detection Server	All Servers				O		
Servers that can run the Group (Add, Remove)	-				O		
<b>Error Detection Tab</b>							
Recovery Target	Cluster name						
Reactivation Threshold	zero				O		
Failover Threshold	zero				O		
Final Action	Stop the cluster daemon and reboot OS.				O		
Execute Script before Final Action	Off						O

## NIC Link Up/Down monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
NIC Link Up/Down Monitor Resource Properties							
Monitor Tab							
Interval	10 seconds				O		
Timeout	60 seconds				O		
Retry Count	3 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always				O		
Target Resource	-				O		

<sup>20</sup> It does not apply to IA64 and PPC64.

Nice Value	0				O		
Error Detection Server							
Error Detection Server	All Servers				O		
Servers that can run the Group (Add, Remove)	-				O		
<b>Error Detection Tab</b>							
Recovery Target	-				O		
Reactivation Threshold	zero				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O
<b>Parameter Tab</b>							
Monitor Target	-						O

## Multi target monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Multi Target Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds				O		
Timeout	30 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	3 times (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Monitor Resources (Add, Remove)	-						O
Multi Target Monitor Resource Tuning Properties							
Parameter Tab							
Error Threshold	Same as Number of Members						O
Specify Number	64						O
Warning Threshold	Off						O
Specify Number	-						O

## Mirror disk monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Mirror Disk Monitor Resource Properties <sup>21</sup>							
Monitor Tab							
Interval	10 seconds				O		
Timeout	60 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		

<sup>21</sup> It does not apply to IA64 and PPC64.

Monitor Timing	Always (fixed)					O		
Target Resource	-					O		
Nice Value	0					O		
<b>Error Detection Tab</b>								
Recovery Target	Cluster name							
Reactivation Threshold	zero							
Failover Threshold	zero							
Final Action	No Operation							
Execute Script before Final Action	Off							O
<b>Parameter Tab</b>								
Mirror Disk Resource	Mirror disk resource name							O

## Mirror disk connect monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Mirror Disk Connect Monitor Resource Properties <sup>22</sup>							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always (fixed)				O		
Target Resource	-				O		
Nice Value	0			O			
Error Detection Tab							
Recovery Target	Cluster name						
Reactivation Threshold	Zero						
Failover Threshold	Zero						
Final Action	No Operation						
Execute Script before Final Action	Off						O
Parameter Tab							
Mirror Disk Resource	Mirror disk resource name						O

## Hybrid disk monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Hybrid Disk Monitor Resource Properties <sup>23</sup>							
Monitor Tab							
Interval	10 seconds				<input type="radio"/>		
Timeout	60 seconds				<input type="radio"/>		
Retry Count	zero				<input type="radio"/>		
Wait Time to Start Monitoring	0 second				<input type="radio"/>		
Monitor Timing	Always (fixed)				<input type="radio"/>		
Target Resource	-				<input type="radio"/>		
Nice Value	0				<input type="radio"/>		
Error Detection Tab							
Recovery Target	Cluster name						
Reactivation Threshold	zero						
Failover Threshold	zero						
Final Action	No Operation						
Execute Script before Final Action	Off						<input type="radio"/>
Parameter Tab							
Hybrid Disk Resource	Hybrid disk resource name						<input type="radio"/>

<sup>22</sup> It does not apply to IA64 and PPC64.

<sup>23</sup> It does not apply to IA64 and PPC64.

## Hybrid disk connect monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Hybrid Disk Connect Monitor Resource Properties <sup>24</sup>							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Always (fixed)				O		
Target Resource	-				O		
Nice Value	0			O			
Error Detection Tab							
Recovery Target	Cluster name						
Reactivation Threshold	Zero						
Failover Threshold	Zero						
Final Action	No Operation						
Execute Script before Final Action	Off						O
Parameter Tab							
Hybrid Disk Resource	Hybrid disk resource name						O

## ARP monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
ARP Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds				O		
Timeout	180 seconds				O		
Retry Count	zero				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	Zero (if the recovery target is other than clusters)				O		
Final Action	No Operation				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Target Resource	-		O				

## Custom monitor resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Custom Monitor Resource Properties <sup>25</sup>								
Monitor Tab								
Interval	60 seconds				O			
Timeout	120 seconds				O			
Retry Count	zero				O			
Wait Time to Start Monitoring	0 second				O			

<sup>24</sup> It does not apply to IA64 and PPC64.

<sup>25</sup> It does not apply to IA64 and PPC64.



Monitor Tab									
Interval	60 seconds					O			
Timeout	120 seconds					O			
Retry Count	3 times					O			
Wait Time to Start Monitoring	0 second					O			
Monitor Timing	Active					O			
Target Resource	-					O			
Nice Value	0					O			
Error Detection Server									
Error Detection Server	All servers					O			
Servers that can run the Group (Add, Remove)						O			
Error Detection Tab									
Recovery Target	-					O			
Reactivation Threshold	Zero (if the recovery target is other than clusters)					O			
Failover Threshold	1 time (if the recovery target is other than clusters)					O			
Final Action	Stop cluster daemon and shutdown OS					O			
Execute Script before Final Action	Off								O
Parameter Tab									
IP Address	127.0.0.1								O
Port Number	21								O
User Name	-								O
Password	-								O

## HTTP monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
HTTP Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	10 seconds				O		
Retry Count	3 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Connecting Destination	localhost						O
Port Number	80						O
Request URI	-						O
Protocol	HTTP						O

## IMAP4 monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6

IMAP4 Monitor Resource Properties									
<b>Monitor Tab</b>									
Interval	60 seconds					O			
Timeout	120 seconds					O			
Retry Count	3 times					O			
Wait Time to Start Monitoring	0 second					O			
Monitor Timing	Active (fixed)					O			
Target Resource	-					O			
Nice Value	0					O			
<b>Error Detection Server</b>									
Error Detection Server	All servers					O			
Servers that can run the Group (Add, Remove)	-					O			
<b>Error Detection Tab</b>									
Recovery Target	-					O			
Reactivation Threshold	Zero (if the recovery target is other than clusters)					O			
Failover Threshold	1 time (if the recovery target is other than clusters)					O			
Final Action	Stop cluster daemon and shutdown OS					O			
Execute Script before Final Action	Off								O
<b>Parameter Tab</b>									
IP Address	127.0.0.1								O
Port	3306								O
User Name	-								O
Password	-								O
Authority Method	AUTHENTICATE LOGIN								O

## MySQL monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
MySQL Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	2 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Database Name	-						O
IP Address	127.0.0.1						O
Port	3306						O
User Name	-						O
Password	-						O
Table	mysqlwatch						O
Storage Engine	MyISAM						O

Library Path	/usr/lib/mysql/libmysqlclient.so.15								O
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## NFS monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Nfs Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds				O		
Timeout	60 seconds				O		
Retry Count	5 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Share Directory	-						O
IP Address	127.0.0.1						O

## Oracle monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Oracle Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	2 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Monitor Method	monitor listener and instance				O		
Connect Command	-						O
User Name	sys						O
Password	change_on_install						O
Authority	SYSDBA						O
Create and Drop Table in Monitoring	On				O		
Table	orawatch						O
Character Set	JAPANESE_JAPAN.JA16E UC						O
Library Path	/opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1						O

## OracleAS monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
OracleAS Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	1 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Instance Name	-						O
Install Path	/home/ias/product/10.1.3.2/companionCDHome_1						O
Monitor Type	Monitor component only						O
Component Monitor	All				O		
Component List	-						O

## POP3 monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
POP3 Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	3 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1						O

Port	110								O
User Name	-								O
Password	-								O
Authority Method	APOP								O

## PostgreSQL monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
PostgreSQL Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	2 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
Database Name	-						O
IP Address	127.0.0.1						O
Port	5432						O
User Name	postgres						O
Password	-						O
Table	psqlwatch						O
Library Path	/usr/lib/libpq.so.3.0						O

## Samba monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Samba Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds				O		
Timeout	60 seconds				O		
Retry Count	5 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than				O		

	clusters)						
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
<b>Parameter Tab</b>							
Share Name	-						O
IP Address	127.0.0.1						O
Port	139						O
User Name	-						O
Password	-						O

## SMTP monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
SMTP Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	3 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)	-				O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1						O
Port	25						O

## Sybase monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Sybase Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	2 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than				O		

		clusters)							
	Final Action	Stop cluster daemon and shutdown OS					O		
	Execute Script before Final Action	Off							O
<b>Parameter Tab</b>									
	Database Name	-							O
	Database Server Name	-							O
	User Name	sa							O
	Password	-							O
	Table	sybwatch							O
	Library Path	/opt/sybase/OCS-12_5/lib/libsybdb.so							O

## Tuxedo monitor resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Tuxedo Monitor Resource Properties								
Monitor Tab								
Interval	60 seconds				O			
Timeout	120 seconds				O			
Retry Count	2 times				O			
Wait Time to Start Monitoring	0 second				O			
Monitor Timing	Active (fixed)				O			
Target Resource	-				O			
Nice Value	0				O			
Error Detection Server								
Error Detection Server	All servers				O			
Servers that can run the Group (Add, Remove)					O			
Error Detection Tab								
Recovery Target	-				O			
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O			
Failover Threshold	1 time (if the recovery target is other than clusters)				O			
Final Action	Stop cluster daemon and shutdown OS				O			
Execute Script before Final Action	Off							O
Parameter Tab								
Application Server Name	BBL							O
Config File	-							O
Library Path	/opt/bea/tuxedo8.1/lib/libtux.so							O

## Weblogic monitor resource

Parameters		Default	How to change					
			1	2	3	4	5	6
Weblogic Monitor Resource Properties								
Monitor Tab								
Interval	60 seconds				O			
Timeout	120 seconds				O			
Retry Count	2 times				O			
Wait Time to Start Monitoring	0 second				O			
Monitor Timing	Active (fixed)				O			
Target Resource	-				O			
Nice Value	0				O			
Error Detection Server								
Error Detection Server	All servers				O			
Servers that can run the Group (Add, Remove)					O			
Error Detection Tab								

Recovery Target	-					O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)					O		
Failover Threshold	1 time (if the recovery target is other than clusters)					O		
Final Action	Stop cluster daemon and shutdown OS					O		
Execute Script before Final Action	Off							O
<b>Parameter Tab</b>								
IP Address	127.0.0.1							O
Port	7002							O
Account Shadow	Off							O
On Config File	-							O
On Key File	-							O
Off User Name	weblogic							O
Off Password	weblogic							O
Authority Method	DemoTrust							O
Key Store File	-							O
Domain Environment File	/opt/bea/weblogic81/samples/domains/examples/setExamplesEnv.sh							O

## Websphere monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6
Websphere Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds				O		
Timeout	120 seconds				O		
Retry Count	2 times				O		
Wait Time to Start Monitoring	0 second				O		
Monitor Timing	Active (fixed)				O		
Target Resource	-				O		
Nice Value	0				O		
Error Detection Server							
Error Detection Server	All servers				O		
Servers that can run the Group (Add, Remove)					O		
Error Detection Tab							
Recovery Target	-				O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)				O		
Failover Threshold	1 time (if the recovery target is other than clusters)				O		
Final Action	Stop cluster daemon and shutdown OS				O		
Execute Script before Final Action	Off						C
Parameter Tab							
Application Server Name	server1						C
Profile Name	default						C
User Name	-						C
Password	-						C
Install Path	/opt/IBM/WebSphere/AppServer						C

## WebOTX monitor resource

Parameters	Default	How to change					
		1	2	3	4	5	6

Tuxedo Monitor Resource Properties									
<b>Monitor Tab</b>									
Interval	60 seconds						O		
Timeout	120 seconds						O		
Retry Count	1 times						O		
Wait Time to Start Monitoring	0 second						O		
Monitor Timing	Active (fixed)						O		
Target Resource	-						O		
Nice Value	0						O		
<b>Error Detection Server</b>									
Error Detection Server	All servers						O		
Servers that can run the Group (Add, Remove)							O		
<b>Error Detection Tab</b>									
Recovery Target	-						O		
Reactivation Threshold	Zero (if the recovery target is other than clusters)						O		
Failover Threshold	1 time (if the recovery target is other than clusters)						O		
Final Action	Stop cluster daemon and shutdown OS						O		
Execute Script before Final Action	Off								O
<b>Parameter Tab</b>									
Connecting Destination	localhost								O
Port	6212								O
User Name	-								O
Password	-								O
Install Path	/opt/WebOTX								O

## Upper limits of registration

	Builder version	You can register up to
Cluster	2.0.0-1 or later	1
Server	2.0.0-1 or later	32
Server group	2.0.0-1 or later	9
Group	2.0.0-1 or later	64
Group resource (Per group)	2.0.0-1 or later	128
Monitor resource	2.0.0-1 or later	512
Heartbeat resource	2.0.0-1 or later	128
Network partition resolution resource	2.0.0-1 or later	64
Mirror disk resources and hybrid disk resources (Per cluster) in total	2.0.0-1 or later	8

# Chapter 4 ExpressCluster command reference

This chapter describes commands that are used on ExpressCluster.

This chapter covers:

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## Operating the cluster from the command line

ExpressCluster provides various commands to operate a cluster by the command line. These commands are useful for things like constructing a cluster or when you cannot use the WebManager. You can perform greater number of operations using the command line than WebManager.

---

**Note:**

When you have configured a group resource (examples: disk resource and exec resource) as a recovery target in the settings of error detection by a monitor resource, and the monitor resource detects an error, do not perform the following actions by commands related to the actions or by the WebManager while recovery (reactivation -> failover -> final action) is ongoing.

- ◆ terminate/suspend the cluster
- ◆ start/terminate/migrate a group

If you perform the actions mentioned above against the cluster while the recovery caused by detection of an error by a monitor resource is ongoing, other group resources of that group may not terminate. However, you can perform these actions as long as the final action has been executed, even if a monitor resource detected an error.

---

**Important:**

The installation directory contains executable-format files and script files that are not listed in this guide. Do not execute these files by programs or applications other than ExpressCluster. Any problems caused by not using ExpressCluster will not be supported.

---

## ExpressCluster commands

Commands for configuring a cluster		
Command	Description	Page
clpcfctrl	Distributes configuration data created by the Builder to servers.  Backs up the cluster configuration data to be used by the Builder.	338
clplcncs	Registers and refers to the product or test version license of this product.	360
Commands for displaying status		
Command	Description	Page
clpstat	Displays the cluster status and configuration information.	245
Commands for cluster operation		
Command	Description	Page
clpcl	Starts, stops, suspends, or resumes the ExpressCluster daemon.	318
clpdown	Stops the ExpressCluster daemon and shuts down the server.	323
clpstdn	Stops the ExpressCluster daemon across the whole cluster and shuts down all servers.	324
clpgrp	Starts, stops, or moves groups.	325
clptoratio	Extends or displays the various time-out values of all servers in the cluster.	349
clproset	Modifies and displays I/O permission of a shared disk partition device.	365
clpmonctrl	Suspends or resumes monitor resources on a single server.	425
clpregctrl	Displays or initializes the reboot count on a single server.	434
clprsc	Stops or resumes group resources	430
clpcpufreq	The clpcpufreq command controls CPU frequency.	438
clpledctrl	The clpledctrl command controls the chassis identify function.	440
clptrnreq	The clptrnreq command requests a server to execute a process.	442
clpbmccnf	The clpbmccnf command changes the information on BMC user name and password.	444
Log-related commands		
Command	Description	Page
clplogcc	Collects logs and OS information.	330
clplogcf	Modifies and displays a configuration of log level and the file size of log output.	352
Script-related commands		
Command	Description	Page
clplogcmd	Writes texts in the exec resource script to create a desired message to the output destination	423

Mirror-related commands (when the Replicator is used)		
Command	Description	Page
clpmdstat	Displays a mirroring status and configuration information.	367
clpmdctrl	Activates/deactivates a mirror disk resource, or recovers mirror. Displays or modifies the maximum number of the request queues.	405
clpmdinit	Initializes the cluster partition of a mirror disk resource. Creates a file system on the data partition of a mirror disk resource.	419
Hybrid disk-related commands (when the Replicator DR is used)		
Command	Description	Page
clphdstat	Displays a hybrid disk status and configuration information.	394
clphdctrl	Activates/deactivates a hybrid disk resource, or recovers mirror. Displays or modifies the maximum number of the request queues.	405
clphdinit	Initializes the cluster partition of a hybrid disk resource. Creates a file system on the data partition of a mirror disk resource.	390
Other commands		
Command	Description	Page
clpdn1000s	Lights off the warning light of the specified server.	437

## Displaying the cluster status (clpstat command)

**clpstat:** the clpstat command displays cluster status and configuration information.

**Command line:**

```
clpstat -s [-h hostname]
clpstat -g [-h hostname]
clpstat -m [-h hostname]
clpstat -n [-h hostname]
clpstat -p [-h hostname]
clpstat -i [--detail] [-h hostname]
clpstat --cl [--detail] [-h hostname]
clpstat --sv [server_name] [--detail] [-h hostname]
clpstat --hb [hb_name] [--detail] [-h hostname]
clpstat --np [np_name] [--detail] [-h hostname]
clpstat --svg [servergroup_name] [--detail]
    [-h hostname]
clpstat --grp [group_name] [--detail] [-h hostname]
clpstat --rsc [resource_name] [--detail] [-h hostname]
clpstat --mon [monitor_name] [--detail] [-h hostname]
```

Description	This command line displays a cluster status and configuration data.	
Option		
-s	No option	Displays a cluster status.
-g		Displays a cluster group map.
-m		Displays status of each monitor resource on each server.
-n		Displays each heartbeat resource status on each server.
-p		Displays the status of network partition resolution resource on each server.
-i		Displays the configuration information of the whole cluster.
--cl		Displays the cluster configuration data. Displays the Mirror Agent information as well for the Replicator, Replicator DR.
--sv [ <i>server_name</i> ]		Displays the server configuration information. By specifying the name of a server, you can display information of the specified server.
--hb [ <i>hb_name</i> ]		Displays heartbeat resource configuration information. By specifying the name of a heartbeat resource, you can display only the information on the specified heartbeat.
--np [ <i>np_name</i> ]		Displays network partition resolution resource configuration information. By specifying the name of a network partition resolution resource, you can display only the information on the specified network partition resolution resource.

<code>--svg</code> <code>[servergroup_name]</code>	Displays server group configuration information. By specifying the name of a server group, you can display only the information on the specified server group.
<code>--rsc</code> <code>[resource_name]</code>	Displays group resource configuration information. By specifying the name of a group resource, you can display only the information on the specified group resource.
<code>--mon</code> <code>[monitor_name]</code>	Displays monitor resource configuration information. By specifying the name of a monitor resource, you can display only the information on the specified resource.
<code>--detail</code>	Displays more detailed information on the setting.
<code>-h hostname</code>	Acquires information from the server specified with <i>hostname</i> . Acquires information from the command running server (local server) when the <code>-h</code> option is omitted.

<b>Return Value</b>	0	Success
	Other than 0	Failure

**Remarks** According to the combination of options, configuration information shows information in various forms.

**Notes** Run this command as root user.

The cluster daemon must be activated on the server where you run this command.

When you specify the name of a server for the `-h` option, the server should be in the cluster.

For the language used for command output, refer to “Cluster Info tab” on “Parameter details”

When you run the `clpstat` command with the `-s` option or without any option, names such as a cluster or a resource will not be displayed halfway.

**Example of Execution** Examples of information displayed after running these commands are provided in the next section.

#### Error Messages

Message	Cause/Solution
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data by using the Builder.
Invalid option.	Specify a valid option.
Could not connect to the server. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Invalid server status.	Check if the cluster daemon is activated.

Server is not active. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid name of a server in the cluster.
Invalid heartbeat resource name. Specify a valid heartbeat resource name in the cluster.	Specify the valid name of a heartbeat resource in the cluster.
Invalid network partition resource name. Specify a valid network partition resource name in the cluster.	Specify the valid name of a network partition resolution resource in the cluster.
Invalid group name. Specify a valid group name in the cluster.	Specify the valid name of a group in the cluster.
Invalid group resource name. Specify a valid group resource name in the cluster.	Specify the valid name of a group resource in the cluster.
Invalid monitor resource name. Specify a valid monitor resource name in the cluster.	Specify the valid name of a monitor resource in the cluster.
Connection was lost. Check if there is a server where the cluster daemon is stopped in the cluster.	Check if there is any server on which the cluster daemon has stopped in the cluster.
Invalid parameter.	The value specified as a command parameter may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set a longer timeout.	A time-out occurred in the ExpressCluster internal communication.  If time-out keeps occurring, set the internal communication time-out longer.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Invalid server group name. Specify a valid server group name in the cluster.	Specify the correct server group name in the cluster.

## Examples of executing the command that displays status (clpstat command)

### Displaying the status

The following is an example of display when you run the clpstat command with the -s option or without any option:

#### Example of the display after running the command

```
===== CLUSTER STATUS =====
Cluster : cluster                                -> See (1)
<server>
  *server1.....: Online          server1          -> See (2)
    lanhb1       : Normal          LAN Heartbeat   -> See (3)
    lanhb2       : Normal          LAN Heartbeat   -> See (3)
    diskhb1      : Normal          Disk Heartbeat  -> See (3)
    comhb1       : Normal          COM Heartbeat    -> See (3)
    pingnp1      : Normal          ping resolution -> See (4)
    pingnp2      : Normal          ping resolution -> See (4)

  server2.....: Online          server2
    lanhb1       : Normal          LAN Heartbeat
    lanhb2       : Normal          LAN Heartbeat
    diskhb1      : Normal          Disk Heartbeat
    comhb1       : Normal          COM Heartbeat
    pingnp1      : Normal          ping resolution
    pingnp2      : Normal          ping resolution

<group>
  failover1.....: Online          failover group1 ->See (5)
    current      : server1
    disk1        : Online          /dev/sdb5      ->See (6)
    exec1        : Online          exec resource1
    fip1         : Online          10.0.0.11
    failover2.....: Online          failover group2
    current      : server2
    disk2        : Online          /dev/sdb6
    exec2        : Online          exec resource2
    fip2         : Online          10.0.0.12

<monitor>
  diskw1        : Normal          disk monitor1   ->See (7)
  diskw2        : Normal          disk monitor2
  ipw1          : Normal          ip monitor1
  pidw1         : Normal          pidw1
  userw         : Normal          usermode monitor
=====
```

(1) Cluster : Cluster name

(2) Server name : Status Server comment  
 “\*” indicates the server has executed this command.

(3) Heartbeat resource name : Status Heartbeat resource comment

(4) Network partition resolution resource name  
 : Status Network partition resolution resource comment

(5) Group name : Status Group comment

Current : Status Server name

Shows the server to which the group belongs now.

(6) Group Resource Name : Status Group resource comment

(7) Monitor Resource Name : Status Monitor resource comment

Information on each status is provided in “Status Descriptions” on page 316.

## Displaying a group map (clpstat command)

To display a group map, run the clpstat command with the -g option.

### Example of the display after running the command:

```
===== GROUPMAP INFORMATION =====
Cluster : cluster -> See (1)
*server0 : server1 -> See (2)
server1 : server2

-----
server0 [o] : failover1 [o] failover2 [o] -> See (3)
server1 [o] : failover3 [o]
=====
```

(1) Cluster :Cluster name

(2) server n :Server name (n is the index number of a server)  
 “\*” indicates the server has executed this command.

(3) server n [*server\_status*] : Group Name [*status*] Group Name [*status*] ...  
 Displays the status of groups in the n-th server.

- In the example above, the groups failover1 and failover2 exist on server0, and the group failover 3 exists on server 3.

◆ Groups that are not running are not displayed.

◆ Information on each status is provided in “Status Descriptions” on page 316.

## Displaying the status of monitor resources (clpstat command)

To display the status of monitor resources, run the clpstat command with the -m option.

### Example of the display after running the command:

```
===== MONITOR RESOURCE STATUS =====
Cluster : cluster                -> see (1)
*server0 : server1              -> see (2)
server1 : server2              -> see (2)
Monitor0 [diskw1 : Normal]     -> see (3)
-----
server0 [o] : Online           -> see (4)
server1 [o] : Online           -> see (4)
Monitor1 [diskw2 : Normal]
-----
server0 [o] : Online
server1 [o] : Online
Monitor2 [ipw1 : Normal]
-----
server0 [o] : Online
server1 [o] : Online
Monitor3 [pidw1 : Normal]
-----
server0 [o] : Online
server1 [o] : Offline
Monitor4 [userw : Normal]
-----
server0 [o] : Online
server1 [o] : Online
=====
```

- (1) Cluster : Cluster name
- (2) server n : Server name (n is the index number of a server)  
“\*” indicates the server has executed this command.
- (3) Monitor n [*monitor\_resource\_name: status*]  
(n is the identification number of a monitor resource)  
The status of a monitor resource gathering status information per server is displayed here.
- (4) server n [*server\_status*] : status  
Displays the status of each monitor resource per server.

Information on each status is provided in “Status Descriptions” on page 316.

## Displaying the status of heartbeat resources (clpstat command)

To display the status of heartbeat resources, run clpstat command with the -n option.

### Example of the display after running the command:

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster          -> see (1)
*server0 : server1         -> see (2)
  server1 : server2         -> see (2)
  HB0 : lanhb1              -> see (3)
  HB1 : lanhb2              -> see (3)
  HB2 : diskhb1             -> see (3)
  HB3 : comhb1              -> see (3)

[on server0 : Online] -> see (4)
  HB   0   1   2   3 -> see (5)
-----
server0: o   o   o   o   -> see (5)
server1: o   o   o   x   -> see (5)

[on server1 : Online]
  HB   0   1   2   3
-----
server0 : o   o   o   x
server1 : o   o   o   o
=====
```

- (1) Cluster : Cluster name
- (2) server n : Server name (n is the index number of a server)  
“\*” indicates the server has executed this command.
- (3) HB n : Heartbeat resource name  
(n is the identification number of a heartbeat resource)
- (4) [on server n : *status*]  
Displays the status of the server whose index number is n.
- (5) HB 0 1 2 ...  
server n : status status status  
Displays the status of heartbeat resource on the server.  
The numbers following HB are heartbeat resource identification numbers described in 0.

Detailed information on each status is provided in “Status Descriptions” on page 316.

### The status of the example shown above:

The example above presents the status of all heartbeat resources seen from server0 and server1 when the COM heartbeat resource is disconnected.

Because comhb1, a COM heartbeat resource, is not able to communicate from both servers, communication to server1 on server0 or communication to server0 on server1 is unavailable.

The rest of heartbeat resources on both servers are in the status allowing communications.

## Displaying the status of network partition resolution resources (clpstat command)

To display the status of network partition resolution resources, run clpstat command with the -p option.

### Example of the display after running the command:

```
===== NETWORK PARTITION RESOURCE STATUS =====
Cluster : cluster          -> see (1)
*server0 : server1         -> see (2)
  server1 : server2         -> see (2)
  NP0 : pingnp1             -> see (3)
  NP1 : pingnp2             -> see (3)

      [on server0 : Caution] -> see (4)
      NP    0  1 -> see (5)
-----
server0  : o  x    -> see (5)
server1  : o  o    -> see (5)

      [on server1 : Caution]
      NP    0  1
-----
server0  : o  x
server1  : o  x
=====
```

- (1) Cluster : Cluster name
- (2) server n : Server name (n is the index number of a server)  
“\*” indicates the server has executed this command.
- (3) NP n : Network partition resolution resource name  
(n is the identification number of network partition resolution resource)
- (4) [on server n : *status*]  
Displays the status of the server whose index number is n.
- (5) NP 0 1 ...  
server n : status status status  
Displays the status of network partition resolution resource on the server.  
The numbers following NP are network partition resolution resource identification numbers described in 3.

Detailed information on each status is provided in “Status Descriptions” on page 316.

### The status of the example shown above:

The example above presents the status of all the network partition resolution resources seen from server0 and server1 when the device to which ping of the network partition resolution resource pingnp2 is sent is down.

## Displaying the cluster configuration data (clpstat command, --cl option)

To display the configuration data of a cluster, run the clpstat command with the -i, --cl, --svg, --hb, --grp, --rsc, or --mon option. You can see more detailed information by specifying the -detail option. See a separate section, “Parameter details” for details of each item of the list.

To display the cluster configuration data, run the clpstat command with the --cl option.

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Cluster : cluster]                                -> see (1)
Comment: failover cluster                          -> see (2)
<Timeout>
Server Sync Wait Time                             : 300          -> see (3)
Heartbeat Timeout                                 : 90000         -> see (4)
Heartbeat Interval                               : 3000          -> see (5)
Server Internal Timeout                           : 180           -> see (6)
Timeout Ratio                                     : 1             -> see (7)
<Port No.>
Server Internal Port Number                       : 29001         -> see (8)
Data Transfer Port Number                         : 29002         -> see (9)
Heartbeat Port Number                             : 29002         -> see (10)
Kernel Mode Heartbeat Port Number: 29006         -> see (11)
WebManager HTTP Port Number                       : 29003         -> see (12)
Alert Sync Port Number                           : 29003         -> see (13)
<Port No.(Log)>
Communication Method for Internal Logs
Port Number                                       : UNIX Domain   -> see (14)
Port Number                                       : 0             -> see (15)
<Port No.(Mirror)>
Mirror Agent Port Number                         : 29004         -> see (16)
<Monitor>
Shutdown Monitor                                 : On            -> see (17)
Shutdown Monitoring Method                       : softdog       -> see (18)
Enable SIGTERM Handler                           : On            -> see (19)
Use HB Timeout                                   : On            -> see (20)
Timeout (sec)                                    : 90            -> see (21)
<Delay Warning>
Heartbeat Delay Warning                          : 80            -> see (22)
Monitor Delay Warning                            : 80            -> see (23)
<Alert Service>
E-mail Address                                   :               -> see (24)
Use Network Warning Light                       : Off           -> see (25)
Use Alert Extension                             : Off           -> see (26)
Use Chassis Identify                            : Off           -> see (27)
Enable Alert Setting                             : Off           -> see (28)
<Mirror Agent>
Auto Mirror Recovery                             : On            -> see (29)
Receive Timeout (sec)                           : 10            -> see (30)
Send Timeout (sec)                               : 30            -> see (31)
Recovery Data Size (kbyte)                       : 4096          -> see (32)
Recovery Retry Count                             : 1             -> see (33)
Start Wait Time (sec)                           : 30            -> see (34)
Cluster Partition I/O Timeout (sec)              : 30            -> see (35)
<Mirror Driver>
Request Queue Maximum Number                     : 2048          -> see (36)
Bitmap Update Interval (sec)                     : 100           -> see (37)
<Exclusion>
```

```

Mount,Umount Exclusion          : On -> see (38)
<Heartbeat I/F>
Server Down Notification        : On -> see (39)
<Recovery>
Max Reboot Count                : 1 -> see (40)
Max Reboot Count Reset Time (min) : 0 -> see (41)
Use Forced Stop                 : On -> see (42)
Forced Stop Action              : BMC Power Off -> see (43)
Forced Stop Timeout (sec)       : 30 -> see (44)
<Power Saving>
Use CPU Frequency Control       : off -> see (45)
=====

```

◆ The items from Timeout down are displayed when the --detail option is used.

#### Explanation of each item

- (1) Cluster : Cluster name
- (2) Comment : Comment
- <Timeout>
- (3) Server Sync Wait Time : Time to wait for synchronization (in seconds)
- (4) Heartbeat Timeout : Heartbeat time-out (in milliseconds)
- (5) Heartbeat Interval : Heartbeat send interval (in milliseconds)
- (6) Server Internal Timeout : Internal communication time-out (in seconds)
- (7) Timeout Ratio : Current time-out ratio
- <Port Number>
- (8) Server Internal Port Number : Internal communication port number
- (9) Data Transfer Port Number : Data transfer port number
- (10) Heartbeat Port Number : Heartbeat port number
- (11) Kernel Mode Heartbeat Port Number : Kernel mode heartbeat port number
- (12) WebManager HTTP Port Number: WebManager HTTP port number
- (13) Alert Sync Port Number : Alert synchronous port number
- <Port No. (Log)>
- (14) Communication Method for Internal Logs : Log communication method
- (15) Port Number : Port number

The items of the information on mirror are displayed even if the Replicator or the Replicator DR are not used.

#### <Port No. (Mirror)>

- (16) Mirror Agent Port Number : Mirror agent port number

#### <Monitoring>

- (17) Shutdown Monitor : Shutdown monitor
- (18) Shutdown Monitoring Method : Shutdown monitor method
- (19) Enable SIGTERM Handler : Enable SIGTERM
- (20) Use HB Timeout : Use HB timeout
- (21) Timeout (sec) : Timeout (in seconds)

<Delay Warning>

- (22) Heartbeat Delay Warning : Delay warning of heartbeat resource (%)
- (23) Monitor Delay Warning : Delay warning of monitor resource (%)

<Alert Service>

- (24) E-mail Address : Address to which notice mails are sent
- (25) Use Network Warning Light : Network warning light
- (26) Use Alert Extension : Alert extension function
- (27) Use Chassies Identify : Chassies Identify
- (28) Enable Alert Setting : Alert report configuration

The items of the information on mirror are displayed when not using the Replicator or the Replicator DR as well.

<Mirror Agent>

- (29) Auto Mirror Recovery :Auto mirror recovery
- (30) Mirror Synchronization :Mirror synchronization
- (31) Receive Timeout : Receive timeout (in seconds)
- (32) Recovery Data Size (kbyte) :Recovery data size (in kilobytes)
- (33) Recovery Retry Count :Recovery retry count
- (34) Start Wait Time (sec) :Time to wait for start synchronization(in seconds)
- (35) Cluster Partition I/O Timeout (sec) : Cluster partition I/O timeout (in seconds)

<Mirror Driver>

- (36) Request Queue Maximum Number: The maximum number of the request queue
- (37) Bitmap Update Interval : Bitmap update interval (in seconds)

<Exclusion>

- (38) Mount, Umount Exclusion : Mount, unmount command exclusion

<Heartbeat I/F>

- (39) Server Down Notification : Server down notification

<Recovery>

- (40) Max Reboot Count : Maximum reboot count
- (41) Max Reboot Count Reset Time (min) : Time (in minutes) to reset the maximum reboot count
- (42) Use Forced Stop : Forced stop
- (43) Forced Stop Action : Forced stop action
- (44) Forced Stop Timeout (sec) : Forced stop timeout (in seconds)

<Power Saving>

- (45) Use CPU Frequency Control : CPU Frequency Control

## Displaying only the configuration data of certain servers (clpstat command with the --sv option)

When you want to display only the cluster configuration data on a specified server, specify the name of the server after the --sv option in the clpstat command. If you want to see the details, specify the --detail option. When the name of the server is not specified, cluster configuration data of all servers are displayed.

### Example of a command entry

```
# clpstat --sv server1 --detail
```

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Server0 : server1]                                -> see (1)
  Comment                                           : server1          -> see (2)
  Product                                           : ExpressCluster X 2.0 for Linux
                                                    -> see (3)
  Internal Version                                : 2.0.0-1           -> see (4)
  Edition                                           : X                 -> see (5)
  Platform                                          : Linux             -> see (6)
  IP Address                                        : 10.0.0.1          -> see (7)
  Mirror Disk Connect IP Address mdc[1]           : 192.168.0.1       -> see (8)
  Network Warning Light IP Address                : 10.0.0.10         -> see (9)
  Disk I/O Lockout Device                          :                   -> see (10)
  BMC IP Address                                   : 10.0.0.11         -> see (11)
  CPU Frequency Status                            : -                 -> see (12)
```

◆ The descriptions circled by the red dot-line are not displayed when --detail option is used.

### Explanation of each item

- |  |   |
|--|---|
| (1) [Server n: hostname]                 | (n is index number of a server)   |
| (2) Comment                              | : Comment   |
| (3) Product                              | : Product   |
| (4) Internal Version                     | : Internal version  |
| (5) Edition                              | : Edition   |
| (6) Platform                             | : Name of the distribution  |
|  | When the lsb_release command is not supported, only "Linux" is displayed. |
| (7) IP Address                           | : Public LAN address  |
| (8) Mirror Disk Connect IP Address mdc n | : Mirror connect address  |
| (9) Network Warning Light IP Address     | : Network warning light IP address  |
| (10) Disk I/O Lockout Device             | : Disk I/O lockout device   |
| (11) BMC IP Address                      | : BMC IP address  |
| (11) CPU Frequency Status                | : CPU Frequency Status  |

## Displaying only the resource information of certain heartbeats (clpstat command with the --hb option)

When you want to display only the cluster configuration data on a specified heartbeat resource, specify the name of the heartbeat resource after the --hb option in the clpstat command. If you want to see the details, specify the --detail option.

**Example of a command entry (For a LAN heartbeat resource)**

```
# clpstat --hb lanhb1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[HB0 : lanhb1]                                -> see (1)
  Type                                           : lanhb          -> see (2)
  Comment                                        : LAN Heartbeat -> see (3)
  <server1>
    IP Address                                 : 192.168.0.1      -> see (4)
    <server2>
    IP Address                                 : 192.168.0.2
=====
```

- ◆ The items described in the 1<sup>st</sup> line to the 3<sup>rd</sup> line are common to all heartbeat resources.
- ◆ The lines from the server 1 under are displayed when the --detail option is used.

### Information common to any heartbeat resource

- (1) [HB n: heartbeat\_resource\_name]  
(n is the identification number of a heartbeat resource)
- (2) Type : Heartbeat resource type
- (3) Comment : Comment

### Information displayed when the --detail option is used

- (4) IP Address : Interconnect address

**Example of a command entry (For disk heartbeat resource)**

```
# clpstat --hb diskhb --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[HB2 : diskhb1]
Type                : diskhb
Comment             : Disk Heartbeat
<server1>
Device Name         : /dev/sdb1                -> see (1)
Raw Device Name     : /dev/raw/raw1            -> see (2)
<server2>
Device Name         : /dev/sdb1
Raw Device Name     : /dev/raw/raw1
=====
```

(1) Device Name : Disk heartbeat device

(2) Raw Device Name : Raw device for the disk heartbeat

**Example of a command entry (For COM heartbeat resource)**

```
# clpstat --hb comhb --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[HB3 : comhb1]
Type                : comhb
Comment             : COM Heartbeat
<server1>
Device Name         : /dev/ttyS0                -> see (1)
<server2>
Device Name         : /dev/ttyS0
=====
```

(1) Device Name : COM heartbeat device

**Example of a command entry (For kernel mode LAN heartbeat resource)**

```
# clpstat --hb lankhb --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[HB4 : lankhb1]
Type                : lankhb
Comment             : Kernel Mode LAN Heartbeat
<server1>
IP Address          : 192.168.0.1                -> see (1)
<server2>
IP Address          : 192.168.0.2
=====
```

(1) IP Address : Interconnect address

◆ Tips

By using the --sv option and the --hb option together, you can see the information as follows.

Command Line # **clpstat --sv --hb --detail**

```
===== CLUSTER INFORMATION =====
[Server0 : server1]
  Comment           : server1
  Product           : ExpressCluster X 2.0 for Linux
  Internal Version  : 2.0.0-1
  Edition           : X
  Platform          : Linux
  IP Address        : 10.0.0.1
  Mirror Disk Connect IP Address mdc[1]
                                     : 192.168.0.1
  Network Warning Light IP Address
                                     : 10.0.0.10
  Disk I/O Lockout Device :
  BMC IP Address    : 10.0.0.11
[HB0 : lanhb1]
  Type              : lanhb
  Comment           : LAN Heartbeat
  IP Address        : 192.168.0.1
[HB1 : lanhb2]
  Type              : lanhb
  Comment           : LAN Heartbeat
  IP Address        : 10.0.0.1
[HB2 : diskhb1]
  Type              : diskhb
  Comment           : Disk Heartbeat
  Device Name       : /dev/sdb1
[HB3 : comhb1]
  Type              : comhb
  Comment           : COM Heartbeat
  Device Name       : /dev/ttyS0
[Server1 : server2]
  Comment           : server2
  Product           : ExpressCluster X 2.0 for Linux
  Internal Version  : 2.0.0-1
  Edition           : X
  Platform          : Linux
  IP Address        : 10.0.0.2
  Mirror Disk Connect IP Address mdc[1]
                                     : 192.168.0.2
  Network Warning Light IP Address
                                     : 10.0.0.10
  Disk I/O Lockout Device :
  BMC IP Address    : 10.0.0.12
[HB0 : lanhb1]
  Type              : lanhb
  Comment           : LAN Heartbeat
  IP Address        : 192.168.0.2
[HB1 : lanhb2]
  Type              : lanhb
  Comment           : LAN Heartbeat
  IP Address        : 10.0.0.2
```

```
[HB2 : diskhb1]
  Type           : diskhb
  Comment        : Disk Heartbeat
  Device Name    : /dev/sdb1
[HB3 : comhb1]
  Type           : comhb
  Comment        : COM Heartbeat
  Device Name    : /dev/ttyS0
=====
```

## Displaying only the configuration data of certain server group (clpstat command, --svg option)

To display only the cluster configuration data on a specified server group, specify the name of server group after --svg option in the clpstat option. When you do not specify the name of server group, the cluster configuration data of all the server groups is displayed.

### Example of a command entry

```
# clpstat --svg servergroup1
```

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[ServerGroup0 : servergroup1]      -> see (1)
  server0 : server1                 -> see (2)
  server1 : server2                 -> see (2)
  server2 : server3                 -> see (2)
=====
```

(1) [ServerGroup n : the name of server group] (n is the identification number of a server group)

(2) server n : server name (n is the priority number of a server group)

## Displaying only the configuration data of certain groups (clpstat command with the --grp option)

When you want to display only the cluster configuration data on a specified group, specify the name of the group after the --grp option in the clpstat command. If you want to see the details, specify the --detail option. When you do not specify the name of group, the cluster configuration data of all the groups is displayed.

### Example of a command entry

```
# clpstat --grp failover1 --detail
```

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Group0 : failover1] -> see (1)
  Type                : failover -> see (2)
  Comment              : failover group1 -> see (3)
  Startup Attribute    : Auto Startup -> see (4)
  Failover Exclusive Attribute : Off -> see (5)
  Failback Attribute   : Manual Failback -> see (6)
  Failover Attribute   : Manual Failover -> see (7)
  Servers that can run the Group : 0 server1 -> see (8)
                                   : 1 server2
=====
```

◆ The items from Comment down are displayed when the --detail option is used.

- (1) [Group n : group name] (n is the identification number of a group)
- (2) Type : Group type
- (3) Comment : Comment
- (4) Startup Attribute : Startup type
  - Manual Startup : Manual startup
  - Auto Startup : Automatic startup
- (5) Failover Exclusive Attribute : Startup exclusive attributes
  - Off : No exclusion
  - Normal : Normal exclusion
  - Absolute : Complete exclusion
- (6) Failback Attribute : Failback attribute
  - Manual Failback : Manual failback
  - Auto Failback : Automatic failback
- (7) Failover Attribute : Failover attribute
  - Manual Failover : Manual failover
  - Auto Failover : Automatic failover
- (8) Servers that can run the Group : Failover order

Servers that can run the Group are displayed in the failover policy sequence.

## Displaying only the configuration data of a certain group resource (clpstat command with the --rsc option)

When you want to display only the cluster configuration data on a specified group resource, specify the group resource after the --rsc option in the clpstat command. If you want to see the details, specify the --detail option. When you do not specify the name of server group, the cluster configuration data of all the group resources is displayed.

### Example of a command entry (For disk resource)

```
# clpstat --rsc disk1 --detail
```

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Resource0 : disk1] -> see (1)
  Type : disk -> see (2)
  Comment : /dev/sdb5 -> see (3)
  Failover Threshold : 1 -> see (4)
  Retry Count at Activation Failure : 0 -> see (5)
  Final Action at Activation Failure : No Operation -> see (6)
  (Next Resources Are Not Activated)
  Execute Script before Final Action : Off -> see (7)
  Retry Count at Deactivation Failure : 0 -> see (8)
  Final Action at Deactivation Failure: No Operation -> see (9)
  (Next Resources Are Not Activated)
  Execute Script before Final Action : Off : fip1 -> see (10)
  Depended Resources : fip1 -> see (11)
  Device Name : /dev/sdb5 -> see (12)
  Mount Point : /mnt/sdb5 -> see (13)
  File System : ext3 -> see (14)
  Disk Type : disk -> see (15)
  Mount Option : rw -> see (16)
  Mount Timeout (sec) : 60 -> see (17)
  Mount Retry Count : 3 -> see (18)
  Fsck Action When Mount Failed : Execute -> see (19)
  Unmount Timeout (sec) : 60 -> see (20)
  Unmount Retry Count : 3 -> see (21)
  Action at Unmount Failure : kill -> see (22)
  Fsck Option : -y -> see (23)
  Fsck Timeout (sec) : 1800 -> see (24)
  Fsck Action Before Mount : Execute at Specified Count -> see (25)
  Fsck Interval : 3 -> see (26)
  Re-restoration of Reiserfs : None -> see (27)
=====
```

- ◆ The items written in the 1<sup>st</sup> to 9<sup>th</sup> line are common to all group resources.
- ◆ The items described in the 4<sup>th</sup> to the 9<sup>th</sup> line, the 12<sup>th</sup> line and the 14<sup>th</sup> to the 24<sup>th</sup> line are displayed when the --detail option is used.

**Information displayed for any group resources**

- (1) [Resource n : *group\_resource\_name*]  
(n is the identification number of group resource)
- (2) Type : Group resource type
- (3) Comment : Comment
- (4) Failover Threshold : Failover count
- (5) Retry Count at Activation Failure : Activation retry count
- (6) Final Action at Activation Failure: Final action at activation failures

No Operation (Next Resources Are Activated)

No action is taken (next resources will be activated).

**No Operation (Not activate next resource)**

No action is taken( next resource will not be activated)

**Stop Group**

The group will be stopped.

**Stop the cluster daemon**

The cluster daemon will be stopped.

**Stop the cluster daemon and shut down OS**

The cluster daemon will be stopped and the OS will be shut down.

**Stop the cluster daemon and reboot OS**

The cluster daemon will be stopped and the OS will be restarted.

**Sysrq Panic**

The panic of sysrq is performed.

**Keepalive Reset**

The server is reset by using the clpkhb or clpka driver.

**Keepalive Panic**

The server panic is performed by using the clpkhb or clpka driver.

**BMC Reset**

The server is reset by using the ipmi command.

**BMC Power Off**

The server is powered off by using the ipmi command.

**BMC Power Cycle**

The server power cycle (power on/off) is performed by using the ipmi command.

**BMC NMI**

The NMI is generated by using the ipmi command.

- (7) Execute Script before Final Action : Execute script before final action
- (8) Retry Count at Deactivation Failure: Inactivation retry count
- (9) Final Action at Deactivation Failure: Final action at inactivation failures

**No Operation (Next Resources Are Deactivated)**

No action is taken (the next resource is deactivated).

**No Operation (Next Resources Are Not Deactivated)**

No action is taken (the next resource is not deactivated).

**Stop the cluster daemon and shut down OS**

The cluster daemon will be stopped and the OS will be shut down.

**Stop the cluster daemon and reboot OS**

The cluster daemon will be stopped and the OS will be restarted.

**Sysrq Panic**

The panic of sysrq is performed.

**Keepalive Reset**

The server is reset by using the clpkhb or clpka driver.

**Keepalive Panic**

The server panic is performed by using the clpkhb or clpka driver.

**BMC Reset**

The server is reset by using the ipmi command.

**BMC Power Off**

The server is powered off by using the ipmi command.

**BMC Power Cycle**

The server power cycle (power on/off) is performed by using the ipmi command.

**BMC NMI**

The NMI is generated by using the ipmi command.

(10) Execute Script before Final Action : Execute script before final action

(11) Depended Resources : Depended resource

**Explanation of each item**

(12) Device Name : Device name

(13) File System : File system

(14) Disk Type : Disk type

(15) Mount Point : Mount point

(16) Mount Option : Mount option

(17) Mount Timeout (sec) : Mount time-out (in seconds)

(18) Mount Retry Count : Mount retry count

(19) Fsck Action When Mount Failed : fsck at mount failure

(20) Unmount Timeout (sec) : Unmount time-out (in seconds)

(21) Unmount Retry Count : Unmount retry count

(22) Action at Unmount Failure : Action at unmount failure

- kill : Forces termination of the process accessing the mount point
- none : Takes no action

(23) Fsck Option : fsck option

(24) Fsck Timeout : fsck time-out (in seconds)

(25) Fsck Action Before Mount : fsck action before mounting

- 0 : Does not execute fsck
- 1 : Always executes fsck
- 2 : Executes fsck once the specified count is reached

(26) fsck Interval : fsck interval

(27) Re-restoration of Reiserfs : Re-install Reiserfs

- Execute: Executes
- None: Takes no action

**Example of a command entry (When mirror disk resource Replicator is used)****# clpstat --rsc md1 --detail****Example of the display after running the command:**

```

===== CLUSTER INFORMATION =====
[Resource0 : md1]
  Type : md
  Comment : /dev/NMP1
  Failover Threshold : 1
  Retry Count at Activation Failure : 0
  Final Action at Activation Failure: No Operation
                                     (Next Resources Are Not Activated)
  Execute Script before Final Action : Off
  Retry Count at Deactivation Failure : 0
  Final Action at Deactivation Failure: No Operation
                                     (Next Resources Are Not Activated)
  Execute Script before Final Action : Off
  Depended Resources : fip1
  Mirror Partition Device Name : /dev/NMP1 -> see (1)
  Mount Point : /mnt/sdb5 -> see (2)
  Data Partition Device Name : /dev/sdb5 -> see (3)
  Cluster Partition Device Name : /dev/sdb1 -> see (4)
  Disk Device Name : /dev/sdb -> see (5)
  File System : ext3 -> see (6)
  Mirror Disk Connect : mdc1 -> see (7)
  Mount Option : rw -> see (8)
  Mount Timeout (sec) : 60 -> see (9)
  Mount Retry Count : 3 -> see (10)
  Unmount Timeout (sec) : 60 -> see (11)
  Unmount Retry Count : 3 -> see (12)
  Action at Umount Failure : kill -> see (13)
  Fsck Option : -y -> see (14)
  Fsck Timeout (sec) : 1800 -> see (15)
  Fsck Action Before Mount : Execute at Specified Count -> see (16)
  Fsck Interval : 10 -> see (17)
  Fsck Action When Mount Failed : Execute -> see (18)
  Re-restoration of Reiserfs : Execute -> see (19)
  Initial Mirror Recovery : Yes -> see (20)
  Initial Mkfs : Yes -> see (21)
  Synchronization Data : Yes -> see (22)
  Synchronization Mode : Synchronous -> see (23)
  Number of Queues : 65535 -> see (24)
  Mirror Data Port Number : 29051 -> see (25)
  Mirror Heartbeat Port Number : 29031 -> see (26)
  Mirror ACK2 Port Number : 29071 -> see (27)
  Send Timeout (sec) : 30 -> see (28)
  Connection Timeout (sec) : 10 -> see (29)
  ACK Timeout (sec) : 100 -> see (30)
  Receive Timeout (sec) : 100 -> see (31)
=====

```

(1) Mirror Partition Device Name	: Mirror partition device name
(2) Mount Point	: Mount point
(3) Data Partition Device Name	: Data partition device name
(4) Cluster Partition Device Name	: Cluster partition device name
(5) Disk Device Name	: Disk device name
(6) File System	: File system
(7) Mirror Disk Connect	: Mirror disk connect
(8) Mount Option	: Mount option
(9) Mount Timeout (sec)	: Mount time-out (in seconds)
(10) Mount Retry Count	: Mount retry count
(11) Unmount Timeout (sec)	: Unmount time-out (in seconds)
(12) Unmount Retry Count	: Unmount retry count
(13) Action at Umount Failure	: Action to be taken at an unmount failure
• kill	: Forces termination of the process accessing the mount point
• none	: Takes no action
(14) fsck Option	: fsck option
(15) fsck Timeout	: fsck time-out ( in seconds)
(16) fsck Action Before Mount	: fsck action before mounting
• Not Execute	: Does not execute fsck
• Always Execute	: Always executes fsck
• Execute at Specified Count	: Executes fsck once the specified count is reached
(17) fsck Interval	: fsck interval
(18) Fsck Action When Mount Failed	: fsck action to be taken at a mount failure
(19) Re-restoration of Reiserfs	: Re-restore Reiserfs
• Execute: Executes	
• None: Takes no action	
(20) Initial Mirror Recovery	: Initial mirror construction
(21) Initial Mkfs	: Initial mkfs
(22) Synchronization Data	: Data synchronization
(23) Synchronization Mode	: Synchronization mode
(24) Number of Queues	: Number of queues
(25) Mirror Data Port Number	: Mirror data port number
(26) Mirror Heartbeat Port Number	: Mirror heartbeat port number
(27) Mirror ACK2 Port Number	: Mirror ACK2 port number
(28) Send Timeout (sec)	: Send timeout (sec)
(29) Connection Timeout (sec)	: Connection timeout (sec)
(30) ACK Timeout (sec)	: ACK timeout (sec)
(31) Receive Timeout (sec)	: Receive timeout (sec)

**Example of a command entry (Hybrid disk resource For Replicator DR)****# clpstat --rsc hd1 --detail****Example of the display after running the command:**

```

===== CLUSTER INFORMATION =====
[Resource0 : hd1]
Type : hd
Comment : /dev/NMP1
Failover Threshold : 1
Retry Count at Activation Failure : 0
Final Action at Activation Failure: No Operation
(Next Resources Are Not Activated)
Execute Script before Final Action : Off
Retry Count at Deactivation Failure : 0
Final Action at Deactivation Failure: No Operation
(Next Resources Are Not Activated)
Execute Script before Final Action : Off
Depended Resources : fip1
Mirror Partition Device Name : /dev/NMP1 (1)
Mount Point : /mnt/sdb5 (2)
Data Partition Device Name : /dev/sdb5 (3)
Cluster Partition Device Name : /dev/sdb1 (4)
Disk Device Name : /dev/sdb (5)
File System : ext3 (6)
Mirror Disk Connect : mdc1 (7)
Mount Option : rw (8)
Mount Timeout (sec) : 60 (9)
Mount Retry Count : 3 (10)
Unmount Timeout (sec) : 60 (11)
Unmount Retry Count : 3 (12)
Action at Umount Failure : kill (13)
Fsck Option : -y (14)
Fsck Timeout (sec) : 1800 (15)
Fsck Action Before Mount : Execute at Specified Count (16)
Fsck Interval : 10 (17)
Fsck Action When Mount Failed : Execute (18)
Re-restoration of Reiserfs : Execute (19)
Initial Mirror Recovery : Yes (19)
Initial Mkfs : Yes (20)
Synchronization Data : Yes (21)
Synchronization Mode : Synchronous (22)
Number of Queues : 65535 (23)
Mirror Data Port Number : 29051 (24)
Mirror Heartbeat Port Number : 29031 (25)
Mirror ACK2 Port Number : 29071 (26)
Send Timeout (sec) : 30 (27)
Connection Timeout (sec) : 10 (28)
ACK Timeout (sec) : 100 (29)
Receive Timeout (sec) : 100 (30)
=====

```

- (1) Mirror Partition Device Name : Mirror partition device name
- (2) Mount Point : Mount point
- (3) Data Partition Device Name : Data partition device name
- (4) Cluster Partition Device Name : Cluster partition device name
- (5) Disk Device Name : Disk device name
- (6) File System : File system
- (7) Mirror Disk Connect : Mirror disk connect

(8) Mount Option	: Mount option
(9) Mount Timeout (sec)	: Mount time-out (in seconds)
(10) Mount Retry Count	: Mount retry count
(11) Unmount Timeout (sec)	: Unmount time-out (in seconds)
(12) Unmount Retry Count	: Unmount retry count
(13) Action at Umount Failure	: Action to be taken at an unmount failure
• kill	: Forces termination of the process accessing the mount point
• none	: Takes no action
(14) fsck Option	: fsck option
(15) fsck Timeout	: fsck time-out ( in seconds)
(16) fsck Action Before Mount	: fsck action before mounting
• Not Execute	: Does not execute fsck
• Always Execute	: Always executes fsck
• Execute at Specified Count	: Executes fsck once the specified count is reached
(17) fsck Interval	: fsck interval
(18) Fsck Action When Mount Failed	: fsck action to be taken at a mount failure
(19) Re-restoration of Reiserfs	: re-restore Reiserfs
• Execute: Executes	
• None: Takes no action	
(20) Initial Mirror Recovery	: Initial mirror construction
(21) Initial Mkfs	: Initial mkfs
(22) Synchronization Data	: Data synchronization
(23) Synchronization Mode	: Synchronization mode
(24) Number of Queues	: Number of queues
(25) Mirror Data Port Number	: Mirror data port number
(26) Mirror Heartbeat Port Number	: Mirror heartbeat port number
(27) Mirror ACK2 Port Number	: Mirror ACK2 port number
(28) Send Timeout (sec)	: Send timeout (sec)
(29) Connection Timeout (sec)	: Connection timeout (sec)
(30) ACK Timeout (sec)	: ACK timeout (sec)
(31) Receive Timeout (sec)	: Receive timeout (sec)

**Example of a command entry (For floating IP resource)**

```
# clpstat --rsc fip1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
```

```
[Resource2 : fip1]
Type                : fip
Comment             : 10.0.0.11
Failover Threshold  : 1
Retry Count at Activation Failure : 5
Final Action at Activation Failure : No Operation
                        (Next Resources Are Not Activated)
Execute Script before Final Action : Off
Retry Count at Deactivation Failure : 0
Final Action at Deactivation Failure: Stop Cluster Daemon And
                        OS No Operation
Execute Script before Final Action : Off
Depended Resources  :
IP Address          : 10.0.0.11      -> see (1)
Ping Timeout (sec)  : 1              -> see (2)
Ping Retry Count    : 5              -> see (3)
Ping Interval (sec) : 1              -> see (4)
FIP Force Activation : On            -> see (5)
ARP Send Count      : 3              -> see (6)
Ifconfig Timeout (sec) : 60          -> see (7)
Ifconfig Status at Failure : Failure -> see (8)
Ping Status at Failure : Failure     -> see (9)
```

- ```
=====
```
- (1) IP Address : FIP address
  - (2) Ping Timeout (sec) : Time-out of ping to confirm redundancy (in seconds)
  - (3) Ping Retry Count : Ping retry count
  - (4) Ping Interval (sec) : Ping interval (in seconds)
  - (5) FIP Force Activation : FIP force activation
  - (6) ARP Send Count : ARP send count
  - (7) Ifconfig Timeout (sec) : Ifconfig timeout (in seconds)
  - (8) Ifconfig Status at Failure : Operation at Ifconfig failure
    - Failure
      - Operates as an activation failure
    - Not Failure
      - Does not operate as an activation failure
  - (9) Ping Status at Failure : Operation at ping failure
    - Failure
      - Operates as an activation failure
    - Not Failure
      - Does not operate as an activation failure

**Example of a command entry (For EXEC resource)**

```
# clpstat --rsc exec1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Resource1 : exec1]
  Type                               : exec
  Comment                             : exec resource1
  Failover Threshold                   : 1
  Retry Count at Activation Failure    : 0
  Final Action at Activation Failure   : No Operation
                                     (Next Resources Are Not Activated)
  Execute Script before Final Action  : Off
  Retry Count at Deactivation Failure  : 0
  Final Action at Deactivation Failure : Stop Cluster Daemon And
                                     OS No Shutdown
  Execute Script before Final Action  : Off
  Depended Resources                   : disk1, fip1
  Start Script Path                    : /opt/userpp/start.sh
                                     -> see (1)
  Stop Script Path                     : /opt/userpp/stop.sh
                                     -> see (2)
  Start Type                           : Asynchronous -> see (3)
  Stop Type                            : Synchronous  -> see (4)
  Start Script Timeout (sec)           : 1800         -> see (5)
  Stop Script Timeout (sec)            : 1800         -> see (6)
  Log Output Path                      :                -> see (7)
=====
```

- (1) Start Script Path : Path to the Start Script
- (2) Stop Script Path : Path to the Stop Script
- (3) Start Type : Synchronization/asynchronization of Start Script
  - Synchronous : Synchronous
  - Asynchronous : Asynchronous
- (4) Stop Type : Synchronization/asynchronization of Stop Script
  - Synchronous : Synchronous
  - Asynchronous : Asynchronous
- (5) Start Script Timeout (sec) : Start Script time-out (in seconds)
- (6) Stop Script Timeout (sec) : Stop Script time-out (in seconds)
- (7) Log Output Path : Destination for message output when running the Script

**Example of a command entry (RAW resource)**

```
# clpstat --rsc raw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====  
[Resource3 : raw1]  
Type : raw  
Comment : /dev/sde6  
Failover Threshold : 1  
Execute Script before Final Action : Off  
Retry Count at Activation Failure : 0  
Final Action at Activation Failure : No Operation  
                                     (Next Resources Are Not Activated)  
Retry Count at Deactivation Failure: 0  
Final Action at Deactivation Failure: Stop Cluster Daemon And  
                                     OS No Shutdown  
Execute Script before Final Action : Off  
Depended Resources : fipl  
Device Name : /dev/sde6 -> see (1)  
Raw Device Name : /dev/raw/raw10 -> see (2)  
Disk Type : disk -> see (3)  
=====
```

**Explanation of each item**

- (1) Device Name : Device name
- (2) Raw Device Name : Raw device name
- (3) Disk Type : Disk type

**Example of a command entry (VxVM disk group resource)**

```
# clpstat --rsc vxdg1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Resource4 : vxdg1]
  Type                : vxdg
  Comment              : dg1
  Failover Threshold   : 1
  Retry Count at Activation Failure : 0
  Final Action at Activation Failure : No Operation
                                (Next Resources Are Not Activated)
  Execute Script before Final Action : Off
  Retry Count at Deactivation Failure: 0
  Final Action at Deactivation Failure: Stop Cluster Daemon And
                                OS No Shutdown
  Execute Script before Final Action : Off
  Depended Resources   : fipl
  Disk Group Name      : dg1 -> see (1)
  Clear Host ID        : 1 (0:Off, 1:On) -> see (2)
  Forced Import        : 0 (0:Off, 1:On) -> see (3)
  Import Timeout (sec) : 60 -> see (4)
  Start Volume Timeout (sec) : 60 -> see (5)
  Stop Volume Timeout (sec) : 60 -> see (6)
  Flush Timeout (sec)   : 60 -> see (7)
  Deport Timeout (sec)  : 60 -> see (8)
=====
```

- (1) Disk Group Name : Disk group name
- (2) Clear Host ID : Clear host ID option
- (3) Forced Import : Force option at import
- (4) Import Timeout (sec) : Import time-out (in seconds)
- (5) Start Volume Timeout (sec) : Start volume time-out (in seconds)
- (6) Stop Volume Timeout (sec) : Stop volume time-out (in seconds)
- (7) Flush Timeout (sec) : Flush time-out (in seconds)
- (8) Deport Timeout (sec) : Deport time-out (in seconds)

**Example of a command entry (VxVM volume resource)**

```
# clpstat --rsc vxvol1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Resource5 : vxvol1]
Type : vxvol
Comment : vol1
Failover Threshold : 1
Retry Count at Activation Failure : 0
Final Action at Activation Failure : No Operation
                                   (Next Resources Are Not Activated)
Execute Script before Final Action : Off
Retry Count at Deactivation Failure : 0
Final Action at Deactivation Failure : Stop Cluster Daemon And
                                   OS No Shutdown
Execute Script before Final Action : Off
Depended Resources : fip1, vxdbg1
Volume Device Name : /dev/vx/dsk/dg1/vol1
                                   -> see (1)
Volume RAW Device Name : /dev/vx/rdisk/dg1/vol1
                                   -> see (2)
Mount Point : /mnt/vol1 -> see (3)
File System : vxfs -> see (4)
Mount Option : rw -> see (5)
Mount Timeout (sec) : 60 -> see (6)
Mount Retry Count : 3 -> see (7)
Fsck Action When Mount Failed : fsck -> see (8)
Unmount Timeout (sec) : 60 -> see (9)
Unmount Retry Count : 3 -> see (10)
Action at Unmount Failure : kill -> see (11)
Fsck Option : -y -> see (12)
Fsck Timeout (sec) : 1800 -> see (13)
Fsck Timing : Execute at Specified Count -> see (14)
Fsck Interval : 10 -> see (15)
=====

(1) Volume Device Name : Volume device name
(2) Volume Raw Device Name : VxVM volume raw device name
(3) File System : File system
(4) Mount Point : Mount point
```

- (5) Mount Option : Mount option
- (6) Mount Timeout (sec) : Mount time-out (in seconds)
- (7) Mount Retry Count : Mount retry count
- (8) Fsk Action When Mount Failed : Action at mount failure
- (9) Unmount Timeout (sec) : Unmount time-out (in seconds)
- (10) Unmount Retry Count : Unmount retry count
- (11) Action at Unmount Failure : Action at unmount failure
  - kill : Forces termination of the process accessing the mount point
  - none : Takes no action
- (12) Fsk Option : fsk option
- (13) Fsk Timeout (sec) : fsk time-out (in seconds)
- (14) Fsk Timing: fsk timing before mounting
  - Not Execute : Does not execute fsk
  - Always Execute : Always executes fsk
  - Execute at Specified Count : Executes fsk once the specified count is reached
- (15) Fsk Interval : fsk interval

**Example of a command entry (For NAS resource)**

```
# clpstat --rsc nas1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Resource6 : nas1]
Type : nas
Comment : nfsserver1:/share1
Failover Threshold : 1
Retry Count at Activation Failure : 0
Final Action at Activation Failure : No Operation
                                   (Next Resources Are Not Activated)
Execute Script before Final Action : Off
Retry Count at Deactivation Failure : 0
Final Action at Deactivation Failure: Stop Cluster Daemon And
                                   OS No Shutdown
Execute Script before Final Action : Off
Depended Resources : fip1
Server Name : nfsserver1 -> see (1)
Share Name : /share1 -> see (2)
File System : nfs -> see (3)
Mount Point : /mnt/nas1 -> see (4)
Mount Option : rw -> see (5)
Mount Timeout (sec) : 60 -> see (6)
Mount Retry Count : 3 -> see (7)
Unmount Timeout (sec) : 60 -> see (8)
Unmount Retry Count : 3 -> see (9)
Action at Unmount Failure : kill -> see (10)
Ping Timeout (sec) : 10 -> see (11)
=====
```

**Explanation of each item**

- (1) Server Name : Server name
- (2) Shared Name : Shared name
- (3) File System : File system
- (4) Mount Point : Mount point
- (5) Mount Option : Mount option
- (6) Mount Timeout (sec) : Mount time-out (in seconds)
- (7) Mount Retry Count : Mount retry count
- (8) Unmount Timeout (sec) : Unmount time-out (in seconds)
- (9) Unmount Retry Count : Unmount retry count
- (10) Action at Unmount Failure : Action to be taken at unmount failure
  - kill : Forces termination of the process accessing the mount point
  - none : Takes no action
- (11) Ping Timeout (sec) : ping time-out (in seconds)

**Example of a command entry (For Virtual IP resource)**

**# clpstat --rsc vip1 --detail**

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Resource7 : vip]
  Type : vip
  Comment : vip1
  Failover Threshold : 1
  Execute Script before Final Action : Off
  Retry Count at Activation Failure : 1
  Final Action at Activation Failure : No Operation
  (Next Resources Are Not Activated)
  Retry Count at Deactivation Failure: 0
  Final Action at Deactivation Failure: No Operation
  (Next Resources Are Deactivated)
  Execute Script before Final Action : Off
  Depended Resources :
  IP Address : Refer to server`s setting
  -> see (1)
  NIC Alias Name : Refer to server`s setting
  -> see (2)
  Destination IP Address : Refer to server`s setting
  -> see (3)
  Source IP Address : Refer to server`s setting
  -> see (4)
  Send Interval : Refer to server`s setting
  -> see (5)
  Routing Protocol : Refer to server`s setting
  -> see (6)
  Ping Timeout (sec) : 1
  -> see (7)
  Ping Retry Count : 0
  -> see (8)
  Ping Interval (sec) : 1
  -> see (9)
  VIP Force Activation : On
  -> see (10)
  ARP Send Count : 1
  -> see (11)
  Ifconfig Timeout (sec) : 30
  -> see (12)
  Ifconfig Status at Failure : Failure
  -> see (13)
  Ping Status at Failure : Failure
  -> see (14)
  Ping Next Hop IP Address :
  -> see (15)
  RIP Metric : 3
  -> see (16)
  Rip Port Number : 520
  -> see (17)
  RIPng Metric : 1
  -> see (18)
  RIPng Port Number : 521
  -> see (19)
<server1>
  IP Address : 10.1.0.1
  -> see (1)
  NIC Alias Name : eth0
  -> see (2)
  Destination IP Address : 10.0.0.255
  -> see (3)
  Source IP Address : 10.0.0.1
  -> see (4)
  Send Interval : 5
  -> see (5)
  Routing Protocol : RIPver2
  -> see (6)
<server2>
  IP Address : 10.1.0.2
  -> see (1)
  NIC Alias Name : eth0
  -> see (2)
  Destination IP Address : 10.0.0.255
  -> see (3)
  Source IP Address : 10.0.0.2
  -> see (4)
  Send Interval : 5
  -> see (5)
  Routing Protocol : RIPver2
  -> see (6)
=====
```

**Explanation of each item**

- (1) IP Address : IP address
- (2) NIC Alias Name : NIC alias name
- (3) Destination IP Address : Destination IP address
- (4) Source IP Address : Source IP address
- (5) Send Interval : Send interval
- (6) Routing Protocol : Routing protocol
- (7) Ping Timeout (sec) : Ping timeout (sec)
- (8) Ping Retry Count : Ping retry count
- (9) Ping Interval (sec) : Ping interval (sec)
- (10) VIP Force Activation : VIP force activation
- (11) ARP Send Count : ARP send count
- (12) Ifconfig Timeout (sec) : Ifconfig timeout (in seconds)
- (13) Ifconfig Status at Failure : Operation at Ifconfig failure
  - Failure  
Operates as an activation failure
  - Not Failure  
Does not operate as an activation failure
- (14) Ping Status at Failure : Operation at ping failure
  - Failure  
Operates as an activation failure
  - Not Failure  
Does not operate as an activation failure
- (15) RIP Next Hop IP Address : RIP next hop IP address
- (16) RIP Metric : RIP metric
- (17) RIP Port Number : RIP port number
- (18) RIPng Metric : RIPng metric
- (19) RIPng Port Number : RIPng port number

◆ Tips

By using the --grp option and the --rsc option together, you can display the information as follows.

```

Command Line # clpstat --grp --rsc
===== CLUSTER INFORMATION =====
[Group0 : failover1]
  Comment                               : failover group1
  [Resource0 : disk1]
    Type                                : disk
    Comment                             : /dev/sdb5
    Device Name                         : /dev/sdb5
    File System                         : ext2
    Mount Point                        : /mnt/sdb5
  [Resource1 : exec1]
    Type                                : exec
    Comment                             : exec resource1
    Start Script
      Path                              : /opt/userpp/start1.sh
    Stop Script
      Path                              : /opt/userpp/stop1.sh
  [Resource2 : fip1]
    Type                                : fip
    Comment                             : 10.0.0.11
    IP Address                         : 10.0.0.11
[Group1 : failover2]
  Comment                               : failover group2
  [Resource0 : disk2]
    Type                                : disk
    Comment                             : /dev/sdb6
    Device Name                         : /dev/sdb6
    File System                         : ext2
    Mount Point                        : /mnt/sdb6
  [Resource1 : exec2]
    Type                                : exec
    Comment                             : exec resource2
    Start Script
      Path                              : /opt/userpp/start2.sh
    Stop Script
      Path                              : /opt/userpp/stop2.sh
  [Resource2 : fip2]
    Type                                : fip
    Comment                             : 10.0.0.12
    IP Address                         : 10.0.0.12
=====

```

## Displaying only the configuration data of a certain monitor resource (clpstat command with the --mon option)

When you want to display only the cluster configuration data on a specified monitor resource, specify the name of the monitor resource after the --mon option in the clpstat command. If you want to see the details, specify --detail option. When you do not specify the name of monitor resource, the cluster configuration data of all monitor resources is displayed.

### Example of a command entry (For disk monitor resource)

```
# clpstat --mon diskw1 --detail
```

### Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor0 : diskw1] -> see (1)
  Type : diskw -> see (2)
  Comment : disk_monitor1 -> see (3)
  Monitor Timing : Always -> see (4)
  Target Resource : -> see (5)
  Interval(sec) : 60 -> see (6)
  Timeout (sec) : 120 -> see (7)
  Retry Count : 0 -> see (8)
  Final Action : No Operation -> see (9)
  Execute Script before Final Action : Off -> see (10)
  Recovery Target : disk1 -> see (11)
  Recovery Target Type : Resource -> see (12)
  Reactivation Threshold : 3 -> see (13)
  Failover Threshold : 1 -> see (14)
  Wait Time to Start Monitoring (sec): 0 -> see (15)
  Nice Value : 0 -> see (16)
  Monitor Suspned Possibility : Possible -> see (17)
  Monitor Target : /dev/sdb5 -> see (18)
  Disk/NAS : disk -> see (19)
  Method : READ -> see (20)
  I/O Size (byte) : 2000000 -> see (21)
=====
```

- ◆ The items written in the 1<sup>st</sup> to the 15<sup>th</sup> line are common to all monitor resources.
- ◆ The items described in the 4<sup>th</sup> to the 15<sup>th</sup> line are displayed when the --detail option is used.

### Explanation of items common to each monitor resource

- (1) [MONITOR n: *monitor\_resource\_name*]  
(n is the identification number of the group)
- (2) Type : Monitor resource type
- (3) Comment : Comment
- (4) Monitor Timing : Timing to start monitoring
  - Always : Always monitors
  - Activating : Monitors while activated
- (5) Target Resource : Monitor target resource
- (6) Interval (sec) : Monitor interval (in seconds)
- (7) Timeout (sec) : Monitor time-out (in seconds)
- (8) Retry Count : Monitor retry count
- (9) Final Action : Final action
  - No Operation : No action is taken
  - Stop Group : The group is stopped

- |                                          |                                                                                 |
|------------------------------------------|---------------------------------------------------------------------------------|
| Stop the cluster daemon                  | : The cluster daemon will be stopped                                            |
| Stop the cluster daemon and shut down OS | : The cluster daemon will be stopped and the OS will be shut down               |
| Stop the cluster daemon and reboot OS    | : The cluster daemon will be stopped and the OS will be restarted.              |
| Sysrq Panic                              | : The panic of sysrq is performed.                                              |
| Keepalive Reset                          | : The server is reset by using the clpkhb or clpka driver.                      |
| Keepalive Panic                          | : The server panic is performed by using the clpkhb or clpka driver.            |
| BMC Reset                                | : The server is reset by using the ipmi command.                                |
| BMC Power Off                            | : The server is powered off by using the ipmi command.                          |
| BMC Power Cycle                          | : The server power cycle (power on/off) is performed by using the ipmi command. |
| BMC NMI                                  | : NMI is generated by using the ipmi command.                                   |
- (10) Execute Script before Final Action : Execute script before final action
- (11) Recovery Target : Target to be recovered when an error is detected
- (12) Recovery Target Type : Type of a target to be recovered when an error is detected
- (13) Reactivation Threshold : Restart count
- (14) Failover Threshold : Failover count
- (15) Wait Time to Start Monitoring (sec)  
: Time to wait for the start of monitoring (in seconds)
- (16) Nice Value : Nice value
- (17) Monitor Suspend Possibility : Possibility of suspending monitoring
- Possible : Suspending monitoring is possible
  - Impossible : Suspending monitoring is not possible

#### Explanation of each item

- (18) Monitor Target : Monitor target name
- (19) Disk/NAS : Monitor target disk type
- (20) Method : Monitor method
- TUR  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”
  - TUR(legacy)  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”
  - TUR(generic)  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”
  - READ  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”
  - READ(O\_DIRECT)  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”

- **WRITE(FILE)**  
For details, see “Understanding the disk monitor resources” in Chapter 6 “Monitor resource details.”

(21) I/O size (byte) : Monitoring I/O size (in bytes)

\* Monitoring I/O size is effective when the monitoring method is “READ.”

**Example of a command entry (For IP monitor resource)**

```
# clpstat --mon ipw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
```

```
[Monitor2 : ipw1]
  Type                : ipw
  Comment              : ip_monitor1
  Monitor Timing       : Always
  Target Resource      :
  Interval(sec)        : 30
  Timeout (sec)        : 10
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action : Off
  Recovery Target      : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold   : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspended Possibility : Possible
  IP Addresses         : 192.168.15.254 -> see (1)
```

```
=====
(1) IP Addresses : IP address of the monitor target
```

**Example of a command entry (For PID monitor resource)**

```
# clpstat --mon pidw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor3 : pidw1]
  Type                : pidw
  Comment             : pidw1
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 5
  Timeout (sec)       : 60
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 3
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspnded Possibility : Possible
  Target PID          : 1197                -> see (1)
=====
```

**Explanation of each item**

(1) Target PID : Monitor target PID

**Example of a command entry (Mirror disk monitor resource: when Replicator is used)**

```
# clpstat --mon mdw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
```

```
[Monitor4 : mdw1]
  Type                : mdw
  Comment             : mirror disk monitor
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 10
  Timeout (sec)       : 60
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Monitor Target      : md1 -> see (1)
```

```
=====
```

**Explanation of each item**

- (1) Monitor Target : Monitor target resource

**Example of a command entry (Mirror disk monitor resource: when Replicator is used)**

```
# clpstat --mon mdnw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor5 : mdnw1]
  Type                : mdnw
  Comment              : mirror disk connect monitor
  Monitor Timing       : Always
  Target Resource      :
  Interval(sec)        : 60
  Timeout (sec)        : 120
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action : Off
  Recovery Target      : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold   : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
  Monitor Target       : md1 -> see (1)
=====
```

**Explanation of each item**

(1) Monitor Target : Monitor target mirror disk resource

**Example of a command entry (Hybrid disk monitor resource: when Replicator DR is used)**

```
# clpstat --mon hdw1 --detail
```

```
===== CLUSTER INFORMATION =====
[Monitor4 : hdw1]
  Type                : hdw
  Comment             : hybrid disk monitor
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 10
  Timeout (sec)       : 60
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspend Possibility : Possible
  Monitor Target      : hd1 -> see (1)
=====
```

**Explanation of each item**

(1) Monitor Target : Monitor target resource

**Example of a command entry (Hybrid disk monitor resource: when Replicator DR is used)**

```
# clpstat --mon hdnw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor5 : hdnw1]
  Type                : hdnw
  Comment             : hybrid disk connect monitor
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspend Possibility : Possible
  Monitor Target      : hd1 (1)
```

**Explanation of each item**

(1) Monitor Target : Monitor target resource

**Example of a command entry (For user mode monitor resource)**

```
# clpstat --mon userw --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor6 : userw]
  Type                      : userw
  Comment                   : usermode monitor
  Monitor Timing            : Always
  Target Resource           :
  Interval(sec)             : 3
  Timeout (sec)             : 90
  Retry Count               : 0
  Final Action              :
  Execute Script before Final Action : Off
  Recovery Target           : cluster
  Recovery Target Type      : Itself
  Reactivation Threshold    : 0
  Failover Threshold        : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value                : -20
  Monitor Suspnd Possibility : Possible
  Method                   : softdog -> see (1)
  Action                   : RESET -> see (2)
  Use HB interval and timeout : On -> see (3)
  Open/Close Temporary File : On -> see (4)
  with Writing              : On -> see (5)
  Size (byte)              : 10000 -> see (6)
  Create Temporary Thread   : On -> see (7)
=====
```

**Explanation of each item**

- |                                 |                                                                      |
|---------------------------------|----------------------------------------------------------------------|
| (1) Method                      | : Monitor method                                                     |
| (2) Action                      | : Final action at timeout                                            |
| (3) Use HB interval and timeout | : Use HB interval and timeout                                        |
| (4) Open/Close Temporary File   | : Open/Close temporary file                                          |
| (5) with Writing                | : Write data into a temporary file                                   |
| (6) Size (byte)                 | : Size of the data to be written into a temporary file<br>(in bytes) |
| (7) Create Temporary Thread     | : Create temporary thread                                            |

**Example of a command entry (For RAW monitor resource)**

```
# clpstat --mon raww1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor7 : raww1]
Type : raww
Comment : raw monitor1
Monitor Timing : Always
Target Resource :
Interval(sec) : 60
Timeout (sec) : 120
Retry Count : 0
Final Action : No Operation
Execute Script before Final Action : Off
Recovery Target : cluster
Recovery Target Type : Itself
Reactivation Threshold : 0
Failover Threshold : 0
Wait Time to Start Monitoring (sec): 0
Nice Value : 0
Monitor Suspned Possibility : Possible
Target RAW Device Name : /dev/raw/raw30 -> see (1)
Device Name : /dev/sdb -> see (2)
Method : READ -> see (3)
I/O Size (byte) : 4096 -> see (4)
=====
```

- (1) Target Raw Device Name : Monitor target raw device name
- (2) Device Name : Device name
- (3) Method : Monitor method
- (4) I/O size (byte) : Monitor I/O size (in bytes)

**Example of a command entry (For VxVM daemon monitor resource)**

```
# clpstat --mon vxdw --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor8 : vxdw]
  Type                : vxdw
  Comment              : VxVM daemon monitor
  Monitor Timing      : Always
  Target Resource      :
  Interval(sec)        : 60
  Timeout (sec)        : 120
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action : Off
  Recovery Target      : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold   : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
=====
```

**Explanation of each item**

There is no information displayed specifically for the VxVM daemon monitor resource.

**Example of a command entry (For VxVM volume monitor resource)**

```
# clpstat --mon vxvolw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor9 : vxvolw1]
Type                : vxvolw
Comment             : vxvol monitor1
Monitor Timing      : Activating
Target Resource     : vxvoll
Interval(sec)       : 60
Timeout (sec)       : 120
Retry Count         : 0
Final Action        : No Operation
Execute Script before Final Action : Off
Recovery Target     : vxvoll
Recovery Target Type : Itself
Reactivation Threshold : 3
Failover Threshold  : 1
Wait Time to Start Monitoring (sec): 0
Nice Value          : 0
Monitor Suspned Possibility : Possible
Monitor Target      : /dev/vx/rdisk/dg1/voll
                                     -> see (1)
Method              : Dummy Read      -> see (2)
I/O Size (byte)     : 4096            -> see (3)
=====
```

**Explanation of each item**

- (1) Monitor Target : Monitor target VxVM volume device name
- (2) Method : Monitor method
- (3) I/O size (byte) : Monitor I/O size (in bytes)

**Example of a command entry (For NIC LINK Up/Down monitor resource)**

```
# clpstat --mon miiw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor10 : miiw1]
  Type                : miiw
  Comment             : NIC Link Up/Down monitor
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 10
  Timeout (sec)       : 60
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Monitor Target      : eth0 -> see (1)
=====
```

**Explanation of each item**

(1) Monitor Target : Monitor target interface name

**Example of a command entry (For multi target monitor resource)**

```
# clpstat --mon mtw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : mtw1]
  Type                : mtw
  Comment             : multi-target monitor
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 30
  Timeout (sec)       : 30
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Monitor Resources   : diskw1      -> see (1)
                      : ipw3
                      : raww1
=====
```

**Explanation of each item**

(1) Monitor Resources : Monitor resource list

**Example of a command entry (For virtual IP monitor resource)**

```
# clpstat --mon vipw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : arpw1]
  Type                : vipw
  Comment             : vip monitor
  Monitor Timing      : Activating
  Target Resource     : vip1
  Interval(sec)       : 3
  Timeout (sec)       : 30
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Final Action : Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Reactivation Threshold : 0
  Failover Threshold  : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Impossible
  Monitor Target      : vip1 -> see (1)
=====
```

**Explanation of each item**

(1) Monitor Target : Monitor target resource

**Example of a command entry (For ARP monitor resource)**

```
# clpstat --mon arpw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : arpw1]
Type                : arpw
Comment             : arp monitor
Monitor Timing      : Activating
Target Resource     : fip1
Interval(sec)       : 30
Timeout (sec)       : 180
Retry Count         : 0
Final Action        : No Operation
Execute Script before Final Action : Off
Recovery Target     : cluster
Recovery Target Type : Itself
Reactivation Threshold : 0
Failover Threshold  : 0
Wait Time to Start Monitoring (sec): 0
Nice Value          : 0
Monitor Suspned Possibility : Impossible
Monitor Target      : fip1 -> see (1)
=====
```

**Explanation of each item**

- (1) Monitor Target : Monitor target resource

**Example of a command entry (For DB2 monitor resource)**

```
# clpstat --mon db2w1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : db2w1]
  Type                : db2w
  Comment              : DB2 monitor
  Monitor Timing      : Activating
  Target Resource      : exec1
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target      : exec1
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspnd Possibility : Possible
  Database Name        : test                -> see (1)
  Instance             : db2inst1           -> see (2)
  Table                : db2watch           -> see (3)
  Character Set         : ja_JP.euc.JP      -> see (4)
  Library Path          : /opt/ibm/db2/V9.1/lib64/libdb2.so
  -> see (5)
=====
```

**Explanation of each item**

- (1) Database Name : Name of the monitor target database
- (2) Instance : Instance of the monitor target database
- (3) Table : Name of the monitor target table created on database
- (4) Character Set : Character set of DB2
- (5) Library Path : Library path of DB2

**Example of a command entry (For FTP monitor resource)**

```
# clpstat --mon ftpw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====  
[Monitor11 : ftpw1]  
  Type                               : ftpw  
  Comment                            : ftp_monitor  
  Monitor Timing                     : Activating  
  Target Resource                    : execl  
  Interval(sec)                     : 60  
  Timeout (sec)                     : 120  
  Retry Count                        : 0  
  Final Action                       : Stop Cluster Daemon And  
                                   OS Shutdown  
  Execute Script before Final Action : Off  
  Recovery Target                    : execl  
  Recovery Target Type               : Resource  
  Reactivation Threshold             : 0  
  Failover Threshold                 : 1  
  Wait Time to Start Monitoring (sec): 0  
  Nice Value                         : 0  
  Monitor Suspend Possibility        : Possible  
  IP Address                         : 127.0.0.1      -> see (1)  
  Port                              : 21             -> see (2)  
=====
```

**Explanation of each item**

- (1) IP Address : IP address of the monitor target
- (2) Port : Port number

**Example of a command entry (For HTTP monitor resource)**

**# clpstat --mon httpw1 --detail**

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : httpw1]
  Type                : httpw
  Comment             : http monitor
  Monitor Timing    : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout(sec)        : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Connecting Destination : localhost      -> see (1)
  Port                 : 80                -> see (2)
  Request URI          :                   -> see (3)
=====
```

**Explanation of each item**

- (1) Connecting Destination : Internet server name of the monitor target
- (2) Port : Port number of the Internet server
- (3) Request URI : Request URI

**Example of a command entry (For imap4 monitor resource)**

```
# clpstat --mon imap4w1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : imap4w1]
  Type                : imap4w
  Comment             : imap4 monitor
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspend Possibility : Possible
  IP Address          : 127.0.0.1          -> see (1)
  Port                : 143                -> see (2)
  Authority Method     : AUTHENTICATE LOGIN -> see (3)
=====
```

**Explanation of each item**

- (1) IP Address : IP address of the monitor target
- (2) Port : Port number of imap4
- (3) Authority Method : Authority method of imap4

**Example of a command entry (For MySQL monitor resource)**

```
# clpstat --mon mysqlw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : mysqlw1]
  Type                : mysqlw
  Comment              : MySQL monitor
  Monitor Timing       : Activating
  Target Resource      : execl
  Interval(sec)        : 60
  Timeout(sec)         : 120
  Retry Count          : 0
  Final Action         : Stop Cluster Daemon And
                        OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target      : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
  Database Name        : test -> see (1)
  IP Address           : 127.0.0.1 -> see (2)
  Port                 : 3306 -> see (3)
  Table                : mysqlwatch -> see (4)
  Storage Engine       : MyISAM -> see (5)
  Library Path          : /usr/lib64/libmysqlclient.so.15 -> see (6)
=====
```

**Explanation of each item**

- |                    |                                                        |
|--------------------|--------------------------------------------------------|
| (1) Database Name  | : Name of the monitor target database                  |
| (2) IP Address     | : IP address to connect to MySQL server                |
| (3) Port           | : Port number of MySQL                                 |
| (4) Table          | : Name of the table for monitoring created on database |
| (5) Storage Engine | : Storage engine of MySQL                              |
| (6) Library Path   | : Library path of MySQL                                |

**Example of a command entry (For nfs monitor resource)**

```
# clpstat --mon nfsw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : nfsw1]
  Type                : nfsw
  Comment              : nfs monitor
  Monitor Timing       : Activating
  Target Resource      : execl
  Interval(sec)        : 60
  Timeout (sec)        : 120
  Retry Count          : 0
  Final Action         : Stop Cluster Daemon And
                        OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target      : execl
  Recovery Target Type  : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
  Shared Directory     : /mnt/nfsmon      -> see (1)
  IP Address           : 127.0.0.1       -> see (2)
=====
```

**Explanation of each item**

- (1) Shared Directory : Shared name that NFS server exports
- (2) IP Address : IP address to connect to NFS server

**Example of a command entry (For Oracle monitor resource)**

```
# clpstat --mon oraclew1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : oraclew1]
  Type                               : oraclew
  Comment                            : Oracle monitor
  Monitor Timing                     : Activating
  Target Resource                    : exec1
  Interval(sec)                      : 60
  Timeout (sec)                     : 120
  Retry Count                        : 0
  Final Action                       : Stop Cluster Daemon And
                                   OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target                    : exec1
  Recovery Target Type               : Resource
  Reactivation Threshold             : 0
  Failover Threshold                 : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value                         : 0
  Monitor Suspned Possibility        : Possible
  Connect Command                    : orcl -> see (1)
  Authority                          : SYSDBA -> see (2)
  Table                              : orawatch -> see (3)
  Character Set                      : JAPANESE_JAPAN.JA16EUC -> see (4)
  Library Path                       :
                                   /opt/oracle/product/1.0.0.1/lib/libclntsh.so.10.1 -> see (5)
=====
```

**Explanation of each item**

- (1) Connect Command : Connection character corresponding to database to be monitored
- (2) Authority : Authority for accessing database
  - SYSDBA  
Accesses database using SYSDBA authority by using a specified user name
  - DEFAULT  
Accesses database by using a specified user name
- (3) Table : Name of the table for monitoring created on database
- (4) Character Set : Character set of Oracle
- (5) Library Path : Library path of Oracle

**Example of a command entry (For OracleAS monitor resource)**

```
# clpstat mon --oracleasw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : oracleasw1]
  Type                : oracleasw
  Comment              : OracleAS_monitor
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspend Possibility : Possible
  Instance            : orcl -> see (1)
  Install Path        :
                      /home/ias/product/10.1.3.2/companionCDHome_1 -> see (2)
=====
```

**Explanation of each item**

- (1) Instance : Name of instance for connecting the application
- (2) Install Path : Install path of OracleAS

**Example of a command entry (For pop3 monitor resource)**

**# clpstat --mon pop3w1 --detail**

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : pop3w1]
  Type                      : pop3w
  Comment                   : pop3_monitor
  Monitor Timing            : Activating
  Target Resource           : exec1
  Interval(sec)             : 60
  Timeout (sec)             : 120
  Retry Count               : 0
  Final Action              : Stop Cluster Daemon And
                           OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target           : exec1
  Recovery Target Type      : Resource
  Reactivation Threshold    : 0
  Failover Threshold        : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value                : 0
  Monitor Suspend Possibility : Possible
  IP Address                : 127.0.0.1      -> see (1)
  Port                     : 110           -> see(2)
  Authority Method          : APOP          -> see(3)
=====
```

**Explanation of each item**

- (1) IP Address : IP address of the monitor target
- (2) Port : Port number of pop3
- (3) Authority Method : Authority method of pop3

**Example of a command entry (For PostgreSQL monitor resource)**

```
# clpstat --mon psqlw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : psqlw1]
  Type                : psqlw
  Comment              : PostgreSQL monitor
  Monitor Timing       : Activating
  Target Resource      : execl
  Interval(sec)        : 60
  Timeout (sec)        : 120
  Retry Count          : 0
  Final Action         : Stop Cluster Daemon And
                        OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target      : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
  Database Name        : test -> see (1)
  IP Address           : 127.0.0.1 -> see (2)
  Port                 : 5432 -> see (3)
  Table                : psqlwatch -> see (4)
  Library Path         : /usr/lib/libpq.so.3.0 -> see (5)
=====
```

**Explanation of each item**

- (1) Database Name : Name of the monitor target database
- (2) IP Address : IP address to connect to PostgreSQL server
- (3) Port : Port number of PostgreSQL
- (4) Table : Name of the table for monitoring created on database
- (5) Library Path : Library path of PostgreSQL

**Example of a command entry (For Samba monitor resource)**

```
# clpstat --mon sambaw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : sambaw1]
  Type                : sambaw
  Comment              : samba monitor
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Share Name          : samba -> see (1)
  IP Address          : 127.0.0.1 -> see (2)
  Port                : 139 -> see (3)
```

**Explanation of each item**

- (1) Share Name : Shared name of monitor target Samba server
- (2) IP Address : IP address to connect to Samba server
- (3) Port : Port number of Samba server

**Example of a command entry (For SMTP monitor resource)**

```
# clpstat --mon smtpw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : smtpw1]
  Type                : smtpw
  Comment              : smtp monitor
  Monitor Timing      : Activating
  Target Resource      : execl
  Interval(sec)        : 60
  Timeout (sec)        : 120
  Retry Count          : 0
  Final Action         : Stop Cluster Daemon And
                        OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target      : execl
  Recovery Target Type  : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspned Possibility : Possible
  IP Address           : 127.0.0.1          -> see (1)
  Port                 : 25                 -> see (2)
```

**Explanation of each item**

- (1) IP Address : IP address to connect to SMTP server
- (2) Port : Port number of SMTP server

**Example of a command entry (For Sybase monitor resource)**

**# clpstat --mon sybasew1 --detail**

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : sybasew1]
  Type                : sybasew
  Comment              : Sybase monitor
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Database Name       : MYDB -> see (1)
  Database Server Name : MYServer -> see (2)
  Table               : mysqlwatch -> see (3)
  Library Path        : /opt/sybase/OCS-12_5/lib/libsybdb64.so -> see (4)
=====
```

**Explanation of each item**

- (1) Database Name : Name of the monitor target database
- (2) Database Server Name : Name of the monitor target database server
- (3) Table : Name of the table for monitoring created on database
- (4) Library Path : Library path of Sybase

**Example of a command entry (For Tuxedo monitor resource)**

```
# clpstat --mon tuxw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : tuxw1]
  Type                : tuxw
  Comment              : Tuxedo monitor
  Monitor Timing      : Activating
  Target Resource     : execl
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : execl
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Application Server Name : BBL -> see (1)
  Config File           : /mnt/tuxedo/tuxconfig -> see (2)
  Library Path          : /opt/boa/tuxedo8.1/lib/libtux.so -> see (3)
=====
```

**Explanation of each item**

- (1) Application Server Name : Name of the monitor target application server
- (2) Config File : Configuration file path of Tuxedo
- (3) Library Path : Library path of Tuxedo

**Example of a command entry (For WebLogic monitor resource)**

```
# clpstat --mon wls1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : wls1]
  Type                : wls1
  Comment             : Weblogic monitor
  Monitor Timing      : Activating
  Target Resource     : exec1
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 0
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : exec1
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspended Possibility : Possible
  IP Address          : 127.0.0.1          -> see (1)
  Port                : 7002              -> see (2)
  Authority Method     : DemoTrust         -> see (3)
  Domain Environment File : /opt/bea/weblogic81/samples/
                      domains/examples/setExamplesEnv.sh
                      -> see (4)
=====
```

**Explanation of each item**

- (1) IP Address : IP address to connect to the application server
- (2) Port : Port number of Weblogic
- (3) Authority Method : Authority method of Weblogic
  - Not Use SSL : Authority is not performed
  - DemoTrust : Authority method of using Weblogic authority file
  - CustomTrust : General SSL authority method
- (4) Domain Environment File : Domain environment file path of Weblogic

**Example of a command entry (For WebSphere monitor resource)**

```
# clpstat --mon wasw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : wasw1]
Type                : wasw
Comment             : WebSphere monitor
Monitor Timing      : Activating
Target Resource     : exec1
Interval(sec)       : 60
Timeout (sec)       : 120
Retry Count         : 0
Final Action        : Stop Cluster Daemon And
                    : OS Shutdown
Execute Script before Final Action : Off
Recovery Target     : exec1
Recovery Target Type : Resource
Reactivation Threshold : 0
Failover Threshold  : 1
Wait Time to Start Monitoring (sec): 0
Nice Value          : 0
Monitor Suspned Possibility : Possible
Application Server Name : server1 -> see (1)
Profile Name         : default -> see (2)
Install Path         : /opt/IBM/WebSphere/AppServer1 -> see (3)
=====
```

**Explanation of each item**

- (1) Application Server Name : Name of the monitor target application server
- (2) Profile Name : Profile name of WebSphere
- (3) Install Path : Install path of WebSphere

**Example of a command entry (For WebOTX monitor resource)**

```
# clpstat --mon otxw1 --detail
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor11 : wasw1]
  Type                : otxw
  Comment             : WebOTX monitor
  Monitor Timing      : Activating
  Target Resource     : exec1
  Interval(sec)       : 60
  Timeout (sec)       : 120
  Retry Count         : 1
  Final Action        : Stop Cluster Daemon And
                      OS Shutdown
  Execute Script before Final Action : Off
  Recovery Target     : exec1
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value          : 0
  Monitor Suspned Possibility : Possible
  Connecting Destination : localhost      -> see (1)
  Port                 : 6212             -> see (2)
  Install Path         : /opt/WebOTX      -> see (3)
=====
```

**Explanation of each item**

- (1) Connecting Destination : Name of the monitor target application server
- (2) Port : Port number of WebOTX
- (3) Install Path : Install path of WebOTX

## Displaying the configuration data of a resource specified for an individual server (clpstat command with the -rsc option or --mon option)

When you want to display the configuration data on a resource specified for an individual server, specify the name of the resource after the -rsc or -mon option in the clpstat command.

**Example of a command entry (When the monitor target IP address of the IP monitor resource is set to an individual server)**

```
# clpstat --mon ipw1
```

**Example of the display after running the command:**

```
===== CLUSTER INFORMATION =====
[Monitor2 : ipw1]
  Type                : ipw
  Comment              : ip monitor1
  IP Addresses         : Refer to server`s setting
                                     -> see (1)

<server1>
  IP Addresses         : 10.0.0.253      -> see (2)
                                     : 10.0.0.254

<server2>
  IP Addresses         : 10.0.1.253      -> see (3)
                                     : 10.0.1.254
=====
```

### Explanation of each item

- (1) IP Addresses : When the IP address is set for an individual server, "Refer to server`s setting" is displayed.
- (2) IP Addresses : Monitor target IP address used on server1
- (3) IP Addresses : Monitor target IP address used on server2

## Displaying all configuration data (clpstat command with the -i option)

By specifying the -i option, you can display the configuration information that is shown when --cl, --sv, --hb, --svg, --grp, --rsc, and --mon options are all specified.

If you run the command with the -i option and the --detail option together, all the detailed cluster configuration data is displayed. Because this option displays large amount of information at a time, use a command, such as the less command, and pipe, or redirect the output in a file for the output.

### ◆ Tips

Specifying the -i option displays all the information on a console. If you want to display some of the information, it is useful to combine the --cl, --sv, --hb, --svg, --grp, --rsc, and/or --mon option. For example, you can use these options as follows:

#### Example of a command entry:

If you want to display the detailed information of the server whose name is “server0,” the group whose name is “failover1,” and the group resources of the specified group, enter:

```
# clpstat --sv server0 --grp failover1 --rsc --detail
```

## Status Descriptions

Server		
Function	Status	Description
Status display	Online	Starting
Heartbeat resource status display	Offline	Offline Pending
	Warning	Heartbeat resource failure
	Unknown	Status unknown
Group map display	o	Starting
Monitor resource status display	x	Offline Pending
	-	Status unknown

Heartbeat Resource		
Function	Status	Description
Status display	Normal	Normal
	Warning	Failure (Some)
	Error	Failure (All)
	Unused	Not used
	Unknown	Status unknown
Heartbeat resource status display	o	Able to communicate
	x	Unable to communicate
	-	Not used or status unknown

Network Partition Resolution Resource		
Function	Status	Description
Status display	Normal	Normal
	Error	Failure
	Unused	Not used
	Unknown	Status unknown
Network partition resolution status display	o	Able to communicate
	x	Unable to communicate
	-	Not used or status unknown

<b>Group</b>		
<b>Function</b>	<b>Status</b>	<b>Description</b>
Status display	Online	Started
	Offline	Stopped
	Online Pending	Now being started
	Offline Pending	Now being stopped
	Error	Error
	Unknown	Status unknown
Group map display	o	Started
	e	Error
	p	Now being started/stopped

<b>Group Resource</b>		
<b>Function</b>	<b>Status</b>	<b>Description</b>
Status display	Online	Started
	Offline	Stopped
	Online Pending	Now being started
	Offline Pending	Now being stopped
	Online Failure	Starting failed
	Offline Failure	Stopping failed
	Unknown	Status unknown

<b>Monitor Resource</b>		
<b>Function</b>	<b>Status</b>	<b>Description</b>
Status Display	Normal	Normal
	Warning	Error (Some)
	Error	Error (All)
	Not Used	Not Used
	Unknown	Status Unknown
Monitor Resource Status Display	Online	Started
	Offline	Stopped
	Warning	Warning
	Suspend	Stopped temporary
	Online Pending	Now being started
	Offline Pending	Now being stopped
	Online Failure	Starting failed
	Offline Failure	Stopping failed
	Not Used	Not used
	Unknown	Status unknown

## Operating the cluster (clpcl command)

**clpcl:** the clpcl command operates a cluster

**Command line:**

clpcl -s [-a] [-h *hostname*]

clpcl -t [-a] [-h *hostname*] [-w *time-out*]

clpcl -r [-a] [-h *hostname*]

clpcl --suspend [--force] [-w *time-out*]

clpcl --resume

<b>Description</b>	This command starts, stops, suspends, or resumes the cluster daemon.	
<b>Option</b>	-s	Starts the cluster daemon.
	-t	Stops the cluster daemon.
	-r	Restarts the cluster daemon.
	--suspend	Suspends the entire cluster
	-w <i>time-out</i>	clpcl command specifies the wait time to stop or suspend the cluster daemon to be completed when -t, -r, or --suspend option is used. The unit of time is second.  When a time-out is not specified, it waits for unlimited time. When “0 (zero)” is specified, it does not wait. When -w option is not specified, it waits for (heartbeat time-out x 2) seconds.
	--resume	Resumes the entire cluster
	-a	Executed the command on all servers
	-h <i>hostname</i>	Makes a request to run the command to the server specified in <i>hostname</i> . Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
	--force	When used with the --suspend option, forcefully suspends the cluster regardless of the status of all the servers in the cluster.
<b>Return Value</b>	0	Success
	Other than 0	Failure

**Notes**

Run this command as root user.

For the name of a server for the -h option, specify the name of a server in the cluster.

When you suspend the cluster, the cluster daemon should be activated in all servers in the cluster. When the --force option is used, the cluster is forcefully suspended even if there is any stopped server in the cluster.

When you start up or resume the cluster, access the servers in the cluster in the order below, and use one of the paths that allowed successful access.

1. via the IP address on the interconnect LAN
2. via the IP address on the public LAN

When you resume the cluster, use the clpstat command to see there is no activated server in the cluster.

**Example of a command entry**

**Example 1:** Activating the cluster daemon in the local server

```
# clpcl -s
```

**Example 2:** Activating the cluster daemon in server1 from server0

```
# clpcl -s -h server1
```

```
Start server1 : Command succeeded.
```

If a server name is specified, the display after running the command should look similar to above.

Start *hostname* : Execution result

(If the activation fails, cause of the failure is displayed)

**Example 3:** Activating the cluster daemon in all servers

```
# clpcl -s -a
```

```
Start server0 : Command succeeded.
```

```
Start server1 : Performed startup processing to the active cluster daemon. When all the servers are activated, the display after running the command should look similar to above. Start hostname : Execution result
```

(If the activation fails, cause of the failure is displayed)

**Example 4:** Stopping the cluster daemon in all servers

```
# clpcl -t -a
```

If the cluster daemon stops on all the servers, it waits till the ExpressCluster daemons stop on all the servers.

If stopping fails, an error message is displayed.

### ◆ Suspend and Resume

When you want to update the cluster configuration data or ExpressCluster, you can stop the cluster daemon while continuing the operation. This status is called “suspend.” Returning from the suspended status to normal status is called “resume.”

Suspend and resume are executed to all servers in the cluster. When you suspend the cluster, the cluster daemon should be activated in all servers in the cluster.

The following functions stop when the cluster is suspended because the cluster daemon stops while active resources stay active.

- All heartbeat resources stop.
- All monitor resources stop.
- You cannot work on groups or group resources (start, stop, or move).
- You cannot display or change the cluster status by the WebManager or with the `clpstat` command.
- The following commands are disabled;
  - `clpstat`
  - `clpcl` options other than `--resume`
  - `clpdown`
  - `clpstdn`
  - `clpgrp`
  - `clptoratio`
  - `clpmonctrlclpstat`

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data using the Builder.
Invalid option.	Specify a valid option
Performed stop processing to the stopped cluster daemon.	The stopping process has been executed on the stopped cluster daemon.
Performed startup processing to the active cluster daemon.	The startup process has been executed on the activated cluster daemon.
Could not connect to the server. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Could not connect to the data transfer server. Check if the server has started up.	Check if the server is running.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Specify the valid name of a server in the cluster.
Failed to obtain the daemon name.	Failed to obtain the cluster name.
Failed to operate the daemon.	Failed to control the cluster.
Resumed the daemon that is not suspended.	Performed the resume process for the HA Cluster daemon that is not suspended.
Invalid server status.	Check that the cluster daemon is activated.
Server is busy. Check if this command is already run.	This command may have already been run.
Server is not active. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
There is one or more servers of which cluster daemon is active. If you want to perform resume, check if there is any server whose cluster daemon is active in the cluster.	When you execute the command to resume, check if there is no server in the cluster on which the cluster daemon is activated.
All servers must be activated. When suspending the server, the cluster daemon need to be active on all servers in the cluster.	When you execute the command to suspend, the cluster daemon must be activated in all servers in the cluster.
Resume the server because there is one or more suspended servers in the cluster.	Execute the command to resume because some server(s) in the cluster is in the suspend status.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid name of a sever in the cluster.
Connection was lost. Check if there is a server where the cluster daemon is stopped in the cluster.	Check if there is any server on which the cluster daemon is stopped in the cluster.
Invalid parameter.	The value specified as a command parameter may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set the longer timeout.	A time-out occurred in the HA Cluster internal communication.  If time-out keeps occurring, set the internal communication time-out longer.

Message	Cause/Solution
Processing failed on some servers. Check the status of failed servers.	If stopping has been executed with all the servers specified, there is one of more server on which the stopping process has failed.  Check the status of the server(s) on which the stopping process has failed.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
There is a server that is not suspended in cluster. Check the status of each server.	There is a server that is not suspended in the cluster. Check the status of each server.
Suspend %s : Could not suspend in time.	The server failed to complete the suspending process of the cluster daemon within the time-out period. Check the status of the server.
Stop %s : Could not stop in time.	The server failed to complete the stopping process of the cluster daemon within the time-out period. Check the status of the server.
Stop %s : Server was suspended. Could not connect to the server. Check if the cluster daemon is active.	The request to stop the cluster daemon was made. However the server was suspended.
Could not connect to the server. Check if the cluster daemon is active.	The request to stop the cluster daemon was made. However connecting to the server failed. Check the status of the server.
Suspend %s : Server already suspended. Could not connect to the server. Check if the cluster daemon is active.	The request to suspend the cluster daemon was made. However the server was suspended.
Event service is not started.	Event service is not started. Check it.
Mirror Agent is not started.	Mirror Agent is not started. Check it.
Event service and Mirror Agent are not started.	Event service and Mirror Agent are not started. Check them.

## Shutting down a specified server (clpdown command)

**clpdown:** the clpdown command shuts down a specified server.

### Command line

clpdown [-r] [-h *hostname*]

<b>Description</b>	This command stops the cluster daemon and shuts down a server.	
<b>Option</b>	None	Shuts down a server.
	-r	Reboots the server.
	-h <i>hostname</i>	Makes a processing request to the server specified in <i>hostname</i> . Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Remarks</b>	This command runs the following commands internally after stopping the cluster daemon.	
	Without any option specified	Shut down
	With the -r option specified	reboot
<b>Notes</b>	Run this command as root user.	
	For the name of a server for the -h option, specify the name of a server in the cluster.	
	When the Replicator or the Replicator DR is used, do not run this command while activating a group.	
	A group can not be deactivated while it is being activated. Because of this, the OS may shut down while the mirror disk resource or the hybrid disk resource is not deactivated properly, which can result in mirror break.	
<b>Example of a command entry</b>	<b>Example 1:</b> Stopping and shutting down the cluster daemon in the local server	
	# clpdown	
	<b>Example 2:</b> Shutting down and rebooting server1 from server0	
	# clpdown -r -h server1	
<b>Error Message</b>	See “Operating the cluster (clpcl command)” on page 318.	

## Shutting down the entire cluster (clpstdn command)

**clpstdn:** the clpstdn command shuts down the entire cluster

### Command line

clpstdn [-r] [-h *hostname*]

<b>Description</b>	This command stops the cluster daemon in the entire cluster and shuts down all servers.	
<b>Option</b>	None	Executes cluster shutdown.
	-r	Executes cluster shutdown reboot.
	-h <i>hostname</i>	Makes a processing request to the server specified in <i>hostname</i> . Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Notes</b>	<p>Run this command as root user.</p> <p>For the name of a server for the -h option, specify the name of a server in the cluster.</p> <p>A server that cannot be accessed from the server that runs the command (for example, a server with all LAN heartbeat resources are off-line.) will not shut down.</p> <p>When the Replicator or Replicator DR is used, do not execute this command while activating a group.</p> <p>A group cannot be deactivated while it is being activated. Because of this, the OS may shut down while the mirror disk resource or the hybrid disk resource is not deactivated properly, which can result in mirror break.</p>	
<b>Example of a command entry</b>	<b>Example 1:</b> Shutting down the cluster	
	# clpstdn	
<b>Example of a command entry</b>	<b>Example 2:</b> Performing the cluster shutdown reboot	
	# clpstdn -r	
<b>Error Message</b>	See “Operating the cluster (clpcl command)” on page 318.	

## Operating groups (clpgrp command)

clpgrp: the clpgrp command operates groups

### Command line

clpgrp -s [*group\_name*] [-h *hostname*] [-f]

clpgrp -t [*group\_name*] [-h *hostname*] [-f]

clpgrp -m *group\_name* [-h *hostname*] [-a *hostname*]

**Description** This command starts, deactivates or moves groups.

<b>Option</b>	-s [ <i>group_name</i> ]	Starts groups. When you specify the name of a group, only the specified group starts up. If no group name is specified, all groups start up.
	-t [ <i>group_name</i> ]	Stops groups. When you specify the name of a group, only the specified group stops. If no group name is specified, all groups stop.
	-m <i>group_name</i>	Moves a specified group.
	-h <i>hostname</i>	Makes a processing request to the server specified in <i>hostname</i> . Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
	-a <i>hostname</i>	Defines the server which is specified by <i>hostname</i> as a destination to which a group will be moved. When the -a option is omitted, the group will be moved according to the failover policy.
	-f	If you use this option with the -s option against a group activated on a remote server, it will forcefully be started on the server that requested the process. If this command is used with the -t option, the group will be stopped forcefully.

<b>Return Value</b>	0	Success
	Other than 0	Failure

**Notes**

- Run this command as root user.
- The cluster daemon must be activated on the server that runs this command.
- Specify a server in the cluster when you specify the name of server name for the -h and -a options.
- Make sure to specify a group name, when you use the -m option.
- When “Normal” is configured for the failover exclusion attribute of a group and you want to move the group with the -m option, explicitly specify a server to which the group is moved by using the -a option.
- Moving a group will fail when “Normal” groups in all servers to which the group can be moved are activated if you omit the -a option.

**Example of Execution**

The following is an example of status transition when operating the groups.

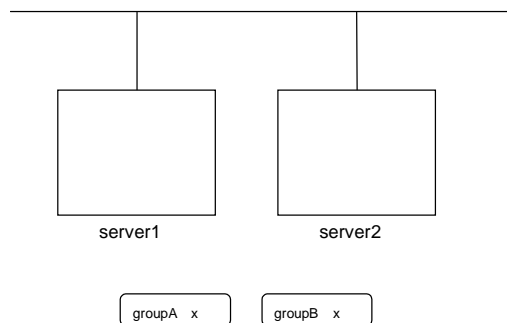
Example: The cluster has two servers and two groups.

Failover policy of group

groupA server1 -> server2

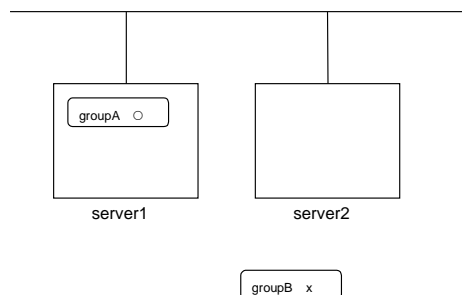
groupB server2 -> server1

1. Both groups are stopped.



2. Run the following command on server1.

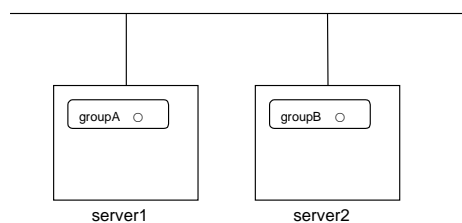
```
# clpgrp -s groupA
```



GroupA starts in server1.

3. Run the following command in server2.

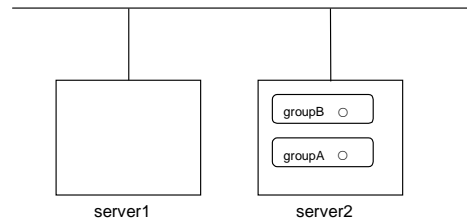
```
# clpgrp -s
```



All groups that are currently stopped but can be started start in server2.

4. Run the following command in server1

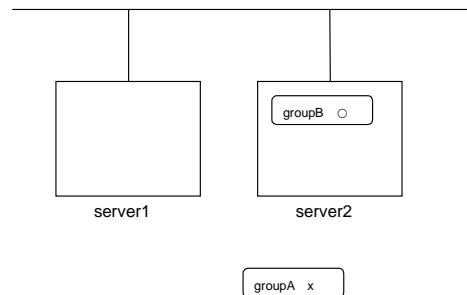
```
# clpgrp -m groupA
```



GroupA moves to server2.

5. Run the following command in server1

```
# clpgrp -t groupA -h server2
```



GroupA stops.

6. Run the following command in server1.

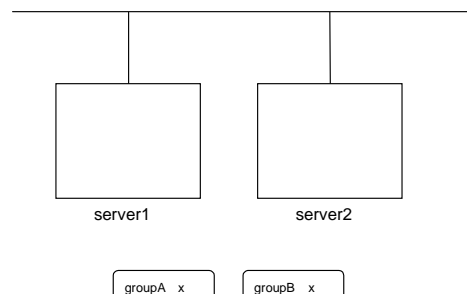
```
# clpgrp -t
```

No operable group exists in the server.

When the command is run, the error message, “No operable group exists in the server.”, is displayed since server1 does not have a group that can be stopped.

7. Add -f to the command you have run in Step 6 and execute it on server1.

```
# clpgrp -t -f
```



Groups which were started in server2 can be forcefully deactivated from server1.

**Error message**

<b>Message</b>	<b>Cause/Solution</b>
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data using the Builder
Invalid option.	Specify a valid option
Could not connect to the server. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Invalid server status.	Check if the cluster daemon is activated.
Server is not active. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid name of sever in the cluster.
Connection was lost. Check if there is a server where the cluster daemon is stopped in the cluster.	Check if there is any server on which the cluster daemon has stopped in the cluster.
Invalid parameter.	The value specified as a command parameter may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set a longer timeout.	A time-out occurred in the ExpressCluster internal communication.  If time-out keeps occurring, set the internal communication time-out longer.
Specify a group name when -m option is used.	Specify a group name for the -m option
Invalid server. Specify a server that can run and stop the group, or a server that can be a target when you move the group.	The server that starts/stops the group or to which the group is moved is invalid.  Specify a valid server.
Could not start the group. Try it again after the other server is started, or after the Wait Synchronization time is timed out.	Start up the group after waiting for the remote server to start up, or after waiting for the time-out of the start-up wait time.
No operable group exists in the server.	Check if there is any group that is operable in the server which requested the process.
The group has already been started on the local server.	Check the status of the group by using the WebManager or the clpstat command.
The group has already been started on the other server. To start the group on the local server, use -f option.	Check the status of the group by using the WebManager or the clpstat command.  If you want to start up a group which was started in a remote server from the local server, move the group or run the command with the -f option.
The group has already been stopped.	Check the status of the group by using the WebManager or the clpstat command.
Failed to start one or more group resources. Check the status of group	Check the status of group by using WebManager or the clpstat command.
Failed to stop one or more group resources. Check the status of group	Check the status of group by using the WebManager or the clpstat command.

Message	Cause/Solution
The group is busy. Try again later.	Wait for a while and then try again because the group is now being started up or stopped.
An error occurred on one or more groups. Check the status of group	Check the status of the group by using the WebManager or the clpstat command.
Invalid group name. Specify a valid group name in the cluster.	Specify the valid name of a group in the cluster.
Some invalid status. Check the status of cluster.	Invalid status for some sort of reason. Check the status of the cluster.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Collecting logs (clplogcc command)

**clplogcc:** the clplogcc command collects logs.

### Command line

```
clplogcc [ [-h hostname] | [-n targetnode1 -n targetnode2 .....] ]  
        [-t collect_type] [-r syslog_rotate_number] [-o path] [-l]
```

<b>Description</b>	This command collects information including logs and the OS information by accessing the data transfer server.	
<b>Option</b>	None	Collects logs in the cluster.
	-h <i>hostname</i>	Specifies the name of the access destination server for collecting cluster node information
	-t <i>collect_type</i>	Specifies a log collection pattern. When this option is omitted, a log collection pattern will be type1. Information on log collection types is provided in the next section.
	-r <i>syslog_rotate_number</i>	Specifies how many generations of syslog will be collected. When this option is omitted, only one generation will be collected.
	-o <i>path</i>	Specifies the output destination of collector files. When this option is skipped, logs are output under tmp of the installation path.
	-n <i>targetmode</i>	Specifies the name of a server that collects logs. With this specification, logs of the specified server, rather than of the entire cluster, will be collected.
	-l	Collects logs on the local server without going through the data transfer server. The -h option and the -n option cannot be specified at the same time.
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Remarks</b>	Since log files are compressed by tar.gz, add the xzf option to the tar command to decompress them.	

**Notes**

Run this command as root user.

All servers in the cluster should check that the data transfer server is active.

For the name of server for the -h option, specify the name of a server in the cluster that allows name resolution.

For the name of server for the -n option, specify the name of server that allows name resolution. If name resolution is not possible, specify the interconnect or public LAN address.

When you run this command, access the servers in the cluster in the order below, and use one of the paths that allowed successful access.

1. via the IP address on the interconnect LAN
2. via the IP address on the public LAN
3. via the IP address whose name was resolved by the server name in the cluster configuration data

**Example of command execution**

**Example 1:** Collecting logs from all servers in the cluster

```
# clplogcc
Collect Log server1 : Success
Collect Log server2 : Success
```

Log collection results (server status) of servers on which log collection is executed are displayed.

Process *hostname*: result of loc collection (server status)

**Execution Result**

For this command, the following processes are displayed.

Steps in Process	Meaning
Connect	Displayed when the access fails.
Get File size	Displayed when acquiring the file size fails.
Collect Log	Displayed with the file acquisition result.

The following results (server status) are displayed:

Result (server status)	Meaning
Success	Success
Timeout	Time-out occurred.
Busy	The server is busy.
Not Exist File	The file does not exist.
No Free space	No free space on the disk.
Failed	Failure caused by other errors.

**Error Message**

<b>Message</b>	<b>Cause/Solution</b>
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data using the Builder.
Invalid option.	Specify a valid option.
Specify a number in a valid range.	Specify a number within a valid range.
Specify a correct number.	Specify a valid number.
Specify correct generation number of syslog.	Specify a valid number for the syslog generation.
Collect type must be specified 'type1' or 'type2' or 'type3'. Incorrect collection type is specified.	Invalid collection type has been specified.
Specify an absolute path as the destination of the files to be collected.	Specify an absolute path for the output destination of collected files.
Specifiable number of servers are the max number of servers that can constitute a cluster.	The number of servers you can specify is within the maximum number of servers for cluster configuration.
Could not connect to the server. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Specify the valid name of a server in the cluster.
Invalid server status.	Check if the cluster daemon is activated.
Server is busy. Check if this command is already run.	This command may have been already activated. Check the status.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Collecting logs by specifying a type (-t option)

To collect only the specified types of logs, run the clplogcc command with the -t option.

Specify a type from 1 thorough 3 for the log collection.

	type1	type2	type3
(1) Default collection information	y	y	y
(2) syslog	y	y	n
(3) core	y	n	y
(4) OS information	y	y	y
(5) script	y	n	n
(6) ESM PRO/AC	y	n	n

(y=yes, n=no)

Run this command from the command line as follows.

Example: When collecting logs using type2

```
# clplogcc -t type2
```

When no option is specified, a log type will be type 1.

### (1) Information to be collected by default

Information on the following is collected by default:

- Logs of each module in the ExpressCluster Server
- Alert logs
- Attribute of each module (ls -l) in the ExpressCluster Server
  - In bin, lib
  - In alert/bin, webmgr/bin
  - In drivers/md
  - In drivers/khb
  - In drivers/ka
- All installed packages (rpm -qa expresscls execution result)
- ExpressCluster version
- distribution (/etc/\*-release)
- CPU license and node license
- Cluster configuration data file
- Policy file
- Dump of shared memory used by ExpressCluster
- Process and thread information (ps execution result)
- PCI device information (lspci execution result)
- Service start configuration information (chkconfig --list and ls -l execution results)
- Output result of kernel parameter (result of running sysctl -a)
- glibc version (rpm -qi glibc execution result)
- Kernel loadable module configuration (/etc/modules.conf. /etc/modprobe.conf)
- File system (/etc/fstab)
- IPC resource (ipcs execution result)
- System (uname -a execution result)
- Network statistics (netstat execution result IPv4/IPv6)
- All network interfaces (ethtool execution result)
- Information collected at an emergency OS shutdown (See “Collecting information ” on page 337.)
- libxml2 version (rpm -qi libxml2 execution result)
- Static host table (/etc/hosts)
- File system export table (exportfs -v execution result)
- User resource limitations (ulimit -a execution result)
- File system exported by kernel-based NFS (/etc/exports)

- OS locale
  - Terminal session environment value (export execution result)
  - Language locale (/etc/sysconfig/i18n)
  - Time zone (env -date execution result)
  - Work area of ExpressCluster server
  - Monitoring options
- This information is collected if options are installed.

(2) syslog

- syslog (/var/log/messages)
- Syslogs for the number of generations specified (/var/log/messages.x)

(3) core file

- core file of ExpressCluster module
- Stored in /opt/nec/clusterpro/log by the following archive names.

Alert related:

al`yyyymmdd`\_x.tar

The WebManager related:

wm`yyyymmdd`\_x.tar

ExpressCluster core related:

cls`yyyymmdd`\_x.tar

`yyyymmdd` indicates the date when the logs are collected. `x` is a sequence number.

(4) OS information

OS information on the following is collected by default:

- Kernel mode LAN heartbeat, keep alive
  - /proc/khb\_moninfo
  - /proc/ka\_moninfo
- /proc/devices
- /proc/mdstat
- /proc/modules
- /proc/lvm
- /proc/mounts
- /proc/meminfo
- /proc/cpuinfo
- /proc/partitions
- /proc/pci
- /proc/version
- /proc/ksyms
- /proc/net/bond\*
- all files of /proc/scsi/ all files in the directory
- all files of /proc/ide/ all files in the directory
- /etc/fstab
- /etc/syslog.conf
- /etc/syslog-ng/syslog-ng.conf
- Kernel ring buffer (dmesg execution result)
- ifconfig (the result of running ifconfig)
- iptables (the result of running iptables -L)
- ipchains (the result of running ipchains -L)
- df (the result of running df)
- raw device information (the result of running raw -qa)
- kernel module load information (the result of running lsmod)
- host name, domain name information (the result of running hostname, domainname)

When you collect logs, you may find the following message on the console. This does not mean failure. The logs are collected normally.

```
hd#: bad special flag: 0x03
```

```
ip_tables: (C) 2000-2002 Netfilter core team
```

(Where hd# is the name of the IDE device that exists on the server)

(5) Script

Start/stop script for a group that was created with the Builder.

If you specify a user-defined script other than the above (/opt/nec/clusterpro/scripts), it is not included in the log collection information. It must be collected separately.

(6) ESMPRO/AC Related logs

Files that are collected by running the acupslog command.

## Syslog generations (-r option)

To collect syslogs for the number of generations specified, run the following command.

Example: Collecting logs for the 3 generations

```
# clplogcc -r 3
```

The following syslogs are included in the collected logs.

/var/log/messages

/var/log/messages.1

/var/log/messages.2

- ◆ When no option is specified, only /var/log/messages is collected.
- ◆ You can collect logs for 0 to 99 generations.
- ◆ When 0 is specified, all syslogs are collected.

Number of Generation	Number of generations to be acquired
0	All Generations
1	Current
2	Current + Generation 1
3	Current + Generation 1 to 2
:	
:	
x	Current + Generation 1 to (x-1)

## Output paths of log files (-o option)

- ◆ Log file is named and be saved as “server name-log.tar.gz”
- ◆ If an IP address is specified for the -n option, log file is named and saved as “IP address-log.tar.gz”
- ◆ Since log files are compressed by tar.gz, decompress them by adding the xzf option to the tar command.

### If not specifying -o option

Logs are output in tmp of installation path.

```
# clplogcc
```

Collect Log *hostname* : Success

```
# ls /opt/nec/clusterpro/tmp
```

*hostname*-log.tar.gz

### When the -o option is not specified:

If you run the command as follows, logs are located in the specified /home/log directory.

```
# clplogcc -o /home/log
```

Collect Log *hostname*: Success

```
# ls /home/log
```

*hostname*-log.tar.gz

## Specifying log collector server (-n option)

By using the -n option, you can collect logs only from the specified server.

Example: Collecting logs from Server1 and Server3 in the cluster.

```
# clplogcc -n Server1 -n Server3
```

- ◆ Specify a server in the same cluster.
- ◆ The number of servers you can specify is within the maximum number of servers in the cluster configuration.

## Collecting information when a failure occurs

When the following failure occurs, the information for analyzing the failure is collected.

- ◆ When a cluster daemon configuring the cluster abnormally terminates due to interruption by a signal (core dump) or internal status error etc.
- ◆ When a group resource activation error or deactivation error occurs
- ◆ When monitoring error occurs in a monitor resource

Information to be collected is as follows:

- ◆ Cluster information
  - Some module logs in ExpressCluster servers
  - Dump files in the shared memory used by ExpressCluster
  - Cluster configuration information files
  - Core files of ExpressCluster module
- ◆ OS information (/proc/\*)
  - /proc/devices
  - /proc/partitions
  - /proc/mdstat
  - /proc/modules
  - /proc/mounts
  - /proc/meminfo
  - /proc/net/bond\*
- ◆ Information created by running a command
  - Results of the sysctl -a
  - Results of the ps
  - Results of the top
  - Results of the ipcs
  - Results of the netstat -i
  - Results of the ifconfig
  - Results of the df
  - Results of the raw -qa

These are collected by default in the log collection. You do not need to collect them separately.

## Creating a cluster and backing up configuration data (clpcfctrl command)

### Creating a cluster

**clpcfctrl:** `--push`: the `clpcfctrl --push` command delivers cluster configuration data to servers.

#### Command line

`clpcfctrl --push [-l|-w] [-c hostname|IP] [-h hostname|IP] [-p portnumber]`

`[-d device] [-m mountpoint]`

`[-x directory] [--force] [--nocheck]`

<b>Description</b>	This command delivers the configuration data created by the Builder to servers.	
<b>Option</b>	<code>--push</code>	Specify this option when delivering the data. You cannot omit this option.
	<code>-l</code>	Specify this option when using the floppy disk with the data saved by the Builder on Linux. If you use the floppy disk with the data saved in the Windows format by the Builder on Linux, specify <code>-w</code> .  You cannot specify <code>-l</code> and <code>-w</code> together.  If neither <code>-l</code> or <code>-w</code> are specified, the current cluster configuration data of the server which runs the command is delivered.
	<code>-w</code>	Specify this option when using the floppy disk with the data saved by the Builder on Windows. When you use the floppy disk with the data saved for Windows with the Builder on Linux, use this option as well.  You cannot specify <code>-l</code> and <code>-w</code> together.  If neither <code>-l</code> or <code>-w</code> are specified, the current cluster configuration data of the server which runs the command is delivered.
	<code>-c <i>hostname IP</i></code>	Specifies a server to access for acquiring a list of servers. Specify a host name or IP address.  When this option is omitted, configuration data in the floppy disk will be used.
	<code>-h <i>hostname IP</i></code>	Specifies a server to which configuration data is delivered. Specify host name or IP address.  If this option is omitted, configuration data is delivered to all servers.
	<code>-p <i>portnumber</i></code>	Specifies a port number of data transfer port.  When this option is omitted, the default value will be used.  In general, it is not necessary to specify this option.

	-d <i>device</i>	<p>Specifies the floppy disk device file</p> <p>Specify this option when the floppy disk device file is not /dev/fd0.</p> <p>When this option is omitted, /dev/fd0 is used.</p>
	-m <i>mountpoint</i>	<p>Specifies a floppy disk mount point.</p> <p>Use with -w.</p> <p>When this option is omitted, /mnt/floppy is used.</p>
	-x <i>directory</i>	<p>Use this option only in an environment where floppy disks cannot be used.</p> <p>Specify this option when delivering configuration data to the specified directory.</p> <p>This option is used with -l or -w.</p> <p>When -l is specified, configuration data saved on the file system by the Builder on Linux is used.</p> <p>When -w is specified, configuration data saved by the Builder on Windows is used.</p>
	--force	<p>Forcibly delivers the cluster configuration data even when the server on which data transfer does not start exists.</p>
	--nocheck	<p>When this option is specified, cluster configuration data is not checked. Use this option only when deleting a server.</p>
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Remarks</b>	<p>In some environments, /mnt/floppy does not exist. When it does not exist, create /mnt/floppy, or specify the mount point by the -m option.</p> <p>When the supermount service is operating and /mnt/floppy is configured to be used, /mnt/floppy cannot be used. Stop the supermount service or specify another mount point by the -m option.</p>	
<b>Notes</b>	<p>Run this command as root user.</p> <p>When you run this command, access the servers in the order below, and use one of the paths that allowed successful access.</p> <ol style="list-style-type: none"> <li>1. via the IP address on the interconnect LAN</li> <li>2. via the IP address on the public LAN</li> <li>3. via the IP address whose name was resolved by the server name in the cluster configuration data</li> </ol>	

**Example of  
command  
execution**

**Example 1:** Generating a cluster from the floppy disk with the data saved by the Builder on Linux

```
# clpcfctrl --push -l
file delivery to server 10.0.0.11 success.
file delivery to server 10.0.0.12 success.
The upload is completed successfully.(cfmgr:0)
Command succeeded.(code:0)
```

**Example 2:** Delivering configuration data from the floppy disk with the data saved by the Builder on Windows to a specified server

```
# clpcfctrl --push -w -h 10.0.0.11
The upload is completed successfully.(cfmgr:0)
Command succeeded.(code:0)
```

**Example 3:** Delivering configuration data that was saved on the file system using the Builder on Linux

```
# clpcfctrl --push -l -x /mnt/config
file delivery to server 10.0.0.11 success.
file delivery to server 10.0.0.12 success.
The upload is completed successfully.(cfmgr:0)
Command succeeded.(code:0)
```

**Example 4:** Delivering the configuration data to the server which has been reinstalled.

```
# clpcfctrl --push -h server2
The upload is completed successfully.(cfmgr:0)
Command succeeded.(code:0)
```

# Error Message

Message	Cause/Solution
Log in as root.	Log on as root user.
This command is already run.	This command has been already started.
Invalid option.	The option is invalid. Check the option.
Invalid mode. Check if -push is specified.	Check if the --push is specified.
The target directory does not exist.	The specified directory is not found.
Invalid host name. Server specified by -h option is not included in the configuration data	The server specified with -h is not included in configuration data. Check if the specified server name or IP address is valid.
Canceled.	Displayed when anything other than "y" is entered for command inquiry.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.
Failed to load the configuration file. Check if memory or OS resources are sufficient.	
Failed to change the configuration file. Check if memory or OS resources are sufficient.	
Failed to load the policy files. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to load the cfctrl policy file. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to create a flag. This floppy disk does not contain valid data created by the Builder.	This is not the floppy disk created by using the Builder.
Failed to restart flag. This floppy disk does not contain valid data created by the Builder.	This is not the floppy disk created by using the Builder.
Failed to get the install path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to get the cfctrl path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Invalid create flag value. This floppy disk does not contain valid data created by the Builder.	This is not the floppy disk created by using the Builder.
Invalid restart flag value. This floppy disk does not contain valid data created by the Builder.	This is not the floppy disk created by using the Builder
Failed to get the list of group.	Failed to acquire the list of group.
Failed to get the list of resource.	Failed to acquire the list of resource.
Failed to initialize the trncl library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

Message	Cause/Solution
Failed to connect to server %s. Check if the other server is active and then run the command again.	Accessing the server has failed. Check if other server(s) has been started.  Run the command again after the server has started up.
Failed to connect to trnsv. Check if the other server is active.	Accessing the server has failed. Check that other server has been started up.
Failed to get the list of node. Check if the server specified by -c is a member of the cluster.	Check to see if the server specified by -c is a cluster member.
File delivery failed. Failed to deliver the configuration data. Check if the other server is active and run the command again.	Delivering configuration data has failed. Check if other server(s) has been started.  Run the command again after the server has started up.
Multi file delivery failed. Failed to deliver the configuration data. Check if the other server is active and run the command again.	Delivering configuration data has failed. Check if other server(s) has been started.  Run the command again after the server has started up.
Failed to deliver the configuration data. Check if the other server is active and run the command again.	Delivering configuration data has failed. Check if other server(s) has been started.  Run the command again after the server has started up.
The directory "/work" is not found. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to make a working directory.	Check to see if the memory or OS resource is sufficient.
The directory does not exist.	
This is not a directory.	
The source file does not exist.	
The source file is a directory.	
The source directory does not exist.	
The source file is a directory.	
The source directory does not exist.	
The source file is not a directory.	
Failed to change the character code set (EUC to SJIS).	
Failed to change the character code set (SJIS to EUC).	
Command error.	

Message	Cause/Solution
Failed to mount the floppy disk. Check if it is inserted. When using the Builder on Linux, check if the disk is saved for Windows. Also, check if mount point exists. When supermount service is running, stop the service or use -m option.	Mounting the floppy disk has failed. Check if the floppy disk has been inserted. If the Builder is used on Linux, check if the data was saved in the Windows format. Check whether the mount point exists. When the supermount service is operating, stop it or use the -m option.
Failed to unmount the floppy disk. Check if it is inserted.	Unmounting the floppy disk has failed. Check that the floppy disk has been inserted.
Command (tar -xf) failed. Check if the floppy disk is inserted. When using the Builder on Linux, check if the disk is saved for Linux.	Loading from the floppy disk has failed. Check if the floppy disk has been inserted. If the Builder is on Linux, check if the data was saved in the Linux format.
Floppy device was already mounted. Unmount the floppy disk, and then perform operations.	The floppy device was already mounted. Unmount the floppy disk, and then operate it again.
Failed to mount the floppy disk. Check if mount point exists.	Failed to mount the floppy disk. Make sure that the mount point exists.
Failed to initialize the cfmgrr library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to get size from the cfmgrr library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to allocate memory.	Check to see if the memory or OS resource is sufficient.
Failed to change the directory.	
Failed to run the command.	
Failed to make a directory.	
Failed to remove the directory.	
Failed to remove the file.	
Failed to open the file.	
Failed to read the file.	
Failed to write the file.	
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
The upload is completed successfully. To start the cluster, refer to "How to create a cluster" in the Installation and Configuration Guide.	The upload is successfully completed. To start the cluster, refer to "Creating a cluster" in the <i>Installation and Configuration Guide</i> .
The upload is completed successfully. To apply the changes you made, shutdown and reboot the cluster.	The upload is successfully completed. To apply the changes you made, shut down the cluster, and reboot it.

Message	Cause/Solution
The upload was stopped. To upload the cluster configuration data, stop the cluster.	The upload was stopped. To upload the cluster configuration data, stop the cluster.
The upload was stopped. To upload the cluster configuration data, stop the Mirror Agent.	The upload was stopped. To upload the cluster configuration data, stop the Mirror Agent.
The upload was stopped. To upload the cluster configuration data, stop the resources to which you made changes.	The upload was stopped. To upload the cluster configuration data, stop the resources to which you made changes.
The upload was stopped. To upload the cluster configuration data, stop the groups to which you made changes.	The upload was stopped. To upload the cluster configuration data, suspend the cluster. To upload, stop the group to which you made changes.
The upload was stopped. To upload the cluster configuration data, suspend the cluster.	The upload was stopped. To upload the cluster configuration data, suspend the cluster.
The upload is completed successfully. To apply the changes you made, restart the Alert Sync. To apply the changes you made, restart the WebManager.	The upload is completed successfully. To apply the changes you made, restart the Alert Sync. To apply the changes you made, restart the WebManager service.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
The upload is completed successfully.	The upload is successfully completed.
The upload was stopped. Failed to deliver the configuration data. Check if the other server is active and run the command again.	The upload was stopped. Failed to deliver the configuration data. Check if the other server is active and run the command again.
The upload was stopped. There is one or more servers that cannot be connected to. To apply cluster configuration information forcibly, run the command again with "--force" option.	The upload was stopped. The server that cannot connect exists. To forcibly upload the cluster configuration information, run the command again with the -force option.

## Backing up the Cluster configuration data

**clpcfctrl --pull:** the clpcfctrl --pull command backups cluster configuration data.

### Command line

```
clpcfctrl --pull [-l|w] [-h hostname|IP] [-p portnumber]
                [-d device] [-m mountpoint]
                [-x directory]
```

<b>Description</b>	This command backs up cluster configuration data to be used for the Builder.	
<b>Option</b>	--pull	Specify this option when performing backup. You cannot omit this option.
	-l	Specify this option when backing up data to the floppy disk that is used for the Builder on Linux. You cannot specify both -l and -w together. You cannot omit both -l and -w.
	-w	Specify this option when backing up data to the floppy disk that is used for the Builder on Windows. The floppy disk must be formatted by 1.44MB (VFAT). You cannot specify both -l and -w together. You cannot omit both -l and -w together.
	-h <i>hostname IP</i>	Specifies the source server for backup. Specify a host name or IP address. When this option is omitted, the configuration data on the server running the command is used.
	-p <i>portnumber</i>	Specifies a port number of data transfer port. When this option is omitted, the default value is used. In general, it is not necessary to specify this option.
	-d <i>device</i>	Specifies the floppy disk device file. Specify when the floppy disk device file is not /dev/fd0. When this option is omitted, /dev/fd0 is used.
	-m <i>mountpoint</i>	Specifies a floppy disk mount point. Use with -w When this option is omitted, /mnt/floppy is used.

	<i>-x directory</i>	<p>Used only in an environment where floppy disks cannot be used.</p> <p>Backs up the configuration data in the specified directory.</p> <p>Use this option with either <i>-l</i> or <i>-w</i>.</p> <p>When <i>-l</i> is specified, configuration data is backed up in the format which can be loaded by the Builder on Linux.</p> <p>When <i>-w</i> is specified, configuration data is saved in the format which can be loaded by the Builder on Windows.</p>
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Remarks</b>	<p>In some environments, <i>/mnt/floppy</i> does not exist. When this does not exist, make <i>/mnt/floppy</i>, or specify the mount point by the <i>-m</i> option.</p> <p>When the supermount service is operating and <i>/mnt/floppy</i> is configured to be used, <i>/mnt/floppy</i> cannot be used. Stop the supermount service or specify another mount point by the <i>-m</i> option.</p>	
<b>Notes</b>	<p>Run this command as root user.</p> <p>When you run this command, access the servers in the cluster in the order below, and use one of the paths that allowed successful access.</p> <ol style="list-style-type: none"><li>1. via the IP address on the interconnect LAN</li><li>2. via the IP address on the public LAN</li><li>3. via the IP address whose name was resolved by the server name in the cluster configuration data</li></ol>	
<b>Example of command execution</b>	<p><b>Example 1:</b> Backing up on the floppy disk that is used by the Builder on Linux</p> <pre># clpcfctrl --pull -l</pre> <p>Command succeeded.(success.(code:0))</p> <p><b>Example 2:</b> Backing up configuration information about the specified server to the floppy disk that is used by the Builder on Windows</p> <pre># clpcfctrl --pull -w -h 10.0.0.11</pre> <p>Command succeeded.(success.(code:0))</p> <p><b>Example 3:</b> Backing up configuration data to the specified directory so that the data can be loaded by the Builder on Linux</p> <pre># clpcfctrl --pull -l -x /mnt/config</pre> <p>Command succeeded.(code:0)</p>	

### Error Message

Message	Cause/Solution
Log in as root.	Log on as root user.
This command is already run.	This command has been already started.
Invalid option.	The option is invalid. Check the option.
Invalid mode. Check if --push or --pull option is specified.	Check to see if the --pull is specified. .
The target directory does not exist.	The specified directory does not exist.
Canceled.	Displayed when anything other than "y" is entered for command inquiry.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to load the configuration file. Check if memory or OS resources are sufficient.	
Failed to change the configuration file. Check if memory or OS resources are sufficient.	
Failed to load the all.pol file. Reinstall the RPM	Reinstall the ExpressCluster Server RPM.
Failed to load the cfctrl.pol file. Reinstall the RPM	Reinstall the ExpressCluster Server RPM.
Failed to get the install path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to get the cfctrl path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM
Failed to initialize the trncl library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to connect to server %1. Check if the other server is active and then run the command again.	Accessing the server has failed. Check if other server(s) has been started. Run the command again after the server has started up.
Failed to connect to trnsv. Check if the other server is active.	Accessing the server has failed. Check if other server(s) has been started.
Failed to get configuration data. Check if the other server is active.	Acquiring configuration data has failed. Check if other(s) server has been started.
The directory "/work" is not found. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM
Failed to make a working directory.	Check to see if the memory or OS resource is sufficient.
The directory does not exist.	
This is not a directory.	

Message	Cause/Solution
The source file does not exist.	
The source file is a directory.	
The source directory does not exist.	
The source file is not a directory.	
Failed to change the character code set (EUC to SJIS).	
Failed to change the character code set (SJIS to EUC).	
Command error.	
Failed to mount the floppy disk. Check if it is inserted. When using the Builder on Linux, check if the disk is saved for Windows. Also, check if mount point exists. When supermount service is running, stop the service or use -m option.	Mounting the floppy disk has failed. Check if the floppy disk has been inserted. If the Builder is used on Linux, check if the data was saved in the Windows format.  Check whether the mount point exists.  When the supermount service is operating, stop it or use the -m option.
Failed to unmount the floppy disk. Check if it is inserted.	Unmounting the floppy disk has failed. Check if the floppy disk has been inserted.
Command (tar -cf) failed. Check if the floppy disk is inserted.	Failed to back up the floppy device. Check if the floppy disk has been inserted.
Floppy device was already mounted. Unmount the floppy disk, and then perform operations.	Floppy device was already mounted. Unmount the floppy disk, and then perform operations.
Failed to mount the floppy disk. Check if mount point exists.	Failed to mount the floppy device. Check that the mount point exists.
Failed to initialize the cfmgr library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to get size from the cfmgr library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to allocate memory.	Check to see if the memory or OS resource is sufficient.
Failed to change the directory.	
Failed to run the command.	
Failed to make a directory.	
Failed to remove the directory.	
Failed to remove the file.	
Failed to open the file.	
Failed to read the file.	
Failed to write the file.	
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Adjusting time-out temporarily

**clptoratio:** the clptoratio command extends or displays the current time-out ratio.

### Command line

```
clptoratio -r ratio -t time
clptoratio -i
clptoratio -s
```

<b>Description</b>	<p>This command displays or temporarily extends the various time-out values of the following on all servers in the cluster.</p> <ul style="list-style-type: none"> <li>+ Monitor resource</li> <li>+ Heartbeat resource</li> <li>+ Mirror Agent</li> <li>+ Mirror driver</li> <li>+ Alert synchronous service</li> <li>+ WebManager service</li> </ul> <p>The current time-out ratio is displayed.</p>	
<b>Option</b>	<p><b>-r <i>ratio</i></b> Specifies the time-out ratio.</p> <p>Use 1 or larger integer.</p> <p>The maxim time-out ratio is 10,000.</p> <p>If you specify “1,” you can return the modified time-out ratio to the original as you can do so when you are using the -i option.</p> <p><b>-t <i>time</i></b> Specifies the extension period.</p> <p>You can specify minutes for m, hours for h, and days for d. The maximum period of time is 30 days. Example: 2m, 3h, 4d</p> <p><b>-i</b> Sets back the modified time-out ratio.</p> <p><b>-s</b> Refers to the current time-out ratio.</p>	
<b>Return Value</b>	<p>0 Success</p> <p>Other than 0 Failure</p>	
<b>Remarks</b>	<p>When the cluster is shutdown, the time-out ratio you have set will become ineffective. However, if any server in the cluster is not shutdown, the time-out ratio and the extension period that you have set will be maintained.</p> <p>With the -s option, you can only refer to the current time-out ratio. You cannot see other information such as remaining time of extended period.</p> <p>You can see the original time-out value by using the status display command.</p> <p>Heartbeat time-out # clpstat --cl --detail</p> <p>Monitor resource time-out # clpstat --mon monitor resource name --detail</p>	

<b>Notes</b>	<p>Run this command as root user.</p> <p>Make sure that the cluster daemon is activated in all servers in the cluster.</p> <p>When you set the time-out ratio, make sure to specify the extension period. However, if you set “1” for the time-out ratio, you cannot specify the extension period.</p> <p>You cannot specify a combination such as “2m3h,” for the extension period.</p>
<b>Example of a command entry</b>	<p><b>Example 1:</b> Doubling the time-out ratio for three days</p> <pre># clptoratio -r 2 -t 3d</pre> <p><b>Example 2:</b> Setting back the time-out ratio to original</p> <pre># clptoratio -i</pre> <p><b>Example 3:</b> Referring to the current time-out ratio</p> <pre># clptoratio -s</pre> <p>present toratio : 2</p> <p>The current time-out ratio is set to 2.</p>

**Error Message**

<b>Message</b>	<b>Cause/Solution</b>
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data by using the Builder.
Invalid option.	Specify a valid option.
Specify a number in a valid range.	Specify a number within a valid range.
Specify a correct number.	Specify a valid number.
Scale factor must be specified by integer value of 1 or more.	Specify 1 or larger integer for ratio.
Specify scale factor in a range less than the maximum scale factor.	Specify a ratio that is not larger than the maximum ratio.
Set the correct extension period.	Set a valid extension period.
Ex) 2m, 3h, 4d	Set the extension period which does not exceed the maximum ratio.
Set the extension period in a range less than the maximum extension period.	Check if the cluster daemon is activated.
Could not connect to the server. Check if the cluster daemon is active.	Check if the cluster daemon is activated.
Server is not active. Check if the cluster daemon is active.	Check if there is any server in the cluster with the cluster daemon stopped.
Connection was lost. Check if there is a server where the cluster daemon is stopped in the cluster.	Check if there is any server in the cluster with the cluster daemon stopped.
Invalid parameter.	The value specified as a parameter of the command may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set the longer timeout.	Time-out has occurred in the internal communication of ExpressCluster. If it occurs frequently, set the internal communication time-out longer.
Processing failed on some servers. Check the status of failed servers.	There are servers that failed in processing. Check the status of server in the cluster. Operate it while all the servers in the cluster are up and running.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Modifying the log level and size

**clplogcf:** the clplogcf command modifies and displays log level and log output file size.

### Command line

`clplogcf -t type -l level -s size`

<b>Description</b>	This command modifies the log level and log output file size, or displays the values currently configured.	
<b>Option</b>	-t	Specifies a module type whose settings will be changed.  If both -l and -s are omitted, the information set to the specified module will be displayed. See the list of "Types that can be specified to the -t option" for types which can be specified.
	-l	Specifies a log level.  You can specify one of the following for a log level. 1, 2, 4, 8, 16, 32  You can see more detailed information as the log level increases.  See the list of "Default log levels and log file sizes" for default values of each module type.
	-s	Specifies the size of a file for log output.  The unit is byte.
	None	Displays the entire configuration information currently set.
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Remarks</b>	Each type of output logs from ExpressCluster uses four log files. Therefore, it is necessary to have the disk space that is four times larger than what is specified by -s.	
<b>Notes</b>	Run this command as root user.	
	To run this command, the ExpressCluster event service must be started.	

**Example of  
command  
execution****Example 1:** Modifying the pm log level

```
# clplogcf -t pm -l 8
```

**Example 2:** Seeing the pm log level and log file size

```
# clplogcf -t pm
```

```
TYPE, LEVEL, SIZE
```

```
pm, 8, 1000000
```

**Example 3:** Displaying the values currently configured

```
# clplogcf
```

```
TYPE, LEVEL, SIZE
```

```
trnsv, 4, 1000000
```

```
xml, 4, 1000000
```

```
logcf, 4, 1000000
```

**Error Message**

Message	Cause/Solution
Log in as root.	Log on as root user.
Invalid option.	The option is invalid. Check the option.
Failed to change the configuration. Check if clpevent is running.	clpevent may not have been started.
Invalid level	The specified level is invalid.
Invalid size	The specified size is invalid.
Failed to load the configuration file. Check if memory or OS resources are sufficient.	Non-clustered server
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to print the configuration. Check if clpevent is running.	clpevent may not be started yet.

**Types that can be specified for the -t option (y=yes, n=no)**

Type	Module	Description	The Express Cluster Server	Replicator	Replicator DR
apicl	libclpapi.so.1.0	API client library	y	y	y
apisv	libclpapisv.so.1.0	API server	y	y	y
bmcconf	clpbmccnf	BMC information update command	y	y	y
cl	clpcl	Cluster startup and stop command	y	y	y
cfctrl	clpcfctrl	Cluster generation, cluster information and backup command	y	y	y
cfmgr	libclpcfmgr.so.1.0	Cluster configuration data operation library	y	y	y
cpufreq	clpcpufreq	CPU Frequency control command	y	y	y
down	clpdown	Server stopping command	y	y	y
grp	clpgroup	Group startup, stop and move command	y	y	y
rsc	clprsc	Group resource startup and stop command	y	y	y
haltp	clpuserw	Shutdown stalling monitoring	y	y	y
lcns	libclplcns.so.1.0	License library	y	y	y
lcnscl	clplcnscl	License registration command	y	y	y
ledctrl	clpledctrl	Chassis identify control command	y	y	y
logcc	clplogcc	Collect Logs command	y	y	y
logcf	clplogcf	Log level and size modification command	y	y	y
logcmd	clplogcmd	Alert producing command	y	y	y
mail	clpmail	Mail Report	y	y	y
monctrl	clpmonctrl	Monitoring control command	y	y	y
nm	clpnm	Node map management	y	y	y
pm	clppm	Process management	y	y	y
rc/rc_ex	clprc	Group and group resource management	y	y	y
reg	libclpreg.so.1.0	Reboot count control library	y	y	y
regctrl	clpregctrl	Reboot count control command	y	y	y
rm	clprm	Monitor management	y	y	y
roset	clproset	Disk control	y	y	y
relpath	clprelpath	Process kill command	y	y	y
stat	clpstat	Status display command	y	y	y
stdn	clpstdn	Cluster shutdown command	y	y	y
toratio	clptoratio	Time-out ratio modification command	y	y	y
trncl	libclptrncl.so.1.0	Transaction library	y	y	y
trnreq	clptrnreq	Inter-cluster processing request command	y	y	y
trnsv	clptrnsv	Transaction server	y	y	y
vxdgc	clpvxdgc	VxVM disk group import/deport command	y	y	y
alert	clpaltinsert	Alert	y	y	y

Type	Module	Description	The Express Cluster Server	Replicator	Replicator DR
webmgr	clpwebmc	WebManager	y	y	y
webalert	clpaltd	Alert synchronization	y	y	y
disk	clpdisk	Disk resource	y	y	y
disk_ex	clpdisk	Disk resource	y	Y	Y
exec	clpexec	Exec resource	y	y	y
fip	clpfip	FIP resource	y	y	y
nas	clpnas	NAS resource	y	y	y
raw	clpraw	Raw resource	y	y	y
vip	clpvip	Virtual IP resource	y	y	y
vxdg	clpvxdg	VxVM disk group resource	y	y	y
vxvol	clpvxvol	VxVM volume resource	y	y	y
arpw	clparpw	ARP monitor resource	y	y	y
diskw	clpdiskw	Disk monitor resource	y	y	y
ipw	clpipw	IP monitor resource	y	y	y
miiw	clpmiiw	NIC link up/down monitor resource	y	y	y
mtw	clpmtw	Multi target monitor resource	y	y	y
pidw	clppidw	PID monitor resource	y	y	y
raww	clpraww	Raw monitor resource	y	y	y
userw	clpuserw	User mode monitor resource	y	y	y
vipw	clpvipw	Virtual IP monitor resource	y	y	y
vxdw	clpvxdw	VxVM daemon monitor resource	y	y	y
vxvolw	clpvxvolw	VxVM volume monitor resource	y	y	y
comhb	clpcomhb	COM heartbeat	y	y	y
diskhb	clpdiskhb	Disk heartbeat	y	y	y
lanhb	clplanhb	LAN heartbeat	y	y	y
lankhb	clplankhb	Kernel mode LAN heartbeat	y	y	y
pingnp	libclppingnp.so.1.0	PING network partition resolution	y	y	y
exping	libclppingnp.so.1.0	PING network partition resolution	y	y	y
mdadmn	libclpmdadmn.so.1.0	Mirror disk admin library	n	y	y
mdfunc	libclpmdfunc.so.1.0	Mirror disk function library	n	y	y
mdagent	clpmdagent	Mirror agent	n	y	y
mdctrl	clpmdctrl	Mirror disk resource operation command	n	y	n
mdinit	clpmdinit	Mirror disk initialization command	n	y	n
mdstat	clpmdstat	Mirror status display command	n	y	n
hdchnng	clphdchnng	Hybrid disk replacement command	n	n	y
hdctrl	clphdctrl	Hybrid disk resource operation command	n	n	y
hdinit	clphdinit	Hybrid disk resource initialization command	n	n	y
hdstat	clphdstat	Hybrid status display command	n	n	y

Type	Module	Description	The Express Cluster Server	Replicator	Replicator DR
md	clpmd	Mirror disk resource	n	y	n
md_ex	clpmd	Mirror disk resource	n	y	n
mdw	clpmdw	Mirror disk monitor resource	n	y	n
mdnw	clpmdnw	Mirror disk connect monitor resource	n	y	n
hd	clphd	Hybrid disk resource	n	n	y
hd_ex	clphd	Hybrid disk resource	n	n	y
hdw	clphdw	Hybrid disk monitor resource	n	n	y
hdnw	clphdnw	Hybrid disk connect monitor resource	n	n	y
oraclew	clp_oraclew	Oracle monitor resource	y	y	y
oracleasw	clp_oracleasw	OracleAS monitor resource	y	y	y
db2w	clp_db2w	DB2 monitor resource	y	y	y
psqlw	clp_psqlw	PostgreSQL monitor resource	y	y	y
mysqlw	clp_mysqlw	MySQL monitor resource	y	y	y
sybasew	clp_sybasew	Sybase monitor resource	y	y	y
sambaw	clp_sambaw	Samba monitor resource	y	y	y
nfs	clp_nfs	NFS monitor resource	y	y	y
httpw	clp_httpw	HTTP monitor resource	y	y	y
ftpw	clp_ftpw	FTP monitor resource	y	y	y
smtpw	clp_smtpw	SMTP monitor resource	y	y	y
pop3w	clp_pop3w	POP3 monitor resource	y	y	y
imap4w	clp_imap4w	IMAP4 monitor resource	y	y	y
tuxw	clp_tuxw	Tuxedo monitor resource	y	y	y
wls	clp_wls	WebLogic monitor resource	y	y	y
was	clp_was	WebSphere monitor resource	y	y	y
otx	clp_otx	WebOTX monitor resource	y	y	y

**Default log levels and log file sizes**

Type	Level	Size (byte)
apicl	4	5000000
apisv	4	5000000
bmccnf	4	1000000
cfmgr	4	1000000
cl	4	1000000
cfctrl	4	1000000
cpufreq	4	1000000
down	4	1000000
grp	4	1000000
rsc	4	1000000
haltp	4	1000000
lcns	4	1000000
lcnsc	4	1000000
ledctrl	4	1000000
logcc	4	1000000
logcf	4	1000000
logcmd	4	1000000
mail	4	1000000
monctrl	4	1000000
nm	4	2000000
pm	4	1000000
rc	4	2000000
rc_ex	4	2000000
reg	4	1000000
regctrl	4	1000000
rm	4	2000000
roset	4	1000000
relpath	4	1000000
stat	4	1000000
stdn	4	1000000
toratio	4	1000000
trncl	4	2000000
trnreq	4	1000000
trnsv	4	2000000
vxdbg	4	1000000
alert	4	4000000
webmgr	4	1000000
webalert	4	1000000

Type	Level	Size (byte)
disk	4	1000000
disk_ex	4	1000000
exec	4	1000000
fip	4	1000000
nas	4	1000000
raw	4	1000000
vip	4	1000000
vxdg	4	1000000
vxvol	4	1000000
arpw	4	1000000
db2w	4	1000000
diskw	4	1000000
ftpw	4	1000000
httpw	4	1000000
imap4w	4	1000000
ipw	4	1000000
miw	4	1000000
mtw	4	1000000
mysqlw	4	1000000
nfs	4	1000000
oraclew	4	1000000
oracleasw	4	1000000
otw	4	1000000
pidw	4	1000000
pop3w	4	1000000
psqlw	4	1000000
raww	4	1000000
sambaw	4	1000000
smtpw	4	1000000
sybasew	4	1000000
tuxw	4	1000000
userw	4	1000000
vipw	4	1000000
vxdw	4	1000000
vxvolw	4	1000000
wasw	4	1000000
wls	4	1000000
comhb	4	1000000
diskhb	4	1000000
lanhb	4	1000000

Type	Level	Size (byte)
lankhb	4	1000000
pingnp	4	1000000
exping	4	1000000
mdadm	4	10000000
mdfunc	4	10000000
mdagent	4	10000000
mdctrl	4	10000000
mdinit	4	10000000
mdstat	4	10000000
hdctrl	4	10000000
hdinit	4	10000000
hdstat	4	10000000
md	4	10000000
md_ex	4	10000000
mdw	4	10000000
mdnw	4	10000000
hd	4	10000000
hd_ex	4	10000000
hdw	4	10000000
hdnw	4	10000000
liscal *1	-	10000000
clpka *1	-	10000000
clpkhb *1	-	10000000

\* If the module's size is zero, its log will not be produced.

\*1 Output destination of log is syslog.

**Monitoring Agent Types that can be specified for the -t option (Monitoring command type)**

**Monitoring Agent (Monitoring command type) Default Values of Log Level/Log File Size**

## License management command

clplcncs: the clplcncs command manages licenses.

**Command line:**

clplcncs -i [*licensefile*] -p *productid*

clplcncs -l -p *productid*

clplcncs -d -p *productid*

<b>Description</b>	This command registers, refers to and remove the licenses of the product version and trial version of this product.	
<b>Option</b>	<b>-i [<i>licensefile</i>]</b>	Registers licenses.  When a license file is specified, license information is acquired from the file for registration. If nothing is specified, you need to enter license information interactively.
	<b>-l</b>	Refers to the license.
	<b>-d</b>	Deletes the license.
	<b>-p <i>productid</i></b>	Specifies the product ID of a licensed product.
		Cluster product
	Product ID	License product name
	BASE20	ExpressCluster X 2.0 for Linux
	UPGR20	ExpressCluster X for Linux Upgrade
	XSSS20	ExpressCluster X SingleServerSafe 2.0 for Linux
	REPL20	ExpressCluster X 2.0 Replicator for Linux
	RPDR20	ExpressCluster X Replicator DR 2.0 for Linux
	RPUP20	ExpressCluster X Replicator DR 2.0 for Linux Upgrade
	DBAG20	ExpressCluster X Database Agent 2.0 for Linux
	ISAG20	ExpressCluster X Internet Server Agent 2.0 for Linux
	FSAG20	ExpressCluster X File Server Agent 2.0 for Linux
	APAG20	ExpressCluster X Application Server Agent 2.0 for Linux
	ALRT20	ExpressCluster X Alert Service 2.0 for Linux

<b>Return Value</b>	0	Normal termination
	1	Normal termination (with licenses not synchronized)  *This means that license synchronization failed in the cluster at the time of license registration.  For actions to be taken, see “Troubleshooting for licensing” in “Appendix A. Troubleshooting” in the <i>Installation and Configuration Guide</i> .
	2	Initialization error
	4	Invalid option
	7	Other internal error

**Example of a command entry:**

### Registering the license interactively

```
# clplcns -i -p BASE20
```

**for registration**

### Product Version

Select a product division.

Selection of License Version

1. Product Version

2. Trial Version

Select License Version. [1 or 2] .

Enter the number of licenses.

Enter number of license [ 1 to 99 (default:99) ] ...

Enter a serial number.

Enter serial number [ Ex. XXX0000000 ] .

Enter a license key.

Enter license key

[ Ex. XXXXXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX ] ...

### Trial Version

Select a product division.

Selection of License Version

1. Product Version

2. Trial Version

Select License Version. [1 or 2]

Enter a user name.

Enter user name [ 1 to 64byte ] .

Enter a trial start date.

Enter trial start date [ Ex. yyyy/mm/dd ] .

Enter a trial expiration date.

Enter trial end date [ Ex. yyyy/mm/dd ].

Enter a license key.

Enter license key

[Ex. XXXXX-XXXXXXXX-XXXXXXXX-XXXXXXXX].

Specify a license file

# clplcns -i /tmp/cpulcns.key -p BASE20

for referring  
to the license

# clplcns -l -p BASE20

#### 1. Product version

< Cluster CPU License EXPRESSCLUSTER X 2.0 for Linux  
<PRODUCT> >

Seq... 1

Key..... A1234567-B1234567-C1234567-D1234567

The number of license... 2

Status... valid

#### 2. Trial version

< Cluster CPU License EXPRESSCLUSTER X 2.0 for Linux  
<TRIAL> >

Seq... 1

Key..... A1234567-B1234567-C1234567-D1234567

User name... NEC

Start date..... 2003/01/01

End date..... 2003/12/31

Status..... valid

**Notes**

Run this command as root user.

When you register a license, verify that the data transfer server is started up and a cluster has been generated for license synchronization.

When synchronizing the licenses, access the cluster servers in the order below, and use one of the paths that allowed successful access:

1. via the IP address on the interconnect LAN
2. via the IP address on the public LAN
3. via the IP address whose name was resolved by the server name in the cluster configuration data.

When you delete a license, only the license information on the server where this command was run is deleted. The license information on other servers is not deleted. To delete the license information in the entire cluster, run this command in all servers.

When there are multiple pieces of license information on the product ID specified to be deleted, the entire license information of the product ID will be deleted.

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Command succeeded.	The command ran successfully.
Command failed.	The command did not run successfully.
Command succeeded. But the license was not applied to all the servers in the cluster because there are one or more servers that are not started up.	There is one or more server that is not running in the cluster. Perform the cluster generation steps in all servers in the cluster. Refer to Chapter 3 "Installing ExpressCluster" the <i>Installation and Configuration Guide</i> for information on cluster generation.
Log in as root.	You are not authorized to run this command. Log on as root user.
Invalid cluster configuration data. Check it by using the Builder.	The cluster configuration data is invalid. Check the cluster configuration data by using the Builder.
Initialization error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
The command is already run.	The command is already running. Check the running status by using a command such as the ps command.
The license is not registered.	The license has not been registered yet. Register the license.
Could not open the license file. Check if the license file exists on the specified path.	Input/Output cannot be done to the license file. Check to see if the license file exists in the specified path.
Could not read the license file. Check if the license file exists on the specified path.	
The field format of the license file is invalid. The license file may be corrupted. Check the destination from where the file is sent.	The field format of the license file is invalid. The license file may be corrupted. Check it with the file sender.
The cluster configuration data may be invalid or not registered.	The cluster configuration data may be invalid or not registered. Check the configuration data.
Failed to terminate the library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to register the license. Check if the optional product ID and entered license information is correct.	Check to see if the optional product ID or entered license information is correct.
Failed to open the license. Check if the optional product ID and entered license information is correct.	
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Disk I/O lockout command

**clproset:** the clproset command modifies and displays I/O permission of the partition device.

**Command line:**

```
clproset -o [-d device_name | -r resource_name -t resource_type | -a | --lockout]
clproset -w [-d device_name | -r resource_name -t resource_type | -a | --lockout]
clproset -s [-d device_name | -r resource_name -t resource_type | -a | --lockout]
```

<b>Description</b>	This command configures the partition device I/O permission of a shared disk to ReadOnly/ReadWrite possible.	
	This command displays the configured I/O permission status of the partition device.	
<b>Option</b>	-o	Sets the partition device I/O to ReadOnly. When ReadOnly is set to a partition device, you cannot write the data into the partition device.
	-w	Sets the partition device I/O to ReadWrite possible. When ReadWrite is set to a partition device, you may read from and write the data into the partition device.
	-s	Displays the I/O permission status of the partition device.
	-d <i>device_name</i>	Specifies a partition device.
	-r <i>resource_name</i>	Specifies a disk resource name.
	-t <i>resource_type</i>	Specifies a group resource type.
		For the current ExpressCluster version, always specify “disk” as group resource type.
	-a	Runs this command against all disk resources.
	--lockout	Runs this command against the device specified as a disk lock device.
<b>Return Value</b>	0	Success
	Other than 0	Failure
<b>Notes</b>	Run this command as root user.	
	This command can only be used on shared disk resources. It cannot be used for mirror disk resources and hybrid disk resources.	
	Make sure to specify a group resource type when specifying a resource name.	

**Example of  
command  
execution**

**Example 1:** When changing the I/O of disk resource name, disk1, to RW:

```
# clproset -w -r disk1 -t disk  
/dev/sdb5 : success
```

**Example 2:** When acquiring I/O information of all resources:

```
# clproset -s -a  
/dev/sdb5 : rw (disk)  
/dev/sdb6 : ro (raw)  
/dev/sdb7 : ro (lockout)
```

**Error Messages**

Message	Cause/Solution
Log in as root.	Log on as root user.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	Create valid cluster configuration data by using the Builder.
Invalid option.	Specify a valid option.
The -t option must be specified for the -r option.	Be sure to specify the -t option when using the -r option.
Specify 'disk' or 'raw' to specify a group resource.	Specify "disk" or "raw" when specifying a group resource type.
Invalid group resource name. Specify a valid group resource name in the cluster.	Specify a valid group resource name.
Invalid device name.	Specify a valid device name.
Command timeout.	The OS may be heavily loaded. Check to see how heavily it is loaded.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

---

**Note:**

Do not use this command for the purposes other than those mentioned in "Preparing to operate a cluster system" in Chapter 9 in the Installation and Configuration Guide.  
If you run this command while the cluster daemon is activated, the file system may get corrupted.

## Mirror-related commands

### Mirror status display commands

**clpmdstat:** the clpmdstat command displays status related to mirroring and configuration information.

**Command line:**

```
clpmdstat --connect mirrordisk-alias
clpmdstat --mirror mirrordisk-alias
clpmdstat --active mirrordisk-alias
clpmdstat --detail mirrordisk-alias
clpmdstat --list
```

<b>Description</b>	This command displays the status related to mirroring.	
	This command displays mirror disk resources configuration information.	
<b>Option</b>	--connect	Displays mirror disk connect status.
	--mirror	Displays mirror disk resource status.
	--active	Displays status of mirror disk activation.
	--detail	Displays mirror disk resources configuration information.
	--list	Displays mirror disk resources list.
<b>Parameter</b>	<i>mirrordisk-alias</i>	Specifies a mirror disk resource name.
<b>Return value</b>	0	Success
	Other than 0	Failure
<b>Notes</b>	Run this command as root user.	
<b>Example display after running this command</b>	An example of the display after running this command is provided in the next section.	

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Error: Log in as root.	Log on as root user.
Error: Failed to read the configuration file. Check if it exists or is configured properly.	Reading the configuration file has failed. Check to see if the configuration file exists and is configured correctly.
Error: Failed to acquire mirror disk resource name. Check if the Mirror Agent is operating normally.	Acquiring a mirror disk resource name has failed. Check to see if the Mirror Agent is operating normally.
Error: Specified mirror disk resource was not found. Specify a valid mirror disk resource name.	Failed to the specified mirror disk resource. Specify a valid mirror disk resource name.
Error: Invalid mirror-alias. Specify a valid mirror disk resource name.	Specify a valid mirror disk resource name.
Error: Failed to get the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.	Acquiring a server name has failed. Check to see if the configuration file is valid and the Mirror Agent is operating normally.
Error: Failed to communicate with other servers. Check if the Mirror Agent of the other server is operating normally and the interconnect LAN is connected.	Communicating with the remote server has failed. Check if the Mirror Agent in the remote server is operating normally and the interconnect is connected.
Error: Mirror disks of the remote server may be down. Check if the Mirror Agent of the remote server is operating normally and the interconnect LAN is connected.	Communicating with the remote server has failed. Check to see if the Mirror Agent in the remote server is operating normally, and the interconnect is connected.
Error: Failed to get the mirror disk status. Check if the Mirror Agent on the local server is operating normally.	Acquiring the mirror disk status has failed. Check to see if the Mirror Agent in the local server is operating normally.
Error: Failed to acquire the mirror index. Check if the Mirror Agent is operating normally.	Check to see if the Mirror Agent is operating normally.
Error: mirror agent is not running Check if the Mirror Agent is active.	The Mirror Agent is not started up. Check the syslog or the alert message of the module type, mdagent.
Error: Failed to acquire the active status of the Mirror Agent of the local server. Shut down the cluster and reboot both servers	Acquiring the active status of mirror disk resource of the local server has failed. Shut down the cluster and restart both servers.
Error: Failed to acquire the active status of the Mirror Agent of the other server. Shut down the cluster and reboot both servers	Acquiring the active status of a mirror disk resource of the remote server has failed. Shut down the cluster and restart both servers.
Error: Failed to acquire mirror recovery status. Reboot the local server.	Acquiring the mirror recovery status has failed. Restart the local server.
Error: Failed to acquire the list of mirror disks. Reboot the local server.	Acquiring a list of mirror disks has failed. Restart the local server.
Error: Failed to acquire the mirror configuration information. Check if the Mirror Agent is operating normally.	Acquiring the mirror configuration data has failed. Check to see if the Mirror Agent is operating normally.
Error: Failed to acquire the mirror configuration information error. Check if the Mirror Agent is operating normally.	Acquiring the mirror disk configuration data of both servers has failed. Check if the Mirror Agent operate normally.

Message	Cause/Solution
Error: Failed to get acquire mirror- disk configuration information. Reboot the local server.	Acquiring the mirror disk configuration data. Restart the local server.
Error: get local and remote Failed to acquire the mirror- disk configuration information error of both servers. Shut down the cluster and reboot both servers	Acquiring the mirror disk configuration data of both servers failed. Shut down and restart both servers.
Error: The number of the bits of the bitmap is invalid. The mirror difference information of the cluster partition is invalid. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see the Reference Guide.	Acquiring the mirror difference information in the cluster partition has failed. Shut down the cluster. If this error happens again, replace the disk.
Error: Failed to get bitmap information. Failed to acquire the mirror difference information of the local server. Reboot the local server.	The mirror difference information in the cluster partition is invalid. Shut down the cluster. If this error happens again, replace the disk.
Error: Failed to get bitmap information. Failed to acquire the mirror difference information of the local server. Reboot the local server.	Acquiring the mirror difference information has failed of the local server. Restart the local server.
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the mirror difference information of the local server has failed. Restart the local server.
Error: Failed to acquire semaphore. Reboot the local server.	Acquiring semaphore has failed. Restart the local server.
Error: A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory space has failed. Restart the local server.
Error: Mirror driver of the local server is not loaded. Refer to the Reference Guide to load the driver.	The mirror driver in the local server is not loaded. Check it by seeing Chapter 11, "Trouble shooting."
Error: Internal error (errorcode: 0xxxx). Shut down the cluster and reboot the server.	Shut down the cluster and restart the server.
Error: Failed to communicate with server %1 and %2. Check if both Mirror Agents of the two servers are operating normally and the interconnect LANs are connected.	Failed to communicate with both servers represented in the message. Make sure that the mirror agents of both servers are running and the interconnect LANs are connected.  The server names are displayed where "%1", "%2" are represented.
Error: Failed to communicate with server %1. Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected. Failed to acquire the mirror disk detail information of the server %2. Shut down the cluster and reboot both servers.	Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.  Failed to acquire the mirror disk detail information of the server %2. Shut down the cluster, and then restart the both servers.  The server names are displayed where "%1", "%2" are represented.

Message	Cause/Solution
Error: Failed to acquire the mirror disk detail information of the server %1. Shut down the cluster and reboot both servers. Failed to communicate with server %2. Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.	<p>Failed to acquire the mirror disk detail information of the server %1. Shut down the cluster, and then restart the both servers.</p> <p>Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p>
Error: Failed to acquire the mirror disk detail information of the server %1 and server %2. Shut down the cluster and reboot both servers."	<p>Failed to acquire the mirror disk detail information of both servers. Shut down the cluster, and then restart the servers.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p>
Error: Failed to communicate with server %1 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected. Failed to acquire mirror disk %3 net interface status of the server %2. Shut down the cluster and reboot both servers.	<p>Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Failed to acquire the status of mirror disk connect of mirror disk resource %3 of server %2. Shut down the cluster and reboot both servers.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>
Error: Failed to acquire mirror disk %3 net interface status of the server %1. Shut down the cluster and reboot both servers. Failed to communicate with server %2 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.	<p>Failed to acquire the status of mirror disk connect of mirror disk resource %3 of server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>
Error: Failed to acquire mirror disk %3 net interface status of the server %1 and server %2. Shut down the cluster and reboot both servers.	<p>Failed to acquire the status of mirror disk connect of both servers. Shut down the cluster, and then, restart the servers.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>

Message	Cause/Solution
<p>Error: Failed to communicate with server %1 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p> <p>Failed to acquire the active status of the Mirror disk %3 of the server %2. Shut down the cluster and reboot both servers.</p>	<p>Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Failed to acquire the active status of the Mirror disk resource %3 of the server %2. Shut down the cluster and reboot both servers.</p> <p>The server name is displayed where “%1”, “%2” is represented.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>
<p>Error: Failed to acquire the active status of the Mirror disk %3 of the server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with server %2 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p>	<p>Failed to acquire the active status of the mirror disk resource %3 of the server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Where %1, %2 is represented, the server name is displayed.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>
<p>Error: Failed to acquire the active status of the Mirror disk %3 of the server %1 and server %2. Shut down the cluster and reboot both servers.</p>	<p>Failed to acquire the mirror disk detail information of both servers. Shut down the cluster, and then restart the servers.</p> <p>Where %1, %2 is represented, the server name is displayed.</p> <p>Where %3 is represented, the mirror resource name is displayed.</p>
<p>Error: Failed to get all server names. Check if the configuration file is correct and the Mirror Agent is operating normally.</p>	<p>Failed to acquire the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.</p>
<p>Error: The disk alias does not match the command.</p>	<p>The resource type of the specified resource name (mirror alias name) is invalid. Use clpmdctrl for md resource, and clphdctrl for hd resource.</p>
<p>Error: Invalid command name.</p>	<p>The command name is invalid. Do not change the file name of the clphdctrl command.</p>

## Example display after running the mirror status display command

### ◆ Mirror disk connect status display

When the --connect option is specified, the status of mirror disk connect is displayed.

Mirror Name : md1

```
[Server : server1]
192.168.0.1                : Using
```

```
[Server : server2]
192.168.0.2                : Using
```

Explanation of each item

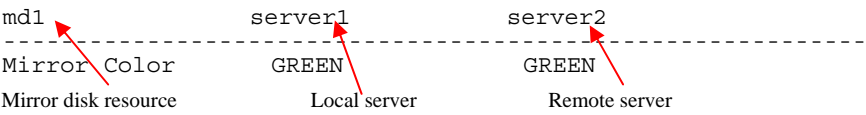
Item	Description										
Server Name	Name of the server										
IP Address	IP address specified by mirror disk connect										
Status	Status of mirror disk connect <table><tr><th>Status</th><th>Description</th></tr><tr><td>Using</td><td>Being used</td></tr><tr><td>Free</td><td>Not used</td></tr><tr><td>Error</td><td>Error</td></tr><tr><td>--</td><td>Unknown</td></tr></table>	Status	Description	Using	Being used	Free	Not used	Error	Error	--	Unknown
Status	Description										
Using	Being used										
Free	Not used										
Error	Error										
--	Unknown										

◆ Displaying the status of mirror disk resource

The status of specified mirror disk resource is displayed by specifying the --mirror option. There are three types of display depending on the status of mirror disk resource:

- When the status of mirror disk resource is Normal:

Mirror Status: Normal



Explanation of each item

Item	Description														
Mirror Status	Status of mirror disk resource														
	<table><tr><th>Status</th><th>Description</th></tr><tr><td>Normal</td><td>Normal</td></tr><tr><td>Recovering</td><td>Mirror is recovering</td></tr><tr><td>Abnormal</td><td>Abnormal</td></tr><tr><td>No Construction</td><td>Initial mirror construction is not done</td></tr></table>	Status	Description	Normal	Normal	Recovering	Mirror is recovering	Abnormal	Abnormal	No Construction	Initial mirror construction is not done				
	Status	Description													
	Normal	Normal													
	Recovering	Mirror is recovering													
	Abnormal	Abnormal													
No Construction	Initial mirror construction is not done														
Mirror Color	Status of mirror disk on each server														
	<table><tr><th>Status</th><th>Description</th></tr><tr><td>GREEN</td><td>Normal</td></tr><tr><td>YELLOW</td><td>Mirror is recovering</td></tr><tr><td>RED</td><td>Abnormal</td></tr><tr><td>GRAY</td><td>Being stopped, Unknown status</td></tr><tr><td>BLACK</td><td>Initial mirror construction is not done, error found in cluster partition data, etc.</td></tr><tr><td>BLUE</td><td>Both disks are active</td></tr></table>	Status	Description	GREEN	Normal	YELLOW	Mirror is recovering	RED	Abnormal	GRAY	Being stopped, Unknown status	BLACK	Initial mirror construction is not done, error found in cluster partition data, etc.	BLUE	Both disks are active
	Status	Description													
	GREEN	Normal													
	YELLOW	Mirror is recovering													
	RED	Abnormal													
	GRAY	Being stopped, Unknown status													
	BLACK	Initial mirror construction is not done, error found in cluster partition data, etc.													
BLUE	Both disks are active														

- When the status of mirror disk resource is abnormal

Mirror Status: Abnormal

```
md1          server1          server2
-----
Mirror Color   GREEN              RED
Lastupdate Time 2004/02/24 15:41:07 --
Break Time     2004/02/24 15:40:38 --
Disk Error     OK                OK
Difference Percent 1%              0%
```

Explanation of each item

Item	Description								
Mirror Status	Status of mirror disk resource *1								
Mirror Color	Status of mirror disk on each server *1								
Last update Time	Last time when the data was updated on the server.								
Break Time	Time when mirror break has occurred								
Disk Error	Status of disk I/O								
	<table><tr><th>Status</th><th>Description</th></tr><tr><td>OK</td><td>Normal</td></tr><tr><td>ERROR</td><td>Error (No I/O)</td></tr><tr><td>--</td><td>Unknown</td></tr></table>	Status	Description	OK	Normal	ERROR	Error (No I/O)	--	Unknown
	Status	Description							
	OK	Normal							
	ERROR	Error (No I/O)							
--	Unknown								
Difference Percent	Percentage of differences in the data on each server.								

\*1 Refer to, "When the status of mirror disk resource is Normal:"

- During mirror recovery

Mirror Status: Recovering

```
md1                server1                server2
-----
```

```
Mirror Color        YELLOW                YELLOW
```

```
Recovery Status     Value
-----
```

```
Status:             Recovering
```

```
Direction: src      server1
```

```
                dst      server2
```

```
Percent:            3%
```

```
Used Time:          00:00:01
```

```
Remain Time:        00:00:32
```

```
Iteration Times:    1/1
```

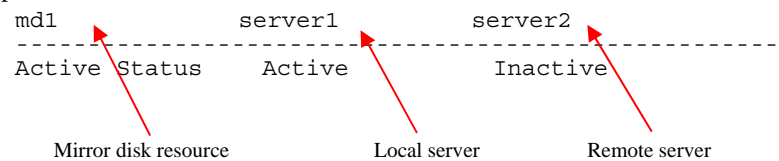
#### Explanation of each item

Item	Description										
Mirror Status	Status of mirror disk resource *1										
Mirror Color	Status of mirror disk on each server *1										
Status	<div> <div>Status of mirror recovery</div> <table> <tr> <th>Status</th><th>Description</th></tr> <tr> <td>Preparing</td><td>Preparing for copy (This status may last for a while if I/O load is high when resource is getting started during recovery)</td></tr> <tr> <td>Recovering</td><td>Being recovered</td></tr> <tr> <td>Completing</td><td>Recovering is being completed</td></tr> <tr> <td>Nothing</td><td>Canceling recovery</td></tr> </table> </div>	Status	Description	Preparing	Preparing for copy (This status may last for a while if I/O load is high when resource is getting started during recovery)	Recovering	Being recovered	Completing	Recovering is being completed	Nothing	Canceling recovery
Status	Description										
Preparing	Preparing for copy (This status may last for a while if I/O load is high when resource is getting started during recovery)										
Recovering	Being recovered										
Completing	Recovering is being completed										
Nothing	Canceling recovery										
Direction	src : source server dst : destination server										
Percent	Percentage of how much data is already recovered										
Used Time	Elapsed time since recovering has started										
Remain Time	Estimated time to complete recovering the remaining data. It is estimated by the speed of already recovered data. The time may be different depending on server load.										
Iteration Times	The current repeat counts and the setting value of the mirror recovery.										

\*1 Refer to “When the status of mirror disk resource is Normal:”.

◆ Displaying active status of mirror disk resource

Active status of the specified mirror disk resource is displayed when the --active option is specified:



Status of mirror partition device

Active Status	Description
Active	Active
Inactive	Not active
--	Unknown

◆ Displaying mirror disk resource information

Configuration information of the specified mirror disk resource is displayed when the --detail option is specified:

```

Mirror Name      : md1
  Sync Switch    : On
  Sync Mode      : Sync
  Diff Recovery   : --

[Server : server1]
  NMP/Disk Size(MB) : 2447/2447
  DP Device        : /dev/sdb2
  CP Device        : /dev/sdb1

[Server : server2]
  NMP/Disk Size(MB) : 2447/2447
  DP Device        : /dev/sdb2
  CP Device        : /dev/sdb1
  
```

Explanation of each item

Item	Description
Mirror Name	Mirror disk resource name
Sync Switch	Perform data synchronization
Sync Mode	Synchronization Mode
Server Name	Server name
NMP/Disk Size(MB)	NMP: the smaller size of data partition of servers Disk Size: actual data partition size
DP Device	Data partition device name
CP Device	Cluster partition device name

◆ Displaying the list of mirror disk resources

The list of mirror disk resources is displayed when the --list option is specified:

```
[Replicator Option]
server1      : Installed
server2      : Installed
server3      : Installed

[Servers Which Can Be Started]
md1          : server1
              server3

md2          : server2
              server3
```

Explanation of each item

Item	Description
Replicator Option	License status of the Replicator
Servers Which Can Be Started	Servers which can be started of mirror disk resources

## Mirror disk resource operation command

**clpmdctrl:** the clpmdctrl command operates mirror disk resources.

**Command line:**

```
clpmdctrl --active mirrordisk-alias
clpmdctrl --active -nomount mirrordisk-alias
clpmdctrl --active --force [-ro] mirrordisk-alias
clpmdctrl --active --force -nomount mirrordisk-alias
clpmdctrl --deactive mirrordisk-alias
clpmdctrl --break mirrordisk-alias
clpmdctrl --force recovery-source-servername mirrordisk-alias
clpmdctrl --force mirrordisk-alias
clpmdctrl --recovery mirrordisk-alias
clpmdctrl --cancel mirrordisk-alias
clpmdctrl --rwait [-timeout time [-rcancel]] mirrordisk-alias
clpmdctrl --getreq
clpmdctrl --setreq request-count
clpmdctrl --sync mirrordisk-alias
clpmdctrl --nosync mirrordisk-alias
```

---

**Note:**

Do not use the --active, and --deactive options when the cluster daemon is started. If you use them, the data in file system can be corrupted. Do not use these options for the purposes other than those mentioned in Chapter 9, “Preparing to operate a cluster system” in the *Installation and Configuration Guide*.

---

<b>Description</b>	This command activates, deactivates or forcibly activates mirror disk resource and recovers or forcibly recovers mirror.	
	This command disconnects a mirror disk.	
	This command displays and/or modifies the settings of maximum number of request queues.	
	This command switches the synchronization status of the mirror data.	
<b>Option</b>	--active	Activates the mirror disk resource on the local server.  If the status of mirror disk resource is normal, mirroring is performed.  If the status of mirror disk resource is not normal, mirroring will not be performed.  When the --force option is specified, mirror disk resource is activated forcibly. This command can be run on the server where mirroring is stopped.
	--deactive	Deactivates the activated mirror disk resource on the local server.

--break	<p>Disconnects the mirror disk resources forcibly specified with <i>mirrordisk-alias</i> on the server where the command is run. The status of mirror disk resource on the server where the command is run becomes an error. The status on the server where the command is not run does not change.</p> <p>When a mirror is recovered, disconnection is cancelled.</p> <p>Mirror data is not synchronized even when any data is written to a mirror disk.</p>
--force	<p>Forcefully performs mirror recovery for the specified mirror disk resource.</p> <p>If only <i>mirrordisk-alias</i> is specified, the status of mirror disk where the command is run becomes normal forcibly. Mirror resynchronization is not performed.</p> <p>If <i>recovery-source-servername</i> and <i>mirrordisk-alias</i> are specified, full mirror recovery is performed using <i>recovery-source-servername</i> as a source data. The status of mirror disk becomes normal when a full mirror recovery completes.</p>
--recovery	<p>Performs either full mirror recovery or differential mirror recovery for the specified mirror disk resource.</p> <p>Whether to perform full or differential mirror recovery is determined automatically.</p>
--cancel	<p>Cancels mirror recovery.</p>
--rwait	<p>Waits for the completion of the mirror recovery of the specified mirror disk resource.</p>
-timeout	<p>Specifies the timeout period of mirror recovery completion (second). This option can be omitted.</p> <p>When this option is omitted, timeout is not executed and waits for the completion of mirror recovery.</p>
-rcancel	<p>Intermits mirror recovery when the timeout of waiting of mirror recovery completion occurred. This option can be set when -timeout option is set. When this option is omitted, the mirror recovery continues even after the timeout occurrence.</p>
--getreq	<p>Displays the current maximum number of request queues.</p>
--setreq	<p>Configures the maximum number of request queues.</p> <p>When the server shuts down, what you have configured here returns to the value set in the cluster configuration data. Use the Builder if you want to modify the cluster configuration data. See Chapter3, “Functions of the Builder” for details.</p> <p>The command is only effective on the server that runs the command.</p>
-nomount	<p>This option is used with the --active option.</p> <p>It allows access to mirror partition device without mounting the file system.</p>

	--sync	<p>This option switches the operation to the mirror synchronization.</p> <p>When the mirror disk resource name is not specified, the operation is switched to synchronizing the mirror data to all mirror resources.</p>
	--nosync	<p>This option switched the operation to the one that does not synchronize the mirror data.</p> <p>When the mirror disk resource name is not specified, the operation is switched to not performing the synchronization of the mirror data to all mirror resources.</p> <p>However, the data updated to a disk during a mirror recovery is synchronized to a standby.</p> <p>The operation mode of the mirror is configured in the <b>Mirror Agent</b> tab by clicking the <b>Cluster Properties</b>.</p>
<b>Parameter</b>	<i>recovery-source-servername</i>	Specify a server name of the copy source.
	<i>mirrordiisk-alias</i>	Specify a mirror disk resource name.
	<i>request-count</i>	Specify a maximum number of request queues. You can specify a number from 256 through 65535.
	<i>time</i>	Specifies the timeout period of mirror recovery completion (second).
<b>Return Value</b>	0	Success
	255 (-1)	Failure
	254 (-2)	Target mirror disk is not configuring mirror, or the mirror configuring failed on the process. (Only when --rwait option is specified, including the case when mirror recovery is interrupted by -rcancel.)
	253 (-3)	Timeout of mirror recovery of target mirror disk occurs (Only when --rwait -timeout option is specified)
<b>Remarks</b>	<p>request-count, which is displayed by specifying the --getreq option, is the same as “Max. Number of Request Queues” which is displayed by using the clpstat command.</p> <pre># clpstat --cl --detail</pre>	

<b>Notes</b>	<p>Run this command as root user.</p> <p>When performing forced mirror recovery only for the local server while the remote server is not running, specify the server that is forcefully mirror recovered as a copy source.</p> <p>When performing mirror recovery again after mirror recovery failed, specify the same server you used last time for mirror recovery as a copy source.</p> <p>To resume the forced mirror recovery that was suspended by selecting <b>Cancel</b>, use this command for forced mirror recovery.</p> <p>In a cluster with more than three nodes, if the server where the command is run is not included in a startup server of a group including mirror disk resources, this command results in error. Do not run this command if the server is not included in a startup server of a group.</p>
<b>Example of command execution</b>	<p><b>Example 1:</b> When activating the mirror disk resource md1:</p> <pre># clpmdctrl --active md1</pre> <p>&lt;md1@server1&gt;: active successfully</p> <p><b>Example 2:</b> When deactivating the mirror disk resource md1:</p> <pre># clpmdctrl --deactive md1</pre> <p>&lt;md1@server1&gt;: deactive successfully</p> <p><b>Example 3:</b> When disconnecting the mirror disk resource md1:</p> <pre># clpmdctrl --break md1</pre> <p>md1: isolate successfully</p> <p><b>Example 4:</b> When the status of both servers is error, and you need to recover the operation which uses the resource md1 as soon as possible:</p> <pre># clpmdctrl --force md1</pre> <p>The data of mirror disk in local server maybe is not latest. Do you still want to continue? (Y/N) md1: Force recovery successful.</p> <pre># clpgrp -s failover1</pre> <p>Command succeeded.</p> <p>When <b>Auto Mirror Recovery</b> is selected, mirror recovery is performed at this timing. When <b>Auto Mirror Recovery</b> is cleared, run the following command.</p> <pre># clpmdctrl --recovery md1</pre> <p><b>Example 5:</b> When mirror recovering the mirror disk resource md1:</p> <pre># clpmdctrl --recovery md1</pre> <p><b>Example 6:</b> When setting the maximum number of request queue to 2048:</p> <pre># clpmdctrl --setreq 2048</pre> <p>current I/O request count &lt;2048&gt;</p> <p><b>Example 7:</b> When configure the setting that does not perform the data synchronization to the mirror disk resource md1:</p> <pre># clpmdctrl --nosync md1</pre>

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Error: Log in as root.	Log on as root user.
Error: Failed to read the configuration file. Check if it exists or is configured properly.	Reading the configuration file has failed. Check to see if the configuration file exists and is configured correctly.
Error: Specified mirror disk resource was not found. Specify a valid mirror disk resource name.	Locating the specified mirror disk resource has failed. Specify a valid mirror disk resource name.
Error: Invalid mirror-alias. Specify a valid mirror disk resource name.	Specify a valid mirror disk resource name.
Error: Failed to get the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.	Acquiring the server name has failed. Check if configuration file is correct and the Mirror Agent is operating normally.
Error: Specified server name was not found. Check if the server name exists in the configuration file.	The specified server name was not found. Check to see if the entered server name exists in the configuration file.
Error: Invalid server name. Specify a valid server name.	Specify a valid sever name.
Error: Failed to communicate with other servers. Check if the Mirror Agent of the other server is operating normally and the mirror disk connect is connected.	Communicating with the remote server has failed. Check to see if the Mirror Agent of the remote server is operating and the mirror disk is connected.
Error: Failed to get the mirror disk status. Check if the Mirror Agent on the local server is operating normally.	Acquiring the mirror disk status has failed. Check to see if the Mirror Agent of the local server is operating normally.
Error: Failed to get the mirror index. Check if the Mirror Agent is operating normally.	Check to see if the Mirror Agent is operating normally.
Error: The status of mirror disk resource of the local server is abnormal.	The mirror disk resource of the local server has a problem.
Error: Specified mirror disk resource is already active. Check active status of mirror disk resource by running the following command: <code>clpmdstat --active &lt;alias&gt;</code>	The specified mirror disk resource is already activated. Check the status of the mirror disk resource using the following command.  <code>clpmdstat --active &lt;alias&gt;</code>
Error: A hardware error has occurred on the disk. Check the disk.	A hardware error has occurred on the disk. Check the disk.
Error: The sizes of data partition of the servers do not match.	Data partition sizes of both servers do not match.
Error: Specified mirror disk is not active. Check the active status of mirror disk resource.	The specified mirror disk resource is not activated. Check the status of mirror disk resource.
Error: There is no recovering mirror disk resource.	There is no mirror disk under mirror recovery process.
Error: Mirror disk resource is recovering. Wait until mirror recovery completes.	The mirror disk resource is under mirror recovery process. Wait until mirror recovery is completed
Error: Failed to cancel the mirror recovery. The system may be highly loaded. Wait for a while and try again.	Stopping mirror recovery has failed. The system may be heavily loaded. Wait for a while and try again.

Message	Cause/Solution
Error: Performed mirror recovery to the mirror disk resource that is not necessary to recover the mirror. Run the clpmdctrl--force command if you want to perform forced mirror recovery.	Mirror recovery has been performed on the mirror disk resource that is in normal status and not requiring mirror recovery. To perform forced mirror recovery, use "clpmdctrl --force."
Error: Specification of the server that is copied from is incorrect. When executing mirror recovery again after a failure end of mirror recovery, specify the same server as the previous one.	The server specified for a copy source is invalid. When performing the mirror recovery again after the mirror recovery has failed, specify the same server that you specified last time for the failed mirror recovery as a copy source.
Error: Forced mirror recovery is required. Run the clpmdctrl --force command to perform the recovery.	Forced mirror recovery is necessary. Use "clpmdctrl --force" and perform forced mirror recovery.
Error: Server with old data is specified as the server which is copied from. Specify a correct recovery direction.	The server with old data is specified as a copy source. Specify a correct recovery direction.
Error: Failed to acquire mirror recovery status. Reboot the local server.	Acquiring the mirror recovery status has failed. Restart the local server.
Error: Both of the mirrors are not constructed. Initial mirror configuration of the mirror disks by running the clpmdctrl --force command is necessary.	Initial mirror construction of mirror disk is necessary. Construct initial mirror configuration using "clpmdctrl --force."
Error: Initial mirror configuration of mirror disk of local server is necessary. Specify the other server as the one that is copied from by using the clpmdctrl --force command to configure an initial mirror.	Initial mirror construction is necessary for the mirror disk of the local server. Specify the remote server as a copy source and construct initial mirror using "clpmdctrl --force."
Error: Initial mirror configuration of mirror disk of the other server is necessary. Specify the local server as the one that is copied from by using the clpmdctrl--force command to configure an initial mirror.	Initial mirror construction is necessary for the mirror disk of the remote server. Specify the local server as a copy source and construct initial mirror using "clpmdctrl --force."
Error: Mirror flag error. Use "clpmdinit" to construct the mirror. The status of cluster partition of the mirror disk resource is abnormal. When the server with the error has the latest data, backup the data, initialize the cluster partition, and replace the same disk by using the same disk. If the error persists, change the disk to new one.	The cluster partition of the mirror disk resource has a problem. When the server with error has the latest data, back up the data, initialize the cluster partition, and follow the same "disk replacement" steps using the same disk by seeing "Backup Procedure" and "Restoration Procedure" in Chapter 8 "Verifying Operation" in the <i>Installation and Configuration Guide</i> . If this occurs again, replace the disk with a new disk.
Error: Both local and remote mirrors are active. Shut down the cluster and execute forced mirror recovery after rebooting the server.	Both systems are active. Shut down the cluster and perform forced mirror recovery after reactivating the server.
Error: Mirror Agent is not running. Check if the Mirror Agent is active.	The Mirror Agent is not started up. Check to see if the Mirror Agent is running.
Error: System calls error. Failed to run the system command when active and/or inactive. Check if the search path is set to an environment variables.	Running the system command when active/inactive has failed. Check to see if a search path is set as an environmental variable.
Error: Failed to create a mount point. The disk space may not be sufficient.	Creating a mount point has failed. Disk space may be insufficient. Check it.

Message	Cause/Solution
Error: Timeout has occurred on active fsck. When it is not journaling file system, it may take time to run fsck if the size of data partition of mirror disk is large. Set timeout of fsck longer by using the Builder.	fsck time-out has occurred. In case it is not the journaling file system, running fsck may take time when the data partition of the mirror disk is large.  Set the longer timer for the fsck time-out using the Builder.
Error: Timeout occurs at activation mount. Set mount timeout longer	Time-out has occurred at active mounting. Set the mounting time-out longer by using the Builder.
Error: Timeout occurs at deactivation mount. Set unmount timeout longer.	Time-out has occurred at inactive unmounting of the file system. Set the mount time-out period longer by using the Builder.
Error: fsck failed. Check if file system type of data partition does not match configuration file, fsck option is incorrect or partition is incorrect.	Running fsck has failed. Check to see if the file system type of the data partition matches to the configuration file, fsck option is valid, and partition is not destroyed.
Error: Failed to mount when active. The file system type of the data partition does not match the settings of the configuration file, or the partition may be corrupted.	Mounting during activation has failed. Check to see if the file system type of the data partition matches to the configuration file, fsck option is valid, and the partition is not destroyed.
Error: Failed to unmount when inactive. Check if the file system on the data partition is busy.	Unmount during deactivation has failed. Check to see if the file system on data partition is not busy.
Error: Mirror disk resource is on process of activation. Execute after activation is completed.	The mirror disk is in the process of activation. Try after activation is completed.
Error: Failed to perform forced mirror recovery or activate a single server. Check if any hardware error has occurred on the disk.	Performing forced recovery or activating a standalone server has failed. Check to see if any hardware error has occurred on the disk.
Error: Entered incorrect maximum number of request queues. Check the specifiable range.	Invalid maximum number of request queues is entered. Check the range of numbers that can be specified.
Error: Failed to set the maximum number of request queues. Reboot the local server.	Setting a maximum number of request queues has failed. Restart the local server.
Error: Failed to acquire the maximum number of request queues. Reboot the local server.	Acquiring a maximum number of request queues has failed. Restart the local server.
Mirror disk resource was not found on local server. Cannot perform this action.	The mirror disk resource was not defined on the local server. Cannot configure the maximum number of request queue. Check the status of the mirror disk resource.
Error: Failed to get the NMP path. Check if the Mirror Agent is operating normally. Reboot the local server.	Check to see if the Mirror Agent is operating normally. Restart the local server.
Error: Failed to acquire the mirror configuration information. Check if the Mirror Agent is operating normally.	Acquiring the mirror configuration information has failed. Check to see if the Mirror Agent is operating normally.

Message	Cause/Solution
Error: Failed to acquire the mirror disk configuration information. Reboot the local server.	Acquiring mirror disk configuration data has failed. Restart the local server.
Error: Failed to acquire the mirror disk configuration information of both local and remote servers. Shut down the cluster and reboot both servers	Acquiring mirroring disk configuration data of both servers has failed. Shut down the cluster and restart both servers.
Error: Failed to get the number of bits of the bitmap due to the errors occurred when acquiring the mirror difference information of the cluster partition. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see the Reference Guide.	Acquiring the information of mirror differences on the cluster partition has failed. Shut down the cluster. If the error occurs again, replace the disk. For information on how to replace a disk, refer to the <i>Reference Guide</i> .
Error: The number of the bits in the bitmap is invalid. The mirror difference information of the cluster partition is invalid. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see Reference Guide.	The information of the mirror differences in the cluster partition is invalid. Shut down the cluster. If the error occurs again, replace the disk. For information on how to replace a disk, refer to the <i>Reference Guide</i> .
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the information of mirror differences on the local server has failed. Restart the local server.
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the information of the mirror differences on the remote server has failed. Restart the remote server.
Error: Failed to get the bitmap information of the local server due to the errors occurred when acquiring the mirror difference information of the local server. Reboot the local server.	Acquiring the information of the mirror differences on the local server has failed. Restart the local server.
Error: Failed to read the disk space. Shut down the cluster and reboot the server	Acquiring the disk space has failed. Shut down the cluster and restart the server.
Error: Failed to acquire the disk space of the other server. Shut down the cluster and reboot both servers.	Acquiring the disk space of the remote server has failed. Shut down the cluster and restart the server.
Error: Setting of cluster partition failed. Restart local server.	Configuring the cluster partition has failed. Restart the local server.
Error: Error occurred on the settings of the mirror disk resource. Reboot the local server.	Error occurred in the status settings of mirror disk resource. Restart the local server.
Error: Failed to create a thread. Reboot the local server.	Creating thread has failed. Restart the local server.
Error: Internal error. Failed to create process. Reboot the local server.	Creating the process has failed. Restart the local server.
Error: Failed to acquire semaphore. Reboot the local server.	Acquiring semaphore has failed. Restart the local server.
Error: A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory has failed. Restart the local server.
Error: Mirror driver of the local server is not loaded. Confirm kernel version.	The mirror driver of the local server is not loaded. Check the kernel version.

Message	Cause/Solution
Error: Mirror recovery cannot be executed as NMP size of mirror recovery destination is smaller than the size of where the mirror is recovered from. Change the recovery destination and try again.	Mirror recovery cannot be performed because NMP size of recovery destination is smaller than the recovery source. Change the destination and try again.
Error: NMP size of local server is bigger, cannot active. Initial mirror configuration is not completed. Execute mirror recovery from server of smaller NMP size to that of larger one.	Initial mirror configuration is not completed. Perform forced mirror recovery from the server whose NMP size is smaller to the larger one.
Local and remote recovery mode do not match. Reboot a server other than the master server to keep the same contents of configuration file among servers. Note that a failover may occur at server reboot.	<p>The both servers are different on the recovery mode. The recovery is not performed.</p> <p>Restart the servers other than master server to make the information file be the same among servers.</p> <p>Note that a failover may occur at server reboot.</p>
Failed to get remote recovery mode. Recovery will not be interrupted. Check the communication status of mirror connect.	Failed to get remote recovery mode. Recovery will not be interrupted. Check the communication status of mirror connect.
Failed to get local recovery mode. Recovery will not be interrupted. Note that a failover may occur at server reboot.	Failed to get local recovery mode. Recovery will not be interrupted. Restart the local server. Note that a failover may occur when the server is restarted.
Local or remote mirror is forced activated. Cannot to perform this action.	Mirror disks are forcibly activated. Cannot perform the mirror recovery. Check the status of local or remote mirror.
The recovery destination of mirror disk is activated. Cannot perform this action.	The recovery destination of mirror disk is activated. Cannot perform the mirror recovery. Check the status of the mirror disk.
Mirror disk connection is disconnected. Cannot perform this action.	The communication status of mirror disk connect is error. Cannot perform the mirror recovery. Check the status of the mirror disk connect.
Failed to get mirror disk list and failed to set all NMP sync flag. Reboot the local server. Note that a failover may occur at server reboot.	<p>The setting of synchronizing data for all the mirror disks failed since acquiring the mirror disk list failed.</p> <p>Reboot the local server. Note that a failover may occur at server reboot.</p>
Failed to get mirror disk list and failed to set all NMP sync flag to OFF. Reboot the local server. Note that a failover may occur at server reboot.	<p>The setting of not to synchronize data for all the mirror disks failed since acquiring the mirror disk list failed.</p> <p>Reboot the local server. Note that a failover may occur at server reboot.</p>
sync flag is successfully set. <mirrordisk-alias> is a mirror resource name.	The setting of not to synchronize data is successfully configured. <mirrordisk-alias> is a name of the mirror resource.
sync flag is successfully set to OFF. <mirrordisk-alias> is a mirror resource name.	The setting of not to synchronize data is successfully completed. <mirrordisk-alias> is a name of the mirror resource.

Message	Cause/Solution
Failed to set sync flag on both servers. Shut down a cluster and reboot server.	The setting of synchronizing data failed on the both servers. Shut down the cluster and restart it.
Failed to set sync flag to OFF on both servers. Shut down a cluster and reboot server.	The setting of not to synchronize data failed on the both servers. Shut down the cluster and restart it.
Succeeded to set sync flag on local server and failed on remote server. Check the communication status of mirror connect.	The setting of synchronizing data succeeded on the local server, yet failed on the other server. Check the communication status of the mirror connect.
Succeeded to set sync flag to OFF on local server and failed on remote server. Check the communication status of mirror connect.	The setting of not to synchronize data succeeded on the local server, yet failed on the other server. Check the communication status of the mirror connect.
Succeeded to set sync flag on remote server and failed on local server. Note that a failover may occur at server reboot.	The setting of synchronizing data failed on the local server, yet succeeded in the other server. Restart the local server. Note that a failover may occur when the server is restarted.
Succeeded to set sync flag to OFF on remote server and failed on local server. Note that a failover may occur at server reboot.	The setting of not to synchronize data failed on the local server, yet succeeded in the other server. Restart the local server. Note that a failover may occur when the server is restarted.
Cannot change the settings of sync status during mirror recovery. Change the settings after mirror recovery is completed.	The setting of synchronizing data cannot be changed during mirror recovery. Change the settings after mirror recovery is completed.
Mirror disk resource was not found on local server. Cannot perform this action.	The mirror disk resource is not defined on the local server. The setting of synchronizing data cannot be changed.
The status of the mirror disk does not satisfy the conditions to perform this action. A probable cause: 1. Local mirror disk is not initialized or is already force activated. 2. Local mirror disk is not RED or remote is GREEN or remote is already activated.	The status of mirror is invalid. Cannot perform a forced recovery.
The data of mirror disk in the local server may not be the latest. Do you still want to continue? (Y/N)	The data of the local server may not be the latest. Cannot check the status of mirror disk on the other server.
Forced recovery has completed successfully.	The forced mirror recovery has successfully completed.
The status of mirror disk in local server is not GREEN or is already activated. Cannot perform this action.	The status of mirror is invalid. Cannot disconnect a mirror.
Failed to set an isolate flag in the local server.	Cannot update the flag for mirror disconnect.
Isolated completed successfully.	The mirror disconnect is successfully completed.
The status of the mirror disk does not satisfy the conditions to perform this action. A probable cause: 1. Mirror disk is not initialized or is not RED. 2. Mirror disk is already activated.	The status of mirror is invalid. Cannot perform the forced activation.

Message	Cause/Solution
sync flag of %1 is successfully set to ON.	The data synchronization is set to on. A name of the mirror resource is displayed where %1 is represented.
Failed to set sync flag of %1 on both servers. Shut down the cluster and reboot server.	Failed to set the data synchronization flag on the both servers. A name of the mirror resource is displayed where %1 is represented.
%3: Succeeded to set sync flag ON on %1 Failed to set sync flag ON on %2 Check the communication status of mirror connect.	Failed to set the data synchronization flag on either of the servers. Check if the mirror disk connect can properly communicate. A name of the successfully-set server is displayed where %1 is represented. A name of the faultly-set server is displayed where %2 is represented. A name of the mirror resource is displayed where %3 is represented.
%1: Cannot change the settings of sync status during mirror recovery. Change the settings after mirror recovery is completed.	Cannot change the data synchronization flag during mirror recovery. Change the settings after mirror recovery is completed. A name of the mirror resource is displayed where %1 is represented.
sync flag of %1 is successfully set to OFF.	The mirror synchronization is set to off for %1. A name of the mirror resource is displayed where %1 is represented.
%3: Succeeded to set sync flag OFF on %1 Failed to set sync flag OFF on %2 Check the communication status of mirror connect.	Failed to set the data synchronization flag on either server. Check if the mirror disk connect can normally communicate. A name of the successfully-set server is displayed where %1 is represented. A name of the faultly-set server is displayed where %2 is represented. A name of the mirror resource is displayed where %3 is represented.
The specified mirror disk is not defined on this server.	The specified mirror disk is not defined on the local server.
Failed to acquire the path of mirror device. Check if the Mirror Agent is operating normally. Reboot the local server.	Failed to acquire the device name of the mirror disk. Check if the mirror agent is running.
The disk alias does not match the command.	The resource type of the specified resource name (mirror alias name) is invalid. Use clpmdctrl for md resource, and clphdctrl for hd resource.
Invalid command name.	The command name is invalid. Do not change the file name of the clpmdctrl command.
Failed to get host name.	Acquiring the server name failed.
<%1>: mirror broken	The status of mirror is invalid. Target mirror disk is not configuring mirror, or the mirror configuring failed on the process. A name of the mirror resource is displayed where %1 is represented.

Message	Cause/Solution
<%1>: recovery timeout	Mirror recovery timed out. Check if the specified timeout period is appropriate, or if the disk I/O or communication delay is not occurring due to heavy loads. A name of the mirror resource is displayed where %1 is represented.

## Initializing mirror disks (clpmdinit command)

**clpmdinit:** the clpmdinit initializes a mirror disk.

**Command line:**

clpmdinit --create normal [*mirrordisk-alias*]

clpmdinit --create quick [*mirrordisk-alias*]

clpmdinit --create force [*mirrordisk-alias*]

---

**Caution:**

Generally you do not need to run this command when constructing or operating a cluster. You should exercise caution when you use this command because the partition used for the data will be initialized.

---

<b>Description</b>	This command initializes the cluster partition of a mirror disk resource.  This command creates a file system on the data partition of a mirror disk resource.	
<b>Option</b>	--create normal	Initializes a cluster partition and creates a file system of the data partition, if necessary. <sup>1</sup>  The necessity is determined by the magic number set by ExpressCluster on the cluster partition.  Generally, it is not necessary to run the command with this option.
	--create quick	Initializes the cluster partition, if necessary.  Whether or not it is necessary to initialize the cluster partition is determined by the magic number set by ExpressCluster on the cluster partition.  Generally, it is not necessary to run the command with this option.
	--create force	Forcefully initializes the cluster partition and creates a file system of the data partition. <sup>2</sup>  This option is used when using the disk that was once used as a mirror disk of ExpressCluster again.
<b>Parameter</b>	<i>mirrordisk-alias</i>	Specifies a mirror disk resource name. If this parameter is not specified, the process is performed on all mirror disk resources.
<b>Return Value</b>	0	Success
	Other than 0	Failure

---

<sup>1</sup> Unless “Execute initial mkfs” is selected in the cluster configuration data, the file system will not be created.

## Notes

You should exercise caution when you run this command because the mirror disk will be initialized.

Run this command as root user.

Do not run other commands, until this command is returned.

When running this command, make sure that the Mirror Agent in all servers in the cluster is stopped. To check the Mirror Agent is stopped on all servers, run the following command:

```
# /etc/init.d/clusterpro_md status
```

In a cluster with more than three nodes, if the server where the command is run is not included in a startup server of a group including mirror disk resources, this command results in error. Do not run this command if the server is not included in a startup server of a group.

## Example of command execution

**Example 1:** When forcefully initializing the cluster partition because the disk to be used for the mirror disk resource md1 was once used as a mirror disk of ExpressCluster:

```
# clpmdinit --create force md1
```

mirror info will be set as default

the main handle on initializing mirror disk <md1> success

initializing mirror disk complete

**Error Messages**

<b>Message</b>	<b>Causes/Solution</b>
Log in as root.	Log on as root user.
Stop the Mirror Agent.	Stop the mirror agent.
The clpmdinit command is currently running. Execute after it is completed.	This command is running. Run after it is completed.
The clpmdchng command is currently running. Execute after it is completed	The clpmdchng command is running. Run after it is completed.
Invalid mirror-alias. Specify a valid mirror disk resource name.	Specify a valid mirror disk resource name.
The mirror disk resource was not found. Set the mirror disk resource properly.	The mirror disk resource was not found. Set a mirror disk resource properly.
Specified mirror disk resource <%1> was not found. Specify a valid mirror disk resource name.	The specified mirror disk resource was not found. Specify a valid mirror disk resource name.
The partition does not exist . Check if the cluster partition of specified mirror disk resource exists (<%1>).	Check to see if the cluster partition of the specified mirror disk resource exists.
Check if the cluster partition size of specified mirror disk resource is larger than 10MB. <%1>	Check to see if the cluster partition size of the specified mirror disk resource is 10 MB or larger.
Internal error (open error <%1>). The cluster partition of the mirror disk resource may not exist or the OS resource may be insufficient.	Check to see if the cluster partition of the specified mirror disk resource exists or OS resource is sufficient.
Internal error (<%1> cluster partition: unknown error). Failed to initialize the cluster partition. Check if any hardware error has occurred on the disk.	Initializing the cluster partition has failed. Check to see if there is any hardware error on the disk.
Internal error (<%1> cluster partition: %2). Check if the size of cluster partition is sufficient and any hardware error has occurred on the disk.	Setting a cluster partition has failed. Check to see if the cluster partition space is sufficient and a hardware error has not occurred on the disk.
The data partition does not exist (<%1>). Check if the data partition of the specified mirror disk resource exists. Data Partition is: %2	Check to see if the data partition of the specified mirror disk resource exists.
Failed to initialize the cluster partition <%1>. The data partition of the specified mirror disk resource may not exist, hardware error may have occurred on the disk, or specified file system may not be supported by OS. Check them. mirror<%2>: fstype<%3>	Initializing the data partition has failed. Check to see if the data partition of the specified mirror disk resource exists, hardware error has not occurred on the disk and the specified file system is supported by OS.
Unknown error occurred when formatting mirror-disk<%1>. The data partition of the specified mirror disk resource may not exist or hardware error may have occurred on the disk. Check them.	Initializing the data partition has failed. Check to see if the data partition of the specified mirror disk resource exists and a hardware error has not occurred on the disk.

Message	Causes/Solution
Internal error (Failed to open the data partition:<%1>). Failed to initialize the data partition. The data partition of the specified mirror disk resource may not exist or OS resource may not be sufficient. Data Partition is: %2	Initializing the data partition has failed. Check to see if the data partition of the specified mirror disk resource exists and OS resource is sufficient.
Internal error (data partition check error---<%1>). Failed to initialize the data partition. Check if any hardware error has occurred on the disk.	Initializing the data partition has failed. Check to see if any hardware error has not occurred on the disk.
Failed to acquire mirror disk list information. Reboot the local server.	Acquiring a list of mirror disk has failed. Restart the local server.
Internal error (PID write failed). Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Internal error (initialization failed) Failed to read the configuration file, or failed to initialize the shared memory or semaphore. Check if the file is configured properly and reboot the local server.	Reading the configuration file, initialize the shared memory or semaphore has failed. Check to see if configuration file is correct, and restart the local server.
Internal error (termination failed) Failed to release the shared memory. Check if any system error has occurred while running the program.	Freeing up the shared memory has failed. Check to see if any system error has not occurred while running the program.
A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory space has failed. Restart the local server.
An error has occurred when the data partition is set to writable mode. <Device:%1>. Reboot the local server.	An error occurred when the data partition was set to the writable mode. Restart the local server.
An error has occurred when the data partition is set to read-only mode.<Device:%1>. Reboot the local server.	An error occurred when the data partition was set to the read-only mode. Restart the local server.
Cluster Partition or Data Partition does not exist.	No cluster partition or data partition exists. Check if a partition is created.
Failed to upgrade the cluster partition of <%s>.	Upgrading a cluster partition failed. Check if there is an error on the disk.
Specified mirror disk resource was not found on local server. Cannot perform this action.	The mirror disk resource is not defined on the local server. Cannot perform initialization. Check the status of the mirror disk resource.
The disk alias does not match the command.	The resource type of the specified resource name (mirror alias name) is invalid. Use clpmdinit for md resource, and clphdinit for hd resource.
Invalid command name.	The command name is invalid. Do not change the file name of the clphdinit command.

## Hybrid-disk-related commands

### Hybrid disk status display commands

**clphdstat:** the clphdstat command displays status related to mirroring and configuration information.

**Command line:**

```
clphdstat --connect hybriddisk-alias
clphdstat --mirror hybriddisk-alias
clphdstat --active hybriddisk-alias
clphdstat --detail hybriddisk-alias
clphdstat --list
```

<b>Description</b>	This command displays the status related to mirroring of hybrid disk.	
	This command displays hybrid disk resources configuration information.	
<b>Option</b>	--connect	Displays the status of mirror connect used by hybrid disk resource.
	--mirror	Displays the mirroring status of hybrid disk resource.
	--active	Displays status of hybrid disk resource activation.
	--detail	Displays hybrid disk resources configuration information.
	--list	Displays hybrid disk resources list.
<b>Parameter</b>	<i>hybriddisk-alias</i>	Specifies a hybrid disk resource name.
<b>Return value</b>	0	Success
	Other than 0	Failure
<b>Notes</b>	Run this command as root user.  If there is no current server in the server group, the server in which a mirror agent is working normally becomes the current server. The server having the highest priority in server priority in <b>Server Group Properties</b> is selected.	
<b>Example display after running this command</b>	An example of the display after running this command is provided in the next section.	

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Error: Log in as root.	Log on as root user.
Error: Failed to read the configuration file. Check if it exists or is configured properly.	Reading the configuration file has failed. Check to see if the configuration file exists and is configured correctly.
Error: Failed to acquire hybrid disk resource name. Check if the Mirror Agent is operating normally.	Acquiring a hybrid disk resource name has failed. Check to see if the Mirror Agent is operating normally.
Error: Specified hybrid disk resource was not found. Specify a valid hybrid disk resource name.	Failed to the specified hybrid disk resource. Specify a valid mirror disk resource name.
Error: Invalid hybrid-alias. Specify a valid hybrid disk resource name.	Specify a valid hybrid disk resource name.
Error: Failed to get the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.	Acquiring a server name has failed. Check to see if the configuration file is valid and the Mirror Agent is operating normally.
Error: Failed to communicate with other servers. Check if the Mirror Agent of the other server is operating normally and the interconnect LAN is connected.	Communicating with the remote server has failed. Check if the Mirror Agent in the remote server is operating normally and the interconnect is connected.
Error: Hybrid disks of the remote server may be down. Check if the Mirror Agent of the remote server is operating normally and the interconnect LAN is connected.	Communicating with the remote server has failed. Check to see if the Mirror Agent in the remote server is operating normally, and the interconnect is connected.
Error: Failed to get the hybrid disk status. Check if the Mirror Agent on the local server is operating normally.	Acquiring the hybrid disk status has failed. Check to see if the Mirror Agent in the local server is operating normally.
Error: Failed to acquire the mirror index. Check if the Mirror Agent is operating normally.	Check to see if the Mirror Agent is operating normally.
Error: mirror agent is not running Check if the Mirror Agent is active.	The Mirror Agent is not started up. Check the syslog or the alert message of the module type, mdagent.
Error: Failed to acquire the active status of the Mirror Agent of the local server. Shut down the cluster and reboot both servers	Acquiring the active status of mirror disk resource of the local server has failed. Shut down the cluster and restart both servers.
Error: Failed to acquire the active status of the Mirror Agent of the other server. Shut down the cluster and reboot both servers	Acquiring the active status of a mirror disk resource of the remote server has failed. Shut down the cluster and restart both servers.
Error: Failed to acquire mirror recovery status. Reboot the local server.	Acquiring the mirror recovery status has failed. Restart the local server.
Error: Failed to acquire the list of hybrid disks. Reboot the local server.	Acquiring a list of hybrid disks has failed. Restart the local server.
Error: Failed to acquire the mirror configuration information. Check if the Mirror Agent is operating normally.	Acquiring the mirror configuration data has failed. Check to see if the Mirror Agent is operating normally.
Error: Failed to acquire the hybrid disk configuration information of both servers. Shut down the cluster and reboot both servers	Acquiring the hybrid disk configuration data of both servers failed. Perform cluster shut down and restart both servers.

Message	Cause/Solution
Error: The number of the bits of the bitmap is invalid. The mirror difference information of the cluster partition is invalid. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see the Reference Guide.	Acquiring the mirror difference information in the cluster partition has failed. Shut down the cluster. If this error happens again, replace the disk.
Error: Failed to get bitmap information. Failed to acquire the mirror difference information of the local server. Reboot the local server.	The mirror difference information in the cluster partition is invalid. Shut down the cluster. If this error happens again, replace the disk.
Error: Failed to get bitmap information. Failed to acquire the mirror difference information of the local server. Reboot the local server.	Acquiring the mirror difference information has failed of the local server. Restart the local server.
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the mirror difference information of the local server has failed. Restart the local server.
Error: Failed to acquire semaphore. Reboot the local server.	Acquiring semaphore has failed. Restart the local server.
Error: A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory space has failed. Restart the local server.
Error: Mirror driver of the local server is not loaded. Refer to the Reference Guide to load the driver.	The mirror driver in the local server is not loaded. Check it by seeing Chapter 11, "Trouble shooting."
Error: Internal error (errorcode: 0xxxx). Shut down the cluster and reboot the server.	Shut down the cluster and restart the server.
Error: Failed to communicate with server %1 and %2. Check if both Mirror Agents of the two servers are operating normally and the interconnect LANs are connected.	Failed to communicate with both servers represented in the message. Make sure that the mirror agents of both servers are running and the interconnect LANs are connected.  The server names are displayed where "%1", "%2" are represented.
Error: Failed to communicate with server %1. Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected. Failed to acquire the hybrid disk detail information of the server %2. Shut down the cluster and reboot both servers.	Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.  Failed to acquire the hybrid disk detail information of the server %2. Shut down the cluster, and then restart the both servers.  The server names are displayed where "%1", "%2" are represented.
Error: Failed to acquire the hybrid disk detail information of the server %1. Shut down the cluster and reboot both servers. Failed to communicate with server %2. Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.	Failed to acquire the hybrid disk detail information of the server %1. Shut down the cluster, and then restart the both servers.  Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.  The server name is displayed where "%1", "%2" is represented.

Message	Cause/Solution
Error: Failed to acquire the hybrid disk detail information of the server %1 and server %2. Shut down the cluster and reboot both servers."	<p>Failed to acquire the hybrid disk detail information of both servers. Shut down the cluster, and then restart the servers.</p> <p>The server name is displayed where "%1", "%2" is represented.</p>
<p>Error: Failed to communicate with server %1. Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p> <p>Failed to acquire mirror disk %3 net interface status of the server %2. Shut down the cluster and reboot both servers.</p>	<p>Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Failed to acquire the status of mirror disk connect of mirror disk resource %3 of server %2. Shut down the cluster and reboot both servers.</p> <p>The server name is displayed where "%1", "%2" is represented.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>
<p>Error: Failed to acquire hybrid disk %3 net interface status of the server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with server %2 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p>	<p>Failed to acquire the status of hybrid disk connect of mirror disk resource %3 of server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>The server name is displayed where "%1", "%2" is represented.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>
Error: Failed to acquire mirror disk %3 net interface status of the server %1 and server %2. Shut down the cluster and reboot both servers.	<p>Failed to acquire the status of hybrid disk connect of both servers. Shut down the cluster, and then, restart the servers.</p> <p>The server name is displayed where "%1", "%2" is represented.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>
<p>Error: Failed to communicate with server %1 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p> <p>Failed to acquire the active status of the Hybrid disk %3 of the server %2. Shut down the cluster and reboot both servers.</p>	<p>Failed to communicate with the server %1. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Failed to acquire the active status of the Hybrid disk resource %3 of the server %2. Shut down the cluster and reboot both servers.</p> <p>The server name is displayed where "%1", "%2" is represented.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>

Message	Cause/Solution
<p>Error: Failed to acquire the active status of the Hybrid Mirror disk %3 of the server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with server %2 . Check if Mirror Agent of the server is operating normally and the interconnect LAN is connected.</p>	<p>Failed to acquire the active status of the hybrid disk resource %3 of the server %1. Shut down the cluster and reboot both servers.</p> <p>Failed to communicate with the server %2. Check if the Mirror Agent of the other server is running and the interconnect LAN is connected.</p> <p>Where %1, %2 is represented, the server name is displayed.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>
<p>Error: Failed to acquire the active status of the Hybrid disk %3 of the server %1 and server %2. Shut down the cluster and reboot both servers.</p>	<p>Failed to acquire the hybrid disk detail information of both servers. Shut down the cluster, and then restart the servers.</p> <p>Where %1, %2 is represented, the server name is displayed.</p> <p>Where %3 is represented, the hybrid resource name is displayed.</p>
<p>Error: Failed to get all server names. Check if the configuration file is correct and the Mirror Agent is operating normally.</p>	<p>Failed to acquire the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.</p>
<p>Error: The disk alias does not match the command.</p>	<p>The resource type of the specified resource name (mirror alias name) is invalid. Use clpmdstat for md resource, and clphdstat for hd resource.</p>
<p>Error: Invalid command name.</p>	<p>The command name is invalid. Do not change the file name of the clphdstat command.</p>
<p>Error: This server is not current server. Cannot perform this action.</p>	<p>This command cannot be executed because this server is not current server.</p>
<p>Error: Hybrid disk internal error.</p>	<p>An internal error occurred.</p>

## Example display after running the hybrid disk status display command

### ◆ Hybrid disk connect status display

When the --connect option is specified, the status of mirror connect that is used by hybrid disk resource is displayed.

Hybrid disk Name : hd1

```
[Server : server1]
192.168.0.1                : Using
```

```
[Server : server2]
192.168.0.2                : Using
```

Explanation of each item

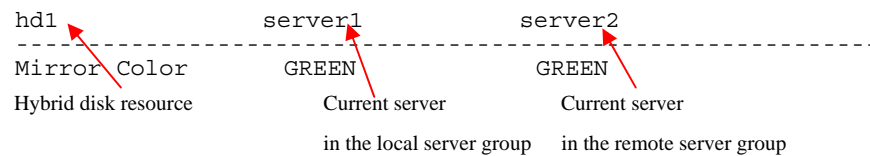
Item	Description										
Server Name	Name of the server										
IP Address	IP address specified by hybrid disk connect										
Status	<div>Status of mirror connect</div> <table> <tr> <th>Status</th><th>Description</th></tr> <tr> <td>Using</td><td>Being used</td></tr> <tr> <td>Free</td><td>Not used</td></tr> <tr> <td>Error</td><td>Error</td></tr> <tr> <td>--</td><td>Unknown</td></tr> </table>	Status	Description	Using	Being used	Free	Not used	Error	Error	--	Unknown
Status	Description										
Using	Being used										
Free	Not used										
Error	Error										
--	Unknown										

◆ Displaying the status of mirroring of hybrid disk resource

The status of mirroring of the specified hybrid disk resource is displayed by specifying the `--mirror` option.

- When the status of mirror disk resource is Normal:

Mirror Status: Normal



Explanation of each item

Item	Description	
Mirror Status	Mirroring status of hybrid disk resource	
	Status	Description
	Normal	Normal
	Recovering	Mirror is recovering
	Abnormal	Abnormal
	No Construction	Initial mirror construction is not done
Mirror Color	Status of hybrid disk on each server	
	Status	Description
	GREEN	Normal
	YELLOW	Mirror is recovering
	RED	Abnormal
	ORANGE	Suspension (The server having the latest cannot be determined.)
	GRAY	Being stopped, Unknown status
	BLACK	Initial mirror construction is not done, error found in cluster partition data, etc.
	BLUE	Both disks are active

- When the status of mirror disk resource is abnormal

Mirror Status: Abnormal

```

hd1                server1                server2
-----
Mirror Color       GREEN                  RED
Lastupdate Time    2004/02/24 15:41:07 --
Break Time         2004/02/24 15:40:38 --
Disk Error         OK                    OK
Difference Percent  1%                   0%

```

Explanation of each item

Item	Description								
Mirror Status	Status of mirror disk resource *1								
Mirror Color	Status of mirror disk on each server *1								
Last update Time	Last time when the data was updated on the server.  This is not displayed when the mirror disk status is unknown.								
Break Time	Time when mirror break has occurred  This is not displayed when the mirror disk status is unknown.								
Disk Error	Status of disk I/O <table border="1"> <thead> <tr> <th>Status</th><th>Description</th></tr> </thead> <tbody> <tr> <td>OK</td><td>Normal</td></tr> <tr> <td>ERROR</td><td>Error (No I/O)</td></tr> <tr> <td>--</td><td>Unknown</td></tr> </tbody> </table> This is not displayed when the mirror disk status is unknown.	Status	Description	OK	Normal	ERROR	Error (No I/O)	--	Unknown
Status	Description								
OK	Normal								
ERROR	Error (No I/O)								
--	Unknown								
Difference Percent	Percentage of differences in the data on each server.  This is not displayed when the mirror disk status is unknown.								

\*1 Refer to. "When the status of mirror disk resource is Normal:"

- During mirror recovery

Mirror Status: Recovering

hd1	server1	server2
-----	---------	---------

Mirror Color	YELLOW	YELLOW
--------------	--------	--------

Recovery Status	Value
-----------------	-------

Status:	Recovering
---------	------------

Direction: src	server1
dst	server2

Percent:	3%
----------	----

Used Time:	00:00:01
------------	----------

Remain Time:	00:00:32
--------------	----------

Iteration Times:	1/1
------------------	-----

Explanation of each item

Refer to “During mirror recovery” in Example display after running the mirror status display command (clpmdstat).

◆ Displaying active status of hybrid disk resource

Active status of the specified hybrid disk resource is displayed when the --active option is specified:

```
md1          server1          server2
-----
Active Status  Active          Inactive
  ^             ^               ^
  |             |               |
Hybrid disk resource  Current server name  Current server name
                        of local server      of the remote server group
```

Status of mirror partition device

See “During mirror recovery” in Example display after running the mirror status display command (clpmdstat).

◆ Displaying hybrid disk resource information

Configuration information of the specified hybrid disk resource is displayed when the --detail option is specified:

```
Hybrid Disk Name      : hd1
Sync Switch           : On
Sync Mode              : Sync
Diff Recovery          : --

[Server : server1]
NMP/Disk Size(MB)     : 2447/2447
DP Device              : /dev/sdb2
CP Device              : /dev/sdb1

[Server : server2]
NMP/Disk Size(MB)     : 2447/2447
DP Device              : /dev/sdb2
CP Device              : /dev/sdb1
```

Explanation of each item

Item	Description
Hybrid Name	Hybrid disk resource name
Sync Switch	Perform data synchronization
Sync Mode	Synchronization Mode
Server Name	Current server name
NMP/Disk Size(MB)	NMP: the smaller size of data partition of servers Disk Size: actual data partition size
DP Device	Data partition device name
CP Device	Cluster partition device name

## ◆ Displaying the list of hybrid disk resources

The list of hybrid disk resources is displayed when the --list option is specified:

```
[HybridDisk Option]
server1           : Installed
server2           : Installed
server3           : Installed

[Servers Which Can Be Started]
<hd1>
  [ServerGroup0 : server group1]
    *server1
    server2
  [ServerGroup1 : server group2]
    *server3
<hd2>
  [ServerGroup0 : server group1]
    server1
    *server2
  [ServerGroup1 : server group2]
    *server3
```

Explanation of each item

Item	Description
HybridDisk Option	License status of the Replicator DR
Servers Which Can Be Started	The server group of the hybrid disk resource and servers that can be started
*	Current server of each server group

# Hybrid disk resource operation command

**clpmdctrl**: the clpmdctrl command operates hybrid disk resources.

## Command line:

```
clphdctrl --active hybriddisk -alias
clphdctrl --active -nomount hybriddisk -alias
clphdctrl --active --force [-ro] hybriddisk -alias
clphdctrl --active --force -nomount hybriddisk -alias
clphdctrl --deactive hybriddisk -alias
clphdctrl --break hybriddisk -alias
clphdctrl --force recovery-source-servername hybriddisk -alias
clphdctrl --force hybriddisk -alias
clphdctrl --recovery hybriddisk -alias
clphdctrl --cancel hybriddisk -alias
clphdctrl --rwait [-timeout time [-rcancel]] hybriddisk -alias
clphdctrl --getreq
clphdctrl --setreq request-count
clphdctrl --sync hybriddisk -alias
clphdctrl --nosync hybriddisk -alias
clphdctrl --setcur [hybriddisk -alias]
```

## Note:

Do not use the --active, and --deactive options when the cluster daemon is started. If you use them, the data in file system can be corrupted. Do not use these options for the purposes other than those mentioned in Chapter 9, “Preparing to operate a cluster system” in the *Installation and Configuration Guide*.

Description	<p>This command activates, deactivates or forcibly activates hybrid disk resource and recovers or forcibly recovers mirror.</p> <p>This command disconnects a hybrid disk.</p> <p>This command displays and/or modifies the settings of maximum number of request queues.</p> <p>This command switches the synchronization status of the mirror data.</p> <p>This command acquires the current right of hybrid disk resource.</p>	
Option	--active	<p>Activates the hybrid disk resource on the local server.</p> <p>If the status of hybrid disk resource is normal, mirroring is performed.</p> <p>If the status of hybrid disk resource is not normal, mirroring will not be performed.</p> <p>When the --force option is specified, hybrid disk resource is activated forcibly. This command can be run on the server where mirroring is stopped.</p>
	--deactive	<p>Deactivates the activated hybrid disk resource on the local server.</p>

--break	<p>Disconnects the hybrid disk resources forcibly specified with <i>hybriddisk-alias</i> on the server where the command is run. The status of the hybrid disk resource on the server where the command is run becomes an error. The status of the hybrid disk resource on the server where the command is not run does not change.</p> <p>When a mirror is recovered, disconnection is cancelled.</p> <p>Hybrid disk data is not synchronized even when any data is written to a hybrid disk.</p>
--force	<p>Forcefully performs mirror recovery for the specified hybrid disk resource.</p> <p>If only <i>hybriddisk-alias</i> is specified, the status of the hybrid disk where the command is run becomes normal forcibly. Mirror resynchronization is not performed.</p> <p>If <i>recovery-source-servername</i> and <i>hybriddisk-alias</i> are specified, full mirror recovery is performed using <i>recovery-source-servername</i> as source data. The status of the hybrid disk becomes normal when the full mirror recovery completes.</p>
--recovery	<p>Performs either full mirror recovery or differential mirror recovery for the specified hybrid disk resource.</p> <p>Whether to perform full or differential mirror recovery is determined automatically.</p>
--cancel	<p>Cancels mirror recovery.</p>
--rwait	<p>Waits for the completion of the mirror recovery of the specified disk resource.</p>
-timeout	<p>Specifies the timeout period of mirror recovery completion (second). This option can be omitted.</p> <p>When this option is omitted, timeout is not executed and waits for the completion of mirror recovery.</p>
-rcancel	<p>Intermits mirror recovery when the timeout of waiting of mirror recovery completion occurred. This option can be set when -timeout option is set. When this option is omitted, the mirror recovery continues even after the timeout occurrence.</p>
--getreq	<p>Displays the current maximum number of request queues.</p>
--setreq	<p>Configures the maximum number of request queues.</p> <p>When the server shuts down, what you have configured here returns to the value set in the cluster configuration data. Use the Builder if you want to modify the cluster configuration data. See Chapter3, “Functions of the Builder” for details.</p> <p>The command is only effective on the server that runs the command.</p>
-nomount	<p>This option is used with the --active option.</p> <p>It allows access to hybrid partition device without mounting the file system.</p>

	--sync	<p>This option switches the operation to the mirror synchronization.</p> <p>When the hybrid disk resource name is not specified, the operation is switched to synchronizing the mirror data to all hybrid resources.</p>
	--nosync	<p>This option switched the operation to the one that does not synchronize the mirror data.</p> <p>When the hybrid disk resource name is not specified, the operation is switched to not performing the synchronization of the mirror data to all hybrid resources.</p> <p>However, the data updated to a disk during a mirror recovery is synchronized to a standby.</p> <p>The operation mode of the mirror is configured in the <b>Mirror Agent</b> tab by clicking the <b>Cluster Properties</b>.</p>
	--setcur	This option acquires the current right of hybrid disk resource specified by <i>hybriddisk-alias</i> on the server on which the command is executed.
<b>Parameter</b>	<i>recovery-source-servername</i>	Specify a server name of the copy source.
	<i>hybriddisk-alias</i>	Specify a hybrid disk resource name.
	<i>request-count</i>	Specify a maximum number of request queues. You can specify a number from 256 through 65535.
	<i>time</i>	Specifies the timeout period of mirror recovery completion (second).
<b>Return Value</b>	0	Success
	255 (-1)	Failure
	254 (-2)	Target disk is not configuring mirror, or the mirror configuring failed on the process. (Only when --rwait option is specified, including the case when mirror recovery is interrupted by -rcancel.)
	253 (-3)	Timeout of mirror recovery of target disk occurs (Only when --rwait -timeout option is specified)
<b>Remarks</b>	<p>request-count, which is displayed by specifying the --getreq option, is the same as "Max. Number of Request Queues" which is displayed by using the clpstat command.</p> <p><b># clpstat --cl --detail</b></p>	
<b>Notes</b>	<p>Run this command as root user.</p> <p>--active/--force(Forced mirror recovery) / --setcur can be executed on a server that has a current right or that can have a current right.</p> <p>You can execute --recovery or --force (full mirror recovery with recovery-source-servername specified) in the following condition.</p> <ul style="list-style-type: none"> <li>- The server of copy source has the current right or can have a current right.</li> <li>- The server of copy target has the current right or can have a current</li> </ul>	

right.

(Mirror recovery cannot be performed on the server without current right in the cluster where hybrid mirror disk resource is configured on the shared disk.)

```
--break /--cancel /--setreq/--sync /--nosync  
/--setreq can be executed on the server that has a current right.
```

For further information on the conditions for changing the current server by this command, see “List of operations to switch a current server.”

When performing forced mirror recovery only for the local server while the remote server is not running, specify the server that is forcefully mirror recovered as a copy source.

When performing mirror recovery again after mirror recovery failed, specify the same server you used last time for mirror recovery as a copy source.

To resume the forced mirror recovery that was suspended by selecting **Cancel**, use this command for forced mirror recovery.

In a cluster with more than three nodes, if the server where the command is run is not included in a startup server of a group including hybrid disk resources, this command results in error. Do not run this command if the server is not included in a startup server of a group.

**Example of  
command  
execution**

**Example 1:** When activating the hybrid disk resource hd1:

```
# clphdctrl --active hd1  
<hd1@server1>: active successfully
```

**Example 2:** When deactivating the hybrid disk resource md1:

```
# clphdctrl --deactive hd1  
<hd1@server1>: deactive successfully
```

**Example 3:** When disconnecting the hybrid disk resource hd1:

```
# clphdctrl --break hd1  
hd1: isolate successfully
```

**Example 4:** When the status of hybrid disks both servers is error, and you need to recover the operation that uses the resource hd1 (group name: failover1) as soon as possible:

```
# clphdctrl --force hd1  
The data of mirror disk in local server maybe is  
not latest.  
Do you still want to continue? (Y/N)  
hd1: Force recovery successful.  
  
# clpgrp -s failover1  
Command succeeded.
```

When **Auto Mirror Recovery** is selected, mirror recovery is performed at this timing. When **Auto Mirror Recovery** is cleared, run the following command.

```
# clphdctrl --recovery hd1
```

**Example 5:** When recovering mirroring of the hybrid disk resource hd1 :

```
# clphdctrl --recovery hd1
```

**Example 6:** When setting the maximum number of request queue to  
ExpressCluster X 2.1 for Linux Reference Guide

2048:

```
# clphdctrl --setreq 2048
```

current I/O request count <2048>

**Example 7:** When configure the setting that does not perform the data synchronization to the hybrid disk resource hd1:

```
# clphdctrl --nosync hd1
```

## List of operations to switch a current server

Current server is also switched when the following operations are performed with this command.

Hybrid disk status		Whether or not current server can be changed		Possible operation	
Server group 1	Server group 2	Server group 1	Server group 2	Server group 1	Server group 2
normal/inactive	normal/inactive	Yes	Yes	1	1
normal/ inactive	error/ inactive	Yes	Yes	1	1,3
normal/ active	error/ inactive	No	Yes	-	1,3
error/ inactive	error/ inactive	Yes	Yes	1, 2, 3	1, 2, 3
error/ inactive d	error/forcibly activated	Yes	No	2, 3	-
error/ inactive	Unknown	Yes	No	2, 3	-
pending/ inactive	pending/ inactive	Yes	Yes	1	1
pending/ inactive	Unknown	Yes	No	2	-

1	Recovering mirror (differential/entire data)
2	Forcefully recovering mirror on one server
3	Cancelling access restriction (Forcible activation)
4	Disconnecting a mirror disk

---

**Note:**

For the procedures on how to switch a current server when the operations like above are performed on the WebManager, see “Changing a current server (Only for hybrid disk resource) in Chapter 1 Functions of the WebManager.”

---

**Error Messages**

<b>Message</b>	<b>Cause/Solution</b>
Error: Log in as root.	Log on as root user.
Error: Failed to read the configuration file. Check if it exists or is configured properly.	Reading the configuration file has failed. Check to see if the configuration file exists and is configured correctly.
Error: Specified hybrid disk resource was not found. Specify a valid mirror disk resource name.	Locating the specified hybrid disk resource has failed. Specify a valid hybrid disk resource name.
Error: Invalid hybrid-alias. Specify a valid mirror disk resource name.	Specify a valid hybrid disk resource name.
Error: Failed to get the server name. Check if the configuration file is correct and the Mirror Agent is operating normally.	Acquiring the server name has failed. Check if configuration file is correct and the Mirror Agent is operating normally.
Error: Specified server name was not found. Check if the server name exists in the configuration file.	The specified server name was not found. Check to see if the entered server name exists in the configuration file.
Error: Invalid server name. Specify a valid server name.	Specify a valid sever name.
Error: Failed to communicate with other servers. Check if the Mirror Agent of the other server is operating normally and the mirror disk connect is connected.	Communicating with the remote server has failed. Check to see if the Mirror Agent of the remote server is operating and the mirror disk is connected.
Error: Failed to get the hybrid disk status. Check if the Mirror Agent on the local server is operating normally.	Acquiring the hybrid disk status has failed. Check to see if the Mirror Agent of the local server is operating normally.
Error: Failed to get the mirror index. Check if the Mirror Agent is operating normally.	Check to see if the Mirror Agent is operating normally.
Error: The status of hybrid disk resource of the local server is abnormal.	The hybrid disk resource of the local server has a problem.
Error: Specified hybrid disk resource is already active. Check active status of hybrid disk resource by running the following command: <code>clpmdstat --active &lt;alias&gt;</code>	The specified hybrid disk resource is already activated. Check the status of the hybrid disk resource using the following command.  <code>clpmdstat --active &lt;alias&gt;</code>
Error: A hardware error has occurred on the disk. Check the disk.	A hardware error has occurred on the disk. Check the disk.
Error: The sizes of data partition of the servers do not match.	Data partition sizes of both servers do not match.
Error: Specified hybrid disk is not active. Check the active status of hybrid disk resource.	The specified hybrid disk resource is not activated. Check the status of hybrid disk resource.
Error: There is no recovering hybrid disk resource.	There is no hybrid disk under mirror recovery process.
Error: Mirror hybrid resource is recovering. Wait until mirror recovery completes.	The hybrid disk resource is under mirror recovery process. Wait until mirror recovery is completed
Error: Failed to cancel the mirror recovery. The system may be highly loaded. Wait for a while and try again.	Stopping mirror recovery has failed. The system may be heavily loaded. Wait for a while and try again.

Message	Cause/Solution
Error: Performed mirror recovery to the hybrid disk resource that is not necessary to recover the mirror. Run the <code>clpmdctrl--force</code> command if you want to perform forced mirror recovery.	Mirror recovery has been performed on the hybrid disk resource that is in normal status and not requiring mirror recovery. To perform forced mirror recovery, use <code>"clpmdctrl --force."</code>
Error: Specification of the server that is copied from is incorrect. When executing mirror recovery again after a failure end of mirror recovery, specify the same server as the previous one.	The server specified for a copy source is invalid. When performing the mirror recovery again after the mirror recovery has failed, specify the same server that you specified last time for the failed mirror recovery as a copy source.
Error: Forced mirror recovery is required. Run the <code>clphdctrl --force</code> command to perform the recovery.	Forced mirror recovery is necessary. Use <code>"clphdctrl --force"</code> and perform forced mirror recovery.
Error: Server with old data is specified as the server which is copied from. Specify a correct recovery direction.	The server with old data is specified as a copy source. Specify a correct recovery direction.
Error: Failed to acquire mirror recovery status. Reboot the local server.	Acquiring the mirror recovery status has failed. Restart the local server.
Error: Both of the mirrors are not constructed. Initial mirror configuration of the hybrid disks by running the <code>clpmdctrl --force</code> command is necessary.	Initial mirror construction of hybrid disk is necessary. Construct initial mirror configuration using <code>"clphdctrl --force."</code>
Error: Initial mirror configuration of mirror disk of local server is necessary. Specify the other server as the one that is copied from by using the <code>clphdctrl --force</code> command to configure an initial mirror.	Initial mirror construction is necessary for the hybrid disk of the local server. Specify the remote server as a copy source and construct initial mirror using <code>"clphdctrl --force."</code>
Error: Initial mirror configuration of mirror disk of the other server is necessary. Specify the local server as the one that is copied from by using the <code>clphdctrl--force</code> command to configure an initial mirror.	Initial mirror construction is necessary for the hybrid disk of the remote server. Specify the local server as a copy source and construct initial mirror using <code>"clphdctrl --force."</code>
Error: Mirror flag error. Use <code>"clphdinit"</code> to construct the mirror. The status of cluster partition of the hybrid disk resource is abnormal. When the server with the error has the latest data, backup the data, initialize the cluster partition, and replace the same disk by using the same disk. If the error persists, change the disk to new one.	The cluster partition of the hybrid disk resource has a problem. When the server with error has the latest data, back up the data, initialize the cluster partition, and follow the same "disk replacement" steps using the same disk by referring to "Backup Procedure" and "Restoration Procedure" in Chapter 8 "Verifying Operation" in the <i>Installation and Configuration Guide</i> . If this occurs again, replace the disk with a new disk.
Error: Both local and remote mirrors are active. Shut down the cluster and execute forced mirror recovery after rebooting the server.	Both systems are active. Shut down the cluster and perform forced mirror recovery after reactivating the server.
Error: Mirror Agent is not running. Check if the Mirror Agent is active.	The Mirror Agent is not started up. Check to see if the Mirror Agent is running.
Error: System calls error. Failed to run the system command when active and/or inactive. Check if the search path is set to an environment variables.	Running the system command when active/inactive has failed. Check to see if a search path is set as an environmental variable.
Error: Failed to create a mount point. The disk space may not be sufficient.	Creating a mount point has failed. Disk space may be insufficient. Check it.

Message	Cause/Solution
Error: Timeout has occurred on active fsck. When it is not journaling file system, it may take time to run fsck if the size of data partition of hybrid disk is large. Set timeout of fsck longer by using the Builder.	fsck time-out has occurred. In case it is not the journaling file system, running fsck may take time when the data partition of the hybrid disk is large.  Set the longer time for the fsck time-out using the Builder.
Error: Timeout occurs at activation mount. Set mount timeout longer	Time-out has occurred at active mounting. Set the mounting time-out longer by using the Builder.
Error: Timeout occurs at deactivation mount. Set unmount timeout longer.	Time-out has occurred at inactive unmounting of the file system. Set the mount time-out period longer by using the Builder.
Error: fsck failed. Check if file system type of data partition does not match configuration file, fsck option is incorrect or partition is incorrect.	Running fsck has failed. Check to see if the file system type of the data partition matches to the configuration file, fsck option is valid, and partition is not destroyed.
Error: Failed to mount when active. The file system type of the data partition does not match the settings of the configuration file, or the partition may be corrupted.	Mounting during activation has failed. Check to see if the file system type of the data partition matches to the configuration file, fsck option is valid, and the partition is not destroyed.
Error: Failed to unmount when inactive. Check if the file system on the data partition is busy.	Unmount during deactivation has failed. Check to see if the file system on data partition is not busy.
Error: Hybrid disk resource is on process of activation. Execute after activation is completed.	The hybrid disk resource is in the process of activation. Try after activation is completed.
Error: Failed to perform forced mirror recovery or activate a single server. Check if any hardware error has occurred on the disk.	Performing forced recovery or activating a standalone server has failed. Check to see if any hardware error has occurred on the disk.
Error: Entered incorrect maximum number of request queues. Check the specifiable range.	Invalid maximum number of request queues is entered. Check the range of numbers that can be specified.
Error: Failed to set the maximum number of request queues. Reboot the local server.	Setting a maximum number of request queues has failed. Restart the local server.
Error: Failed to acquire the maximum number of request queues. Reboot the local server.	Acquiring a maximum number of request queues has failed. Restart the local server.
Hybrid disk resource was not found on local server. Cannot perform this action.	The hybrid disk resource was not defined on the local server. Cannot configure the maximum number of request queue. Check the status of the mirror disk resource.
Error: Failed to get the NMP path. Check if the Mirror Agent is operating normally. Reboot the local server.	Check to see if the Mirror Agent is operating normally. Restart the local server.
Error: Failed to acquire the mirror configuration information. Check if the Mirror Agent is operating normally.	Acquiring the mirror configuration information has failed. Check to see if the Mirror Agent is operating normally.

Message	Cause/Solution
Error: Failed to acquire the hybrid disk configuration information. Reboot the local server.	Acquiring hybrid disk configuration data has failed. Restart the local server.
Error: Failed to acquire the hybrid disk configuration information of both local and remote servers. Shut down the cluster and reboot both servers	Acquiring hybrid disk configuration data of both servers has failed. Shut down the cluster and restart both servers.
Error: Failed to get the number of bits of the bitmap due to the errors occurred when acquiring the mirror difference information of the cluster partition. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see the Reference Guide.	Acquiring the information of mirror differences on the cluster partition has failed. Shut down the cluster. If the error occurs again, replace the disk. For information on how to replace a disk, refer to the <i>Reference Guide</i> .
Error: The number of the bits in the bitmap is invalid. The mirror difference information of the cluster partition is invalid. Shut down the cluster. If it fails again, replace the disk. For procedure to replace the disk, see Reference Guide.	The information of the mirror differences in the cluster partition is invalid. Shut down the cluster. If the error occurs again, replace the disk. For information on how to replace a disk, refer to the <i>Reference Guide</i> .
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the information of mirror differences on the local server has failed. Restart the local server.
Error: Failed to read the mirror difference information of the local server. Reboot the local server.	Reading the information of the mirror differences on the remote server has failed. Restart the remote server.
Error: Failed to get the bitmap information of the local server due to the errors occurred when acquiring the mirror difference information of the local server. Reboot the local server.	Acquiring the information of the mirror differences on the local server has failed. Restart the local server.
Error: Failed to read the disk space. Shut down the cluster and reboot the server	Acquiring the disk space has failed. Shut down the cluster and restart the server.
Error: Failed to acquire the disk space of the other server. Shut down the cluster and reboot both servers.	Acquiring the disk space of the remote server has failed. Shut down the cluster and restart the server.
Error: Setting of cluster partition failed. Restart local server.	Configuring the cluster partition has failed. Restart the local server.
Error: Error occurred on the settings of the hybrid disk resource. Reboot the local server.	Error occurred in the status settings of hybrid disk resource. Restart the local server.
Error: Failed to create a thread. Reboot the local server.	Creating thread has failed. Restart the local server.
Error: Internal error. Failed to create process. Reboot the local server.	Creating the process has failed. Restart the local server.
Error: Failed to acquire semaphore. Reboot the local server.	Acquiring semaphore has failed. Restart the local server.
Error: A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory has failed. Restart the local server.
Error: Mirror driver of the local server is not loaded. Confirm kernel version.	The mirror driver of the local server is not loaded. Check the kernel version.

Message	Cause/Solution
Error: Mirror recovery cannot be executed as NMP size of mirror recovery destination is smaller than the size of where the mirror is recovered from. Change the recovery destination and try again.	Mirror recovery cannot be performed because NMP size of recovery destination is smaller than the recovery source. Change the destination and try again.
Error: NMP size of local server is bigger, cannot active. Initial mirror configuration is not completed. Execute mirror recovery from server of smaller NMP size to that of larger one.	Initial mirror configuration is not completed. Perform forced mirror recovery from the server whose NMP size is smaller to the larger one.
Local and remote recovery mode do not match. Reboot a server other than the master server to keep the same contents of configuration file among servers. Note that a failover may occur at server reboot.	<p>The both servers are different on the recovery mode. The recovery is not performed.</p> <p>Restart the servers other than master server to make the information file be the same among servers.</p> <p>Note that a failover may occur at server reboot.</p>
Failed to get remote recovery mode. Recovery will not be interrupted. Check the communication status of mirror connect.	Failed to get remote recovery mode. Recovery will not be interrupted. Check the communication status of mirror connect.
Failed to get local recovery mode. Recovery will not be interrupted. Note that a failover may occur at server reboot.	Failed to get local recovery mode. Recovery will not be interrupted. Restart the local server. Note that a failover may occur when the server is restarted.
Local or remote mirror is forced activated. Cannot to perform this action.	Hybrid disk is forcibly activated. Cannot perform the mirror recovery. Check the status of local or remote mirror.
The recovery destination of hybrid disk is activated. Cannot perform this action.	The recovery destination of mirror disk is activated. Cannot perform the mirror recovery. Check the status of the mirror disk.
Hybrid disk connection is disconnected. Cannot perform this action.	The communication status of hybrid disk connect is error. Cannot perform the mirror recovery. Check the status of the mirror disk connect.
Failed to get hybrid disk list and failed to set all NMP sync flag. Reboot the local server. Note that a failover may occur at server reboot.	<p>The setting of synchronizing data for all the hybrid disks failed since acquiring the hybrid disk list failed.</p> <p>Reboot the local server. Note that a failover may occur at server reboot.</p>
Failed to get hybrid disk list and failed to set all NMP sync flag to OFF. Reboot the local server. Note that a failover may occur at server reboot.	<p>The setting of not to synchronize data for all the hybrid disks failed since acquiring the hybrid disk list failed.</p> <p>Reboot the local server. Note that a failover may occur at server reboot.</p>
sync flag is successfully set. <hybriddisk-alias> is a mirror resource name.	The setting of not to synchronize data is successfully configured. <hybriddisk-alias> is the name of the hybrid disk resource.
sync flag is successfully set to OFF. <mirrordisk-alias> is a mirror resource name.	The setting of not to synchronize data is successfully completed. <hybriddisk-alias> is a name of the hybrid disk resource.

Message	Cause/Solution
Failed to set sync flag on both servers. Shut down a cluster and reboot server.	The setting of synchronizing data failed on the both servers. Shut down the cluster and restart it.
Failed to set sync flag to OFF on both servers. Shut down a cluster and reboot server.	The setting of not to synchronize data failed on the both servers. Shut down the cluster and restart it.
Succeeded to set sync flag on local server and failed on remote server. Check the communication status of mirror connect.	The setting of synchronizing data succeeded on the local server, yet failed on the other server. Check the communication status of the mirror connect.
Succeeded to set sync flag to OFF on local server and failed on remote server. Check the communication status of mirror connect.	The setting of not to synchronize data succeeded on the local server, yet failed on the other server. Check the communication status of the mirror connect.
Succeeded to set sync flag on remote server and failed on local server. Note that a failover may occur at server reboot.	The setting of synchronizing data failed on the local server, yet succeeded in the other server. Restart the local server. Note that a failover may occur when the server is restarted.
Succeeded to set sync flag to OFF on remote server and failed on local server. Note that a failover may occur at server reboot.	The setting of not to synchronize data failed on the local server, yet succeeded in the other server. Restart the local server. Note that a failover may occur when the server is restarted.
Cannot change the settings of sync status during mirror recovery. Change the settings after mirror recovery is completed.	The setting of synchronizing data cannot be changed during mirror recovery. Change the settings after mirror recovery is completed.
Hybrid disk resource was not found on local server. Cannot perform this action.	The hybrid disk resource is not defined on the local server. The setting of synchronizing data cannot be changed.
The status of the hybrid disk does not satisfy the conditions to perform this action. A probable cause: 1. Local hybrid disk is not initialized or is already force activated. 2. Local hybrid disk is not RED or remote is GREEN or remote is already activated.	The status of mirror is invalid. Cannot perform a forced recovery.
The data of hybrid disk in the local server may not be the latest. Do you still want to continue? (Y/N)	The data of the local server may not be the latest. Cannot check the status of hybrid disk on the other server.
Forced recovery has completed successfully.	The forced mirror recovery has successfully completed.
The status of hybrid disk in local server is not GREEN or is already activated. Cannot perform this action.	The status of mirror is invalid. Cannot disconnect a mirror.
Failed to set an isolate flag in the local server.	Cannot update the flag for mirror disconnect.
Isolated completed successfully.	The mirror disconnect is successfully completed.
The status of the hybrid disk does not satisfy the conditions to perform this action. A probable cause: 1. Hybrid disk is not initialized or is not RED. 2. Hybrid disk is already activated.	The status of mirror is invalid. Cannot perform the forced activation.

Message	Cause/Solution
sync flag of %1 is successfully set to ON.	The data synchronization is set to on.  A name of the mirror resource is displayed where %1 is represented.
Failed to set sync flag of %1 on both servers. Shut down the cluster and reboot server.	Failed to set the data synchronization flag on the both servers.  A name of the mirror resource is displayed where %1 is represented.
%3: Succeeded to set sync flag ON on %1 Failed to set sync flag ON on %2 Check the communication status of mirror connect.	Failed to set the data synchronization flag on either of the servers. Check if the mirror disk connect can properly communicate.  A name of the successfully-set server is displayed where %1 is represented.  A name of the faultly-set server is displayed where %2 is represented.  A name of the mirror resource is displayed where %3 is represented.
%1: Cannot change the settings of sync status during mirror recovery. Change the settings after mirror recovery is completed.	Cannot change the data synchronization flag during mirror recovery. Change the settings after mirror recovery is completed.  A name of the mirror resource is displayed where %1 is represented.
sync flag of %1 is successfully set to OFF.	The mirror synchronization is set to off for %1.  A name of the mirror resource is displayed where %1 is represented.
%3: Succeeded to set sync flag OFF on %1 Failed to set sync flag OFF on %2 Check the communication status of mirror connect.	Failed to set the data synchronization flag on either server. Check if the mirror disk connect can normally communicate.  A name of the successfully-set server is displayed where %1 is represented.  A name of the faultly-set server is displayed where %2 is represented.  A name of the mirror resource is displayed where %3 is represented.
The specified hybrid disk is not defined on this server.	The specified hybrid disk is not defined on the local server.
Failed to acquire the path of mirror device. Check if the Mirror Agent is operating normally. Reboot the local server.	Failed to acquire the device name of the mirror disk. Check if the mirror agent is running.
The disk alias does not match the command.	The resource type of specified resource name (mirror alias name) is invalid. Use clpmdctrl for md resource, clphdctrl for hd resource.
Invalid command name.	The command name is invalid. Do not change the file name of clphdctrl command.
There is an error when the server gets current priority.	An error has occurred when the server acquired the current priority.
Data synchronizing. Cannot perform this action.	This action cannot be performed on the data synchronization.

Message	Cause/Solution
The other server is already active. Cannot perform this action.	This action cannot be performed because the resource is activated on the other server.
Cannot judge which side has the nearest data. Cannot perform this action. Reboot or execute force recovery.	Because which server has the latest data cannot be determined, this action cannot be performed. Perform the Forced Mirror Recovery.
Failed to get host name.	Acquiring the server name has failed.
This server is not current server. Cannot perform this action.	This command cannot be performed because the specified server is not the current server.
Hybrid disk internal error.	An internal error has occurred.
The current server is being forced to activated, cannot release current right.	The current priority cannot be released while the resource is activated on the server with the current priority.
The current server is changing. Cannot perform this action.	This command cannot be performed because the current priority is being shifted from the current server.
<%1>: mirror broken	<p>The status of mirror is invalid. Target disk is not configuring mirror, or the mirror configuring failed on the process.</p> <p>A name of the mirror resource is displayed where %1 is represented.</p>
<%1>: recovery timeout	<p>Mirror recovery timed out. Check if the specified timeout period is appropriate, or if the disk I/O or communication delay is not occurring due to heavy loads.</p> <p>A name of the mirror resource is displayed where %1 is represented.</p>

# Initializing hybrid disks (clphdinit command)

**clphdinit:** the clpmdinit command initializes a hybrid disk.

**Command line:**

```
clphdinit --create normal [hybriddisk-alias]
clphdinit --create quick [hybriddisk-alias]
clphdinit --create force [hybriddisk-alias]
```

---

**Caution:**

Generally you do not need to run this command when constructing or operating a cluster. You should exercise caution when you use this command because the partition used for the data will be initialized.

---

<b>Description</b>	<p>This command initializes the cluster partition of a hybrid disk resource.</p> <p>This command creates a file system on the data partition of a hybrid disk resource.</p>	
<b>Option</b>	--create normal	<p>Initializes a cluster partition and creates a file system of the data partition, if necessary.<sup>2</sup></p> <p>The necessity is determined by the magic number set by ExpressCluster on the cluster partition.</p> <p>Generally, it is not necessary to run the command with this option.</p>
	--create quick	<p>Initializes the cluster partition, if necessary.</p> <p>Whether or not it is necessary to initialize the cluster partition is determined by the magic number set by ExpressCluster on the cluster partition.</p> <p>Generally, it is not necessary to run the command with this option.</p>
	--create force	<p>Forcefully initializes the cluster partition and creates a file system of the data partition.<sup>2</sup></p> <p>This option is used when using the disk that was once used as a hybrid disk of ExpressCluster again.</p>
<b>Parameter</b>	<i>hybriddisk-alias</i>	<p>Specifies a hybrid disk resource name.</p> <p>If this parameter is not specified, the process is performed on all hybrid disk resources.</p>
<b>Return Value</b>	0	Success
	Other than 0	Failure

---

<sup>2</sup> Unless “Execute initial mkfs” is selected in the cluster configuration data, the file system will not be created.

**Notes**

You should exercise caution when you run this command because the hybrid disk will be initialized.

When there are multiple servers in one server group, execute the command on one of the servers to initialize a cluster partition and create a file system of data partition.

Run this command as root user.

Do not run other commands, until this command is returned.

When running this command, make sure that the Hybrid Agent is stopped in all servers in the cluster. To check the Hybrid Agent is stopped on all servers, run the following command:

```
# /etc/init.d/clusterpro_md status
```

In a cluster with more than three nodes, if the server where the command is run is not included in a startup server of a group including hybrid disk resources, this command results in error. Do not run this command if the server is not included in a startup server of a group.

**Example of command execution**

**Example 1:** When forcefully initializing the cluster partition because the disk to be used for the hybrid disk resource hd1 was once used as a hybrid disk of ExpressCluster:

```
# clphdinit --create force hd1
```

mirror info will be set as default

the main handle on initializing hybrid disk <hd1> success

initializing hybrid disk complete

### Error Messages

Message	Causes/Solution
Log in as root.	Log on as root user.
Stop the Mirror Agent.	Stop the mirror agent.
The clphdinit command is currently running. Execute after it is completed.	This command is running. Run after it is completed.
The clphdchng command is currently running. Execute after it is completed	The clphdchng command is running. Run after it is completed.
Invalid hybrid-alias. Specify a valid hybrid disk resource name.	Specify a valid hybrid disk resource name.
The mirror hybrid disk resource was not found. Set the hybrid disk resource properly.	The hybrid disk resource was not found. Set a hybrid disk resource properly.
Specified hybrid disk resource <%1> was not found. Specify a valid hybrid disk resource name.	The specified hybrid disk resource was not found. Specify a valid mirror disk resource name.
The partition does not exist. Check if the cluster partition of specified hybrid disk resource exists (<%1>).	Check to see if the specified cluster partition of the hybrid disk resource exists.
Check if the cluster partition size of specified hybrid disk resource is larger than 10MB. <%1>	Check to see if the cluster partition size of the specified hybrid disk resource is 10 MB or larger.
Internal error (open error <%1>). The cluster partition of the hybrid disk resource may not exist or the OS resource may be insufficient.	Check to see if the cluster partition of the specified hybrid disk resource exists or OS resource is sufficient.
Internal error (<%1> cluster partition: unknown error). Failed to initialize the cluster partition. Check if any hardware error has occurred on the disk.	Initializing the cluster partition has failed. Check to see if there is any hardware error on the disk.
Internal error (<%1> cluster partition: %2). Check if the size of cluster partition is sufficient and if there is any hardware error on the desk.	Setting a cluster partition has failed. Check to see if the cluster partition space is sufficient and a hardware error has not occurred on the disk.
The data partition does not exist (<%1>). Check if the data partition of the specified hybrid disk resource exists. Data Partition is: %2	Check to see if the data partition of the specified hybrid disk resource exists.
Failed to initialize the cluster partition <%1>. The data partition of the specified hybrid disk resource may not exist, hardware error may have occurred on the disk, or specified file system may not be supported by OS. Check them. mirror<%2>: fstype<%3>	Initializing the data partition has failed. Check to see if the data partition of the specified hybrid disk resource exists, hardware error has not occurred on the disk and the specified file system is supported by OS.
Unknown error occurred when formatting mirror-disk<%1>. The data partition of the specified hybrid disk resource may not exist or hardware error may have occurred on the disk. Check them.	Initializing the data partition has failed. Check to see if the data partition of the specified hybrid disk resource exists and a hardware error has not occurred on the disk.

Message	Causes/Solution
Internal error (Failed to open the data partition:<%1>). Failed to initialize the data partition. The data partition of the specified hybrid disk resource may not exist or OS resource may not be sufficient. Data Partition is: %2	Initializing the data partition has failed. Check to see if the data partition of the specified hybrid disk resource exists and OS resource is sufficient.
Internal error (data partition check error---<%1>). Failed to initialize the data partition. Check if any hardware error has occurred on the disk.	Initializing the data partition has failed. Check to see if any hardware error has not occurred on the disk.
Failed to acquire hybrid disk list information. Reboot the local server.	Acquiring a list of hybrid disk has failed. Restart the local server.
Internal error (PID write failed). Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Internal error (initialization failed) Failed to read the configuration file, or failed to initialize the shared memory or semaphore. Check if the file is configured properly and reboot the local server.	Reading the configuration file, initialize the shared memory or semaphore has failed. Check to see if configuration file is correct, and restart the local server.
Internal error (termination failed) Failed to release the shared memory. Check if any system error has occurred while running the program.	Freeing up the shared memory has failed. Check to see if any system error has not occurred while running the program.
A malloc error. Failed to reserve the memory space. Reboot the local server.	Reserving memory space has failed. Restart the local server.
An error has occurred when the data partition is set to writable mode. <Device:%1>. Reboot the local server.	An error occurred when the data partition was set to the writable mode. Restart the local server.
An error has occurred when the data partition is set to read-only mode.<Device:%1>. Reboot the local server.	An error occurred when the data partition was set to the read-only mode. Restart the local server.
Cluster Partition or Data Partition does not exist.	No cluster partition or data partition exists. Check if a partition is created.
Failed to upgrade the cluster partition of <%s>.	Upgrading a cluster partition failed. Check if there is an error on the disk.
Specified hybrid disk resource was not found on local server. Cannot perform this action.	The hybrid disk resource is not defined on the local server. Cannot perform initialization. Check the status of the mirror disk resource.
The disk alias does not match the command.	The resource type of the specified resource name (mirror alias name) is invalid. Use clpmdinit for md resource, clphdinit for hd resource.
Invalid command name.	The command name is invalid. Do not change the file name of clphdinit command.

## Message output command

**clplogcmd:** the clplogcmd command registers the specified text with syslog and alert, or reports the text by mail.

**Command line:**

```
clplogcmd -m message [--syslog] [--alert] [--mail] [-i eventID] [-l level]
```

**Note:**

Generally, it is not necessary to run this command for constructing or operating the cluster. You need to write the command in the exec resource script.

<b>Description</b>	Write this command in the exec resource script and output messages you want to send to the destination.	
<b>Options</b>	<b>-m <i>message</i></b>	Specifies text to be produced in message. This option cannot be omitted. The maximum size of message is 511 bytes. (When syslog is specified as an output destination, the maximum size is 485 bytes.) The text exceeding the maximum size will not be shown.  You may use alphabets, numbers, and symbols. See below (*) for notes on them.
	<b>--syslog</b>	Specify the output destination from syslog, alert, and mail. (Multiple destinations can be specified.)
	<b>--alert</b>	This parameter can be omitted. The syslog and alert will be the output destinations when the parameter is omitted.)
	<b>--mail</b>	See “Directory structure of ExpressCluster” in Chapter 10, “The system maintenance information” for more information on output destinations.
	<b>-i <i>eventID</i></b>	Specify event ID. The maximum value of event ID is 10000.  This parameter can be omitted. The default value 1 is set when the parameter is omitted.
<b>Return Value</b>	<b>-l <i>level</i></b>	Select a level of alert output from ERR, WARN, or INFO. The icon on the alert view of the WebManager is determined according to the level you select here.  This parameter can be omitted. The default value INFO is set when the parameter is omitted.  See “Checking alerts using the WebManager” for more information.
	<b>0</b>	Success
	<b>Other than 0</b>	Failure
<b>Notes</b>	Run this command as root user.  When mail is specified as the output destination, you need to make the settings to send mails by using the mail command.	

**Example of command execution**

**Example 1:** When specifying only message (output destinations are syslog and alert):


When the following is written in the exec resource script, text is produced in syslog and alert.

```
clplogcmd -m test1.
```

The following log is the log output in syslog:

```
Sep 1 14:00:00 server1 expresscls: <type: logcmd><event: 1> test1
```

The following is displayed in the alert view of the WebManager:

	Receive Time	Time ▼	Server Name	Module Name	Event ID	Message
	2004/09/01 14:00:00	2004/09/01 14:00:00	server1	logcmd	1	test1

**Example 2:** When specifying message, output destination, event ID, and level (output destination is mail):

When the following is written in the exec resource script, the text is sent to the mail address set in the **Cluster Properties**. See “Alert Service tab” for more information on the mail address settings.

```
clplogcmd -m test2 --mail -i 100 -l ERR
```

The following information is sent to the mail destination:

```
Message:test2
Type:  logcmd
ID:    100
Host:  server1
Date:  2004/09/01 14:00:00
```

**\* Notes on using symbols in text:**

The symbols below must be enclosed in double quotes (“ ”):

```
# & ' ( ) ~ | ; : * < > , .
```

(For example, if you specify “#” in the message, # is produced.)

The symbols below must have a backslash \ in the beginning:

```
\ ! " & ' ( ) ~ | ; : * < > , .
```

(For example, if you specify \\ in the message, \ is produced.)

The symbol that must be enclosed in double quotes (“ ”) and have a backslash \ in the beginning:

(For example, if you specify “\” in the message, ` will be produced.)

- ◆ When there is a space in text, it must be placed in enclosed in double quotes (“ ”).
- ◆ The symbol % cannot be used in text.

# Controlling monitor resources (clpmonctrl command)

**clpmonctrl:** the clpmonctrl command controls the monitor resources.

## Command line:

```
clpmonctrl -s [-m resource_name ...] [-w wait_time]
```

```
clpmonctrl -r [-m resource_name ...] [-w wait_time]
```

## Note:

This command must be run on all servers that control monitoring because the command controls the monitor resources on a single server.

It is recommended to use the WebManager if you control monitor resources on all the servers in a cluster.

<b>Description</b>	This <b>command</b> suspends and/or resumes monitor resources on a single server.	
<b>Option</b>	-s	Suspends monitoring
	-r	Resumes monitoring
	-m	Specifies one or more monitor resources to be controlled.
	<i>resource_name...</i>	This option can be omitted. All monitor resources are controlled when the option is omitted.
	-w <i>wait_time</i>	Waits for control monitoring on a monitor resource basis. (in seconds)  This option can be omitted. The default value 5 is set when the option is omitted.
<b>Return Value</b>	0	Normal termination
	1	Privilege for execution is invalid
	2	The option is invalid
	3	Initialization error
	4	The cluster configuration data is invalid
	5	Monitor resource is not registered.
	6	The specified monitor resource is invalid
	10	The cluster is not activated
	11	The cluster daemon is suspended
	12	Waiting for cluster synchronization
	90	Monitoring control wait time-out
	128	Duplicated activation
	255	Other internal error

**Example of Monitor resource configuration command execution**

```
# clpstat -m
=== MONITOR RESOURCE STATUS ===
Cluster : cluster
      *server0 : server1
      server1 : server2

Monitor0 [ipw1 :Normal]
-----
server0 [o] : Online
server1 [o] : Online

Monitor1 [miiw1: Normal]
-----
server0 [o] : Online
server1 [o] : Online

Monitor2 [userw : Normal]
-----
server0 [o] : Online
server1 [o] : Online
=====
```

In the examples 1 below, the monitor resources of the server1 are controlled.

To control the monitor resources of the server2, run this command in the server2.

**Example 1:** When suspending all monitor resources:

```
# clpmonctrl -s
Command succeeded.
# clpstat -m
=== MONITOR RESOURCE STATUS ===
Cluster : cluster
      *server0 : server1
      server1 : server2

Monitor0 [ipw1 : Warning]
-----
server0 [o] : Suspend
server1 [o] : Online

Monitor1 [miiw1: Warning]
-----
server0 [o] : Suspend
server1 [o] : Online

Monitor2 [userw : Warning]
-----
server0 [o] : Suspend
server1 [o] : Online
=====
```

**Example 2:** When resuming all monitor resources:

```
# clpmonctrl -r
Command succeeded.
# clpstat -m
=== MONITOR RESOURCE STATUS ===
Cluster : cluster
*server0 : server1
server1 : server2

[Monitor0 [ipw1 : Normal]]
-----
server0 [o] : Online
server1 [o] : Online

[Monitor1 [miiw1: Normal]]
-----
server0 [o] : Online
server1 [o] : Online

[Monitor2 [userw : Normal]]
-----
server0 [o] : Online
server1 [o] : Online
=====
```

**Example 3:** When suspending only the IP monitor resource (ipw1):

```
# clpmonctrl -s -m ipw1
Command succeeded.
# clpstat -m
=== MONITOR RESOURCE STATUS ===
Cluster : cluster
*server0 : server1
server1 : server2

[Monitor0 [ipw1 : Warning]]
-----
server0 [o] : Suspend
server1 [o] : Online

Monitor1 [miiw1: Normal]
-----
server0 [o] : Online
server1 [o] : Online

Monitor2 [userw : Normal]
-----
server0 [o] : Online
server1 [o] : Online
=====
```

**Example 4:** When resuming only the IP monitor resource (ipw1):

```
# clpmonctrl -r -m ipw1
Command succeeded.
# clpstat -m
=== MONITOR RESOURCE STATUS ===
      Cluster : cluster
      *server0 : server1
      server1 : server2

      Monitor0 [ipw1 : Normal]
      -----
      server0[o] : Online
      server1[o] : Online
      -----
      Monitor1 [miiw1: Normal]
      -----
      server0[o] : Online
      server1[o] : Online
      -----
      Monitor2 [userw : Normal]
      -----
      server0[o] : Online
      server1[o] : Online
      =====
```

**Remarks** If you suspend a monitor resource that is already suspended or resume that is already resumed, this command terminates successfully without changing the status of the monitor resource.

**Notes** Run this command as root user.

Check the status of monitor resource by using the status display command or WebManager.

Before you run this command, use the clpstat command or WebManager to verify that the status of monitor resources is in either “Online” or “Suspend.”

When the exec resource is deactivated, a PID monitor resource cannot detect errors if the PID monitor resource has been suspended and is now resumed.

**Error Messages**

Message	Causes/Solution
Command succeeded.	The command ran successfully.
Log in as root.	You are not authorized to run this command. Log on as root user.
Initialization error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Invalid cluster configuration data. Check it by using the Builder.	The cluster configuration data is invalid. Check the cluster configuration data by using the Builder.
Monitor resource is not registered.	The monitor resource is not registered.
Specified monitor resource is not registered. Check the cluster configuration information by using the Builder.	The specified monitor resource is not registered. Check the cluster configuration data by using the Builder.
The cluster has been stopped. Check the active status of the cluster daemon by using the command such as ps command.	The cluster has been stopped. Check the activation status of the cluster daemon by using a command such as ps command.
The cluster has been suspended. The cluster daemon has been suspended. Check activation status of the cluster daemon by using a command such as the ps command.	The cluster daemon has been suspended. Check the activation status of the cluster daemon by using a command such as ps command.
Waiting for synchronization of the cluster. The cluster is waiting for synchronization. Wait for a while and try again.	Synchronization of the cluster is awaited. Try again after cluster synchronization is completed.
Monitor %1 was unregistered, ignored. The specified monitor resources %1 is not registered, but continue processing. Check the cluster configuration data by using the Builder.	There is an unregistered monitor resource in the specified monitor resources but it is ignored and the process is continued Check the cluster configuration data by using the Builder.  %1: Monitor resource name
Monitor %1 denied control permission, ignored. but continue processing.	The specified monitor resources contain the monitor resource which cannot be controlled, but it does not affect the process.  %1: Monitor resource name
This command is already run.	The command is already running. Check the running status by using a command such as ps command.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Controlling group resources (clprsc command)

**clprsc:** the clprsc command controls group resources

**Command line:**

```
clprsc -s resource_name [-h hostname] [-f]
```

```
clprsc -t resource_name [-h hostname] [-f]
```

**Description** This command starts and stops group resources.

<b>Option</b>	-s	Starts group resources.
	-t	Stops group resources.
	-h	Requests processing to the server specified by the hostname.  When this option is skipped, request for processing is made to the following servers. <ul style="list-style-type: none"><li>• When the group is offline, the command execution server (local server) .</li><li>• When the group is online, the server where group is activated.</li></ul>
	-f	When the group resource is online, all group resources that the specified group resource depends starts up.  When the group resource is offline, all group resources that the specified group resource depends stop.

<b>Return Value</b>	0	success
	Other than 0	failure

**Example** Group resource configuration

```
# clpstat
===== CLUSTER STATUS =====
Cluster : cluster
<server>
  *server1 .....: Online
    lanhb1           : Normal
    lanhb2           : Normal
    pingnp1          : Normal
  server2.....: Online
    lanhb1           : Normal
    lanhb2           : Normal
    pingnp1          : Normal
<group>
  ManagementGroup .....: Online
    current           : server1
```

```

ManagementIP : Online
failover1 .....: Online
  current : server1
  fip1 : Online
  md1 : Online
  exec1 : Online
failover2 .....: Online
  current : server2
  fip2 : Online
  md2 : Online
  exec2 : Online
<monitor>
  ipw1 : Normal
  mdnw1 : Normal
  mdnw2 : Normal
  mdw1 : Normal
  mdw2 : Normal

```

**Example 1:** When stopping the resource (fip1) of the group (failover 1)

```
# clprsc -t fip1
```

Command succeeded.

```
# clpstat
```

```
===== CLUSTER STATUS =====
```

```
<abbreviation>
```

```
<group>
```

```

ManagementGroup .....: Online
  current : server1
  ManagementIP : Online
failover1 .....: Online
  current : server1
  fip1 : Offline
  md1 : Online
  exec1 : Online
failover2 .....: Online
  current : server2
  fip2 : Online
  md2 : Online
  exec2 : Online

```

```
<abbreviation>
```

**Example 2:** When starting the resource (fip1) of the group(failover 1)

```
# clprsc -s fip1
Command succeeded.
# clpstat
===== CLUSTER STATUS =====
<Abbreviation>
<group>
  ManagementGroup .....: Online
    current                : server1
    ManagementIP           : Online
  failover1 .....: Online
    current                : server1
    fip1                   : Online
    md1                    : Online
    exec1                   : Online
  failover2 .....: Online
    current                : server2
    fip2                    : Online
    md2                     : Online
    exec2                   : Online
<Abbreviation>
```

- Notes**
- Run this command as a user with root privileges.
  - Check the status of the group resources by the status display or the WebManager.
  - When there is an active group resource in the group, the group resources that are offline cannot be started on another server.

#### Error Messages

Message	Causes/Solution
Log in as Administrator.	Run this command as a user with Administrator privileges.
Invalid cluster configuration data. Check it by using the Builder.	The cluster construction information is not correct. Check the cluster construction information by Builder.
Invalid option.	Specify a correct option.
Could not connect server. Check if the cluster service is active.	Check if the ExpressCluster is activated.
Invalid server status. Check if the cluster service is active.	Check if the ExpressCluster is activated.
Server is not active. Check if the cluster service is active.	Check if the ExpressCluster is activated.
Invalid server name. Specify a valid server name in the cluster.	Specify a correct server name in the cluster.
Connection was lost. Check if there is a server where the cluster service is stopped in the cluster.	Check if there is any server with ExpressCluster service stopped in the cluster,

Message	Causes/Solution
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set the longer timeout.	Timeout has occurred in internal communication in the ExpressCluster.  Set the internal communication timeout longer if this error occurs frequently.
The group resource is busy. Try again later.	Because the group resource is in the process of starting or stopping, wait for a while and try again.
An error occurred on group resource. Check the status of group resource.	Check the group resource status by using the WebManager or the clpstat command.
Could not start the group resource. Try it again after the other server is started, or after the Wait Synchronization time is timed out.	Wait till the other server starts or the wait time times out, then start the group resources.
No operable group resource exists in the server.	Check there is a processable group resource on the specified server,.
The group resource has already been started on the local server.	Check the group resource status by using the WebManager or clpstat command.
The group resource has already been started on the other server.	Check the group resource status by using the WebManager or clpstat command.  Stop the group to start the group resources on the local server.
The group resource has already been stopped.	Check the group resource status by using the WebManager or clpstat command.
Failed to start group resource. Check the status of group resource.	Check the group resource status by using the WebManager or clpstat command.
Failed to stop resource. Check the status of group resource.	Check the group resource status by using the WebManager or clpstat command.
Depended resource is not offline. Check the status of resource.	Because the status of the depended group resource is not offline, the group resource cannot be stopped. Stop the depended group resource or specify the -f option.
Depending resource is not online. Check the status of resource.	Because the status of the depended group is not online, the group resource cannot be started. Start the depended group resource or specify the -f option.
Invalid group resource name. Specify a valid group resource name in the cluster.	The group resource is not registered.
Internal error. Check if memory or OS resources are sufficient.	Not enough memory space or OS resource. Check if there is enough space.

## Reboot count control command

**clpregctl:** the `clpregctl` command controls reboot count limitation.

**Command line:**

```
clpregctl --get
clpregctl -g
clpregctl --clear -t type -r registry
clpregctl -c -t type -r registry
```

---

**Note:**

This command must be run on all servers that control the reboot count limitation because the command controls the reboot count limitation on a single server.

---

<b>Description</b>	This command displays and/or initializes reboot count on a single server	
<b>Option</b>	-g, --get	Displays reboot count information
	-c, --clear	Initializes reboot count
	-t	Specifies the type to initialize the reboot count. The type that can be specified is <i>rc</i> or <i>rm</i>
	-r	Specifies the registry name. The registry name that can be specified is <i>haltcount</i> .
<b>Return Value</b>	0	Normal termination
	1	Privilege for execution is invalid
	2	Duplicated activation
	3	Option is invalid
	4	The cluster configuration data is invalid
	10~17	Internal error
	20~22	Obtaining reboot count information has failed.
	90	Allocating memory has failed.
	91	Changing the work directory as failed.

**Example of  
command  
execution**

Display of reboot count information

```
# clpregctrl -g

*****

-----
type      : rc
registry  : haltcount
comment   : halt count
kind      : int
value     : 0
default   : 0

-----
type      : rm
registry  : haltcount
comment   : halt count
kind      : int
value     : 3
default   : 0

*****

Command succeeded.(code:0)
```

The reboot count is initialized in the following examples.

Run this command on server2 when you want to control the reboot count of server2.

**Example1:** When initializing the count of reboots caused by group resource error:

```
# clpregctrl -c -t rc -r haltcount

Command succeeded.(code:0)

#
```

**Example2:** When initializing the count of reboots caused by monitor resource error:

```
# clpregctrl -c -t rm -r haltcount

Command succeeded.(code:0)

#
```

**Remarks**

See “Limitations of the reboot count” in Chapter 5, “Group resource detail for reboot count limitation.

**Notes**

Run this command as root user.

**Error Messages**

<b>Message</b>	<b>Causes/Solution</b>
Command succeeded.	The command ran successfully.
Log in as root.	You are not authorized to run this command. Log on as root user.
The command is already executed. Check the execution state by using the "ps" command or some other command.	The command is already running. Check the running status by using a command such as ps command.
Invalid option.	Specify a valid option.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

## Warning light turning off command

**clpdn1000s:** The `clpdn1000s` command turns the warning light off.

**Command line:**

<b>clpdn1000s</b>	<code>-h <i>hostname</i></code>
-------------------	---------------------------------

<b>Description</b>	Turns the warning light of the specified server off.
--------------------	------------------------------------------------------

<b>Option</b>	<code>-h <i>hostname</i></code>	Specify a server whose warning light you want to turn off.
---------------	---------------------------------	------------------------------------------------------------

<b>Return Value</b>	0	Normal termination
	Other than 0	Abnormal termination

<b>Notes</b>	This command should be performed by the user with root privilege.
--------------	-------------------------------------------------------------------

## CPU frequency control command

### **clpcpufreq**

The clpcpufreq command controls CPU frequency.

#### **Command line:**

clpcpufreq --high [-h *hostname*]

clpcpufreq --low [-h *hostname*]

clpcpufreq -i [-h *hostname*]

clpcpufreq -s [-h *hostname*]

#### **Description**

This command enables/disables power-saving mode by CPU frequency control.

#### **Option**

--high	Sets CPU frequency to highest.
--low	Sets CPU frequency to lowest.
-i	Switch to automatic control by cluster.
-s	Displays the current CPU frequency level. high: Frequency is highest low: Frequency is lowered and it is in power-saving mode
-h <i>hostname</i>	Requests the server specified in <i>hostname</i> for processing. If this is omitted, it requests the local server for processing.

#### **Return Value**

0	Completed successfully.
Other than 0	Terminated due to a failure.

#### **Example**

```
# clpcpufreq -s
performance
Command succeeded.

# clpcpufreq -- high
Command succeeded.

# clpcpufreq --low -h server1
Command succeeded.

# clpcpufreq -i
Command succeeded
```

#### **Remark**

If the driver for CPU frequency control is not loaded, an error occurs.

If the **Use CPU frequency control** checkbox is not selected in the power saving settings in cluster properties, this command results in error.

- Notes** This command must be executed by a user with the root privilege.
- When you use CPU frequency control, it is required that frequency is changable in the BIOS settings, and that the CPU supports frequency control by Windows OS power management function.

## Error Messages

Message	Cause/Solution
Log in as root.	Log in as root user.
This command is already run.	This command has already been run.
Invalid option.	Specify a valid option.
Invalid mode. Check if --high or --low or -i or -s option is specified.	Check if either of the --high, --low, -l or -s option is specified.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to load the configuration file. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to load the all.pol file. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to load the cpufreq.pol file. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to get the install path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to get the cpufreq path. Reinstall the RPM.	Reinstall the ExpressCluster Server RPM.
Failed to initialize the apicl library. Reinstall the RPM.	Check to see if the memory or OS resource is sufficient.
Failed to change CPU frequency settings. Check the BIOS settings and the OS settings. Check if the cluster is started. Check if the setting is configured so that CPU frequency control is used.	Check the BIOS settings and the OS settings. Check if the cluster service is started. Check if the setting is configured so that CPU frequency control is used.
Failed to change CPU frequency settings. Check the BIOS settings and the OS settings. Check if the cluster is started. Check if the setting is configured so that CPU frequency control is used.	Check the BIOS settings and the OS settings. Check if the cluster service is started. Check if the setting is configured so that CPU frequency control is used.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

## Chassis identify control command

### **clpledctrl**

The clpledctrl command controls the chassis identify function.

#### **Command line:**

```
clpledctrl -d [-h hostname] [-a] [-w timeout]
```

```
clpledctrl -i [-h hostname] [-a] [-w timeout]
```

**Description** This command disables/enables chassis identify function.

<b>Option</b>	-d	Disables the chassis identify function.
	-i	Enables the chassis identify function.
	-h <i>hostname</i>	Specifies the name of the server which enables/disables the chassis identify function. Specify -a to omit this.
	-a	All servers in the cluster are the targets. The -a option can be omitted. If so, specify <i>hostname</i> .
	-w <i>timeout</i>	Specifies the timeout value of the command by the second.  If the -w option is not specified, it waits for 30 seconds.

<b>Return Value</b>	0	Completed successfully.
	Other than 0	Terminated due to a failure.

**Notes** This command must be executed by a user with the root privilege.

Execute this command in the server operating normally in the same cluster as the one which the target server belongs to.

If you disable the chassis identify function by this command, it is cancelled when the cluster is restarted or when the target server recovers the normal status.

**Examples**

Example 1: When disabling (i.e. turn off the lamp which is turned on) the chassis identify function in server1 (specify the command timeout as 60 seconds)

```
# clpledctrl -d server1 -w 60
```

Example 2: When disabling chassis identify in all servers in the cluster

```
# clpledctrl -d -a
```

Example 3: When enabling the chassis identify function in server1 where the function was disabled

```
# clpledctrl -i server1
```

The result of command execution is displayed as follows:  
Detail of the processing    Server name:    Result (Cause if failed)

## Error messages

Message	Cause/solution
Log in as root.	Log in as root user.
Invalid option.	The command line option is invalid. Specify the correct option.
Could not connect to the data transfer server. Check if the server has started up.	Check if the server has started up.
Could not connect to all data transfer servers. Check if the servers have started up.	Check the all servers in the cluster have started up.
Command timeout.	The cause may be heavy load on OS and so on. Check this.
Chassis identify is not setting or active at all servers.	Chassis identify is disabled or not used.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Specify a valid server name in the cluster.
All servers are busy. Check if this command is already run.	This command may be run already. Check it.
Internal error. Check if memory or OS resource is sufficient.	Check if the memory or OS resource is sufficient.

## Inter-cluster processing request command

### clptrnreq

The clptrnreq command requests a server to execute a process.

#### Command line:

```
clptrnreq -t request_code -h IP [-r resource_name] [-s script_file] [-w timeout]
```

**Description** The command issues the request to execute specified process to the server in another cluster.

<b>Option</b>	<b>-t <i>request_code</i></b>	Specifies the request code of the process to be executed. The following request codes can be specified:  GRP_FAILOVER      Group failover EXEC_SCRIPT      Execute script
	<b>-h <i>IP</i></b>	Specifies the server to issue the request to execute the process with IP address. You can specify more than one server by separating by commas.  When you specify group failover for request code, specify the IP addresses of all the servers in the cluster.
	<b>-r <i>resource_name</i></b>	Specifies the resource name which belongs to the target group for the request for process when GRP_FAILOVER is specified for request code.  If GRP_FAILOVER is specified, -r cannot be omitted.
	<b>-s <i>script_file</i></b>	Specifies the file name of the script to be executed (e.g. batch file or executable file) when EXEC_SCRIPT is specified for request code. The script needs to be created in the work\trnreq folder in the folder where ExpressCluster is installed in each server specified with -h.  If EXEC_SCRIPT is specified, -s cannot be omitted.
	<b>-w <i>timeout</i></b>	Specifies the timeout value of the command by the second.  If the -w option is not specified, the command waits for 1 second shorter than script time out.

<b>Return Value</b>	0	Completed successfully.
	Other than 0	Terminated due to a failure.

**Notes** This command must be executed by a user with the root privilege.  
This command cannot be executed when the ExpressCluster Transaction

service is not operating on the server with the IP address specified by -h.

When WebManager connection restriction is conducted by the client IP address on this target server, it is required that connection to the address of the server to execute the command is permitted.

#### Examples

Example 1: When performing a failover on the group having the `exec1` resource of another cluster

```
# clptrnreq -t GRP_FAILOVER -h 10.0.0.1,10.0.0.2 -r exec1
```

Command succeeded.

Example 2: When executing the `script1.bat` script by the server with IP address 10.0.0.1

```
# clptrnreq -t EXEC_SCRIPT -h 10.0.0.1 -s script1.bat
```

Command Succeeded.

#### Error messages

Message	Cause/solution
Log in as root.	Log in as root user.
Invalid option.	The command line option is invalid. Specify the correct option.
Could not connect to the data transfer server. Check if the server has started up.	Check if the server has started up.
Could not connect to all data transfer servers. Check if the servers have started up.	Check if all the servers in the cluster have started up.
Command timeout.	The cause may be heavy load on OS and so on. Check this.
All servers are busy. Check if this command is already run.	This command may be run already. Check it.
GRP_FAILOVER %s : Group that specified resource(%s) belongs to is offline.	Failover process is not performed because the group to which the specified resource belongs is not started.
EXEC_SCRIPT %s : Specified script(%s) does not exist.	The specified script does not exist. Check it.
EXEC_SCRIPT %s : Specified script(%s) is not executable.	The specified script could not be executed. Check that execution is permitted.
%s %s : This server is not permitted to execute clptrnreq.	The server that executed the command does not have permission. Check that the server is registered to the connection restriction IP list of WebManager.
GRP_FAILOVER %s : Specified resource(%s) does not exist.	The specified resource does not exist. Check it.
Internal error. Check if memory or OS resource is sufficient.	Check if the memory or OS resource is sufficient.

## BMC information change command

**clpbmccnf**                      The clpbmccnf command changes the information on BMC user name and password.

**Command line:**

clpbmccnf [-u *username*] [-p *password*]

**Description**                      This command changes the user name/password for the LAN access of the baseboard management controller (BMC) which ExpressCluster uses for chassis identify or forced stop.

<b>Option</b>	-u <i>username</i>	Specifies the user name for BMC LAN access used by ExpressCluster. A user name with root privilege needs to be specified.  The -u option can be omitted. Upon omission, when the -p option is specified, the value currently set for user name is used. If there is no option specified, it is configured interactively.
	-p <i>password</i>	Specifies the password for BMC LAN access used by ExpressCluster. The -p option can be omitted. Upon omission, when the -u option is specified, the value currently set for password is used. If there is no option specified, it is configured interactively.

<b>Return Value</b>	0	Completed successfully.
	Other than 0	Terminated due to a failure.

**Notes**                      This command must be executed by a user with root privilege.

Execute this command when the cluster is in normal status.

BMC information update by this command is enabled when the cluster is started/resumed next time.

This command does not change the BMC settings. Use a tool attached with the server or other tools in conformity with IPMI standard to check or change the BMC account settings.

**Examples**                      When you changed the IPMI account password of the BMC in server1 to mypassword, execute the following on server1:

```
# clpbmccnf -p mypassword
```

Alternatively, enter the data interactively as follows:

```
# clpbmccnf
```

New user name: <- If there is no change, press **Return** to skip

New password: \*\*\*\*\*

Retype new password: \*\*\*\*\*

Cluster configuration updated successfully.

#### Error messages

Message	Cause/solution
Log in as root	Log in as root user.
Invalid option.	The command line option is invalid. Specify the correct option.
Failed to download the cluster configuration data. Check if the cluster status is normal.	Downloading the cluster configuration data has been failed. Check if the cluster status is normal.
Failed to upload the cluster configuration data. Check if the cluster status is normal.	Uploading the cluster configuration data has been failed. Check if the cluster status is normal.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	The cluster configuration data is invalid. Check the cluster configuration data by using the Builder.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.



## Section II      Resource details

This section provides detailed information on the resources that constitute a cluster.

Chapter 5	Group resource details
Chapter 6	Monitor resource details
Chapter 7	Heartbeat resources details
Chapter 8	Network partition resolution resources details
Chapter 9	Information on other monitor settings



# Chapter 5      Group resource details

This chapter provides information on group resources that constitute a failover group. For overview of group resources, see Chapter 2, “Configuring a cluster system” in the *Installation and Configuration Guide*.

This chapter covers:

• Group resources and supported ExpressCluster versions .....	450
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• Displaying and changing the settings of group properties .....	465
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## Group resources and supported ExpressCluster versions

The following is the number of group resources that can be registered with a group:

Version	Number of group resources (per group)
-	128

Currently supported group resources are:

Group resource name	Abbreviation	Functional overview	Supported version
Exec resource	exec	See “Understanding EXEC resources.” (Page 491)	2.0.0-1~
Disk resource	disk	See “Understanding disk resource.” (Page 524)	2.0.0-1~
Floating IP resource	fip	See “Understanding floating IP resource.” (Page 533)	2.0.0-1~
Virtual IP resource	vip	See “Understanding virtual IP resources” (Page 544)	2.0.0-1~
Mirror disk resource	md	See “Understanding mirror disk resources.” (Page 561)	2.0.0-1~
Hybrid disk resource	hd	See “Understanding hybrid disk resources” (Page 594)	2.0.0-1~
Raw resource	raw	See “Understanding raw resources.” (Page 594)	2.0.0-1~
VxVM disk group resources	vxdg	See “Understanding VxVM related resources.” (Page 609)	2.0.0-1~
VxVM volume resource	vxvol		2.0.0-1~
NAS resource	nas	See “Understanding NAS resource.” (Page 639)	2.0.0-1~

## Attributes common to group resources

This section describes the attributes common to group resources.

### Understanding failover policy

A failover policy is a priority that determines a server to be the failover destination from multiple servers. When you configure the failover policy, avoid making certain servers heavily loaded at a failover.

The following describes how servers behave differently depending on failover policies when a failover occurs using example of the server list that can fail over and failover priority in the list.

<Symbols and meaning>

Server status	Description
O	Normal (properly working as a cluster)
×	Stopped (cluster is stopped)

3-node configuration:

Group	Failover policy		
	1 <sup>st</sup> priority server	2 <sup>nd</sup> priority server	3 <sup>rd</sup> priority server
A	server1	server3	server2
B	server2	server3	server1

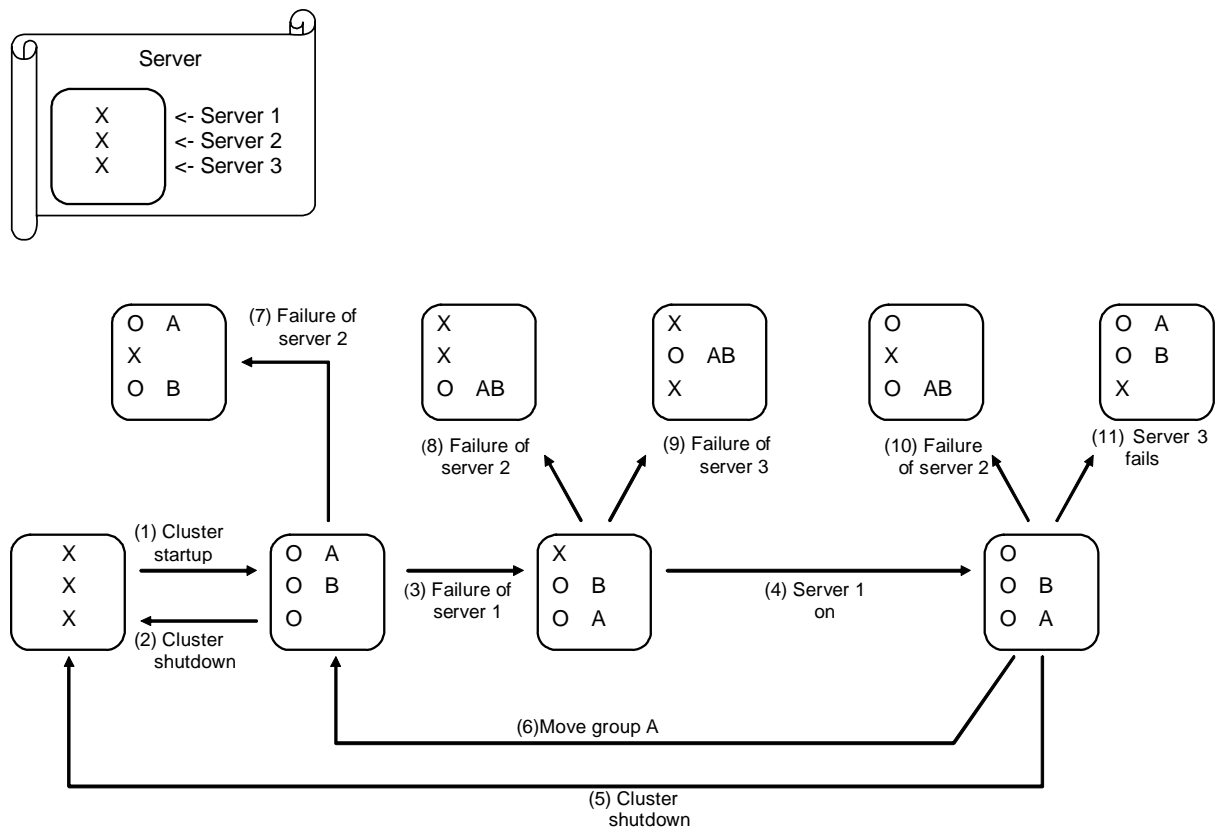
2-node configuration:

Group	Failover policy	
	1 <sup>st</sup> priority server	2 <sup>nd</sup> priority server
A	server1	server2
B	server2	server1

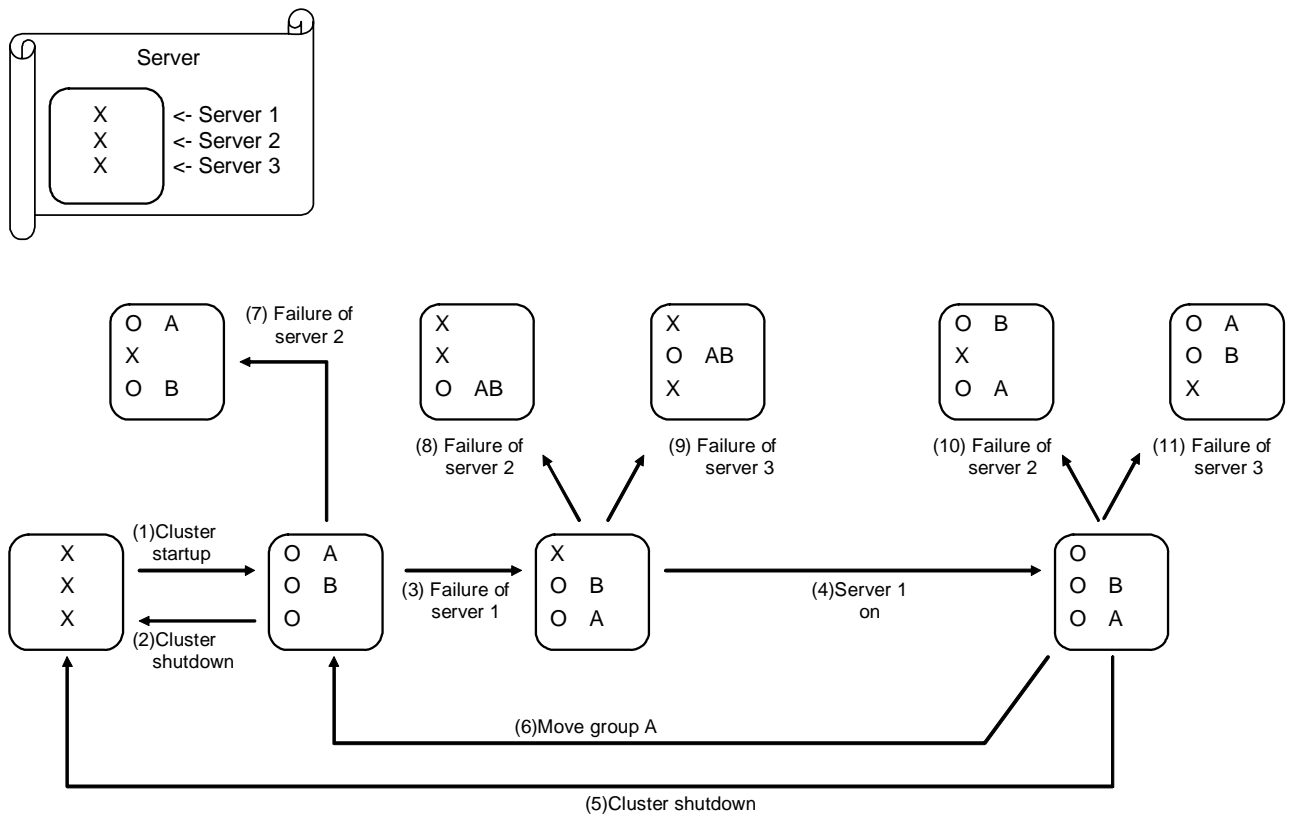
It is assumed that the group startup attributes are set to auto startup and the failback attributes are set to manual failback for both Group A and B.

- ◆ If groups of different failover exclusive attributes co-exist in a cluster, they do not interfere with each other. For example, a group of full exclusive attributes may start on a server where a group of non-exclusive attributes is active, and vice versa.
- ◆ For groups whose failover exclusive attributes are normal or full, the server which they start up or fail over is determined by the failover priority to the server. If a group has two or more servers of the same failover priority, it is determined by the alphabetical order of the group name.

**When the failover exclusive attribute of Group A and B is set to Off:**

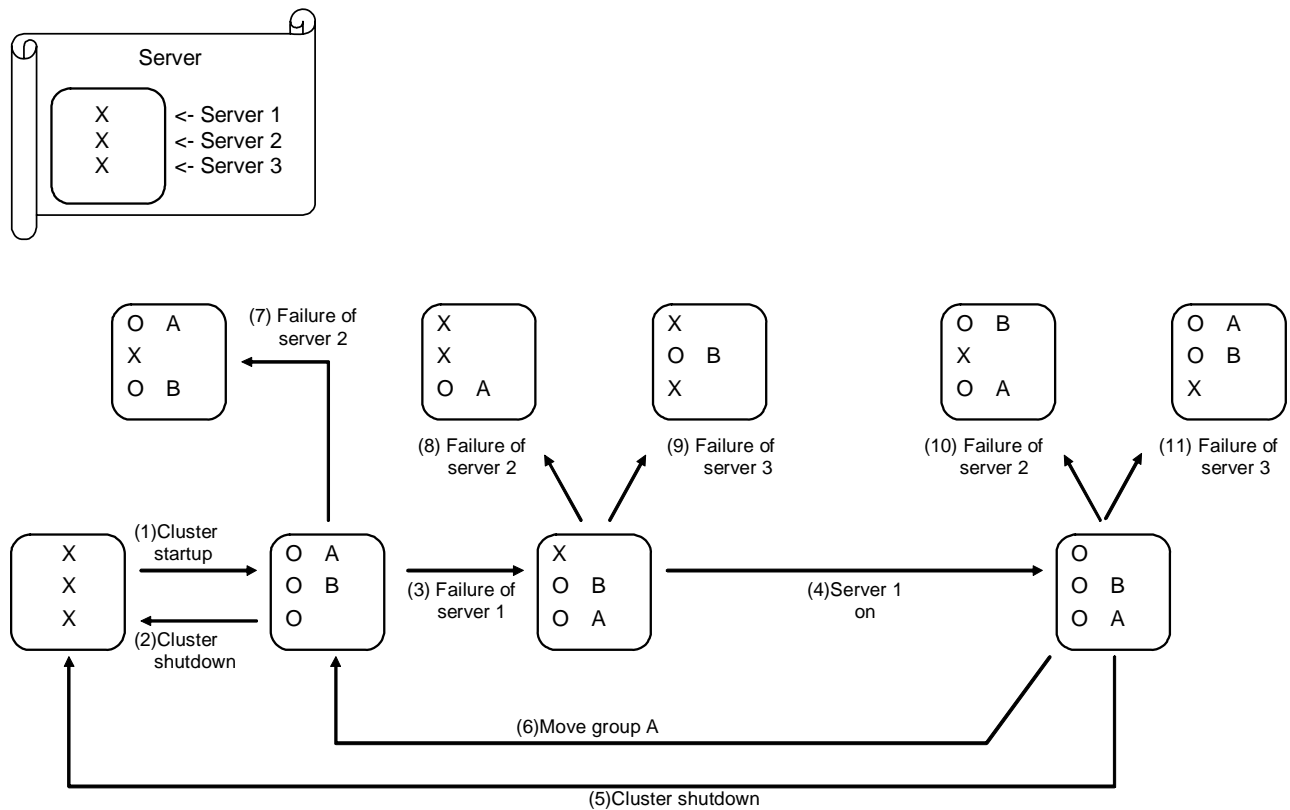


1. Cluster startup
2. Cluster shutdown
3. Failure of server1      Fails over to the next priority server.
4. server1 power on
5. Cluster shutdown
6. Move group A
7. Failure of server2:      Fails over to the next priority server.
8. Failure of server2:      Fails over to the next priority server.
9. Failure of server3:      Fails over to the next priority server.
10. Failure of server2:      Fails over to the next priority server.
11. Failure of server3:      Fails over to the next priority server.

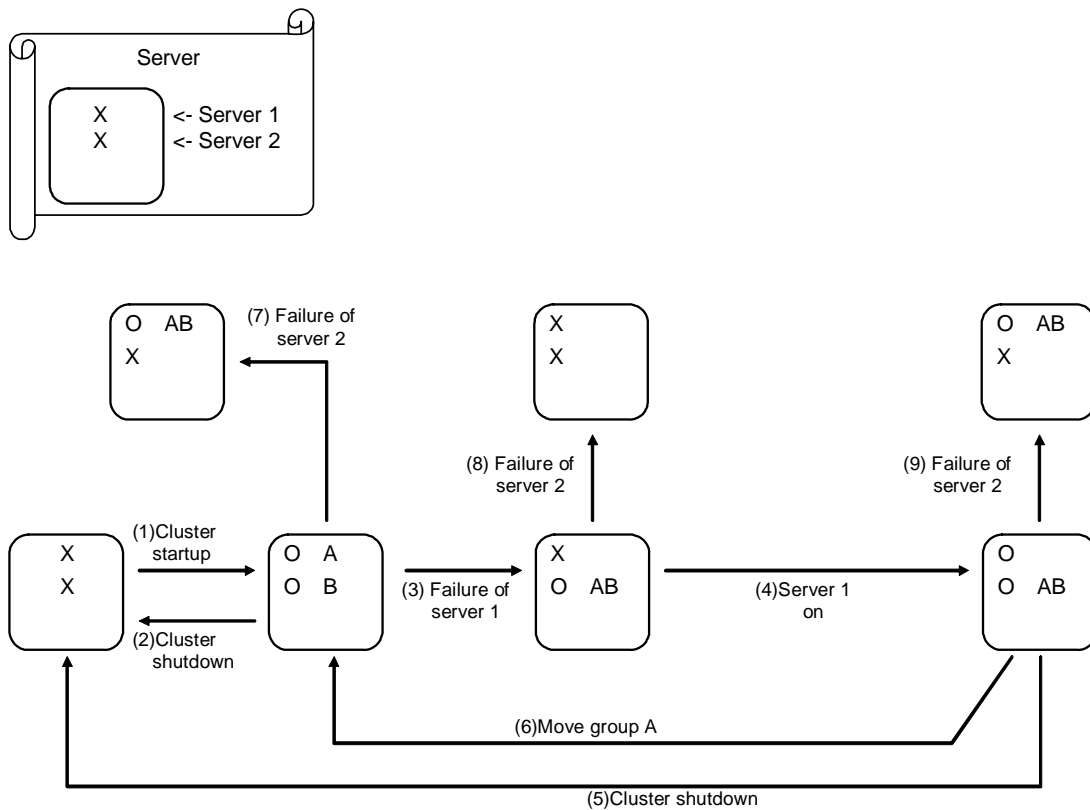
**When the failover exclusive attribute for Group A and B is set to Normal:**

1. Cluster startup
2. Cluster shutdown
3. Failure of server1: Fails over to a server where no normal exclusive group is active.
4. Server1 power on
5. Cluster shutdown
6. Move groupA
7. Failure of server2: Fails over to a server where a normal exclusive group is not active.
8. Failure of server2: Normal exclusive groups of all servers are active, but the server fails over to a server because there is a server that can start normal exclusive groups.
9. Failure of server3: There is no server where a normal exclusive group is not active, but failover to the server because there is a server that can be started.
10. Failure of server2: Fails over to a server where a normal exclusive group is not active.
11. Failure of server3: Fails over to a server where a normal exclusive group is not active.

**When the failover exclusive attribute for Group A and B is set to Absolute:**



1. Cluster startup
2. Cluster shutdown
3. Failure of server1: Fails over to the next priority server.
4. server1 power on
5. Cluster shutdown
6. Move groupA
7. Failure of server2: Fails over to the next priority server.
8. Failure of server2: Does not failover (GroupB stops).
9. Failure of server3: Does not failover (GroupA stops).
10. Failure of server2: Fails over to the server where no full exclusive group is active.
11. Failure of server3: Fails over to the server where no full exclusive group is active.

**For Replicator (two-server configuration)****When the failover exclusive attribute for Group A and B is set to Off:**

1. Cluster startup
2. Cluster shutdown
3. Failure of server1: Fails over to the standby server of GroupA.
4. Server1 power on
5. Cluster shutdown
6. Move groupA
7. Failure of server2: Fails over to the standby server of GroupB.
8. Failure of server2
9. Failure of server3: Fails over to the standby server.

## Operations at detection of activation and inactivation errors

When an activation or deactivation error is detected, the following operations are performed:

- ◆ When an error in activation of group resources is detected:
  - When an error in activation of group resources is detected, activation is retried.
  - When activation retries fail as many times as the number set to **Retry Count at Activation Failure**, a failover takes place.
  - If the failover fails as many times as the number set to **Failover Threshold**, the final action is performed.
- ◆ When an error in deactivation of group resources is detected:
  - When an error in deactivation of group resources is detected, deactivation is retried.
  - When deactivation retries fail as many times as the number set to **Retry Count at Deactivation Failure**, the final action is performed.

---

### Note:

Activation retries and failovers are counted on a server basis. The Retry Count at Activation Failure and Failover Threshold are maximum activation retry count and failover count on a server basis respectively.

The activation retry count and failover count are reset in a server where the group activation is successful.

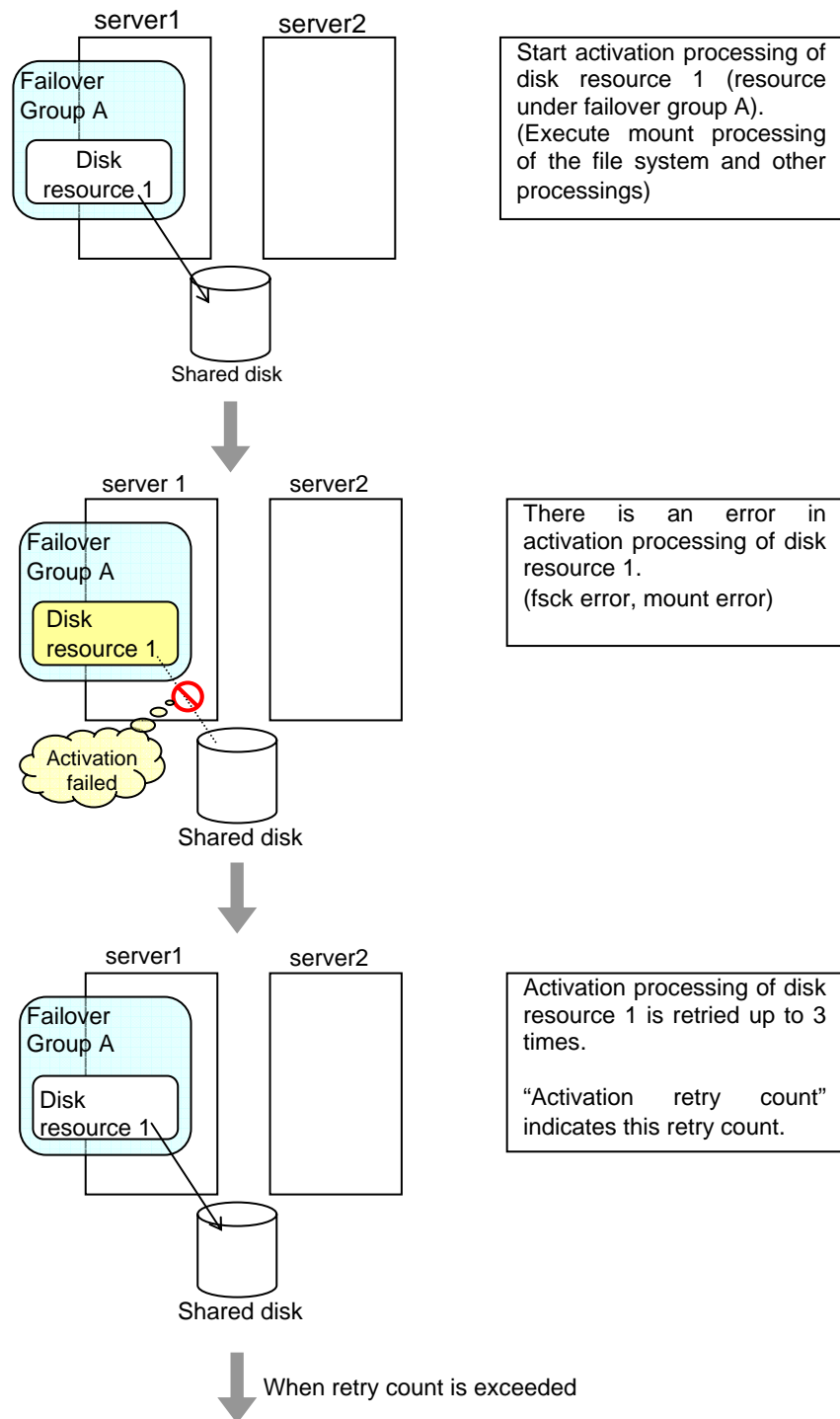
Note that a failed recovery action is also counted as one for the activation retry count or failover count.

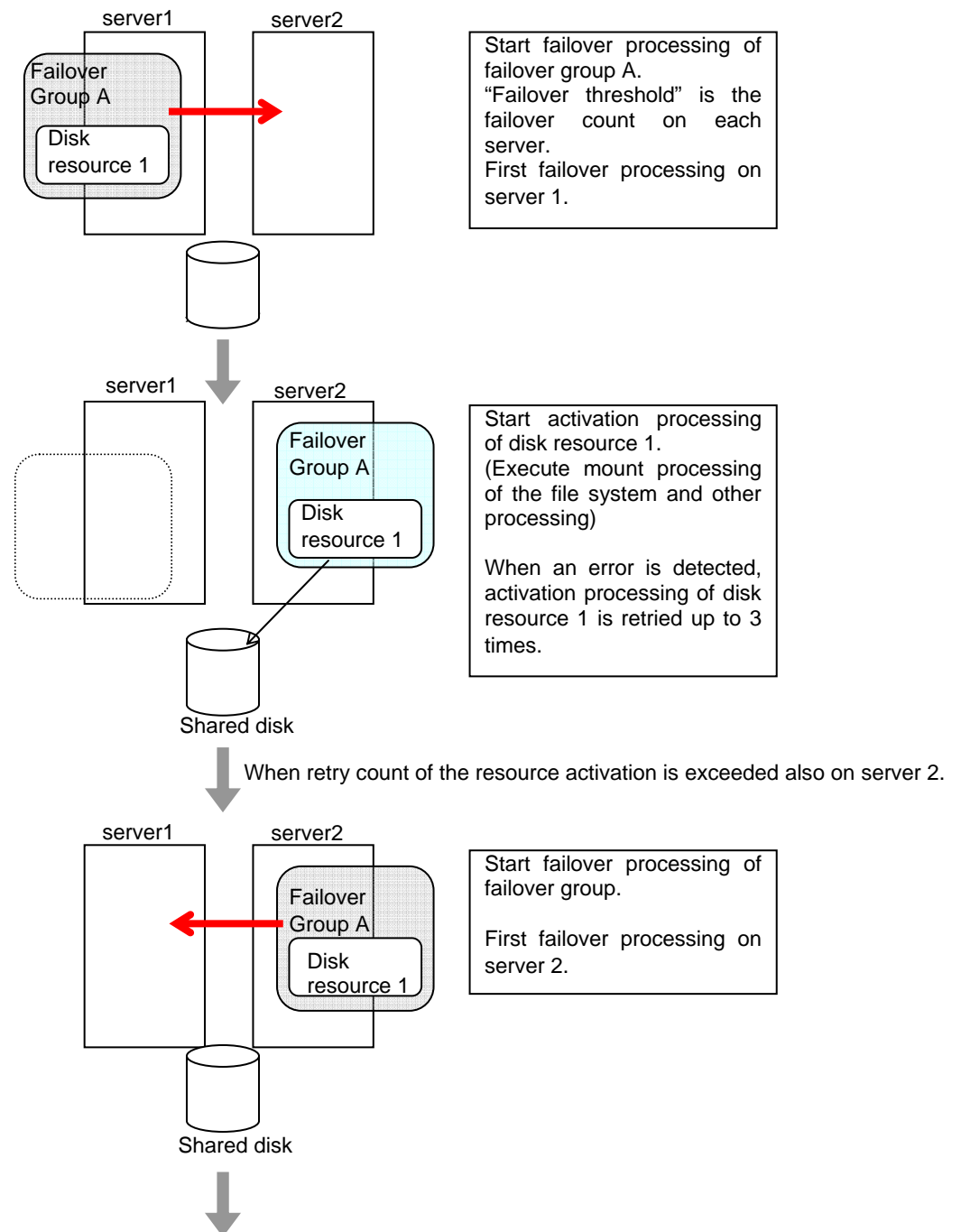
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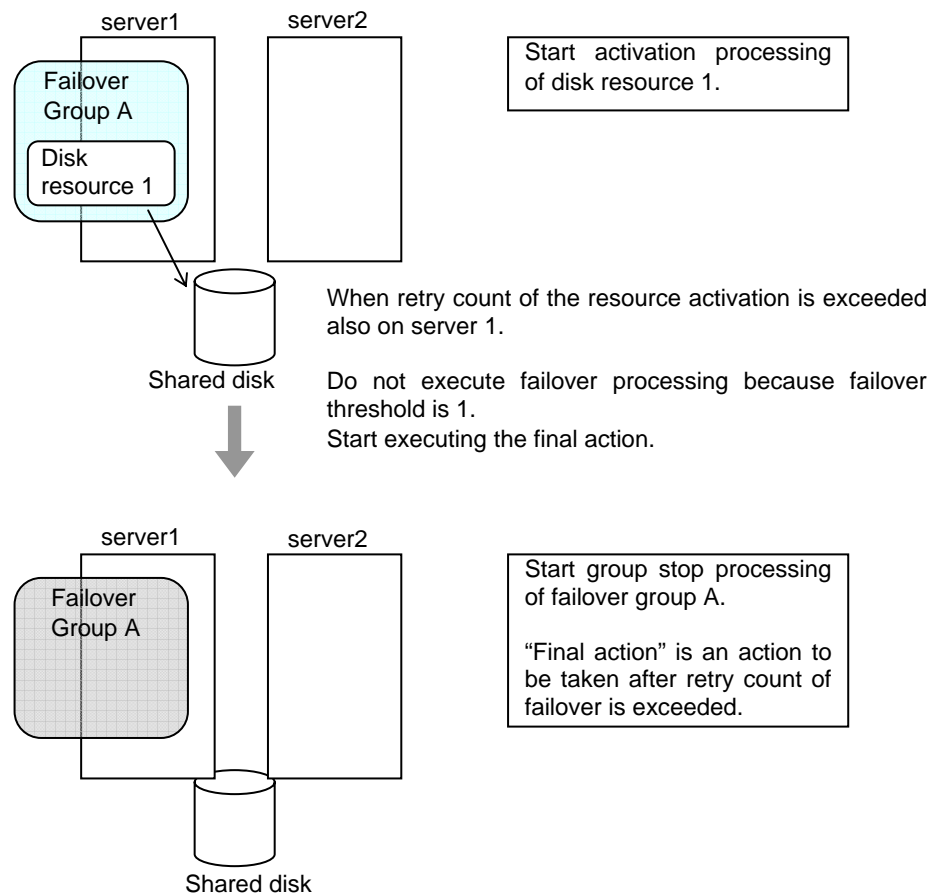
The following describes how an error in activation of a group resource is detected:

When the following settings are made:

Retry Count at Activation Failure	3 times
Failover Threshold	1 times
Final Action	Stop Group







## Reboot count limit

If **Stop cluster daemon and shutdown OS** or **Stop cluster daemon and reboot OS** is selected as the final action to be taken when any error in activation or deactivation is detected, you can limit the number of shutdowns or reboots caused by detection of activation or deactivation errors.

This maximum reboot count is the upper limit of reboot count of each server.

---

**Note:**

The maximum reboot count is the upper limit of reboot count of a server because the number of reboots is recorded per server.

The number of reboots that are taken as a final action in detection of an error in group activation or deactivation and those by a monitor resource are recorded separately.

If the time to reset the maximum reboot count is set to zero (0), the number of reboots will not be reset. Run the `clpregctl` command to reset this number. See “Reboot count control command” in Chapter 4, “ExpressCluster command reference” for details of the `clpregctl` command.

---

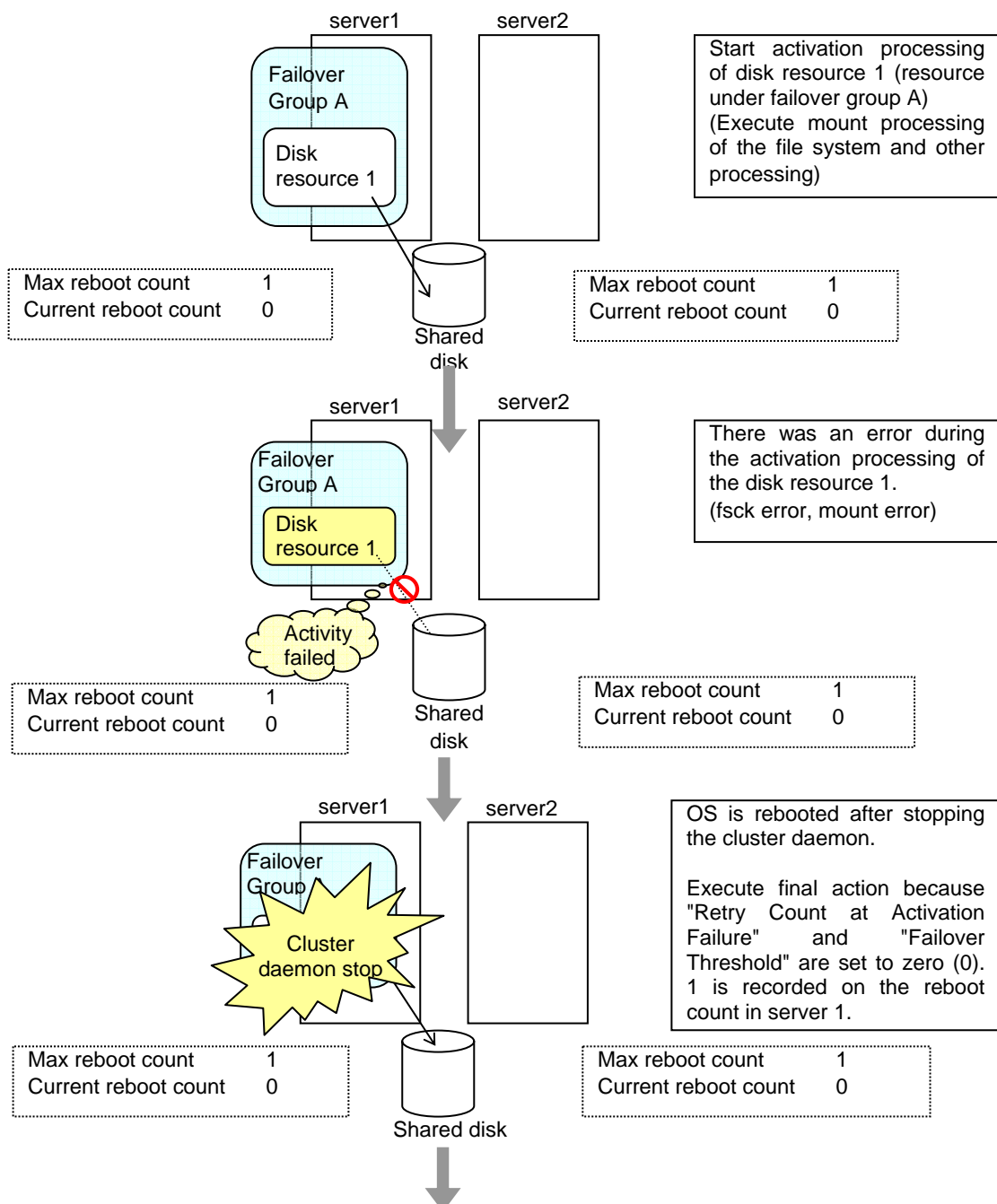
The following describes the flow of operations when the limitation of reboot count is set as shown below:

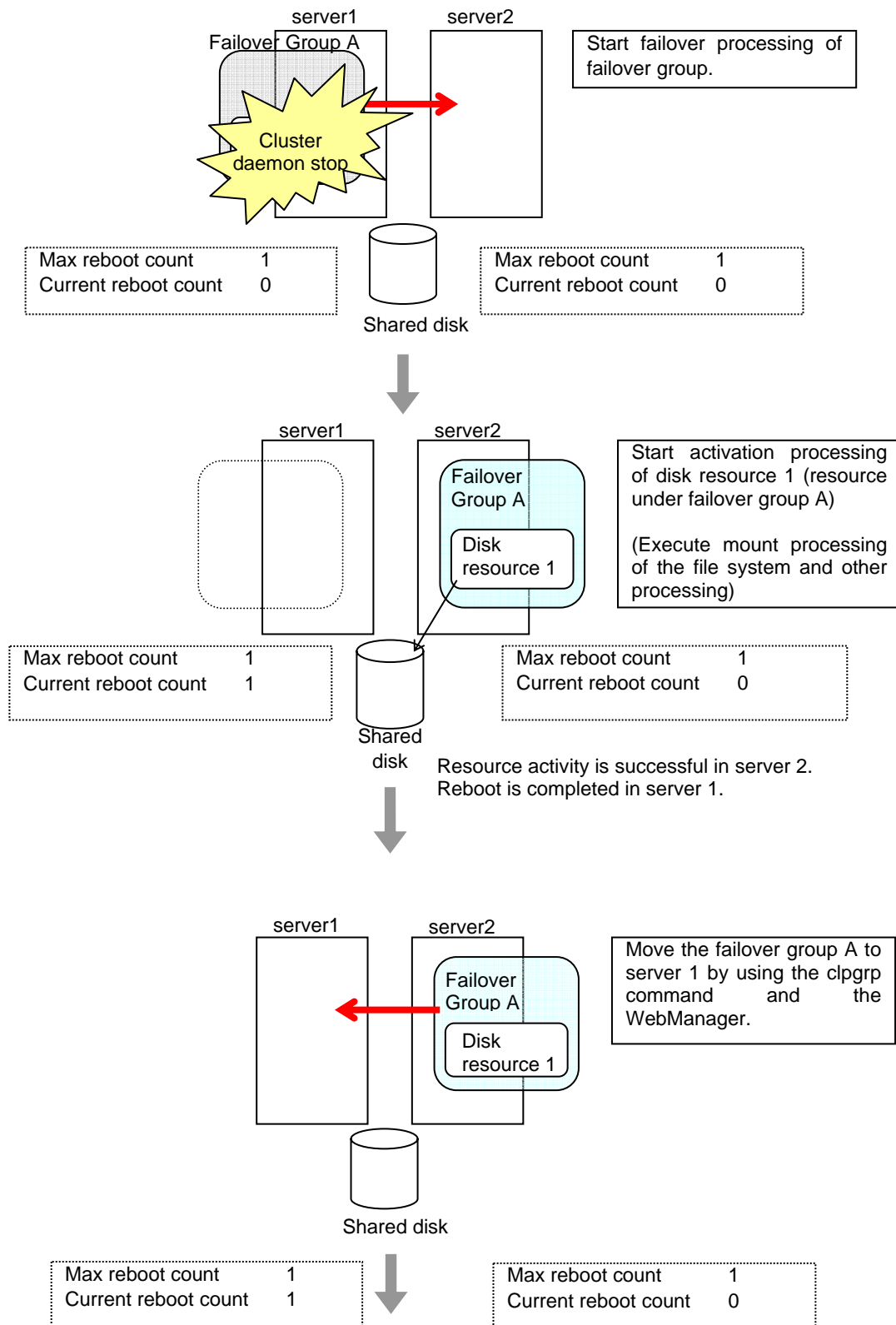
As a final action, **Stop cluster daemon and reboot OS** is executed once because the maximum reboot count is set to one (1).

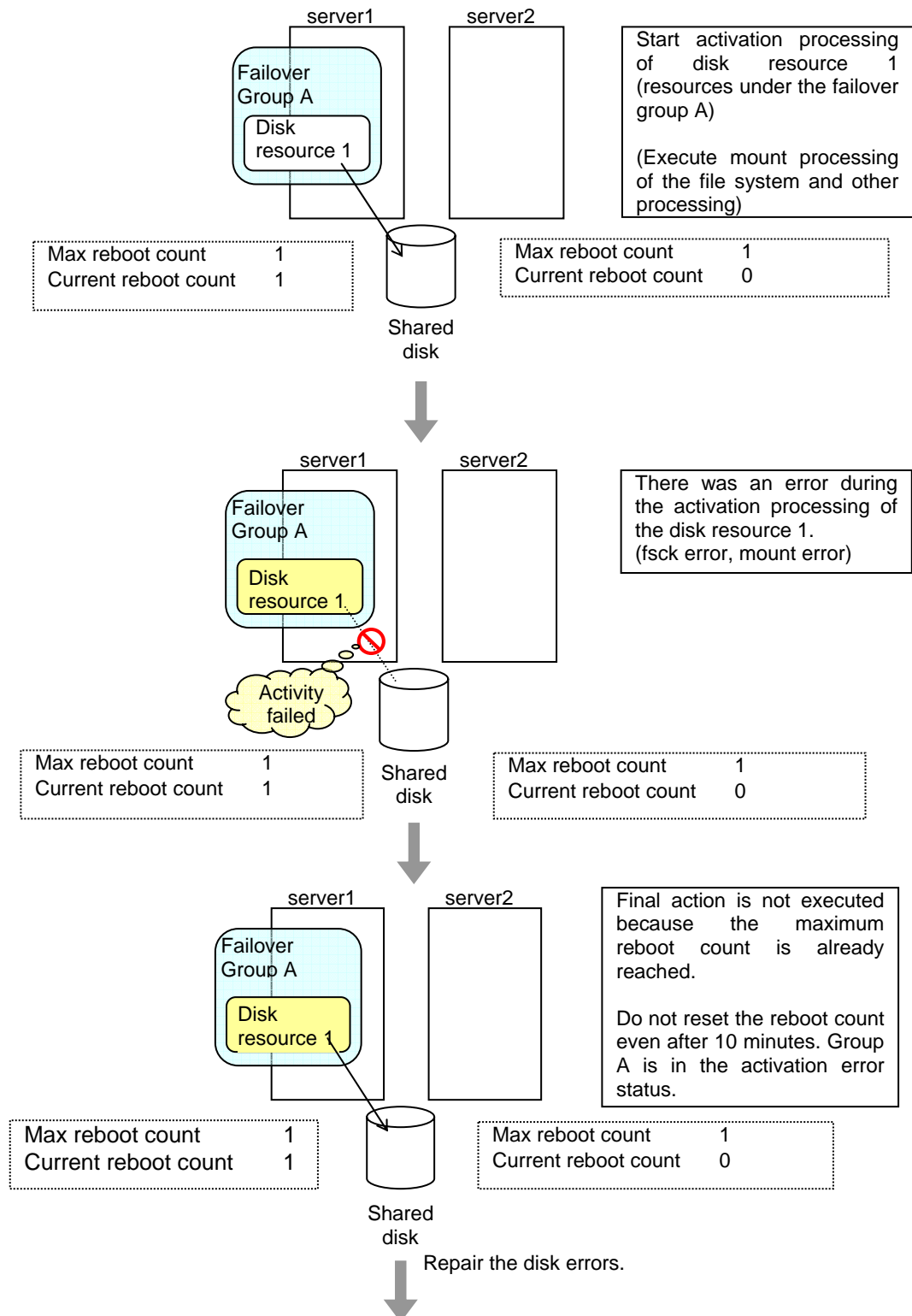
If group activation is successful at a reboot following the cluster shutdown, the reboot count is reset after 10 minutes because the time to reset maximum reboot count is set to 10 minutes.

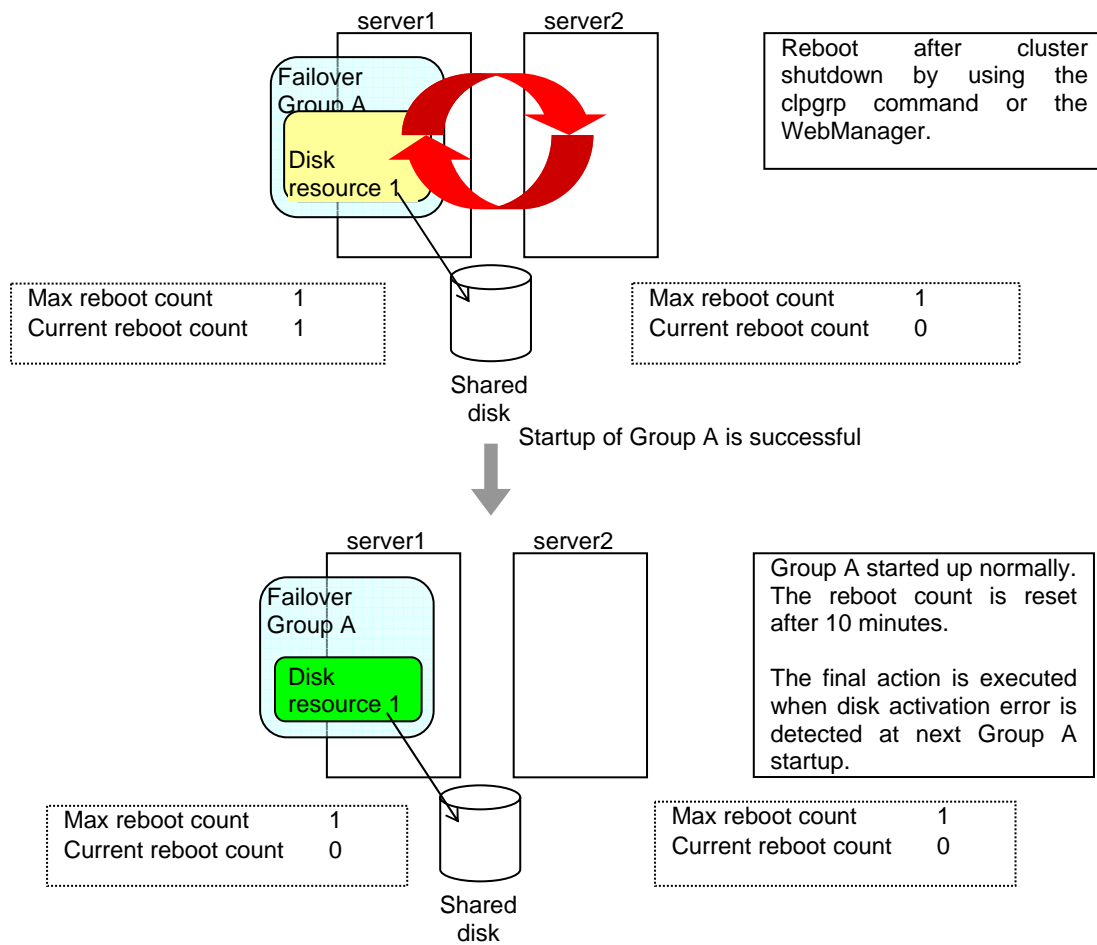
#### Setting example

Retry Count at Activation Failure	0 time
Failover Threshold	0 time
Final Action	Stop cluster daemon and reboot OS
Max Reboot Count	1 time
Max Reboot Count Reset Time	10 minutes









## Resetting the reboot count

Run the `clpregctl` command to reset the reboot count. For details on the `clpregctl` command, see Chapter 4, “ExpressCluster command reference.”

## Displaying and changing the settings of group properties

You can display and change the settings of the group properties by using **Group Properties** of the Builder.

### Renaming a group (Group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the group that you want to rename, and then click **Rename Group**.
2. The **Change Group Name** dialog box is displayed. Enter a new name.

### Displaying and changing the comment of a group (Group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the group that you want to change its comment, and then click **Properties**. The **Group Properties** dialog box is shown.
2. On the **Info** tab, the group name and comment are displayed. Enter a new comment.

---

**Note:**

You cannot change the group name on the **Info** tab. To change the group name, right-click the icon of the group as described in the step 1 above. Click **Rename Group** and enter a new name.

---

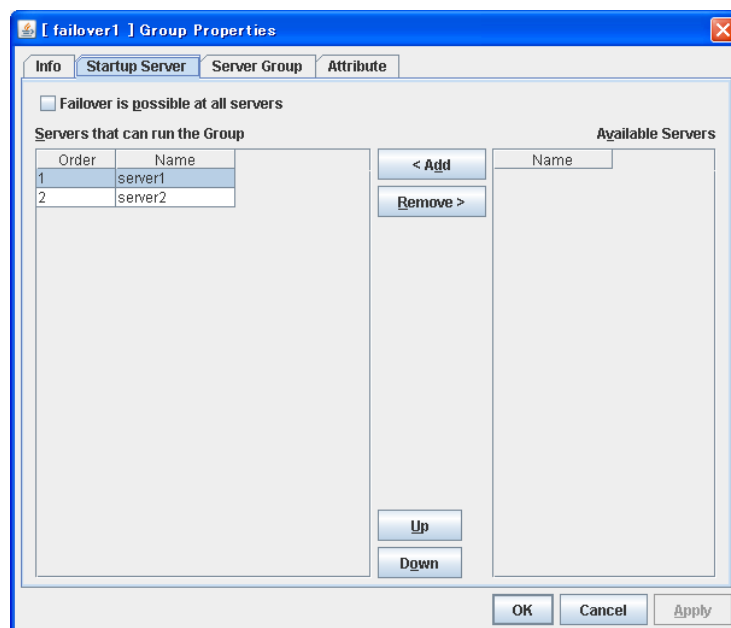
## Displaying and changing the settings of servers that starts up the group (Group properties)

There are two types of settings for the server that starts up the group; the group is started up by all the servers or by only the specified servers.

If the setting on which the group is started up by all the servers is configured, all the servers in a cluster can start a group. The group startup priority of servers is same as the one of servers. For details on the server priority, see “Master Server tab” in Chapter 3 “Functions of the Builder.”

If selecting servers that can start up the group, you can select any server from those registered to a cluster. Also, you can change the startup priority of servers that start up the group.

1. In the tree view in the left pane of the Builder, right-click the icon of the group with servers whose settings you want to display and change, and then click **Properties**. The **Group Properties** dialog box is displayed.
2. Click **Startup Server** tab. In **Servers that can run the Group**, servers that can start the group and their order are shown. In **Available Servers**, the servers that can be registered with **Servers that can run the Group** are shown.



3. Set the startup servers by following the procedures below:

### Failover is possible at all servers

Specify the server that starts a group.

- When selected  
All servers registered to a cluster can start a group. The priority of starting up a group is same as the one of the servers.
- When not selected  
You can select the servers that can start a group, and change the startup priority.

**Add**

Use this button to add a server. Select a server that you want to add from **Available Servers**, and then click **Add**. The server is added to **Servers that can run the Group**.

**Remove**

Use this button to remove a server. Select a server that you want to remove from **Servers that can run the Group**, and then click **Remove**. The server is added to **Available Servers**.

**Up, Down**

Use these buttons to change the priority of the servers that can be started. Select a server whose priority you want to change from **Servers that can run the Group**. Click **Up** or **Down** to move the selected row upward or downward.

---

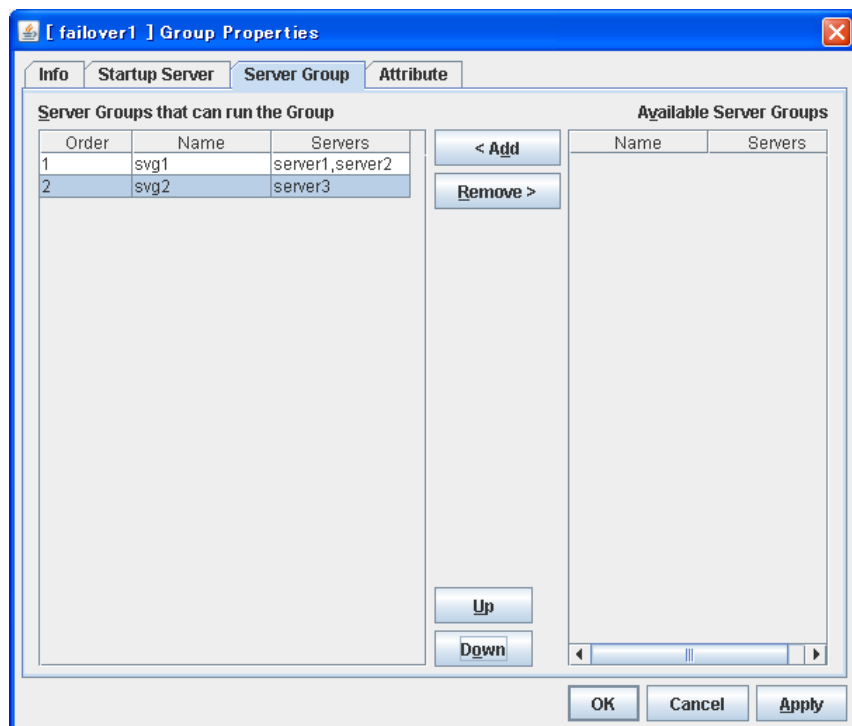
**Note:** When you configure the server group, delete servers which do not belong to the server group from **Available Servers**. Add the servers which belong to the server group to **Available Servers**. When you add/delete servers after creating a group or server group, do it carefully.

---

## Displaying and changing the settings of server group that starts up the group (Group properties)

It is necessary to configure a server group that starts up the failover group for the settings of a server that startups a group including a hybrid disk resource.

1. In the tree view in the left pane of the Builder, right-click the icon of the group with servers whose settings you want to display and change, and then click **Properties**. The **Group Properties** dialog box is displayed.
2. Click **Server Groups** tab. In **Servers that can run the Group**, servers that can start the group and their order are shown. The smaller number a server has, the higher its priority is. In **Available Servers**, the servers that can be registered with **Servers that can run the Group** are shown.



3. Configure the settings for the server groups that can run the group according to the following instruction.

**Add**

Use this button to add a server group to server groups you use. Select a server group that you want to add from **Available Server Groups**, and then click **Add**. The server group is added to **Server Groups that can run the Group**.

**Remove**

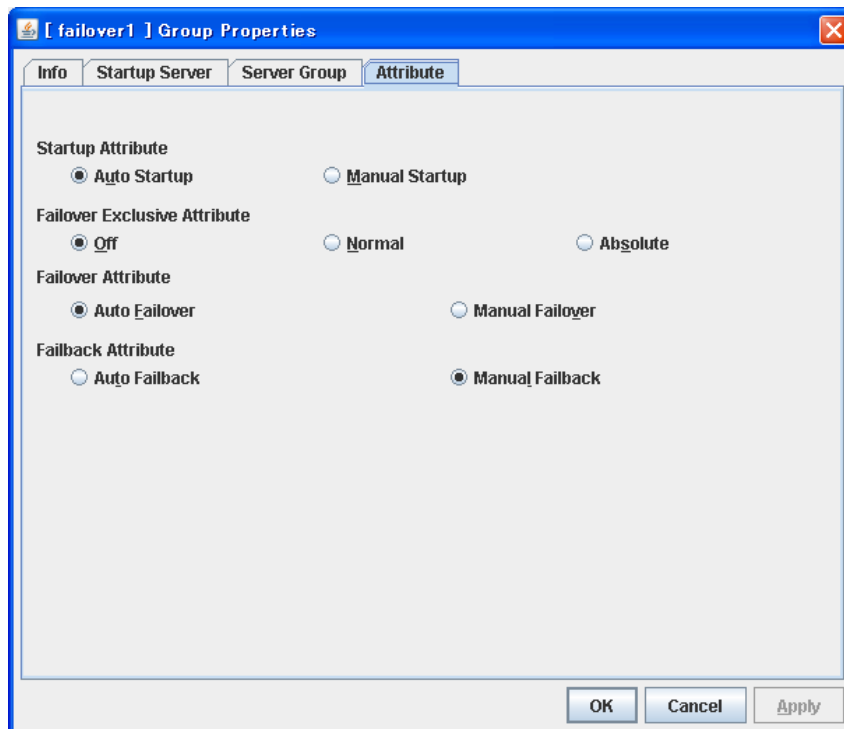
Use this button to remove a server group from server groups you use. Select a server group that you want to remove from **Available Server Groups**, and then click **Remove**. The server is added to **Server Groups that can run the Group**.

**Up, Down**

Use these buttons to change the priority of a server group. Select a server group whose priority you want to change from **Available Servers**. Click **Up** or **Down** to move the selected row upward or downward.

## Displaying and changing the group attribute (Group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the group that you want to show/change its settings of the attribute, and then click **Properties**. The **Group Properties** dialog box is displayed.
2. Click the **Attribute** tab. Specify **Startup Attribute**, **Failover Exclusive Attribute**, **Failover Attribute**, and **Failback Attribute** of this group by following the procedures on the next page:



### Startup Attribute

Select whether to automatically start the group from ExpressCluster (auto startup), or to manually start from the WebManager or by using the `clpgrp` command (manual startup) at the cluster startup.

- **Auto Startup**  
The group will automatically be started at the cluster startup (active state).
- **Manual Startup**  
The group will not be started at the cluster startup (inactive state).  
You can start the group from the WebManager or by using the `clpgrp` command (active state).

**Failover Exclusive Attribute**

This attribute determines the server to which ExpressCluster automatically fails over. You can select from Off, Exclusion, and Absolute.

- **Off**  
This is always the top priority server. Multiple groups may be started on the same server.
- **Exclusion**  
This is the top priority server among servers where no group of Exclusion is active. If all servers have an active group of Exclusion, the group fails over to the top priority server. Multiple groups may be started on the same server.
- **Absolute**  
This is the top priority server among servers where no group of Absolute is active. If all servers have an active group of Absolute, the group does not fail over. More than one group of Absolute cannot be started on the same server.  
It is not recommended to specify this in 2-server cluster systems (the group does not fail over in 2-server configurations in many cases).

**Failover Attribute**

Select if the failover is automatically performed when a server fails.

- **Auto Failover**  
Failover is executed automatically.
- **Manual Failover**  
Failover is executed manually.

**Failback Attribute**

Select if the failback is executed automatically to the group when a server that has a higher priority than other server where the group is active is started. For groups that have mirror disk resources or hybrid disk resources, select manual failback.

- **Auto Failback**  
Failback is executed automatically.
- **Manual Failback**  
Failback is not executed automatically.

## Displaying and changing the settings of group resources

You can display and change the settings of the group resources by using the **Resource Properties** in the Builder.

### Renaming a group resource (Group properties)

1. In the tree view in the left pane of the Builder, click the icon of the group to which the group resource that you want to rename belongs. The list of selected group resources is shown on the table view in the right pane of the screen.
2. Right-click the name of the group resource that you want to rename, and then click **Rename Resource**.
3. The **Change Resource Name** dialog box is displayed. Enter a new name.

### Displaying and changing the comment of a group resource (Group properties)

1. In the tree view in the left pane of the Builder, click the icon of the group to which the group resource whose comment you want to change belongs. Group resources of the selected group will be listed on the table view in the right pane of the screen.
2. Right-click the name of the group resource whose comment you want to display or change, and click **Resource Properties**.
3. On the **Info** tab, the group resource name and comment are shown. Enter new comment (within 127 bytes).

---

**Note:**

You cannot change the group resource name on the **Info** tab. To change the group name, right-click the icon of the group resource as described in the step 1 above. Click **Rename Group** and enter new name.

---

## Understanding the settings of dependency among group resources (Common to group resources)

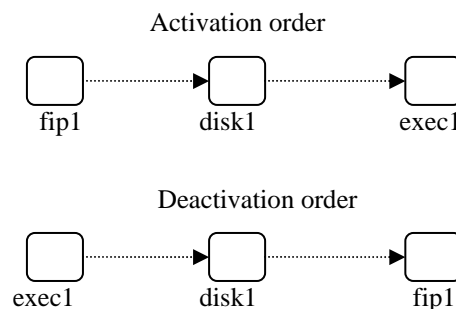
By specifying dependency among group resources, the order of activating them can be specified.

- ◆ When the dependency among group resources is set:
  - When activating a failover group that a group resource belongs to, its activation starts after the activation of the Dependent Resources is completed.
  - When deactivating a group resource, the deactivation of the “Dependent Resources” starts after the deactivation of the group resource is completed.

To display the settings of dependency among group resources, click the icon of the group whose group resources dependency you want to view on the tree view shown in the left pane of the Builder, and then click the **Entire Dependency** tab on the table view shown in the right pane of the Builder.

The following shows an example of the depth of dependency of resources that belong to a group.

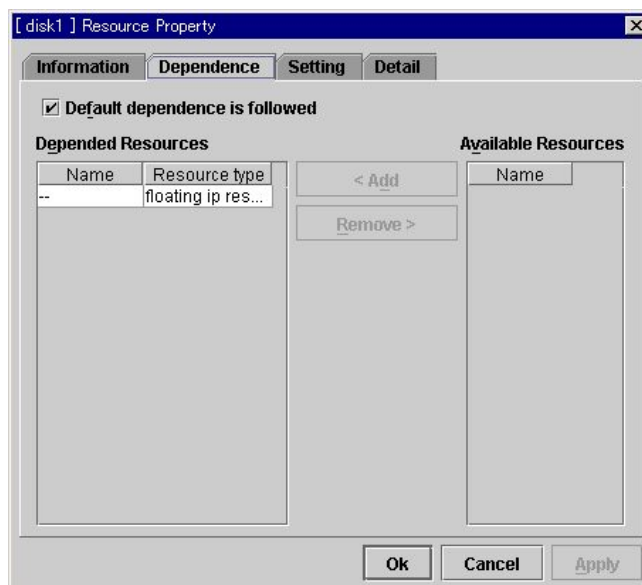
Resources		Entire Dependency	
Depth	Name	Dependent Resource Name	Type
0	fip1	none	
1	disk1	fip1	floating ip resource
2	exec1	disk1	disk resource



## Displaying and configuring the settings of dependency among group resources (Common to group resources)

Set the dependent group resources on a group resource basis.

1. In the tree view shown in the left pane of the Builder, click the icon of the group to which the group resource whose settings of dependency you want to display or configure belongs.
2. The list of group resources is shown in the table view in the right pane. Right-click the group resource whose dependency settings you want to display and configure. Click **Properties**, and then click the **Dependency** tab.
3. Set the dependency as described below:
  - When Follow the default dependence is selected:
    - Default dependency resource type is shown in **Dependent Resources**.
    - Nothing is shown in **Available Resources**.
  - When Follow the default dependence is not selected:
    - Group resource names and types are shown in **Dependent Resources**.
    - Group resources that can be added to Dependent Resources are listed in Available Resources. Group resources whose dependency is looped (that depend on depended group resource) are not shown. Group resources in Dependent Resources are not shown either.



### **Follow the default dependence**

Select if the selected group resource follows the default ExpressCluster dependency.

- When Follow the default dependence is selected:  
The selected group resource depends on the type(s) of resources.  
See “Parameters list” in Chapter 3, “Functions of the Builder” for the default dependency of each resource.  
When there is more than one resource of the same type, the selected group resource depends on all resources of that type.
- When Follow the default dependence is not selected:  
The selected group resource depends on the specified resource.

### **Add**

It is used when adding the group resource selected in **Available Resources** to **Dependent Resources**.

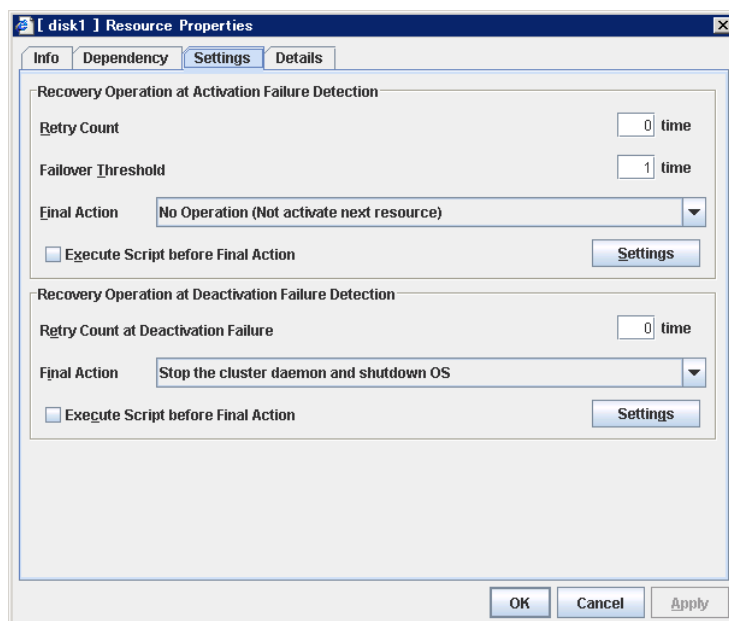
### **Remove**

It is used when removing the group resource selected in **Dependent Resources** from **Dependent Resources**.

## Displaying and changing the operation settings when a group resource error is detected (Common to group resources)

You can display and change the operation settings of actions when a group resource error is detected (when group resources are active/inactive) by using the **Settings** tab of the Builder.

1. In the tree view shown in the left pane of the Builder, click the icon of the group to which the group resource whose behavior at the time when a group resource error is detected you want to view or set.
2. The list of group resources is shown in the table view on the right pane. Right-click the group resource which you want to display and specify the behavior at the time when a group resource error is detected. Click **Properties**, and then click the **Settings** tab.
3. Specify the behavior at the time when a group resource error is detected by following the procedures below:
  - When an error in activation of the group resource is detected:
    - When an error is detected while activating the group resource, try activating it again.
    - When the activation retry count exceeds the number of times set in **Retry Count at Activation Failure**, failover is executed.
    - When the group resource cannot be activated even after executing a failover as many times as specified in **Failover Threshold**, the final action is taken.
  - ◆ When an error in deactivation of the group resource is detected:
    - When an error is detected while deactivating the group resource, try deactivating it again.
    - When the deactivation retry count exceeds the number of times set in **Retry Count at Deactivation Failure**, the final action is taken.



### Retry Count at Activation Failure 0 to 99

Enter how many times to retry activation when an activation error is detected. If this is set to zero (0), the activation will not be retried.

### Failover Threshold 0 to 99

Enter how many times to retry failover after activation retry fails as many times as the number of times set in **Retry Count at Activation Failure** when an error in activation is detected.

If this is set to zero (0), failover will not be executed.

### Final Action

Select an action to be taken when activation retry failed the number of times specified in **Activation Retry Threshold** and failover failed as many times as the number of times specified in **Failover Threshold** when an activation error is detected.

Select a final action from the following:

- **No Operation (Activate next resource):**  
Activates a group resource which depends on the group resource where an activation error is detected.
- **No Operation (Not activate next resource):**  
Does not activate a group resource which depends on the group resource where an activation error is detected.
- **Stop Group:**  
Deactivates all resources in the group of which the group resource that an activation error is detected.
- **Stop cluster daemon:**  
Stops the cluster daemon of the server of which an activation error is detected.
- **Stop cluster daemon and shutdown OS:**  
Stops the cluster daemon of the server of which an activation error is detected, and shuts down the OS.
- **Stop cluster daemon and reboot OS:**  
Stops the cluster daemon of the server where an activation error is detected, and restarts the OS.
- **Sysrq Panic:**  
Performs the sysrq panic.

---

#### Note:

If performing the sysrq panic fails, the OS is shut down.

---

- **Keepalive Reset:**  
Resets the OS using the clpkhb or clpka driver.

---

#### Note:

If resetting keepalive fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported

---

- **Keepalive Panic:**  
Performs the OS panic using the clpkhb or clpka driver.

---

#### Note:

If performing the keepalive panic fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported.

---

- BMC Reset:

Perform hardware reset on the server by using the ipmi command.

---

**Note:**

If resetting BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

- BMC Power Off:

Powers off the OS by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If powering off BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

- BMC Power Cycle:

Performs the power cycle (powering on/off) of the server by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If performing the power cycle of BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

- BMC NMI:

Uses the ipmi command to cause NMI occur on the server. Actions after NMI occurrence depend on the OS settings.

---

**Note:**

If BMC NMI fails, the OS shutdown is performed.  
Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

### Execute Script before Final Action

Select whether script is run or not before executing final action when an activation failure is detected.

- When selected:  
A script/command is run before executing final action. To configure the script/command setting, click **Settings**.
- When cleared:  
Any script/command is not run.

### Retry Count at Deactivation Failure (0 to 99)

Enter how many times to retry deactivation when an error in deactivation is detected.

If you set this to zero (0), deactivation will not be retried.

### Final Action

Select the action to be taken when deactivation retry failed the number of times specified in **Retry Count at Deactivation Failure** when an error in deactivation is detected.

Select the final action from the following:

- **No Operation (Deactivate next resource):**  
Deactivate a group resource of which the group resource that an error in deactivation is detected depends on.

---

#### Note:

If **No Operation** is selected as the final action when a deactivation error is detected, group does not stop but remains in the deactivation error status.  
Make sure not to set **No Operation** in the production environment.

---

- **No Operation (Not deactivate next resource):**  
Do not activate a group resource which depends on the group resource where an error in activation is detected.

---

#### Note:

If **No Operation** is selected as the final action when a deactivation error is detected, group does not stop but remains in the deactivation error status.  
Make sure not to set **No Operation** in the production environment.

---

- **Stop Group:**  
Deactivate all resources in the group of which the group resource that error in activation is detected belong.
- **Stop cluster daemon and shutdown OS:**  
Stop the cluster daemon on the server of which error in deactivation is detected, and shut down the OS.
- **Stop cluster daemon and reboot OS:**  
Stop the cluster daemon on the server where an error in deactivation is detected, and restart the OS.
- **Sysrq Panic:**  
Performs the sysrq panic.

---

#### Note:

If performing the sysrq panic fails, the OS is shut down.

---

- **Keepalive Reset:**  
Resets the OS using the clpkhb or clpka driver.

---

#### Note:

If resetting keepalive fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported

---

- **Keepalive Panic:**  
Performs the OS panic using the clpkhb or clpka driver.

---

#### Note:

If performing the keepalive panic fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported.

---

- BMC Reset:

Perform hardware reset on the server by using the ipmi command.

---

**Note:**

If resetting BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

- BMC Power Off:

Powers off the OS by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If powering off BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

- BMC Power Cycle:

Performs the power cycle (powering on/off) of the server by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If performing the power cycle of BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

- BMC NMI:

Uses the ipmi command to cause NMI occur on the server. Actions after NMI occurrence depend on the OS settings.

---

**Note:**

If BMC NMI fails, the OS shutdown is shut down.  
Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

### Execute Script before Final Action

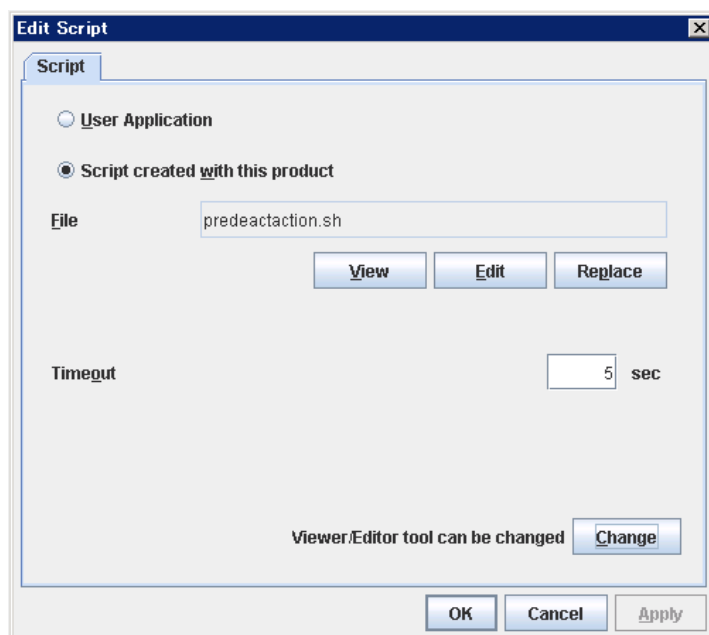
Select whether script is run or not before executing final action when a deactivation failure is detected.

- When selected:  
A script/command is run before executing final action. To configure the script/command setting, click **Settings**.
- When cleared:  
Any script/command is not run.

## Displaying and changing the script when a group resource activation/deactivation failure is detected

You can display and change the setting of a script which is run before executing final action when a group resource failure is detected (when group resources are active/inactive) by using the **Settings** tab of the Builder.

1. In the tree view shown in the left pane of the Builder, click the icon of the group to which the group resource you want to view or set whose behavior at the time when a group resource activation/deactivation failure is detected belongs.
2. The list of group resources will be shown in the table view on the right pane. Right-click the group resource which you want to display or set whose behavior at the time when a group resource error is detected. Click **Properties**, and then click the **Settings** tab.
3. Click **Settings** in **Recovery Operation at Activation Failure Detection** or **Recovery Operation at Deactivation Failure Detection** to display the **Edit Script** dialog box. Set the script/command to be run before executing final action.



### User Application

Use an executable file (executable shell script file or execution file) on the server as a script. For the file name, specify an absolute path or name of the executable file of the local disk on the server. If there is any blank in the absolute path or the file name, put them in double quotation marks (“”) as follows.

Example:

“/tmp/user application/script.sh”

Each executable files is not included in the cluster configuration information of the Builder. They must be prepared on each server since they cannot be edited nor uploaded by the Builder.

### Script created with this product

Use a script file which is prepared by the Builder as a script. You can edit the script file with the Builder if you need. The script file is included in the cluster configuration information.

**File** (Within 1023 bytes)

Specify a script to be executed (executable shell script file or execution file) when you select **User Application**.

### View

Click here to display the script file with a editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

**Edit**

Click here to edit the script file with the editor when you select **Script created with this product**. Overwrite the script file to reflect the change. You cannot edit the script file if it is currently displayed or edited. You cannot modify the name of the script file.

**Replace**

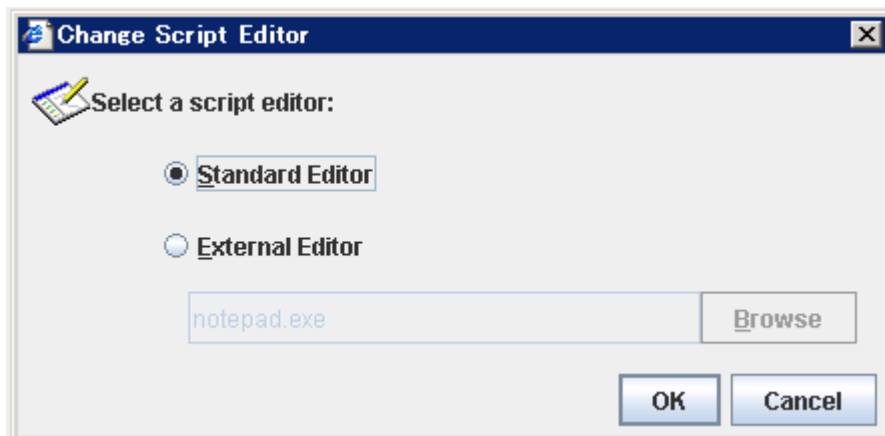
Click here to replace the contents of a script file with the contents of the script file which you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not select binary files (applications), and so on.

**Timeout (0 to 99)**

Specify the maximum time to wait for completion of script to be executed. The default value is set as 5.

**Change**

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

**Standard Editor**

Select this option to use the standard editor for editing scripts.

- Linux: vi (vi which is detected by the user's search path)
- Windows: Notepad (notepad.exe which is detected by the user's search path)

**External Editor**


Select this option to specify a script editor. Click **Browse** to select an editor.

To specify a CUI-based external editor on Linux, create a shell script.

The following is a sample shell script to run vi:

```
xterm -name clpedit -title " Cluster Builder " -n " Cluster Builder "  
-e vi "$1"
```

## Displaying the property of the whole groups by using the WebManager

1. Startup WebManager.
2. When you click the object for the all groups  in the tree view, the following information is displayed in the list view.


Group Name	Current Server	Status
WebManager	server1	Online
failover1	server1	Online

Groups Name: Group name

Current Server: Server that the group is currently active

Status: Group status

## Displaying the property of a certain group by using the WebManager

1. Startup the WebManager.
2. When you click the object for a certain group  in the tree view, the following information is displayed in the list view.

Group Name: failover 1		Details
Properties		Value
Name	failover1	
Comment		
Status	Online	
Group Status on Each Server		
Server Name		Status
server1	Online	
server2	Offline	
Resource Status		
Resource Name		Status
fip1	Online	

For Replicator

Resource Status	
Resource Name	Status
exec1	Online
fip1	Online
md1	Online
md2	Online

Name:	Group name
Comment:	Group comment
Status:	Group status
Server Name:	Server name
Status:	Status of the group on the server
Resource Name:	Resource name of the group
Status:	Status of the resources of the group

If you click **Details** button, the following information is displayed:

Property	Value
Type	failover
Startup Attribute	Auto Startup
Failover Exclusive Attribute	Off
Auto Failback Attribute	Auto Failback
Servers Which Can Be Started	server1
	server2

Type:	Group type
Startup Attribute:	Startup type of the group (auto/manual)
Failover Exclusive Attribute:	Startup exclusive attribute
Failback Attribute:	Failback attribute of the group (auto/manual)
Failover Attribute:	Failover attribute of the group (auto/manual)
Servers that can run the Group:	Order of the servers that the group failover

## Setting group resources for individual server

Some setting values of group resources can be configured for individual servers. On the properties of resources which can be set for individual servers, tabs for each server are displayed on the **Details** tab.

The following resources can be set for individual servers.

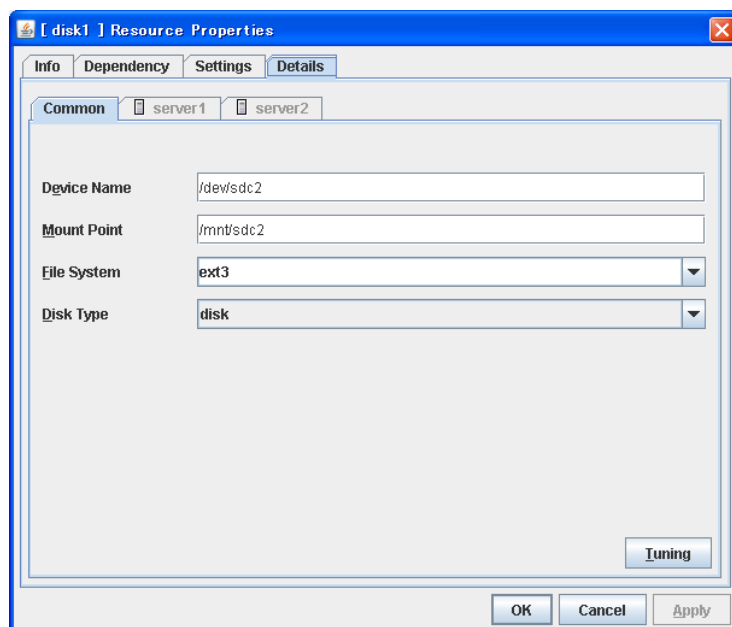
Group resource name	Supported version
Disk resource	2.0.0-1~
Floating IP resource	2.0.0-1~
Virtual IP resource	2.0.0-1~
Mirror disk resource	2.0.0-1~
Hybrid disk resource	2.0.0-1~
RAW resource	2.0.0-1~

### Note:

Some parameters of virtual IP resources should be configured for individual servers.

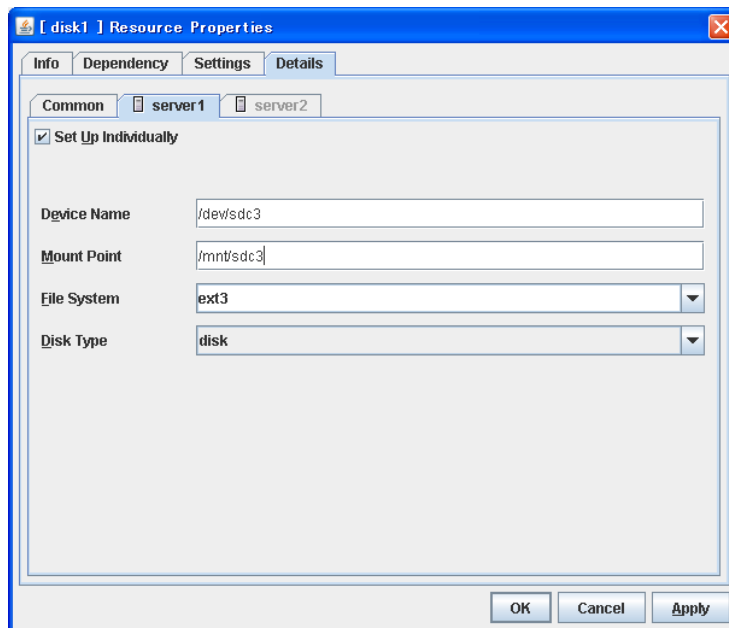
For parameters that can be set for individual servers, see the descriptions of parameters on each group resource. On those parameters, the **Server Individual Setup** icon is displayed.

In this example, the server individual setup for a disk resource is explained.



### Server Individual Setup

Parameters that can be set for individual servers on a disk resource are displayed.



### Set Up Individually

Click the tab of the server on which you want to configure the server individual setting, and select this check box. The boxes for parameters that can be configured for individual servers become active. Enter required parameters.

---

#### Note:

When setting up a server individually, you cannot select **Tuning**.

---

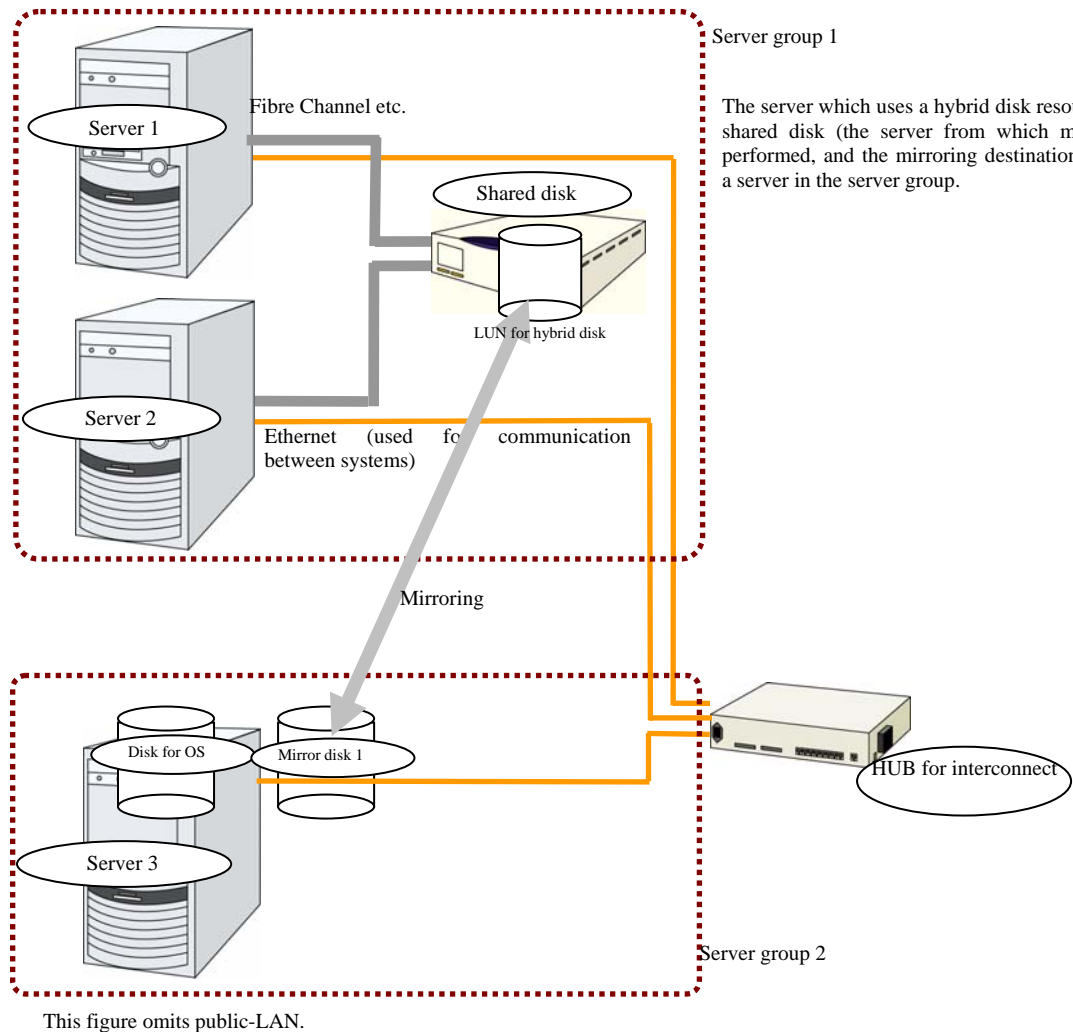
## Understanding server groups

This section explains about server groups.

Server groups are groups of servers which are required when hybrid disk resources are used.

Upon using hybrid disk resources in a shared disk device, servers connected by the same shared disk device are configured as a server group.

Upon using hybrid disk resources in a disk which is not shared, a server is configured as a server group.



## Displaying and changing the settings of server groups

You can display and change the settings of the server group by using **Server Group Properties** of the Builder.

### Renaming a server group (Server group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to rename, and then click **Rename Server Group**.
2. The **Change Server Group Name** dialog box is displayed. Enter a new name.

### Displaying and changing the comment of a server group (Server group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to change its comment, and then click **Properties**. The **Server Group Properties** dialog box is shown.
2. On the **Info** tab, the server group name and comment are displayed. Enter a new comment.

---

**Note:**

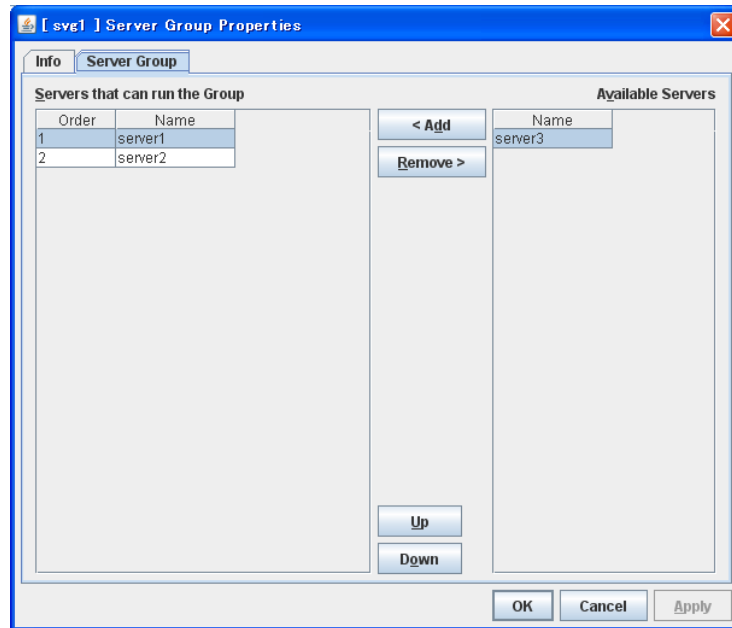
You cannot change the server group name on the **Info** tab. To change the group name, right-click the icon of the group as described in the step 1 above. Click **Rename Server Group** and enter a new name.

---

### Displaying and changing the settings of servers belonging to a server group (Server group properties)

You can change the servers which belong to a server group.

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to display and change the settings, and then click **Properties**. The **Server Group Properties** dialog box is shown.
2. Click the **Server Group** tab.
3. In **Servers that can run the Group**, servers that belong to the server group and their order are shown. The smaller the number, the higher priority the server has. In **Available Servers**, the servers that can be registered with **Servers that can run the Group** are shown.



4. Configure the server group settings according to the following instruction.

#### Add

Use **Add** to add a server that can run the group. Select the server you want to add from **Available Servers** list and then click **Add**. The selected server is added to the **Servers that can run the Group**.

#### Remove

Use **Remove** to remove a server that can run the group. Select the server you want to remove from the **Servers that can run the Group** list and then click **Remove**. The selected server is added to **Available Servers**.

#### Up & Down


Use **Up** and **Down** to change the priority of a server that can run the group. Select the server whose priority you want to change, and then click **Up** or **Down**. The selected row moves accordingly.

---

**Note:** Make sure that the priority of the **Servers that can run the Group** is consistent with the failover policy of the failover group to which the resource using this server group belongs.

---

## Displaying the server group properties with WebManager

1. Start WebManager.
2. In the tree view, click the object . The following will be displayed in the list view.

Servers Name: Servers		
Server Name	Type	Status
server1	Master	Online
server2		Online
server3		Online
server4		Online

Server group name  
Server name

Server group name  
Server names which belong to the server group

## Understanding EXEC resources

You can register applications and shell scripts that are managed by ExpressCluster and to be run when starting, stopping, failing over or moving groups in ExpressCluster. It is also possible to register your own programs and shell scripts in EXEC resources. You can write codes as required for respective application because shell scripts are in the same format as sh shell script.

---

**Note:**

The same version of the application to be run from EXEC resources must be installed on all servers in failover policy.

---

## Dependency of EXEC resources

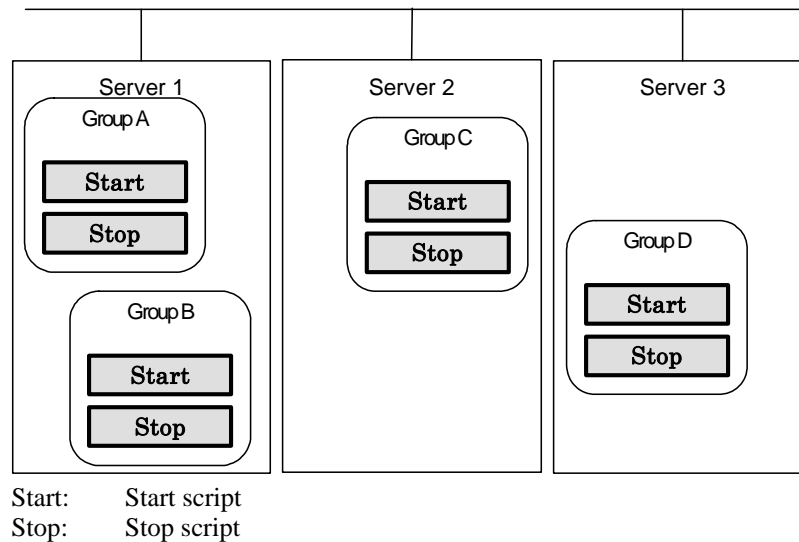
By default, exec resources depend on the following group resource types:

Group resource type
FIP Resource
Virtual IP resource
Disk Resource
Mirror Disk Resource
Hybrid Disk Resource
Raw Resource
Disk Group Resource
VxVM Volume Resource
NAS Resource

## Scripts in EXEC resources

### Types of scripts

Start script and stop script are provided in EXEC resources. ExpressCluster runs a script for each EXEC resource when the cluster needs to change its status. You have to write procedures in these scripts about how you want applications to be started, stopped, and restored in your cluster environment.



## Environment variables in EXEC resource script

When ExpressCluster runs a script, it records information such as condition when the scrip was run (script starting factor) in environment variables.

You can use the environment variables in the table below as branching condition when you write codes for your system operation.

Stop script returns the contents of the previous start script in the environment variable as a value. Start script does not set environment variables of CLP\_FACTOR and CLP\_PID.

The environment variable CLP\_LASTACTION is set only when the environment variable CLP\_FACTOR is CLUSTERSHUTDOWN or SERVERSHUTDOWN.

Environment Variable	Value of environment variable	Meaning
CLP_EVENT ...script starting factor	START	The script was run: - by starting a cluster; - by starting a group; - on the destination server by moving a group; - on the same server by restarting a group due to the detection of a monitor resource error; or - on the same server by restarting a group resource due to the detection of a monitor resource error.
	FAILOVER	The script was run on the failover target server: - by the failure of the server; - due to the detection of a monitor resource error; or - because activation of group resources failed.
CLP_FACTOR ...group stopping factor	CLUSTERSHUTDOWN	The group was stopped by stopping the cluster.
	SERVERSHUTDOWN	The group was stopped by stopping the server.
	GROUPSTOP	The group was stopped by stopping the group.
	GROUPMOVE	The group was moved by moving the group.
	GROUPFAILOVER	The group failed over because an error was detected in monitor resource; or the group failed over because of activation failure in group resources.
	GROUPRESTART	The group was restarted because an error was detected in monitor resource.
	RESOURCERestart	The group resource was restarted because an error was detected in monitor resource.
CLP_LASTACTION ...process after cluster shutdown	REBOOT	In case of rebooting OS
	HALT	In case of halting OS
	NONE	No action was taken.

Environment Variable	Value of environment variable	Meaning
CLP_SERVER ...server where the script was run	HOME	The script was run on the primary server of the group.
	OTHER	The script was run on a server other than the primary server of the group.
CLP_DISK ...partition connection information on shared or mirror disks	SUCCESS	There was no partition where connection had failed.
	FAILURE	There was one or more partition where connection had failed.
CLP_PRIORITY ... the order in failover policy of the server where the script is run	1 to the number of servers in the cluster	Represents the priority of the server where the script is run. This number starts from 1 (The smaller the number, the higher the server's priority).  If CLP_PRIORITY is 1, it means that the script is run on the primary server.
CLP_GROUPNAME ...Group name	Group name	Represents the group name that the script belongs.
CLP_RESOURCENAME ...Resource name	Resource name	Represents the resource name that the script belongs.
CLP_PID ...Process ID	Process ID	Represents the process ID of start script when the property of start script is set to asynchronous. This environment variable is null when the start script is set to synchronous.

## Execution timing of EXEC resource script

This section describes the relationships between the execution timings of start and stop scripts and environment variables according to cluster status transition diagram.

- ◆ To simplify the explanations, 2-server cluster configuration is used as an example. See the supplements for the relations between possible execution timings and environment variables in 3 or more server configurations.
- ◆ O and X in the diagrams represent the server status.

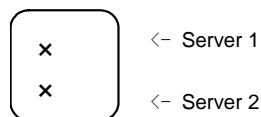
Server	Server status
O	Normal (properly working as a cluster)
X	Stopped (cluster is stopped)

(Example) OA: Group A is working on a normally running server.

- ◆ Each group is started on the top priority server among active servers.
- ◆ Three Group A, B and C are defined in the cluster, and they have their own failover policies as follows:

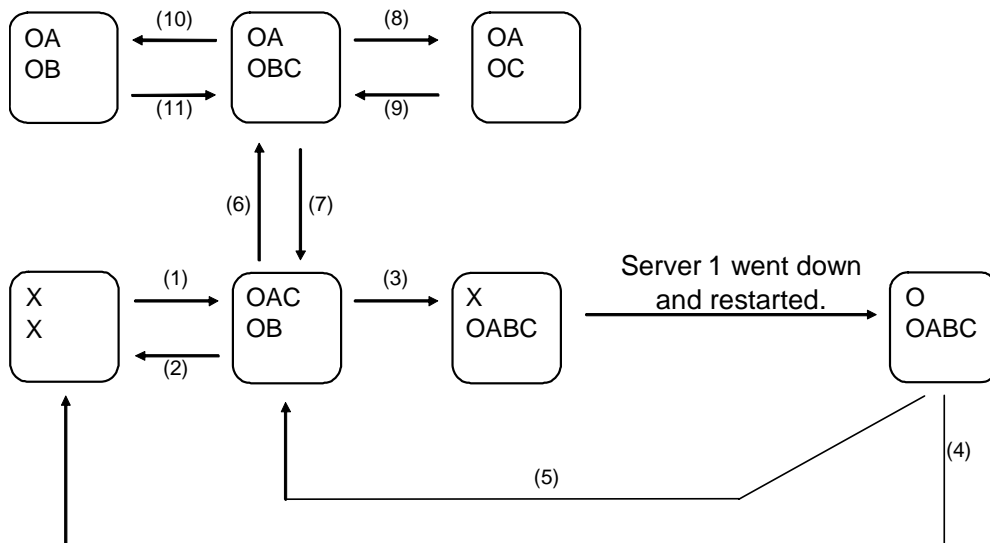
Group	1 <sup>st</sup> priority server	2 <sup>nd</sup> priority server
A	server1	server2
B	server2	server1
C	server1	server2

- ◆ The upper server is referred to as server1 and the lower one as server2.



<Cluster status transition diagram>

This diagram illustrates a typical status transition of cluster.

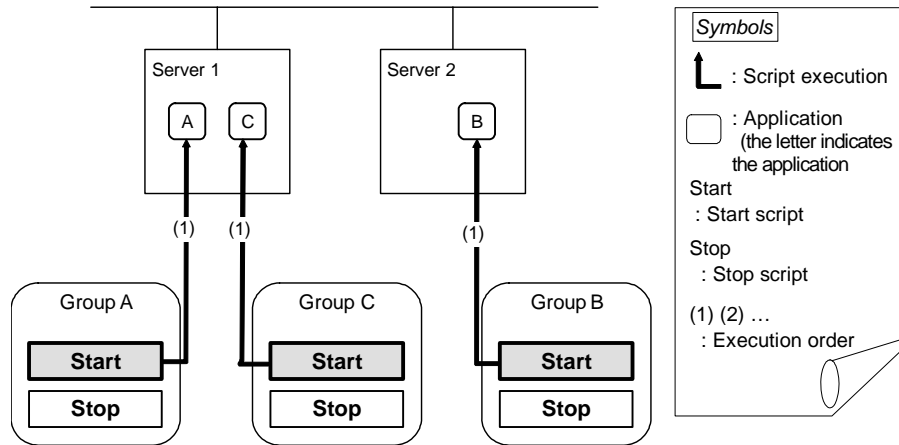


Numbers (1) to (11) in the diagram correspond to descriptions as follows.

### (1) Normal startup

Normal startup here means that the start script has been run properly on the primary server.

Each group is started on the server with the highest priority among the active servers.

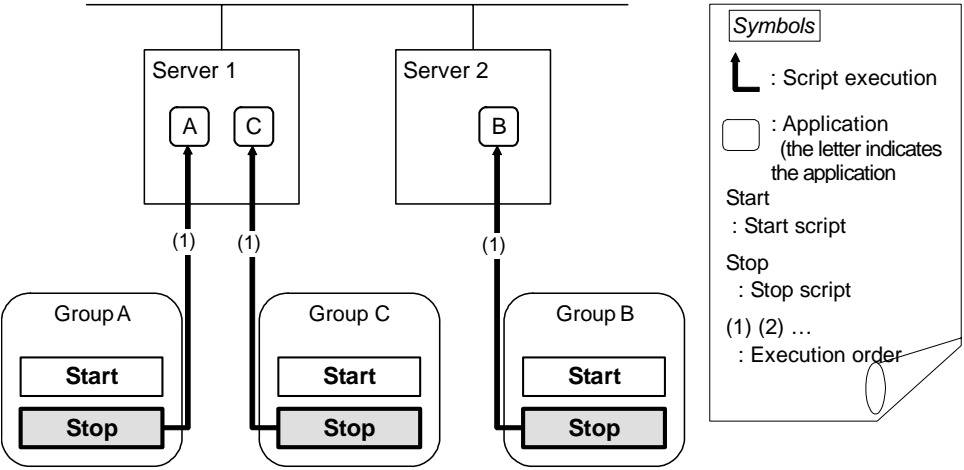


Environment variables for Start

Group	Environment variable	Value
A	CLP_EVENT	START
	CLP_SERVER	HOME
B	CLP_EVENT	START
	CLP_SERVER	HOME
C	CLP_EVENT	START
	CLP_SERVER	HOME

(2) Normal shutdown

Normal shutdown here means a cluster shutdown immediately after the start script corresponding to the stop script that was run by performing normal startup or by moving a group (online failback).



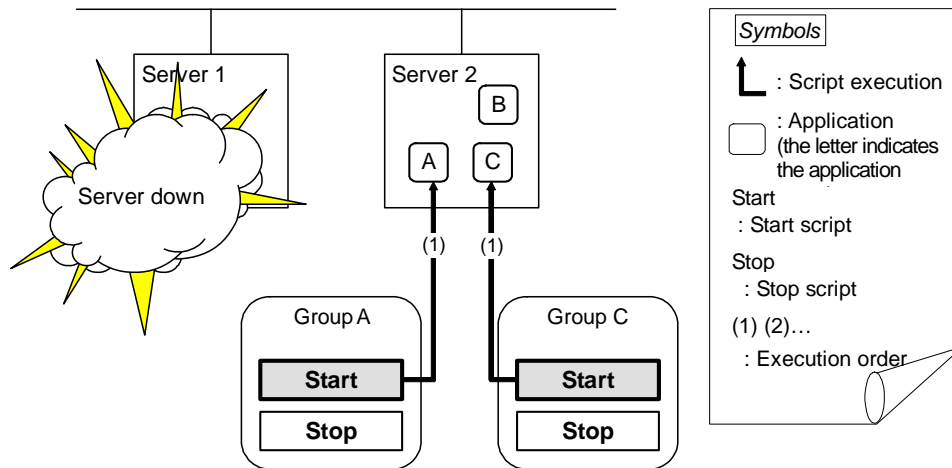
Environment variables for Stop

Group	Environment variable	Value
A	CLP_EVENT	START
	CLP_SERVER	HOME
B	CLP_EVENT	START
	CLP_SERVER	HOME
C	CLP_EVENT	START
	CLP_SERVER	HOME

**(3) Failover at server1 down**

When the start scrip of a group which has server1 as its primary server, it is run on a lower priority server (server2) when an error occurs. You need to write `CLP_EVENT(=FAILOVER)` as a branching condition for triggering application startup and recovery processes (such as database rollback process) in the start script in advance.

For the process to be performed only on a server other than the primary server, specify `CLP_SERVER(=OTHER)` as a branching condition and describe the process in the script.

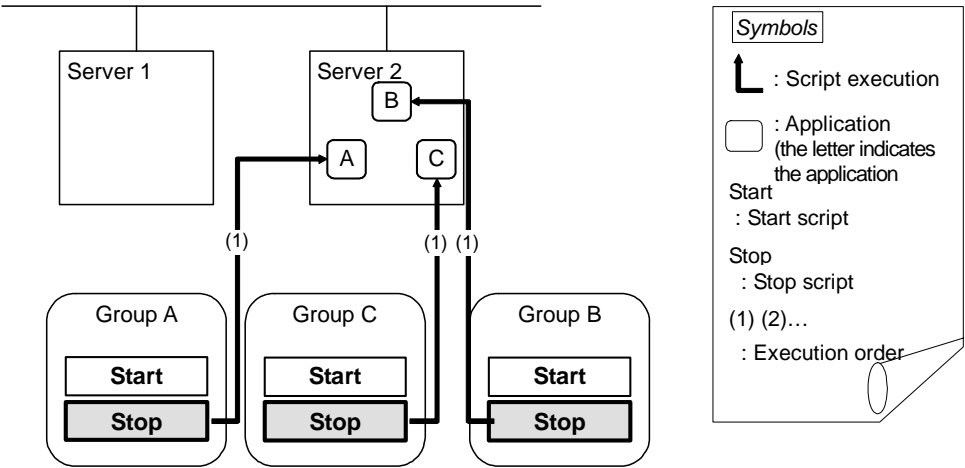


Environment variables for Start

Group	Environment variable	Value
A	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

(4) Cluster shutdown after failover of server1

The stop scripts of the Group A and C are run on server2 where the groups fail over (the stop script of Group B is run by a normal shutdown).

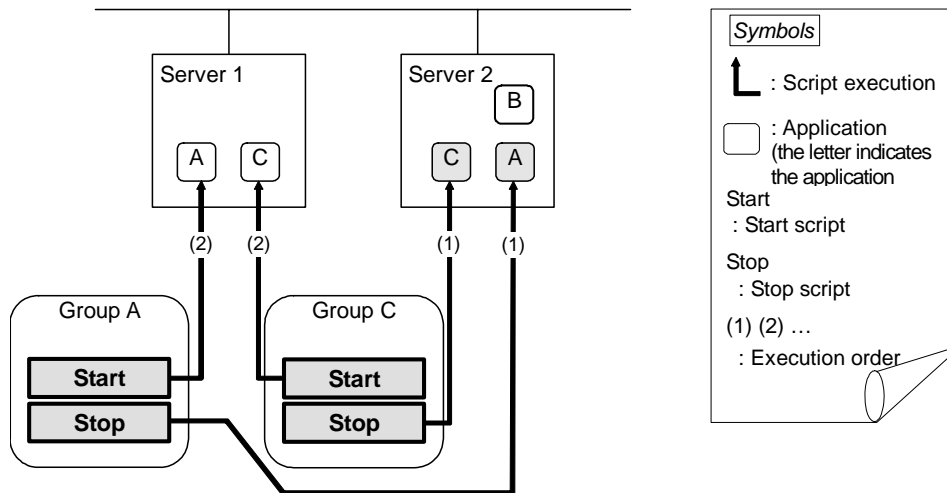


Environment variables for Stop

Group	Environment variable	Value
A	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER
B	CLP_EVENT	START
	CLP_SERVER	HOME
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

**(5) Moving of Group A and C**

After the stop scripts of Group A and C are run on server2 where the groups fail over, their start scripts are run on server1.



Environment variables for Stop

Group	Environment variable	Value
A	CLP_EVENT	FAILOVER <sup>1</sup>
	CLP_SERVER	OTHER
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

Environment variables for Start

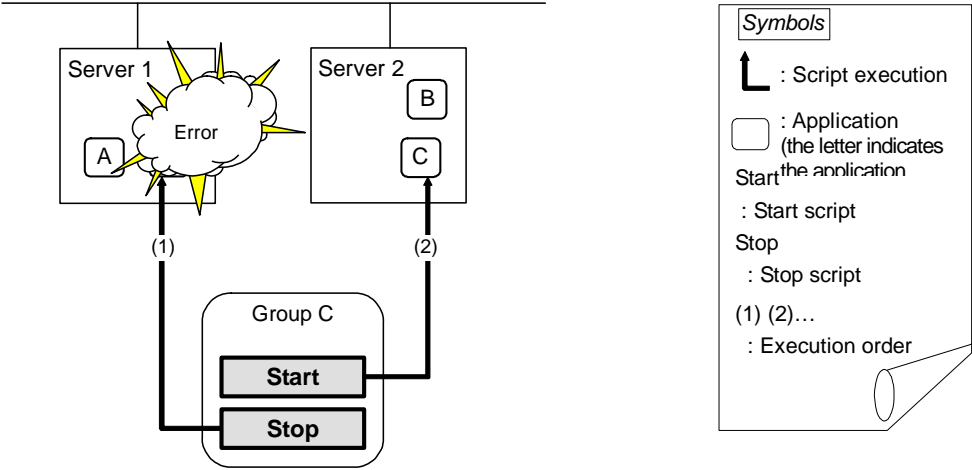
Group	Environment variable	Value
A	CLP_EVENT	START
	CLP_SERVER	HOME
C	CLP_EVENT	START
	CLP_SERVER	HOME

<sup>1</sup> Environment variables in a stop script take those in the previous start script.

For moving in “(5) Moving of Group A and C” because it is not preceded by a cluster shutdown, the environment variable used here is FAILOVER. However, if a cluster shutdown is executed before moving in “(5) Moving of Group A and C,” the environment variable is START.

(6) Error in Group C and failover

When an error occurs in Group C, its stop script is run on server1 and start script is run on server2.



Stop for server1

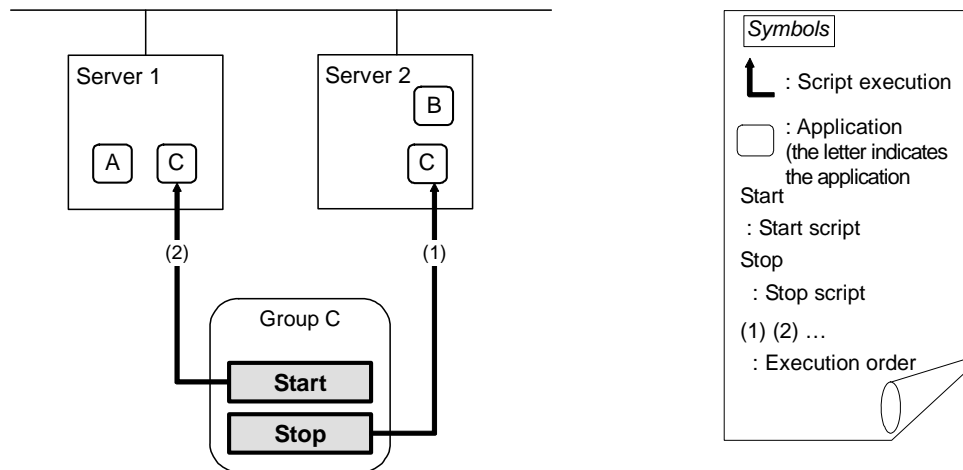
Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	HOME

Start for server2

Group	Environment variable	Value
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

**(7) Moving of Group C**

Move the Group C that is failed over to server2 in (6) from server2 to server1. Run the stop script on server2, and then run the start script on server1.



Stop (because this is failed over in (6))

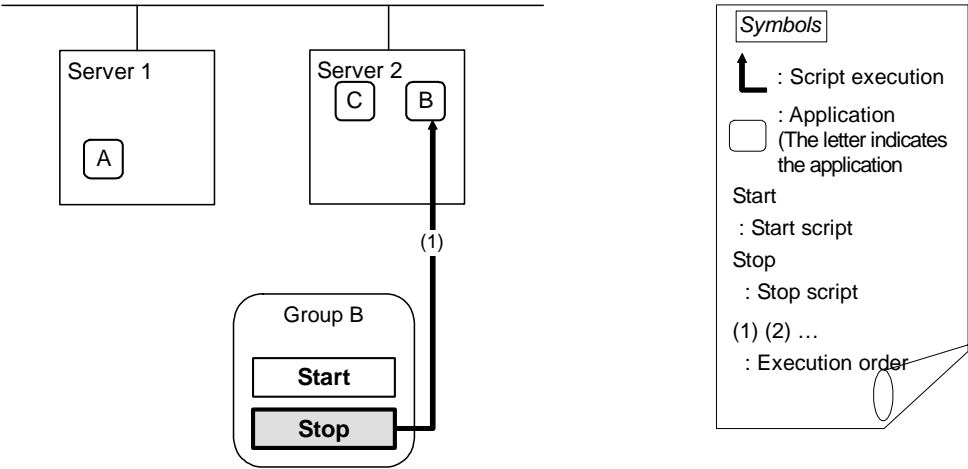
Group	Environment variable	Value
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

Start

Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	HOME

(8) Stopping Group B

The stop script of Group B is run on server2.

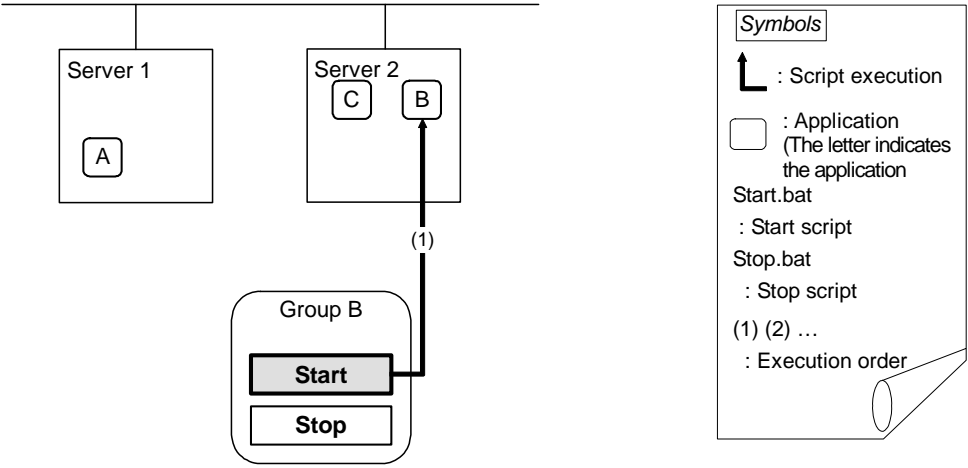


Stop

Group	Environment variable	Value
B	CLP_EVENT	START
	CLP_SERVER	HOME

(9) Starting Group B

The start script of Group B is run on server2.

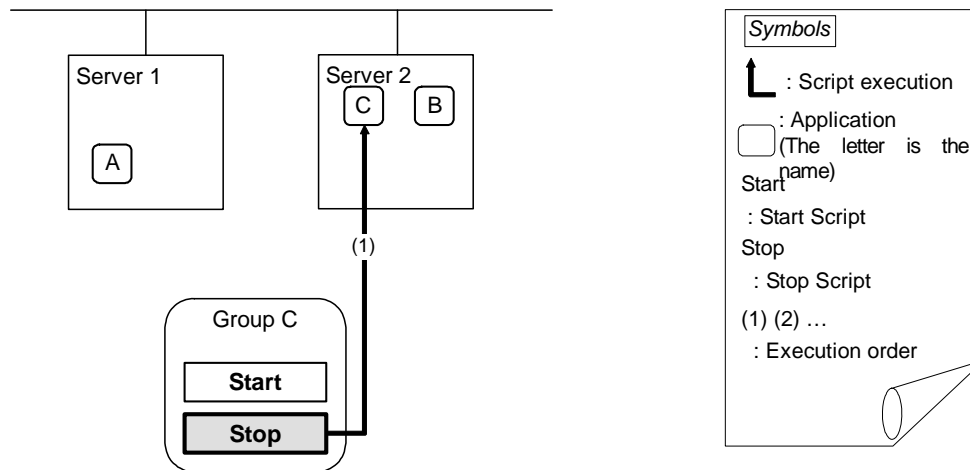


Start

Group	Environment variable	Value
B	CLP_EVENT	START
	CLP_SERVER	HOME

**(10) Stopping Group C**

The stop script of Group C is run on server2.

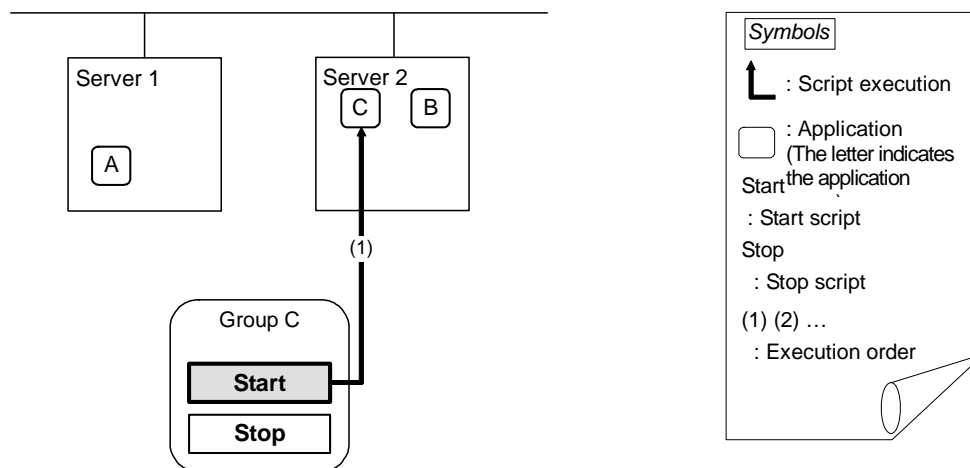


Stop

Group	Environment variable	Value
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

**(11) Starting Group C**

The start scrip of Group C is run on server2.

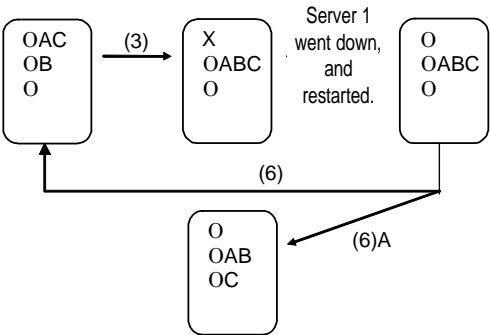


Start

Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	OTHER

Supplementary information 1

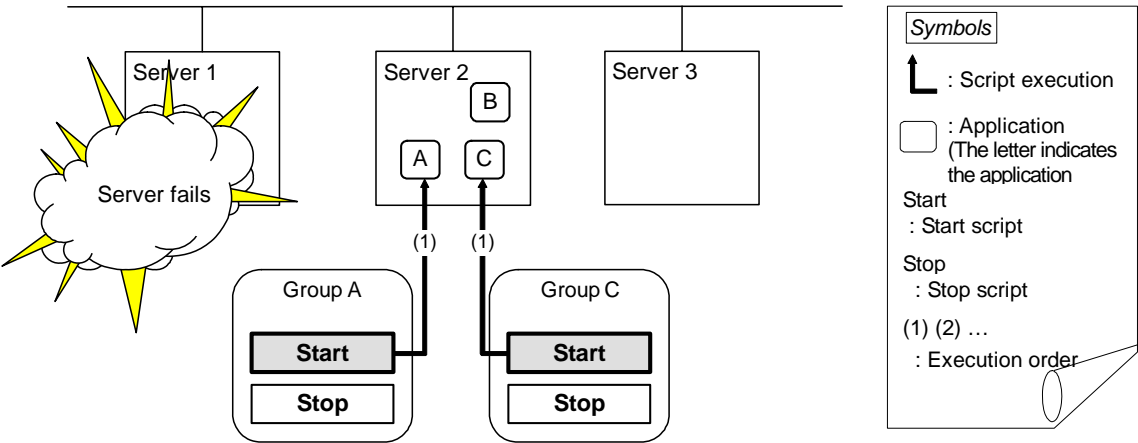
For a group that has three or more servers specified in the failover policy to behave differently on servers other than the primary server, use CLP\_PRIORITY instead of CLP\_SERVER(HOME/OTHER).



Example 1: “(3) Failover at server1 down” in the cluster status transition diagram

A group has server1 as its primary server. If an error occurs on server1, its start script is run on server2 that has next highest priority failover policy. You need to write CLP\_EVENT(=FAILOVER) as the branching condition for triggering applications’ startup and recovery processes (such as database rollback process) in the start script in advance.

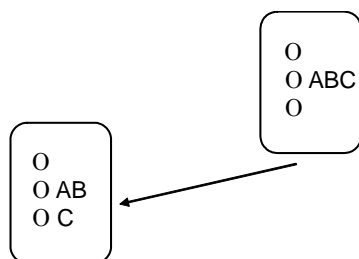
For a process to be performed only on the server that has the second highest priority failover policy, it is necessary to write CLP\_PRIORITY(=2) as the branching condition.



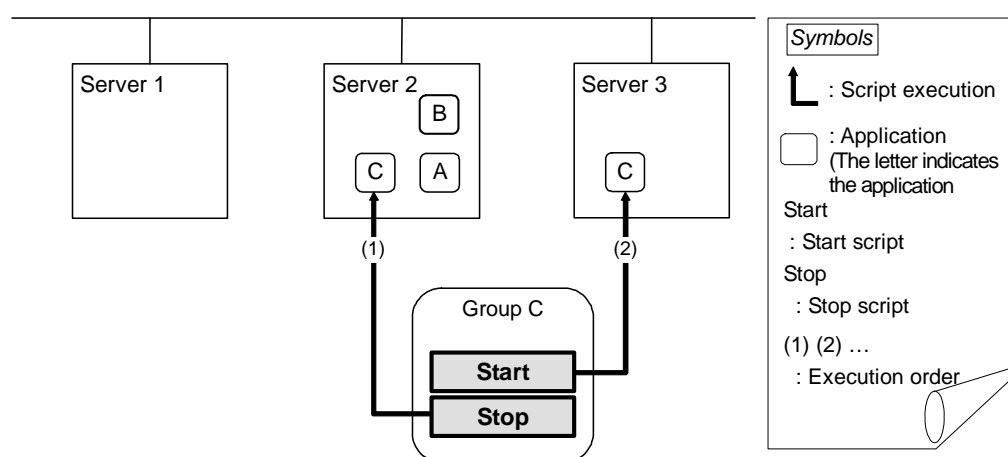
Environment variables for Start

Group	Environment variable	Value
A	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER
	CLP_PRIORITY	2
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER
	CLP_PRIORITY	2

Example 2: “(7) Moving of Group C” in the cluster status transition diagram



After the stop scrip of Group C is run on server2 where the group failed over from, the start script is run on server3.



Environment variables for Stop

Group	Environment variable	Value
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER
	CLP_PRIORITY	2

Environment variables for Start

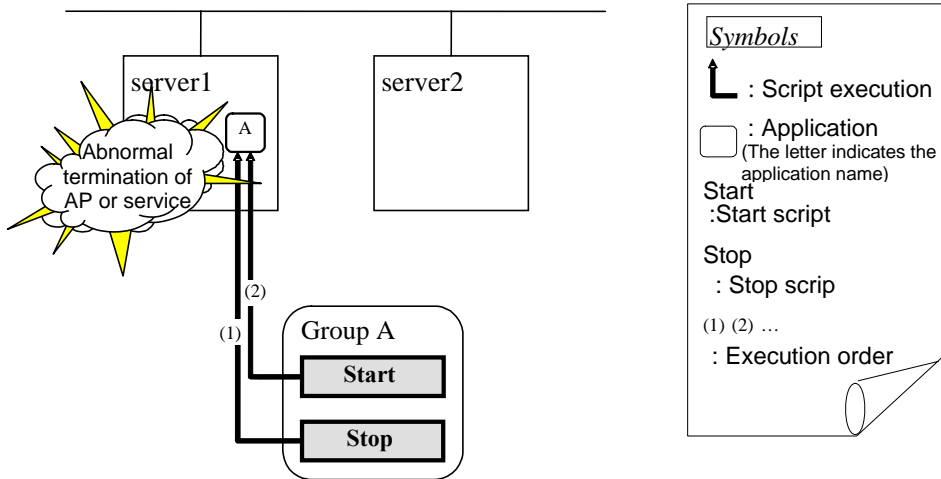
Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	OTHER
	CLP_PRIORITY	3

Supplementary information 2

When monitor resource starts or restarts a script:

To run the start script when resource monitor detected an error in application, the environment variables should be as follows:

Example 1: Resource monitor detects abnormal termination of an application that was running on server1 and restarts Group A on the server1.



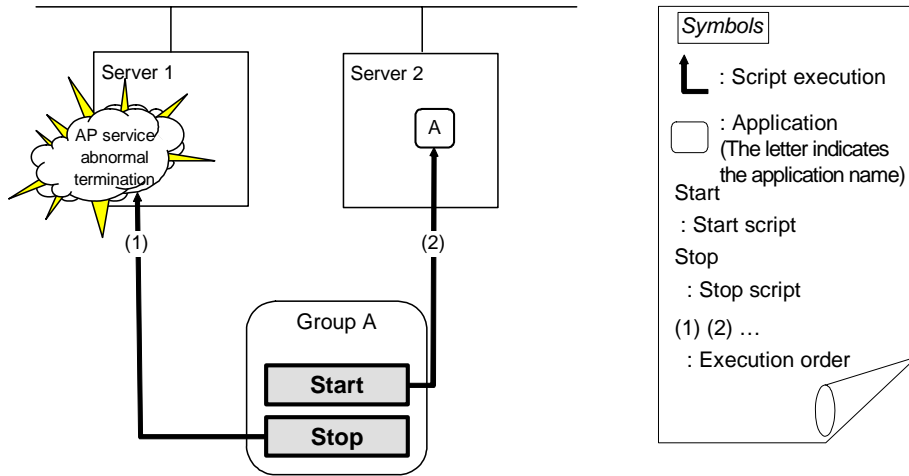
Environment variable for Stop

Group		Environment variable	Value
A	(1)	CLP_EVENT	The same value as when the start script is run

Environment variable for Start

Group		Environment variable	Value
A	(2)	CLP_EVENT	START

Example2: Resource monitor detects abnormal termination of an application that was running on server1, fails over to server2 and restarts Group A on server2



Environment variable for Stop

Group		Environment variable	Value
A	(1)	CLP_EVENT	The same value as when the start script is run

Environment variable for Start

Group		Environment variable	Value
A	(2)	CLP_EVENT	FAILOVER

## Writing EXEC resource scripts

This section explains timing script execution described in the preceding topic relating to the actual script codes.

Numbers in brackets “(number)” in the following example script code represent the actions described in “Execution timing of EXEC resource script” on page 495.

Group A start script: A sample of **start.sh**

```
#!/bin/sh
# *****
# *          start.sh          *
# *****

if [ "$CLP_EVENT" = "START" ]
then
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
```

Refer to the environment variable of script executing factor and divide the processes.

*Overview of processing:*  
Application's normal startup processing  
*When to start this process:*  
(1) Normal startup  
(5) Moving of Group A and C

```

    if [ "$CLP_SERVER" = "HOME" ]
    then
```

Refer to the environment variable of executing server and divide the processes.

*Overview of processing:*  
A process to be executed only when the application is normally started on the primary server.  
*When to start this process:*  
(1) Normal startup  
(5) Moving of Group A and C

```

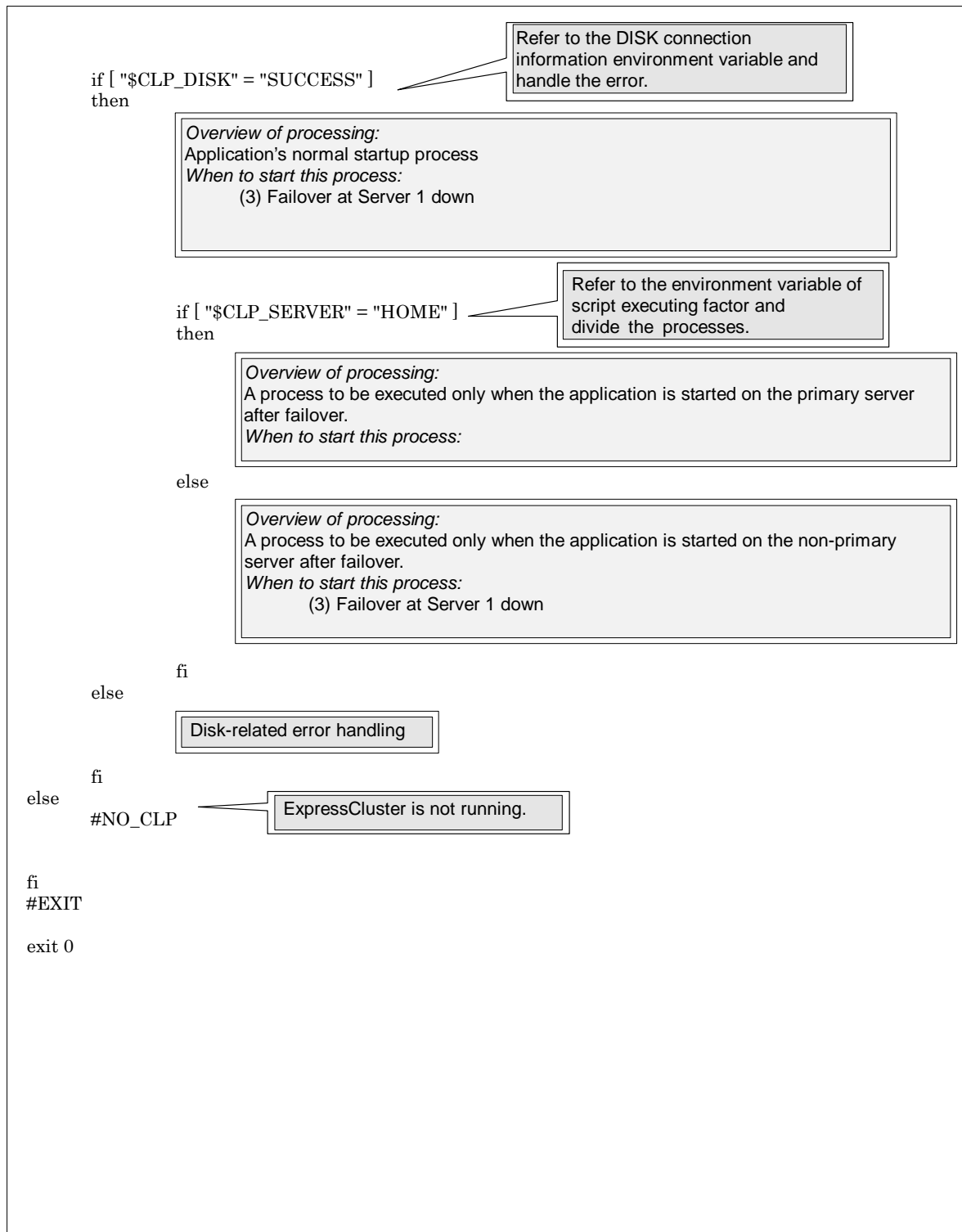
    else
```

*Overview of processing:*  
A process to be executed only when the application is normally started on the server other than the primary server.  
*When to start this process:*

```

    fi
else
    Disk-related error handling
fi

elif [ "$CLP_EVENT" = "FAILOVER" ]
then
```



Group A stop script: A sample of **start.sh**

```
#!/bin/sh
# *****
# *           stop.sh           *
# *****
```

```
if [ "$CLP_EVENT" = "START" ]
then
```

```
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
```

Refer to the environment variable of script executing factor and divide the processes.

*Overview of processing:*  
Application's normal startup process  
*When to start this process:*  
(2) Normal shutdown

```
    if [ "$CLP_SERVER" = "HOME" ]
    then
```

Refer to the environment variable of executing server and divide the processes.

*Overview of processing:*  
A process to be executed only when the application is normally terminated on the primary server.  
*When to start this process:*  
(2) Normal shutdown

```
    else
```

*Overview of processing:*  
A process to be executed only when the application is normally terminated on the server other than the primary server.  
*When to start this process:*

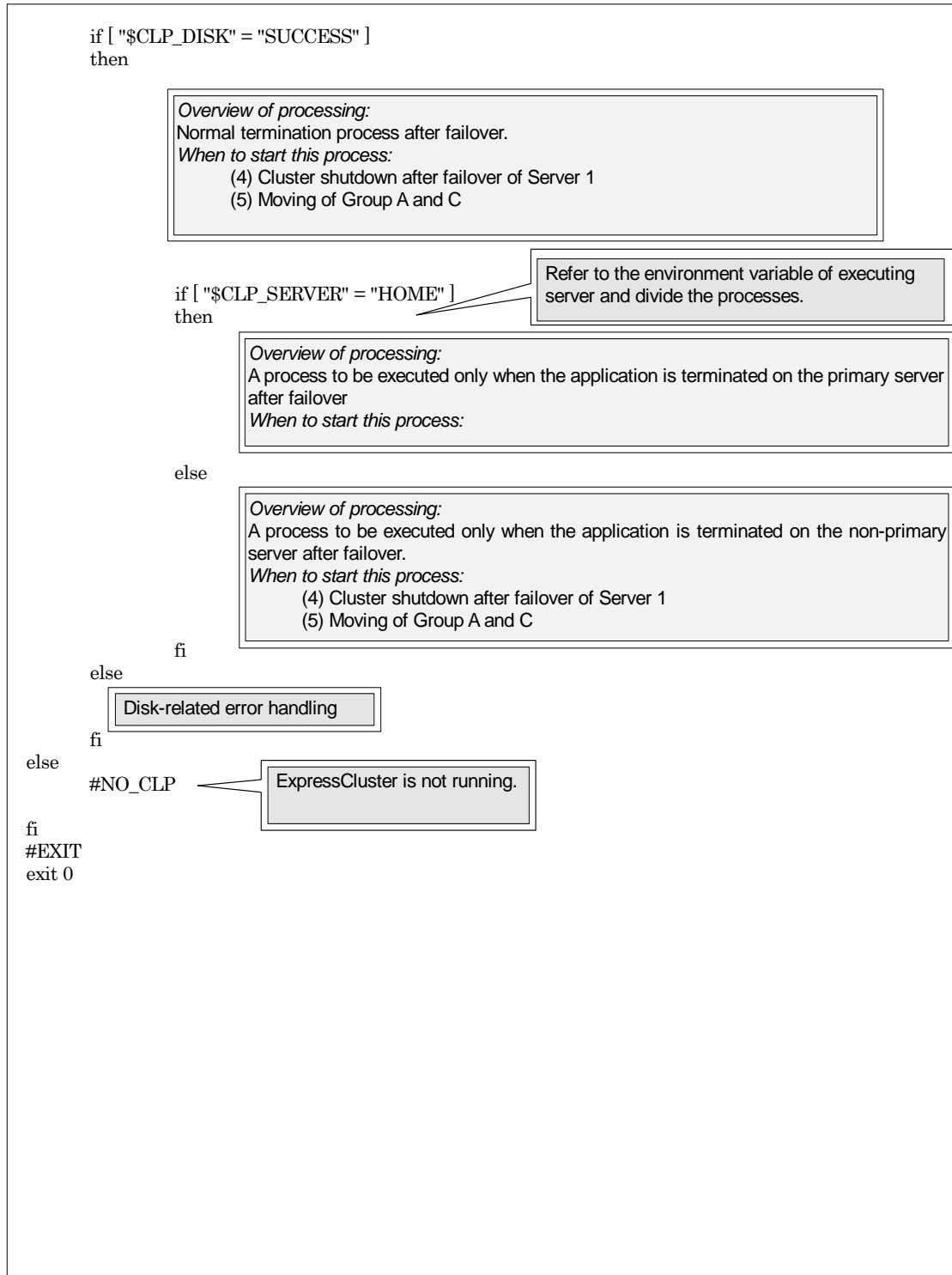
```
    fi
```

```
else
```

Disk-related error handling

```
fi
```

```
elif [ "$CLP_EVENT" = "FAILOVER" ]
then
```



## Tips for creating EXEC resource script

If your script has a command that requires some time to complete, it is recommended to configure command completion messages to be always produced. This message can be used to determine the error when a problem occurs. There are two ways to produce the message:

- ◆ Specify the log output path of EXEC resource by writing the echo command in the script.

The message can be produced with the echo command. Specify the log output path in the resource properties that contain the script. The message is not logged by default. For how to configure the settings for the log output path, see “Tuning EXEC resource” on page 520. Pay attention to the available disk space of a file system because messages are sent to the file specified as the log output destination file regardless of the size of available disk space.

(Example: sample script)

```
echo “appstart..”
```

```
appstart
```

```
echo “OK”
```

- ◆ Write the clplogcmd command in the script.

The message can be produced to the alert view of the WebManager or syslog in OS with the clplogcmd command. For details on the clplogcmd command, refer to “Message output command” in Chapter 4, “ExpressCluster command reference.”

(Example: sample script)

```
clplogcmd -m “appstart..”
```

```
appstart
```

```
clplogcmd -m “OK”
```

## Notes on EXEC Resource

- ◆ Stack size of the application started from exec resources

Exec resource is executed with the stack size configured to 2MB. If an application which is started from exec resource requires the stack size of more than 2MB, stack overflow occurs. If stack overflow occurs, configure the stack size before starting the application.

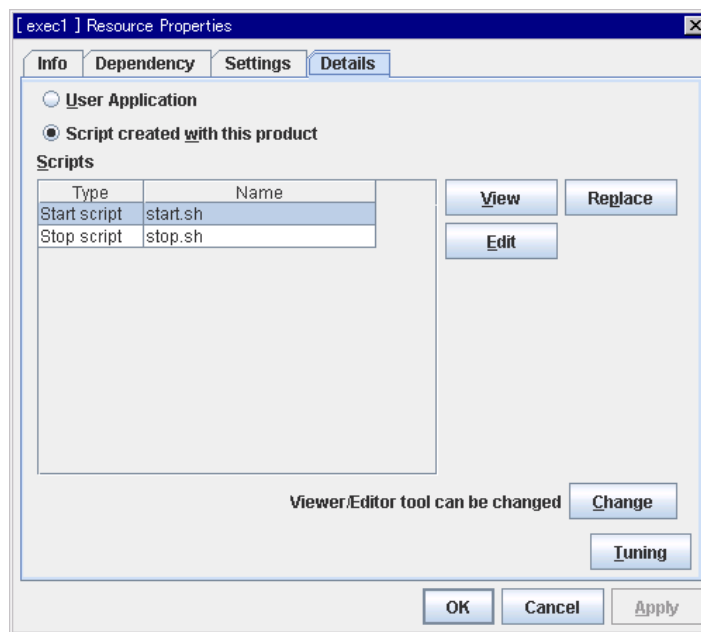
1. If you select **Script created with this product**  
Please change stack size using ulimit command before the application is executed.
2. If you select **User Application** (Do not use this mode)  
Please select Script created with this product and edit script file to execute the application by the script. Also, please change stack size using ulimit command before the application is executed.

Example of start script (start.sh)

```
-----  
#!/bin/sh  
#*****  
#*                start.sh                *  
#*****  
  
ulimit -s unlimited  # Change stack size (unlimited)  
  
" the application to be executed"  
  
-----
```

## Displaying and changing the EXEC resource details

1. In the tree view shown on the left pane of the Builder, click the icon of the group to which the EXEC resource whose detailed information you want to display and change belongs.
2. The list of group resources is displayed in the table view on the right pane of the screen. Right-click the name of EXEC resource that you want to display and change. Click **Properties**, and then click **Details** tab.
3. Display and/or change the settings by following the description below.



### User Application

Select this option to use executable files (executable shell scripts and binary files) on your server as scripts. Specify the local disk path on the server for each executable file name.

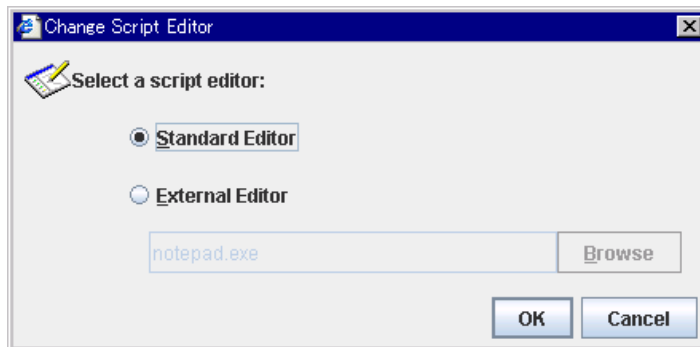
The executable files will not be distributed to each server. They should be placed on each server in advance. The cluster configuration data created by the Builder does not contain these files. You cannot edit the script files using the Builder.

### Script Created with the Builder

Select this option to use script files created by the Builder as scripts. You can edit them using the Builder as necessary. The cluster configuration data contains these script files.

**Change**

Opens a dialog box for changing script editor. You can change the script editor for viewing and editing scripts to any editor.

**Standard Editor**

Select this option to use the standard editor for editing scripts.

- Linux: vi (vi which is detected by the user's search path)
- Windows: Notepad (notepad.exe which is detected by the user's search path)

**External Editor**

Select this option to specify a script editor. Click **Browse** to select an editor.

To specify a CUI-based external editor on Linux, create a shell script.

The following is a sample shell script to run vi:

```
xterm -name clpedit -title "Cluster Builder " -n " Cluster Builder"
-e vi "$1"
```

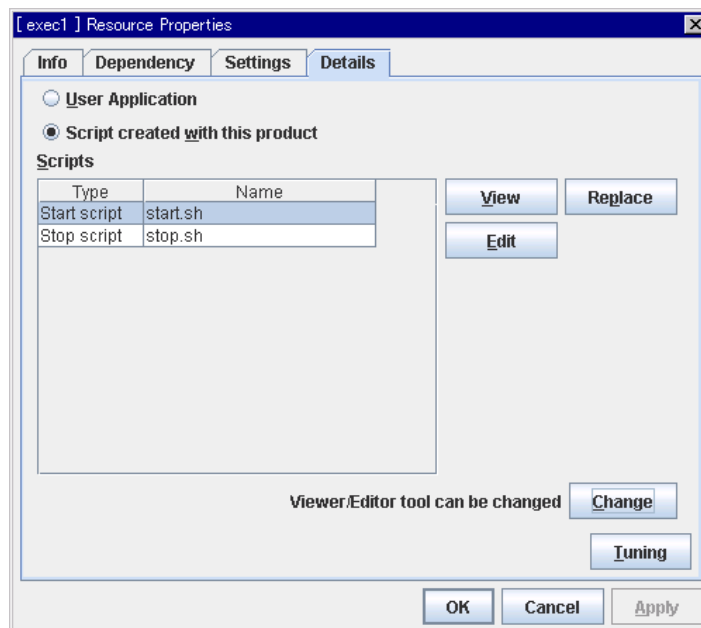
**Tuning**

Opens the EXEC resource tuning properties dialog box. You can make advanced settings for the EXEC resource. If you want the PID monitor resource to monitor the exec resources, you have to set the start script to asynchronous.

## Displaying and changing the EXEC resource script created by the Builder

1. From the tree view in the left pane of the Builder, click the icon of the group to which EXEC resource whose detail information you want to display and change belongs.
2. Group resource list is displayed on the table view in the right pane of the window. Right-click the EXEC resource name. Then click **Properties** and select the **Details** tab.
3. Click **Script Created by the Builder** in the **Details** tab.
4. The settings of monitor resource can be displayed and/or changed by following the description below.

The default script file names, start.sh and stop.sh, are listed on **Scripts**.



### View

Displays the selected script file on the script editor.<sup>2</sup> Changes made and saved by the editor are not reflected.

If the selected script file is being viewed or edited, you cannot see it.

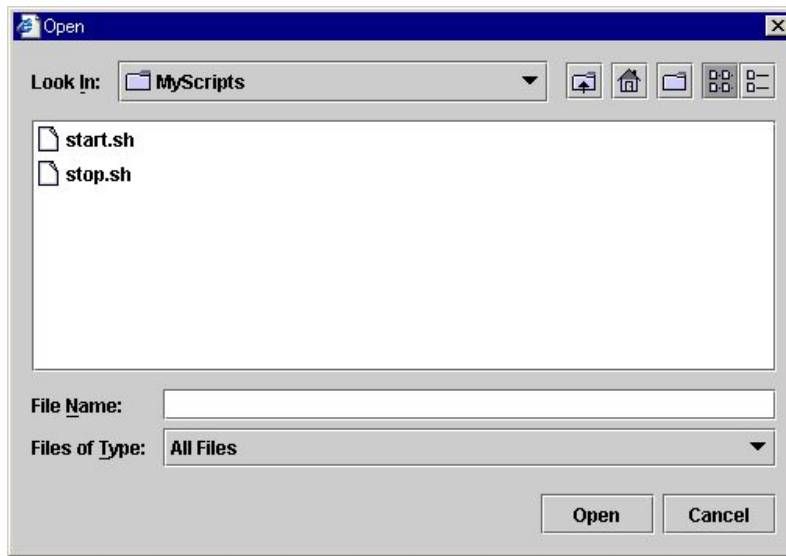
### Edit

You can edit the selected script file on the script editor. To reflect changes, overwrite the file. If the selected script file is being viewed or edited, you cannot edit it. You cannot rename the script file

<sup>2</sup> In the Linux environment, the default script editor is vi. Use the q command to close the editor.

## Replace

Opens the **Open** dialog box.



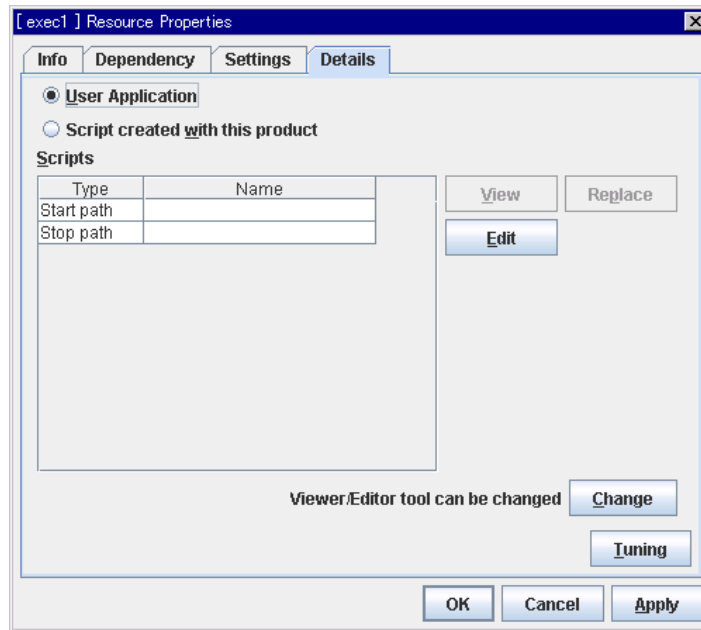
The contents of the script file selected in the **Resource Property** are replaced with the one selected in the **Open** dialog box. If the selected script file is being viewed or edited, you cannot replace it. Select a script file, not a binary file such as an application program.

## Displaying and changing EXEC resource script using a user application

1. From the tree view displayed in the left pane of the Builder, click the icon of the group to which the EXEC resource whose detail information you want to display and change belongs.
2. Group resource list is displayed on the table view in the right pane of the window. Right-click the EXEC resource name. Then click **Properties** and select the **Details** tab.
3. Click **User Application** on the **Details** tab.
4. The settings of monitor resource can be displayed and/or changed by following the description below.

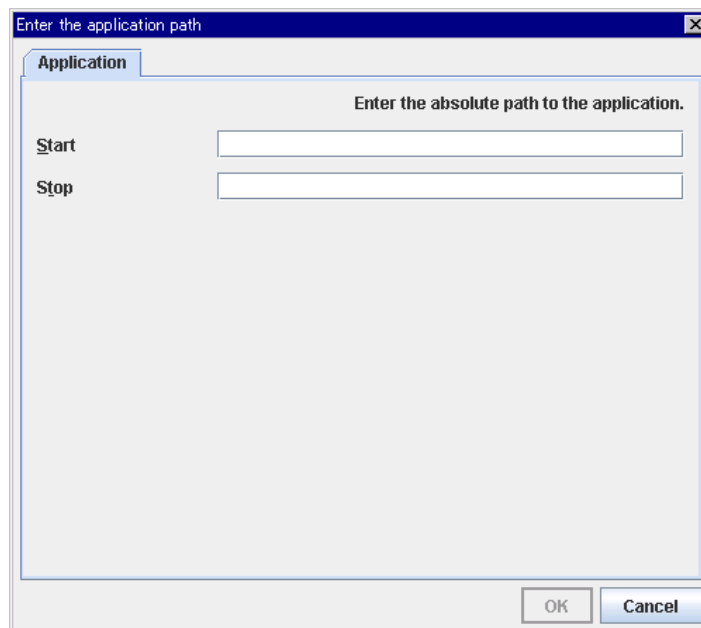
Select any file as the EXEC resource executable file. Specified executable file names are listed on **Scripts**. Executable files mean executable shell scripts and binary files.

The standard script editor, which is set to the Builder that operates on Linux, is vi. When closing the window for display and editing, close with the q command of vi.



### Edit

Specify an exec resource executable file name. The **Enter the application path** dialog box is displayed.



**Start** (Within 1023 bytes)

Enter an executable file name to be run when the exec resource starts. The name should begin with “/.”

**Stop** (Within 1023 bytes)

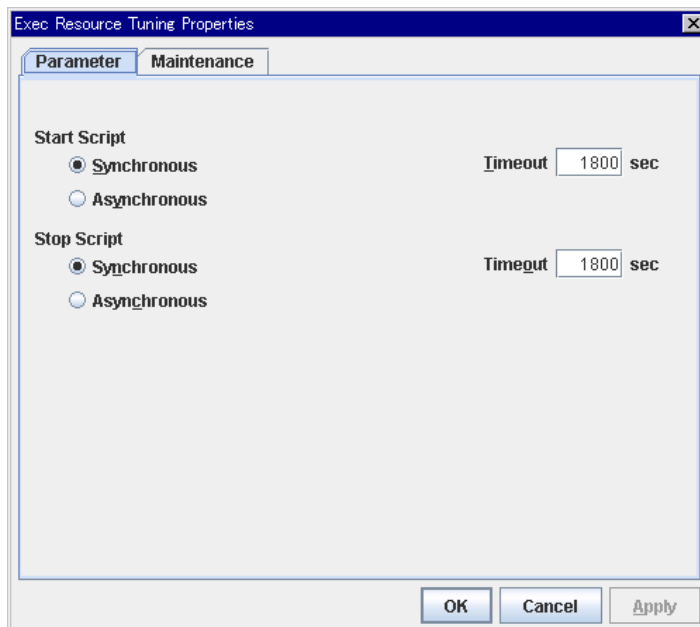
Enter an executable file name to be run when the exec resource exits. The name should begin with “/.” The stop script is optional.

For the executable file name, specify a full path name starting with “/” to a file on your cluster server.

## Tuning EXEC resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the EXEC resource whose detail information you want to display and change belongs.
2. Group resource list is displayed on the table view in the right pane of the window. Right-click the EXEC resource name. Then click **Properties** and select the **Details** tab.
3. Click **Tuning** on the **Details** tab. The **Exec Resource Tuning Properties** dialog box is displayed.
4. On the **Details** tab, you can see and/or change the settings of monitor resource by following the description below.

### Parameter tab



### Common to all start scripts and stop scripts

#### Synchronous

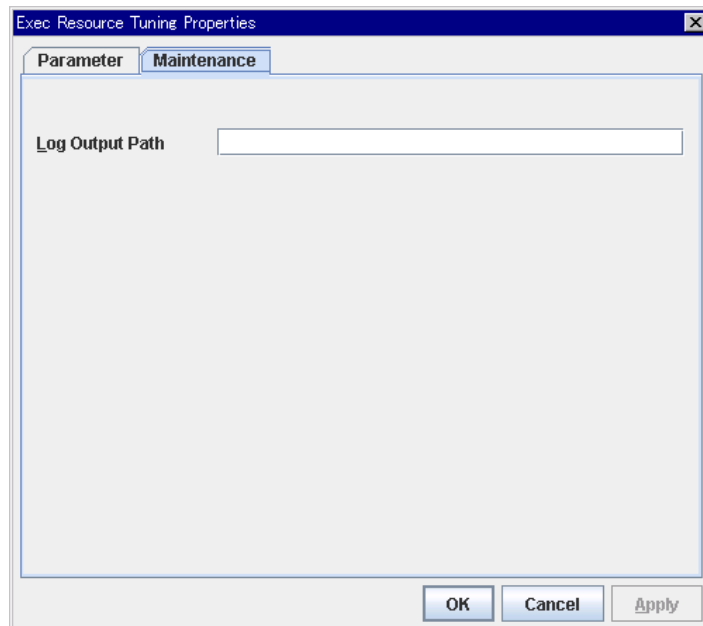
Waits for the script to end when it is run. Select this option for executable files that are not resident (the process is returned immediately after the script completion).

#### Asynchronous

Does not wait for the script to end when it is run. Select this for resident executable files. The script can be monitored by PID monitor resource if **Asynchronous** is selected.

#### Timeout 0 to 9999


When you want to wait for a script termination (when selecting **Synchronous**), specify how many seconds you want to wait before a timeout. This box is enabled when **Synchronous** is selected. Unless the script completes within the specified time, it is determined as an error.

**Maintenance tab****Log Output Path** (Within 1023 bytes)

Specify the redirect destination path of standard output and standard error output for EXEC resource scripts and executable files. If this box is left blank, messages are directed to /dev/null. The name should begin with “/.”

Pay attention to the available disk space of the file system because if a file name is specified, messages are sent to that file regardless of the size of available disk space.

## Displaying EXEC resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for an EXEC resource  in the tree view, the following information is displayed in the list view.

EXEC Name: exec1 Details

Common server1 server2

Properties	Value
Name	exec1
Comment	
Start Script Path	start.sh
Stop Script Path	stop.sh
Status	Online

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Resource name
Comment:	Comment
Start Script Path:	Path of the start script
Stop Script Path:	Path of the stop script
Status:	Resource status
Server Name:	Server name
Status:	Resource status of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	exec
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	flp1_md1
Start Type	Synchronous
Stop Type	Synchronous
Start Script Timeout (sec)	1800
Stop Script Timeout (sec)	1800
Log Output Path	

Type:	Resource type
Failover Threshold:	Failover count
Retry Count at Activation Failure:	Activation retry count
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Reactivation retry count
Final Action at Deactivation Failure:	Last action at a reactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resources
Start Type:	Start script type: synchronous/asynchronous
Stop Type:	Stop script type: synchronous/asynchronous
Start Script Timeout (sec):	Start script timeout for waiting the script to end (synchronous) (in seconds)
Stop Script Timeout (sec):	Stop script timeout for waiting the script to end (synchronous) (in seconds)
Log Output Path:	Message output destination while running scripts

## Understanding disk resource

### Dependencies of disk resource

Disk resource is supported by the following versions of ExpressCluster by default.

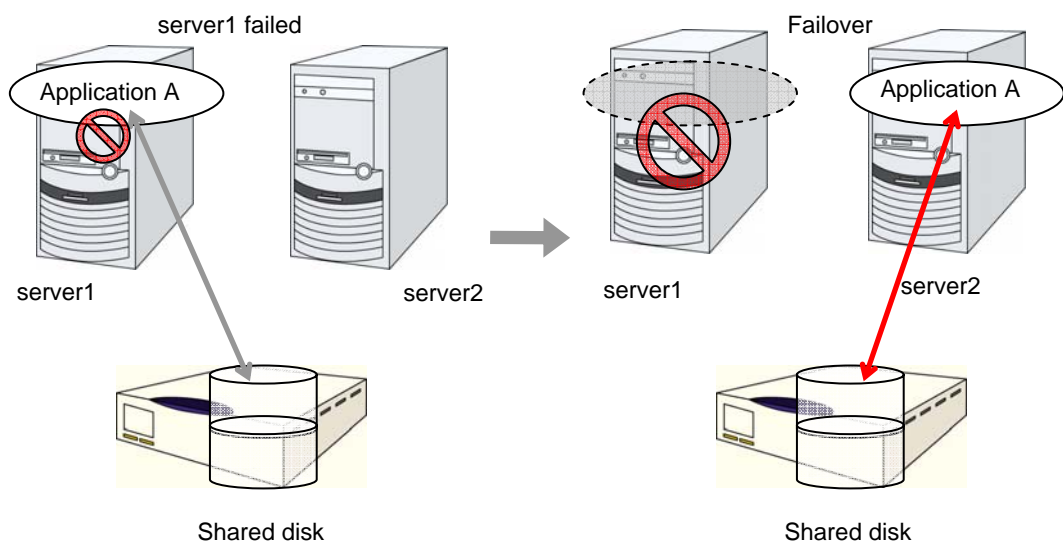
Group Resource Type
Floating IP resource
Virtual IP resource

### Switching partitions

Switching partitions refer to partitions on shared disks connected to more than one server in a cluster.

Switching is done for each failover group according to the failover policy. By storing data required for applications on switching partitions, the data can be automatically used when failing over or moving failover group.

If switching partitions are not accessible with the same device name on all the servers, configure the server individual setup.



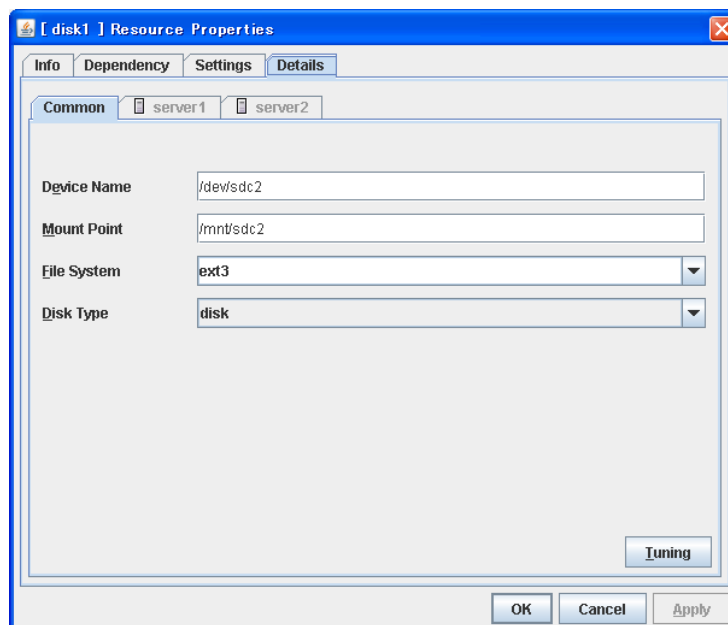
## Disk resources

- Note 1:** For shared disks, functions such as stripe set, volume set, mirroring, stripe set with parity by Linux md are not supported.
- Note 2:** ExpressCluster controls accesses to the file system (mount/umount). Thus, do not configure the settings about mount/umount on the OS.
- Note 3:** The partition device name set to the disk resource is in the read-only mode on all servers in a cluster. Read-only status is released when the server is activated.
- Note 4:** If **Mount/Umount Exclusion** is selected on the **Exclusion** tab of the **Cluster Prosperities**, it may take some time to activate or deactivate a disk resource because mount or unmount of disk resource, VxVM volume resource, NAS resource, and mirror resource is performed exclusively in the same server.
- Note 5:** When specifying path including symbolic link for mount point, Force Operation cannot be done even if it is chosen as operation in Detecting Failure.

## Displaying and changing the details of disk resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the disk resource whose detailed information you want to display and/or change belongs.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the desired disk resource name, click **Properties**, and open the **Details** tab.
3. On the **Details** tab, you can see and/or change the settings by following the description on the next page.

### Disk Resource Properties: Details tab



**Device Name** (Within 1023 bytes) **Server Individual Setup**

Enter the disk device name to be used for disk resources. The name should begin with “/.”

**Mount Point** (Within 1023 bytes) **Server Individual Setup**

Enter the directory to mount the disk device. The name should begin with “/.”

**File System** **Server Individual Setup**

You select a file system type created on the disk device. Choose one from the types described below. You may also directly enter the type.

- ◆ ext2
- ◆ ext3
- ◆ xfs
- ◆ jfs
- ◆ reiserfs

**Disk Type** **Server Individual Setup**

Select a disk type. You can only choose [disk].

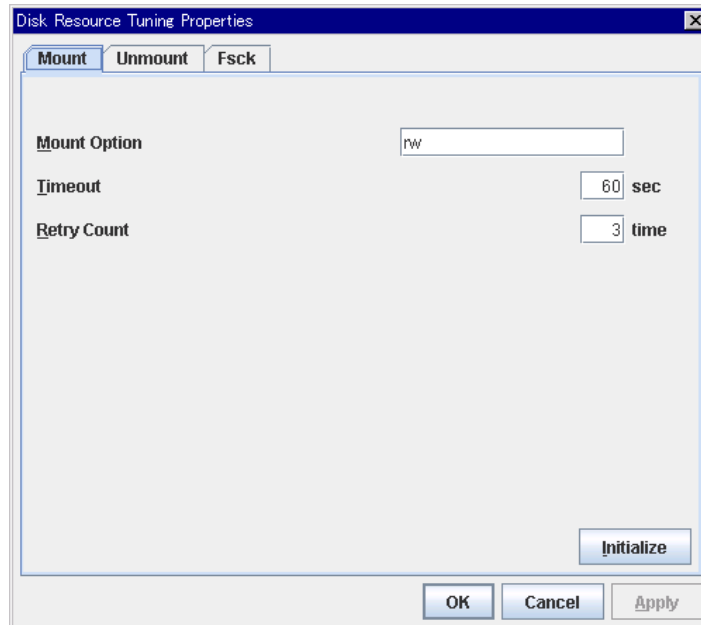
**Tuning**

Opens the **Disk Resource Tuning Properties** dialog box. Make detailed settings on the dialog box.

## Disk Resource Tuning Properties

### Mount tab

The detailed settings related to mount are displayed.



### Mount Option

Enter options to give the mount command when mounting the file system on the disk device. More than one option is delimited with a comma “,”.

A mount option sample

Setting item	Setting value
Device name	/dev/sdb5
Mount point	/mnt/sdb5
File system	ext3
Mount option	rw,data=journal

The mount command to be run with the above settings is:

```
mount -t ext3 -o rw,data=journal /dev/sdb5 /mnt/sdb5
```

### Timeout 1 to 999

Enter how many seconds you want to wait for the mount command completion before its timeout when you mount the file system on the disk device.

If the file system has a large size of disk space, it may take some time for the command to complete. Make sure to specify the value that is enough for the mount command completion.

### Retry Count 0 to 999

Enter how many times you want to retry to mount the file system on the disk device when one fails.

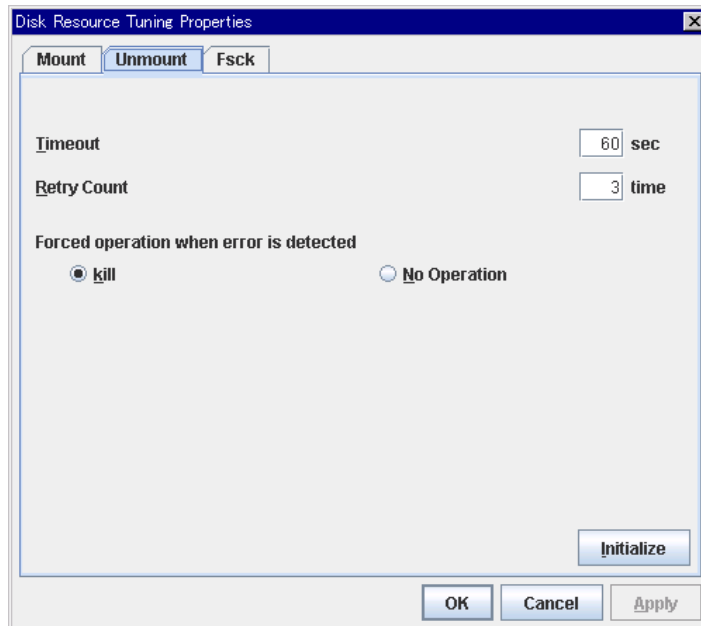
If you set this to zero (0), mount will not be retried.

### Initialize

Clicking **Initialize** resets the values of all items to the default values.

### Unmount tab

The detailed settings related to unmount are displayed.



**Timeout** 1 to 999

Enter how many seconds you want to wait for the umount command completion before its timeout when you unmount the file system on the disk device.

**Retry Count** 0 to 999

Enter how many times you want to retry to unmount the file system on the disk device when one fails. If this is set to zero (0), unmount will not be retried.

#### Forced Operation When Detecting Failure

Select an action to be taken at an unmount retry if unmount is failed.

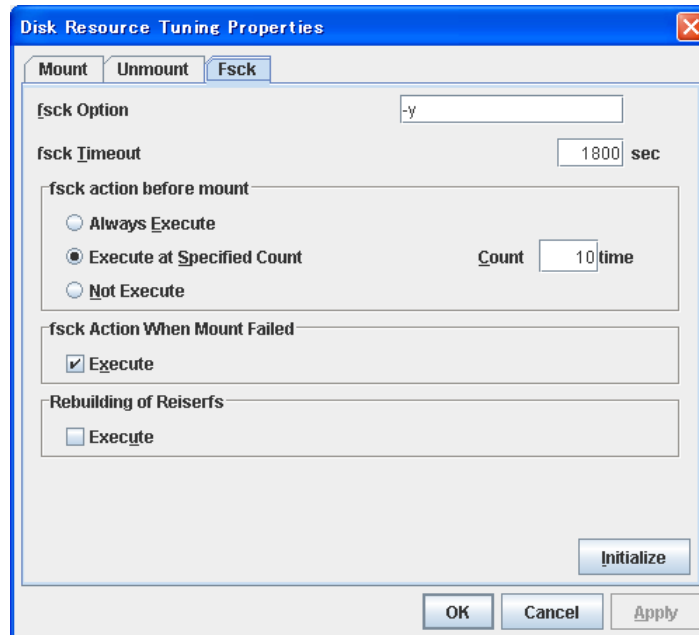
- ◆ **kill**  
Select this to try to kill the processes that are accessing the mount point. Not always the process can be killed.
- ◆ **No Operation**  
Select this not to try to kill the processes that are accessing the mount point.

#### Initialize

Clicking **Initialize** resets the values of all items to the default values.

## Fsck tab

The detailed settings related to fsck are displayed. fsck is executed when mounting disk resources failed.



### fsck Option (Within 1023 bytes)

Enter options to give to the fsck command when checking the file system on disk device. Options are delimited with a space. Specify options so that the fsck command does not work interactively. Otherwise, you may not be allowed to mount until the “fsck timeout” elapses. When the file system is reiserfs, the fsck command works interactively. However, it can be avoided if ExpressCluster gives “Yes” to reiserfsck.

### fsck timeout 1 to 9999

Enter how many seconds you want to wait for the fsck command completion before its timeout when you check the file system on the disk device. If the file system has a large size of disk space, it may take some time for the command to complete. Make sure to specify the value that is enough for the mount command completion.

### fsck action before performing mount

Select an fsck action before mounting file system on a disk device from the following choices:

- ◆ Always Execute  
fsck is executed before mounting the file system.
- ◆ Execute at Specified Count  
fsck is executed when resource is activated successfully within the count specified by **Count**.  
= Count (0~999)
- ◆ Not Execute  
fsck is not executed before mounting the file system.

---

#### Note:

The number of times to execute fsck is not related to the check interval managed by a file system.

---

### **fsck action when mount failed**

Set an fsck action when detecting a mount failure on a disk device.

This setting is enabled when the setting of Mount **Retry Count** is other than zero.

- ◆ When selected:  
Mount is retried after running fsck.
- ◆ When cleared:  
Mount is retried without running fsck.

---

#### **Note:**

It is not recommended to set “Not Execute” fsck action before performing mount. With this setting, disk resource does not execute fsck and disk resource cannot be failed over when there is an error that can be recovered by fsck in the switchable partition.

---

### **Follow-up recovery of reiserfs**


Specify the action when reiserfsck fails with a recoverable error.

- ◆ When the checkbox is selected  
reiserfsck --fix --fixable is executed.
- ◆ When the checkbox is not selected  
Recovery is not performed even if reiserfsck fails with a recoverable error.

### **Initialize**

Clicking **Initialize** resets the values of all items to the default values.

## Displaying the disk resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a disk resource  in the tree view, the following information is displayed in the list view.

DISK Name: disk1		Details
Common		server1 server2
Properties		Value
Name		disk1
Comment		
Device Name		/dev/sdc2
Mount Point		/mnt/sdc2
File System		ext3
Status		Online
Resource Status on Each Server		
Server Name		Status
server1		Online
server2		Offline

Name: Disk resource name  
 Comment: Comment  
 Device Name: Name of the disk device used as disk resource  
 Mount Point: Directory where the disk device is mounted  
 File System: Type of the file system created on the disk device  
 Status: Disk resource status

Server Name: Server name  
 Status: Resource status of each server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	disk
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	fip1
Disk Type	disk
Mount Option	rw
Mount Timeout (sec)	60
Mount Retry Count	3
Fsck Action When Mount Failed	Execute
Unmount Timeout (sec)	60
Unmount Retry Count	3
Action at Unmount Failure	kill
Fsck Option	-y
Fsck Timeout (sec)	1800
Fsck Action Before Mount	Execute at Specified Count
Fsck Interval	3
Re-restoration of Reiserfs	None

Type:	Resource type
Failover Threshold:	Failover count
Retry Count at Activation Failure:	Activation retry count
Final Action at Activation Failure:	Final action at activation failures
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Reactivation retry count
Final Action at Deactivation Failure:	Final action at reactivation failures
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Disk Type:	Disk type
Mount Option:	Mount option
Mount Timeout (sec):	Mount timeout (in seconds)
Mount Retry Count:	Mount retry count
Fsck Action When Mount Failed	Action to be taken at a mount error
	0 No action
	1 Perform fsck
Unmount Timeout (sec):	Unmount timeout (in seconds)
Unmount Retry Count:	Unmount retry count
Action at Unmount Failure:	Action to be taken at an unmount error
	kill Force termination
	No Operation No action
Fsck Option:	Options passed to the fsck command
Fsck Timeout (sec):	Timeout for the fsck command execution (in seconds)
Fsck Action Before Mount	fsck timing when performing mount
	+0 Do not perform fsck
	+1 Always perform fsck
	+2 Perform fsck at fsck interval
Fsck Interval:	fsck interval
Follow-up recovery of reiserfs	Action to be taken at reiserfsck failure
	0 No action
	1 Perform recovery

# Understanding floating IP resource

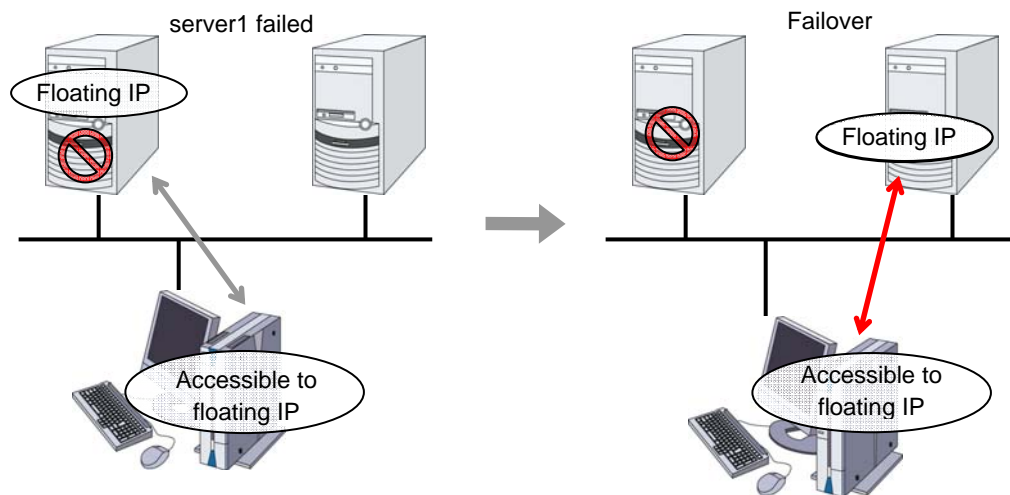
## Dependencies of floating IP resource

By default, this function does not depend on any group resource type.

## Floating IP

Client applications can use floating IP addresses to access cluster servers. By using floating IP addresses, clients do not need to be aware of switching access destination server when a failover occurs or moving a group migration.

Floating IP addresses can be used on the same LAN and over the remote LAN.



### Address assignment

An IP address to assign for floating IP address needs to meet the condition described below:

- ◆ Available host address which is in the same network address as the LAN that the cluster server belongs

Allocate as many IP addresses that meet the above condition as required (generally as many as failover groups). These IP addresses are the same as general host addresses, therefore, global IP addresses can be assigned such as Internet.

**Switching method**

By ARP broadcasting from the server, MAC addresses on ARP table are switched. The table below shows the information of ARP broadcasting packets sent by ExpressCluster:

		0	1	2	3
		ff	ff	ff	ff
ff	ff	MAC address			
(6 bytes)					
08	06	00		01	
08	00	06		04	
00	02				
MAC address (6 bytes)					
FIP address (4 bytes)					
MAC address (6 bytes)					
			FIP address		
(4 bytes)			00 00		
		00	00	00	00
		00	00	00	00
		00	00	00	00
		00	00	00	00

**Routing**

You do not need to configure the settings for the routing table.

**Conditions to use**

Floating IP addresses are accessible to the following machines:

- ◆ Cluster server itself
- ◆ Other servers in the same cluster and the servers in other clusters
- ◆ Clients on the same LAN as the cluster server and clients on remote LANs

If the following conditions are satisfied, machines other than the above can also access floating IP addresses. However, connection is not guaranteed for all models or architectures of machines. Test the connection thoroughly by yourself before using those machines.

- ◆ TCP/IP is used for the communication protocol.
- ◆ ARP protocol is supported.

Even over LANs configured with switching hubs, floating IP address mechanism works properly. When a server goes down, the TCP/IP connection the server is accessing will be disconnected.

## Notes on floating IP resource

- ◆ IP address overlaps due to time-lag of the ifconfig command

If the following is set to the floating IP resource, the failover of resources may fail:

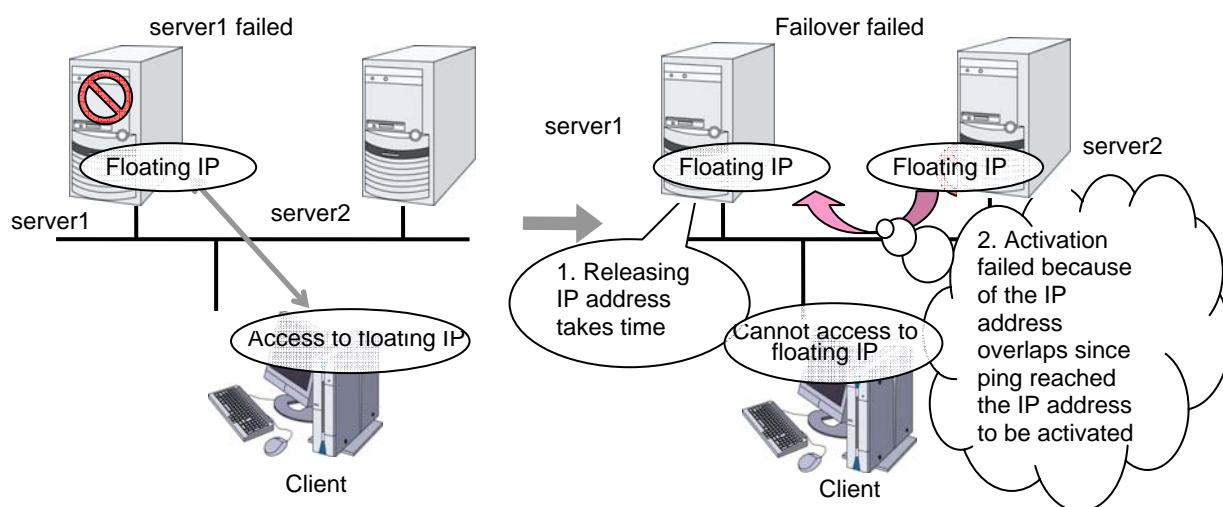
- When a value smaller than the default is set to **Retry Count at Activation Failure**.
- When **Ping Retry Count** and **Ping Interval** are not set.

This problem occurs due to the following causes:

- Releasing IP address may take time depending on the specification of the ifconfig command after deactivating the floating IP address on the server from which the resource is failed over.
- On the activation of the floating IP address on the server to which the resource is failed over, if the ping command is run to the IP address to be activated in order to prevent dual activation, ping reaches the IP address because of the reason above, and the resource activation error occurs.

Make the following settings to avoid this problem:

- Set a greater value to **Retry Count at Activation Failure** of the resource (default: 5 times).
- Set greater values to **Ping Retry Count** and **Ping Interval**.



- ◆ IP address overlaps when OS is stalled

If OS stalls with the floating IP address activated, the resource failover may fail when the following settings are made:

- A value other than 0 is set to **Ping Timeout**.
- **Forced FIP Activation** is off.

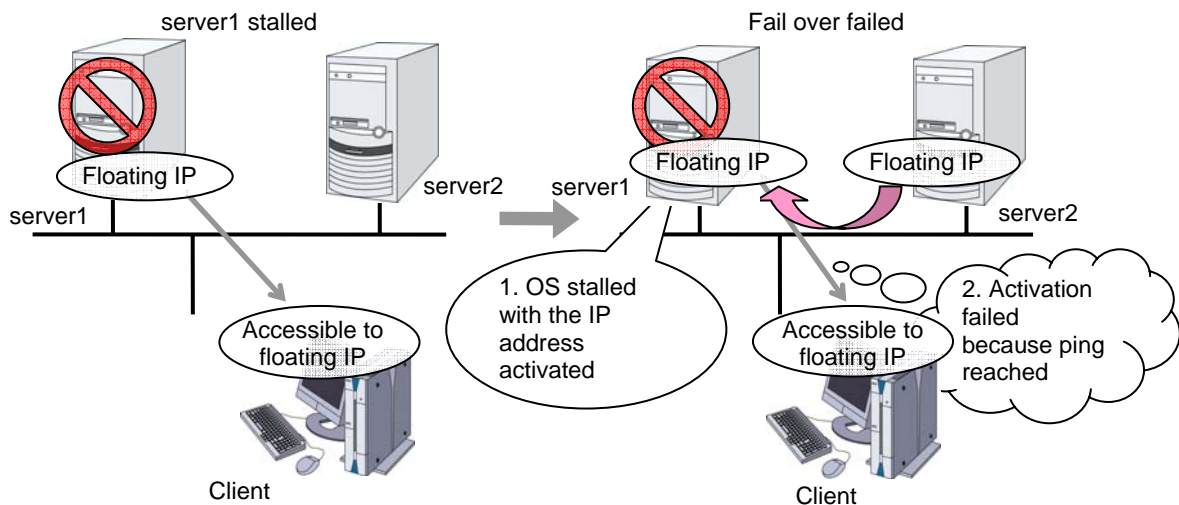
This problem occurs due to the following causes:

- A part of OS stalls (as examples below) with the floating IP address activated.
  - Network modules are running and respond to ping from other nodes
  - A stall cannot be detected in the user-mode monitor resource
- When activating the floating IP address on the server to which the resource is failed over, if the ping command is executed to the IP address to be activated in order to prevent redundant activation, ping reaches the IP address because of the reason above, and the resource activation error occurs.

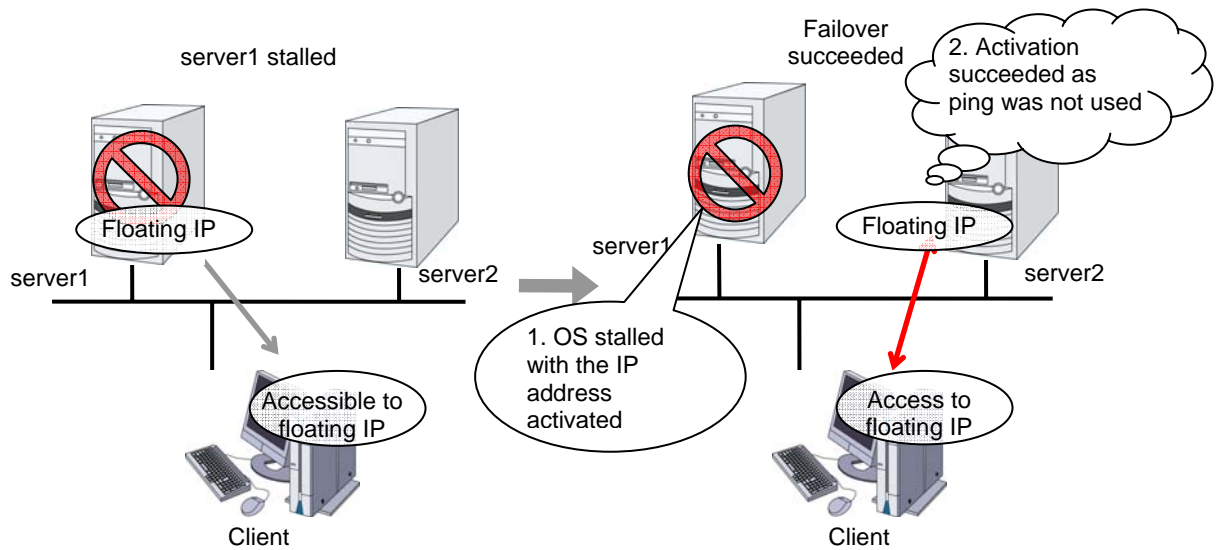
In the machine environment where this problem often occurs, this can be prevented by the settings below. However, both groups may be activated depending on the status of a stall, and server shutdown may occur depending on the timing of the activation of both groups. For details, refer to Chapter 10, “The system maintenance information” the Reference Guide.

- Specify 0 to **Ping Timeout**  
Overlap check is not performed to the floating IP address.
- Specify “On” to **Forced FIP Activation**  
The floating IP address is activated forcibly even when the address is used on a different server.

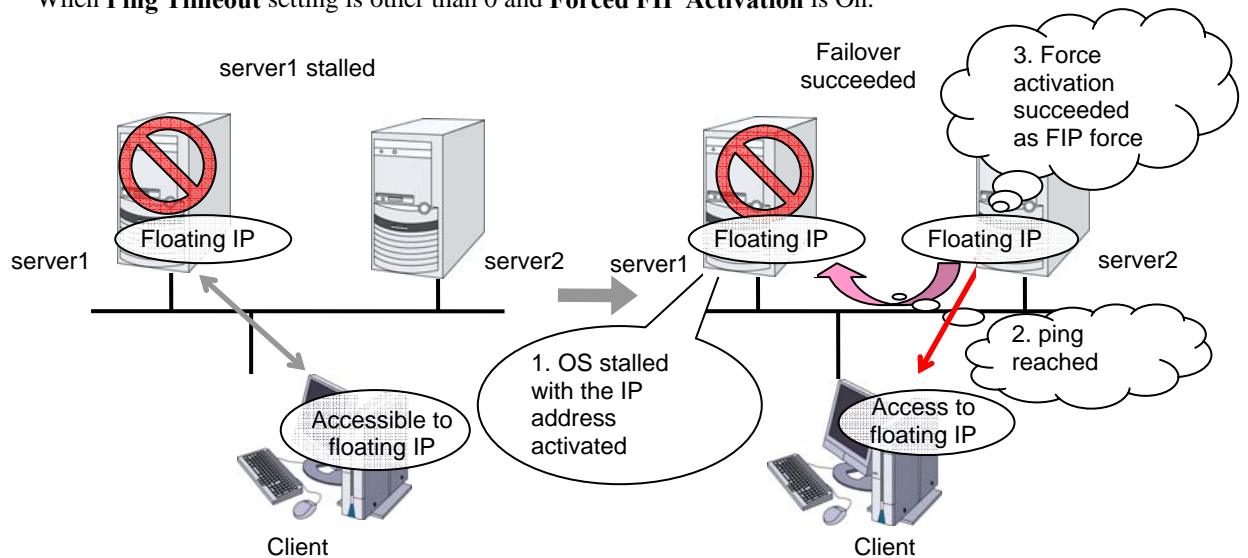
When **Ping timeout** setting is other than 0 and **Forced FIP Activation** is Off.



When **Ping timeout** setting is 0



When **Ping Timeout** setting is other than 0 and **Forced FIP Activation** is On.



## Waiting process for floating IP resource deactivation

The following process takes place after deactivating of floating IP address with the `ifconfig` command is done.

1. Waiting process by the `ifconfig` command.
  - The `ifconfig` command is executed to get a list of IP addresses that OS has. If no floating IP address exists in the IP address list, it is regarded as deactive.
  - If a floating IP address exists in the IP addresses, one-second waiting takes place. This setting cannot be changed with the Builder.
  - The operation mentioned above is repeated for up to four times at maximum. This number of times cannot be changed by the Builder.
  - When it results in an error, the status of floating IP resource can be changed in **ifconfig** on the **Deactivity Check** tab of the floating IP resource.
2. Confirming process by the `ping` command
  - The `ping` command is executed to check if there is a response from the floating IP address. If there is no response, it is regarded as deactive.
  - When there is a response from the floating IP address, one-second waiting takes place. This setting cannot be changed with the Builder.
  - The operation mentioned above is repeated for up to four times at maximum. This number of times cannot be changed by the Builder.
  - The `ping` command is executed with one-second timeout. You cannot change this timeout.
  - When it results in an error, the status of floating IP resource can be changed in **ping** on the **Deactivity Check** tab of the floating IP resource.

---

### Note:

Acquisition of the list of IP addresses and floating address activation/deactivation using the `ifconfig` command timeout in 60 seconds (this is the default value). This timeout value can be changed by the Builder. For details, see the **Parameter** tab of the **Floating IP Resource Tuning Properties**.

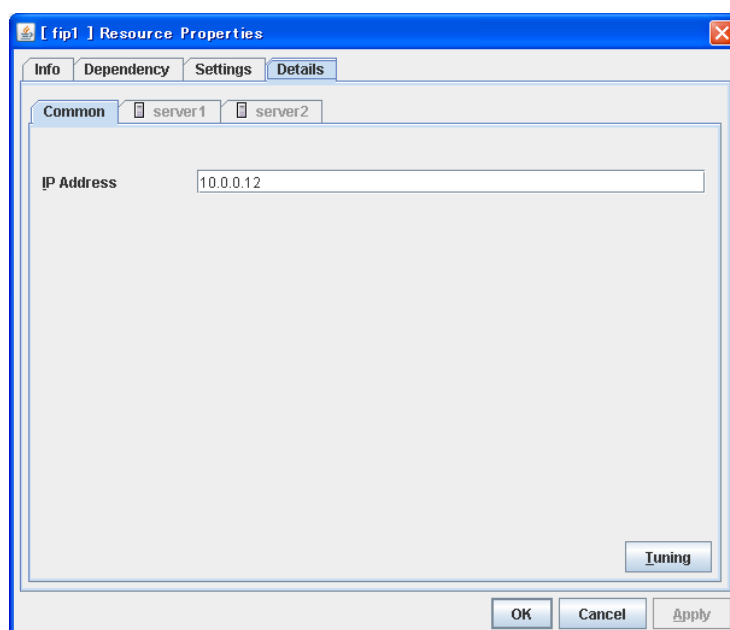
---

## Displaying and changing the details of floating IP resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the floating IP resource whose detailed information you want to display and/or change belongs.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the desired floating IP resource name, click **Disk Resource Properties** and select the **Details** tab.
3. On the **Details** tab, you can see and/or change the settings by following the description below.

### Floating IP Resource

#### Detail tab



#### IP Address **Server Individual Setup**

Enter the floating IP address to be used. When setting the bonding, specify the bonding interface name by using “%” to separate. For details, see “Bonding” in “Chapter 9 Information on other monitor settings”.

- ◆ Example: 10.0.0.12%bond0

#### Tuning

Opens the **Floating IP Resource Tuning Properties** dialog box where the detailed settings for the floating IP resource can be configured.

#### Server Individual Setup

Opens the **Server Individual Setup** dialog box. Set the floating IP addresses which are different depending on a server.

## Floating IP Resource Tuning Properties

### Parameter tab

Detailed settings on parameters for floating IP resource are displayed.

### ifconfig

The following is the detailed settings on getting IP addresses and on the ifconfig command executed for the activation and/or deactivation of the floating IP resource.

- ◆ **Timeout** 1 to 999  
Make the setting of the timeout of ifconfig command.

### ping

These are the detailed settings of the ping command is used to check if there is any overlapped IP address before activating floating IP resource.

- ◆ **Interval** 0 to 999  
Set the interval to issue the ping command.
- ◆ **Timeout** 0 to 999  
Set timeout of the ping command.  
If zero is set, the ping command is not run.
- ◆ **Retry count** 0 to 999  
Set retry count of the ping command.
- ◆ **Forced FIP Activation**  
Specify whether to forcibly activate floating IP address when an overlapped IP address is detected by command check.
  - When selected  
Forced activation is performed.
  - When cleared  
Forced activation is not performed.

### ARP Send Count 0 to 999

Specify how many times you want to send ARP packets when activating floating IP resources.

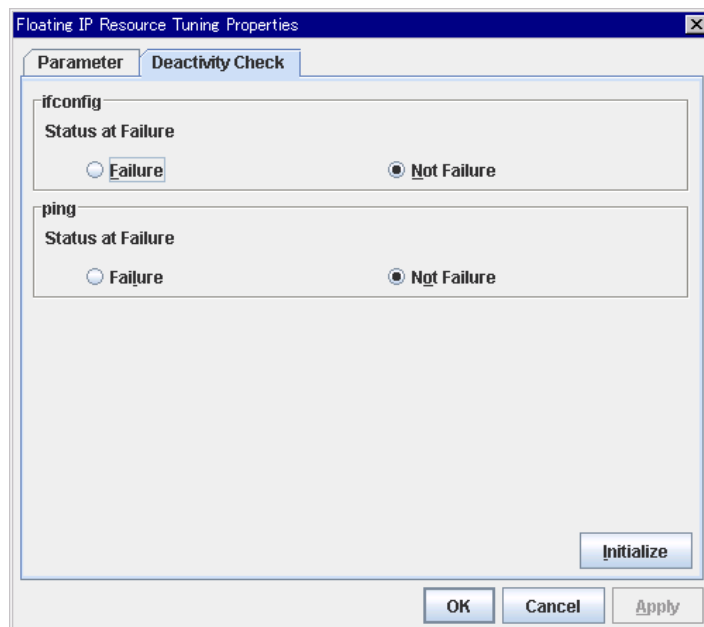
If this is set to zero (0), ARP packets will not be sent.

### Initialize

Clicking **Initialize** resets the values of all items to the default values.

### Deactivity check tab

Detailed settings on deactivity check of floating IP resource are displayed.



#### ifconfig

After deactivating the floating IP, the cluster makes sure that the given floating IP address disappeared successfully. Configure if the ifconfig failure is treated as the IP resource deactivity failure.


- ◆ **Failure:**  
Treats as a deactivity failure of a floating IP resource.
- ◆ **Not Failure:**  
Does not treat as a deactivity failure of a floating IP resource.

#### ping

After deactivating a floating IP, a cluster makes sure that the given floating IP address cannot be accessed by the ping command. Configure reaching the floating IP address by the ping command is treated as deactivity failure.

- ◆ **Failure:**  
Treats as a deactivity failure of a floating IP resource.
- ◆ **Not Failure:**  
Do not treat as a deactivity failure of a floating IP resource.

## Displaying the property of floating IP resource with the WebManager

1. Start the WebManager.
2. When you click an object for a floating IP resource  in the tree view, the following information is displayed in the list view.

FIP Name: fip1
Details

Common
server1
server2

Properties	Value
Name	fip1
Comment	
IP Address	10.0.0.12
Status	Online

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Floating IP resource name
Comment:	Comment
IP Address:	IP address used by floating IP resource
Status:	Status of floating IP resource
Server Name:	Server name
Status:	Status of floating IP resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	fip
Failover Threshold	1
Retry Count at Activation Failure	5
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	
Ping Timeout (sec)	1
Ping Retry Count	0
Ping Interval (sec)	1
FIP Force Activation	Off
ARP Send Count	1
Ifconfig Timeout (sec)	60
Ifconfig Status at Failure	Not Failure
Ping Status at Failure	Not Failure

Type:	Resource type
Failover Threshold:	Failover count
Retry Count at Activation Failure:	Activation retry count
Final Action at Activation Failure:	Final action at activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Deactivation retry count
Final Action at Deactivation Failure:	Final action at deactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Ping Timeout (sec):	Timeout of ping to confirm redundancy (in seconds)
Ping Retry Count:	Ping retry count
Ping Interval(sec):	Ping interval (in seconds)
FIP Force Activation:	Forced Floating IP Activation
ARP Send Count:	ARP send count
Ifconfig Timeout (sec):	Timeout of ifconfig command timeout (in seconds)
Ifconfig Status at Failure:	Status of inactivation check ifconfig error
PingStatus at Failure:	Status of inactivation check ping error

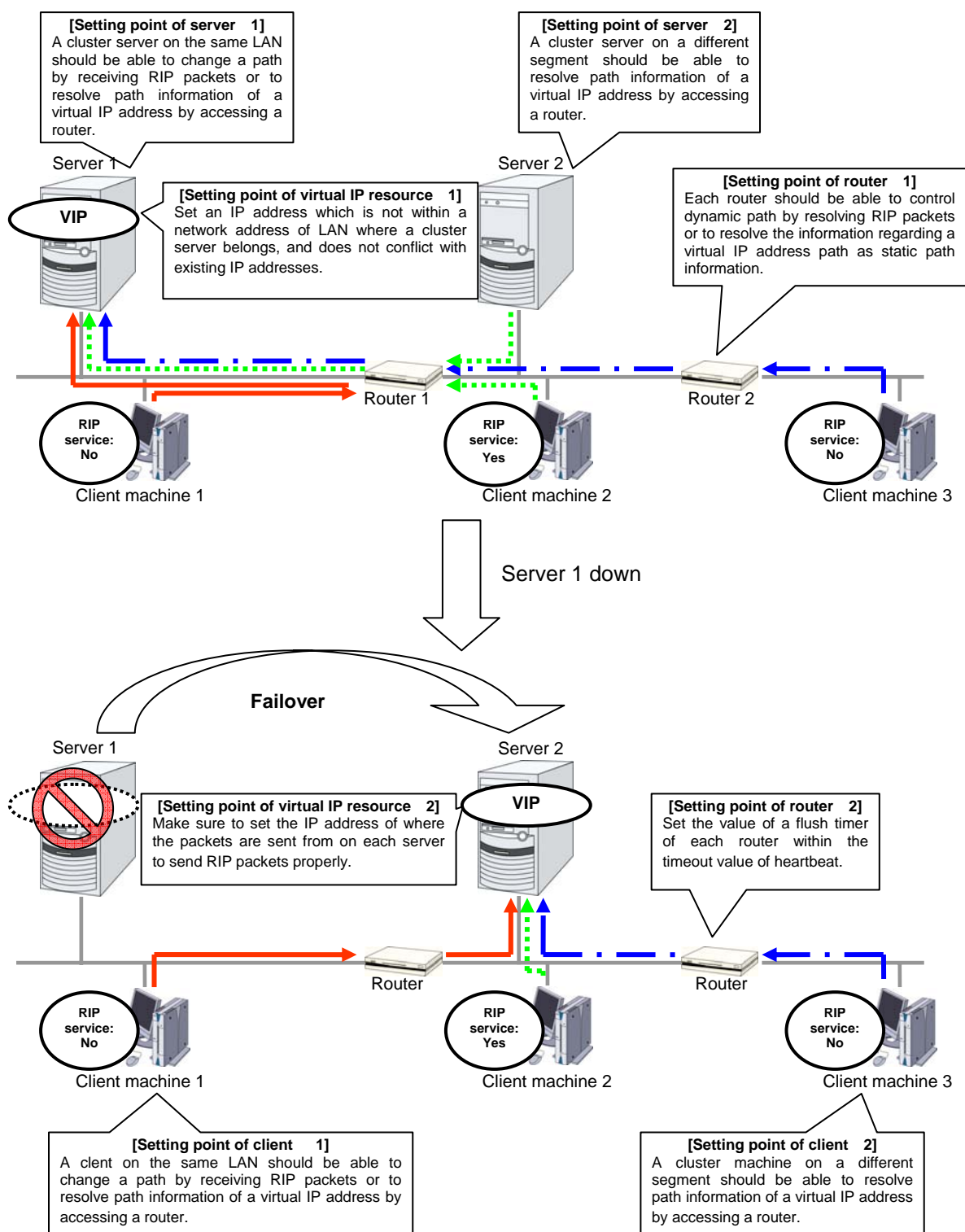
## Understanding virtual IP resources

### Dependencies of virtual IP resources

By default, this function does not depend on any group resource type.

### Virtual IP resources

Client applications can be connected to a cluster server by using a virtual IP address. The servers can be connected to each other by using a virtual IP address. By using a virtual IP address, switching from one server to the other to which a client is connecting remains transparent even if failover or moving of a failover group occurs. The graphic in the next page shows how virtual IP resources work in the cluster system.



## Determining virtual IP address

An IP address used as a virtual IP address should satisfy the following conditions:

- ◆ The IP address should not be within the network address of the LAN to which the cluster belongs.
- ◆ The IP address should not conflict with existing network addresses.

Select one of the following allocation methods to meet the requirements above:

- ◆ Obtain a new network IP address for virtual IP address and allocate virtual IP address.
- ◆ Determine a network IP address from private IP address space and allocate virtual IP address. The following procedures are given as an example.
  - Select one network address from 192.168.0 to 192.168.255 for virtual IP address.
  - Allocate up to 64 host IP addresses for virtual IP address from the network address you have selected. (For example, select the network address 192.168.10 and allocate two host IP addresses: 192.168.10.1 and 192.168.10.254)
  - Specify 255.255.255.0 to net mask of the virtual IP address.
  - When you configure multiple virtual IP addresses, dummy virtual IP addresses may be required. For details, see “”.
  - Private IP addresses are addresses for a closed network and they cannot be accessed using virtual IP address from outside of the network through internet providers.
  - Do not disclose path information of private IP addresses outside the organization.
  - Adjust the private IP addresses to avoid conflict with other address.

## Preparing for using virtual IP resources

If your cluster configuration satisfies the following conditions, you need to set a dummy virtual IP address which has same network address as a virtual IP address on each server.

- ◆ When multiple virtual IP resources exist in a cluster.
- ◆ Virtual IP resources whose network address and NIC alias name are same exist in a cluster.

---

**Note:**

If a dummy virtual IP address cannot be configured, virtual IP resources do not operate properly.

---

A dummy virtual IP address should satisfy the following conditions:

- ◆ The IP address has a same network address as of a virtual IP resource, and is unique.
- ◆ The IP address can be prepared for each server constructing a cluster.

In the following settings, a dummy virtual IP address should be configured on each server.

- Virtual IP resource 1  
IP address 10.0.1.11/24  
NIC alias name eth1
- Virtual IP resource 2  
IP address 10.0.1.12/24  
NIC alias name eth1

For example, set a dummy virtual IP address as follows:

- Dummy virtual IP address of server1  
IP address 10.0.1.100/24  
NIC alias name eth1:0
- Dummy virtual IP address of server2  
IP address 10.0.1.101/24  
NIC alias name eth1:0

Configure the OS by the following procedure so that dummy virtual IP addresses are enabled at OS startup.

In the following procedure, eth1 of server 1 is set to 10.0.1.100/24 as an example.

1. Perform one of the following procedures according to your distribution.
  - For Novell SUSE LINUX Enterprise Server:  
Edit the file on the following path. Add the italic parts on the setting information.

**Path**

/etc/sysconfig/network/ifcfg-eth1-“MAC\_address\_of\_eth1”

**Setting information**

```
BOOTPROTO='static'
BROADCAST='10.0.0.255'
IPADDR='10.0.0.1'
MTU=""
NETMASK='255.255.255.0'
NETWORK='10.0.0.0'
IPADDR_1='10.0.1.100'
NETMASK_1='255.255.255.0'
NETWORK_1='10.0.1.0'
LABEL_1=1
REMOTE_IPADDR=""
STARTMODE='onboot'
UNIQUE='xxx'
_nm_name='xxx'
```

- For other than Novell SUSE LINUX Enterprise Server:  
Create a file on the following path, and add the setting information.

**Path**

/etc/sysconfig/network-scripts/ifcfg-eth1:0

**Setting information**

```
DEVICE=eth1:0
BOOTPROTO=static
BROADCAST=10.0.1.255
HWADDR=MAC_address_of_eth1
IPADDR=10.0.1.100
NETMASK=255.255.255.0
NETWORK=10.0.1.0
ONBOOT=yes
TYPE=Ethernet
```

2. Restart the OS.

Dummy virtual IP addresses are enabled after the OS restart. Configure server 2 in the same manner.

Follow the procedure below when the settings above is required due to the cluster configuration change.

1. Stop a cluster. For details, see “Stopping the ExpressCluster daemon” in the *Installation and Configuration Guide*.
2. Disable the cluster daemon. For details, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.
3. Change the settings above.
4. Restart the OS, and check that the settings are reflected.
5. Enable the cluster daemon. For details, see “Enabling the disabled ExpressCluster daemon” in the *Installation and Configuration Guide*.
6. Modify the cluster configuration. For details, see “Modifying the cluster configuration data” in the *Installation and Configuration Guide*.

## Controlling path

To access to a virtual IP address from a remote LAN, path information of the virtual IP address must be effective to all routers on the path from the remote LAN to the LAN for cluster server. To be specific, the following condition must be satisfied:

- ◆ Routers on the cluster servers LAN interpret host RIP.
- ◆ Routers on the path from a cluster server to the remote server have the dynamic routing settings or information on the virtual IP address routes has configured as static routing settings.

## Requirement to use virtual IP address

### Environments where virtual IP address can be used

Virtual IP addresses can be accessed from the machines listed below. Virtual IP address mechanism functions properly even in a LAN where switching hubs are used. However, when a server goes down, TCP/IP that has been connected will be disconnected.

When using virtual IP addresses with a switching HUB that cannot be configured to create a host routing table by receiving host RIP, you need to reserve one new network address and configure virtual IP addresses so that the IP address of each server belongs to a different network address.

◆ **Cluster servers that belong to the same LAN which the server the virtual IP activates belongs to**

Virtual IP addresses can be used if the following conditions are satisfied:

- Machines that can change the path by receiving RIP packets.
- Machines that can resolve the path information of a virtual IP address by accessing a router.

◆ **Cluster servers that belongs to the different LAN from which the server the virtual IP activates belongs to**

Virtual IP addresses can be used if the following condition is satisfied:

- Machines that can resolve path information of the virtual IP address by accessing a router.

◆ **Clients that belongs to the same LAN which cluster servers belong to**

Virtual IP addresses can be used if the following conditions are satisfied:

- Machines that can change the path by receiving RIP packets.
- Machines that can resolve the path information of a virtual IP address by accessing a router.

◆ **Clients on remote LAN**

Virtual IP addresses can be used if the following condition is satisfied:

- Machines that can resolve path information of the virtual IP address by accessing a router.

## Notes on virtual IP resources

The following rule applies to virtual IP addresses.

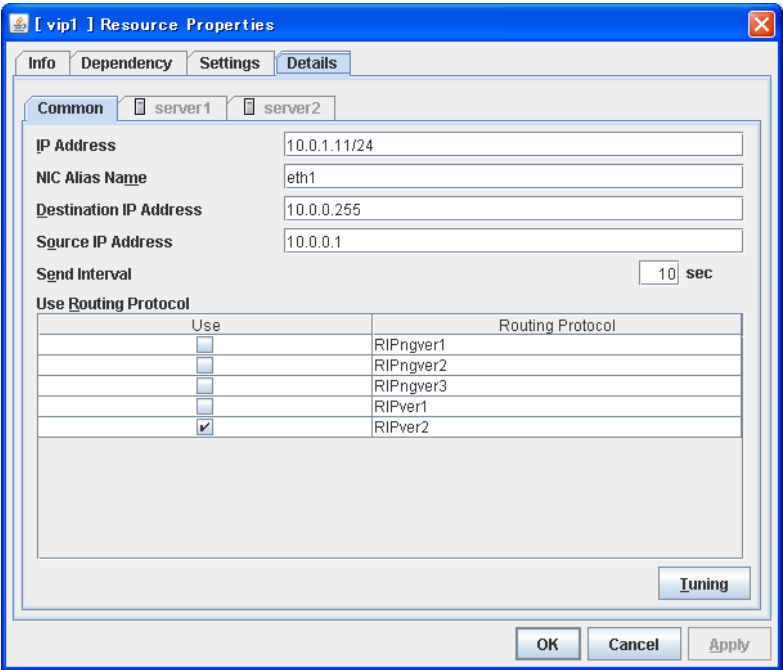
- ◆ If virtual IP resources are not inactivated properly (e.g. when a server goes down), the path information of virtual IP resources is not deleted. If virtual IP resources are activated with their path information not deleted, the virtual IP addresses cannot be accessed until their path information is reset by a router or a routing daemon.

Thus, you need to configure the settings of a flush timer of a router or a routing daemon. For a flush timer, specify the value within the heartbeat timeout value. For details on the heartbeat timeout, see “Timeout tab” on Chapter 3 “Functions of the Builder.”

## Displaying and changing the details of virtual IP resource

1. From the tree view on the left pane of the Builder, click the group icon where the virtual IP resources whose details you want to display and/or change belong.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the desired virtual IP resource name, click **Properties**, and then click **Details** tab.
3. On **Details** tab, you can display and/or change the settings by following the description below.

### Virtual IP resource details tab



**IP Address** **Server Individual Setup**

Enter the virtual IP address to use.

**NIC Alias Name** **Server Individual Setup**

Enter the NIC interface name that activates the virtual IP address to be used.

**Destination IP Address** **Server Individual Setup**

Enter the destination IP address of RIP packets. IPv4 specifies the broadcast address and IPv6 specifies the multicast address.

**Source IP Address** **Server Individual Setup**

Enter the IP address to bind when sending RIP packets. Specify the actual IP address activated on NIC which activates the virtual IP address.

**Note:**

The source IP address should be set for individual servers, and set the actual IP address of each server. Virtual IP resources do not operate properly if a source address is invalid.

**Send Interval (1 to 30)** **Server Individual Setup**

Specify the send interval of RIP packets.

**Use Routing Protocol (1 to 30) Server Individual Setup**

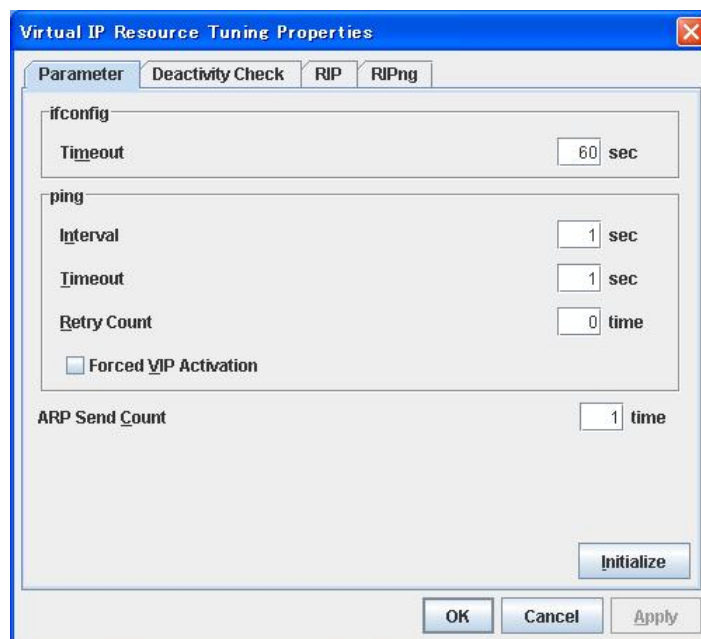
Specify the RIP version to use. For IPv4 environment, select RIPver1 or RIPver2. For IPv6 environment, select RIPngver1 or RIPngver2 or RIPngver3. You can select more than one routing protocols.

**Tuning**

Opens **Virtual IP resource Tuning Properties**. You can make the advanced settings for the virtual IP resources.

**Virtual IP Resource Tuning Properties****Parameter tab**

Detailed setting for virtual IP parameter is displayed.

**ifconfig**

The following is the detailed settings on getting IP addresses and on the ifconfig command executed for the activation and/or deactivation of the virtual IP resource.

- ◆ **Timeout** 1 to 999  
Make the setting of the timeout of ifconfig command.

**ping**

In this box, make detailed settings of the ping command used to check for any overlapped IP address before activating the virtual IP resource.

- ◆ **Interval** 0 to 999  
Specify the interval to issue the ping command in seconds.
- ◆ **Timeout** 1 to 999  
Specify the time-out for the ping command in seconds.  
When 0 is specified, the ping command is not run.
- ◆ **Retry Count** 0 to 999  
Specify how many retries of issuing the ping command are attempted.
- ◆ **VIP Forced Activation**  
Use this button to configure whether to forcibly activate the virtual IP address when an overlapped IP address is found using the ping command.
  - **When selected**  
Forcefully activate the virtual IP address.
  - **When cleared**  
Do not forcefully activate the virtual IP address.

**ARP Send Count** 0 to 999

Specify how many times you want to send ARP packets when activating virtual IP resources.

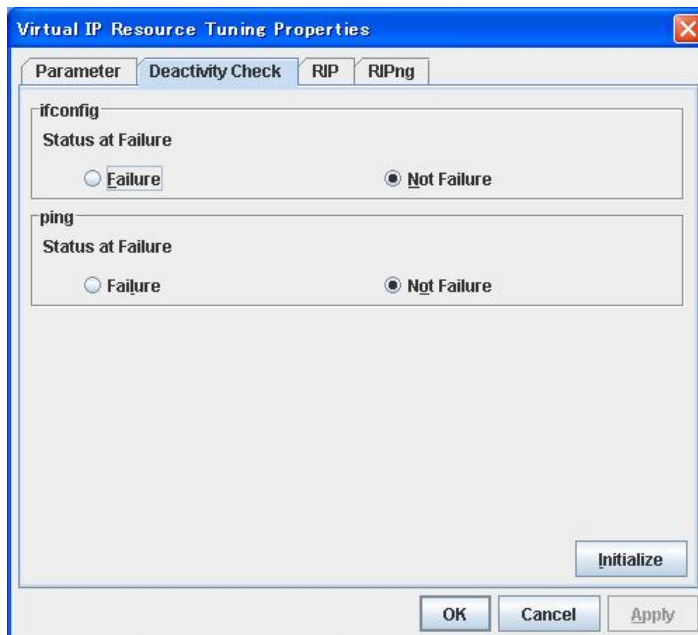
If this is set to zero (0), ARP packets will not be sent.

**Initialize**

Click **Initialize** to reset the values of all items to their default values.

### Deactivity Check tab

Detailed settings on deactivity check of virtual IP resource are displayed.



#### ifconfig

After deactivating the floating IP, the cluster makes sure that the given virtual IP address disappeared successfully. Configure if the ifconfig failure is treated as the IP resource deactivity failure.

- ◆ **Failure:**  
Treats as a deactivity failure of a virtual IP resource.
- ◆ **Not Failure:**  
Does not treat as a deactivity failure of a virtual IP resource.

#### ping

After deactivating a virtual IP, a cluster makes sure that the given virtual IP address cannot be accessed by the ping command. Configure reaching the virtual IP address by the ping command is treated as deactivity failure.

- ◆ **Failure:**  
Treats as a deactivity failure of a virtual IP resource.
- ◆ **Not Failure:**  
Do not treat as a deactivity failure of a virtual IP resource.

**RIP tab**

Detailed settings on RIP of virtual IP resource are displayed.

Virtual IP Resource Tuning Properties

Parameter Deactivity Check **RIP** RIPng

Next Hop IP Address

Metric

Port

Port Number
520

Add Edit Remove

Initialize

OK Cancel Apply

**Next Hop IP Address**

Enter the next hop address (address of the next router). Next hop IP address can be omitted. It can be specified for RIPver2 only. You cannot specify a netmask or prefix.

**Metric** (1 to 15)

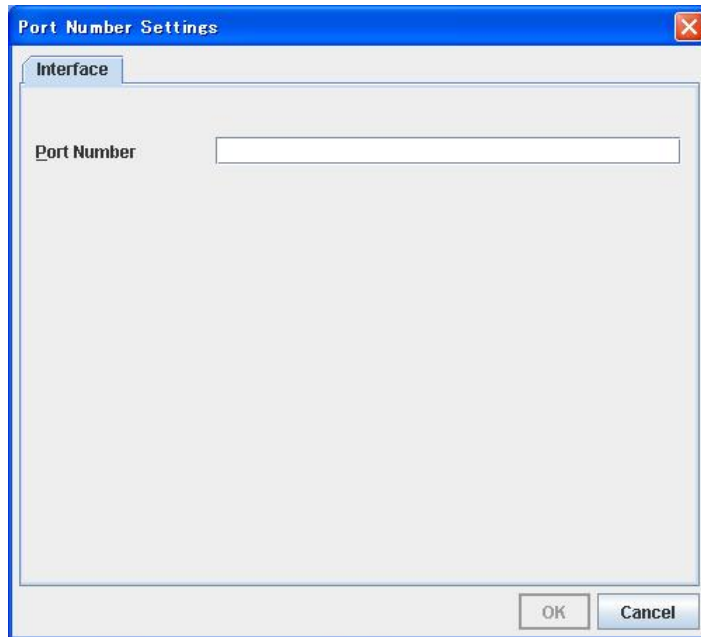
Enter a metric value of RIP. A metric is a hop count to reach the destination address.

**Port**

On **Port Number**, a list of communication ports used for sending RIP is displayed.

**Add**

Add a port number used for sending RIP. Clicking this button displays the dialog box to enter a port number.



**Port Number**

Enter a port number to be used for sending RIP, and click **OK**.

**Delete**

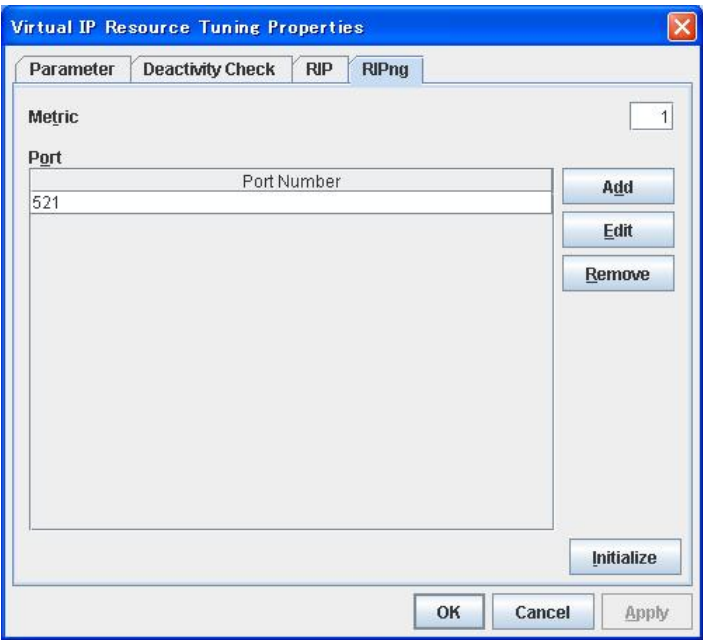
Click **Delete** to delete the selected port on the **Port Number**.

**Edit**

A dialog box to enter a port number is displayed. The port selected in the **Port Number** is displayed. Edit it and click **OK**.

**RIPng tab**

Detailed settings on RIPng of virtual IP resource are displayed.



**Metric (1 to 15)**

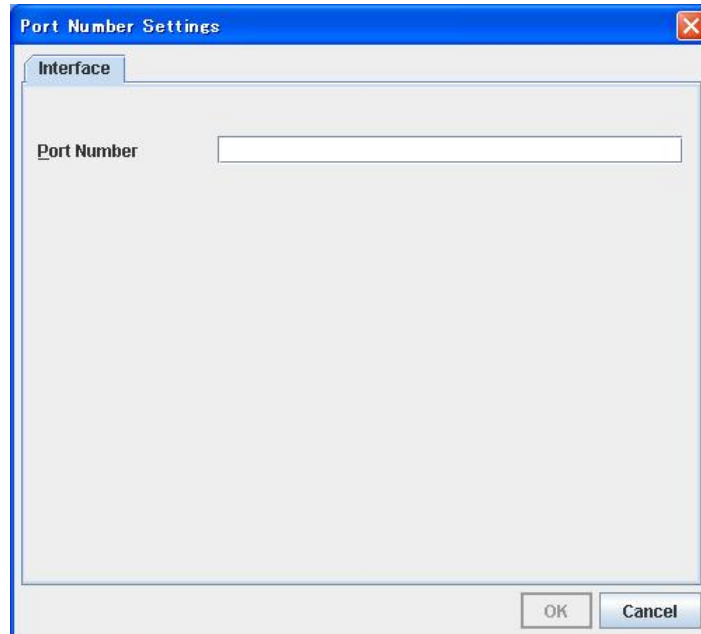
Enter a metric value of RIPng. A metric is a hop count to reach the destination address.

**Port**

On **Port Number**, a list of ports used for sending RIPng is displayed.

### Add

Add a port number used for sending RIPng. Clicking this button displays the dialog box to enter a port number.



### Port Number

Enter a port number to be used for sending RIPng, and click **OK**.


### Delete

Click **Delete** to delete the selected port on the **Port Number**.

### Edit

A dialog box to enter a port number is displayed. The port selected in the **Port Number** is displayed. Edit it and click **OK**.

## Displaying the virtual IP resource properties with the WebManager

1. Start the WebManager.
2. Click an object for virtual IP resource  in the tree view. The following information is displayed in the list view.

VIP Name: vip1

Details

Common

server1

server2

Properties	Value
Name	vip1
Comment	
IP Address	10.0.1.11/24
NIC Alias Name	eth1
Destination IP Address	10.0.0.255
Source IP Address	10.0.0.1
Send Interval	10
Routing Protocol	RIPver2
Status	Offline

Resource Status on Each Server

Server Name	Status
server1	Offline
server2	Offline

Name:	Virtual IP resource name
Comment:	Comment for the virtual IP resource
IP Address:	IP address of the virtual IP resource
NIC Alias Name:	NIC Alias Name of the virtual IP resource
Destination IP Address:	Destination IP Address of RIP for virtual IP resource
Source IP Address:	Source IP Address of RIP for virtual IP resource
Send Interval:	Interval of RIP sending for virtual IP resource
Routing Protocol:	RIP version for virtual IP resource
Status:	Status of the virtual IP resource
Server Name:	Server name
Status:	Status of the virtual IP resource on the given server

If you click the **Details** button, the following information is displayed in the pop-up dialog.

Properties	Value
Type	vip
Failover Threshold	0
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	No Operation (Deactivate next resource)
Execute Script before Final Action	Off
Depended Resources	
Ping Timeout (sec)	1
Ping Retry Count	0
Ping Interval (sec)	1
VIP Force Activation	Off
ARP Send Count	1
Ifconfig Timeout (sec)	60
Ifconfig Status at Failure	Not Failure
Ping Status at Failure	Not Failure
RIP Next Hop IP Address	
RIP Metric	1
RIP Port Number	520
RIPng Metric	1
RIPng Port Number	521

Type:	Resource type
Failover Threshold:	The number of failovers to be made at detection of an error
Retry Count at Activation Failure:	The number of times activation is retried when an activation error is detected
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	The number of times deactivation is retried when a deactivation error is detected
Final Action at Deactivation Failure:	Final action when a deactivation error is detected
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resources
Ping Timeout (sec):	ping timeout
Ping Retry Count:	ping retry count
Ping Interval (sec):	ping interval
VIP Forced Activation:	Forcibly activate the virtual IP resource
ARP Send Count:	ARP send count
Ifconfig Timeout (sec) :	Ifconfig timeout
Ifconfig Status at Failure:	Status of inactivation check ifconfig error
Ping Status at Failure:	Status of inactivation check ping error
RIP Next Hop Ip Address:	Next hop address of RIP
RIP Metric:	RIP metric
RIP Port Number:	RIP port number
RIPng Metric:	RIPng metric
RIPng Port Number:	RIPng port number

# Understanding mirror disk resources

## Dependencies of mirror disk resource

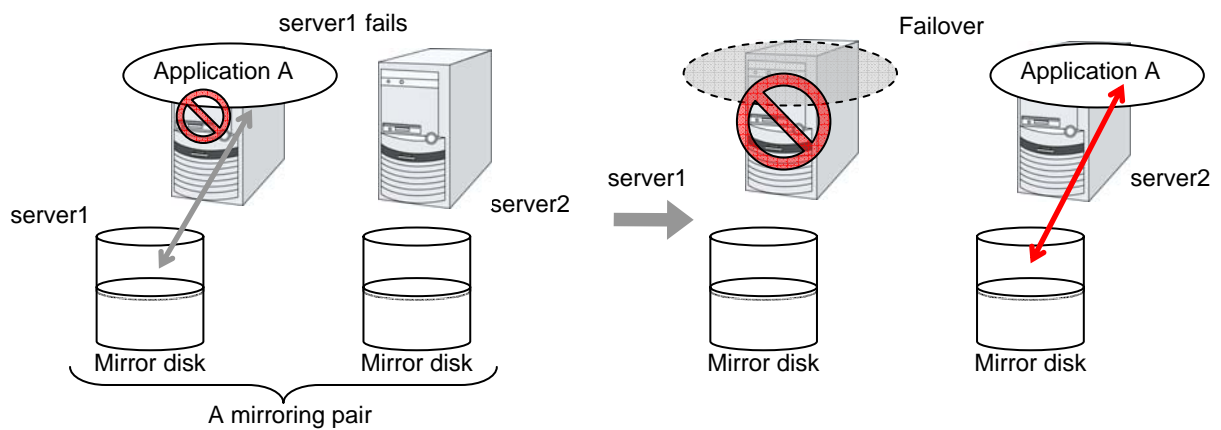
By default, this function depends on the following group resource type.

Group resource type
Floating IP resource
Virtual IP resource

## Mirror disk

### Mirror disk

Mirror disks are a pair of disks that mirror disk data between two servers in a cluster.



### Data partition

Partitions where data to be mirrored (such as application data) is stored are referred to as data partitions. Allocate data partitions as follows:

- ◆ Data partition size  
The size of data partition should be 1GB or larger but smaller than 1TB.
- ◆ Partition ID  
83(Linux)
- ◆ If Execute initial mkfs is selected in the cluster configuration information, a file system is automatically created when a cluster is generated.
- ◆ ExpressCluster is responsible for the access control (mount/umount) of file system. Do not configure the settings that allow the OS to mount or unmount a data partition.

### Cluster partition

Dedicated partitions used in ExpressCluster for mirror partition controlling are referred to as cluster partition.

Allocate cluster partitions as follows:

- ◆ Cluster partition size  
10 MB or more. Depending on the geometry, the size may be larger than 10 MB, but that is not a problem.
- ◆ Partition ID  
83(Linux)
- ◆ A cluster partition and data partition for data mirroring should be allocated in a pair.
- ◆ You do not need to make the file system on cluster partitions.
- ◆ ExpressCluster performs the access control of the file system (mount/unmount) as a device to mount the mirror partition device. Thus, do not configure the settings to mount or unmount the cluster partition on the OS side.

### Mirror Partition Device (/dev/NMPx)

One mirror disk resource provides the file system of the OS with one mirror partition. If a mirror disk resource is registered to the failover group, it can be accessed from only one server (it is generally the primary server of the resource group).

Typically, the mirror partition device (dev/NMPx) remains invisible to users (AP) since they perform I/O via a file system. The device name is assigned so that the name does not overlap with others when the information is created by the Builder.

- ◆ ExpressCluster is responsible for the access control (mount/umount) of file system. Do not configure the settings that allow the OS to mount or unmount a data partition.

Mirror partition's (mirror disk resource's) accessibility to applications is the same as switching partition (disk resources) that uses shared disks.

- ◆ Mirror partition switching is done for each failover group according to the failover policy.

### Mirror disk connect

Maximum of two mirror disk connects can be registered per mirror disk resource.

- ◆ When two mirror disk connects are registered, operations such as switching etc. are as follows:
  - The paths used to synchronize mirror data can be duplicated. By setting this, mirror data can be synchronized even when one of the mirror disk connects becomes unavailable due to such as disconnection.
  - The speed of mirroring does not change.
  - When mirror disk connects switch during data writing, mirror break may occur temporarily. After switching mirror disk connects completes, differential mirror recovery may be performed.
  - When mirror disk connects switch during mirror recovery, mirror recovery is suspended. If the setting is configured so that the automatic mirror recovery is performed, mirror recovery automatically starts after switching mirror disk connects completes. If the setting is configured so that the automatic mirror recovery is not performed, you need to perform mirror recovery again after switching mirror disk connects completes.  
Since the previous mirror recovery has been recognized as abnormal termination, all the data required for the recovery is transferred, instead of resuming from where it was suspended last time.

For the settings of mirror disk connect, see “Mirror connect I/F tab” in Chapter 3 “Functions of the Builder.”

#### ◆ Disk type

For information on supported disk types, see the appendix in the *Installation and Configuration Guide*.

- Disk partition
 

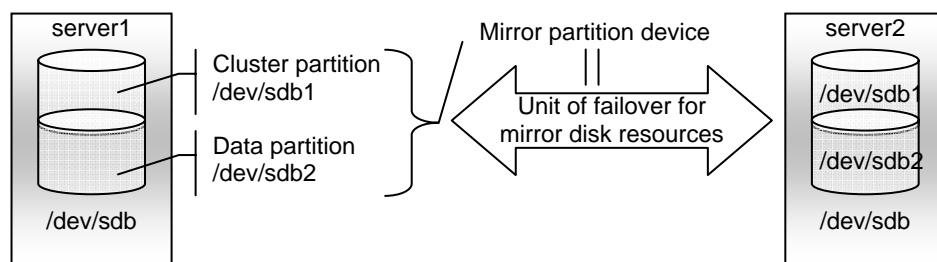
It is possible to allocate a mirror disk partition (cluster partition, data partition) on a disk, such as root partition or partition, where the OS is located

  - When maintainability at a failure is important:
 

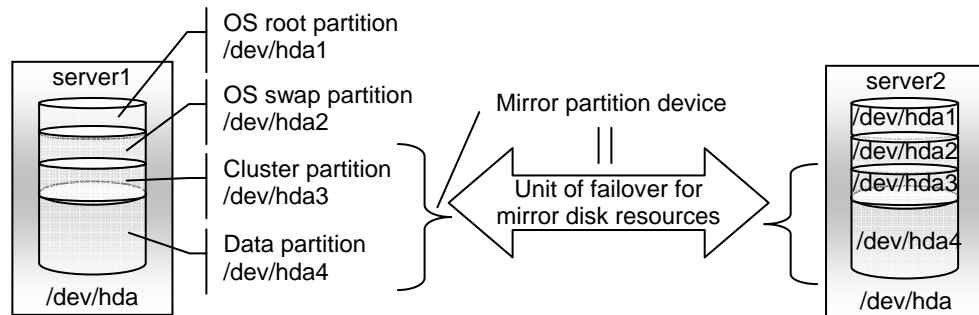
It is recommended to allocate a disk for mirror which is not used by the OS (such as root partition, swap partition).

If LUN cannot be added due to H/W RAID specifications:  
If you are using hardware/RAID preinstall model where the LUN configuration cannot be changed, you can allocate a mirror partition (cluster partition, data partition) in the disk where the OS (root partition, swap partition) is located.

Example: Adding a SCSI disk to both servers to create a pair of mirroring disks.



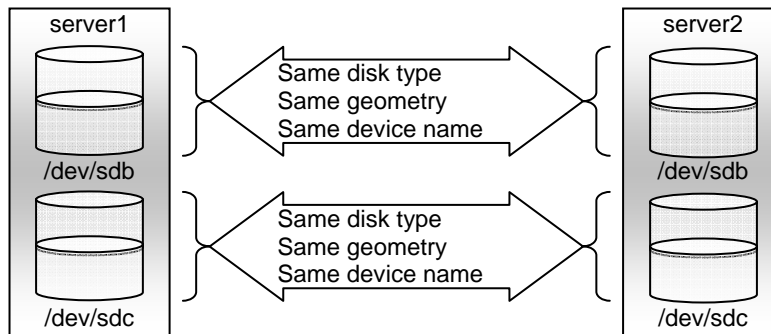
Example: Using available area of the IDE disks of both servers on which OS of is stored to create a pair of mirroring disks.



◆ Disk allocation

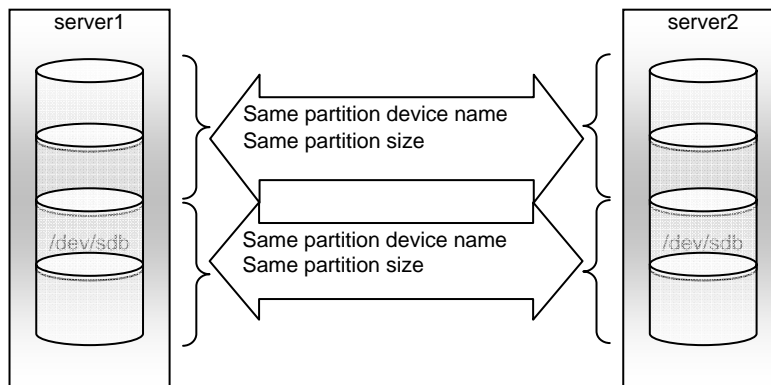
You may use more than one disk for mirror disk. You may also allocate multiple mirror partition devices to a single disk.

Example: Adding two SCSI disks to both servers to create two pairs of mirroring disks.



- Allocate a cluster partition and a data partition in a pair on a single disk.
- You may not use two or more added disks as one for a data partition and another for a cluster partition.

Example: Adding a SCSI disk for both servers to create two mirroring partitions.



## Understanding mirror parameters

### Mirror Data Port Number

Set the TCP port number used for sending and receiving mirror data between servers. It needs to be configured for individual mirror disk resources.

The default value is displayed when a mirror disk resource is added in Builder based on the following condition:

- A port number of 29051 or later which is unused and the smallest

### Heartbeat Port Number

Set the port number that a mirror driver uses to communicate control data between servers. It needs to be configured for individual mirror disk resources.

The default value is displayed when a mirror disk resource is added in Builder based on the following condition:

- A port number of 29031 or later which is unused and the smallest

### ACK2 Port Number

Set the port number that a mirror driver uses to communicate control data between servers. It needs to be configured for individual mirror disk resources.

The default value is displayed when a mirror disk resource is added in Builder based on the following condition:

- A port number of 29071 or later which is unused and the smallest

### The maximum number of request queues

Configure the number of queues for I/O requests from the higher layer of the OS to the mirror disk driver. If a larger value is selected, the performance will improve but more physical memory will be required. If a smaller value is selected, less physical memory will be used but the performance may be lowered.

Note the following when setting the number of queues:

- ◆ The improvement in the performance is expected when a larger value is set under the following conditions:
  - Large amount of physical memory is installed on the server and there is plenty of available memory.
  - The performance of the disk I/O is high.
- ◆ It is recommended to select a smaller value under the conditions:
  - Small amount of physical memory is installed on the server.
  - I/O performance of the disk is low.
  - “alloc\_pages: 0-order allocation failed (gfp=0x20/0)” is entered to the system log of the OS.

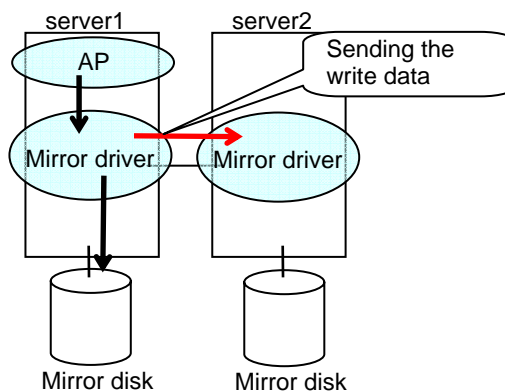
### Connection Timeout

This timeout is used for the time passed waiting for a successful connection between servers when recovering mirror or synchronizing data.

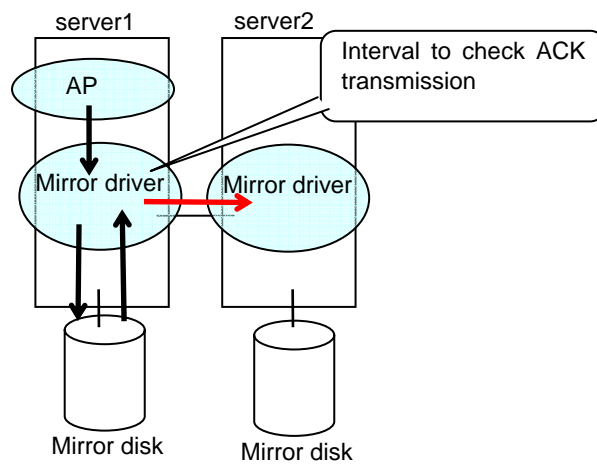
### Send timeout

This timeout is used:

- ◆ For the time passed waiting for the write data to be completely sent from the active server to the standby server from the beginning of the transmission at mirror return or data synchronization.

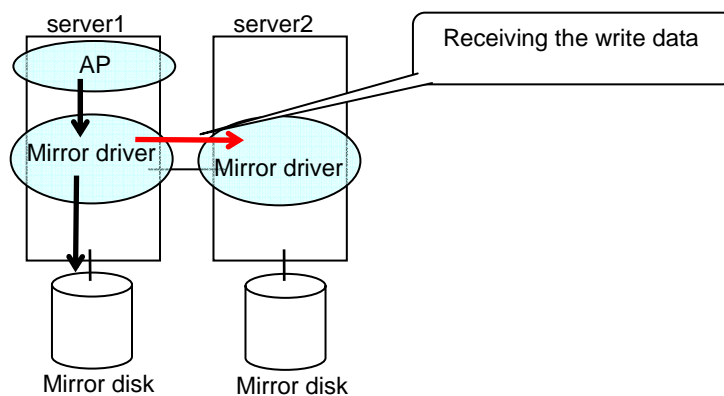


- ◆ For the time interval for checking if ACK notifying completion of write is sent from the active server to the standby server.



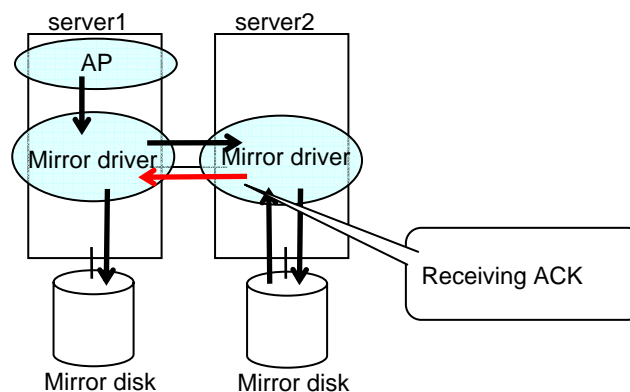
### Receiving timeout

- ◆ This timeout is used for the time passed waiting for the standby server to completely receive the write data from the active server from the beginning of the transmission.

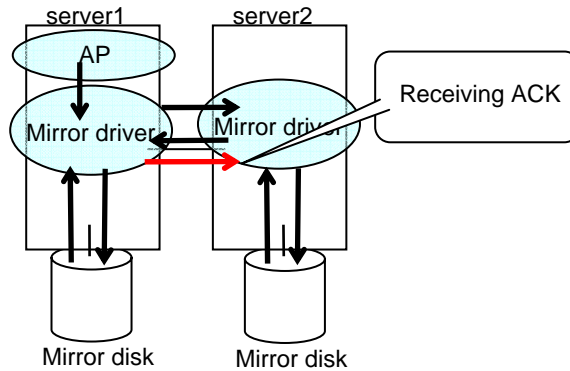


### Ack timeout

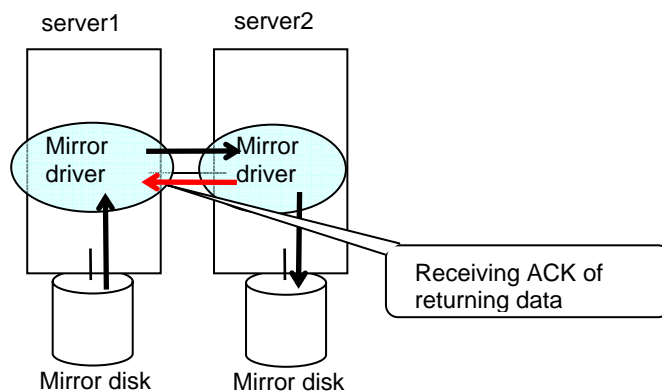
- ◆ This timeout is used for the time passed waiting for the active server to receive the ACK notifying the completion of write after the write data is completely sent to the standby server.  
If the ACK is not received within the specified timeout time, the bitmap for difference on the active server is accumulated



- ◆ This timeout is used for the time passed waiting for the standby server to receive the ACK from the active server after the standby server completely sent the ACK notifying the completion of write.  
If the ACK for the active server is not received within the specified timeout time, the bitmap for difference on the standby server is accumulated.



- ◆ This timeout is used for the time passed waiting for the copy resource server to receive the ACK notifying completion of receiving of the data from the copy destination server after it began the data transmission when recovering mirror.



### Bitmap update interval

The time interval for checking the queue of the data to be written into the difference bitmap on the standby server.

### Flush sleep time

Set the wait time for the thread to periodically write the write data that is accumulated in the buffer of the standby system (mirroring destination).

- ◆ When a large value is set:
  - The OS of the standby system (mirroring destination) will be less-heavily loaded.
  - The write performance will be lowered.
- ◆ When a small value is set:
  - The OS of the standby system (mirroring destination) will be more-heavily loaded.
  - The write performance will improve.

Note the information described above is a guide for your configuration. Changing this parameter may not function as expected due to the following conditional and environmental factors. It is recommended to use the default value:

- OS type
- Memory size
- File system tuning
- Type of the disk interface
- Performance of the disk or disk interface board (such as cache size and seek time)
- Write logic of the application

### Flush count

When the number of write data buffer blocks which are accumulated in the buffer of the standby system (mirroring destination) reaches this value, they are written to the disk.

- ◆ When a larger value is set:
  - If the size of write data is small, write performance will be lower.
  - If the size of write data is big, write performance will improve.
- ◆ When a smaller value is set:
  - If the size of write data is small, write performance will improve. For example, write performance may improve with an application in which small data is written frequently not by the flush operation of the file system.
  - If the size of write data is large, write performance will be lower.
- Note the information described above is a guide for your configuration. Changing this parameter may not give you the expected result due to the following conditional and environmental factors. It is recommended to use the default value:
  - Memory size
  - File system tuning
  - Write logic of the application

### Initial Mirror Construction

Specify if configure initial mirroring<sup>3</sup> when activating cluster for the first time after the cluster is created.

- ◆ Execute the initial mirror construction

An initial mirroring is configured when activating cluster for the first time after the cluster is created.
- ◆ Do not execute initial mirror construction

Does not configure initial mirroring after constructing a cluster. Before constructing a cluster, it is necessary to make the content of mirror disks identical without using ExpressCluster.

---

<sup>3</sup> Regardless of the existence of the FastSync Option, the entire data partition is copied.

### Initial mkfs

Specify if initial file creation in the data partition of the mirror disk is configured when activating cluster for the first time after the cluster is created.

#### ◆ Execute initial mkfs

The first file system is created when activating cluster for the first time immediately after the cluster is created.

#### ◆ Do not execute initial mkfs

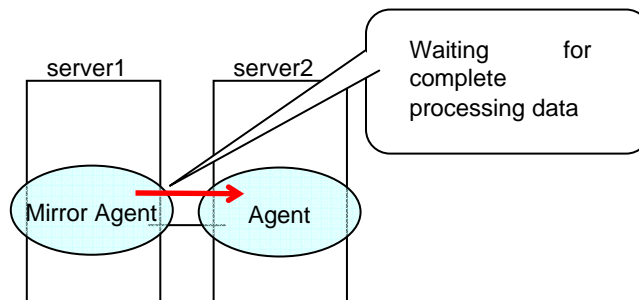
Does not create a first file system to the data partition in the mirror disk when activating cluster for the first time immediately after the cluster is created. Select this option when a file system has been set up in the data partition of the mirror disk and has data to be duplicated, which does not require mkfs.

The mirror disk partition<sup>4</sup> configuration should fulfill mirror disk resource requirements.

If **Does not execute initial mirror construction** is selected, **Execute initial mkfs** cannot be chosen. That is because there are differences in the partition images even right after mkfs is performed.

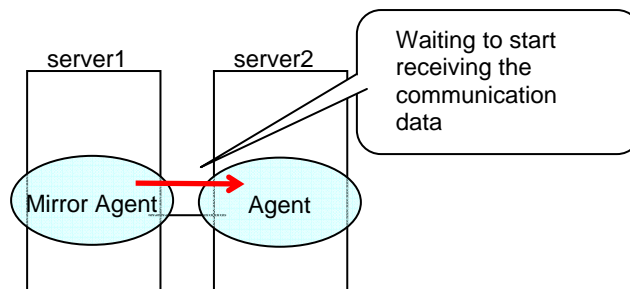
### Mirror agent send time-out

Time-out for the mirror agent waiting to complete processing data after sending a request to the other server.



### Mirror agent receiving time-out

Time-out for the mirror agent waiting to start receiving data after the mirror agent creates a communication socket with the other server.



<sup>4</sup> There must be a cluster partition in a mirror disk. If you cannot allocate a cluster partition when the single server disk is the mirroring target, take a backup and allocate the partition.

**Recovery Data Size** 64 to 32768

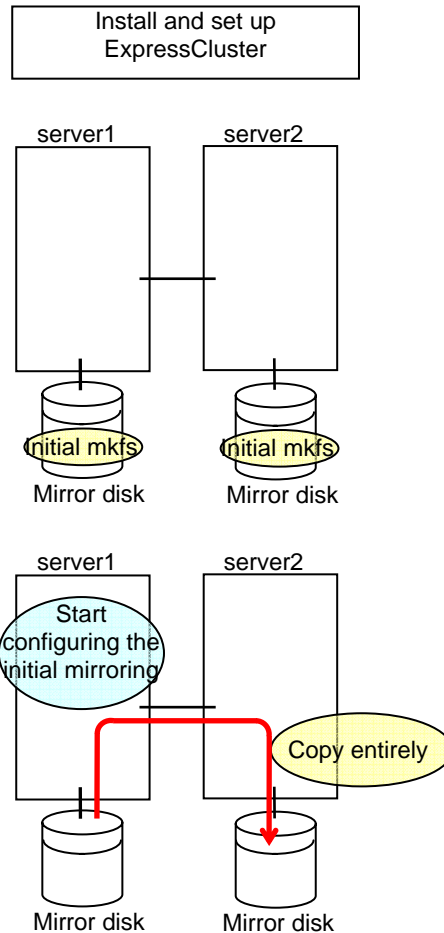
Specify the size of data in mirror recovery between two servers in one processing. The default size is used in general.

- ◆ Specify a larger size
  - During mirror recovery, the possibility to exclude writing request from file system becomes higher and writing performance may decrease.
  - It takes less time to process mirror recovery.
- ◆ Specify a smaller size
  - Sending/receiving data between two servers gets segmented and the possibility for time-out to occur is decreased with a slow network speed.
  - It takes longer time to process mirror recovery.

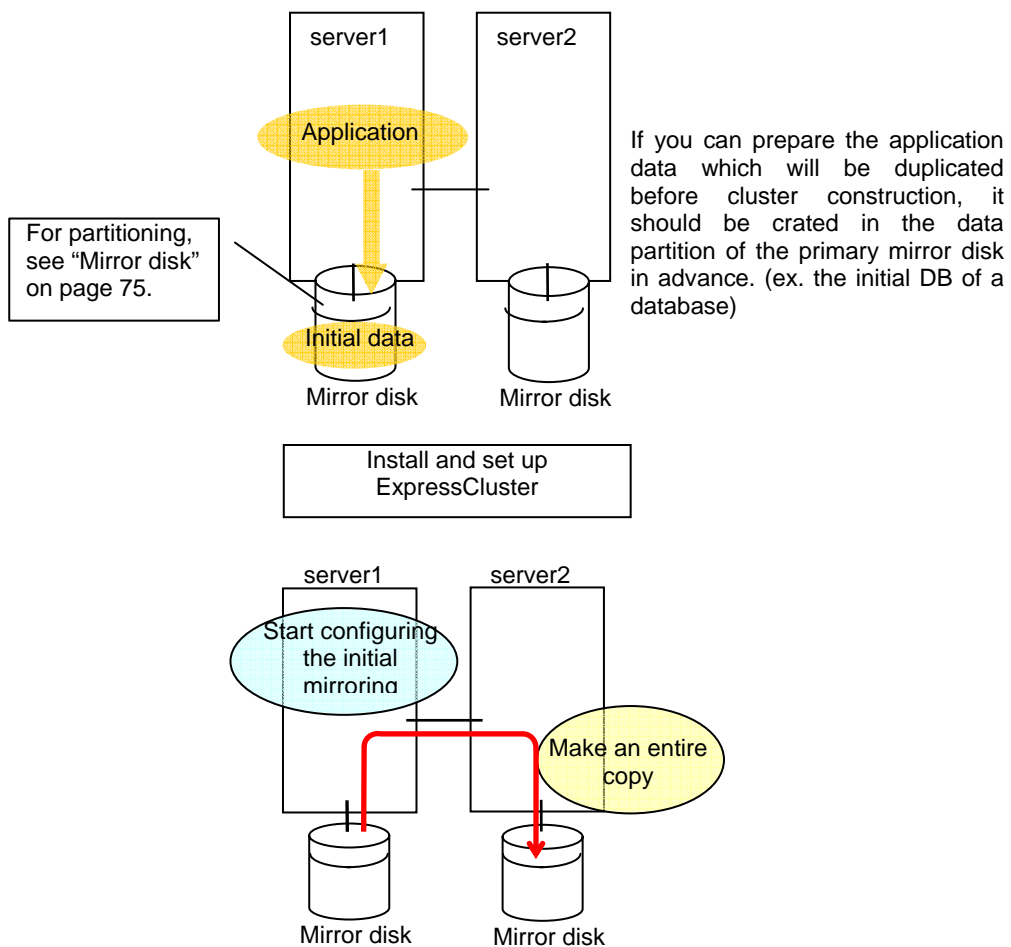
## Examples of mirror disk construction

If you are using a disk that has been used as a mirror disk in the past, you must format the disk because old data exists in its cluster partition. For the initialization of a cluster partition, refer to the *Installation and Configuration Guide*.

- ◆ Execute the initial mirror construction  
Executing initial mkfs



- ◆ Execute the initial mirror construction  
Not executing initial mkfs

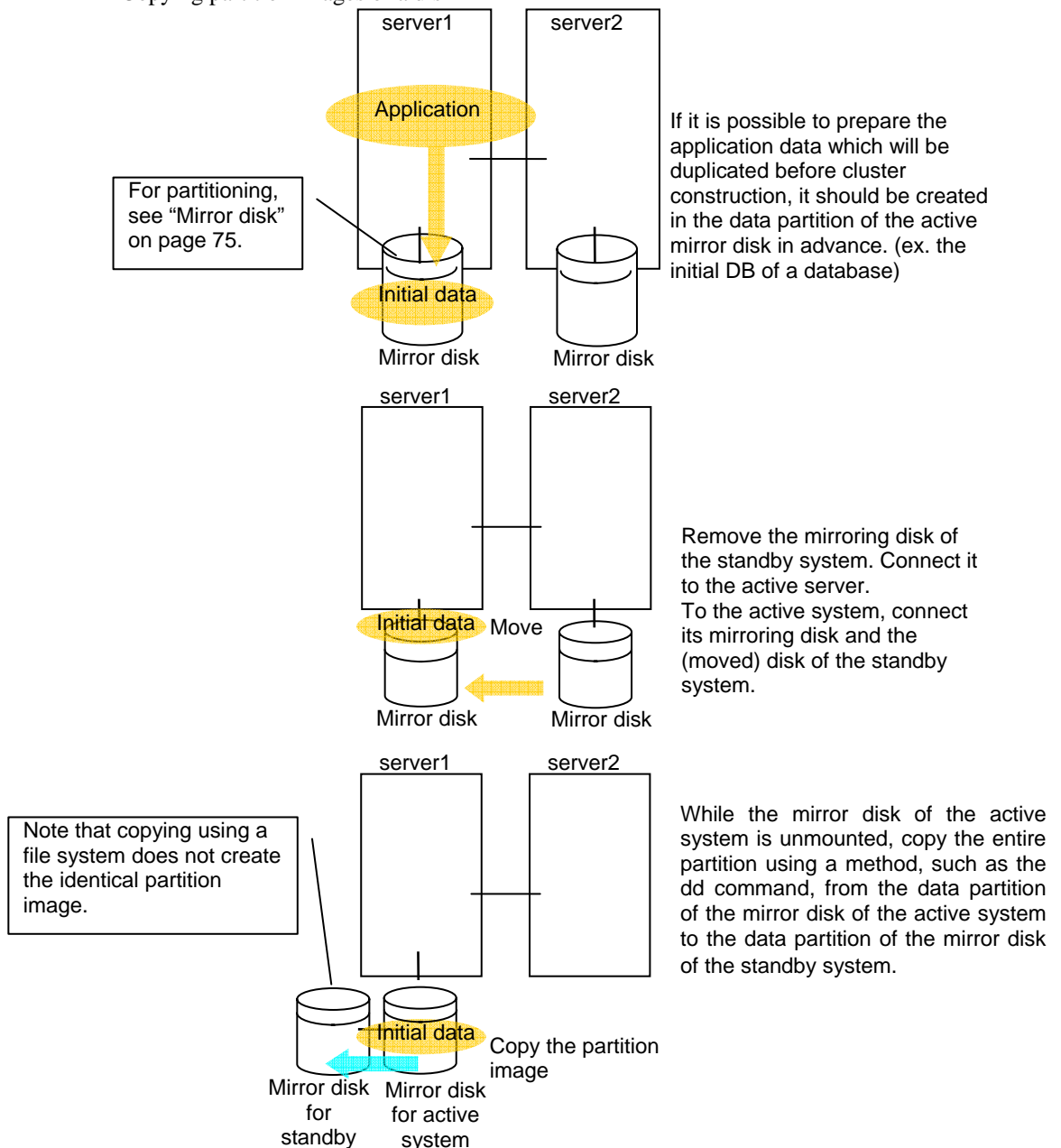


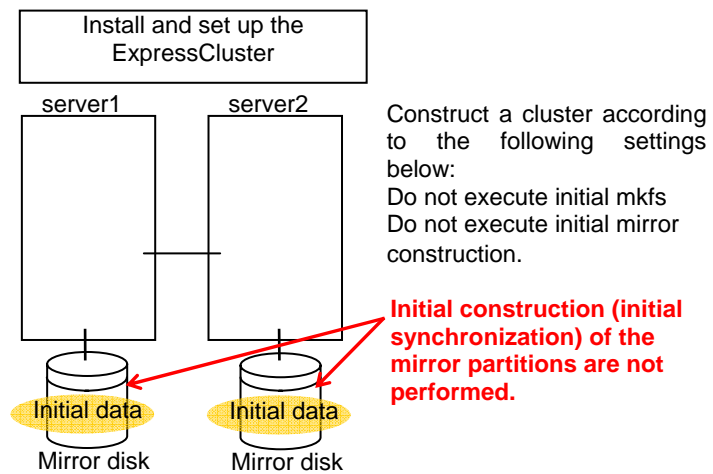
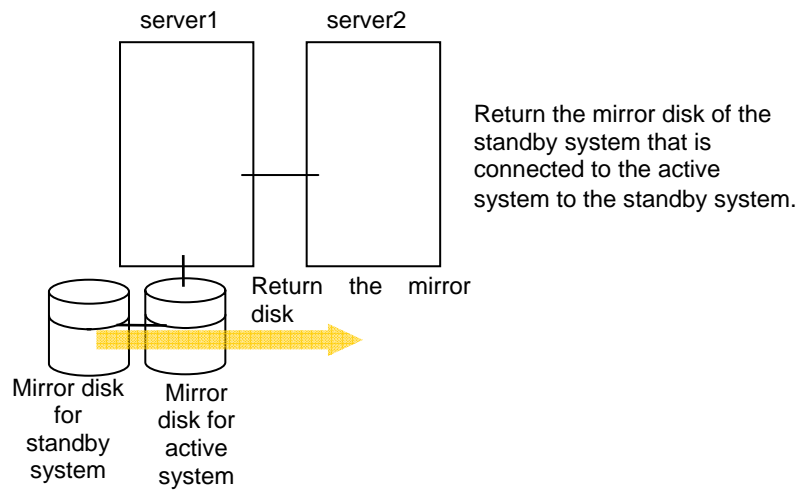
- ◆ Do not execute initial mirror construction  
Not executing initial mkfs

The following is an example of making the mirror disks of both servers identical. (This cannot be done after constructing the cluster. Be sure to perform this before the cluster construction.)

### Example 1

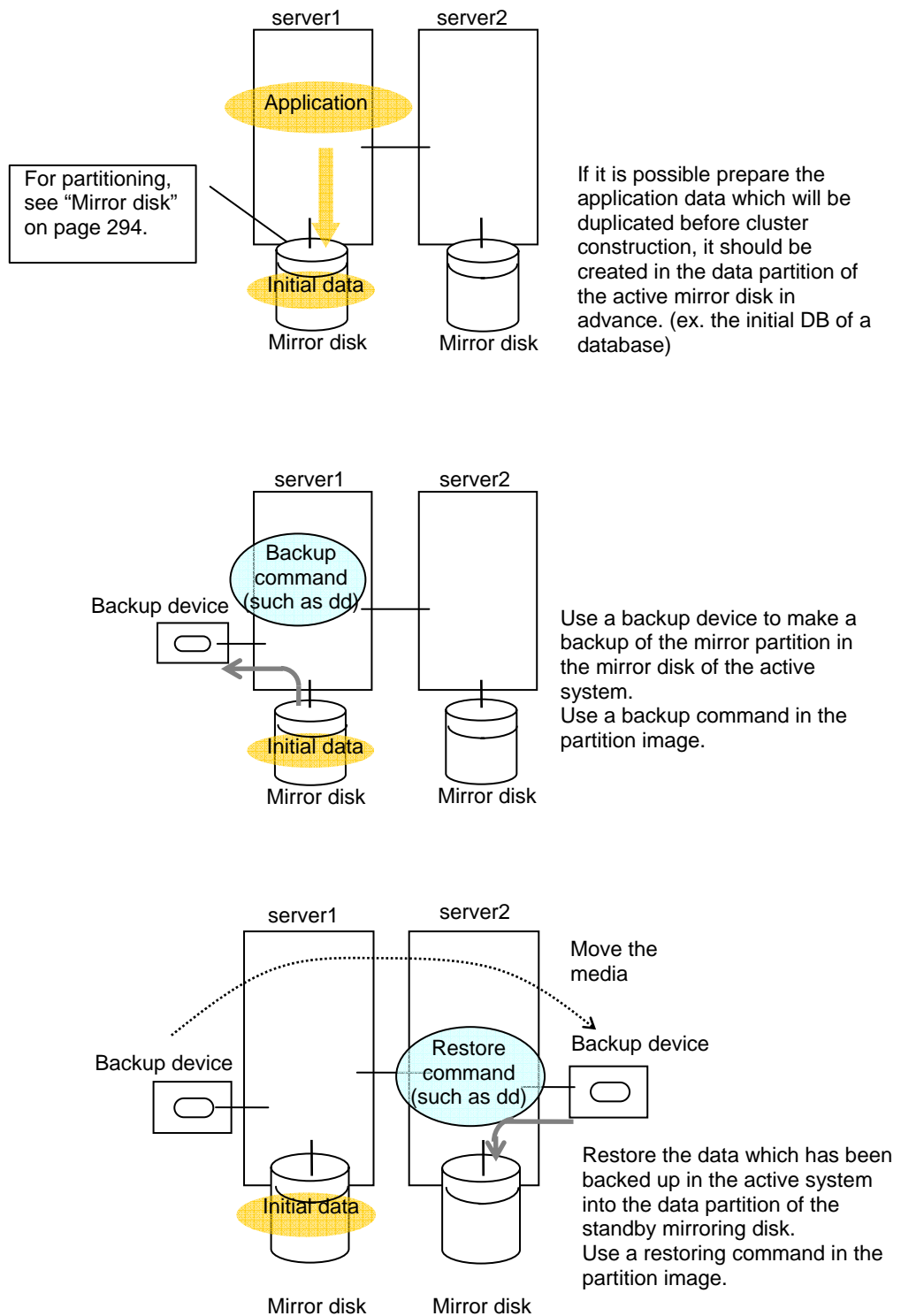
Copying partition images of a disk

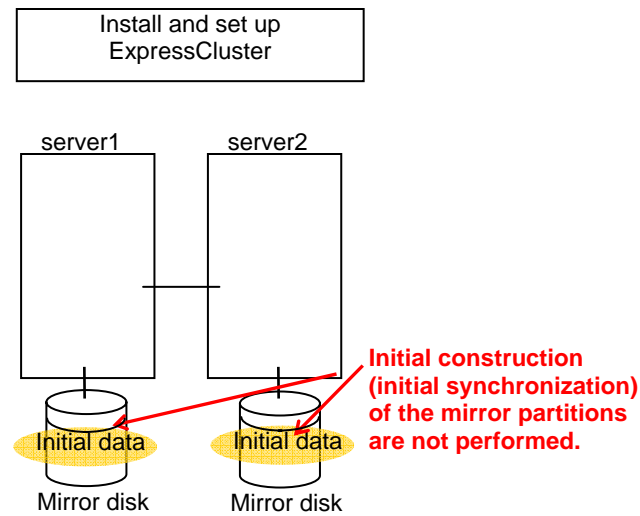




**Example 2**

Copying by a backup device





## Mirror disk resource

- Note 1** If both servers cannot access the identical partitions under the identical device name, configure the server individual setting.
- Note 2** If **Mount/Unmount Exclusion** is selected on the **Exclusion** tab in **Cluster Properties**, activation/deactivation of mirror resource may take time because mount/unmount is performed exclusively to disk resource, VxVM volume resource, NAS resource, and mirror resource in the same server.
- Note 3** When specifying path including symbolic link for mount point, Force Operation cannot be done even if it is chosen as operation in Detecting Failure.
- Note 4** Disks using stripe set, volume set, mirroring, stripe set with parity by Linux md or LVM cannot be specified for the cluster partition and data partition.
- Note 5** Mirror disk resources (mirror partition devices) cannot be the targets of stripe set, volume set, mirroring, stripe set with parity by Linux md or LVM.
- Note 6** When the geometries of the disks used as mirror disks differ between the servers:

The size of a partition allocated by the fdisk command is aligned by the number of blocks (units) per cylinder. Allocate data partitions to achieve the following data partition size and direction of the initial mirror construction.

### Source server $\leq$ Destination server

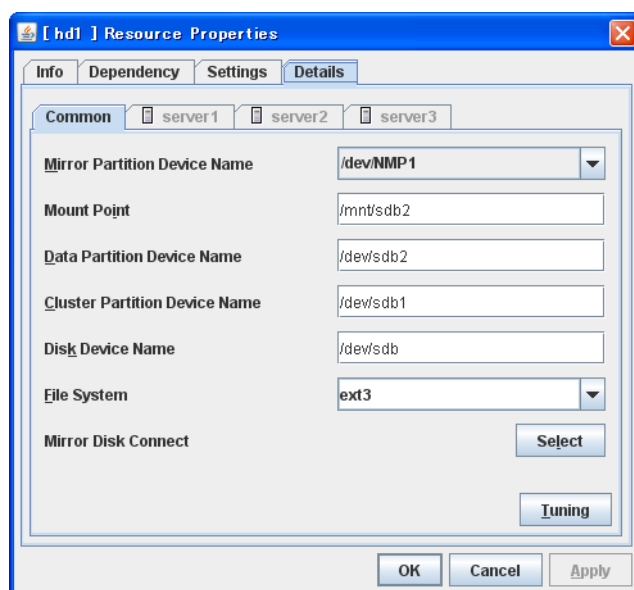
“Source server” refers to the server with the higher failover policy in the failover group to which a mirror resource belongs.

“Destination server” refers to the server with the lower failover policy in the failover group to which a mirror resource belongs.

## Displaying and changing the details of mirror disk resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the mirror disk resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired mirror disk resource name, and click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

### Mirror Disk Resource Property: Details tab



### Mirror Partition Device Name

Select a mirror partition device name to be associated with the mirror partition.

Device names of mirror disk resource/hybrid disk resource that have already been configured are excluded from the list.

### Mount Point (Within 1023 bytes) **Server Individual Setup**

Specify a directory to mount the mirror partition device. The name should begin with “/.”

### Data Partition Device Name (Within 1023 bytes) **Server Individual Setup**

Specify a data partition device name to be used for a disk resource.

The name should begin with “/.”

### Cluster Partition Device Name (Within 1023 bytes) **Server Individual Setup**

Specify a cluster partition device name to be paired with the data partition.

The name should begin with “/.”

### Disk Device Name (Within 1023 bytes) **Server Individual Setup**

Specify a device name that represents the whole disk that contains the mirroring partition. The name should begin with “/.”

For FT server, specify /dev/md. The /dev/md device does not exist on the OS, but the command operates normally.

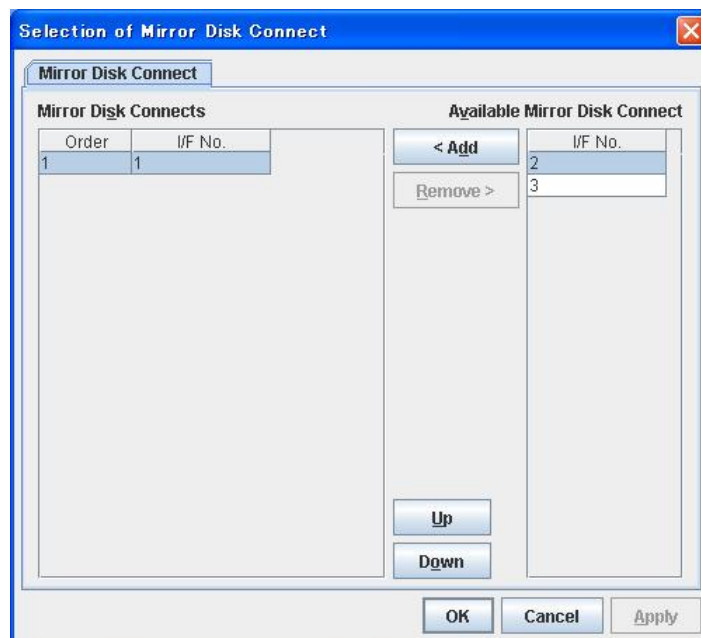
### File System

You select a file system type to be used on the mirror partition. Choose one from the list box. You may also directly enter the type.

- ◆ ext2
- ◆ ext3
- ◆ xfs
- ◆ jfs
- ◆ reiserfs
- ◆ vxfs

### Mirror Disk Connect

Add, delete or modify mirror disk connects. In the **Mirror Disk Connects** list, I/F numbers of the mirror disk connects used for mirror disk resources are displayed.

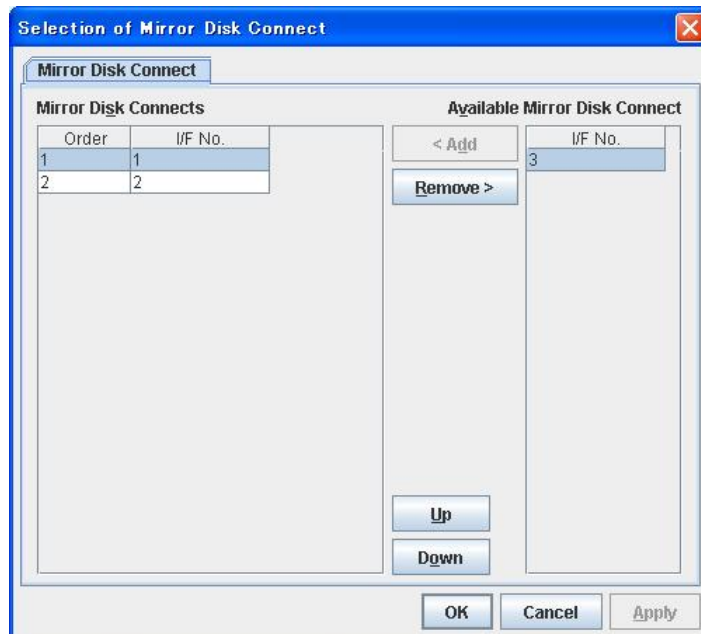


In **Available Mirror Disk Connect**, mirror disk connect I/F numbers that are currently not used are displayed.

- ◆ Set mirror disk connects on the server properties.
- ◆ Maximum of two mirror disk connects can be used per mirror disk resource. For a behavior of when two mirror disk connects are used, see “Mirror disk.”
- ◆ For details on how to configure mirror disk connects, see the *Installation and Configuration Guide*.

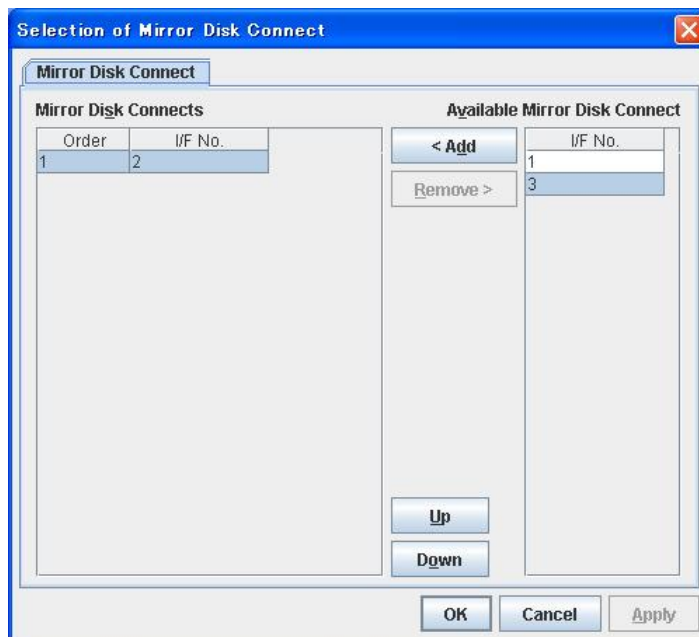
### Add

Use **Add** to add a mirror disk connect. Select the I/F number you want to add from **Available Mirror Disk Connect** and then click **Add**. The selected number is added to the **Mirror Disk Connects** list.



### Remove

Use **Remove** to remove mirror disk connects to be used. Select the I/F number you want to remove from the **Mirror Disk Connects** list and then click **Remove**. The selected number is added to **Available Mirror Disk Connect**.



### Up & Down

Use **Up** and **Down** to change the priority of mirror disk connects to be used. Select the I/F number whose priority you want to change, and then click **Up** or **Down**. The selected row moves accordingly.

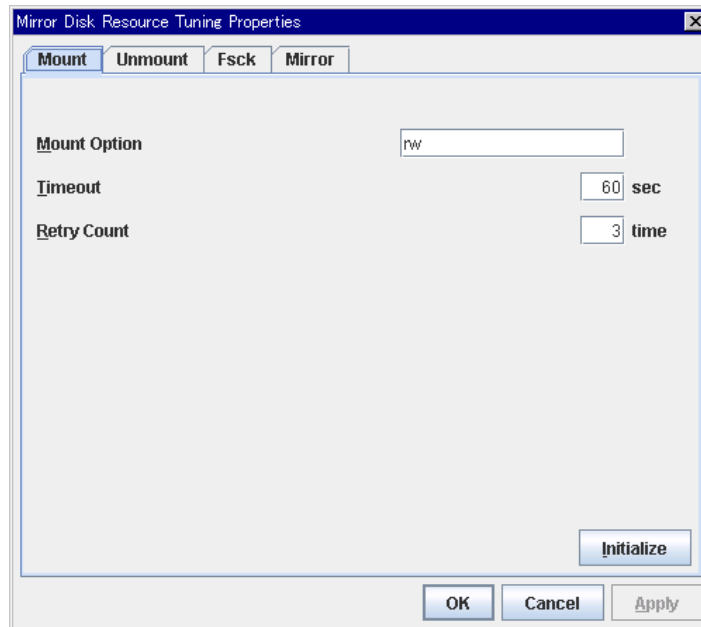
### Tuning

Opens the **Mirror Disk Resource Tuning Properties** dialog box. You make detailed settings for the mirror disk resource there.

## Mirror disk resource tuning properties

### Mount tab

The advanced settings of mount are displayed.



### Mount Option (Within 1023 bytes)

Enter options to give the mount command when mounting the file system on the mirror partition device. Use a comma “,” to separate multiple options.

### Mount option example

Setting item	Setting value
Mirror partition device name	/dev/NMP5
Mirror mount point	/mnt/sdb5
File system	ext3
Mount option	rw,data=journal

The mount command to be run with the above settings is:

```
mount -t ext3 -o rw,data=journal /dev/NMP5 /mnt/sdb5
```

### Timeout 1 to 999

Enter how many seconds you want to wait for the mount command completion before its timeout when you mount the file system on the mirror partition device. Be careful about the value you specify. That is because it may take some time for the command to complete if the capacity of the file system is large.

### Retry Count 0 to 999

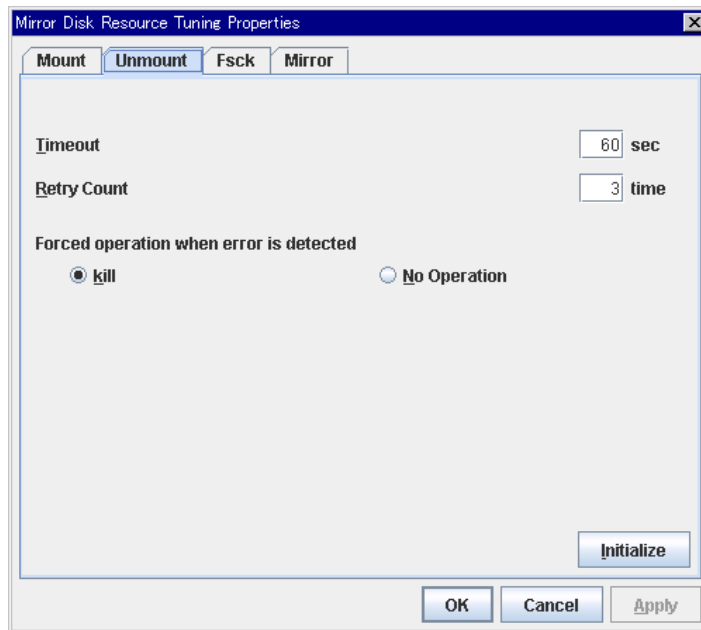
Enter how many times you want to retry to mount the file system on the mirror partition device when one fails. If you set this to zero (0), mount will not be retried.

**Initialize**

Clicking Initialize resets the values of all items to the default values.

**Unmount tab**

The advanced settings for unmounting are displayed.

**Timeout** 1 to 999

Enter how many seconds you want to wait for the unmount command completion before its timeout when you unmount the file system on the mirror partition device.

**Retry Count** 0 to 999

Enter how many times you want to retry to unmount the file system on the mirror partition device when one fails. If you set this to zero (0), unmount will not be retried.

**Forced Operation When Detecting Failure**

Select an action to be taken at an unmount retry if unmount fails.

- ◆ **kill:**  
Select this option to try to forcibly terminate the processes that are accessing the mount point. Not all processes can be terminated.
- ◆ **none:**  
Select this option not to try killing the processes that are accessing the mount point.

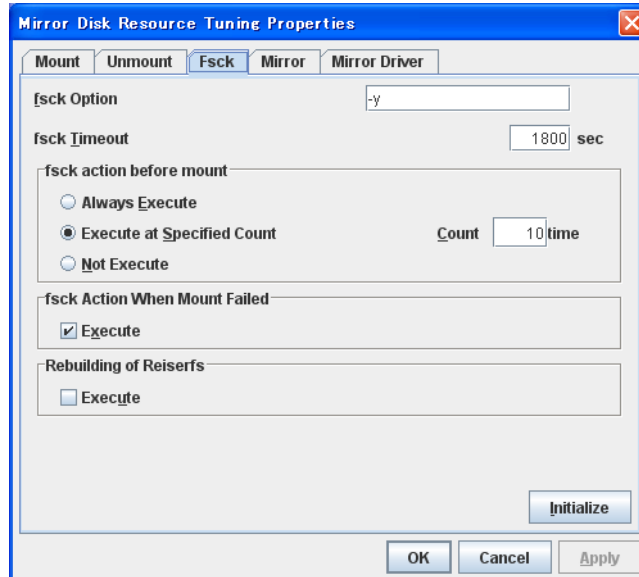
**Initialize**

Clicking **Initialize** resets the values of all items to the default values.

**fsck tab**

The advanced settings of fsck are displayed.

fsck is run before the mount command when mounting the disk resource.

**fsck Option** (Within 1023 bytes)

Enter options to give the fsck command when checking the file system on the mirror partition device. Use a space to separate multiple options. Specify options so that the fsck command does not run interactively. Otherwise, activation of resources after the time specified to **fsck Timeout** elapses becomes an error.

**fsck Timeout** 1 to 9999

Enter how many seconds you want to wait for the fsck command completion before its timeout when you check the file system on the mirror partition device. Be careful about the value you specify. This is because it may take some time for the command to complete if the capacity of the file system is large.

**fsck action before mount**

Select an fsck action before mounting file system on a disk device from the following choices:

- ◆ Always Execute:  
fsck is executed before mounting the file system.
- ◆ Execute at Specified Count:  
fsck is executed when resource is activated successfully within the count specified by Count.  
= Count (0~999)
- ◆ Not Execute:  
fsck is not executed before mounting the file system.

**Note:**

The specified count for fsck is not related to the check interval managed by a file system.

### **fsck Action When Mount Failed**

Set an fsck action to take when detecting a mount failure on a disk device.  
This setting is enabled when the setting of Mount **Retry Count** is other than zero.

- ◆ When selected:  
Mount is retried after running fsck.
- ◆ When cleared:  
Mount is retried without running fsck.

---

#### **Note:**

It is not recommended to set “Not Execute” fsck action before performing mount. With this setting, disk resource does not execute fsck and disk resource cannot be failed over when there is an error that can be recovered by fsck in the switchable partition.

---

### **Reconstruction of reiserfs**

Specify the action when reiserfsck fails with a recoverable error.

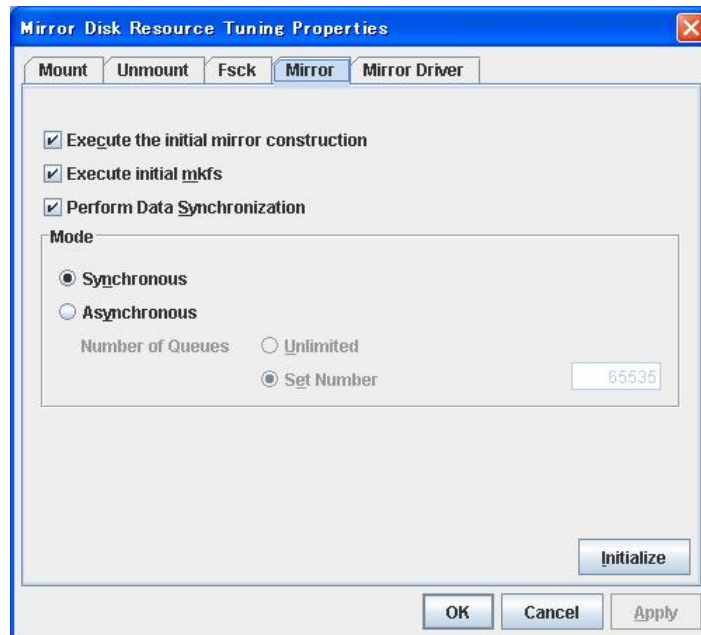
- ◆ When the checkbox is selected  
reiserfsck --fix-fixable is executed.
- ◆ When the checkbox is not selected  
Recovery is not performed even if reiserfsck fails with a recoverable error.

### **Initialize**

Clicking **Initialize** resets the values of all items to the default values.

**Mirror tab**

The advanced settings of mirror disks are displayed.

**Execute the initial mirror construction**

Specify if an initial mirror configuration is constructed when constructing a cluster.

- ◆ When selected:  
An initial mirror configuration will be constructed.
- ◆ When cleared:  
An initial mirror configuration will not be constructed.

**Execute initial mkfs**

Specify if an initial mkfs is constructed when constructing a cluster. This option can be set only if the initial mirror is being constructed.

In the case of hybrid disk resources, the clphdinit command behavior is executed instead of initial mkfs behavior upon cluster construction

- ◆ When selected:  
An initial mkfs will be run.
- ◆ When cleared:  
An initial mkfs will not be run.

**Execute data synchronization**

Specify if the mirror data synchronization is executed when mirror data is activated.

- ◆ When selected:  
Mirror data synchronization is executed. The write data is passed from the active server to the standby server. The clpmdctr command and clphdctr command can be used not to synchronize mirror data.
- ◆ When cleared:  
Mirror data synchronization will not be executed. The write data will not be passed from the active server to the standby server and will be accumulated as the finite difference. You can use the clpmdctr command and clphdctr command to switch to the status where mirror data is synchronized.

### **mode**

Specify synchronous mode of mirror data.

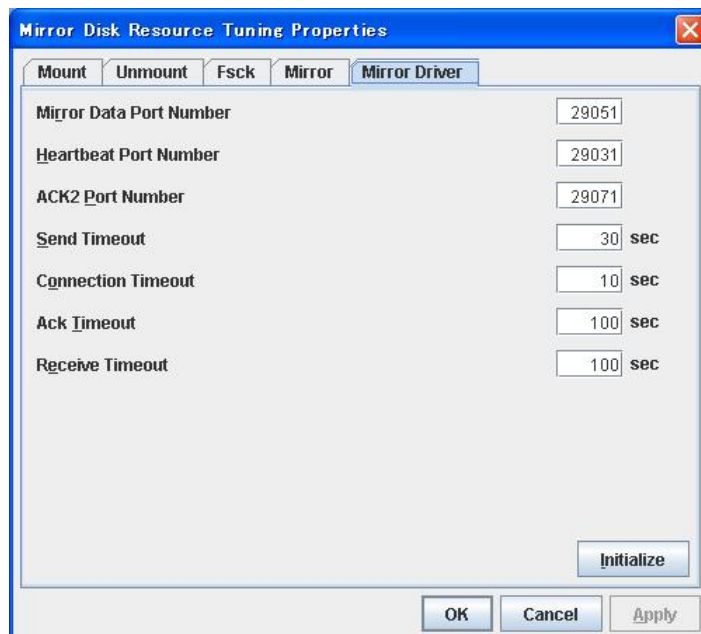
- ◆ [Synchronous]  
Select when LAN is mainly used for mirror connect.
- ◆ [Asynchronous]  
Select when WAN is mainly used for mirror connect. Specify Number of Queues when Asynchronous is chosen. Specify it for each mirror resource.
  - Unlimited:  
Queues will be allocated as long as possible to allocate memory. When it failed to allocate memory, mirror breaks.
  - Set Number(1~999999):  
Specify maximum number of queues to be allocated. When synchronous data exceeds it, mirror breaks.

### **Initialize**

Clicking **Initialize** resets the values of all items to the default values.

### Mirror driver tab

Advanced settings for a mirror driver is displayed.



#### Mirror Data Port Number (1 to 65535 <sup>5</sup>)

Set the TCP port number used for sending and receiving disk data between servers. The default value 29051 is set to the mirror disk resource or the hybrid disk resource created first. From a second mirror disk resource or the hybrid disk resource, the value increased by one from default (29052, 29053, ...) is set accordingly.

#### Heartbeat Port Number (1 to 65535 <sup>6</sup>)

Set the port number that a mirror driver uses to communicate control data between servers. The default value 29031 is set to the mirror disk resource or the hybrid disk resource created first. From a second mirror disk resource or the hybrid disk resource, the value increased by one from default (29032, 29033, ...) is set accordingly.

#### ACK2 Port Number (1 to 65535 <sup>7</sup>)

Set the port number that a mirror driver uses to communicate control data between servers. The default value 29071 is set to the mirror disk resource or the hybrid disk resource created first. From a second mirror disk resource or the hybrid disk resource, the value increased by one from default (29072, 29073, ...) is set accordingly.

#### Send Timeout (10 to 99)

Set the delivery time-out for write data.

#### Connection Timeout (5 to 99)

Set the time-out for connection.

<sup>5</sup> It is not recommended to use well-known ports, especially reserved ports from 1 to 1023.

<sup>6</sup> It is not recommended to use well-known ports, especially reserved ports from 1 to 1023.

<sup>7</sup> It is not recommended to use well-known ports, especially reserved ports from 1 to 1023.

### **Ack Timeout** (1 to 600)

Set the time-out which waits for Ack response when mirror recovers and data is synchronized.

### **Receive Timeout** (1 to 600)

Set the receive time-out for write confirmation.

### **Initialize**

Clicking **Initialize** resets the following values to the default values.

- Send Timeout
- Connection Timeout
- Ack Timeout
- Receive Timeout


---

### **Note:**

For **Mirror Data Port Number**, **Heartbeat Port Number** and **ACK2 Port Number**, different port numbers should be configured for each resource. Also, those should not be the same as other port numbers used on a cluster. Thus, the initial values are not set even when you click **Initialize**.

---

## Displaying the mirror disk resource property with the WebManager ~For Replicator ~

1. Start the WebManager.
2. When you click an object for a mirror disk resource  in the tree view, the following information is displayed in the list view.

Mirror Disk Name: md1		Details
Common	server1	server2
Properties		Value
Name		md1
Comment		
Mirror Partition Device Name		/dev/NMP1
Mount Point		/mnt/sdb2
Data Partition Device Name		/dev/sdb2
Cluster Partition Device Name		/dev/sdb1
Disk Device Name		/dev/sdb
File System		ext3
Mirror Disk Connect		mdc1
Status		Offline
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	Mirror disk resource name
Comment:	Comment
Mirror Partition Device Name:	Name of the mirror partition device linked to the mirror partition
Mount Point:	Directory where the mirror partition device is mounted
Data Partition Device Name:	Name of the data partition device used as a mirror disk resource
Cluster Partition Device Name:	Name of the cluster partition device to be paired with the data partition
Disk Device Name:	Name of the device denoting the entire disk where partitions to be mirrored exist
File System:	Type of the file system used on the mirror partition
Mirror Disk Connect:	IP address for the mirror disk resource
Status:	Status of the mirror disk resource
Server Name:	Server name
Status:	Status of the mirror disk resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	md
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	
Mount Option	rw
Mount Timeout (sec)	60
Mount Retry Count	3
Unmount Timeout (sec)	60
Unmount Retry Count	3
Action at Unmount Failure	kill
Fsck Option	-y
Fsck Timeout (sec)	1800
Fsck Action Before Mount	Execute at Specified Count
Fsck Interval	10
Fsck Action When Mount Failed	Execute
Re-restoration of Reiserfs	None
Initial Mirror Recovery	Yes
Initial Mkfs	Yes
Synchronization Data	Yes
Synchronization Mode	Synchronous
Number of Queues	2048
Mirror Data Port Number	29051
Mirror Heartbeat Port Number	29031
Mirror ACK2 Port Number	29071
Send Timeout (sec)	30
Connection Timeout (sec)	10
ACK Timeout (sec)	100
Receive Timeout (sec)	100

Type:	Resource type
Failover Threshold:	Maximum number of times that failover is performed at an activation error
Retry Count at Activation Failure:	Maximum number of times that activation is retried at an activation error
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Maximum number of times that inactivation is retried at an inactivation error
Final Action at Activation Failure:	Final action at an inactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Mount Option:	Options to pass to the mount command when mounting a file system
Mount Timeout (sec):	Timeout for waiting for the completion of the mount command (in seconds)
Mount Retry Count:	Mount retry count when the mount command fails
Unmount Timeout (sec):	Timeout for waiting for the completion of the unmount command to (in seconds)
Unmount Retry Count:	Unmount retry count when the unmount command fails
Action at Unmount Failure:	Action to be taken at an unmount error kill Force termination No Operation No action
fsck Option:	Options to be passed to the fsck command

fsck Timeout:	Timeout for waiting for the completion of the fsck command (in seconds)
fsck Action Before Mount:	fsck timing at mount <ul style="list-style-type: none"> <li>0 Does not execute fsck</li> <li>1 Always execute fsck</li> <li>2 Executes fsck when reached to fsck interval</li> </ul>
fsck Interval:	fsck interval
Fsck Action When Mount Failed:	Action when mount failed <ul style="list-style-type: none"> <li>0 No action</li> <li>1 Executes fsck</li> </ul>
Reconstruction of reiserfs	Action when reiserfsck failed <ul style="list-style-type: none"> <li>0 No operation</li> <li>1 Execute recovery by reiserfsck</li> </ul>
Initial Mirror Recovery:	Mirror recovery at cluster configuration
Initial mkfs:	Initial mkfs execution at cluster configuration
Synchronization Data:	Synchronization of mirror data
Synchronization Mode:	Synchronization mode of mirror data
Number of Queues:	Number of queues used for asynchronous mirroring
Mirror Data Port Number:	Data port number of a mirror disk
Mirror Heartbeat Port Number:	Heartbeat port number of a mirror disk
Mirror ACK2 Port Number:	Port number used for ACK2 of a mirror disk
Send Timeout (sec):	Send timeout (in seconds)
Connection Timeout (sec):	Connection timeout (in seconds)
ACK Timeout (sec):	Timeout waiting for ACK response(in seconds)
Receive Timeout (sec):	Receive timeout waiting for writes confirmation (in seconds)

# Understanding hybrid disk resources

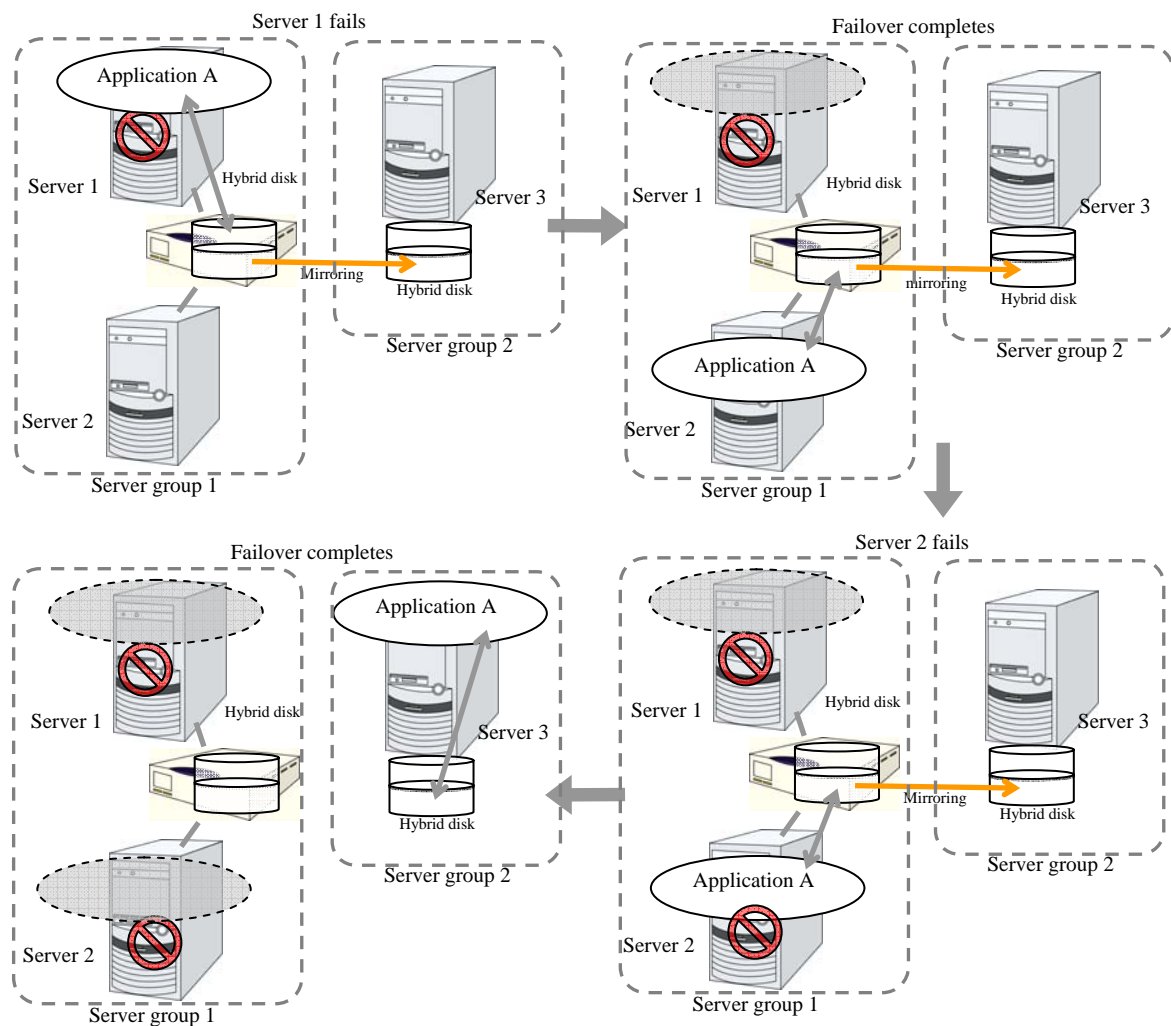
## Dependencies of hybrid disk resource

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource

## What is hybrid disk?

A hybrid disk is a resource which performs data mirroring between two server groups. A server group consists of 1 server or 2 servers. When a server group consists of 2 servers, a shared disk is used. When a server group consists of 1 server, a disk which is not shared type (e.g. a built-in disk, an external disk chassis which is not shared between servers) is used.



**Data partition**

Partitions where data to be mirrored (such as application data) is stored are referred to as data partitions.

Allocate data partitions as follows:

- ◆ Data partition size  
The size of data partition should be 1GB or larger but smaller than 1TB.
- ◆ Partition ID  
83(Linux)
- ◆ ExpressCluster is responsible for the access control (mount/umount) of file system. Do not configure the settings that allow the OS to mount or unmount a data partition.

**Cluster partition**

Dedicated partitions used in ExpressCluster for controlling hybrid disk are referred to as cluster partition.

Allocate cluster partitions as follows:

- ◆ Cluster partition size  
10 MB or more. Depending on the geometry, the size may be larger than 10 MB but that is not a problem.
- ◆ Partition ID  
83(Linux)
- ◆ A cluster partition and data partition for data mirroring should be allocated in a pair.
- ◆ You do not need to make the file system on cluster partitions.

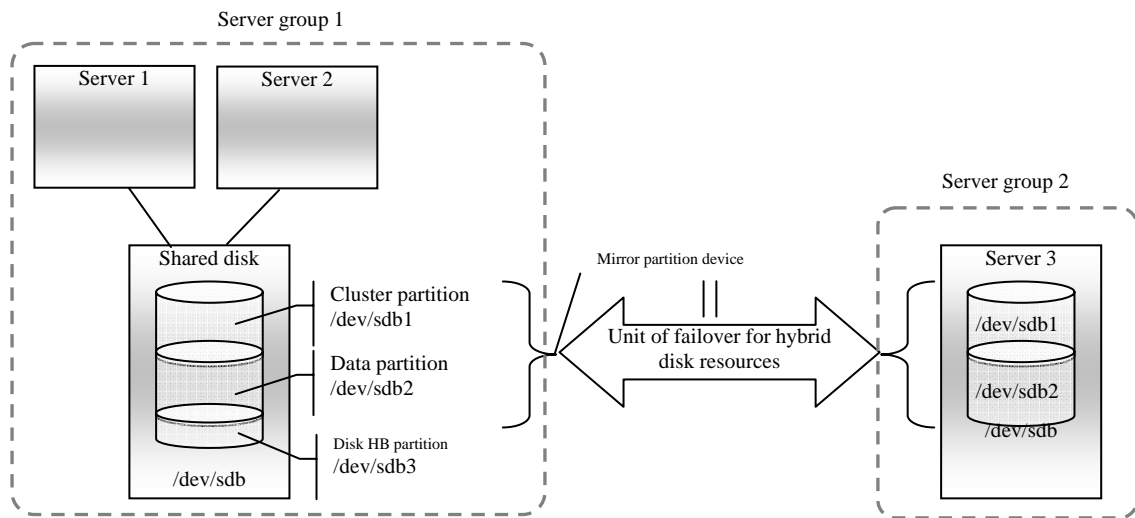
**Mirror Partition Device (/dev/NMPx)**

One hybrid disk resource provides the file system of the OS with one mirror partition. If a hybrid disk resource is registered with the failover group, it can be accessed only from one server (it is generally the primary server of the resource group).

Typically, the mirror partition device (dev/NMPx) remains transparent to users (AP) since I/O is performed via a file system. When the information is created by the Builder, device names should be assigned without overlapping with each other.

- ◆ ExpressCluster is responsible for the access control (mount/umount) of file system. Do not configure the settings that allow the OS to mount or unmount a data partition.  
Mirror partition's (hybrid disk resource's) accessibility to applications is the same as switching partition (disk resources) that uses shared disks.
- ◆ Mirror partition switching is performed on a failover group basis according to the failover policy.
- ◆ /dev/NMPx(x is a number between 1 and 8) is used for the special device name of mirror partition. Do not use /dev/NMPx in other device drivers.
- ◆ The major number 218 is used for mirror partition. Do not use the major number 218 in other device drivers.

Example 1) When two servers use the shared disk and the third server uses the built-in disk



- When a non-shared disk is used (i.e. when there is one server in the server group), it is possible to secure a partition for the hybrid disk resource (cluster partition and data partition) on the same disk where the OS (root partition and swap partition) is located.
  - When maintainability at a failure is important:
 

It is recommended to allocate a disk for mirror which is not used by the OS (such as root partition, swap partition).
  - If LUN cannot be added due to H/W RAID specifications:
 

If you are using hardware/RAID preinstall model where the LUN configuration cannot be changed, you can allocate a mirror partition (cluster partition, data partition) in the disk where the OS (root partition, swap partition) is located.

### Mirror disk connect

See “mirror disk connect” in “mirror disk resource”.

## Mirror parameter settings

The following parameters are the same as those of mirror disk resources. See “mirror disk resources”.

- ◆ Mirror data port number
- ◆ Heartbeat port number
- ◆ ACK2 port number
- ◆ The maximum number of request queues
- ◆ Connection timeout
- ◆ Send timeout
- ◆ Receiving timeout
- ◆ Ack timeout
- ◆ Bitmap update interval (cluster properties)
- ◆ Mirror agent send timeout (cluster properties)
- ◆ Mirror agent receiving timeout (cluster properties)
- ◆ Recovery data size (cluster properties)
- ◆ Initial mirror construction

The following parameter is different from mirror disk resource.

- ◆ Initial mkfs  
The behavior of the clphdinit command is configured.

## Notes on hybrid disk resources

- ◆ For servers that cannot be accessed by the same device name, configure individual settings for them.
- ◆ If **Mount/Unmount Exclusion** is selected on the **Exclusion** tab in **Cluster Properties**, activation/deactivation of hybrid disk resource may take time because mount/unmount is performed exclusively to disk resource, VxVM volume resource, NAS resource, mirror resource and hybrid disk resource in the same server.
- ◆ When specifying path including symbolic link for mount point, Force Operation cannot be done even if it is chosen as operation in failure detection.
- ◆ Disks using stripe set, volume set, mirroring, stripe set with parity by Linux md or LVM cannot be specified for the cluster partition and data partition.
- ◆ Hybrid disk resources (mirror partition devices) cannot be the targets of stripe set, volume set, mirroring, stripe set with parity by Linux md or LVM.
- ◆ When the geometries of the disks used as hybrid disks differ between the servers:

The size of a partition allocated by the `fdisk` command is aligned by the number of blocks (units) per cylinder. Allocate data partitions to achieve the following data partition size and direction of the initial mirror construction.

**Source server  $\leq$  Destination server**

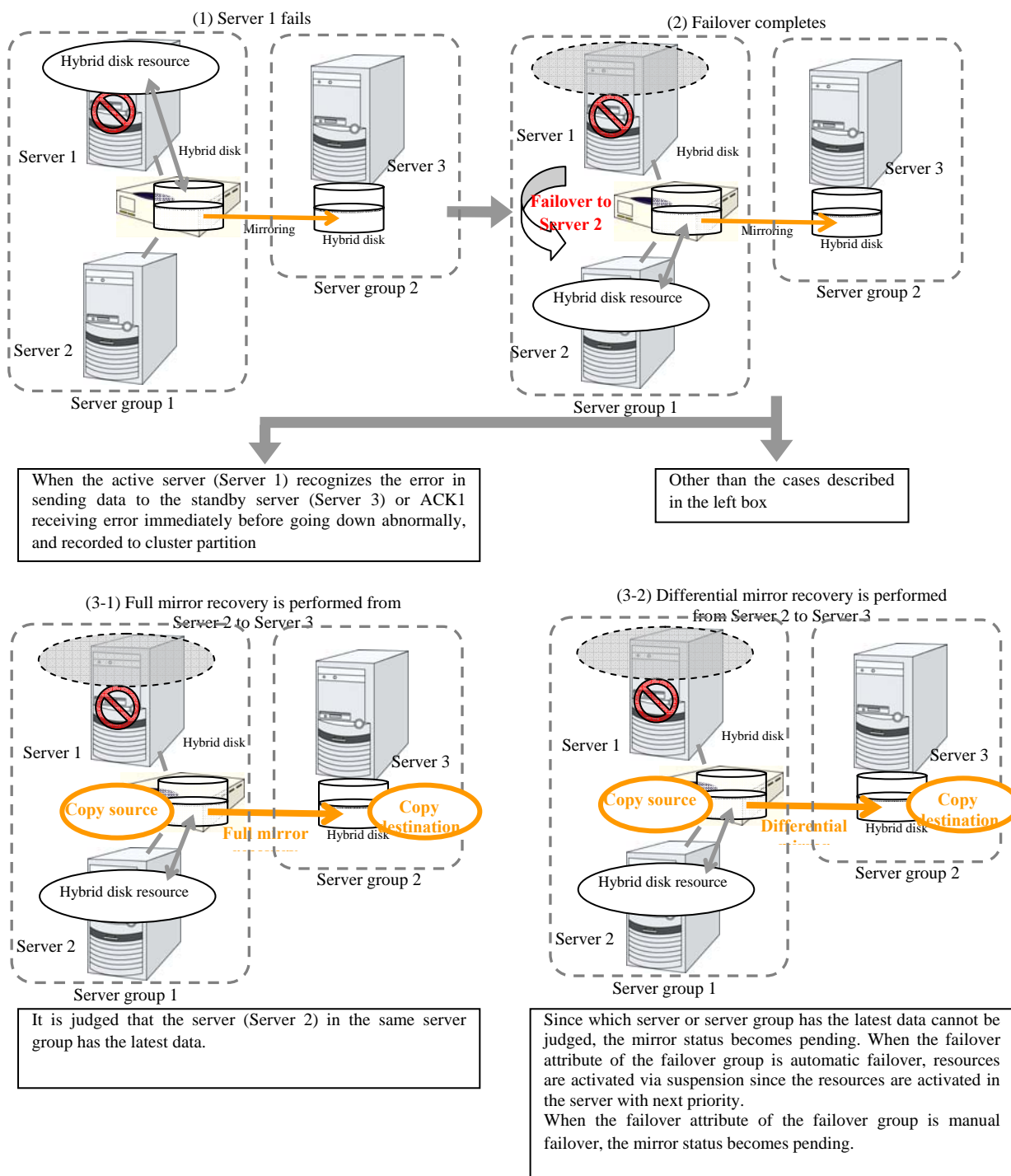
“Source server” refers to the server with the higher failover policy in the failover group to which a hybrid disk resource belongs.

“Destination server” refers to the server with the lower failover policy in the failover group to which a hybrid disk resource belongs.

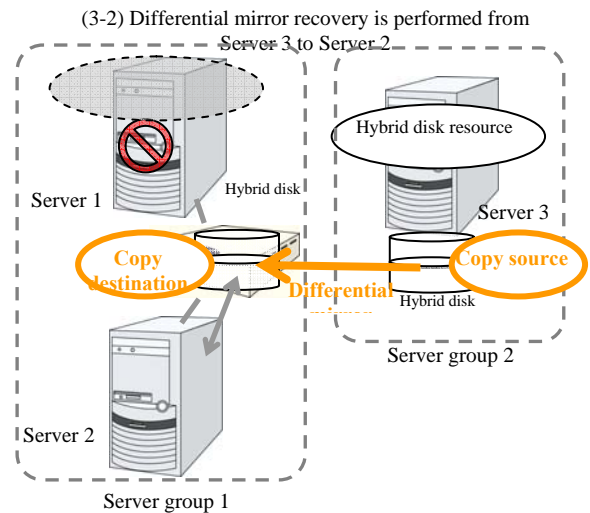
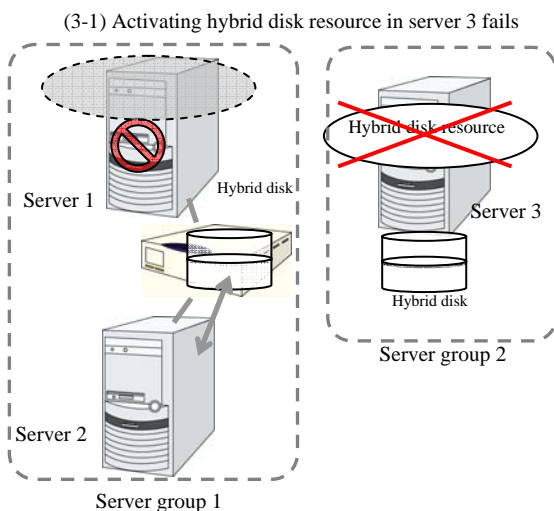
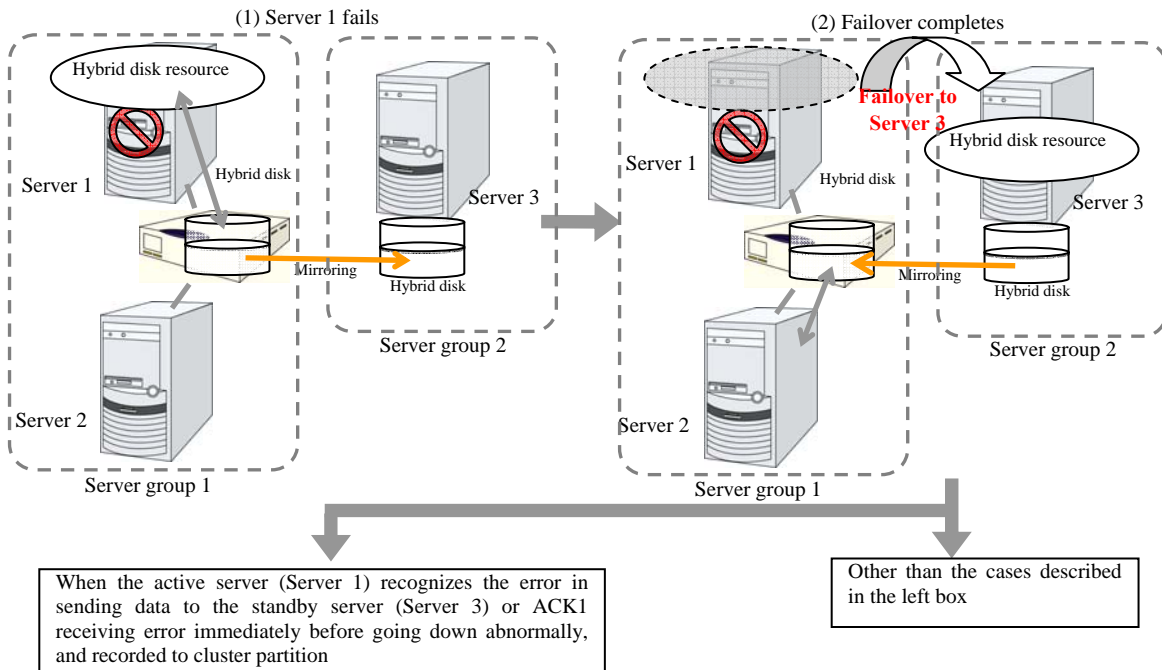
◆ Behavior of mirror recovery after the active server goes down abnormally

When the active server goes down abnormally, depending on the timing of the server failure, full mirror recovery or differential mirror recovery is performed.

- When a resource is activated by a server connected via a shared disk (a server in the same server group)



- When a resource is activated by a server in the remote server group



## Displaying and changing the details of hybrid disk resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the hybrid disk resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired hybrid disk resource name, and click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

The following tabs are the same as those of mirror disk resources. Refer to “mirror disk resource”.

- ◆ Hybrid disk detail tab (See mirror disk detail tab)
- ◆ Mirror disk connect selection
- ◆ Hybrid disk adjustment properties (See mirror disk adjustment properties)
  - Mount tab
  - Unmount tab
  - Fsck tab
  - Mirror tab (parameter other than the one for executing the initial mkfs)
  - Mirror drive tab

The following tab is different from that of mirror disk resource:


- ◆ Mirror tab of hybrid disk adjustment properties [execute initial mkfs]

### Execute initial mkfs

Specify if mkfs is executed to the data partition by running the clphdinit command. You can specify this only when initial mirror construction is performed. Automatic initial mkfs is not executed upon cluster construction in either configuration.

- When the checkbox is selected:  
mkfs is executed.
- When the checkbox is not selected:  
mkfs is not executed.

## Displaying the hybrid disk resource property with the WebManager ~For Replicator DR~

1. Start the WebManager.
2. When you click an object for a hybrid disk resource  in the tree view, the following information is displayed in the list view.

Hybrid Disk Name: hd1		Details
<div>Commonserver1server2server3</div>		
Properties		Value
Name	hd1	
Comment		
Mirror Partition Device Name	/dev/NMP1	
Mount Point	/mnt/sdb2	
Data Partition Device Name	/dev/sdb2	
Cluster Partition Device Name	/dev/sdb1	
Disk Device Name	/dev/sdb	
File System	ext3	
Mirror Disk Connect	mdc1	
Status	Online	
Resource Status on Each Server		
Server Name		Status
server1		Online
server2		Offline
server3		Offline

Name:	Hybrid disk resource name
Comment:	Comment
Mirror Partition Device Name:	Name of the mirror partition device linked to the mirror partition
Mount Point:	Directory where the mirror partition device is mounted
Data Partition Device Name:	Name of the data partition device used as a hybrid disk resource
Cluster Partition Device Name:	Name of the cluster partition device to be paired with the data partition
Disk Device Name:	Name of the device denoting the entire disk where partition to be mirrored exist
File System:	Type of the file system used on the mirror partition
Mirror Disk Connect:	IP address for the hybrid disk resource
Status:	Status of the hybrid disk resource
Server Name:	Server name
Status:	Status of the hybrid disk resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	hd
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	
Mount Option	rw
Mount Timeout (sec)	60
Mount Retry Count	3
Unmount Timeout (sec)	60
Unmount Retry Count	3
Action at Unmount Failure	kill
Fsck Option	-y
Fsck Timeout (sec)	1800
Fsck Action Before Mount	Execute at Specified Count
Fsck Interval	10
Fsck Action When Mount Failed	Execute
Re-restoration of Reiserfs	None
Initial Mirror Recovery	Yes
Initial Mkfs	Yes
Synchronization Data	Yes
Synchronization Mode	Synchronous
Number of Queues	2048
Mirror Data Port Number	29051
Mirror Heartbeat Port Number	29031
Mirror ACK2 Port Number	29071
Send Timeout (sec)	30
Connection Timeout (sec)	10
ACK Timeout (sec)	100
Receive Timeout (sec)	100

Type:	Resource type
Failover Threshold:	Maximum number of times that failover is performed at an activation error
Retry Count at Activation Failure:	Maximum number of times that activation is retried at an activation error
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Maximum number of times that inactivation is retried at an inactivation error
Final Action at Activation Failure:	Final action at an inactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Mount Option:	Options to pass to the mount command when mounting a file system
Mount Timeout (sec):	Timeout for waiting for the completion of the mount command (in seconds)
Mount Retry Count:	Mount retry count when the mount command fails
Unmount Timeout (sec):	Timeout for waiting for the completion of the unmount command to (in seconds)
Unmount Retry Count:	Unmount retry count when the unmount command fails
Action at Unmount Failure:	Action to be taken at an unmount error
	kill Force termination
	No Operation No action
Fsck Option:	Options to be passed to the fsck command

Fsck Timeout:	Timeout for waiting for the completion of the fsck command (in seconds)
Fsck Action Before Mount:	fsck timing at mount 0 Does not execute fsck 1 Always execute fsck 2 Executes fsck when reached to fsck interval
Fsck Interval:	fsck interval
Fsck Action When Mount Failed:	Action when mount failed 0 No operation 1 Executes fsck
Reconstruction of Reiserfs	Action when reiserfsck failed 0 No operation 1 Execute recovery by reiserfsck
Initial Mirror Recovery:	Mirror recovery at cluster configuration
Initial mkfs:	Initial mkfs execution by the clphdinit command
Synchronization Data:	Synchronization of mirror data
Synchronization Mode:	Synchronization mode of mirror data
Number of Queues:	Number of queues used for asynchronous mirroring
Mirror Data Port Number:	Data port number used for mirroring by hybrid disk
Mirror Heartbeat Port Number:	Heartbeat port number used for mirroring by hybrid disk
Mirror ACK2 Port Number:	Port number used for ACK2 of mirroring by hybrid disk
Send Timeout (sec):	Send timeout (in seconds)
Connection Timeout (sec):	Connection timeout (in seconds)
ACK Timeout (sec):	Timeout waiting for ACK response(in seconds)
Receive Timeout (sec):	Receive timeout waiting for writes confirmation (in seconds)

## Understanding raw resources

A raw resource is a resource of a raw device. It is a device on Linux and accesses partition devices without using a file system. Generally, applications build their specific data structures instead of file system.

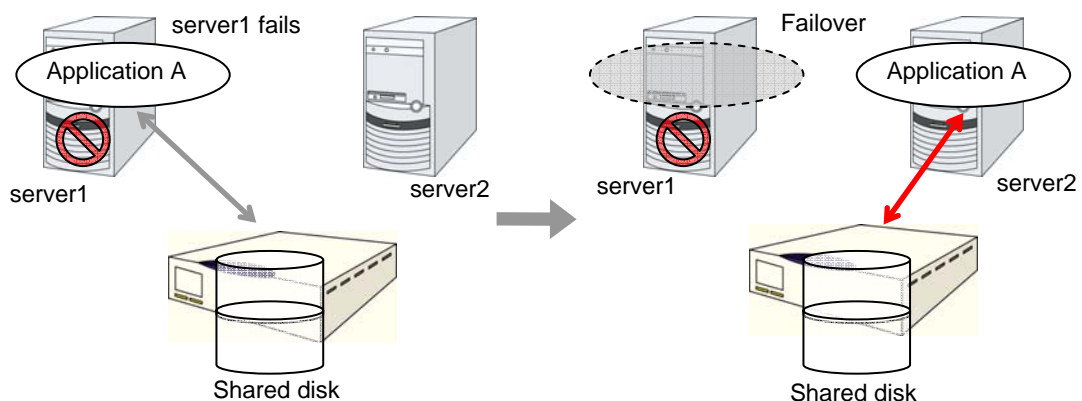
### Dependencies of raw resource

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource

### Switching partition

- ◆ A switching partition is a partition on a share disk connected to more than one server that forms a cluster.
- ◆ ExpressCluster maps (binds) switchable partition to raw device in OS.
- ◆ Switching is performed according to the failover policy for each failover group. By storing data necessary to applications on switching partitions, the data can be automatically passed over at a failover or when moving a failover group.
- ◆ Switching partitions should be accessible to the same area with the same device name on all servers.



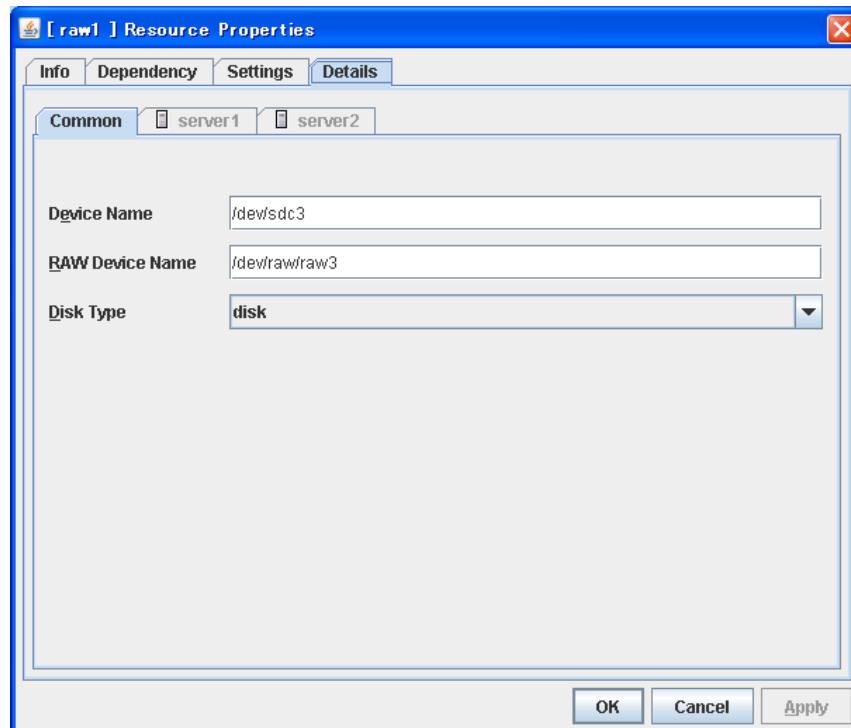
### Raw resources

- Note 1** Configure settings so that the same partition is accessible with the same device name.
- Note 2** Stripe set, volume set, mirroring, and the stripe set functions with parity are not supported for shared disks on Linux with md.
- Note 3** ExpressCluster performs maps (binds) a raw device. Do not configure the settings to perform bind on the OS.
- Note 4** Partitions are in the read-only mode on servers where groups are not activated.
- Note 5** Do not register raw devices which have been in **Disk I/F**, **Raw Monitor Resource** or **VxVM Volume Resource** on the **Server Properties** dialog box. See Section “Using ExpressCluster to control the VxVM disk” on page 625, for details of raw device of VxVM volume resource.

## Displaying and changing the details of raw resources

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the raw resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired raw resource name, click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

### Raw Resource Property: Details tab



**Device Name** (Within 1023 bytes) **Server Individual Setup**

Enter the actual device name in a shared disk that will be used as a raw resource. The name must begin with “/.”

**Raw Device Name** (Within 1023 bytes) **Server Individual Setup**

Enter the name of a device used for a raw access.


The raw device that is already registered in **Disk I/F** and **Raw Monitor Resource** on the **Server Properties** dialog box cannot be registered.

The raw device that is registered in the VxVM volume resource cannot be registered. For details of the Raw device of VxVM volume resource, see “Using ExpressCluster to control the VxVM disk” on page 625. The name must begin with “/.”

**Disk Type** **Server Individual Setup**

Specify a disk type. Only disk can be selected.

## Displaying the raw resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a Raw resource  in the tree view, the following information is displayed in the list view.

RAW Name: raw1
[Details](#)

Common
server1
server2

Properties	Value
Name	raw1
Comment	
Device Name	/dev/sdc3
RAW Device Name	/dev/raw/raw3
Status	Offline

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name:	Raw resource name
Comment:	Comment
Device Name:	Actual monitored device name
Raw Device Name:	Raw device name for raw access
Status:	Status of raw resource
Server Name:	Server name
Status:	Status of raw resource on each server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	raw
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	vip1
Disk Type	disk

Type:

Failover Threshold:

Retry Count at Activation Failure:

Final Action at Activation Failure:

Execute Script before Final Action:

Retry Count at Deactivation Failure:

Final Action at Deactivation Failure:

Execute Script before Final Action:

Depended Resources:

Disk Type:

Resource type

Maximum number of times failover is performed

Maximum number of times activation is retried when an activation error is detected

Final action at an activation error

Whether or not script is executed upon activation failure

Maximum number of times inactivation is retried when a inactivation error is detected

Final action at a inactivation error

Whether or not script is executed upon deactivation failure

Dependent resource

Disk type

# Understanding VxVM related resources

## System requirements for VxVM related resources

### Distribution

This function has been tested on the following versions.

IA32, x86\_64

Distribution	kernel
Red Hat Enterprise Linux 4 (RHEL 4) Update 5	2.6.9-55.ELsmp

### VERITAS Volume Manager versions

This function has been tested on the following versions.

x86\_64

rpm	Version	Release
VRTSvlic	3.02	012
VRTSvxvm	4.1.40.00	MP4-RHEL4
VRTSvxfs	4.1.40.00	MP4-RHEL4

### File system in volume

The following file system has been tested.

- ◆ vxfs

## Dependencies of VxVM related resources

By default, this function depends on the following group resource types.

- ◆ VxVM disk group resource

Group resource type
Floating IP resource
Virtual IP resource

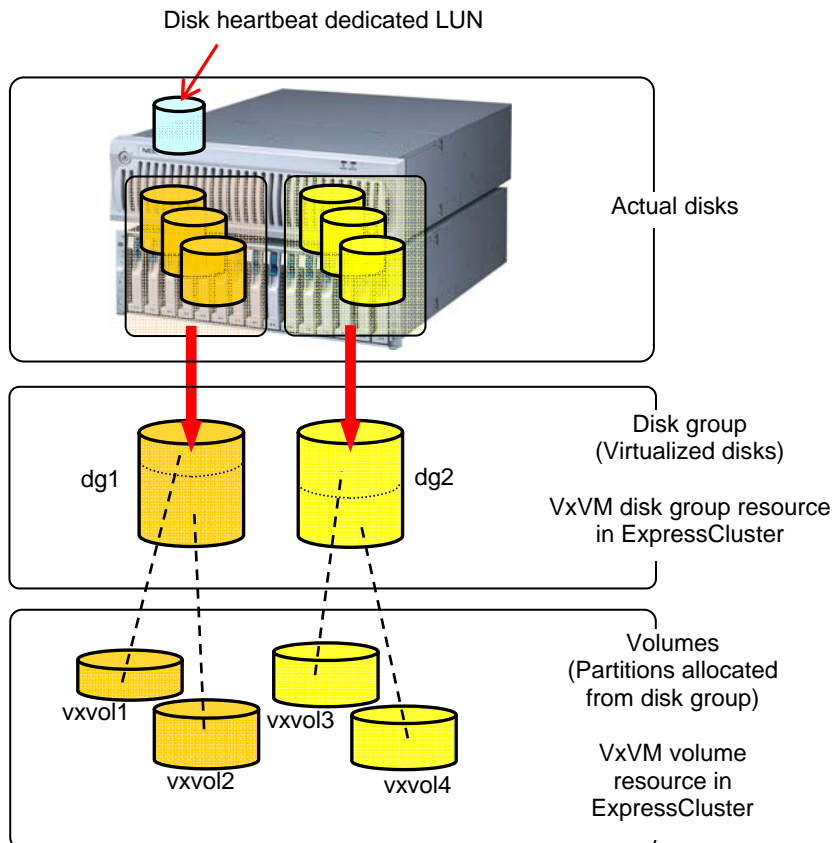
- ◆ VxVM volume resource

Group resource type
Floating IP resource
Virtual IP resource
VxVM disk group resource

## Resources controlled by ExpressCluster

VERITAS Volume Manager **disk group** (hereinafter referred to as “disk group”) is the virtually grouped physical disks. Logical partitions allocated from this disk group are referred to as “volume.”

ExpressCluster can control disk group as VxVM disk group resource and volume as VxVM volume resource.



## VxVM disk group resources

### About disk group

- Disk group is not defined by ExpressCluster.
- VxVM disk group resource in ExpressCluster activate (imports)/deactivate (deports) disk group.
- Disk group is automatically deported at OS startup if it is contained in the ExpressCluster configuration data.
- A disk group is not supported if it is not contained in the ExpressCluster configuration data.

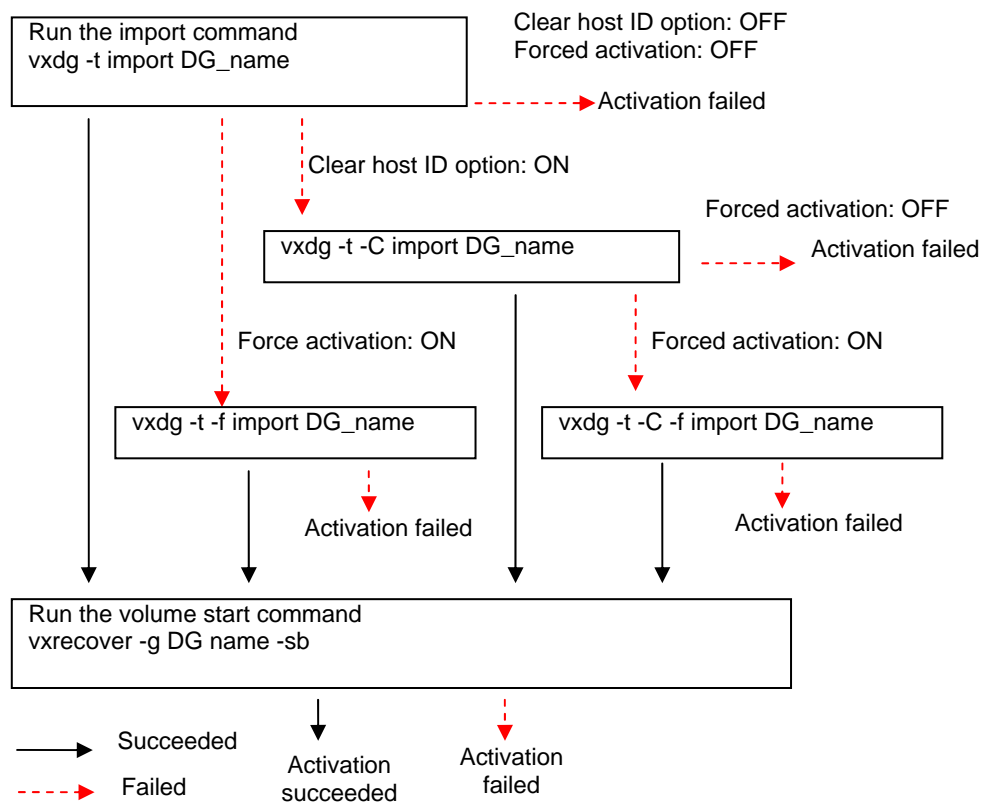
**Commands executed when the VxVM disk group is activated**

Execute the following commands when the VxVM disk group is activated.

Command	Option	Used when:
vxdg	import	importing a disk group
	-t	importing a disk group
	-C	importing a disk group failed, and the clear host ID option is ON.
	-f	importing a disk group failed, and the forced activation option is ON.

Command	Option	Used when:
vxrecover	-g	starting a specified disk group volume
	-sb	starting a specified disk group volume

Sequence when the disk is activated



- ◆ If the disk group was not deported successfully on the server from which the group is failed over, the disk group cannot be imported on the server to which the group is failed over when the clear host ID option is OFF because of VxVM specifications.
- ◆ In some cases, importing is successful even though the import timeout occurred. You can prevent this problem by executing import retries if the host ID clear or the forced import option is set to the import options.

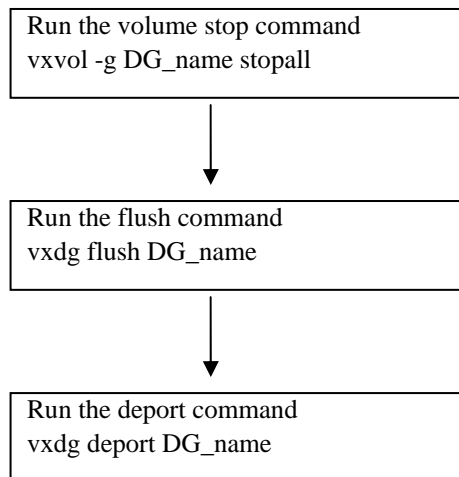
**Commands executed when the VxVM disk group is deactivated**

Execute the following commands when the VxVM disk group is not activated.

Command	Option	Used when:
vxdg	deport	deporting a disk group
	flush	flushing a disk group

Command	Option	Used when:
vxvol	-g	stopping the specified disk group volume
	stopall	stopping the specified disk group volume

Sequence when the disk is not activated

**VxVM volume resource****Note 1** About volume

- Volume is not defined by ExpressCluster.
- VxVM volume resource in ExpressCluster mounts/unmounts the file system on volume.
- VxVM volume resource is not required if you use only accessible raw devices (/dev/vx/rdisk/[disk group name]/[volume name]) on the condition where disk groups are imported and volumes are active (i.e., you do raw access without building a file system on the volume).

**Note 2** About dependencies

- The default dependency is “VxVM volume resource depends on VxVM disk group resource.”

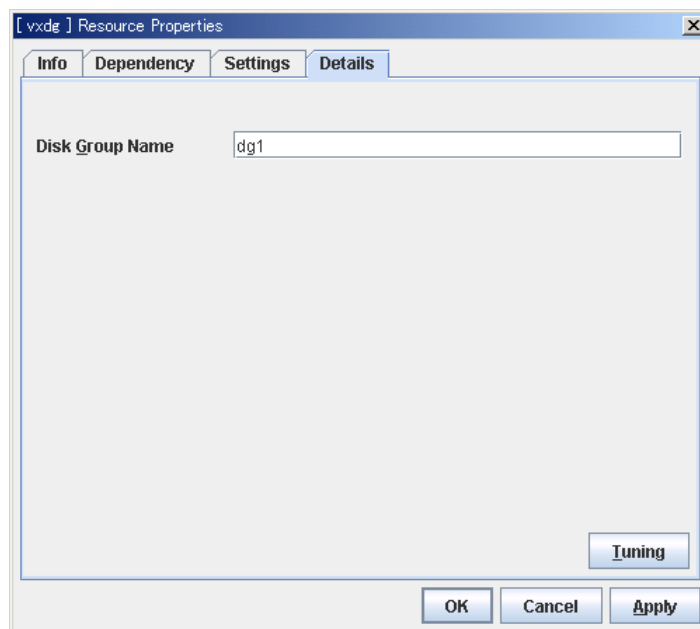
**Note 3** If **Mount/Unmount Exclusion** is selected on the **Exclusion** tab of the **Cluster Properties**, it may take some time to activate or deactivate the VxVM volume resource because the mount or unmount of the disk resource, VxVM resource, NAS resource, and mirror resource is performed exclusively in the same server.

**Note 4:** When specifying path including symbolic link for mount point, Force Operation cannot be done even if it is chosen as operation in Detecting Failure.

## Displaying and changing the detail of the VxVM disk group resource

1. From the tree view displayed in the left pane of the window, click the icon of the group to which the VxVM disk group resource whose detailed information you want to display and/or change belongs.
2. The group resource list is displayed in the table view on the right pane of the window. Right-click the desired VxVM disk group resource name and click the **Details** tab in the **Properties** dialog box.
3. Configure the settings on the **Details** tab by following the description below.

### VxVM disk group resource: Details tab



**Disk Group Name** Within 31 bytes

Enter the VxVM disk group name.

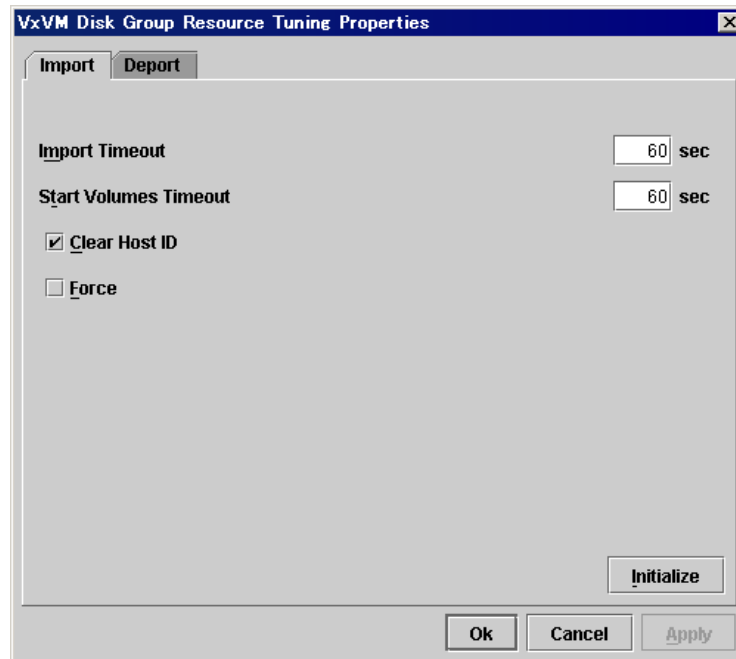
### Tuning

Displays the **VxVM Disk Group Resource Tuning Properties** dialog box. Configure the detailed settings of the VxVM disk group resource.

## VxVM Disk Group Resource Tuning Properties

### Import tab

Detailed settings for import of VxVM disk group resource are displayed.



#### Import Timeout 1 to 9999

Set a timeout for the import command, `vx dg import`.

#### Start Volume Timeout 1 to 9999

Set a timeout for the start command, `vx recover`.

#### Clear Host ID

When general importing of the VxVM disk group fails, the importing is set by performing Clear Host ID.

- ◆ When selected:  
The host ID is cleared. ExpressCluster runs the following import command:  
`vx dg -tC import [disk_group]`
- ◆ When cleared:  
The host IP is not cleared.

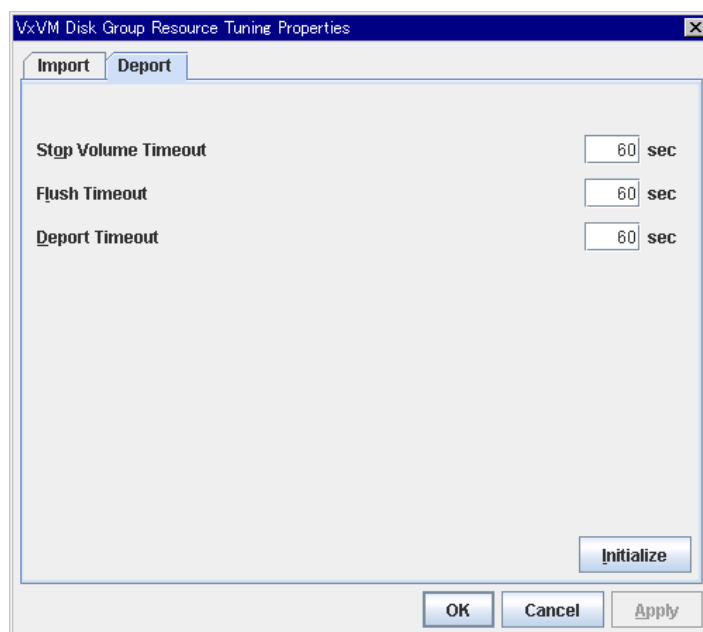
#### Forced Import

When general importing of the VxVM disk group fails and re-importing by Clear Host ID setting fails, forced import will be set.

- ◆ When selected:  
Forced import is performed. ExpressCluster runs following import commands:  
If the “Clear Host ID” option is OFF : `vx dg -tf import [disk_group]`  
If the “Clear Host ID” option is ON : `vx dg -tCf import [disk_group]`
- ◆ When cleared:  
Forced import is not performed.

**Deport tab**

Detailed settings for deporting VxVM disk group resource are displayed.



The image shows a Windows-style dialog box titled "VxVM Disk Group Resource Tuning Properties". It has two tabs: "Import" and "Deport", with "Deport" currently selected. The dialog contains three settings, each with a text input field and a unit label "sec":

Setting	Value	Unit
Stop Volume Timeout	60	sec
Flush Timeout	60	sec
Deport Timeout	60	sec

At the bottom right of the main area is an "Initialize" button. At the very bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

**Stop Volume Timeout** 1 to 9999

Set a timeout for the volume inactivation command, vxvol stopall.

**Flush Timeout** 1 to 9999

Set a timeout for the flush command, vxdg flush.

**Deport Timeout** 1 to 9999

Set a timeout for the deport command, vxdg deport.

## Displaying and changing the details of VxVM volume resources

1. From the tree view displayed on the left pane of the window, click the icon of the group to which the VxVM volume resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the VxVM volume source name, and then click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

### VxVM Volume Resource Details tab

The screenshot shows a dialog box titled "[ vxvol1 ] Resource Properties" with four tabs: Info, Dependency, Settings, and Details. The Details tab is selected. It contains four input fields: "Volume Device Name" with the value "/dev/vxdisk/dg1/vol1", "Volume RAW Device Name" with the value "/dev/vxrdisk/dg1/vol", "Mount Point" with the value "/mnt/vxvol1", and "File System" with a dropdown menu showing "vxfs". At the bottom right of the dialog is a "Tuning" button. At the very bottom are "OK", "Cancel", and "Apply" buttons.

#### Volume Device Name (Within 1023 bytes)

Enter the name of a volume device used as the VxVM volume resource. The name must begin with a “/.”

#### Volume Raw Device Name (Within 1023 bytes)

Enter the name of a Raw device used as the VxVM volume resource. The name must begin with a “/.”

#### Mount Point (Within 1023 bytes)

Set the directory to mount the VxVM volume device. The name must begin with a “/.”

#### File System (Within 15 bytes)

Specify the type of the file system created on the VxVM Volume Device.

◆ vxfs

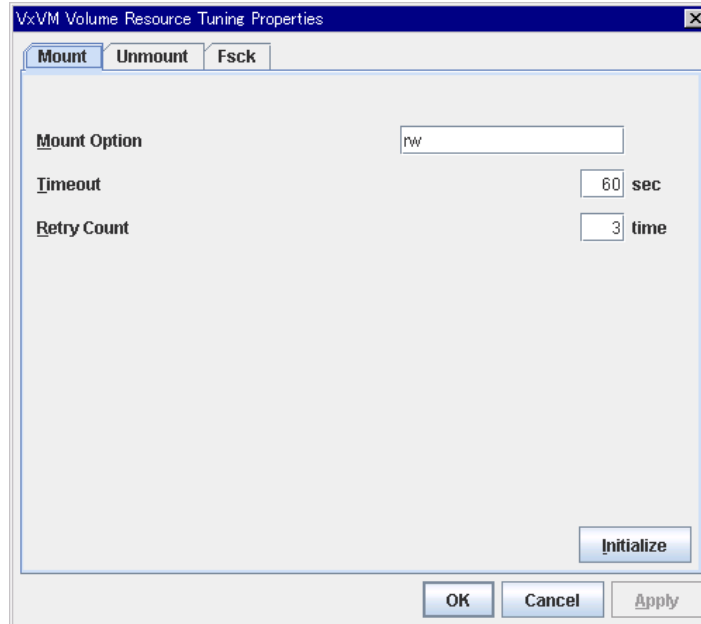
#### Tuning

Configure the detailed settings in the **VxVM Volume Resource Tuning Properties** dialog box.

## VxVM Volume Resource Tuning Properties

### Mount tab

The advanced settings for mounting are displayed.



### Mount Option (Within 1023 bytes)

Sets the option that is passed to the mount command when mounting the VxVM volume device.

Use a comma “,” to separate multiple options.

A mount option sample

Setting item	Setting value
Volume Device Name	/dev/vx/dsk/dg1/vol1
Mount Point	/mnt/vxvol1
File System	vxfs
Mount Option	rw

The mount command which will be executed by the setting above:

```
mount -t vxfs -o rw /dev/vx/dsk/dg1/vol1 /mnt/vxvol1
```

### Timeout 1 to 999

Sets the timeout to wait for the end of the mounting command which is used to mount the VxVM volume device. This may take some time if the file system capacity is large. Be careful of the setting value.

### Retry Count 0 to 999

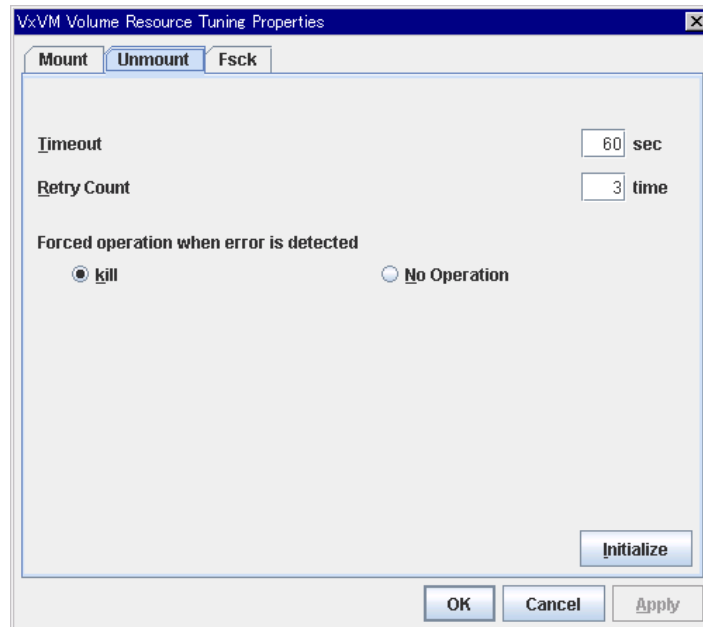
Sets the retry count used when failed to mount the VxVM volume device. Mounting is not retried if 0 is set.

**Initialize**

Clicking the **Initialize** button resets the values of all items to the default values.

**Unmount tab**

The advanced settings for unmounting are displayed.

**Timeout** 1 to 999

Sets the timeout to wait for the umount command used to unmount the VxVM volume device.

**Retry Count** 0 to 999

Specify the unmount retry count used when unmounting the VxVM volume device failed. Unmounting is not retried if 0 is set.

**Forced operation when error is detected**

When retrying unmounting after unmount failed, the operation to be performed is chosen from the following:

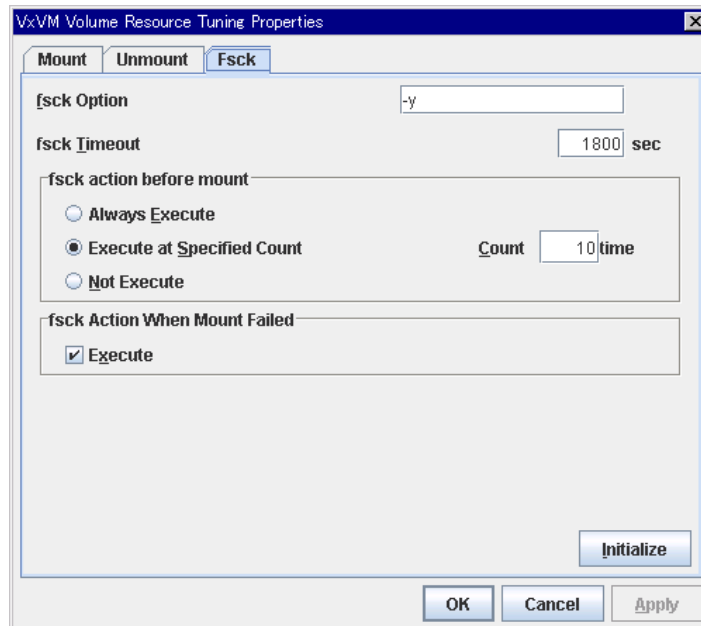
- ◆ **kill:**  
Attempt to forcefully terminate the processes that are accessing the mount point. The process cannot necessarily be forcefully terminated.
- ◆ **none:**  
Does not attempt to forcefully terminate the processes that are accessing the mount point.

**Initialize**

Clicking the **Initialize** button resets the values of all items to the default values.

### Fsck tab

The advanced settings for fsck are displayed. fsck is performed when mounting the VxVM volume device failed.



#### fsck Option (Within 1023 bytes)

When checking the VxVM volume device, specify the option to pass to the fsck command. To set multiple options, use a space to separate the options. Specify the option so that the fsck command will not operate interactively. If the fsck command operates interactively, resource activation becomes an error after "fsck timeout" progress.

#### fsck Timeout 1 to 9999

Specifies the timeout to wait for the fsck command to end when checking the VxVM volume device. This may take some time if the capacity of the file system is large. Pay attention to the set value.

#### fsck action before mount

Select an fsck action before mount of VxVM volume device from the following choices.

- ◆ Always Execute:  
fsck is run before mounting.
- ◆ Execute at Specified Count:  
fsck is run when resource is activated successfully within the count specified at Count.  
= Count (0 to 999)
- ◆ Not execute:  
fsck is not run before mount.

---

#### Note:

The specified count for fsck is not related to the check interval managed by the file system.

---

### **fsck Action When Mount Failed**

Select an fsck action when mounting VxVM volume device fails from the following choices:

When selected:

fsck is run.


When cleared:

fsck is not run.

### **Initialize**

Clicking the **Initialize** button resets the values of all items to the default values.

## Displaying the property of the VxVM disk group resources with the WebManager

1. Start the WebManager.
2. When you click an object for a VxVM disk group resource  in the tree view, the following information is displayed in the list view.

VxVM Disk Group Name: wxdg1		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	wxdg1	
Comment		
Disk Group Name	dg1	
Status	Offline	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	


Name:	VxVM disk group resource name
Comment:	Comment
Disk group Name:	VxVM disk group name
Status:	Status of VxVM disk group resource
Server Name:	Server name
Status:	Status of VxVM disk group resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	wxdg
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	vip1
Clear Host ID	On
Force	Off
Import Timeout (sec)	60
Start Volume Timeout (sec)	60
Stop Volume Timeout (sec)	60
Flush Timeout (sec)	60
Deport Timeout (sec)	60

Type:	Resource type
Failover Threshold:	Maximum number of times that failover is performed when an activation error is detected
Retry Count at Activation Failure:	Maximum number of times that activation is retried
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Deactivation retry count
Final Action at Deactivation Failure:	Final action at a inactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Depended Resources:	Dependent resource
Clear Host ID:	Whether or not to clear host ID
Force:	Whether or not to perform forced import
Import Timeout (sec):	Import timeout
Start Volume Timeout (sec):	Start volume timeout
Stop Volume Timeout (sec):	Stop volume timeout
Flush Timeout (sec):	Flush timeout
Deport Timeout (sec):	Deport timeout

## Displaying the property of the VxVM volume resources with the WebManager

1. Start the WebManager.
2. When you click an object for a VxVM volume resource  in the tree view, the following information is displayed in the list view.

VxVM Volume Name: vxvol1		Details
Common	server1	server2
Properties		Value
Name		vxvol1
Comment		
Volume Device Name		/dev/vxdsk/dg1/vol1
Volume RAW Device Name		/dev/vxrdsk/dg1/vol1
Mount Point		/mnt/vol1
File System		vxfs
Status		Offline
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	VxVM volume resource name
Comment:	Comment
Volume Device Name:	Device name of the VxVM volume
Volume Raw Device Name:	Raw device name of the VxVM volume
Mount Point:	Directly to mount the VxVM volume device
File System:	Type of the file system that is created on the VxVM volume device
Status:	Status of the VxVM volume resource
Server Name:	Server name
Status:	Status of the VxVM volume resource of the server

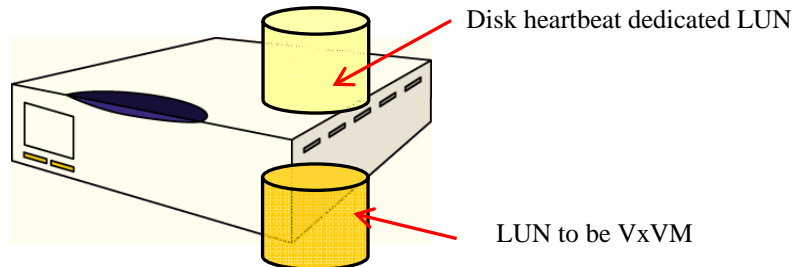
If you click the **Details** button, the following information is displayed.

Properties	Value
Type	vxvol
Failover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	vip1,vxdg1
Mount Option	rw
Mount Timeout (sec)	60
Mount Retry Count	3
Fsck Action When Mount Failed	Execute
Unmount Timeout (sec)	60
Unmount Retry Count	3
Action at Unmount Failure	kill
Fsck Option	-y
Fsck Timeout (sec)	1800
Fsck Action Before Mount	Execute at Specified Count
Fsck Interval	10

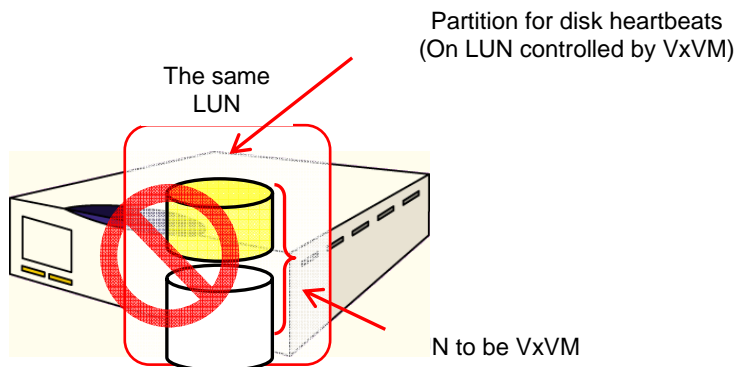
Type:	Resource type
Failover Threshold:	Maximum number of times that failover is performed when an activation error is detected.
Retry Count at Activation Failure:	Maximum number of times that activation is retried when an activation error is detected
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Maximum number of times that inactivation is retried when an inactivation error is detected
Final Action at Deactivation Failure:	Final action at a inactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Depended Resources:	Dependent resource
Mount Option:	Options to be passed to the mount command when mounting a file system
Mount Timeout (sec):	Timeout for waiting for the mount command to complete (in seconds)
Mount Retry Count:	Number of times mounting is retried when the mount command fails
Fsck Action When Mount Failed:	Action at mount failure + 0 Do not run fsck + 1 Run fsck
Unmount Timeout (sec):	Timeout for waiting for the umount command to complete (in seconds)
Unmount Retry Count	Number of times unmounting is retried when the umount command fails
Action at Unmount Failure:	Action at unmount error kill Forced termination No Operation No action
fsck Option:	Options to be passed to the fsck command
fsck Timeout (sec):	Timeout for waiting for the fsck command to complete (in seconds)
fsck Action Before Mount:	fsck timing at mount + 0 No action + 1 Always run fsck + 2 Run fsck at fsck interval
fsck Interval:	fsck interval

## Using ExpressCluster to control the VxVM disk

**Note 1** Allocate a LUN for disk heartbeat.



If you add disks to a disk group, add on a physical disk basis. The disk group is imported into one of the servers, not both. Therefore, the partition for disk heartbeats, which should be accessible from both servers, cannot be on the same LUN as the disk to be added in disk group.



**Note 2** Check the actual raw device of the volume raw device in advance.

Import all disk groups which can be activated on one server and activate all volumes before installing ExpressCluster.

Run the command below:

```
# raw -qa
```

/dev/raw/raw2:	bound to	major 199, minor 2
/dev/raw/raw3:	bound to	major 199, minor 3

(A) (B)

Example: Assuming the disk group name and volume name are:

Disk group name: dg1

Volume name under dg1: vol1, vol2

Run the command below:

```
# ls -l /dev/vx/dsk/dg1/
```

brw-----	1 root	root	199, 2	May 15 22:13 vol1
brw-----	1 root	root	199, 3	May 15 22:13 vol2

(C)

Confirm that major and minor numbers are identical between (B) and (C).

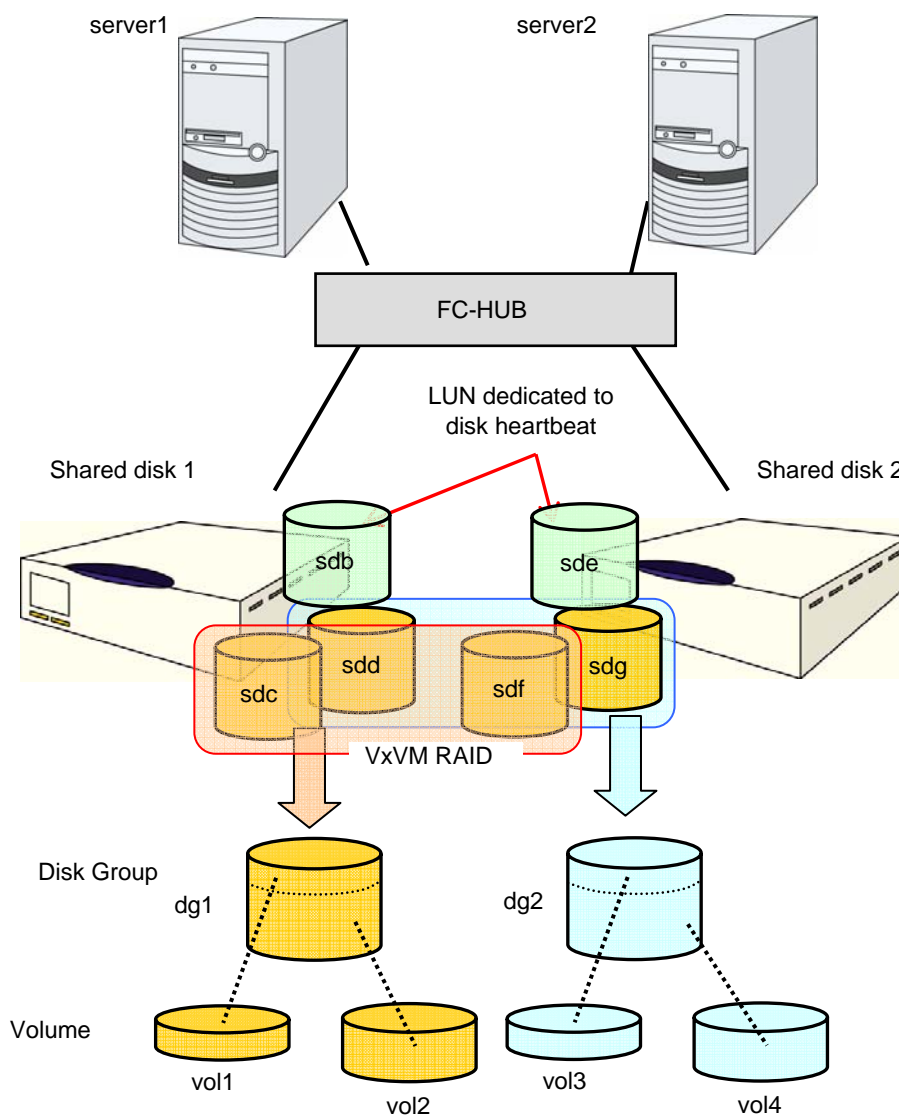
Never use these raw devices (A) for disk heartbeat resource, raw resource, or raw monitor resource in ExpressCluster.

## Cluster configuration using VERITAS volume manager

This section describes configuration of cluster using VERITAS Volume Manager with some configuration examples. For the flow of the procedure regarding to the cluster configuration, refer to the *Installation and Configuration Guide*.

### VERITAS volume manager configuration

The following is the VERITAS Volume Manager configuration that has been tested to run on ExpressCluster:



A VxVM configuration example on the previous page is:

Disk group 1			
dg1	Physical disk 1	/dev/sdc	
	Physical disk 2	/dev/sdf	
	Volume		
	vol1 * <sup>1</sup>	Volume device name	/dev/vx/dsk/dg1/vol1
		Volume Raw device name	/dev/vx/rdsk/dg1/vol1
		File system	vxfs
	vol2 * <sup>1</sup>	Volume device name	/dev/vx/dsk/dg1/vol2
		Volume Raw device name	/dev/vx/rdsk/dg1/vol2
		File system	vxfs
Disk group 2			
dg2	Physical disk 1	/dev/sdd	
	Physical disk 2	/dev/sdg	
	Volume		
	vol3 * <sup>1</sup>	Volume device name	/dev/vx/dsk/dg2/vol3
		Volume Raw device name	/dev/vx/rdsk/dg2/vol3
		File system	vxfs
	vol4 * <sup>1</sup>	Volume device name	/dev/vx/dsk/dg2/vol4
		Volume Raw device name	/dev/vx/rdsk/dg2/vol4
		File system	vxfs
LUN for disk heartbeat resource			
Shared disk 1		Partition of /dev/sdb	
Shared disk 2		Partition of /dev/sde	

\*<sup>1</sup> In the tested environment, multiple physical disks were registered in disk group and volumes were mirrored between shared disk cabinets.

## Example of ExpressCluster environment with VxVM

Refer to Chapter 5 “Creating the cluster configuration data using the Builder” in the *Installation and Configuration Guide* for details of resource parameters. VxVM parameters to be specified here are based on the “VERITAS volume manager configuration” on page 626.

	Parameters	Values
Cluster configuration	Cluster name	cluster
	Number of servers	2
	Number of failover groups	3
	Number monitor resources	8
Heartbeat resource	Number of LAN heartbeats	2
	Number of COM heartbeats	1
	Number of disk heartbeats	2
1st server information (Master server)	Server name	server1
	Interconnection IP address (dedicated)	192.168.0.1
	Interconnection IP address (backup)	10.0.0.1
	Public IP address	10.0.0.1
	COM heartbeat device	/dev/ttyS0
	Disk heartbeat device	/dev/sdb1 /dev/raw/raw10
		/dev/sde1 /dev/raw/raw11
2nd server information	Server name	server2
	Interconnection IP address (dedicated)	192.168.0.2
	Interconnection IP address (backup)	10.0.0.2
	Public IP address	10.0.0.2
	COM heartbeat device	/dev/ttyS0
	Disk heartbeat device	/dev/sdb1 /dev/raw/raw10
		/dev/sde1 /dev/raw/raw11
1st group (For the WebManager)	Type	failover
	Group name	ManagementGroup
	Startup server	All servers
	Number of group resources	1

1st group resource* <sup>1</sup>	Type	floating ip resource
	Group resource name	ManagementIP
	IP address	10.0.0.11
2nd group (For applications)	Type	failover
	Group name	failover1
	Server that can be started	All servers
	Number of group resources	4
1st group resource	Type	floating ip resource
	Group resource name	fip1
	IP address	10.0.0.12
2nd group resource	Type	VxVM disk group resource
	Group resource name	vx dg1
	Disk group name	dg1
	Host ID clear	ON
	Forced import	OFF
3rd group resource	Type	VxVM volume resource
	Group resource name	vxvol1
	Volume device name	/dev/vx/dsk/dg1/vol1
	Volume raw device name	/dev/vx/rdisk/dg1/vol1
	Mount point	/mnt/vol1
	File system	vxfs
4th group resource	Type	VxVM volume resource
	Group resource name	vxvol2
	Volume device name	/dev/vx/dsk/dg1/vol2
	Volume raw device name	/dev/vx/rdisk/dg1/vol2
	Mount point	/mnt/vol2
	File system	vxfs
3rd group (For applications)	Type	failover
	Group name	failover2
	Startup server	server2 to server1
	Number of group resources	4
1st group resource	Type	floating ip resource
	Group resource name	fip2
	IP address	10.0.0.13

2nd group resource	Type	VxVM disk group resource
	Group resource name	vxdg2
	Disk group name	dg2
	Host ID clear	ON
	Forced import	OFF
3rd group resource	Type	VxVM volume resource
	Group resource name	vxvol3
	Volume device name	/dev/vx/dsk/dg2/vol3
	Volume raw device name	/dev/vx/rdisk/dg2/vol3
	Mount point	/mnt/vol3
	File system	vxfs
4th group resource	Type	VxVM volume resource
	Group resource name	vxvol4
	Volume device name	/dev/vx/dsk/dg2/vol4
	Volume raw device name	/dev/vx/rdisk/dg2/vol4
	Mount point	/mnt/vol4
	File system	vxfs
1st monitor resource (to be created by default)	Type	user mode monitor
	Monitor resource name	userw
2nd monitor resource (Automatically created at VxVM disk group resource addition)	Type	VxVM daemon monitor
	Monitor resource name	vxdw
3rd monitor resource (monitors vxvol1)	Type	VxVM volume monitor
	Monitor resource name	vxvolw1
	Device to be monitored	/dev/vx/rdisk/dg1/vol1
	VxVM volume resource	vxvol1
	Actions at error detection	Stop cluster daemon and Shut down OS
4th monitor resource (monitors vxvol2)	Type	VxVM volume monitor
	Monitor resource name	vxvolw2
	Device to be monitored	/dev/vx/rdisk/dg1/vol2
	VxVM volume resource	vxvol2
	Actions at error detection	Stop cluster daemon and shutdown OS

5th monitor resource (monitors vxvol3)	Type	VxVM volume monitor
	Monitor resource name	vxvolw3
	Device to be monitored	/dev/vx/rdisk/dg2/vol3
	VxVM volume resource	vxvol3
	Actions at error detection	Stop cluster daemon and shutdown OS
6th monitor resource (monitors vxvol4)	Type	VxVM volume monitor
	Monitor resource name	vxvolw4
	Device to be monitored	/dev/vx/rdisk/dg2/vol4
	VxVM volume resource	vxvol4
	Actions at error detection	Stop cluster daemon and shutdown OS
7th monitor resource	Type	ip monitor
	Monitor resource name	ipw1
	Monitor IP address	10.0.0.254 (Gateway)
	Actions at error detection	"ManagementGroup" group failover

\*<sup>1</sup> : You can use a floating IP for connecting the WebManager to enter a dedicated group. Unless the group dedicated to the WebManager does not stop, it can be accessed from Web browser without being aware of the server's real IP.

- ◆ Make correct settings for monitor object VxVM volume resource and its volume raw device in VxVM volume monitor resource.
- ◆ VxVM daemon resource monitors VxVM's vxconfigd daemon. This is automatically added when the settings for first VxVM disk group resource is configured.
- ◆ Each name of raw devices to be set for the following resources MUST be unique:
  - Raw device of disk heartbeat resource
  - Actual raw device of volume raw device of VxVM volume resource
  - Raw device of raw resource
  - Raw device to be monitored of raw monitor resource

The configuration of this cluster is illustrated on the next page.



## Overview of the procedure to create a cluster

Create a cluster as described below:

1. Setup of VERITAS Volume Manager  
Set up VERITAS Volume Manager on the server.
2. Check up of volume raw device  
Confirm the actual raw device of the Volume raw device. For details, see “Using ExpressCluster to control the VxVM disk” on page 625.
3. Setup of ExpressCluster server  
Set up ExpressCluster server on all servers to form a cluster.
4. Registering a license  
Register a license on a master server that configures a cluster.
5. Rebooting servers  
Reboot servers that construct a cluster.
6. Connecting to the ExpressCluster WebManager  
Connect to the ExpressCluster WebManager using a web browser.
7. Making cluster configuration data  
Create cluster configuration data and upload it to a server using the online version Builder.
8. Rebooting the WebManager and starting the cluster

## Procedure to create cluster configuration data

---

### Related Information:

For the details about how to create cluster configuration data, see Chapter 5, “Creating the cluster configuration data using the Builder” in the *Installation and Configuration Guide*.

---

Start the online version Builder and add a server, heartbeat resource, and group. Refer to Chapter 5 “Creating the cluster configuration data using the Builder” in the *Installation and Configuration Guide*, and go to “2-2. Add a group for operation.”

## Adding a group resource (Floating IP address)

1. In the Group Definitions list, click Group Resource with failover1 selected.
2. In **Group Resource Definitions**, click **Add**.
3. Enter the first group resource information in the **Resource Definition** dialog box. Select the group resource type “**floating ip resource**” in the **Type** box, and enter the group resource name (fip1) in the **Name** box. Click **Next**.
4. Enter the IP Address **10.0.0.12** in the **IP Address** box. Click **Next**.
5. **Recovery operation at activity failure detection** and **Recovery Operation at Deactivity Failure Detection** are displayed. Ignore them and click **Next**.
6. A page for setting up a dependency is displayed. Nothing needs to be configured in this page. Click **Finish**.

## Adding a group resource (VxVM disk group resources)

1. In **Group Resource Definitions**, click **Add**.
2. Enter the second group resource information in the **Resource Definition** dialog box. Select the group resource type (**VxVM disk group resource**) in the **Type** box, and enter the group resource name **vxvg1** in the **Name** box. Click **Next**.
3. Enter the disk group name (dg1) into **Disk Group Name** box, and click **Next**.
4. **Recovery operation at activity failure detection** and **Recovery Operation at Deactivity Failure Detection** are displayed. Ignore them and click **Next**.
5. Click **Finish** in the screen shown.

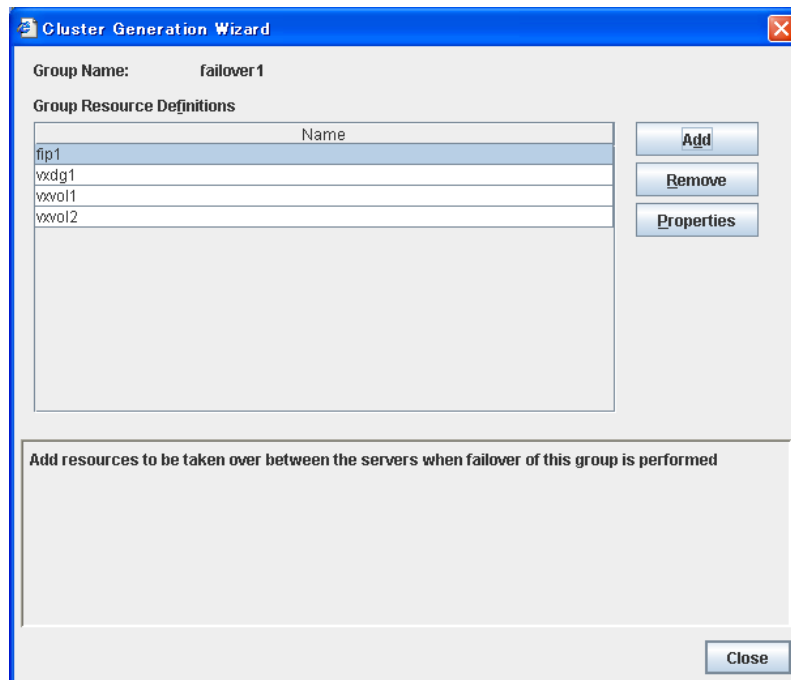
## Adding a group resource (VxVM volume resources)

1. In **Group Resource Definitions**, click **Add**.
2. Enter the third group resource information in the **Resource Definition** dialog box. Select the group resource type (**VxVM volume resource**) in the **Type** box, and enter the group resource name **vxvol1** in the **Name** box. Click **Next**.
3. Enter the volume device name (/dev/vx/dsk/dg1/vol1), volume raw device name (/dev/vx/rdisk/dg1/vol1) and mount point (/mnt/vol1) into their respective boxes. Then select the type (vxfs) in the **File System** box and click **Next**.
4. **Recovery operation at activity failure detection** and **Recovery Operation at Deactivity Failure Detection** are displayed. Ignore them and click **Next**.
5. Click **Finish** in the screen shown.

## Adding a group resource (VxVM volume resources)

1. In **Group Resource Definitions**, click **Add**.
2. Enter the fourth group resource information in the **Resource Definition** dialog box. Select the group resource type (**VxVM volume resource**) in the **Type** box, and enter the group resource name **vxvol2** in the **Name** box. Click **Next**.
3. Enter the volume device name (/dev/vx/dsk/dg1/vol2), volume raw device name (/dev/vx/rdisk/dg1/vol2) and mount point (/mnt/vol2) into their respective boxes. Then select the type (vxfs) in the **File System** box and click **Next**.
4. **Recovery operation at activity failure detection** and **Recovery Operation at Deactivity Failure Detection** are displayed. Ignore them and click **Next**.
5. Click **Finish** in the screen shown.

**Group Resource Definitions** of failover1 is as follows:

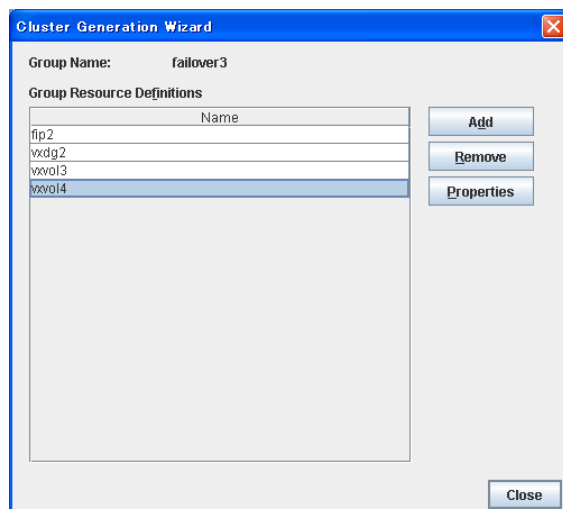


## Add the third group (for operation)

Configure a second group that works as a unit of failover at the time an error occurs.

1. In the **Group Definitions** list, click **Add**.
2. In the **Group Definition** dialog box, enter the group name (failover2) in the **Name** box, and click **Next**.
3. Clear the **Failover is possible at all servers** check box.
4. Select **server2** on **Available Servers** and click **Add**. **server2** is added to **Servers that can run the Group**. Likewise, add **server1**.

For a third group, add group resources in the same way as a second group.



## Adding a monitor resource (VxVM volume monitor resource)

1. In the **Group Definitions** list, click **Next**.
2. In the **Monitor Resource Definitions** list, click **Add**.
3. Enter the third group monitor resource information in the **Monitor Resource Definition** dialog box. The first monitor resource (user-mode monitor) has been created when the cluster name was defined by default. The second monitor resource (VxVM daemon monitor) has been automatically created when VxVM disk group resource was added. Select the monitor resource type (VxVM volume monitor) in the **Type** box, and enter the monitor resource name (vxvolw1) in the **Name** box. Then click **Next**.
4. Enter the monitor target device (/dev/vx/rdisk/dg1/vol1) in the **Monitor Target** box, and click **Browse**.
5. Select the icon of vxvol1 in the **Selection of VxVM Volume Resource** dialog box, and click **OK**.
6. Make sure that **vxvol1** is set to **VxVM Volume Resource**, and click **Next**.
7. Make the setting of the action when detecting an error in the shown screen. Click **Browse**.
8. Select the icon of **cluster** in the **Selection of Recovery Target** and click **OK**.
9. Confirm that **cluster** is configured as the recovery target, and set **Stop the cluster daemon and shut down OS** as the final action. Click **Finish**.
10. Set the following monitor resources in the same procedure with step 2 to step 9 described above.

4th monitor resource

Type	VxVM volume monitor
Monitor resource name	vxvolw2
Device to be monitored	/dev/vx/rdisk/dg1/vol2
VxVM volume resource	vxvol2
Actions at error detection	Stop the cluster daemon and shut down OS

5th monitor resource

Type	VxVM volume monitor
Monitor resource name	vxvolw3
Device to be monitored	/dev/vx/rdisk/dg2/vol3
VxVM volume resource	vxvol3
Actions at error detection	Stop the cluster daemon and shut down OS

6th monitor resource

Type	VxVM volume monitor
Monitor resource name	vxvolw4
Device to be monitored	/dev/vx/rdisk/dg2/vol4
VxVM volume resource	vxvol4
Actions at error detection	Stop the cluster daemon and shut down OS

## Adding a monitor resource (IP monitor resource)

1. In the **Monitor Resource Definitions** list, click **Add**.
2. Enter the seventh monitor resource information in the **Monitor Resource Definition** dialog box. Select the monitor resource type **IP Monitor** in the **Type** box, and enter the monitor resource name **ipw1** in the **Name** box. Click **Next**.
3. Click **Add**. Enter the IP address to be monitored **10.0.0.254** in the **IP Address** box, and click **OK**.

---

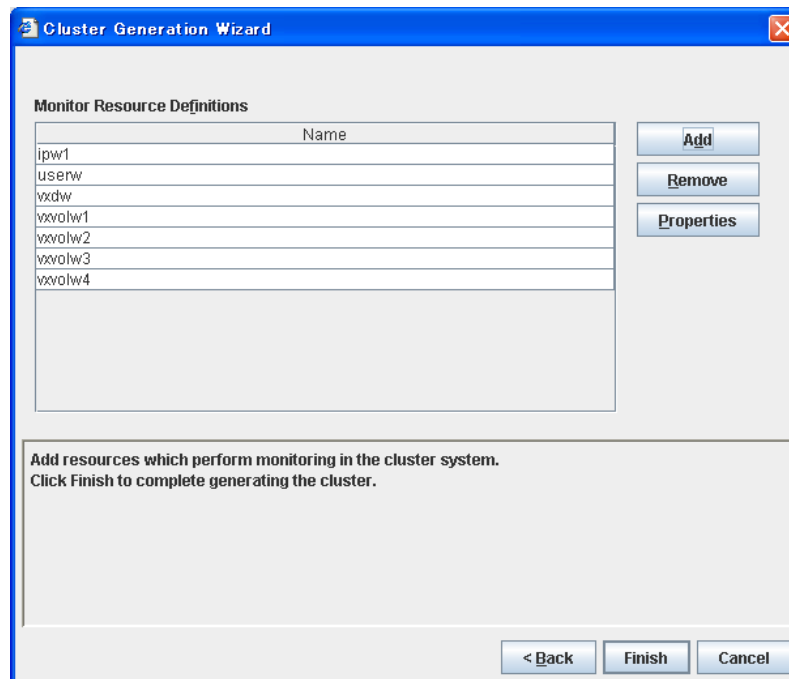
### Note:

Specify the IP address of the device that is supposed to operate always (such as gateway) on the public LAN.

---

4. The IP address you have entered is set in the **IP Addresses**. Click **Next**.
5. Configure the monitor settings. Click **Next**.
6. Set the action to be taken at the time when an error is detected. Click **Browse**.
7. Click **ManagementGroup** in the tree view shown. Click **OK**.
8. Now **ManagementGroup** is set in the **Recovery Target**. Set **1** in the **Reactivation Threshold** box. Click **Finish**.

The **Monitor Resource Definitions** should look similar to the following:



The creation of the cluster configuration information has completed. For the subsequent procedure, refer to the *Installation and Configuration Guide*.

# Understanding NAS resource

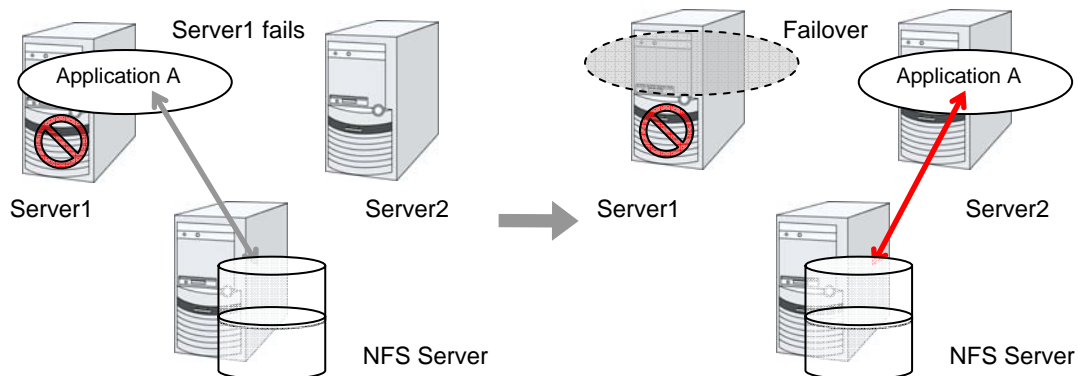
## Dependencies of the NAS resource

By default, this function depends on the following group resource type:

Group resource type
Floating IP resource
Virtual IP resource

## NAS resource

- ◆ The NAS resource controls the resources in the NFS server.
- ◆ By storing the data that is necessary for business transactions in the NFS server, it is automatically passed on when the failover group is moving during failover.



## Notes on NAS resource

- Note 1** The ExpressCluster will control the access (mount and/or umount) to the file system. Thus, do not configure the settings for the OS to run the mount or umount command.
- Note 2** On the NFS server, it is necessary to configure the settings that allow servers in the cluster for access to NFS resources.
- Note 3** On the ExpressCluster X, configure the settings that start the portmap service.
- Note 4** If the host name is specified as the NAS server name, make the settings for name resolving.
- Note 5** If **Mount/Unmount Exclusion** is selected on the Exclusion tab of the Cluster Properties, it may take some time to activate or deactivate the VxVM volume resource because the mount or unmount of the disk resource, VxVM resource, NAS resource, and mirror resource is performed exclusively in the same server.
- Note 6** When specifying path including symbolic link for mount point, Force Operation cannot be done even if it is chosen as operation in Detecting Failure.

## Displaying and changing the details of NAS resource

1. From the tree view displayed in the left pane of the window, click the icon of the group to which the NAS resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired NAS resource name, and then click **Properties** on the shortcut menu. Click the **Details** tab in the properties dialog box.
3. Display and/or change the detailed settings on the **Details** tab as described below.

### NAS resource: Detail tab

The screenshot shows a window titled "[ nas1 ] Resource Properties" with a close button (X) in the top right corner. Inside the window, there are four tabs: "Info", "Dependency", "Settings", and "Details". The "Details" tab is selected and active. It contains four labeled input fields: "Server Name" with the text "mfs server1", "Shared Name" with the text "/share1", "Mount Point" with the text "/mnt/nas1", and "File System" with a dropdown menu showing "nfs". Below these fields is a "Tuning" button. At the bottom of the window are three buttons: "OK", "Cancel", and "Apply".

**Server Name** Up to 255 bytes

Enter the IP address or the server name of the NFS. If you set the host name, set the name resolution to OS. (ex. By adding entry to /etc/hosts)

**Shared Name** Up to 1023 bytes

Enter the share name on the NFS server.

**Mount Point** Up to 1023 bytes

Enter the directory where the NFS resource will be mounted. This must start with “/.”

**File System** Up to 15 bytes

Enter the type of file system of the NFS resource. You may also directly enter the type.

◆ nfs

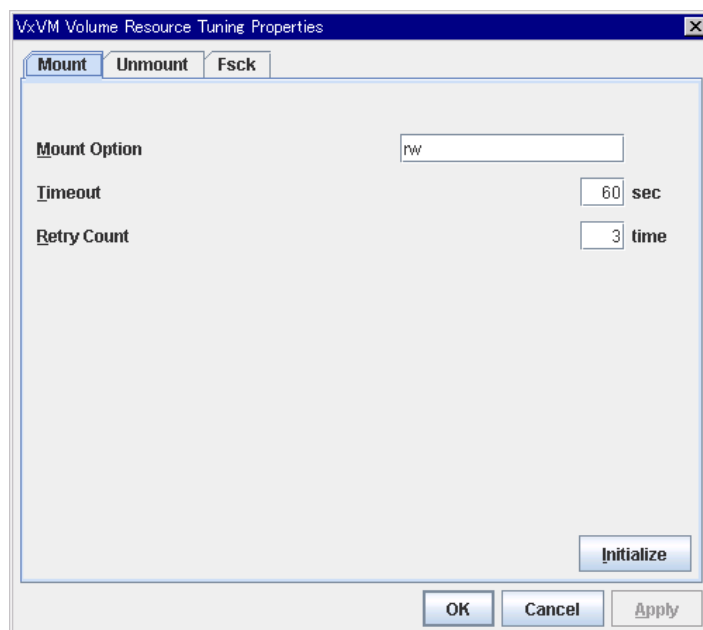
### Tuning

Displays the **NAS Resource Tuning Properties** dialog box. Configure the NAS resource detailed settings.

## NAS Resource Tuning Properties

### Mount tab

The advanced settings for mounting are displayed.



**Mount Option** Up to 1023 bytes

Enter the option that is passed to the mount command when mounting a file system. If you are entering more than one option, use “,” to separate them.

Examples of the mount option

Setting item	Setting value
Server Name	nfsserver1
Shared Name	/share1
Mount Point	/mnt/nas1
File System	nfs
Mount Option	rw

The mount command that is run when the option shown above is set:

```
mount -t nfs -o rw nfsserver1:/share1 /mnt/nas1
```

**Timeout** 1 to 999

Set the timeout to wait the mount command to be completed when mounting a file system.

It may take a while depending on how heavily network is loaded. Be careful when you are setting the value as the timeout may be detected while a command is running when you set a small value.

**Retry Count** 0 to 999

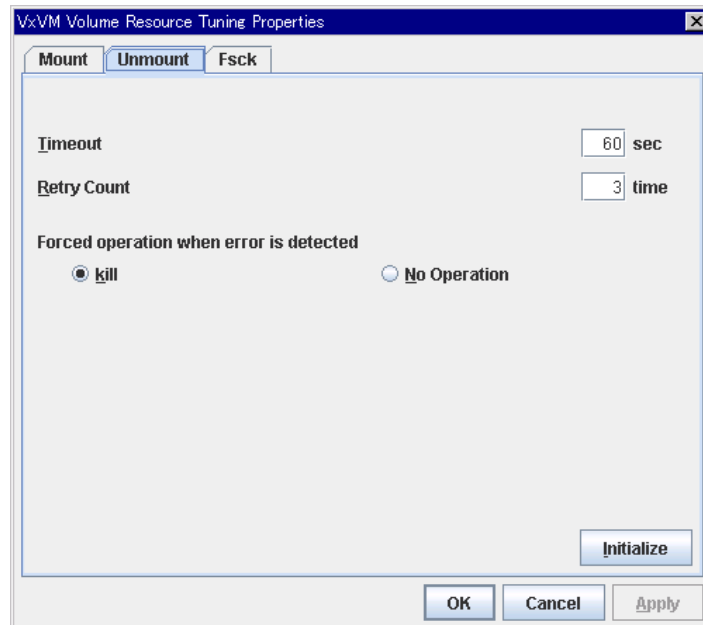
Set the number of mount retries when mounting the file system fails. When zero is set, mounting is not retried.

**Initialize**

Clicking the **Initialize** button resets the values of all items to the default values.

**Unmount tab**

The advanced settings for unmounting are displayed.

**Timeout** 1 to 999

Set the timeout that waits for the end of the umount command when unmounting a file system.

**Retry Count** 0 to 999

Set the number of unmount retries to be made when unmounting the file system fails. When zero is set, unmounting is not retried.

**Forced operation when error is detected**

Select an action to be taken when retrying unmount after unmount fails from the following.

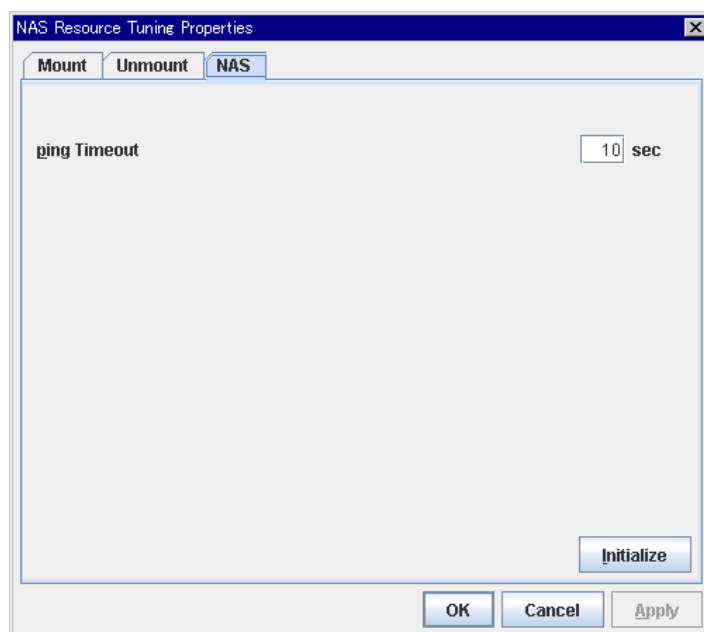
- ◆ **kill:**  
Attempts the forceful termination of the process that is accessing the mount point. This does not always mean that the processes can be forcibly terminated.
- ◆ **none:**  
Does not attempt the forceful termination of the process that is accessing the mount point.

**Initialize**

Clicking the **Initialize** button resets the values of all items to the default values.

## NAS tab

The advanced settings for NAS are displayed.




### Ping Timeout 0 to 999

Set timeout of the ping command is used to check the connection with the server when activating and deactivating NAS resources. If zero is specified, the ping command is not is used.

### Initialize

Clicking the **Initialize** button resets the values of all items to the default values.

## Displaying the property of NAS resource with the WebManager

1. Start the WebManager.
2. When you click an object for the NAS resource  in the tree view, the following information is displayed in the list view.

NAS Name: nas1 Details

**Common** server1 server2

Properties	Value
Name	nas1
Comment	
Server Name	nfsserver1
Shared Name	/share1
File System	nfs
Mount Point	/mnt/nas1
Status	Offline

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: NAS resource name  
 Comment: NAS resource comment  
 Server Name: NFS server name  
 Shared Name: NFS share name  
 File System: NFS file system  
 Mount Point: Directory to mount NFS  
 Status: NAS resource status  
 Server Name: Server name  
 Status: Status of a NAS resource on a server

When you select **Details**, the following information is displayed.

Properties	Value
Type	nas
Fallover Threshold	1
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	Stop the cluster daemon and shutdown OS
Execute Script before Final Action	Off
Depended Resources	vip1
Mount Option	rw
Mount Timeout (sec)	60
Mount Retry Count	3
Unmount Timeout (sec)	60
Unmount Retry Count	3
Action at Unmount Failure	kill
Ping Timeout (sec)	10

Type:	Resource type
Fallover Threshold:	Maximum number of times that failover is performed when an activation error is detected
Retry Count at Activation Failure:	Maximum number of times that activation is retried when an activation error is detected
Final Action at Activation Failure:	Final action at an activation error
Execute Script before Final Action:	Whether or not script is executed upon activation failure
Retry Count at Deactivation Failure:	Maximum number of times that inactivation is retried when a inactivation error is detected
Final Action at Deactivation Failure:	Final action at a inactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Depended Resources:	Dependent resource
Mount Option:	Options to be passed to the mount command when mounting a file system
Mount Timeout (sec):	Timeout for waiting for the mount command to complete (in seconds)
Mount Retry Count:	Number of times mounting is retried when the mount command fails
Unmount Timeout (sec):	Timeout for waiting for the umount command to complete (in seconds)
Unmount Retry Count:	Number of times unmounting is retried when the umount command fails
Action at Unmount Failure:	Action at an unmount error
Ping Timeout (sec):	Timeout of ping which checks for redundancy (in seconds)



# Chapter 6      Monitor resource details

This chapter provides detailed information on monitor resources. Monitor resource is a unit to perform monitoring.

This chapter covers:

• Monitor resource .....	648
• Understanding the disk monitor resources .....	706
• Understanding raw monitor resources .....	713
• Understanding IP monitor resources .....	719
• Understanding NIC link up/down monitor resources .....	724
• Understanding mirror disk connect monitor resources .....	730
• Understanding mirror disk monitor resources .....	734
• Understanding hybrid disk connect monitor resources .....	738
• Understanding hybrid disk monitor resources .....	743
• Understanding PID monitor resources .....	748
• Understanding user-mode monitor resources .....	751
• Understanding VxVM daemon monitor resources .....	762
• Understanding VxVM volume monitor resources .....	765
• Understanding multi target monitor resources .....	768
• Understanding virtual IP monitor resources .....	776
• Understanding ARP monitor resources .....	779
• Understanding custom monitor resources .....	783
• Understanding DB2 monitor resources .....	787
• Understanding FTP monitor resources .....	792
• Understanding HTTP monitor resources .....	797
• Understanding IMAP4 monitor resources .....	801
• Understanding MySQL monitor resources .....	806
• Understanding NFS monitor resources .....	811
• Understanding Oracle monitor resources .....	815
• Understanding OracleAS monitor resources .....	820
• Understanding POP3 monitor resources .....	825
• Understanding PostgreSQL monitor resource .....	829
• Understanding Samba monitor resources .....	834
• Understanding SMTP monitor resources .....	838
• Understanding Sybase monitor resources .....	842
• Understanding Tuxedo monitor resource .....	847
• Understanding Weblogic monitor resources .....	851
• Understanding Websphere monitor resources .....	856
• Understanding WebOTX monitor resources .....	860

## Monitor resource

A monitor resource refers to a resource that monitors a specified target to be monitored. When detecting an error in a target to be monitored, a monitor resource restarts a group resource and/or executes failover.

Currently supported monitor resources:

Monitor resource name	Abbreviation	Functional overview	Supported version
Disk Monitor Resource	diskw	See "Understanding the disk monitor resources" on page 706.	2.0.0-1~
Raw Monitor Resource	raww	See "Understanding raw monitor resources" on page 713.	2.0.0-1~
IP Monitor Resource	ipw	See "Understanding IP monitor resources" on page 719.	2.0.0-1~
NIC Link Up/Down Monitor Resource	miiw	See "Understanding NIC link up/down monitor resource on page 724.	2.0.0-1~
Mirror Disk Connect Monitor Resource	mdnw	See "Understanding mirror disk connect monitor resources" on page 730.	2.0.0-1~
Mirror Disk Monitor Resource	mdw	See "Understanding mirror disk monitor resources" on page 734.	2.0.0-1~
Hybrid Disk Connect Monitor Resource	hdnw	See "Understanding hybrid disk connect monitor resources" on page 738.	2.0.0-1~
Hybrid Disk Monitor Resource	hdw	See "Understanding hybrid disk monitor resources" on page 743.	2.0.0-1~
PID Monitor Resource	pidw	See "Understanding PID monitor resource" on page 748.	2.0.0-1~
User-Mode Monitor Resource	userw	See "Understanding user-mode monitor resource" on page 751.	2.0.0-1~
VxVM Daemon Monitor Resource	vxdw	See "Understanding VxVM daemon monitor resource" on page 762.	2.0.0-1~
VxVM Volume Monitor Resource	vxvolw	See "Understanding VxVM volume monitor resource" on page 765.	2.0.0-1~
Multi Target Monitor Resource	mtw	See "Understanding multi target monitor resource on page 768.	2.0.0-1~
Virtual IP Monitor Resource	vipw	See "Understanding virtual IP monitor resources on page 779.	2.0.0-1~
ARP Monitor Resource	arpw	See "Understanding ARP monitor resources" on page 779.	2.0.0-1~
Custom monitor Resource	genw	See "Understanding custom monitor resources" on page 783.	2.0.0-1~

DB2 Monitor Resource <sup>1</sup>	db2w	See “Understanding DB2 monitor resources” on page 787.	2.0.0-1~
FTP Monitor Resource <sup>1</sup>	ftpw	See “Understanding FTP monitor resources” on page 792.	2.0.0-1~
HTTP Monitor Resource <sup>1</sup>	httpw	See “Understanding HTTP monitor resources” on page 797.	2.0.0-1~
IMAP4 Monitor Resource <sup>1</sup>	imap4w	See “Understanding IMAP4 monitor resources” on page 801.	2.0.0-1~
MySQL Monitor Resource <sup>1</sup>	mysqlw	See “Understanding MySQL monitor resources” on page 806.	2.0.0-1~
NFS Monitor Resource <sup>1</sup>	nfs	See “Understanding NFS monitor resources” on page 811.	2.0.0-1~
Oracle Monitor Resource <sup>1</sup>	oraclew	See “Understanding Oracle monitor resources” on page 815.	2.0.0-1~
OracleAS Monitor Resource <sup>1</sup>	oracleasw	See “Understanding OracleAS monitor resources” on page 820.	2.0.0-1~
POP3 Monitor Resource <sup>1</sup>	pop3w	See “Understanding POP3 monitor resources” on page 825.	2.0.0-1~
PostgreSQL Monitor Resource <sup>1</sup>	psqlw	See “Understanding PostgreSQL monitor resource” on page 829.	2.0.0-1~
Samba Monitor Resource <sup>1</sup>	sambaw	See “Understanding Samba monitor resources” on page 834.	2.0.0-1~
SMTP Monitor Resource <sup>1</sup>	smtpw	See “Understanding SMTP monitor resources” on page 838.	2.0.0-1~
Sybase Monitor Resource <sup>1</sup>	sybasew	See “Understanding Sybase monitor resource” on page 842.	2.0.0-1~
Tuxedo Monitor Resource <sup>1</sup>	tuxw	See “Understanding Tuxedo monitor resource” on page 847.	2.0.0-1~
Websphere Monitor Resource <sup>1</sup>	wasw	See “Understanding Websphere monitor resources” on page 856.	2.0.0-1~
Weblogic Monitor Resource <sup>1</sup>	wls	See “Understanding Weblogic monitor resources” on page 851.	2.0.0-1~
WebOTX Monitor Resource <sup>1</sup>	otxw	See “Understanding WebOTX monitor resources” on page 860.	2.0.0-1~

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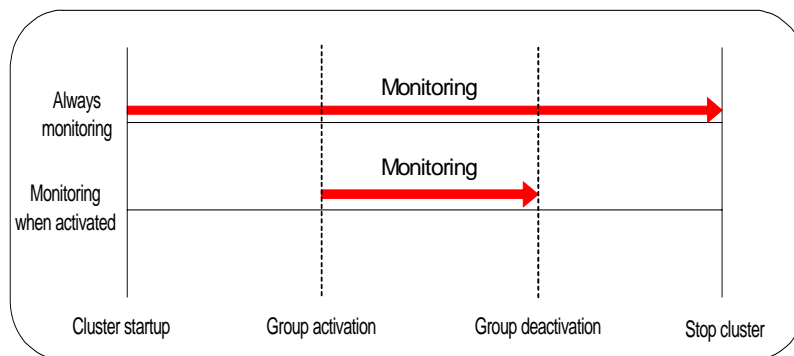
<sup>1</sup> To use this monitor resource, you need to register a license. For details on how to register a license, see the *Getting Started Guide*.

## Monitor timing of monitor resource

There are two types of monitoring by monitor resources; **Always** and **Active**.

The monitoring timing differs depending on monitor resources:

- ◆ **Always:**  
Monitoring is performed by monitor resource all the time.
- ◆ **Active:**  
Monitoring is performed by monitor resource while specified group resource is active.  
Monitor resource does not monitor while group resource is not activated.



Monitor resource	Monitor timing	Target resource
Disk Monitor Resource	Always or when activated	All
IP Monitor Resource	Always or when activated	All
User-Mode Monitor Resource	Always (Fixed)	-
Mirror Disk Monitor Resource	Always (Fixed)	-
Mirror Disk Connect Monitor Resource	Always (Fixed)	-
Hybrid Disk Monitor Resource	Always (Fixed)	-
Hybrid Disk Connect Monitor Resource	Always (Fixed)	-
Raw Monitor Resource	Always or when activated	All
VxVM Daemon Monitor Resource	Always or when activated	All
NIC Link Up/Down Monitor resource	Always or when activated	All
PID Monitor resource	Fixed to while activating	exec
VxVM Volume Monitor Resource	When activated (Fixed)	vxvol
Multi Target Monitor Resource	Always or when activated	All
Virtual IP Monitor Resource	When activated (Fixed)	vip
ARP Monitor Resource	When activated (Fixed)	fip, vip
Custom monitor resources	Always or when activated	All
DB2 Monitor Resource	When activated (Fixed)	exec
FTP Monitor Resource	Always or when activated	exec
HTTP Monitor Resource	Always or when activated	exec
IMAP4 Monitor Resource	Always or when activated	exec

MySQL Monitor Resource	When activated (Fixed)	exec
NFS Monitor Resource	Always or when activated	exec
Oracle Monitor Resource	When activated (Fixed)	exec
OracleAS Monitor Resource	When activated (Fixed)	exec
POP3 Monitor Resource	When activated (Fixed)	exec
PostgreSQL Monitor Resource	When activated (Fixed)	exec
Samba Monitor Resource	Always or when activated	exec
SMTP Monitor Resource	Always or when activated	exec
Sybase Monitor Resource	When activated (Fixed)	exec
Tuxedo Monitor Resource	When activated (Fixed)	exec
Weblogic Monitor Resource	When activated (Fixed)	exec
Websphere Monitor Resource	When activated (Fixed)	exec
WebOTX Monitor Resource	When activated (Fixed)	exec

## Suspending and resuming monitoring on monitor resources

Monitor resource can temporarily suspend monitoring and resume it.

Monitoring can be suspended and resumed by the following two methods:

- ◆ Operation on the WebManager
- ◆ Operation by the clpmonctrl command  
The clpmonctrl command can control only monitor resources on the server where this command is run.

Some monitor resources can suspend and resume monitoring and others cannot. For details, see the list below.

Monitor Resource	Control
Disk Monitor Resource	Possible
IP Monitor Resource	Possible
User-mode Monitor Resource	Possible
Mirror Disk Monitor Resource	Possible
Mirror Disk Connect Monitor Resource	Possible
Hybrid Disk Monitor Resource	Possible
Hybrid Disk Connect Monitor Resource	Possible
RAW Monitor Resource	Possible
VxVM Daemon Monitor Resource	Possible
NIC Link Up/Down Monitor Resource	Possible
PID Monitor Resource	Possible
VxVM Volume Monitor Resource	Possible
Multi Target Monitor Resource	Possible
Virtual IP Monitor Resource	Impossible
ARP Monitor Resource	Impossible
DB2 Monitor Resource	Possible
FTP Monitor Resource	Possible
HTTP Monitor Resource	Possible
IMAP4 Monitor Resource	Possible
MySQL Monitor Resource	Possible
NFS Monitor Resource	Possible
Oracle Monitor Resource	Possible
OracleAS Monitor Resource	Possible
POP3 Monitor Resource	Possible
PostgreSQL Monitor Resource	Possible
Samba Monitor Resource	Possible
SMTP Monitor Resource	Possible
Sybase Monitor Resource	Possible
Tuxedo Monitor Resource	Possible
Websphere Monitor Resource	Possible

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Weblogic Monitor Resource	Possible
WebOTX Monitor Resource	Possible

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On the WebManager, shortcut menus of the monitor resources which cannot control monitoring are disabled. The clpmonctrl command only controls the resources which can control monitoring. For monitor resources which cannot control monitoring, a warning message is displayed and controls are not performed.

### Monitoring interval for monitor resource

All monitor resources except the user-mode monitor resource monitors their targets at every monitor interval.

The following illustrates the timeline of how a monitor resource monitors its target and finds error/no error with the configuration below:

- ◆ When no error is detected

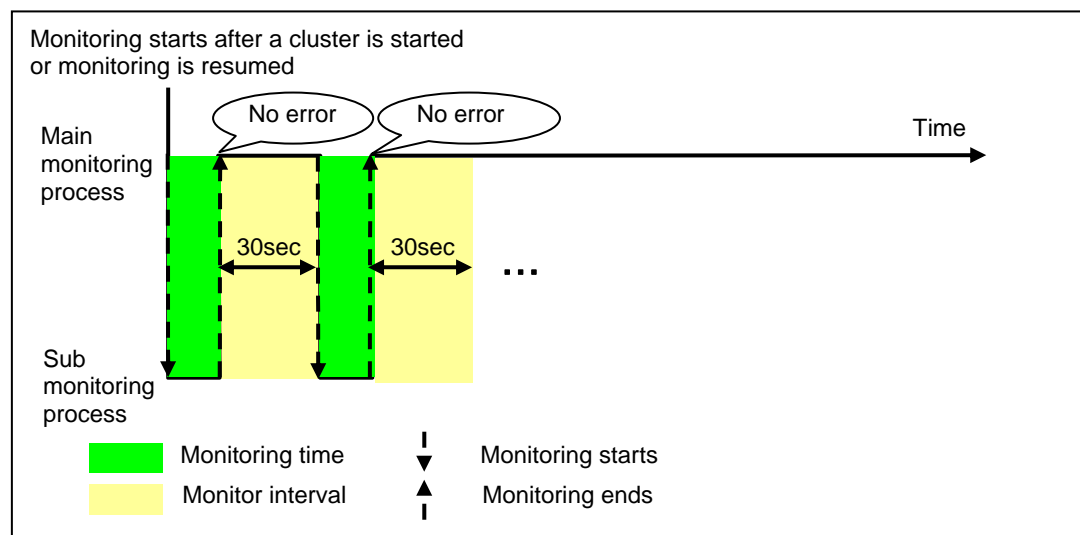
Examples of behavior when the following values are set.

<Monitor>

Monitor Interval	30 sec
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Monitor Interval	30 sec
Monitor Timeout	60 sec

Monitor Retry Count	0 time
---------------------	--------

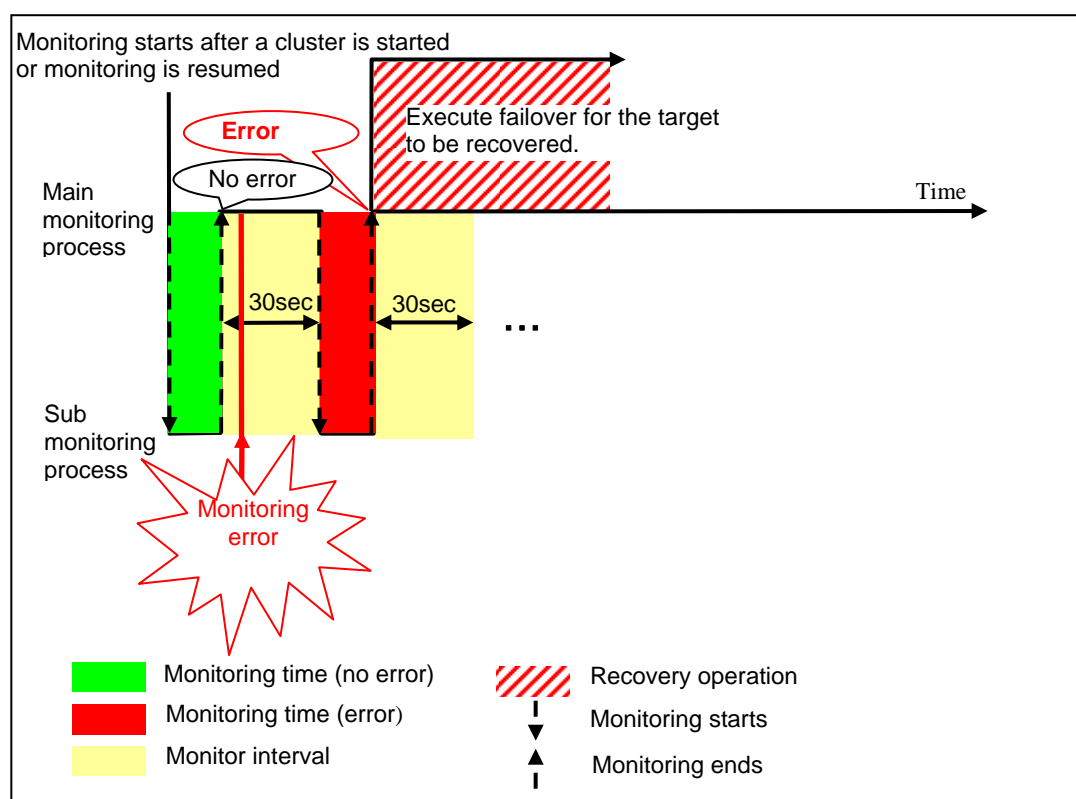


**When an error is detected (without monitor retry setting)**

Examples of behavior when the following values are set.

<Monitor>  
 Monitor Interval 30 sec  
 Monitor Timeout 60 sec  
 Monitor Retry count 0 time

<Error detection>  
 Recovery Target group  
 Reactivation Threshold 0 time  
 Failover Threshold 1 time  
 Final Action None



When an error occurs, it is detected at the next monitoring and the recovery operation for the recovery target starts.

**When an error is detected (with monitor retry settings)**

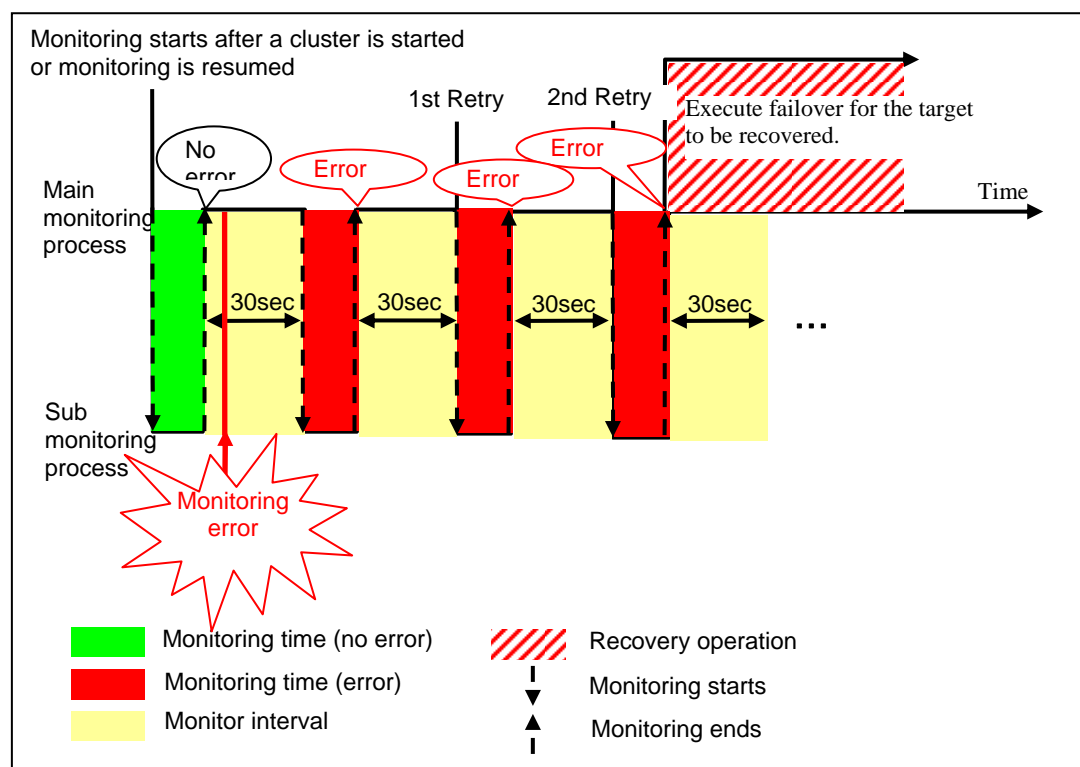
Examples of behavior when the following values are set.

## &lt;Monitor&gt;

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	2 times

## &lt;Error detection&gt;

Recovery Target	group
Reactivation Threshold	0 time
Failover Threshold	1 time
Final Action	None



When an error occurs, it is detected at the next monitoring. If recovery cannot be achieved within the monitor retries, the failover is started for the recovery target.

**When an error is detected (without monitor retry settings)**

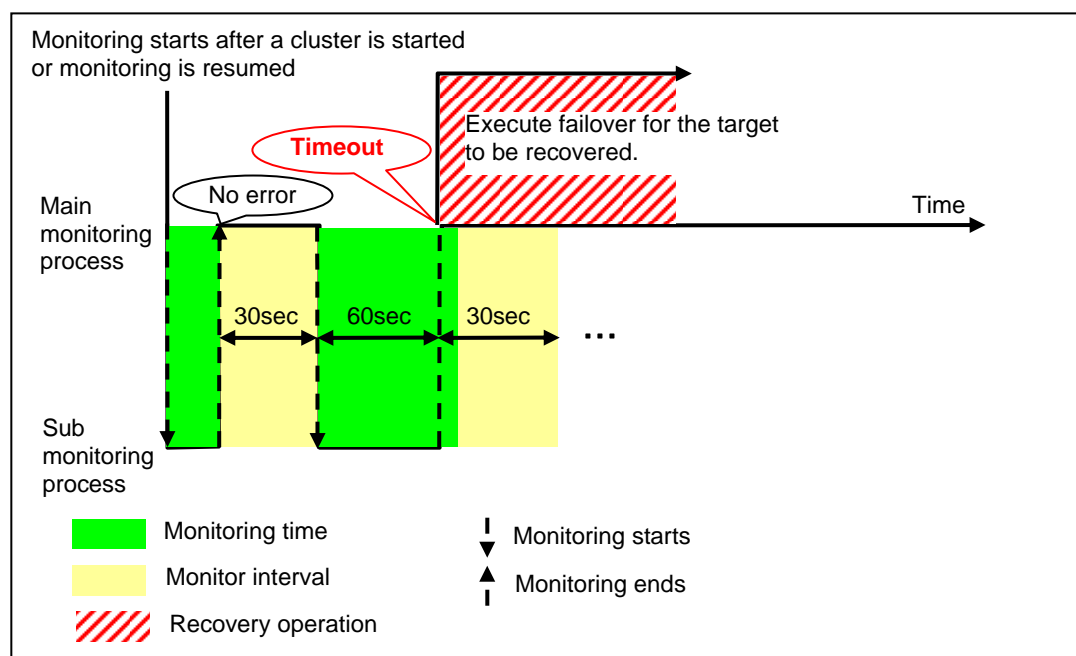
Examples of behavior when the following values are set.

## &lt;Monitor&gt;

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	0 time

## &lt;Error detection&gt;

Recovery Target	group
Reactivation Threshold	0 time
Failover Threshold	1 time
Final Action	none



Immediately after an occurrence of a monitoring timeout, the failover for the recovery target starts.

**When a monitoring timeout is detected (with monitor retry setting)**

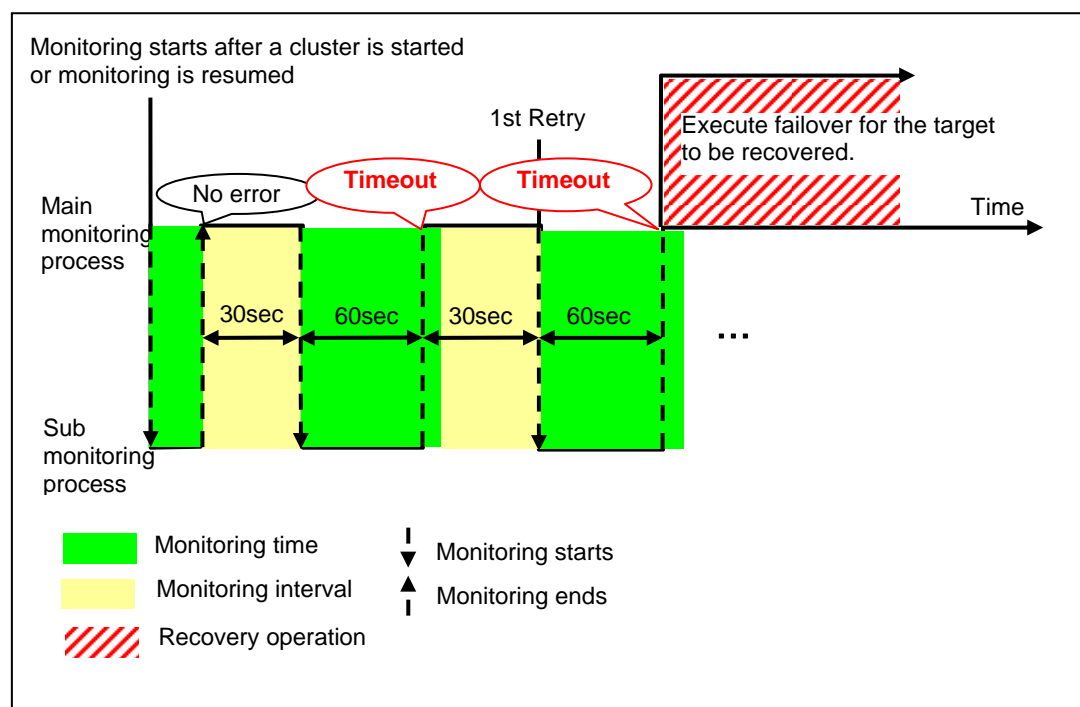
Examples of behavior when the following values are set.

## &lt;Monitor&gt;

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	1 time

## &lt;Error detection&gt;

Recovery Target	group
Reactivation Threshold	0 time
Failover Threshold	1 time
Final Action	none



When a monitoring timeout occurs, monitor retry is performed and failover is started for the recovery target.

## Action when an error is detected by monitor resource

When an error is detected, the following recovery actions are taken against the recovery target in sequence:

- ◆ Reactivation of recovery target: this takes place when an error is detected in a monitor target.
- ◆ Failover: this takes place when reactivation fails for the number of times set in the reactivation threshold.
- ◆ Final action: this takes place when the error is detected even after the failover is executed for the number of times set in the failover threshold.

No recovery action is taken if the status of the recovery target is:

Recovery target	Status	Reactivation <sup>1</sup>	Failover <sup>2</sup>	Final action <sup>3</sup>
Group resource/ Failover group	Already stopped	No	No	No
	Being activated/stopped	No	No	No
	Already activated	Yes	Yes	Yes
	Error	Yes	Yes	Yes
Cluster	-	-	-	Yes

Yes: Recovery action is taken    No: Recovery action is not taken

### Note:

Do not work on the following operations by running commands or using the WebManager when a group resource (e.g. disk resource, EXEC resource) is set as a recovery target in the settings of error detection for the monitor resource, and recovery is in progress (reactivation -> failover -> final action) after detection of an error:

- ◆ Stopping/suspending the cluster
- ◆ Starting/stopping/moving a group

If you perform the above-mentioned operations while recovery caused by detection of an error by a monitor resource is in progress, other group resources of the group with an error may not stop.

However, the above-mentioned operations can be performed when the final action is completed.

When the status of the monitor resource recovers (becomes normal) from error, the reactivation count, failover count, and if the final action is executed are reset.

An unsuccessful recovery action is also counted into reactivation count or failover count.

<sup>1</sup> Effective only when the value for the reactivation threshold is set to 1 (one) or greater.

<sup>2</sup> Effective only when the value for the failover threshold is set to 1 (one) or greater.

<sup>3</sup> Effective only when an option other than **No Operation** is selected.

The following is an example of the progress when only one server detects an error while the gateway is specified as an IP resource of the IP monitor resource:

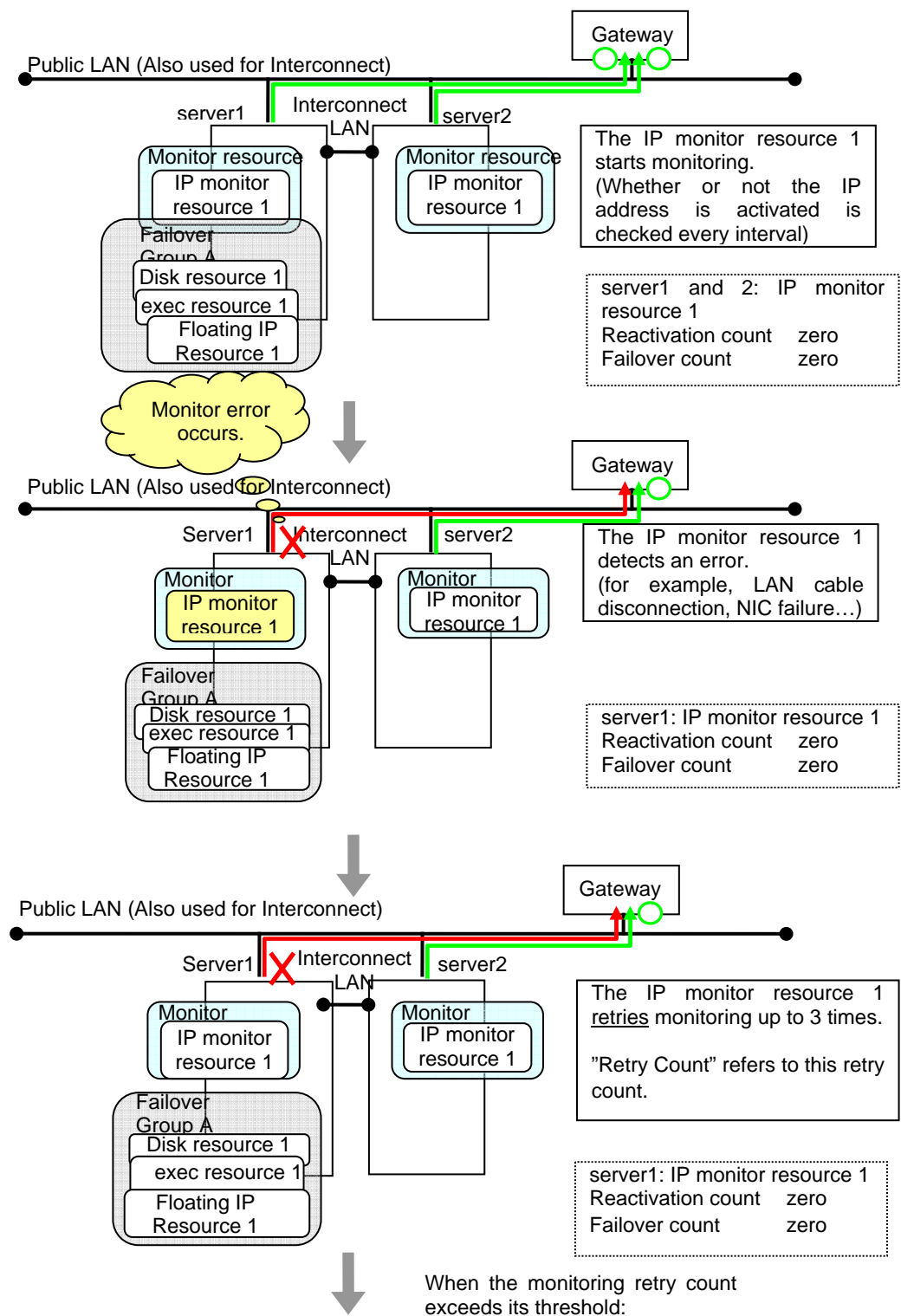
Examples of behavior when the following values are set.

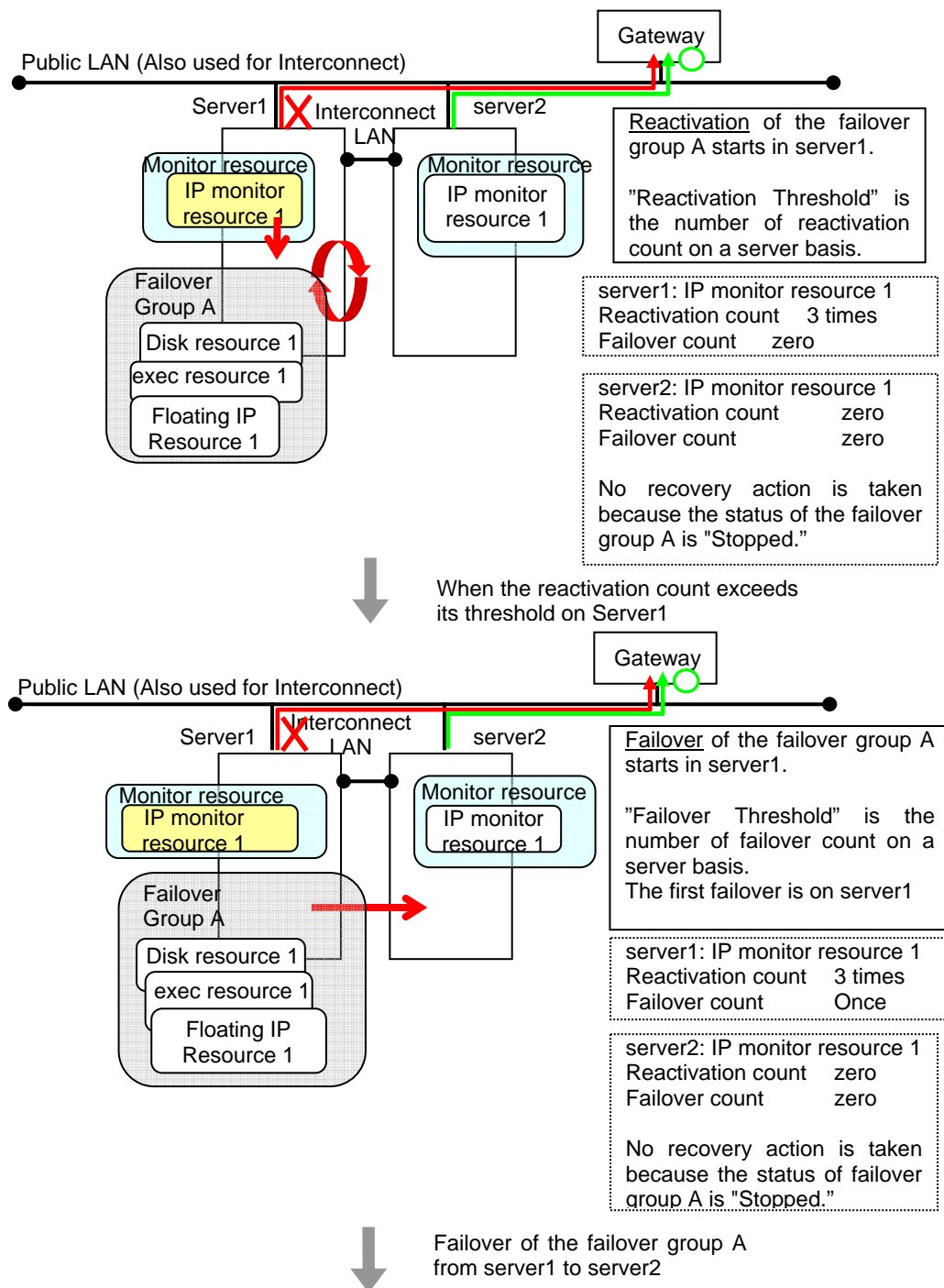
<Monitor>

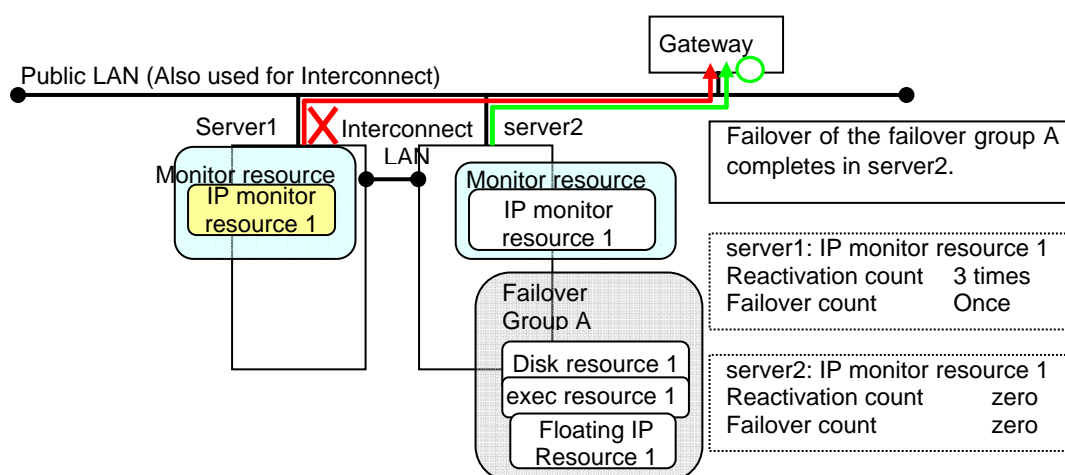
Interval	30 sec
Timeout	30 sec
Retry Count	3 times

<Error detection>

Recovery Target	Failover Group A
Reactivation Threshold	3 times
Failover Threshold	1
Final Action	No Operation







In server2, the operation can continue by failover of the Failover Group A because the IP monitor resource 1 is running properly.

The following is an example of the process when both servers detect an error while the gateway is specified as an IP resource of the IP monitor resource.

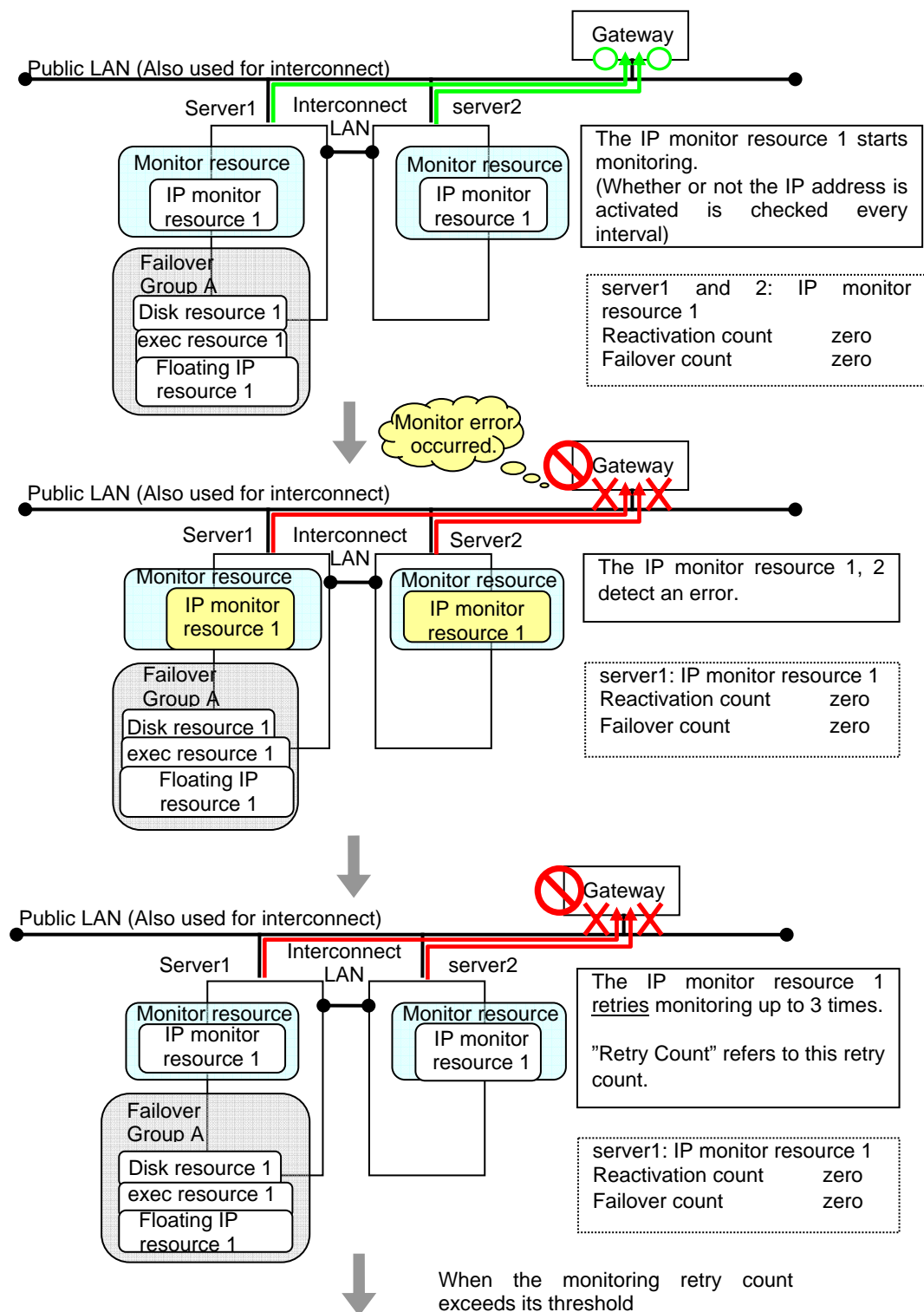
Examples of behavior when the following values are set.

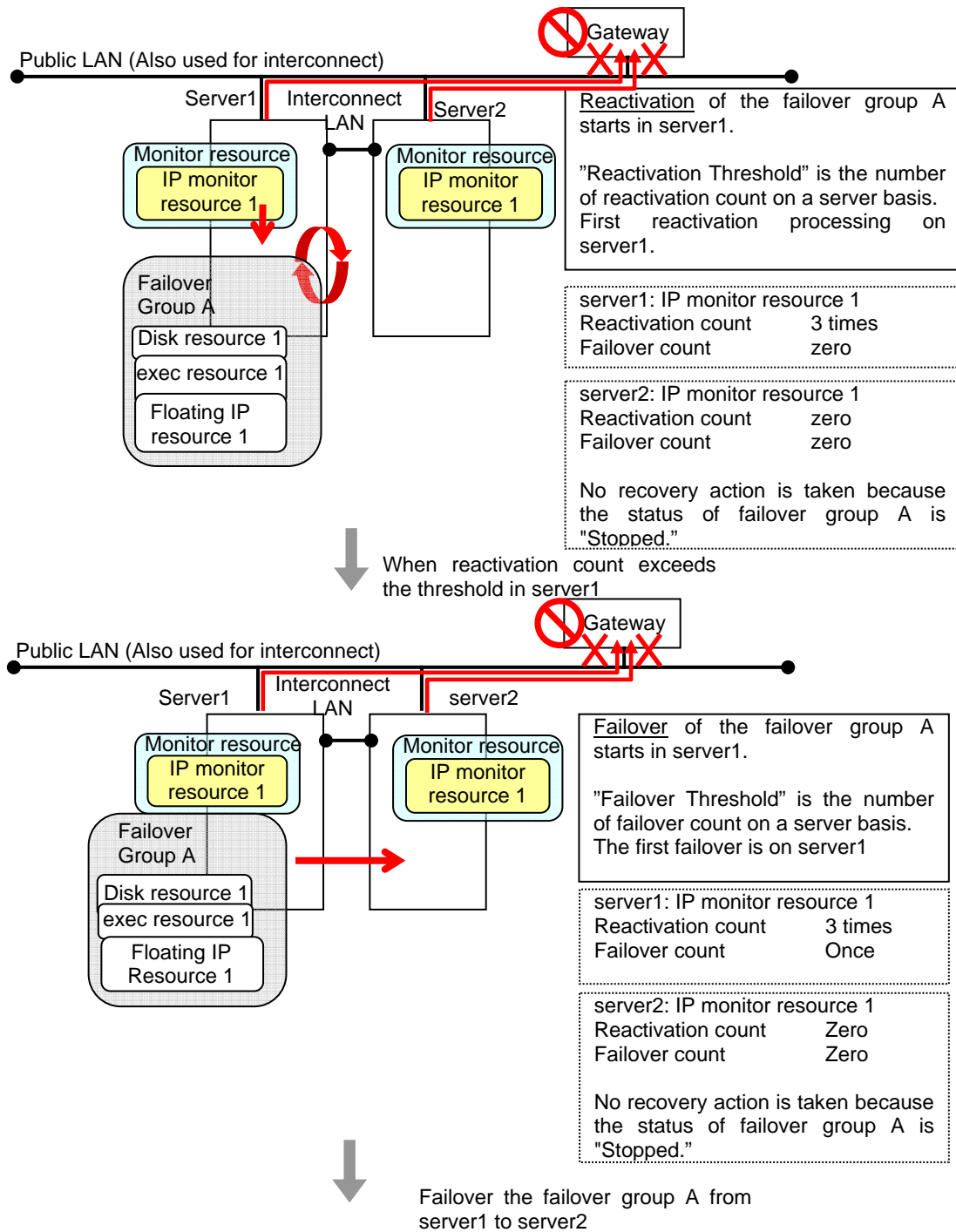
<Monitor>

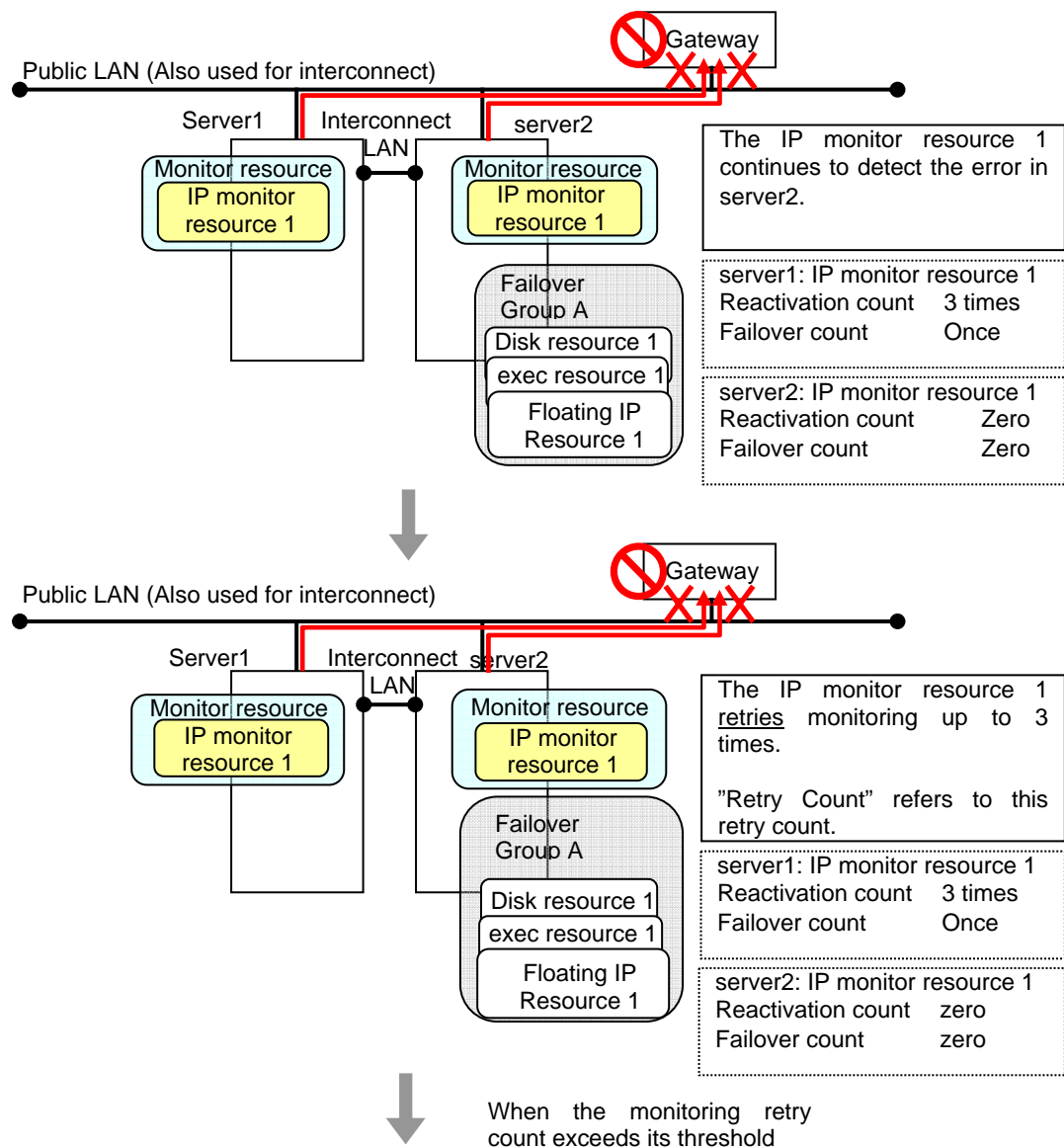
Interval	30 sec
Timeout	30 sec
Retry Count	3 times

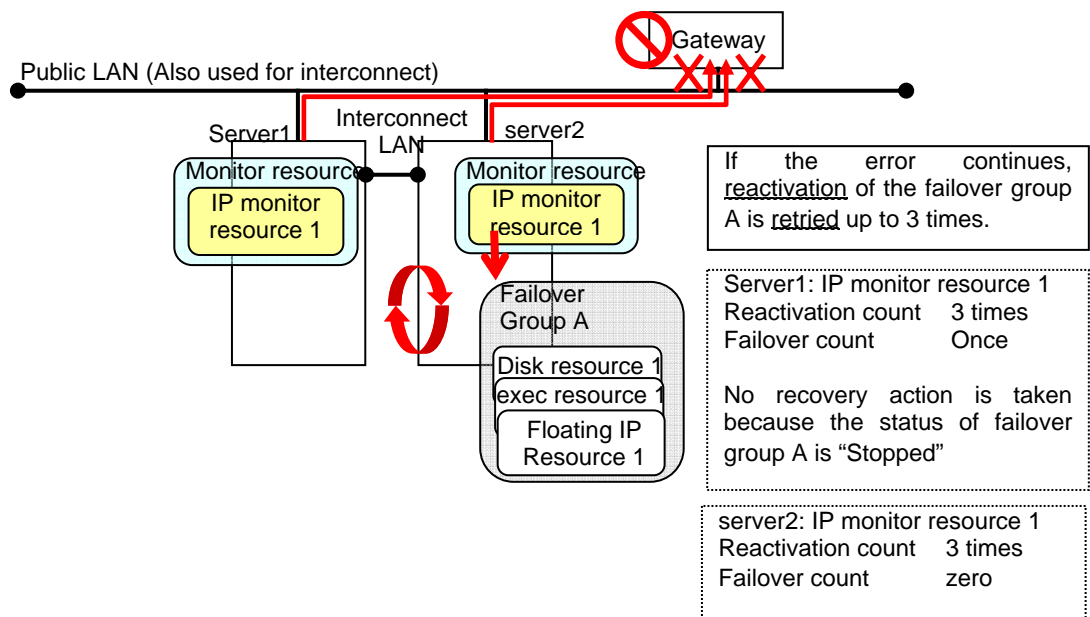
<Error detection>

Recovery Target	Failover Group A
Reactivation threshold	3 times
Failover Threshold	1
Final Action	No Operation

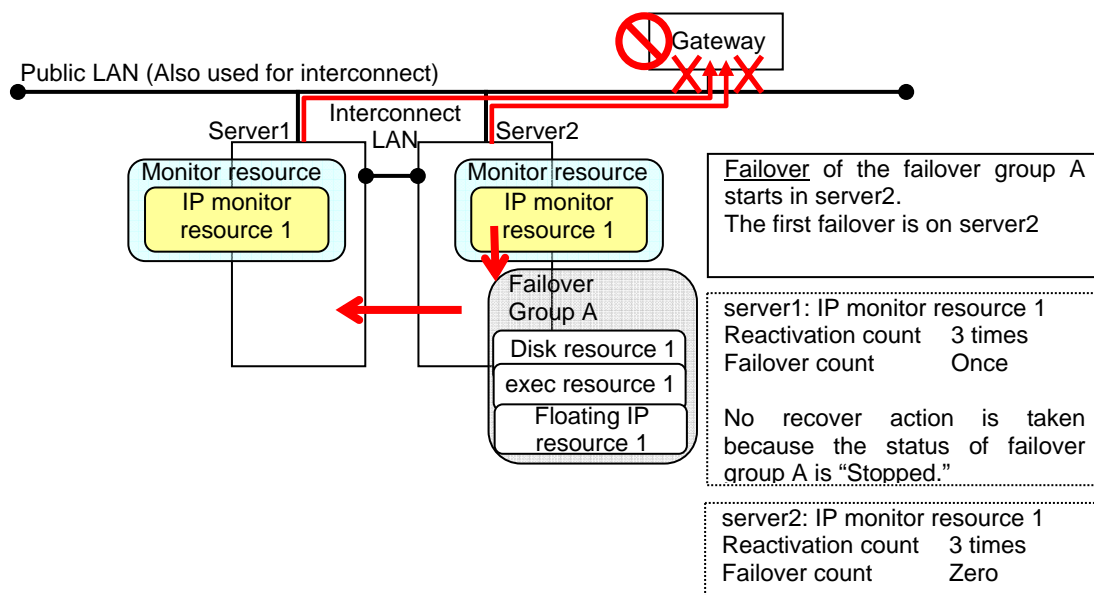




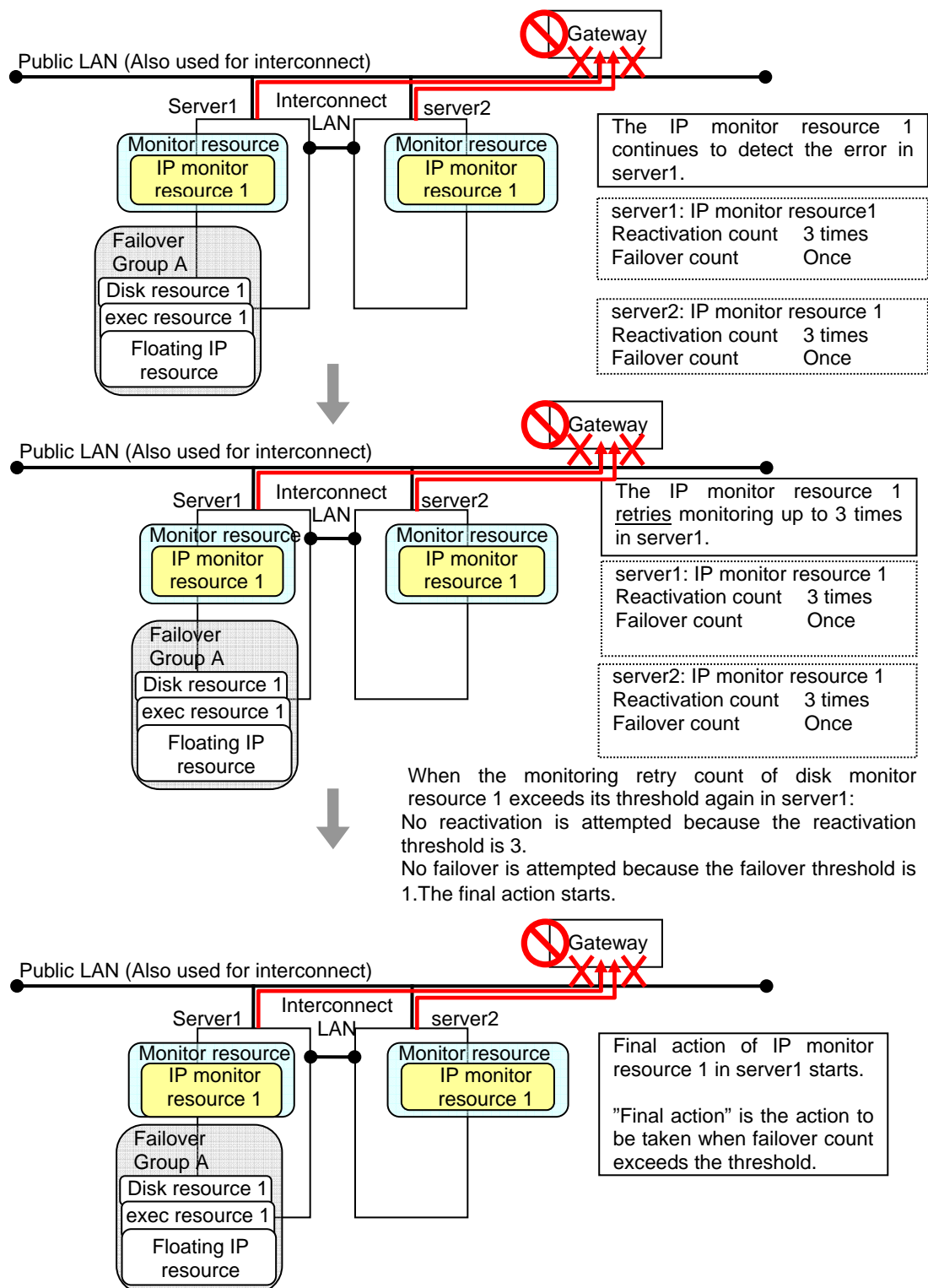




When reactivation count also exceeds its threshold in server2



Failover the failover group A from server2 to server1



### **Additional Information**

When the status of the monitor target becomes normal from an error and the monitor resource detects the change, the reactivation count and failover count are reset to zero (0). When an error is detected next time, the process will be exactly the same as what has been described up to here.

The description up to here assumed the interconnect LANs are working properly.

If all interconnect LANs are disconnected, internal communications with other servers are blocked. As a result, even if an error is detected on a monitor target, failover of groups fails.

To fail over a group when all interconnect LANs are disconnected, you can choose to shut down the server where an error is detected. This will allow other servers to detect the server is shut down and to start failover of the group.

The following is an example of the process when an error is detected while all interconnect LANs are disconnected.

#### Configuration

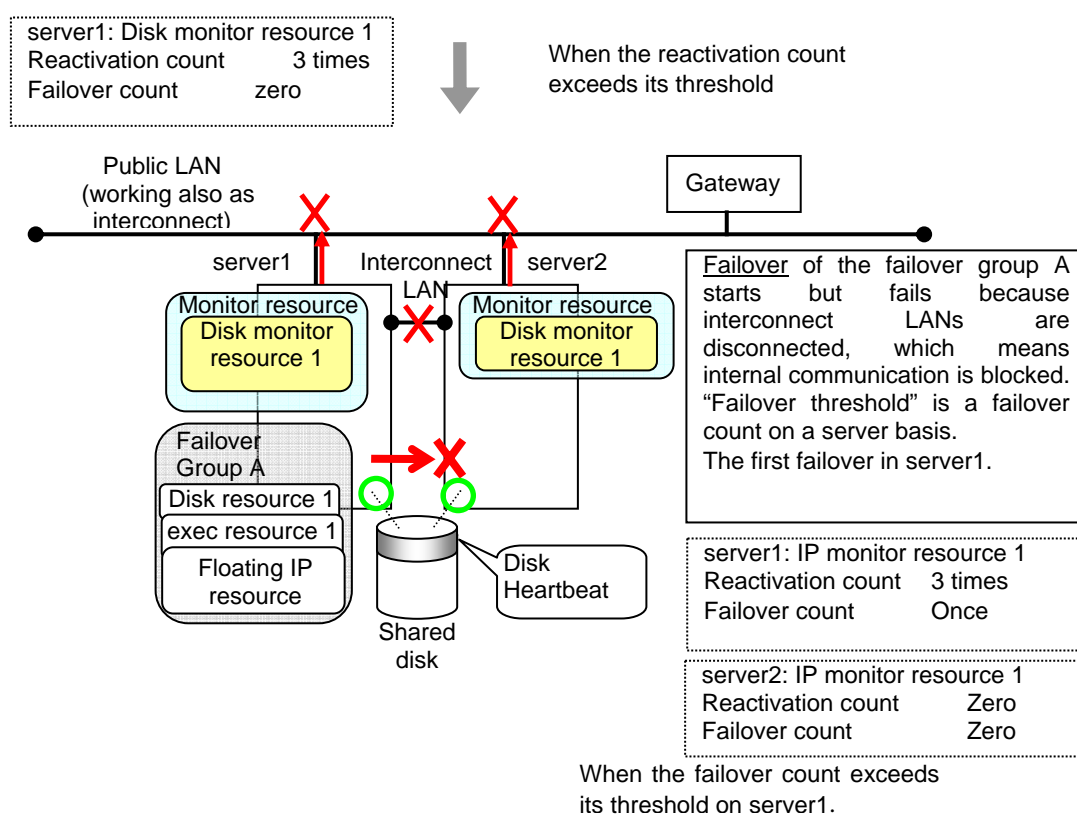
##### <Monitor>

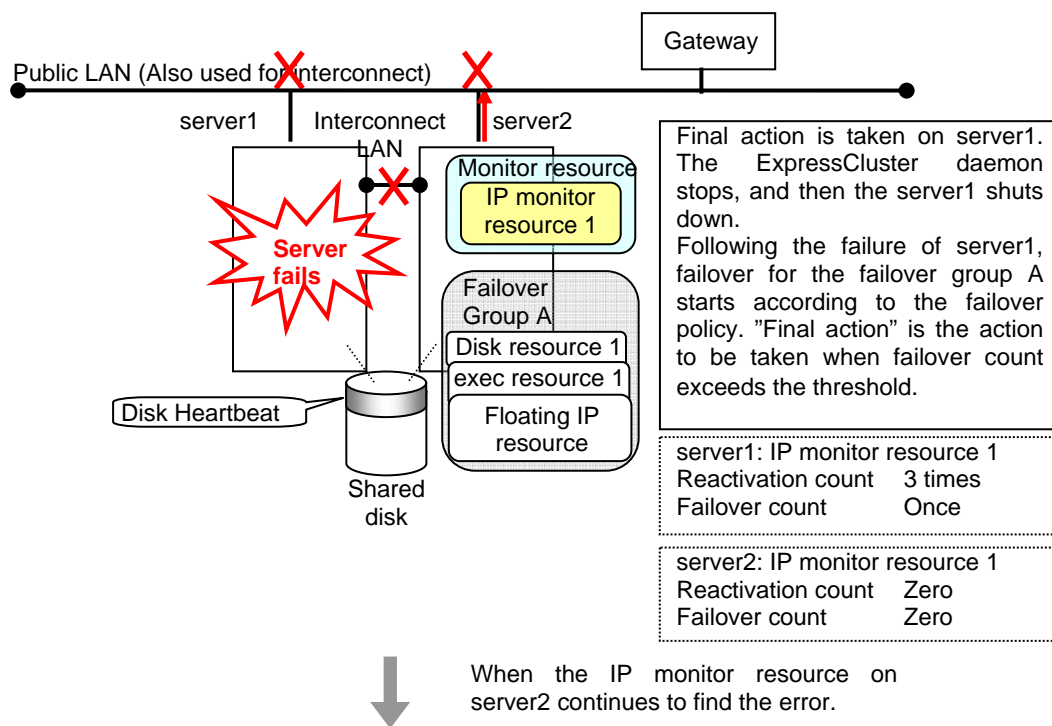
Interval	30 seconds
Timeout	30 seconds
Retry Count	3 times

##### <Error detection>

Recovery Object	Failover Group A
Reactivation Threshold	3 times
Failover Threshold	1 time
Final Action	Stop cluster daemon and shutdown OS

Reactivation for the recovery target is same as the situation when the interconnect LANs are working properly. The description begins from the failover on server1, which requires interconnect LANs.

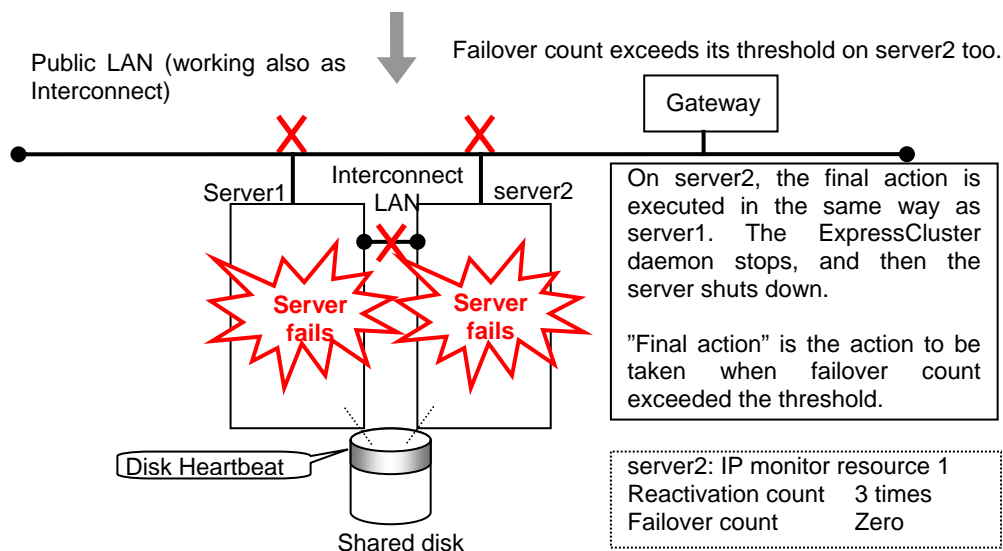




Reactivation of the Failover Group A is executed on server2 in the same way as server1.

Failover is attempted on server2 as well when reactivation of the group A fails. However, the failover cannot be executed because there is no destination server for the failover.

When the failover count exceeds its threshold, the final action is taken on server2 as is the case on server1.



## Returning from monitor error (Normal)

When return of the monitor resource is detected during or after recovery actions following the detection of a monitoring error, counts for the thresholds shown below are reset:

- Reactivation Threshold
- Failover Threshold

Whether or not to execute the final action is reset (execution required).

The following pages describe what will be executed from the point when the final action as described in "Action when an error is detected by monitor resource" on page 659 is executed and another monitoring error occurs after monitoring returns to normal.

Examples of behavior when the following values are set.

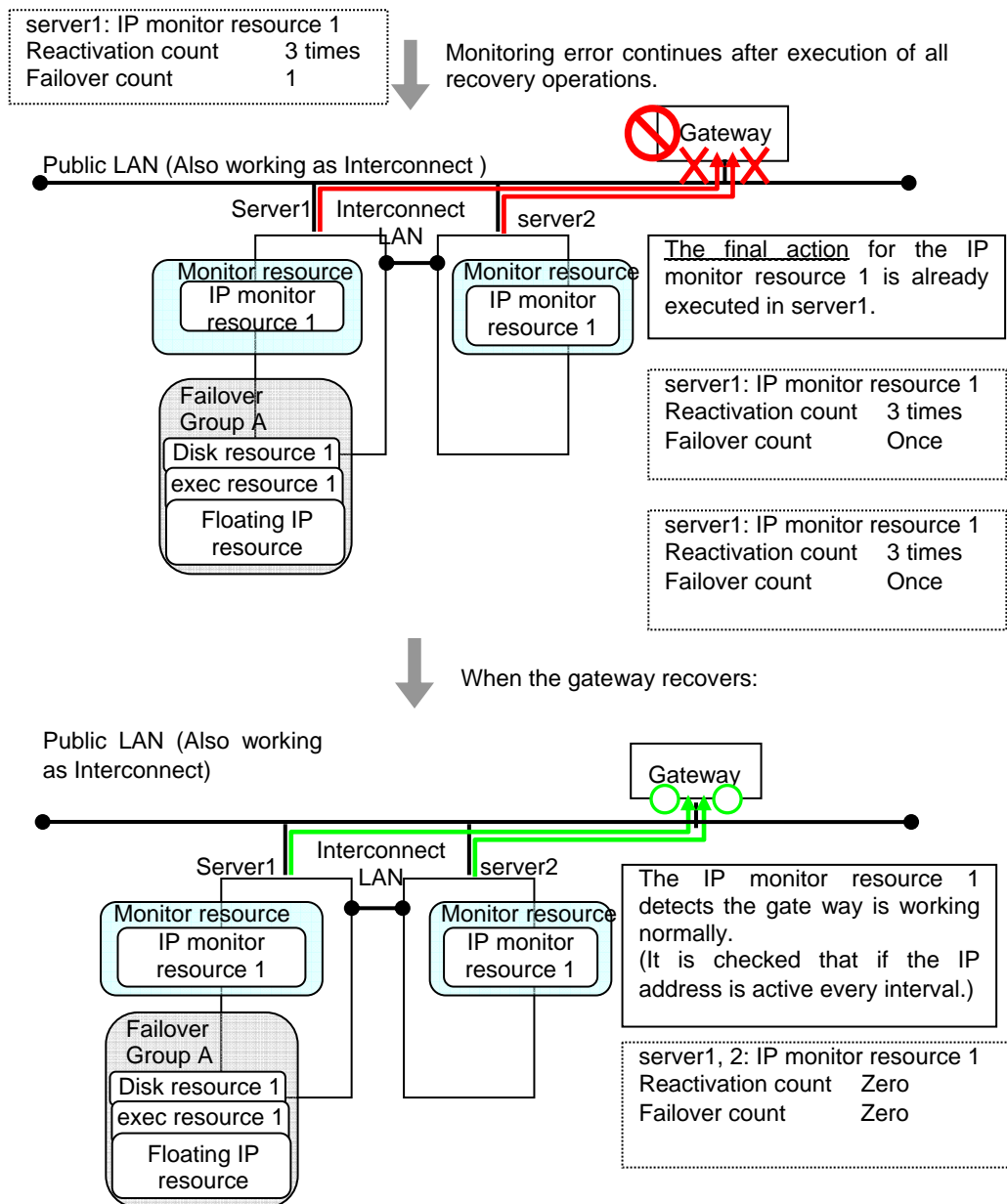
### Configuration

#### <Monitor>

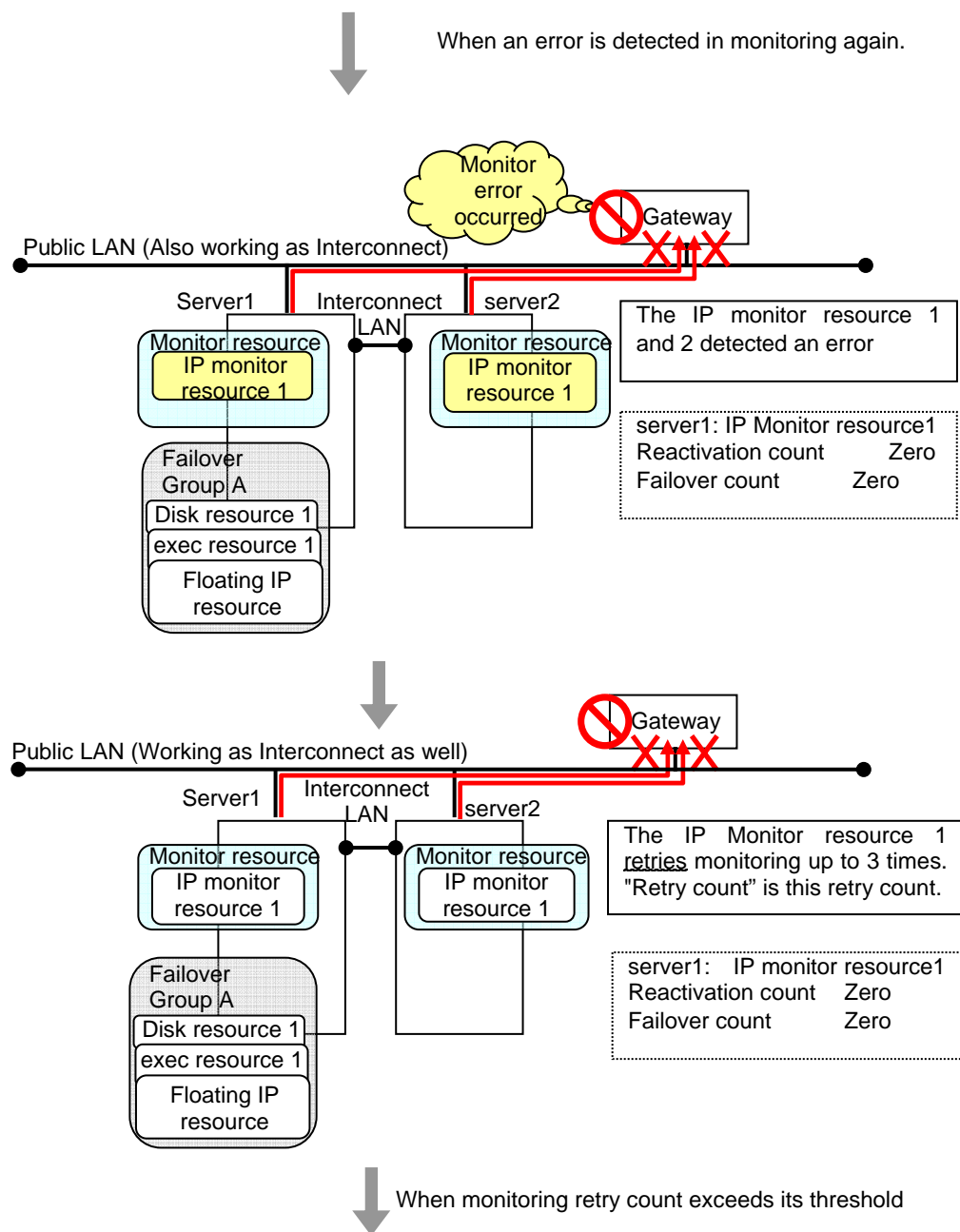
Interval	30 sec
Timeout	30 sec
Retry Count	3 times

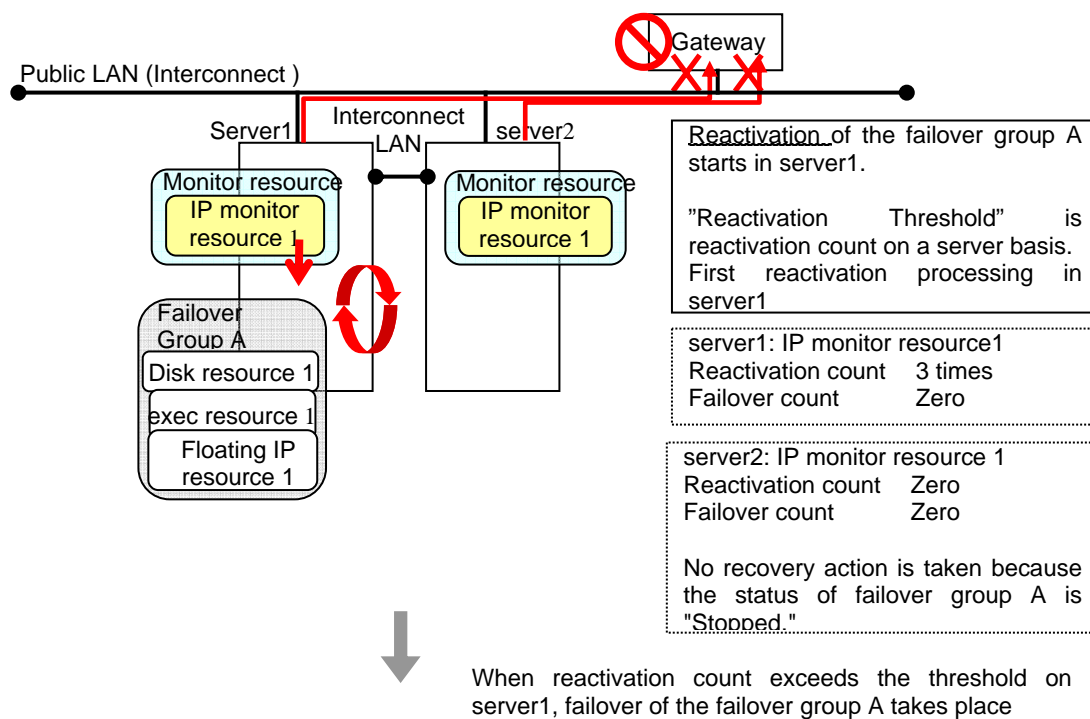
#### <Error detection>

Recovery Target	Failover Group A
Reactivation Threshold	3 times
Failover Threshold	1
Final Action	Stop Failover Group



The number of reactivations and failovers are reset because it has been detected that the status of the monitor target resource became normal.





Reactivation is executed again because it has been detected that the status of the monitor target resource became normal and reactivation count has been reset before.

## Activation and deactivation error of recovery target when executing recovery operation

When the monitoring target of the monitor resource is the device used for the group resource of the recovery target, an activation/deactivation error of the group resource may be detected during recovery when a monitoring error is detected.

The following is an example of the recovery progress when the same device is specified as the monitor target of the disk monitor resource and the disk resource of the Failover Group A:

Configuration of the disk monitor resource

<Monitor>

Interval	60 seconds
Timeout	120 seconds
Retry Count	0 time

<Error detection>

Recovery Target	Failover Group A
Reactivation Threshold	0 time
Failover Threshold	1 time
Final Action	Stop Failover Group

<Parameter>

Method	TUR
--------	-----

Configuration of the failover group A: disk resource

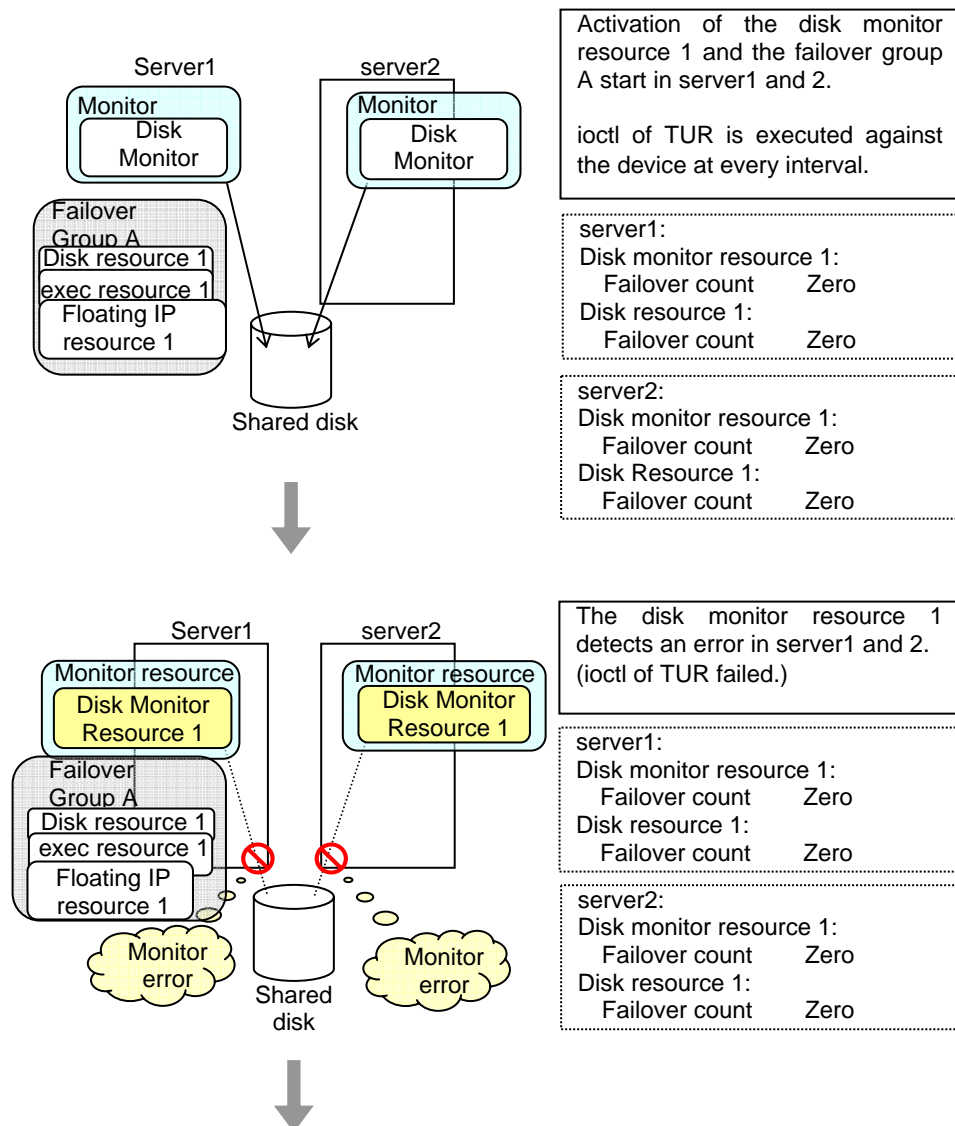
<Activation error>

Activation retry Threshold	0 time
Failover Threshold	1 time
Final Action	No Operation (Next resources are not activated)

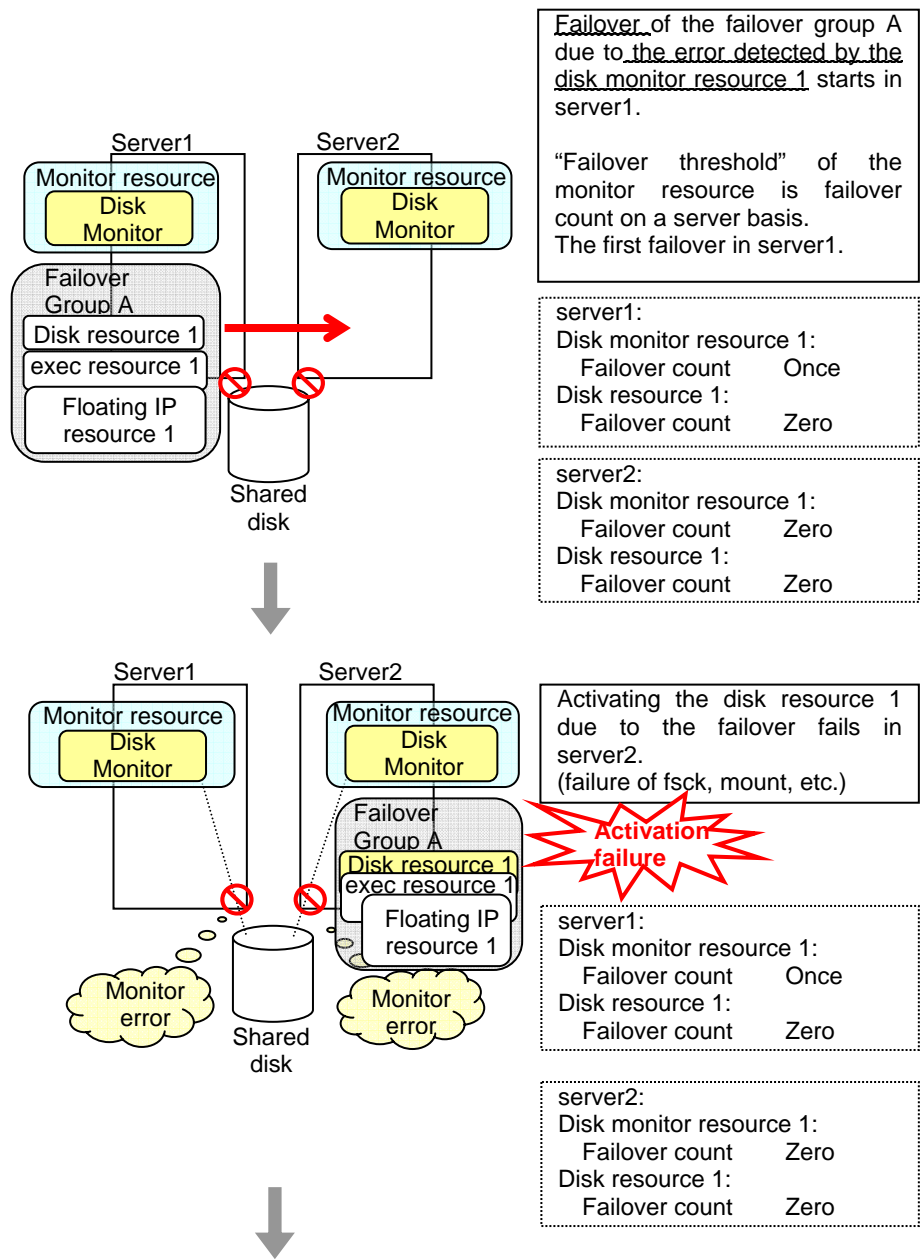
<Deactivation abnormality>

Deactivation Retry Threshold	0 time
Final Action	Stop cluster daemon and shutdown OS

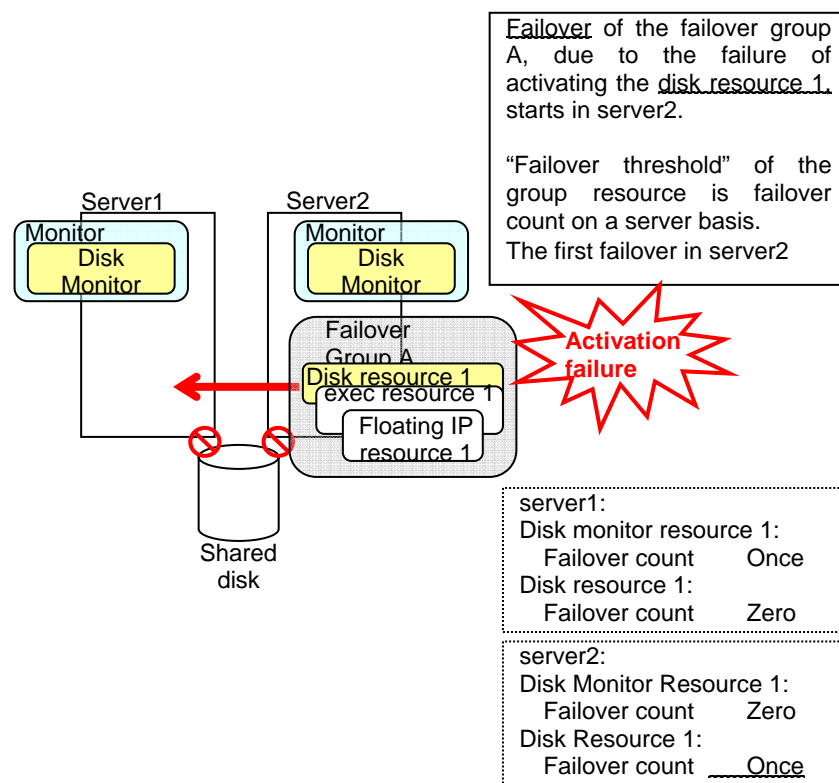
The reactivation threshold of the monitor resource and the activation retry threshold of the group resource are not mentioned in the following diagrams because they are set to zero (0).



An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

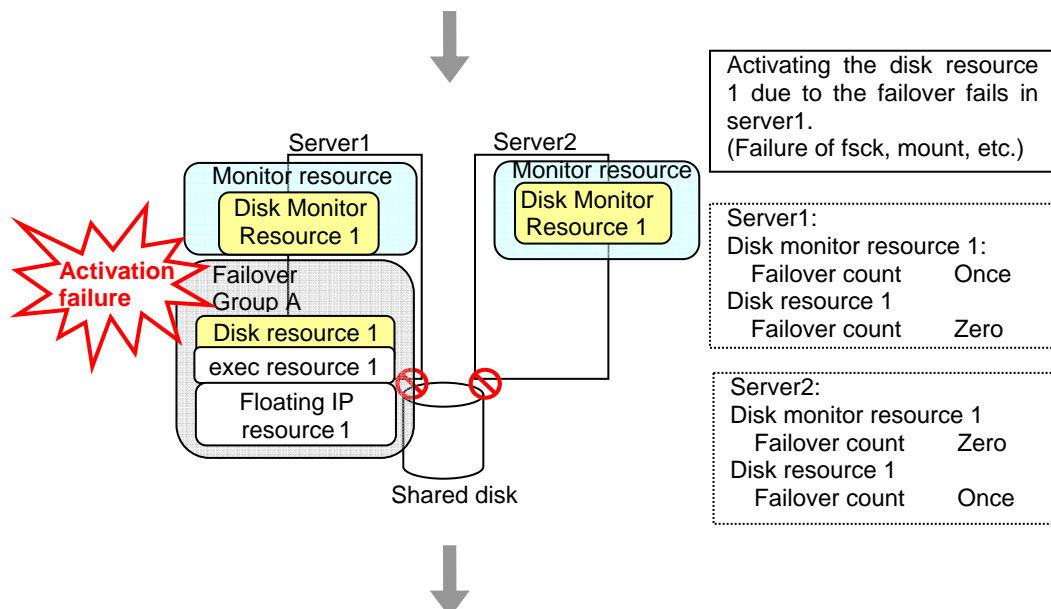


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

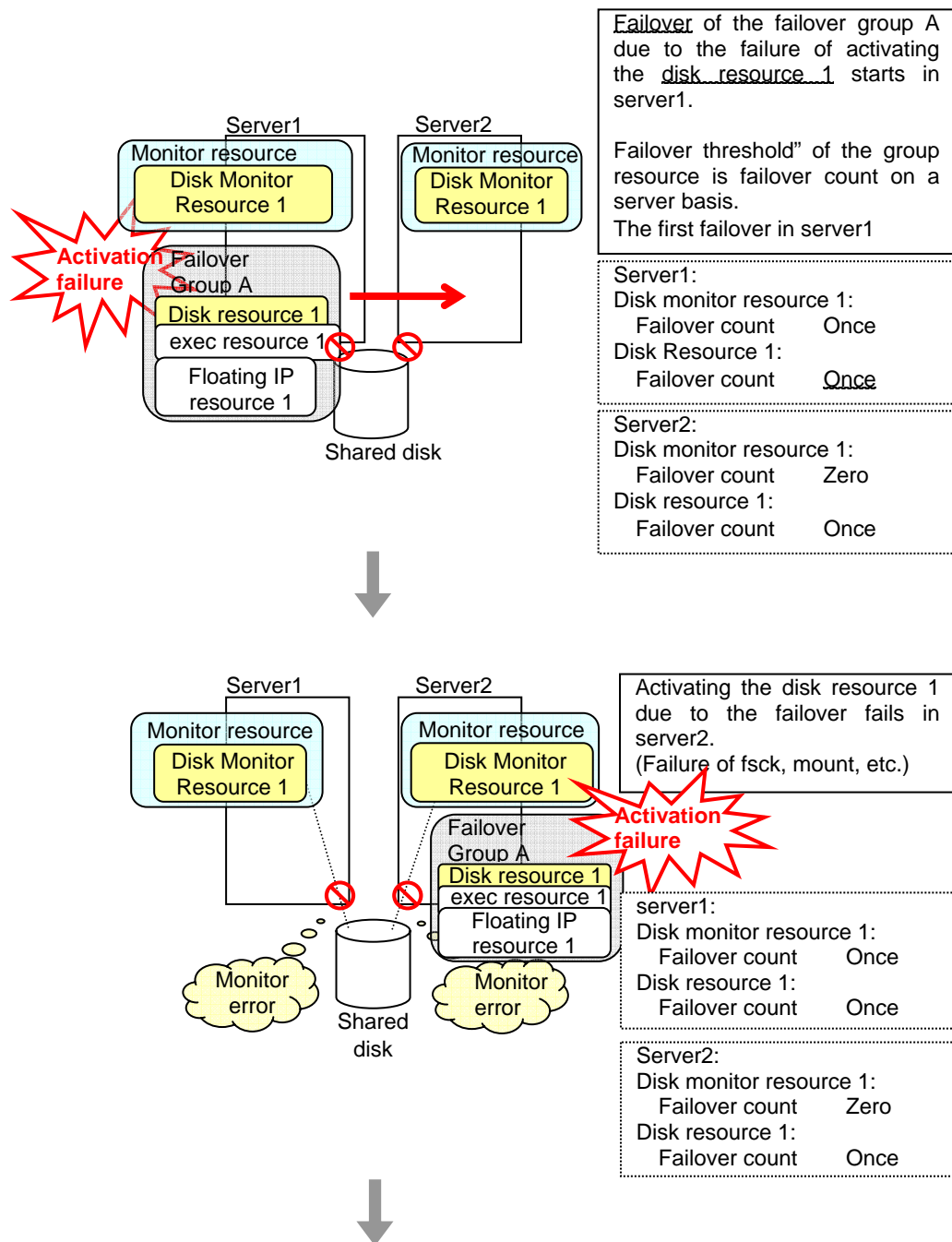


The disk monitor resource 1 detects an error in server2 as is the case in server1. However, no recovery action is taken because the failover group A, the recovery target, is activated.

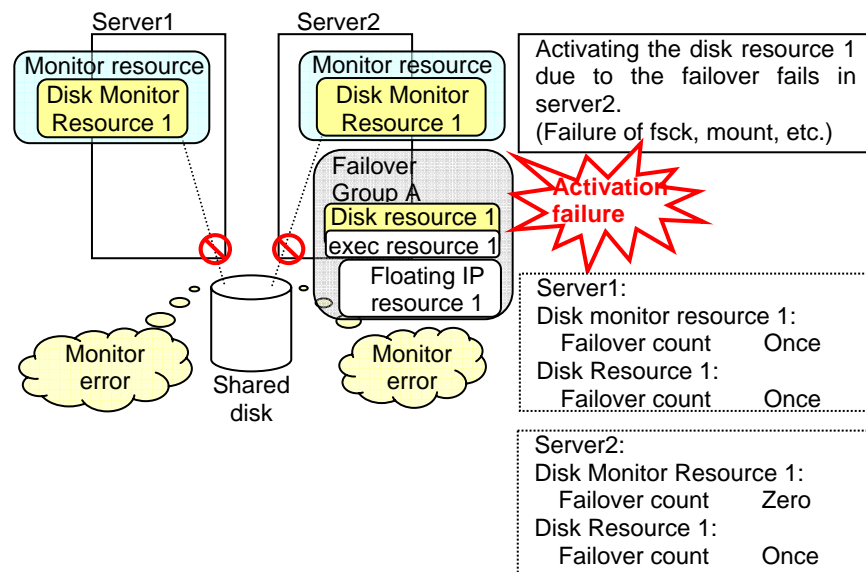
For more information on recovery executed by monitor resources against their recovery targets, see “Action when an error is detected by monitor resource” on page 659.



An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

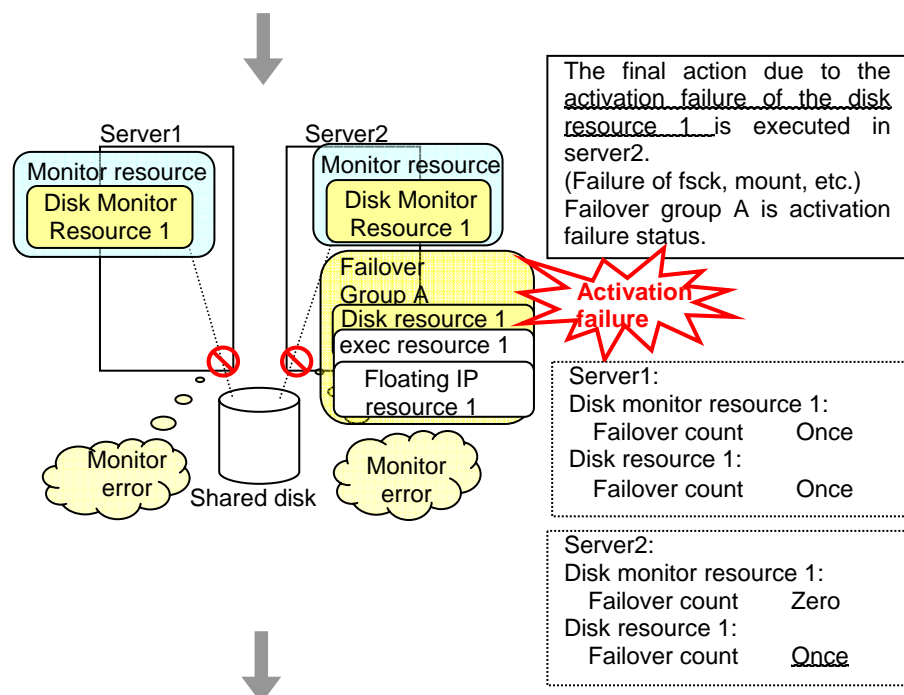


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

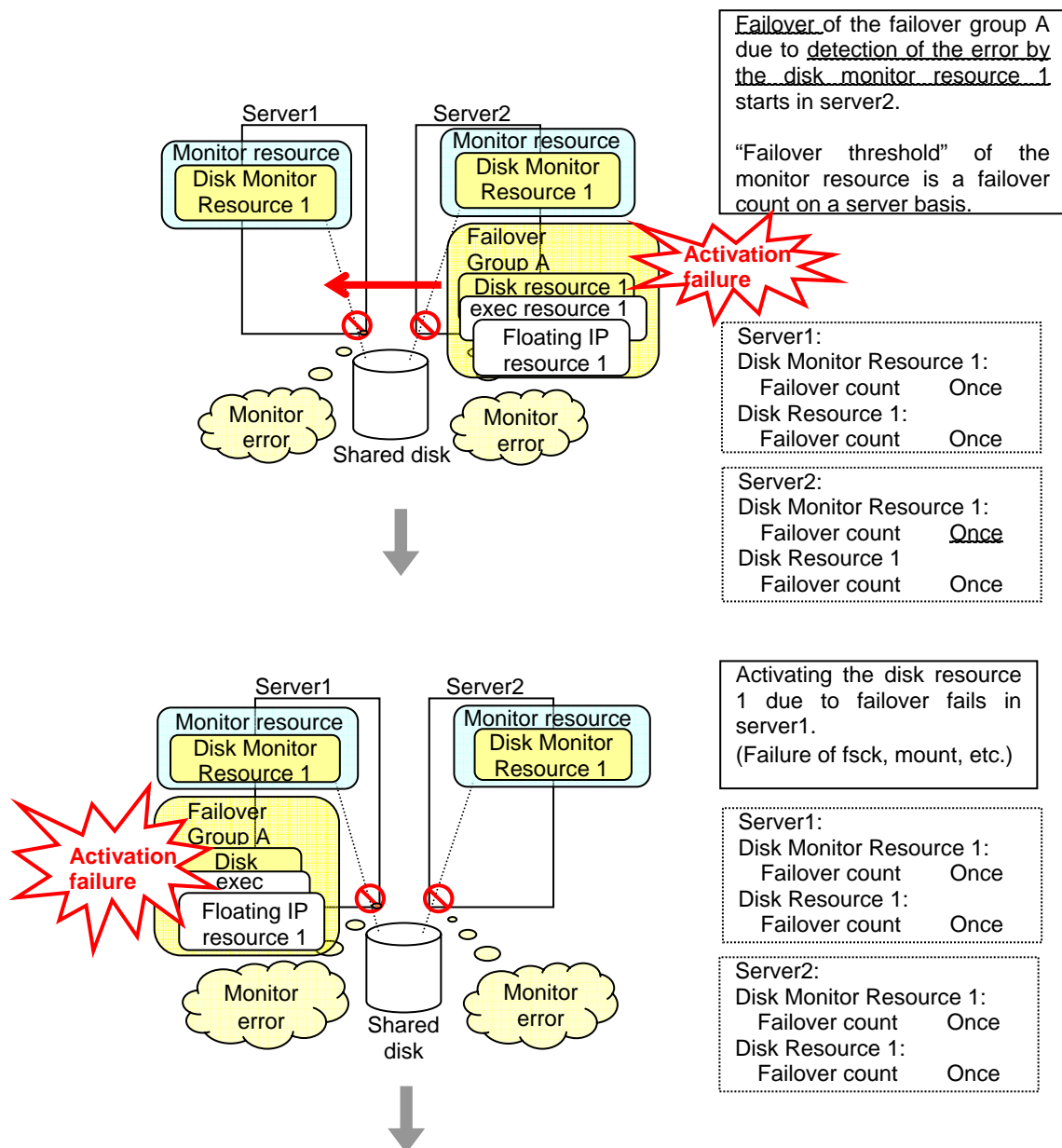


The final action is executed in server2 because the number of failovers due to failure of disk resource activation has exceeded its threshold.

However, note that activation ends abnormally without activating the rest of the group resources in the Failover Group A because “No operation (Next resources are not activated)” is selected as the final action.



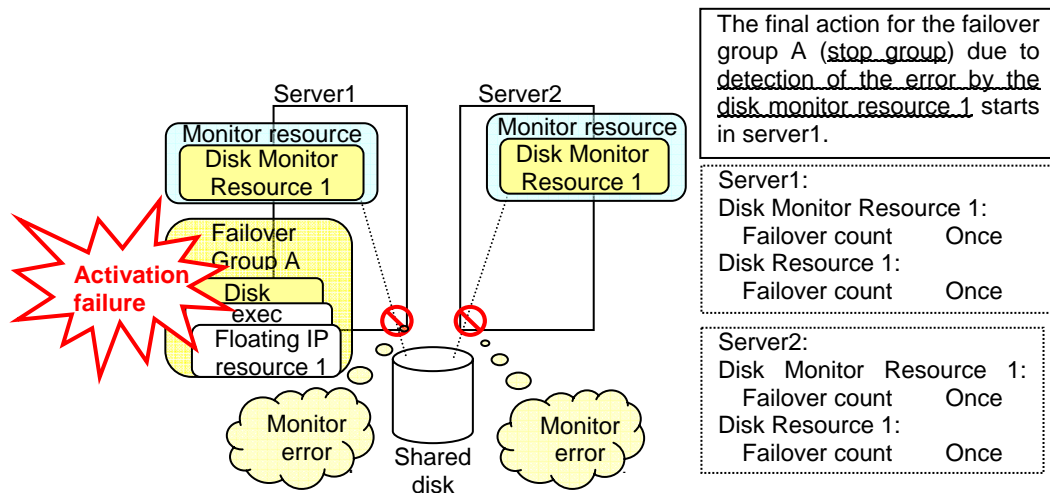
An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



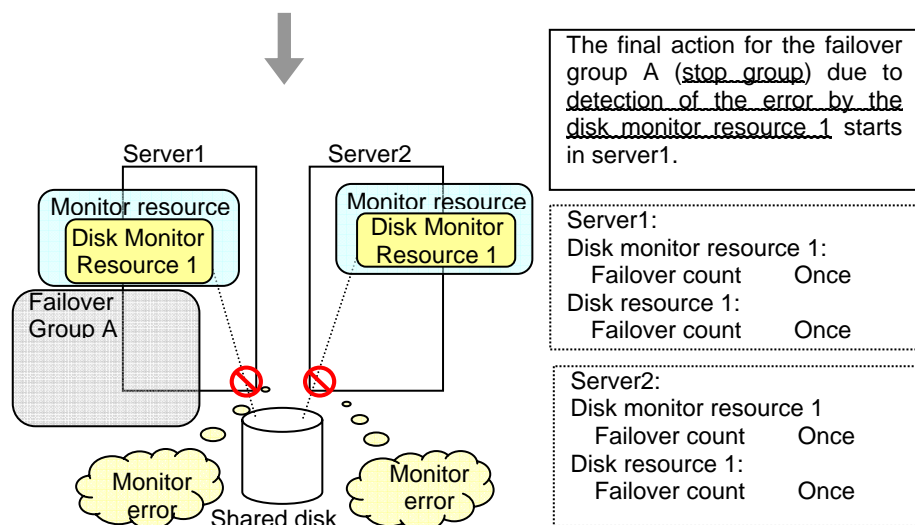
The final action is executed in server1 as is the case in server2 because the number of failovers due to failure of activating the disk resource 1 has exceeded the threshold.

However, note that activation ends abnormally without activating the rest of the group resources in the Failover Group A because "No operation (Next resources are not activated)" is selected as the final action.

An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



The final action is executed in server1 because the number of failovers due to monitoring error detected by the disk monitor resource 1 has exceeded the threshold.



After the Failover Group A is stopped due to the final action executed for the disk monitor resource 1 in server1, nothing will happen even if an error is detected by the disk monitor resource 1.

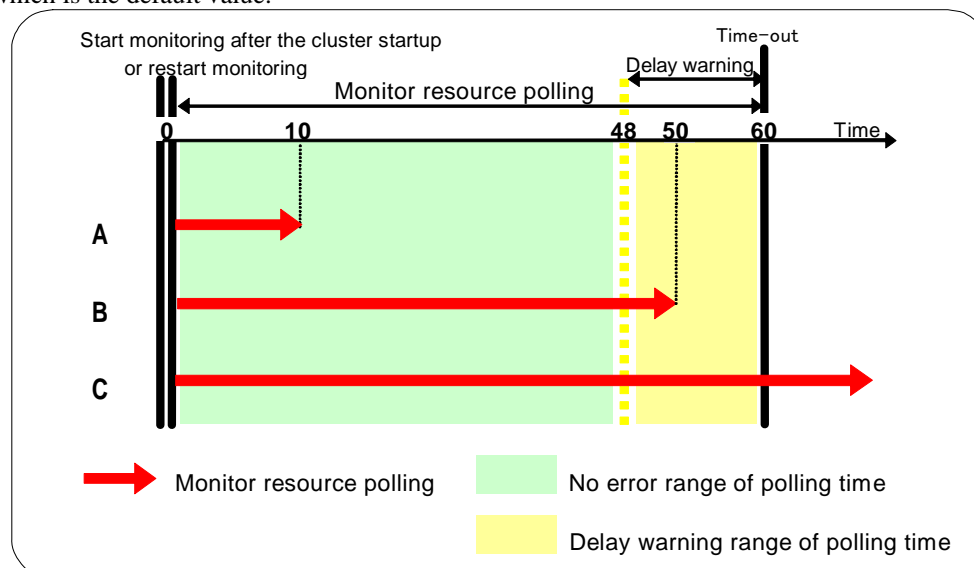
However, note that the final action for the disk monitor resource 1 is executed in server2 if the Failover Group A is manually activated because the final action for the disk monitor resource 1 is not executed yet.

## Delay warning of monitor resources

When a server is heavily loaded, due to a reason such as applications running concurrently, a monitor resource may detect a monitoring time-out. It is possible to have settings to issue an alert at the time when polling time (the actual elapsed time) reaches a certain percentages of the monitoring time before a time-out is detected.

The following figure shows timeline until a delay warning of the monitor resource is used.

In this example, the monitoring time-out is set to 60 seconds and the delay warning rate is set to 80%, which is the default value.



- A. The polling time of monitoring is 10 seconds. The target of the monitor resource is in normal status. In this case, no alert is used.
- B. The polling time of monitoring is 50 seconds and the delay of monitoring is detected during this time. The target of the monitor resource is in the normal status. In this case, an alert is used because the delay warning rate has exceeded 80%.
- C. The polling time of monitoring has exceeded 60 seconds of the monitoring timeout and the delay of monitoring is detected. The target of the monitor resource has a problem. In this case, no alert is used.

If the delay warning rate is set to 0 or 100:

- ◆ When 0 is set to the delay monitoring rate  
An alert for the delay warning is used at every monitoring.  
By using this feature, the polling time for the monitor resource can be calculated at the time the server is heavily loaded, which will allow you to determine the time for monitoring time-out of a monitor resource.
- ◆ When 100 is set to the delay monitoring rate  
The delay warning will not be used.  
Alert for the delay warning is used for the heartbeat resources as well.  
For the user-mode monitor resource, the same delay monitoring rate as for the monitor resource is used.

### Note:

Be sure not to set a low value, such as 0%, except for a test operation.

## Waiting for monitor resource to start monitoring

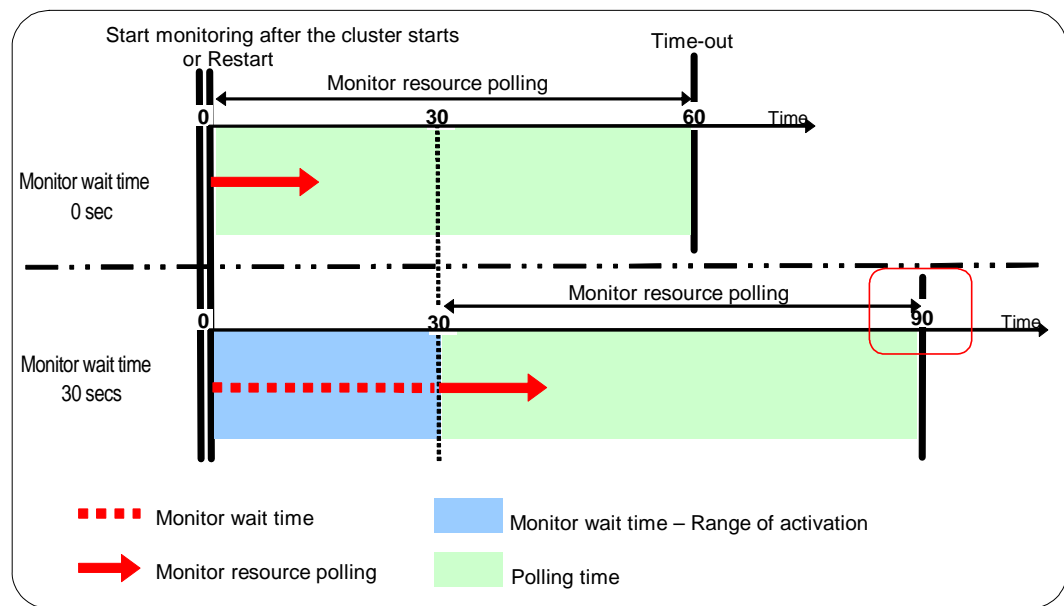
“Wait Time to Start Monitoring” refers to start monitoring after the time period specified as the waiting time elapses.

The following describes how monitoring differs when the wait time to start monitoring is set to 0 second and 30 seconds.

Configuration of monitor resource

<Monitor>

Interval	30 sec
Timeout	60 sec
Retry Count	0 time
Wait Time to Start Monitoring	0 sec / 30 sec



### Note:

Monitoring will start after the time specified to wait for start monitoring has elapsed even when the monitor resource is suspended and/or resumed by using the monitoring control commands.

The wait time to start monitoring is used when there is a possibility for monitoring to be terminated right after the start of monitoring due to incorrect application settings, such as the exec resource monitored by PID monitor resource, and when they cannot be recovered by reactivation.

For example, when the monitor wait time is set to 0 (zero), recovery may be endlessly repeated. See the example below:

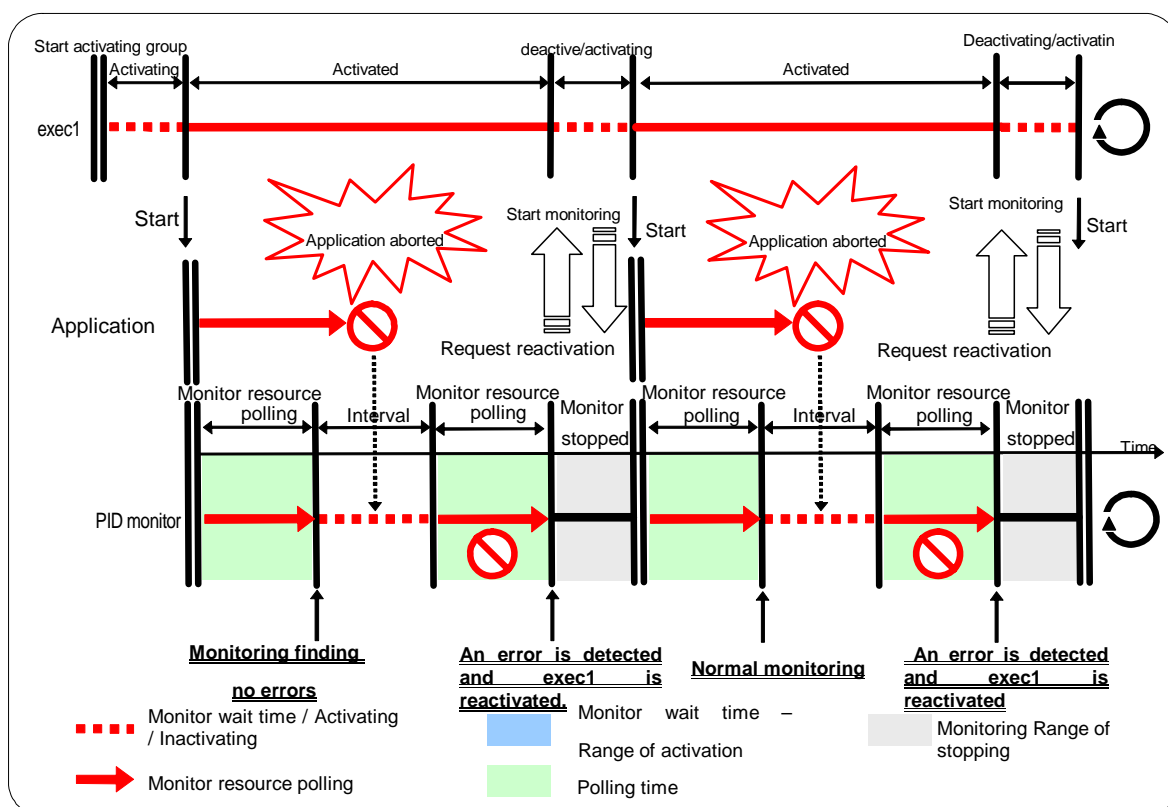
Configuration of PID Monitor resource

<Monitor>

Interval	5 sec
Timeout	60 sec
Retry Count	0 time
Wait Time to Start Monitoring	0 sec (default)

<Error Detection>

Recover Target	exec1
Reactivation Threshold	1
Failover Threshold	1
Final Action	Stop Group



The reason why recovery action is endlessly repeated is because the initial monitor resource polling has terminated successfully. The current count of recoveries the monitor resource has executed is reset when the status of the monitor resource becomes normal (finds no error in the monitor target). Because of this, the current count is always reset to 0 and reactivation for recovery is endlessly repeated.

You can prevent this problem by setting the wait time to start monitoring. By default, 60 seconds is set as the wait time from the application startup to the end.

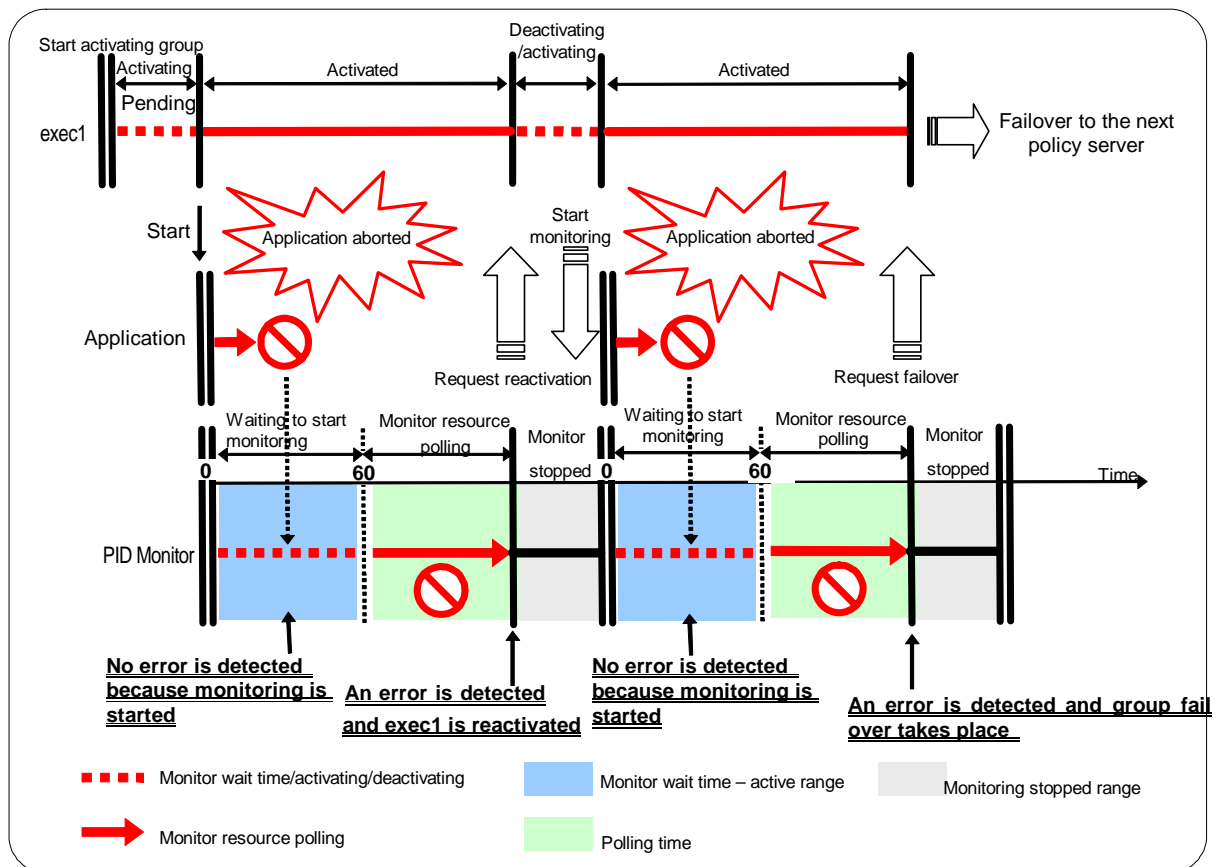
#### Configuration of PID monitor resource

<Monitor>

Interval	5 sec
Timeout	60 sec
Retry Count	0 time
Wait Time to Start Monitoring	60 sec

<Error Detection>

Recover Target	exec1
Reactivation Threshold	1 time
Failover Threshold	1 time
Final Action	Stop Group



If the application is abnormally terminated in the destination server of the group failover, the group stops as the final action.

Limiting the number of reboots when error is detected by monitor resource.

When **Stop cluster daemon and shutdown OS** or **Stop cluster daemon and reboot OS** is selected as a final action to be taken when an error is detected by the monitor resource, the number of shutdowns or reboots can be limited.

**Note:**

The maximum reboot count is on a server basis because the number of reboots is recorded on a server basis.

The number of reboots caused by a final action in detection of error in group activation/deactivation and the number of reboots caused by a final action in detection of error by a monitor resource are recorded separately.

If the time to reset the maximum reboot count is set to zero (0), the number of reboots will not be reset.

The following is an example of the process when the number of reboots is limited.

As a final action, **Stop cluster daemon and reboot OS** is executed once because the maximum reboot count is set to one (1).

When the monitor resource finds no error in its target for 10 minutes after reboot following cluster shutdown, the number of reboots is reset because the time to reset the maximum reboot count is set to 10 minutes.

Examples of behavior when the following values are set.

Configuration

<Monitor>

Interval	60 sec
Timeout	120 sec
Retry Count	3 times

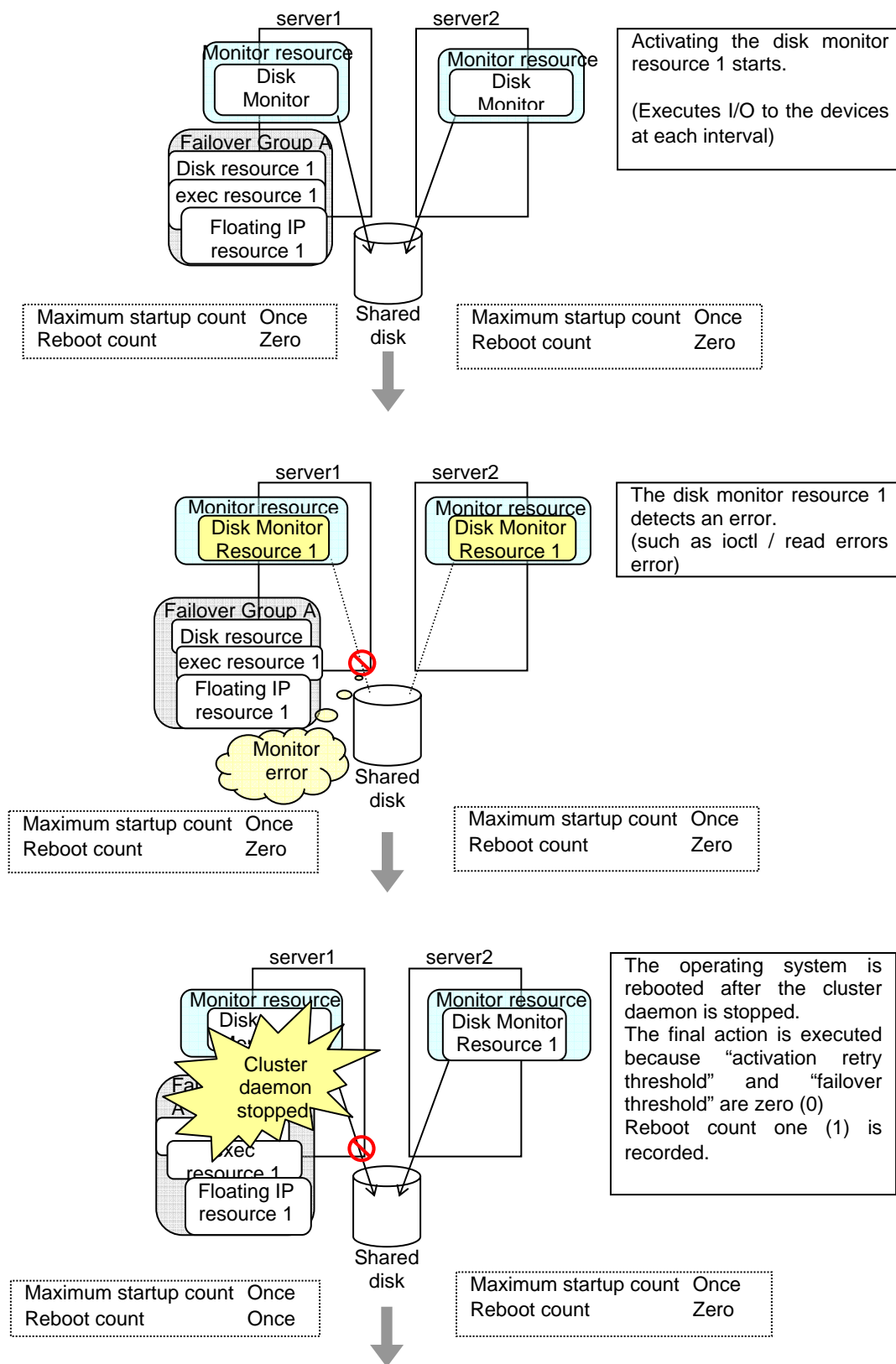
<Error detection>

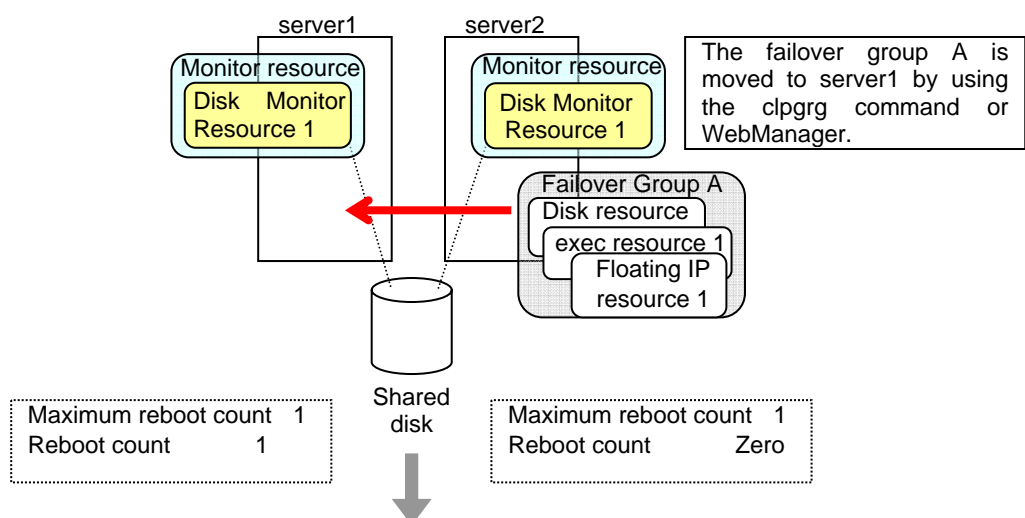
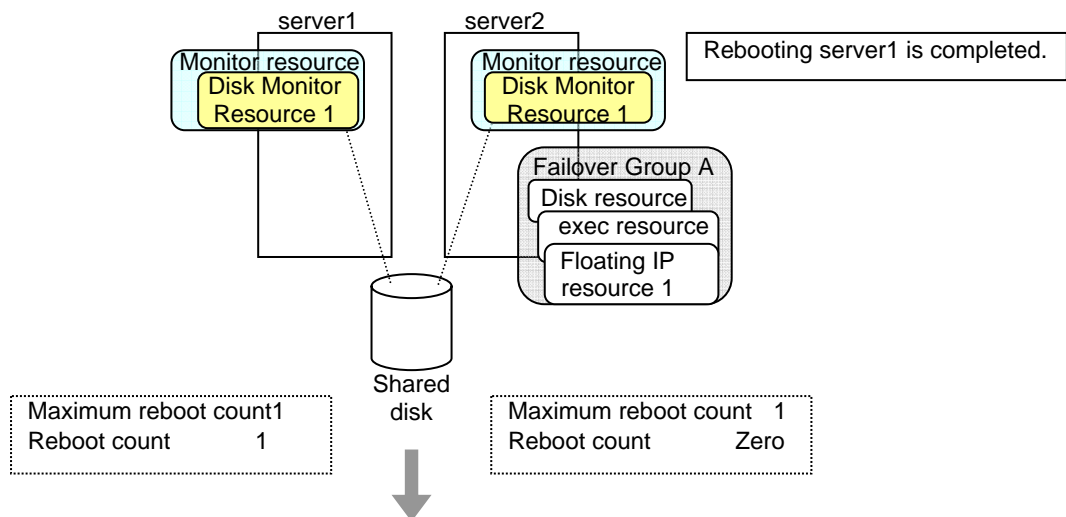
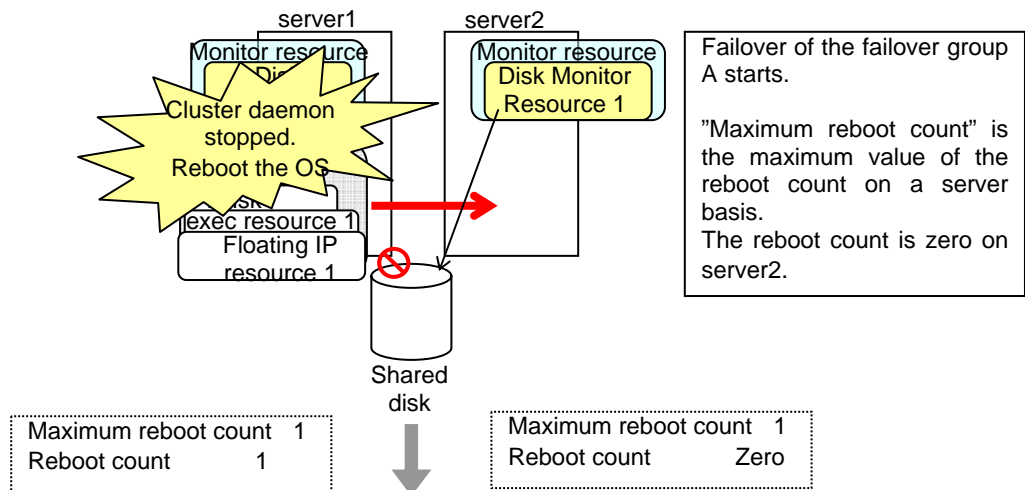
Recovery Target	Failover Group A
Reactivation Threshold	0 time
Failover Threshold	0 time
Fanal Action	Stop cluster daemon and reboot OS

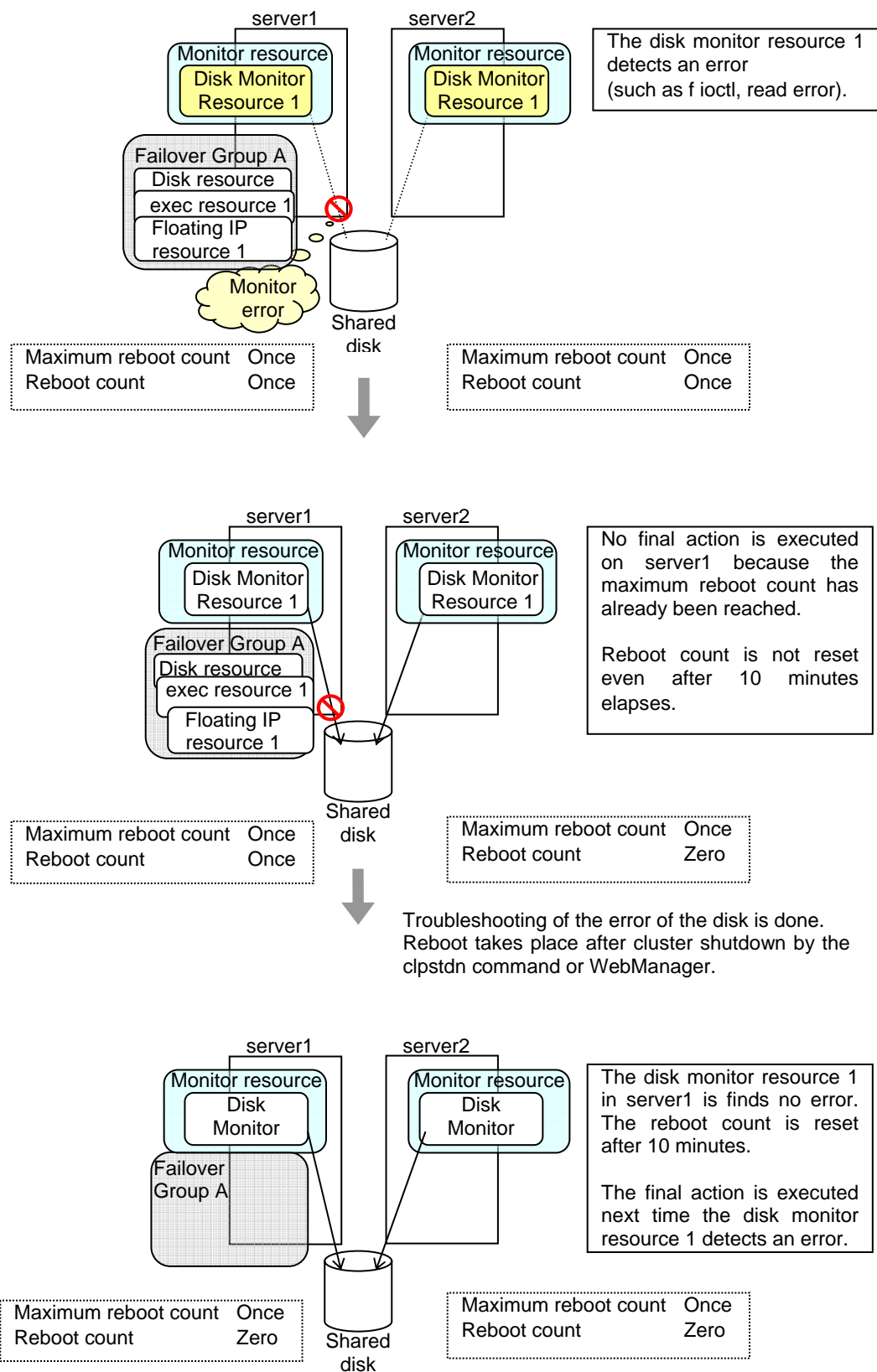
<Reboot count limit >

Maximum reboot count	1 time
----------------------	--------

Time to reset the maximum reboot count 10 minutes







## Monitor priority of the monitor resources

To assign a higher priority for monitor resources to monitor when the operating system is heavily loaded, the nice value can be set to all monitor resources except the user space monitor resource.

- ◆ The nice value can be specified through minus 19 (low priority) to plus 20 (high priority). Detection of the monitor time-out can be controlled by setting a higher priority to the nice value.

## Changing the name of a monitor resource

1. In the tree view shown on the left pane of the Builder, click the **Monitors** icon. In the table view shown on the right side of the screen, right-click the icon of the monitor resource whose name you want to change, and click **Rename Monitor Resource**.
2. Enter a new name in the **Change Monitor Resource Name** dialog box.

## Displaying and changing the comment of a monitor resource (Monitor resource properties)

1. In the tree view shown on the left pane of the Builder, right-click the **Monitors** icon. In the table view shown on the right side of the screen, right-click the icon of the monitor resource whose comment you want to change, and then click **Properties. Group** Properties dialog box is displayed.
2. On the **Info** tab, the group resources name and comment are shown. Enter a new comment (within 127 bytes).

---

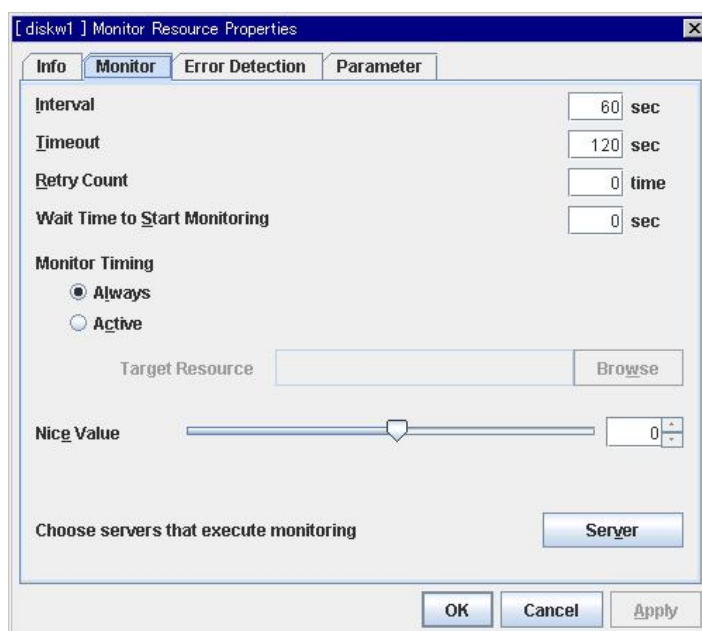
**Note:**

You cannot change the group resource name on the **Info** tab. To change the group name, right-click the **Monitors** icon as described in the step 1 above. Click **Rename Monitor Resource** and enter a new name.

---

## Displaying and changing the settings of a monitor resource (Common to monitor resources)

1. In the tree view shown on the left pane of the Builder, click the **Monitors** icon.
2. The list of monitor resources is shown in the table view on the right side of the screen. Right-click the name of the monitor resource whose settings you want to change. Click **Properties**, and then click the **Monitor** tab.
3. On the **Monitor** tab, you can see and/or change the settings of monitor resource by following the description below.



**Interval** 1 to 999

Specify the interval to check the status of monitor target.

**Timeout** 5 to 999<sup>4</sup>

When the normal status cannot be detected within the time specified here, the status is determined to be error.

**Retry Count** 0 to 999

Specify how many times an error should be detected in a row after the first one is detected before the status is determined as error. If this is set to zero (0), the status is determined as error at the first detection of an error.

**Wait Time to Start Monitoring** 0 to 9999

Set the wait time to start monitoring.

**Monitor Timing**

Set the monitoring timing. Select the timing from:

<sup>4</sup> When ipmi is set as a monitoring method for the user-mode monitor resource, 255 or less should be specified.

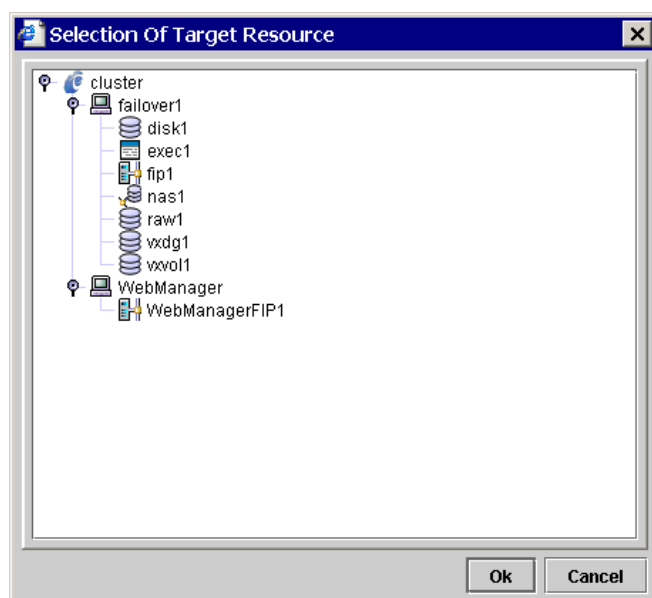
- ◆ Always:  
Monitoring is performed all the time.
- ◆ Active:  
Monitoring is not started until the specified resource is activated.

### Target Resource

The resource which will be monitored when activated is shown.

### Browse

Click this button to open the dialog box to select the target resource. The cluster name, group names and resource names that are registered in the cluster are shown in a tree view. Select the target resource and click **OK**.

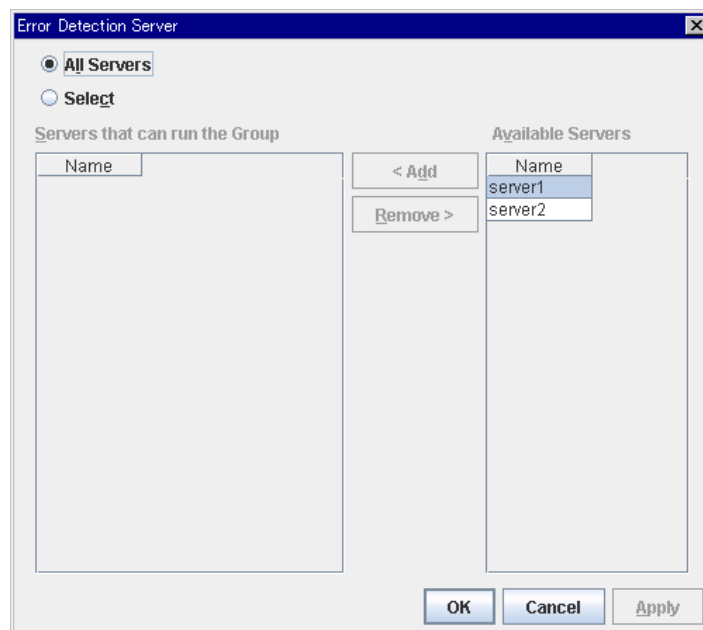


### Nice Value

Set the nice value of a process.

### Choose servers that execute monitoring

Choose the servers that execute monitoring.



#### All Servers

All servers monitor the resources.

#### Select

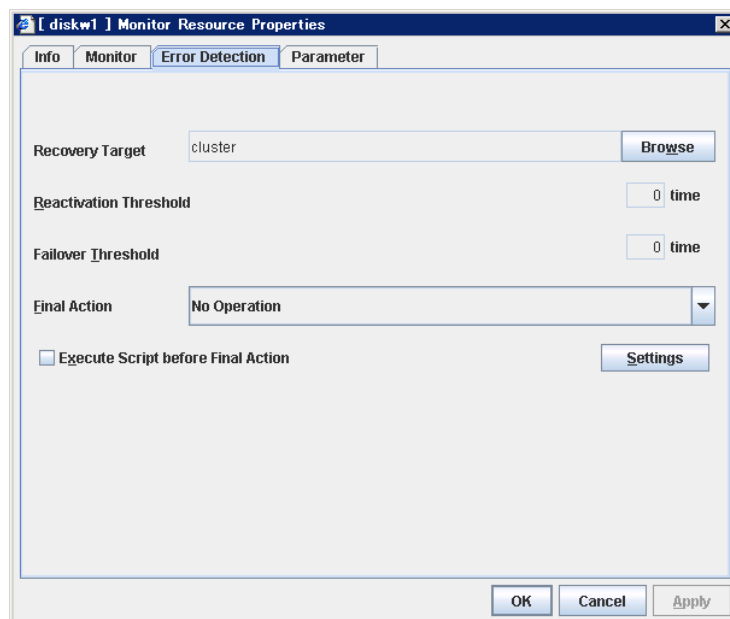
Servers registered in **Available Servers** monitor the resources. One or more servers need to be set to **Available Servers**.

- ◆ Add  
Click this button to add a server selected in Available Servers to Servers that can run the Group.
- ◆ Remove  
Delete a server selected from Servers that can run the Group.

## Displaying and changing the settings of the time when an error is detected by a monitor resource (Common to monitor resources)

1. In the tree view shown on the left pane of the Builder, click the icon of the monitor resource.
2. The list of group resources is shown in the table view on the right side of the screen. Right-click the name of the monitor resource whose settings you want to change or see. Click **Properties**, and then click the **Error Detection** tab.
3. On the **Error Detection** tab, display and/or change the monitor settings by following the description below.

In this dialog box, the recovery target and an action to be taken at the time when an error is detected can be configured. By setting this, it allows failover of the group, restart of the resource and cluster when an error is detected. However, recovery will not occur if the recovery target is not activated.

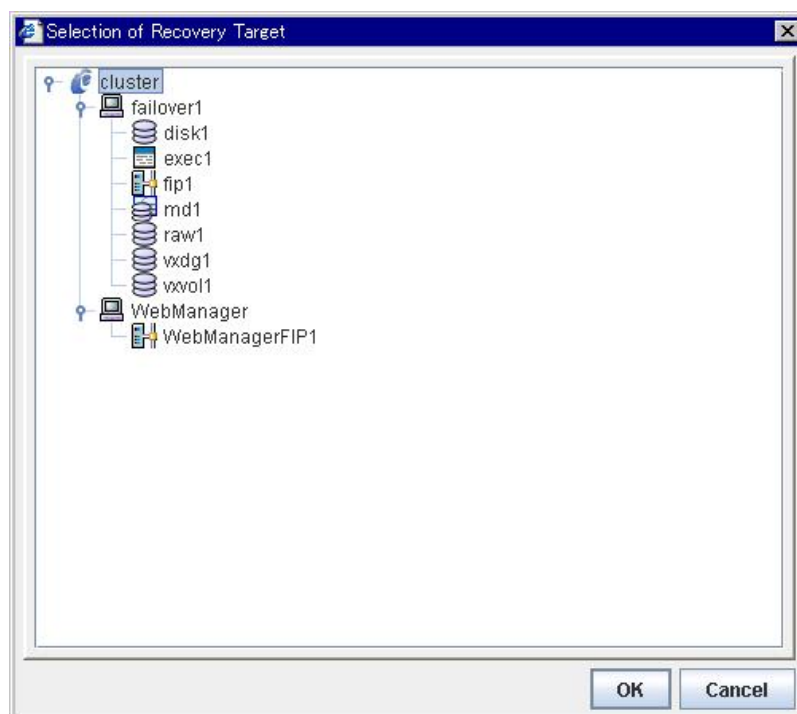


### Recovery Target

A target is shown, which is to be recovered when it is determined as a resource error.

### Browse

Click this button to open the dialog box in which the target resource can be selected. The cluster name, group names and resource names that are registered in the cluster are shown in a tree view. Select the target resource and click **OK**.



### Reactivation Threshold 0 to 99

Specify how many times you allow reactivation when an error is detected. If this is set to zero (0), no reactivation is executed. This is enabled when a group or group resource is selected as a recovery target.

**Failover Threshold** 0 to 99

Specify how many times you allow failover after reactivation fails for the number of times set in **Reactivation Threshold** when an error is detected. If this is set to zero (0), no failover is executed. This is enabled when a group or group resource is selected as a recovery target.

**Final Action**

Select a final action to be taken after reactivation fails for the number of times set in **Reactivation Threshold**, and failover fails for the number of times set in **Failover Threshold** when an error is detected.

Select the final action from the options below:

## ◆ No Operation

No action is taken.

**Note:**

Select **No Operation** only when (1) temporarily canceling the final action, (2) displaying only an alert when an error is detected, and (3) executing the final action by multi target monitor resource.

## ◆ Stop Group

When a group is selected as a recovery target, that group is stopped. When a group resource is selected as a recovery target, the group that the group resource belongs is stopped. This option is disabled when a cluster is selected as a recovery target.

## ◆ Stop cluster daemon

Stops the cluster daemon of the server that detected an error.

## ◆ Stop cluster daemon and shutdown OS

Stops the cluster daemon of the server that detected an error, and then shuts down the OS.

## ◆ Stop cluster daemon and reboot OS

Stops the cluster daemon of the server that detected an error, and then reboots the OS.

## ◆ Sysrq Panic

Performs the sysrq panic.

**Note:**

If performing the sysrq panic fails, the OS is shut down.

## ◆ Keepalive Reset

Resets the OS using the clpkhb or clpka driver.

**Note:**

If resetting keepalive fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported.

## ◆ Keepalive Panic

Performs the OS panic using the clpkhb or clpka driver.

**Note:**

If performing the keepalive panic fails, the OS is shut down. Do not select this action on the OS and kernel where the clpkhb and clpka drivers are not supported.

## ◆ BMC Reset

Perform hardware reset on the server by using the ipmi command.

**Note:**

---

If resetting BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

◆ **BMC Power Off**

Powers off the OS by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If powering off BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or the ipmitool command or the hwreset command does not run.

---

◆ **BMC Power Cycle**

Performs the power cycle (powering on/off) of the server by using the ipmi command. OS shutdown may be performed due to the ACPI settings of the OS.

---

**Note:**

If performing the power cycle of BMC fails, the OS is shut down. Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

◆ **BMC NMI**

Uses the ipmi command to cause NMI occur on the server. Actions after NMI occurrence depend on the OS settings.

---

**Note:**

If BMC NMI fails, the OS shutdown is performed.  
Do not select this action on the server where the ipmitool command or the hwreset command is not installed or ipmitool command or the hwreset command does not run.

---

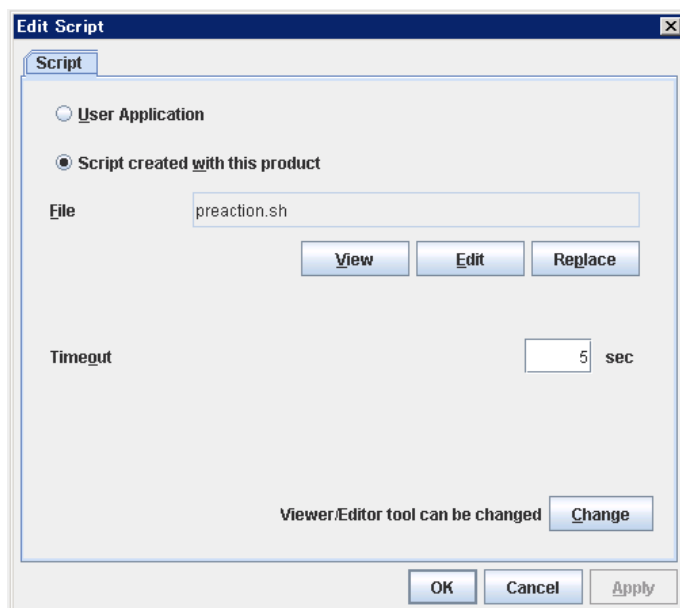
**Execute Script before Final Action**

Select whether script is run or not before executing final action.

- When selected:  
A script/command is run before executing final action. To configure the script/command setting, click **Settings**.
- When cleared:  
Any script/command is not run.

**Settings**

Click here to display the **Edit Script** dialog box. Set the script/command to be run before executing final action.



### User Application

Use an executable file (executable shell script file or execution file) on the server as a script. For the file name, specify an absolute path or name of the executable file of the local disk on the server. If there is any blank in the absolute path or the file name, put them in double quotation marks (“”) as follows.

Example:

”/tmp/user application/script.sh”

Each executable file is not included in the cluster configuration information of the Builder. They must be prepared on each server since they cannot be edited or uploaded by the Builder.

### Script created with this product

Use a script file which is prepared by the Builder as a script. You can edit the script file with the Builder if you need. The script file is included in the cluster configuration information.

#### File (Within 1023 bytes)

Specify a script to be executed (executable shell script file or execution file) when you select **User Application**.

#### View

Click here to display the script file with the editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

#### Edit

Click here to edit the script file with the editor when you select **Script created with this product**. Overwrite the script file to reflect the change. You cannot edit the script file if it is currently displayed or edited. You cannot modify the name of the script file.

#### Replace

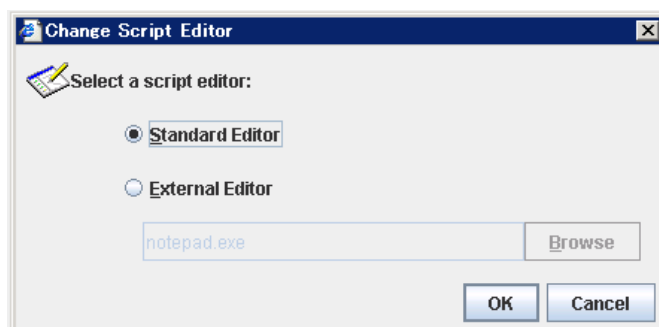
Click here to replace the contents of a script file with the contents of the script file which you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not select binary files (applications), and so on.

**Timeout (0 to 99)**

Specify the maximum time to wait for completion of script to be executed. The default value is set as 5.

**Change**

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

**Standard Editor**

Select this option to use the standard editor for editing scripts.

- Linux: vi (vi which is detected by the user's search path)
- Windows: Notepad (notepad.exe which is detected by the user's search path)

**External Editor**

Select this option to specify a script editor. Click **Browse** to select an editor.

To specify a CUI-based external editor on Linux, create a shell script.

The following is a sample shell script to run vi:

```
xterm -name clpedit -title "Cluster Builder " -n " Cluster Builder"
-e vi "$1"
```

**IPMI command**

Final actions **BMC Reset**, **BMC Power Off**, **BMC Power Cycle** use the following commands and options.

Command	Option	Description	Final Action
ipmitool	power cycle	Performs the power cycle of the server.	BMC Power Cycle
	power off	Powers off the server.	BMC Power Off
	power reset	Resets the server.	BMC Reset
	power diag	Causes NMI to occur.	BMC NMI

Command	Option	Description	Final Action
hwreset	-c	Performs the power cycle of the server.	BMC Power Cycle
	-d	Powers off the server.	BMC Power Off
	-r	Resets the server.	BMC Reset

	-n	Causes NMI to occur	BMC NMI
--	----	---------------------	---------

#### Notes for the final action by ipmi

- ◆ Final Action by IPMI is achieved by associating ExpressCluster and the ipmitool command or the hwreset command.
- ◆ ipmitool(OpenIPMI-tools) and hwreset(ipmiutil) are not shipped with ExpressCluster. Users are required to install the rpm package by themselves.
- ◆ When ipmiutil is used, the following kernel module warning log is recorded on the syslog many times.  

```
modprobe: modprobe: Can't locate module char-major-10-173
```

To prevent this log records, rename /dev/ipmikcs
- ◆ As of April 20, 2009, you can download ipmiutil by visiting the website at:  
<http://ipmiutil.sourceforge.net/>
- ◆ Users are responsible for making decisions and assuming responsibilities. NEC does not support or assume any responsibilities for:
  - Inquires about ipmitool and hwreset themselves.
  - Tested operation of ipmitool and hwreset.
  - Malfunction of ipmitool and hwreset or error caused by such malfunction.
  - Inquiries if ipmitool and hwreset are supported by servers.

## Setting monitor resources on individual servers

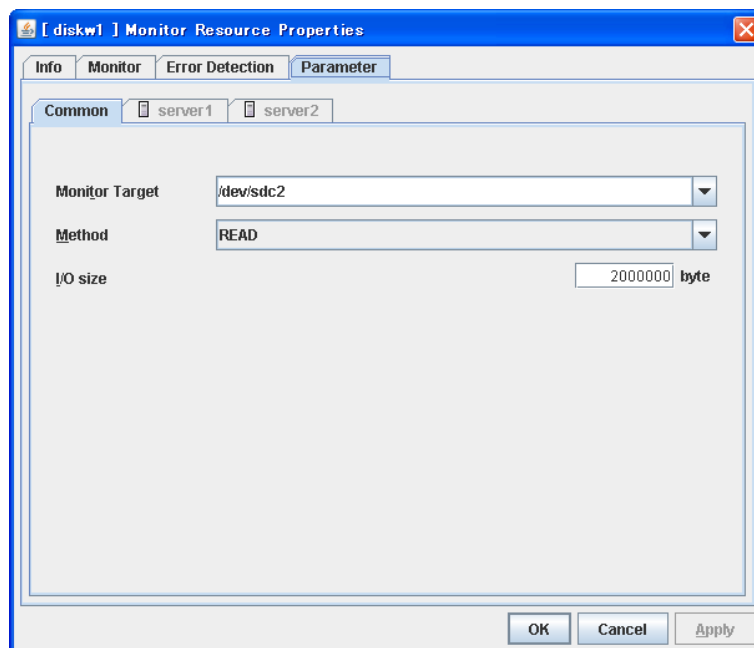
Some setting values of monitor resources can be set for individual servers. For the resources which can be configured on a server basis, the tabs of servers are displayed on the **Details** tab.

The following monitor resources can be configured for individual servers.

Monitor Resource Name	Supported Version
Disk monitor resource	2.0.0-1 or later
IP monitor resource	2.0.0-1 or later
NIC Link Up/Down monitor resource	2.0.0-1 or later
RAW monitor resource	2.0.0-1 or later

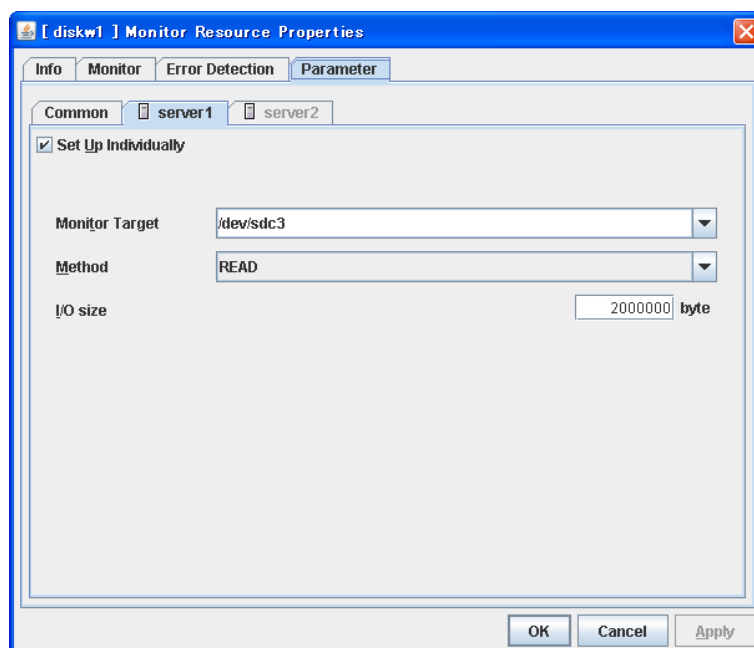
For the parameters that can be configured for individual servers, see the descriptions of parameters on monitor resources. On those parameters, the **Server Individual Setup** icon is displayed.

In the example below, configuring settings for each server on the disk monitor resource is described.



### Server Individual Setup

Parameters that can be configured for individual servers on a disk monitor resource are displayed.



### Set Up Individually

Click the tab of the server on which you want to configure server individual setting, and select this check box. The boxes for parameters that can be configured for individual servers become active. Enter required parameters.

## Common settings for monitor resources of the monitoring option

This section describes the setting procedure and cautions for monitoring applications by using the monitor resources provided by the Application Server Agent, Database Agent, File Server Agent and Internet Server Agent (hereinafter referred to as “monitoring option”).

### Setting procedure of monitor resources of monitoring option

Follow the steps below to monitor applications by using monitor resources of the monitoring options.

In this example, DB2 monitor resource is used.

1. Create a failover group (for target monitoring application)
2. Add the exec resource for target monitoring application startup
3. Perform the test for target monitoring application startup
4. Add DB2 monitor resource for monitoring target monitoring application

The steps are described below.

#### Step 1 Create a failover group (for target monitoring application)

Create a failover group for monitoring the target monitoring application and performing a failover when an error occurs. Add group resources as necessary.

---

#### Note:

For details on how to create failover groups and add group resources, see Chapter 5 “Creating the cluster configuration data using the Builder” in the Installation and Configuration Guide.

---

#### Step 2 Add the exec resource for starting the target monitoring application

Add the exec resource for starting the target monitoring application to the failover group that you have created in Step 1, and edit it to start and finish the target monitoring application by its Start Script or Stop Script. In this guide, this exec resource is called exec 1.

#### Step 3 Confirmation test for target monitoring application startup

After completing the Steps 1 and 2, check that the monitored application is started normally. Modify the settings to the server, start, stop, move and fail over the group by the WebManager and confirm that those operations are performed normally.

#### Step 4 Add the DB2 monitor resource for starting target monitoring application

Add the DB2 monitor resource for monitoring the target monitoring application. Select **Active** for **Monitor Timing** and specify **exec1** for **Target Resource** on the **Monitor** tab.

---

#### Note:

For details of specific information of monitor resources and settings, see the section for monitoring option monitor resources in Chapter 6 “Monitor resource details.”

---

---

**Related Information:**

For details on the monitoring settings common to monitor resources, see “Displaying and changing the settings of a monitor resource (Common to monitor resources) in Chapter 6 “Monitor resource details.”

---

## Cautions on monitoring option monitor resources

Cautions for using monitoring option monitor resources are as follows:

- ◆ On the monitor resource db2w, ftpw, imap4w, mysqlw, oraclew, oracleasw, pop3w, psqlw, sambaw, sybasew, wasw, wlsw and otxw a password is included as a property entry. This password is saved in plain text on the cluster configuration data file (clp.conf). Thus, it is recommended to create an account dedicated to monitoring other than for application and use it for security reasons.

## Understanding the disk monitor resources

Disk monitor resources monitor disk devices. It is recommended to use raw monitoring for monitoring the disk that the disk monitor resource (TUR) cannot be used.

### Monitoring by disk monitor resources

Two ways of monitoring are employed by the disk monitor resource: READ and TUR.

- ◆ Notes on TUR:
  - You cannot run the Test Unit Ready and the SG\_IO command of SCSI on a disk or disk interface (HBA) that does not support it. Even if your hardware supports this command, consult the driver specifications because the driver may not support it.
  - In the case of the disk of S-ATA interface, it may be recognized as the IDE interface disk (hd) or as the SCSI interface disk (sd) depending on the type of a disk controller and the distribution to be used. When the disk is recognized as the IDE interface, no TUR methods can be used. If the disk is recognized as the SCSI interface, TUR (generic) cannot be used but TUR (legacy) can be used.
  - Test Unit Ready, compared to Read, burdens OS and disks less.
  - In some cases, Test Unit Ready may not be able to detect actual errors in I/O to media.

For the TUR monitoring, one of the following is selected:

- ◆ TUR
  - ioctl is used by the following steps and the status of the device is determined by the result of the command:
    - Run the ioctl (SG\_GET\_VERSION\_NUM) command. The status is determined by the return value of ioctl and the version of SG driver.
    - If the ioctl command runs successfully and the version of SG driver is 3.0 or later, execute ioctl TUR (SG\_IO) using the SG driver.
    - If the ioctl command fails or the version of SG driver is earlier than 3.0, execute ioctl TUR which is defined as a SCSI command.
- ◆ TUR (legacy)
  - Monitoring is performed by using ioctl (Test Unit Ready). Test Unit Ready (TUR) which is defined as a SCSI command is used against the specified device, and the status of the device is determined by the result of the command.
- ◆ TUR (generic)
  - Monitoring is executed by using ioctl TUR (SG\_IO). ioctl TUR (SG\_IO) which is defined as a SCSI command is used against the specified device, and the status of the device is determined by the result of the command. Even with a SCSI disk, SG\_IO may not work successfully depending on the OS or distribution.

The following is the READ monitoring:

◆ READ

- Dummy Read reads the specified size data on the specified device (disk device or partition device). Based on the result (the size of data actually read), the status is judged.
- Dummy Read is for determining if the specified size of data can be read. Validity of the data read is not judged.
- Burden of the load experienced by the OS and disk is proportional to the size of the data on the specified disk to be read
- See “I/O size when READ is selected for disk monitor resources” on page 708 to configure the read size.

The following is the READ (O\_DIRECT) monitoring:

◆ READ (O\_DIRECT)

- Judges by the results of reading (the size that was read) the specified device (disk device or partition device) without using cache (O\_DIRECT mode).
- Judgment is based on whether or not reading has been performed successfully. Validity of the read data is not judged.

The following is the WRITE (FILE) monitoring:

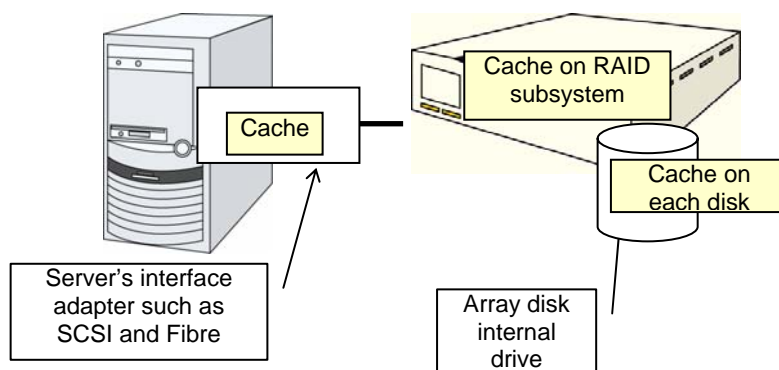
◆ WRITE (FILE)

- The file of the specified path is created, written, and deleted to be judged. Validity of the written data is not judged.

## I/O size when READ is selected for disk monitor resources

Enter the size of data when READ is selected as a method of monitoring.

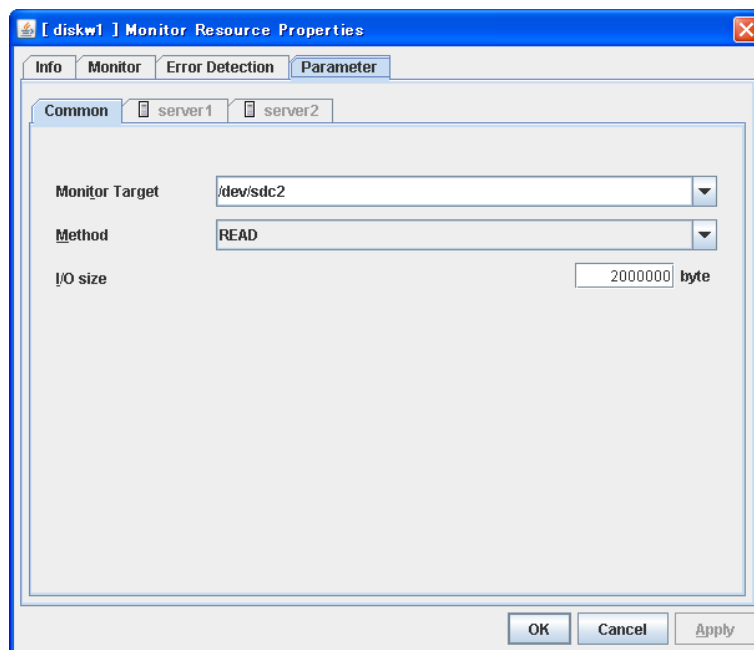
- Depending on the shared disk and interfaces in your environment, various caches for reading may be implemented. Because of this, when the specified read size is too small, READ may hit in cache, and may not be able to detect read errors.
- When you specify a READ I/O size, verify that READ can detect I/O errors on the disk with that size by intentionally creating I/O errors.



Note: This figure illustrates a typical concept of shared disks. This is not always applicable to array unit universally.

## Displaying and changing the details of disk monitor resources

1. In the tree view shown on the left pane of the Builder, click the **Monitors** icon.
2. The list of group resources is shown in the table view on the right side of the screen. Right-click the name of the disk resource whose settings you want to change. Click **Properties**, and then click the **Parameter** tab.
3. On the **Parameter** tab, you can see and/or change the monitor settings by following the description below.



### Monitor Target Name (Within 1023 bytes) **Server Individual Setup**

- ◆ When the monitoring method is other than WRITE (FILE):

Specify a disk device name to be monitored (the name should begin with “/”). When there is a disk resource, a device name specified for the disk resource can be selected. When there is a mirror disk resource, a data partition device name specified for the mirror disk resource or a hybrid disk resource can be selected.

- ◆ When the monitoring method is WRITE (FILE):

Specify the path name of the file to be monitored. The name needs to begin with [/].

Specify the file name with the absolute path. If you specify the file name of an existing file, it is overwritten and the data in the file is lost.

### Method **Server Individual Setup**

Specify how you want to monitor a disk device from TUR, TUR (generic), TUR (legacy), READ, READ (O\_DIRECT) and WRITE (FILE).

### I/O Size 1 to 99999999 **Server Individual Setup**

Specify the size of I/O for reading or reading/writing when READ or WRITE (FILE) is selected as a monitoring method.

When a local disk is specified in **Target Device Name**, a local disk on the server can be monitored.


- ◆ Example of settings to monitor the local disk /dev/sdb by READ method, and to reboot the OS when an error is detected:

Option	Value	Remarks
Target Device Name	/dev/sdb	SCSI disk in the second machine.
Method	READ	READ method.
Recovery Target	Cluster	-
Final Action	Stop cluster daemon and reboot OS	Reboot the OS.

- ◆ Example of settings to monitor the local disk /dev/sdb by TUR (generic) method, and select No Operation (sending an alert to the WebManager only) as the final action when an error is detected:

Option	Value	Remarks
Target Device Name	/dev/sdb	SCSI disk in the second machine.
Method	TUR(generic)	SG_IO method
Final Action	No Operation	

## Displaying the disk monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click a disk monitor resource object, , in the tree view, the following information is displayed in the list view

Disk Monitor Name: diskw1 Details

Common server1 server2 server3 server4

Properties		Value
Name	diskw1	
Comment	TUR	
Monitor Target	/dev/sde5	
Disk/NAS	disk	
Status	Normal	

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online
server3	Online
server4	Online

Name:	Disk monitor resource name
Comment:	Comment on the disk monitor resource
Monitor Target:	The target to be monitored
Disk/NAS:	The type of a disk to be monitored
Status:	Disk monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Type	diskw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Method	READ
I/O Size (byte)	2000000

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Target to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility	Possibility of suspending monitoring
Method:	Monitoring method
I/O Size:	I/O size in monitoring by READ method or WRITE(FILE)

# Understanding raw monitor resources

A raw monitor resource monitors read of the specified device without using cache of the OS, in the same way as the disk monitor resource (READ O\_DIRECT method) does.

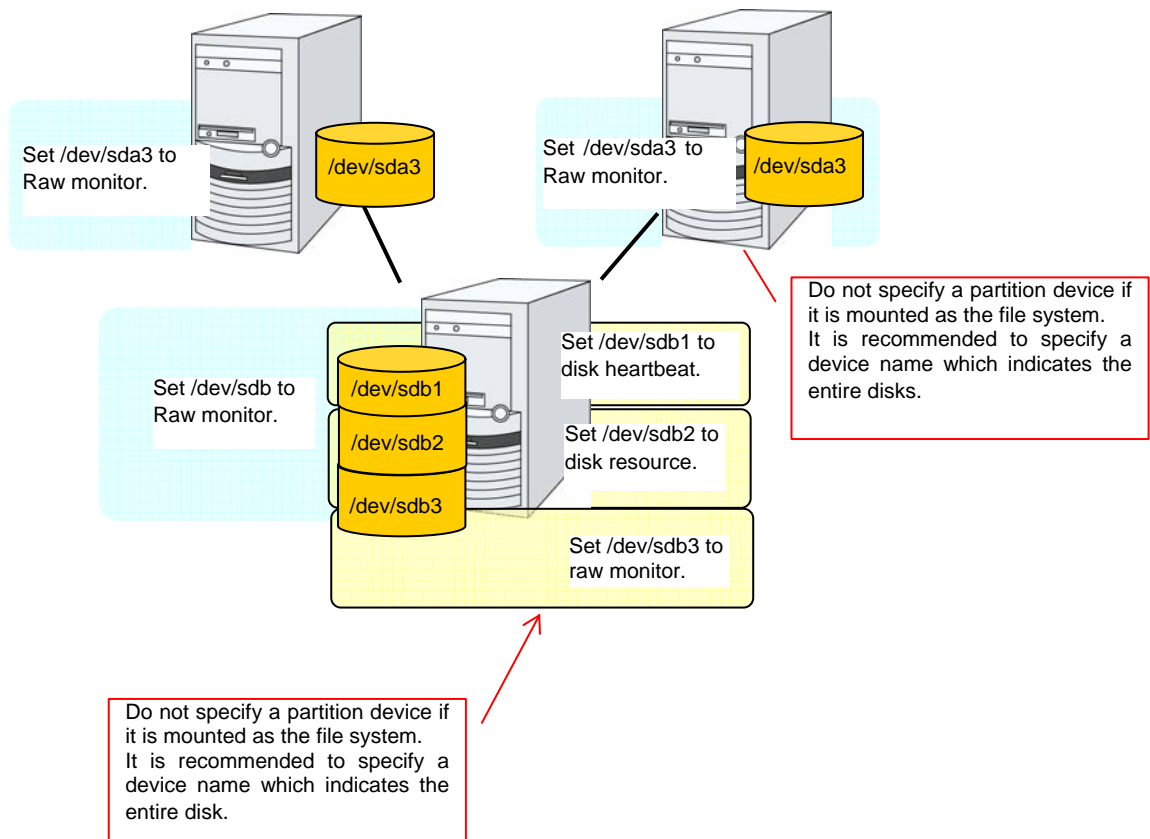
## Raw monitor resources

- Note 1** When a raw monitor resource is set, partitions cannot be monitored if they have been or will be possibly mounted. These partitions cannot be monitored even if you set device name to “whole device” (device indicating the entire disks). Allocate a partition dedicated to monitoring and set the raw monitor resource to it. (This partition dedicated to monitoring should be of the size 10Mbytes or larger).
- Note 2** Do not register raw devices which have been registered in “Disk I/F,” “Raw resource” or “VxVM Volume Resource” on Server Property. See “Using ExpressCluster to control the VxVM disk” , for details of raw device of VxVM volume resource.
- Note 3** When a raw device used by a disk heartbeat is monitored by RAW monitor resource, specify the raw device used by a disk heartbeat in “Target Raw Device Name.” Do not enter the “device name.”

## Examples of a raw monitor resource configuration

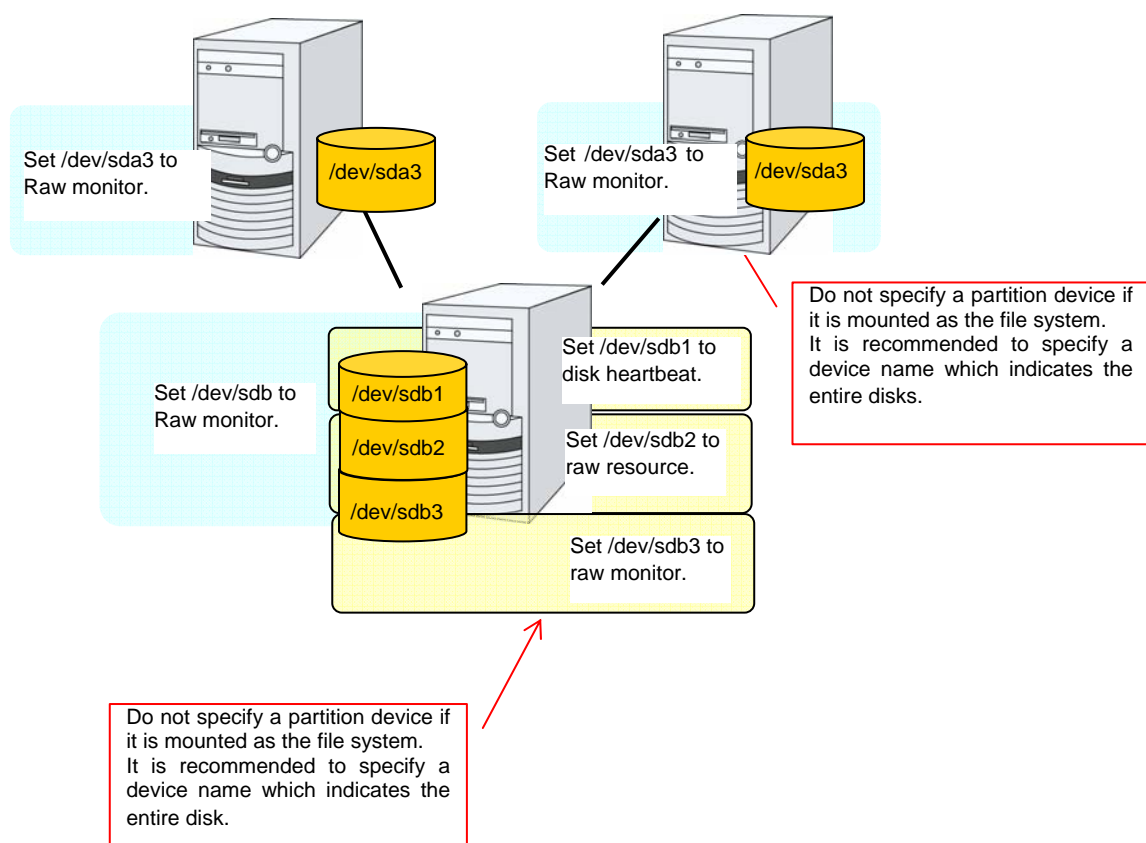
### An example of configuration of disk resources and raw monitors

- Disk resource
- Raw monitor resource (monitors built-in hard disk drives on both servers)
- Raw monitor resource (monitors the shared disk)



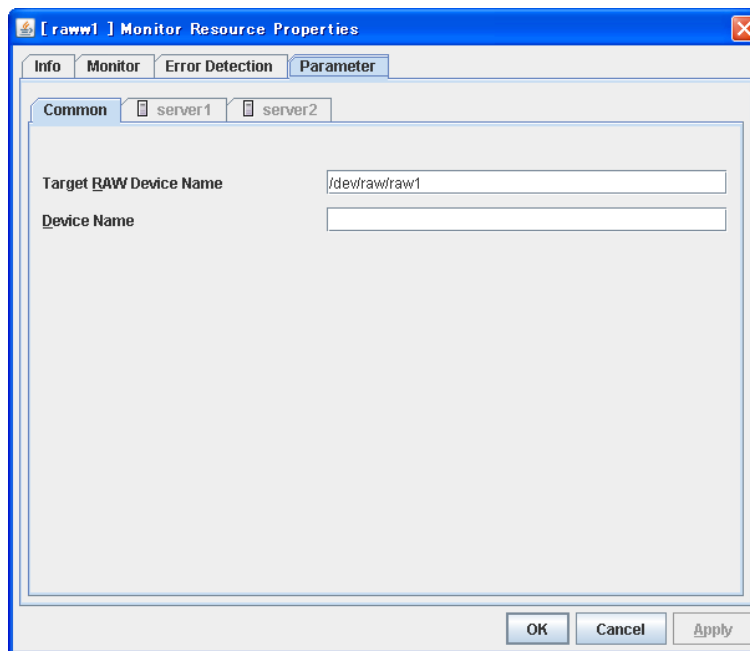
**An example of configuration of raw resources and raw monitors**

- Raw resource
- Raw monitor resource (monitors built-in hard disk drives on both servers)
- Raw monitor resource (monitors the shared disk)



## Displaying and changing the raw monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Click the name of the target Raw monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.




### Target Raw Device Name (Within 1023 bytes) **Server Individual Setup**

Enter the name of a device used for raw access. A raw device that is already registered with “Disk I/F” and “raw resource” of the server properties cannot be registered. A raw device registered with the VxVM volume resource cannot be registered. For details of the raw device of VxVM volume resource, refer to the *Reference Guide*. The name must begin with “/.”

### Device Name (Within 1023 bytes) **Server Individual Setup**

Specify the actual name of a raw device you monitor. Specify this only when monitoring is done by binding. You cannot enter the name of a partition that has been mounted or will possibly be mounted in the **Device Name** box for monitoring. You cannot enter the name of the whole device (device indicating the entire disk) of the partition device that has been or will be possibly mounted in the **Device Name** box for monitoring. You should have a partition dedicated to monitoring and set to the raw monitor resource. (Allocate 10M or greater for the partition size of monitoring.) The name must begin with “/.” For details, refer to the *Reference Guide*.

## Displaying the raw monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click a raw monitor object, , in the tree view, the following information is displayed in the list view.

RAW Monitor Name: raww1		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	raww1	
Comment		
Target RAW Device Name	/dev/raw/raw1	
Device Name		
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Online	
server2	Online	

Name:	Raw monitor resource name
Comment:	Comment on the raw monitor resource
Target Raw Device Name:	The name of the raw device monitored by the raw monitor resource
Device Name:	Actual name of the device to be monitored
Status:	Raw monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Type	raww
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Method	READ
I/O Size (byte)	4096

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring
Method:	Monitoring method
I/O Size:	I/O size at monitoring

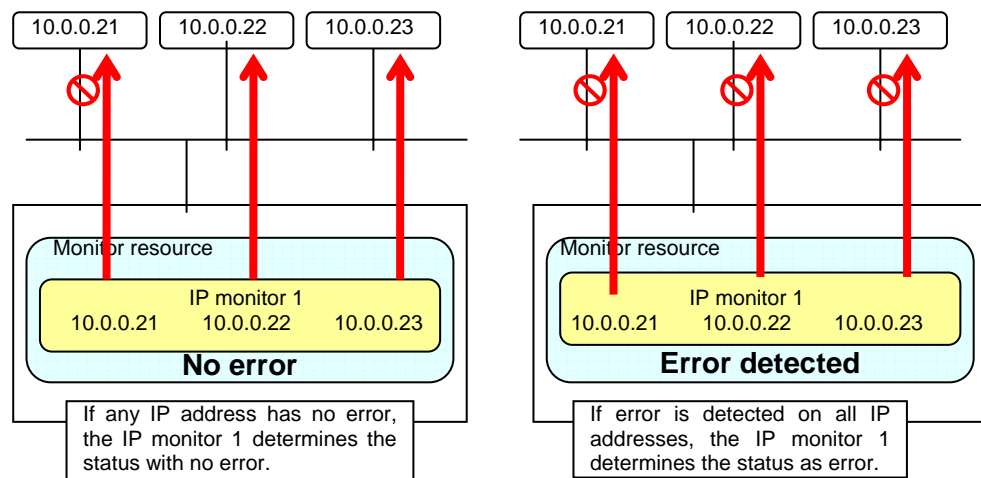
# Understanding IP monitor resources

IP monitor resource monitors IP addresses using the ping command.

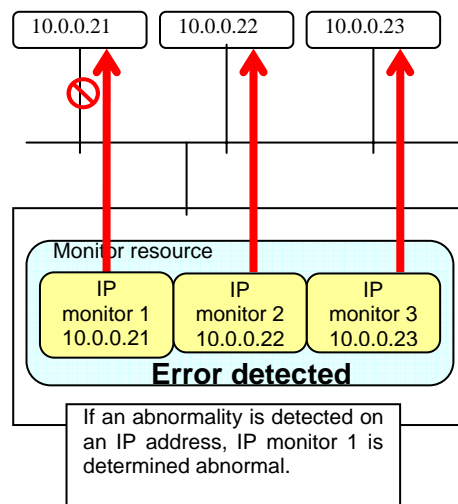
## Monitoring by IP monitor resources

IP monitor resource monitors specified IP addresses by using the ping command. If all IP addresses do not respond, the status is determined to be error.

If you want to establish error when all of the multiple IP addresses have error, register all those IP addresses with one IP monitor resource.



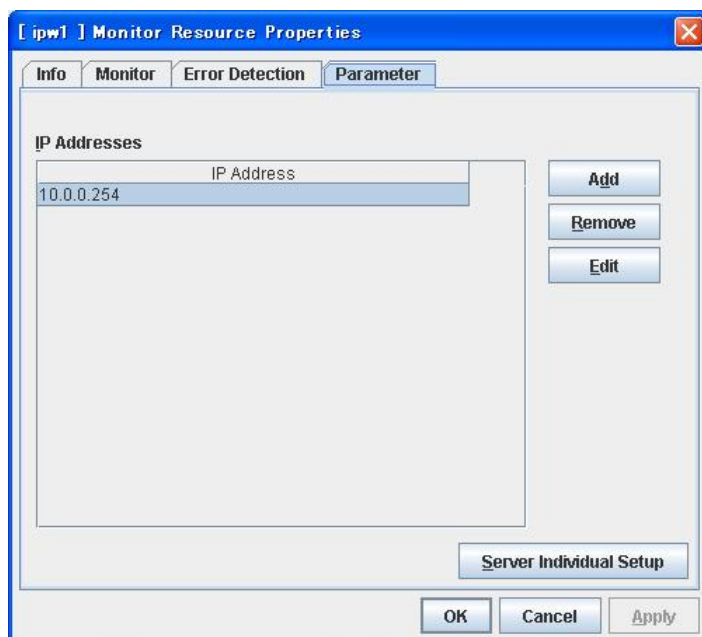
If you want to establish error when any one of IP addresses has an error, create one IP monitor resource for each IP address.



## Displaying and changing IP monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the name of the target IP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

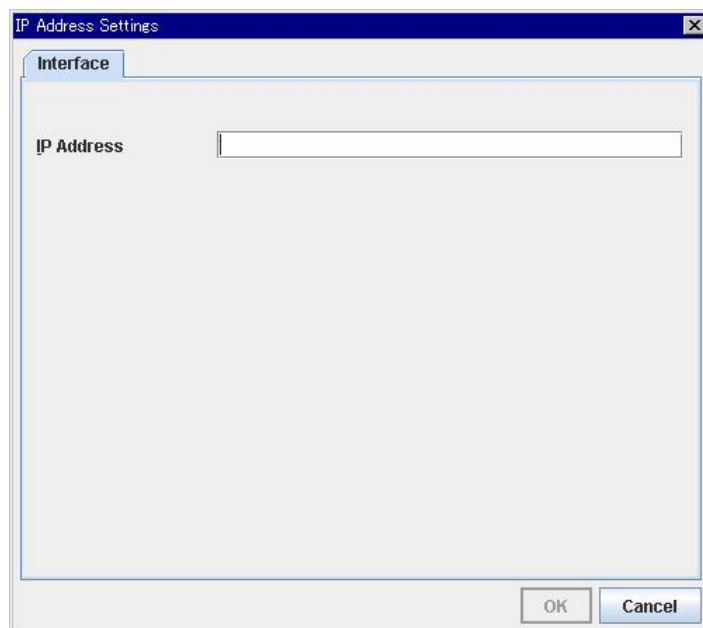
IP addresses to be monitored are listed in **IP Addresses**.



### Add

Click **Add** to add an IP address to be monitored.

A dialog box where an IP address can be entered is displayed.

**IP Address** (Within 255 bytes) **Server Individual Setup**

Enter an IP address or a host name to be monitored in this field and click **OK**.

The IP address or host name you enter here should be the one that exists on the public LAN.

If a host name is set, the name resolution in the OS (such as adding an entry to /etc/hosts) should be configured.


**Remove**

Click **Remove** to remove an IP address selected in **IP Addresses** from the list so that it will no longer be monitored.

**Edit**

Click **Edit** to display the **IP Address Settings** dialog box. The dialog box shows the IP address selected in **IP Addresses** on the **Parameter** tab. Edit the IP address and click **OK**.

## Displaying the IP monitor resource property with the WebManager

1. Start the WebManager.
2. When you click an IP monitor object, , in the tree view, the following information is displayed in the list view.

IP Monitor Name: ipw1 Details

Common server1 server2

Properties	Value
Name	ipw1
Comment	
IP Addresses	10.0.0.254
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name: IP monitor resource name  
 Comment: Comment on the IP monitor resource  
 IP Addresses: IP address to be monitored  
 Status: IP monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Type	ipw
Monitor Timing	Always
Target Resource	
Interval (sec)	30
Timeout (sec)	30
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before start monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding NIC link up/down monitor resources

### System requirements for NIC link up/down monitor resource

#### Network interfaces supporting NIC Link UP/Down monitor resource

NIC Link UP/Down monitor resource has been tested to work in the following network interfaces.

Ethernet Controller(Chip)	Bus	Driver version
Intel 82557/8/9	PCI	3.5.10-k2-NAPI
Intel 82546EB	PCI	7.2.9
Intel 82546GB	PCI	7.3.20-k2-NAPI 7.2.9
Intel 82573L	PCI	7.3.20-k2-NAPI
Intel 80003ES2LAN	PCI	7.3.20-k2-NAPI
Broadcom BCM5721	PCI	7.3.20-k2-NAPI

### Note on NIC link up/down monitor resources

Some NIC boards and drivers do not support required `ioctl()`.

Use the `ethtool` command distributors provide to check whether or not NIC Link Up/Down monitor resource runs. .

---

```

ethtool eth0
Settings for eth0:
    Supported ports: [ TP ]
    Supported link modes:   10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Supports auto-negotiation: Yes
    Advertised link modes:  10baseT/Half 10baseT/Full
                           100baseT/Half 100baseT/Full
                           1000baseT/Full
    Advertised auto-negotiation: Yes
    Speed: 1000Mb/s
    Duplex: Full
    Port: Twisted Pair
    PHYAD: 0
    Transceiver: internal
    Auto-negotiation: on
    Supports Wake-on: umbg
    Wake-on: g
    Current message level: 0x00000007 (7)
    Link detected: yes

```

---

When the LAN cable link status ("Link detected: yes") is not displayed in the result of the `ethtool` command:

- It is highly likely that NIC Link Up/Down monitor resource of EXPRESSCLUSTER is unable to operate. Use the IP monitor resource instead.

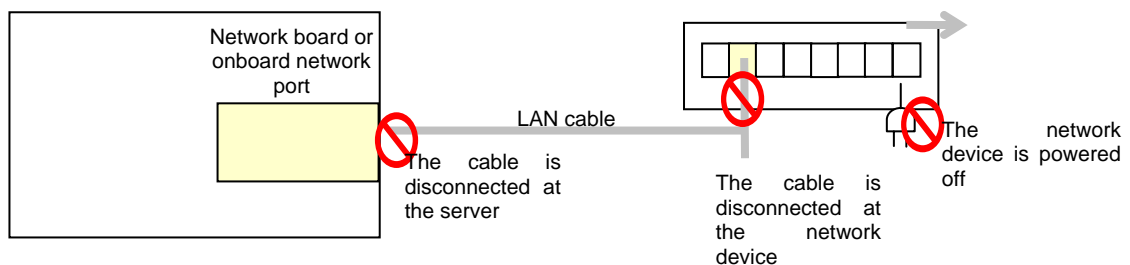
When LAN cable link status ("Link detected: yes") is displayed in the result of the ethtool command:

- In most cases NIC Link Up/Down monitor resource of ExpressCluster can operate, but sometimes it may not operate.
- Particularly in the following hardware, NIC Link Up/Down monitor resource of ExpressCluster may not operate. Use IP monitor resource instead.
- When hardware is installed between the actual LAN connector and NIC chip such as a blade server

When you check if NIC Link Up/Down monitor resource can be used with the use of ExpressCluster on a machine for production environment, follow the steps below.

1. Register NIC Link Up/Down monitor resource with the configuration data.  
Select **No Operation** for the configuration of recovery operation of NIC Link Up/Down monitor resource upon failure detection.
2. Start the cluster.
3. Check the status of NIC Link Up/Down monitor resource.  
If the status of NIC Link Up/Down monitor resource is abnormal while LAN cable link status is normal, NIC Link Up/Down monitor resource cannot be used.
4. If NIC Link Up/Down monitor resource status becomes abnormal when LAN cable link status is made abnormal status (link down status), (NIC Link Up/Down monitor resource can be used).  
If the status remains to be normal, NIC Link Up/Down monitor resource cannot be used.

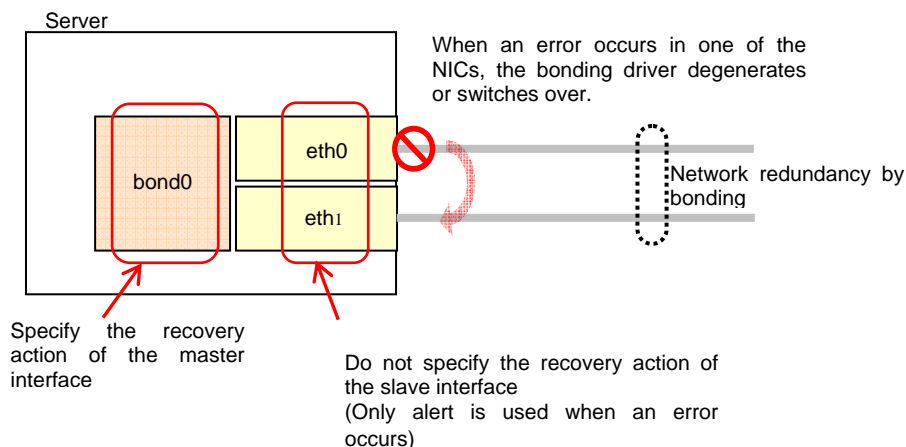
## Configuration and range of NIC link up/down monitoring



- ◆ The `ioctl()` to the NIC driver is used to find how the server is linked to the network. (For the IP monitoring, the status is judged by the ping response from the specified IP address.)
- ◆ You can monitor an NIC dedicated to interconnect (mirror connect). If you do this in the environment where two nodes are directly connected with a cross cable and one server fails, the other server is considered to be failing. This is because no link is established. The recovery action to be taken at detection of error should be configured with the appropriate value. For example, if **Stop cluster daemon and reboot OS** is selected, other servers will continue to restart the OS endlessly.

If the network is has a bonding status, it is possible to monitor the master interface (`bond0...`) as well as the slave interface (`eth0, eth1...`) in the lower level, while applying the bonding availability. It is recommended to use the settings below.

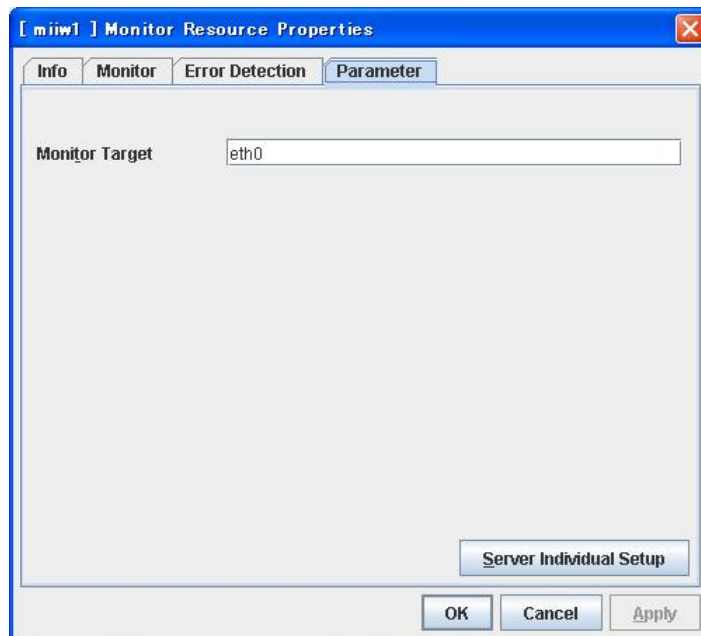
- ◆ Slave Interface Recovery action when an error is detected: Set no action  
When only one of the network cables (`eth0`) fails, ExpressCluster issues an alert, while no recovery action takes place. The network recovery is performed by bonding.
- ◆ Master Interface  
Recovery action when an error is detected: Set actions such as failover and shutdown. When all slave interfaces fail (and the master interface is down), the ExpressCluster performs the recovery action.



## Displaying and changing the NIC link up/down monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the name of the target NIC Link Up/Down monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below..


NIC Link Up/Down monitor resource obtains the information on how the specified NIC is linked monitors the linkage is up or down.



**Monitor Target** (Within 15 bytes) **Server Individual Setup**

Enter the name of the NIC interface you want to monitor.

## Displaying the NIC link up/down monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a NIC Link Up/Down monitor object,  in the tree view, the following information is displayed in the list view.

NIC Link Up/Down Monitor Name: miiw1 Details

Common server1 server2

Properties	Value
Name	miiw1
Comment	
Monitor Target	eth1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name: NIC Link Up/Down monitor resource name  
 Comment: Comment of the NIC Link Up/Down monitor resource  
 Monitor Target: The name of the NIC interface to be monitored by NIC Link Up/Down monitor resource  
 Status: NIC Link Up/Down monitor resource status  
  
 Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Common	server1	server2	server3	server4	
Properties					Value
Type					miw
Monitor Timing					Always
Target Resource					
Interval (sec)					10
Timeout (sec)					60
Retry Count					3
Final Action					No Operation
Execute Script before Final Action					Off
Recovery Target					WebManager
Recovery Target Type					Group
Reactivation Threshold					1
Failover Threshold					1
Wait Time to Start Monitoring (sec)					0
Nice Value					0
Monitor Suspend Possibility					Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding mirror disk connect monitor resources

### Note on mirror disk connect monitor resources

- ◆ A mirror disk connect monitor resource monitors a network for mirroring. If communication of mirror data using the specified mirror disk connect fails, it is recognized as an error. This resource is automatically registered when the mirror disk resource is added.
- ◆ When more than one mirror disk resource is added, the same number of mirror disk connect monitor resources as the one of mirror resources is automatically registered.

### Displaying and changing the mirror disk connect monitor resource details ~For Replicator ~

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target mirror disk connect monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

---

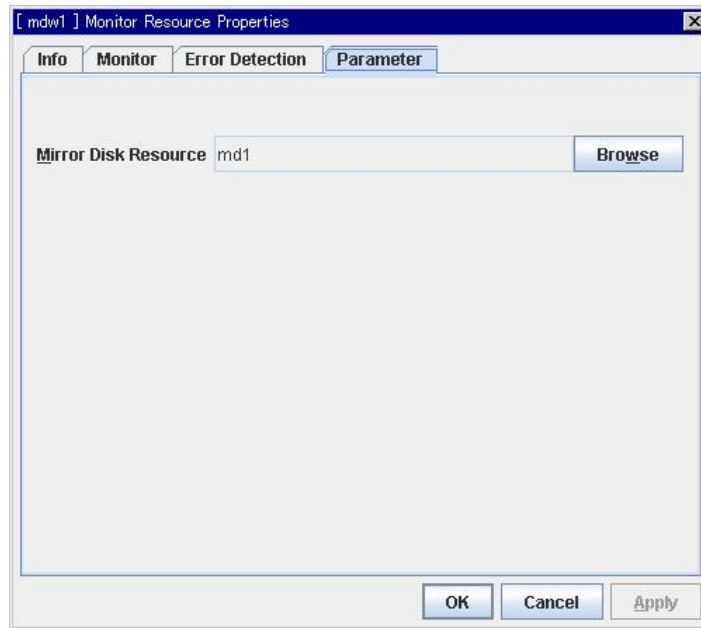
**Note:**

Do not change the settings shown below on the **Error Detection** tab. With these settings, an alert message if an error is determined can be sent.

The **Error Detection** tab settings:

Recovery Target	Cluster name
Reactivation Threshold	0 time
Failover Threshold	0 time
Final Action	No Operation

---



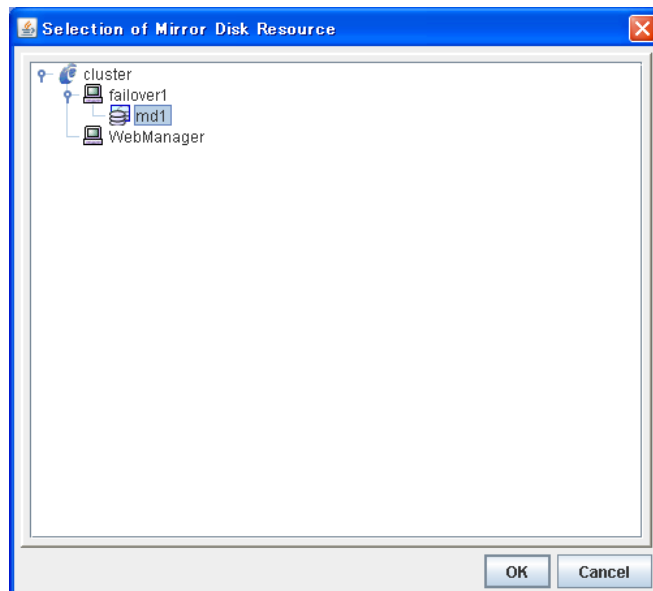
### Mirror Disk Resource

The mirror disk resource to be monitored is displayed.


### Browse

Click this button to display the dialog box where a mirror disk resource to be monitored can be selected.

Mirror disk resources registered with the cluster are displayed in a tree view. Only mirror disk resources can be selected in this view. Select a mirror disk resource and click **OK**.



## Displaying the mirror disk connect monitor resource property with the WebManager

- 1. Start the WebManager.
- 2. When you click a mirror disk connect monitor object, , in the tree view, the following information is displayed in the list view.

Mirror Disk Connect Monitor Name: mdnw1		Details
Common	server1	server2
Properties		Value
Name	mdnw1	
Comment	mirror disk connect monitor	
Monitor Target	md1	
Status	Normal	
Resource Status on Each Server		
Server Name		Status
server1		Online
server2		Online

- Name:

Comment:

Monitor Target:

Status:

Server Name:

Status:
- Mirror disk connect monitor resource name

Comment of the mirror disk connect monitor resource

Mirror disk resource name that uses the mirror disk connect for monitoring on the mirror disk connect monitor resource.

Mirror disk connect monitor resource status

Server name

Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	mdnw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when a problem is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding mirror disk monitor resources

### Note on mirror disk monitor resources

This resource is automatically registered when a mirror disk resource is added. A mirror disk monitor resource corresponding to a mirror disk resource is automatically registered.

### Displaying and changing the mirror disk monitor resource details

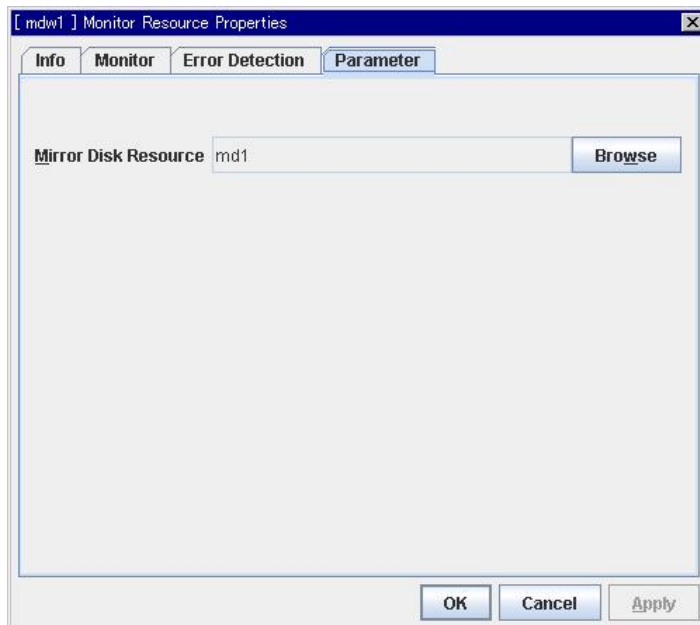
1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target mirror disk monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

#### Note:

Do not change the settings shown below on the **Error Detection** tab. With these settings, an alert message if an error is determined can be sent.

The **Error Detection** tab settings:

Recovery object	Cluster name
Reactivation threshold	0 time
Failover threshold	0 time
Final Action	No Operation



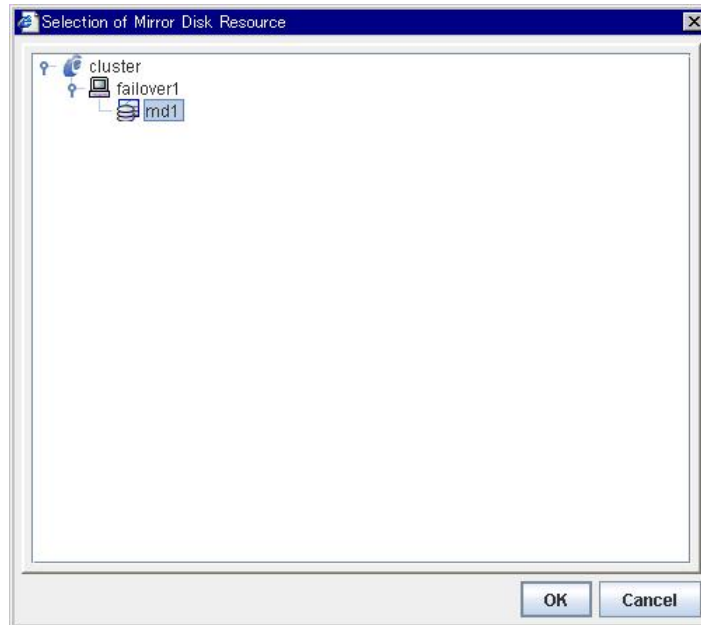
#### Mirror Disk Resource

The mirror disk resource to be monitored is displayed.


**Browse**

Click this button to display the dialog box where a mirror disk resource to be monitored can be selected.

Mirror disk resources registered with the cluster are displayed in a tree view. Only mirror disk resources can be selected in this view. Select a mirror disk resource and click **OK**.



## Displaying the mirror disk monitor resource property with the WebManager

1. Start the WebManager.
2. When you click an object for a mirror disk monitor,  , in the tree view, the following information is displayed in the list view.

Mirror Disk Monitor Name: mdw1		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	mdw1	
Comment	mirror disk monitor	
Monitor Target	md1	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Online	
server2	Online	

Name:	Mirror disk monitor resource name
Comment:	Comment of ht mirror disk monitor resource
Monitor Target:	The name of the mirror disk resource to be monitored by the mirror disk monitor resource
Status:	Mirror disk monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	mdw
Monitor Timing	Always
Target Resource	
Interval (sec)	10
Timeout (sec)	60
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding hybrid disk connect monitor resources

### Note on hybrid disk connect monitor resources

- ◆ A mirror disk connect monitor resource monitors a network for mirroring. If communication of mirror data using the specified mirror disk connect fails, it is recognized as an error. This resource is automatically registered when the hybrid disk resource is added.
- ◆ When more than one hybrid disk resource is added, hybrid disk connect monitor resources as many as the number of the hybrid disk resources are automatically registered.

## Displaying and changing the hybrid disk connect monitor resource details ~For Replicator DR~

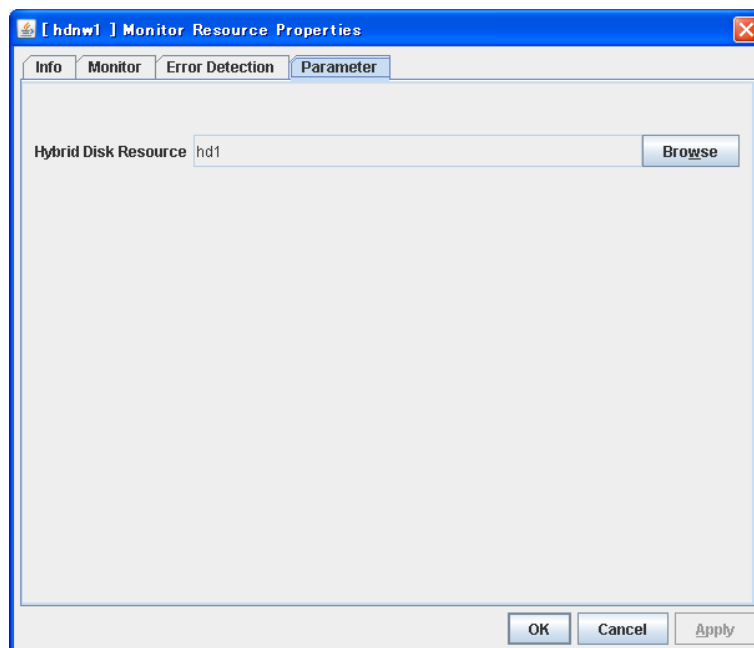
1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target hybrid disk connect monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

### Note:

Do not change the settings shown below on the **Error Detection** tab. These are settings to send alert messages when the status is determined to be failure. .

The **Error Detection** tab settings:

Recovery Target	Cluster name
Reactivation Threshold	0 time
Failover Threshold	0 time
Final Action	No Operation



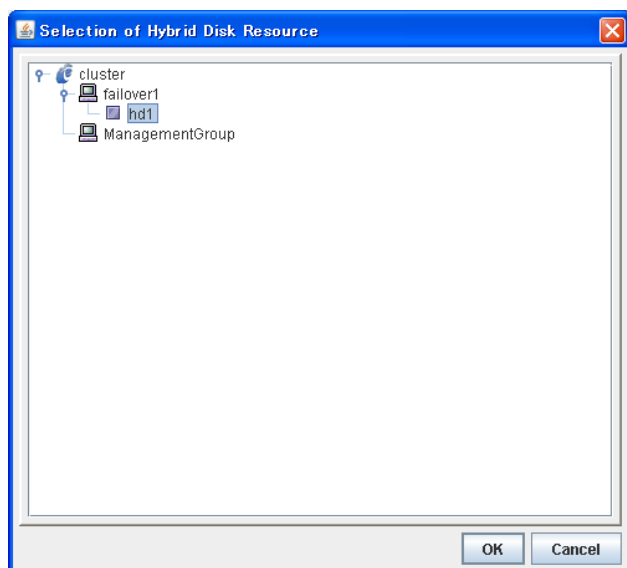
### Hybrid Disk Resource

The hybrid disk resource to be monitored is displayed.


### Browse

Click this button to display the dialog box where a hybrid disk resource to be monitored can be selected.

Hybrid disk resources registered with the cluster are displayed in a tree view. Only hybrid disk resources can be selected in this view. Select a hybrid disk resource and click **OK**.



## Displaying the hybrid disk connect monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a hybrid disk connect monitor object, , in the tree view, the following information is displayed in the list view.

Hybrid Disk Connect Monitor Name: hdnw1 Details

Common server1 server2 server3 server4

Properties	Value
Name	hdnw1
Comment	hybrid disk connect monitor
Monitor Target	hd1
Status	Normal

Resource Status on Each Server

Server Name	Status
server1	Online
server2	Online
server3	Online
server4	Online

Name:	Hybrid disk connect monitor resource name
Comment:	Comment of the hybrid disk connect monitor resource
Monitor Target:	Hybrid disk resource name that uses the mirror disk connect for monitoring on the hybrid disk connect monitor resource.
Status:	Hybrid disk connect monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	hdnw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when a problem is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding hybrid disk monitor resources

Hybrid disk monitor resources monitor the status of the data in the hybrid disk and the health of the mirror driver.

### Note on hybrid disk monitor resources

This resource is automatically registered when a hybrid disk resource is added. Hybrid disk monitor resources corresponding to hybrid disk resources are automatically registered.

## Displaying and changing the hybrid disk monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target hybrid disk monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

---

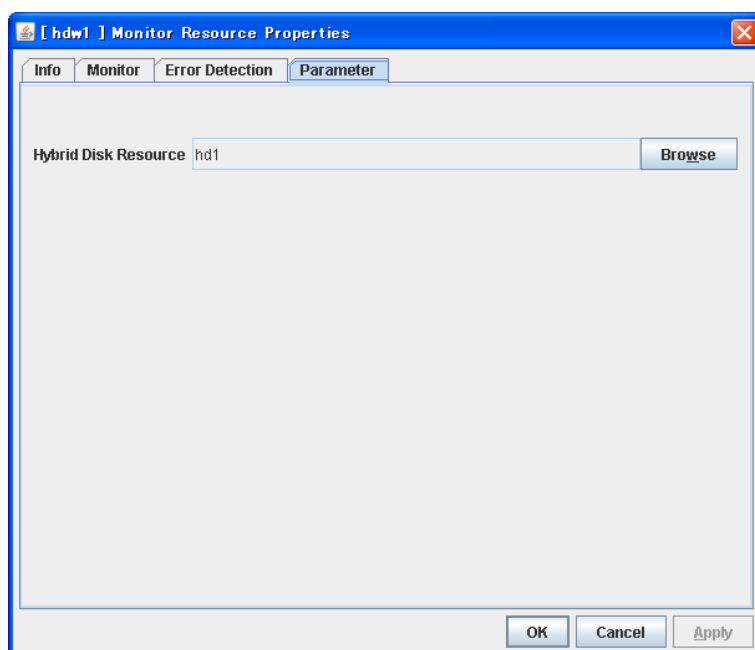
**Note:**

Do not change the settings shown below on the **Error Detection** tab. These are settings to send alert messages when the status is determined to be failure.

The **Error Detection** tab settings:

Recovery object	Cluster name
Reactivation threshold	0 time
Failover threshold	0 time
Final Action	No Operation

---

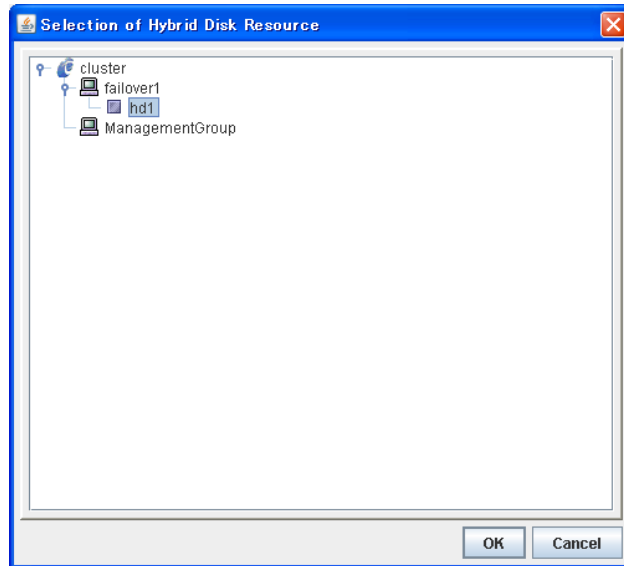
**Hybrid Disk Resource**

The hybrid disk resource for monitoring is displayed.


**Browse**

Click this button to display the dialog box where a hybrid disk resource that performs monitoring can be selected.

Hybrid disk resources registered with the cluster are displayed in a tree view. Only hybrid disk resources can be selected in this view. Select a hybrid disk resource and click **OK**.



## Displaying the hybrid disk monitor resource property with the WebManager

- 1. Start the WebManager.
- 2. When you click an object for a hybrid disk monitor,  , in the tree view, the following information is displayed in the list view.

Hybrid Disk Monitor Name: hdw1 Details

Common server1 server2 server3 server4

Properties		Value
Name	hdw1	
Comment	hybrid disk monitor	
Monitor Target	hd1	
Status	Normal	

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online
server3	Online
server4	Online

Name:

Comment:

Monitor Target:

Status:

Server Name:

Status:

Hybrid disk monitor resource name

Comment of hybrid disk monitor resource

The name of the hybrid disk resource to be monitored by the hybrid disk monitor resource

Hybrid disk monitor resource status

Server name

Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	hdw
Monitor Timing	Always
Target Resource	
Interval (sec)	10
Timeout (sec)	60
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding PID monitor resources

### Note on PID monitor resources

PID monitor resource monitors a successfully activated EXEC resource. The EXEC resource can be monitored if its settings for activation are configured to **Asynchronous**.

### Setting PID monitor resources

PIC monitor resource monitors a successfully activated EXEC resource. By monitoring the presence of process ID, an error is established when the process ID disappears.

The exec resource to be monitored is set according to the steps described in “Target Resource” of “Displaying and changing the settings of a monitor resource” on page 694.

The exec resource can be monitored if its settings for activation are configured to **Asynchronous**.

You cannot detect stalled status of the process.


---

**Note:**

To monitor stalls such as data base, samba, apache, and sendmail, purchase optional ExpressCluster product.

---

## Displaying the PID monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a PID monitor object, , in the tree view, the following information is displayed in the list view.

PID Monitor Name: pidw1		Details
<div> <div>Common</div> <div>server1</div> <div>server2</div> </div>		
Properties		Value
Name	pidw1	
Comment		
Target PID	0	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name: PID monitor resource name  
 Comment: Comment of the PID monitor resource  
 Target PID: PID of the process monitored by the PID monitor resource  
 Status: PID monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	pidw
Monitor Timing	Activating
Target Resource	exec2
Interval (sec)	5
Timeout (sec)	60
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

# Understanding user-mode monitor resources

## Drivers that user-mode monitor resources depend

### Monitor by: **softdog**

softdog

- ◆ If softdog is selected as a monitoring method, the softdog driver is required.
- ◆ Use a loadable module configuration. User-mode monitor resources do not work on the static driver.
- ◆ If the softdog driver is not available, monitoring cannot be started.

### Monitor by: **keepalive**

clpka

clpkhb

- ◆ If keepalive is selected as a monitoring method, the clpkhb driver and the clpka driver of the ExpressCluster are required.
- ◆ When keepalive is set to the monitoring method, it is recommended to set the kernel mode LAN heartbeat. To use the kernel mode LAN heartbeat, the clpkhb driver is required.
- ◆ The clpka driver and the clpkhb driver are provided by ExpressCluster. For information on support, refer to the *Getting Started Guide*.
- ◆ You cannot start monitoring if the clpkhb driver and the clpka driver cannot be used.

## rpm that user-mode monitor resources depend

### Monitor by: **ipmi**

ipmiutil

- ◆ If ipmi is used as a monitoring method, it is required to install this rpm of ipmiutil.
- ◆ If this rpm is not installed, monitoring cannot be started.

## How monitor user-mode monitor resources perform monitoring

You can select how a user-mode monitor resource monitors its target from the following:

### Monitor by: softdog

If softdog is selected as a monitoring method, the softdog driver of the OS is used.

### Monitor by: ipmi

If ipmi is selected as a monitoring method, ipmiutil is used. If ipmiutil is not installed, you need to install it.

### Monitor by: keepalive

If keepalive is selected as a monitoring method, the clpkhb and the clpka drivers are used.

---

#### Note:

Make sure to check the distributions and the kernel versions on which the clpkhb driver and the clpka driver can be operated in the *Getting Started Guide*. Check them when applying a security patch released by a distributor to the operating cluster (when the kernel version changes).

---

### Monitor by: none

“none” is a monitoring method is used for evaluation. This only executes operations of the advanced settings of the user-mode monitor resource. Do not use this in a production environment.

## Advanced settings of user-mode monitor resource

Opening/closing of a dummy file, writing to a dummy file and creating a dummy thread are the configurations that allow advance user-mode monitor resource. If any of these configurations fail, the timer will not be updated. If a configuration continues to fail for the time period set for the timeout or heartbeat timeout, the OS is reset.

### Opening/closing a dummy file

A dummy file is created, opened, closed and then deleted at every monitoring interval repeatedly.

- ◆ When this advanced function is set and there is no free disk space, opening the dummy file fails and the OS is reset.

### Writing to a dummy file

A specified size of data is written into a dummy file at every monitoring interval.

- ◆ This advanced function is not available unless opening/closing a dummy file is set.

### Creating a dummy thread

A dummy thread is created at every monitoring interval.

## User-mode monitor resource logic

The following sections describe how processes and features differ by ways of monitoring. For the shutdown stall monitoring, only Step 1 in each process overview is performed.

### Monitoring method: IPMI

- ◆ Process overview  
Steps 2 to 7 of the process are repeated.
  1. Set the IPMI timer
  2. Open a dummy file
  3. Write to the dummy file
  4. Execute fdatsync for the dummy file
  5. Close the dummy file
  6. Create a dummy thread
  7. Updated the IPMI timer
  - Steps 2 to 6 of the process overview are for advanced settings. To execute these steps, you need to configure the settings.
- ◆ What happens when timeout does not occur (i.e. Steps 2 to 7 are performed without any problem):  
Recovery actions such as resetting are not performed.
- ◆ What happens when timeout occurs (i.e. any of Steps 2 to 7 is stopped or delayed):  
Reset is performed by BMC (the management function of the server).
- ◆ Advantages
  - This method of is less likely to be impacted by a kernel space failure, which makes chance of reset higher because BMC (the management function of the server itself) is used.
- ◆ Disadvantages
  - This method is not available on servers not supporting IPMI or on which ipmiutil does not run. This is because this monitoring method is hardware dependent.
  - This method is not available on a server where NEC ESMPRO Agent is used.
  - This method may not be able to coexist with software programs for server monitoring that are supplied by server vendors.
  - ipmiutil is not provided in some architectures.

**Monitoring method: softdog**

- ◆ Process overview  
Steps 2 to 7 of the process are repeated.
  1. Set softdog
  2. Open a dummy file
  3. Write to the dummy file
  4. Execute fdatsync for the dummy file
  5. Close the dummy file
  6. Create a dummy thread
  7. Update the softdog timer
  - Steps 2 to 6 of the process overview are for advanced settings. To execute these steps, you need to configure the settings.
- ◆ What happens when timeout does not occur (i.e. Steps 2 to 7 are performed without any problem):  
Recovery actions such as reset are not performed.
- ◆ What happens when timeout occurs (i.e. any of Steps 2 to 7 is stopped or delayed):  
Reset is performed by softdog.ko.
- ◆ Advantages
  - Since this method is not dependent on hardware, you can use it as long as there is a softdog kernel module.  
(In some distributions, softdog is not provided by default. Check that you have softdog before configuring the settings.)
- ◆ Disadvantages
  - Because softdog is dependent on the timer logic of the kernel space, reset may not be performed if an error occurs in the kernel space.

**Monitoring method: keepalive**

- ◆ Process overview  
Steps 2 to 7 are repeated.
  1. Set the keepalive timer
  2. Open a dummy file
  3. Execute write to the dummy file
  4. Execute fdatsync to the dummy file
  5. Close the dummy file
  6. Create a dummy thread
  7. Update the keepalive timer
  - Steps 2 to 6 of the process overview are for advanced settings. To execute these steps, you need to configure the settings
- ◆ When a timeout does not occur (i.e. Steps 2 to 7 are performed without any problem):  
Recovery actions such as reset are not performed.
- ◆ When a timeout occurs (i.e. any of Steps 2 to 7 is stopped or delayed):
  - Reset of the local server is announced to other servers through clpkhb.ko.

- Reset or panic is performed by clpka.ko according to the action setting.
- ◆ **Advantage**
  - Logs are recorded on other servers by announcement of the reset of the local server through execution of clpkhb.
- ◆ **Disadvantages**
  - Distributions, architectures, kernel versions which can be operated (which provide drivers) are limited.
  - Because clpka is dependent on the timer logic of the kernel space, reset may not be performed if an error occurs in the kernel space.

## Checking availability of IPMI

You can quickly check if ipmiutil runs on the server by following the steps below:

1. Install the rpm package in the downloaded ipmiutil<sup>5</sup>.
2. Run `/usr/sbin/wdt`.
3. Check the result of the execution.

### When you see the following:

(This is an example. Different values may be shown depending on your hardware devices.)

---

```
wdt ver 1.8
-- BMC version 0.8, IPMI version 1.5
wdt data: 01 01 01 00 31 17 31 17
Watchdog timer is stopped for use with BIOS FRB2. Logging
           pretimeout is 1 seconds, pre-action is None
           timeout is 593 seconds, counter is 593 seconds
           action is Hard Reset
```

---

You can use ipmiutil. ipmi can be chosen as a monitoring method.

### When you see the following:

---

```
wdt version 1.8
ipmignu_cmd timeout, after session activated
```

---

You can not use ipmiutil. Do not choose ipmi as a monitoring method.

---

<sup>5</sup> ipmiutil is installed with a distribution in some distributions. If you use such a distribution, installing the ipmi-until rpm package is not required.

## IPMI command

In the user-mode monitor resource and shutdown monitoring, the following command and options in ipmiutil are used.

Command	Option	Timing to use	
		User mode stallmonitor	Shutdown stall monitor
wdt	-e (start timer)	When starting	When starting monitoring
	-d (stop timer)	When stopping	When stopping (SIGTERM enabled)
	-r (update timer)	When starting/at every monitoring interval	When starting monitoring
	-t (set timeout value)	When starting/ when changing the monitoring interval	When starting monitoring

## User-mode monitor resources

### All monitoring methods:

- ◆ When a cluster is added by the Builder, a user-mode monitor resource of softdog is automatically created.
- ◆ A user-mode monitor resource with different monitoring method can be added. A user-mode monitor resource of softdog that was automatically created can be deleted when a cluster is added.
- ◆ When the activation of a user-mode monitor resource fails due to a reason such as the softdog driver of OS or the clpkhb/clpka driver of ExpressCluster does not exist, or the rpm for ipmiutil is not installed, “Monitor userw failed.” will be displayed on the alert view in the WebManager. In the tree view of the WebManager, as the response to the clpstat command, Normal will be displayed as the resource status, and Offline will be displayed as the status of each server.

### Monitoring by IPMI:

- ◆ For notes on ipmi, see “IPMI commandIPMI command” in Displaying and changing the settings of the time when an error is detected by a monitor resource (Common to monitor resources).

Operation in the following combinations has been tested.

Distribution	kernel version	ipmiutil version	Server
Red Hat Enterprise Linux AS 5 (update1)	2.6.18-53.el5	ipmiutil-1.7.9-1.x86_64.rpm	Express5800/120Rg-1
Red Hat Enterprise Linux AS 4 (update6)	2.6.9-67.EL smp	ipmiutil-2.0.8-1.x86_64.rpm	Express5800/120Rg-1
Asianux Server 3	2.6.18-8.10AXxen	ipmiutil-1.7.9-1.x86_64.rpm	Express5800/120Rg-2

### Note:

If you are using a software program for server monitoring provided by a server vendor such as NEC ESMPro Agent, do not choose IPMI as a monitoring method.

Because these software programs for server monitoring and ipmiutil both use BMC (Baseboard Management Controller) on the server, a conflict occurs, preventing successful monitoring.

### Monitoring by keepalive

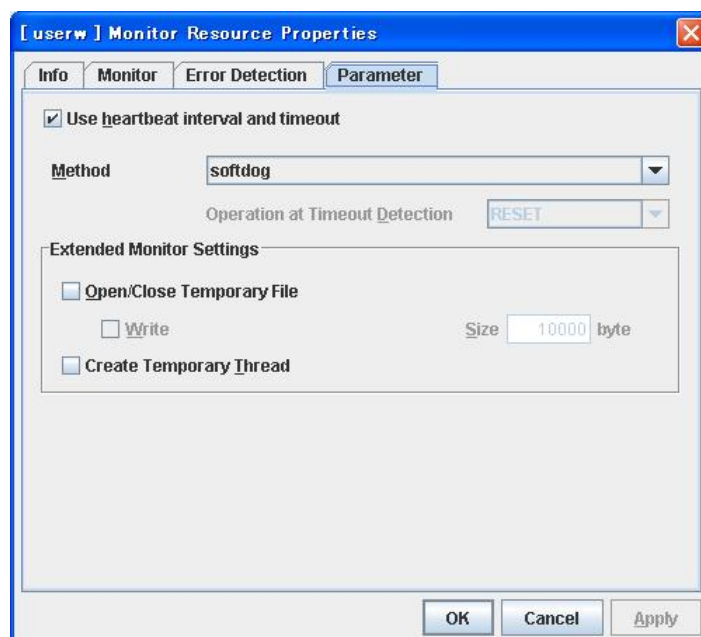
Notification to other servers are performed only when a kernel mode LAN heartbeat resource is set. In this case, the following log is displayed on the syslog.

```
kernel: clpka: <server priority: %d> <reason: %s> <process
name: %s>system reboot.
```

## Displaying and changing the user-mode monitor resource details

User-mode monitor resource considers stalling in user space as an error. This resource is automatically registered when a cluster is added. The user-mode monitor resource of softdog is automatically registered. The monitoring method is softdog.

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target user-mode monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



### Use heartbeat interval and timeout

Select this check box if you use heartbeat's interval and timeout for monitor's interval and timeout.

- ◆ When the check box is selected:  
Heartbeat interval and timeout are used.
- ◆ When the check box is not selected:  
Heartbeat is not used. Interval and timeout specified on the **Monitor** tab are used.  
You need to set a larger value for timeout than interval.  
When ipmi is specified to **Method**, you need to specify 255 or less for timeout.

### Method

Choose how you want to monitor the user-mode monitor resource from the following.  
You can not select a method which has already been used for other user-mode monitor resource.

- ◆ softdog:  
Uses softdog driver

- ◆ ipmi:  
Uses ipmiutil
- ◆ keepalive:  
Uses clpkhb driver and clpka driver.
- ◆ No Operation:  
Uses nothing.

**Operation at timeout detection**

Select the final action. This can be set only when the monitoring method is keepalive.

- ◆ RESET:  
Resets the server.
- ◆ PANIC:  
Performs a panic of the server.

**Open/Close temporary file**

Select this check box if you want to open/close a dummy file at every interval when you execute monitoring.

- ◆ When the check box is selected:  
A dummy file will be opened/closed.
- ◆ When the check box is not selected:  
A dummy file will not be opened/closed.

**Write**

Select this check box if you have chosen to open/close a dummy file and want to write in dummy data.

- ◆ When the check box is selected:  
Dummy data is written into a dummy file.
- ◆ When the check box is not selected:  
Dummy data is not written into a dummy file.

**Size** 1 to 9999999


If you have chosen to write dummy data into a dummy file, specify the size to write in.

**Create Temporary Thread**

Select this check box if you want to create a dummy thread when monitoring is performed.

- ◆ When the check box is selected:  
Temporary thread will be created.
- ◆ When the check box is not selected:  
Temporary thread will not be created.

## Displaying the user-mode monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a user-mode monitoring resource object,  , in the tree view, the following information is displayed in the list view.

User-Mode Monitor Name: userw Details

Common server1 server2

Properties	Value
Name	userw
Comment	user mode monitor
Method	softdog
Use HB interval and timeout	On
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name: User-mode monitor resource name

Comment: Comment of the user-mode monitor resource

Method: Monitoring method

Use HB Interval and Timeout: 0 - Heartbeat interval and timeout are not used  
1 - Heartbeat interval and timeout are used

Status: Status of the user-mode monitor resource

Server Name: Server name

Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	userw
Monitor Timing	Always
Target Resource	
Interval (sec)	3
Timeout (sec)	90
Retry Count	0
Final Action	
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	-20
Monitor Suspend Possibility	Possible
Action	RESET
Open/Close Temporary File	Off
with Writing	Off
Size (byte)	10000
Create Temporary Thread	Off

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when a problem is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring
Action:	Operation at timeout
Open/Close temporary file:	Open/Close a temporary file
With Writing:	Write dummy data into a temporary file
Size:	Size of writing into a temporary file
Create Temporary Thread:	Create a temporary thread

## Understanding VxVM daemon monitor resources

### VxVM daemon monitor resources

There is no detailed setting for the VxVM daemon monitor resource. VxVM daemon monitor resource is used when VxVM volume resource and VxVM disk group resource of ExpressCluster are used.


- ◆ VxVM daemon monitor resource is automatically created when VxVM disk group resource is added.
- ◆ VxVM daemon monitor resource needs to be deleted when unnecessary.
- ◆ Only one VxVM daemon monitor resource can be registered in a single cluster.
- ◆ Do not change the recovery target.

### Setting VxVM daemon monitor resources

The VxVM daemon monitor resource monitors the VxVM config daemon. For VxVM daemon monitor resource, there is no setting for the information which is specific to a monitor resource.

- ◆ Select **No Operation** for the final action if no recovery action is needed.

## Displaying the VxVM daemon monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a VxVM daemon monitor object, , in the tree view, the following information is displayed in the list view.

VxVM Daemon Monitor Name: vxdw Details

Common server1 server2

Properties	Value
Name	vxdw
Comment	VxVM daemon monitor
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name: VxVM daemon monitor resource name  
 Comment: Comment of the VxVM daemon monitor resource  
 Status: Status of the VxVM daemon monitor resource

Server Name: Server name  
 Status: Status of the monitor resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	vxdw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

# Understanding VxVM volume monitor resources

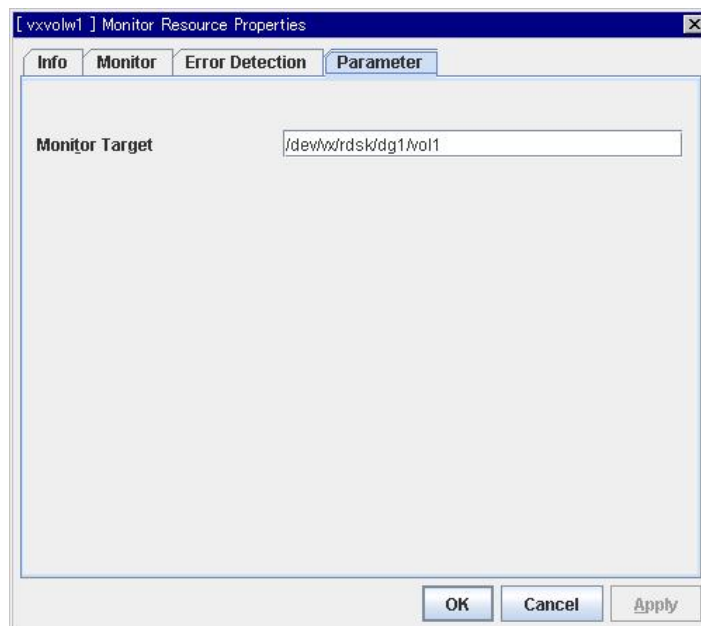
## Note on VxVM volume monitor resources

VxVM volume monitor resource is used when VxVM volume resource and VxVM disk group resource of ExpressCluster are used.

- ◆ When the file system of volume RAW device is not vxfs, VxVM volume monitor resource cannot be used for monitoring.

## Displaying and changing the VxVM volume monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target VxVM volume monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.




### Monitor Target (Within 1023 bytes)

Set the name of a volume raw device of the VxVM volume resource.

If the file system of the volume raw device is not vxfs, you cannot use the VxVM volume monitor resource for monitoring. The target must begin with “/.”

- ◆ To link with VxVM volume resource, configure the settings for the VxVM volume resource, which the **Target Resource** of “Displaying and changing the settings of a monitor resource” on page 694 depends on. The monitoring will start after the set VxVM volume resource is activated.

## Displaying the VxVM volume monitor resource property with the WebManager

1. Start the WebManager.
2. When you click a VxVM volume monitor object, , in the tree view, the following information is displayed in the list view.

VxVM Volume Monitor Name: vxvolw1 Details

Common server1 server2

Properties	Value
Name	vxvolw1
Comment	
Monitor Target	/dev/xx/dsk/dg1/vol1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: VxVM volume monitor resource name  
 Comment: Comment of VxVM volume monitor resource  
 Monitor Target: The name of VxVM volume raw device  
 Status: VxVM volume monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

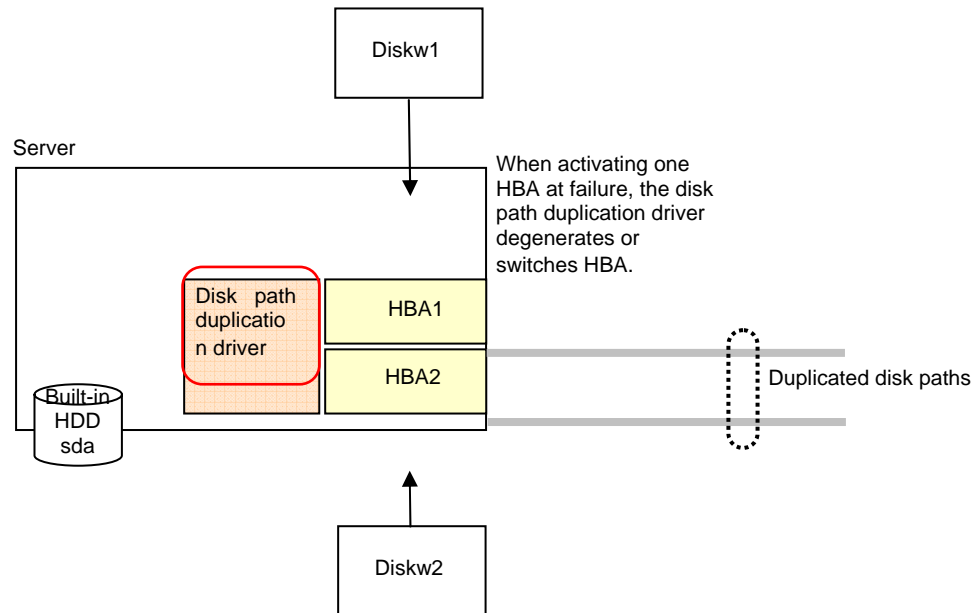
Properties	Value
Type	vxvolw
Monitor Timing	Activating
Target Resource	vxvol
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Method	READ
I/O Size (byte)	4096

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec) :	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring
Method:	Monitoring method
I/O Size:	I/O size at monitoring



## Example of the multi target monitor resource configuration

- ◆ An example of disk path duplication driver usage  
The status should be indicating an error only when disk devices (for example, /dev/sdb and /dev/sdc) fail at the same time.



Monitor resources to be registered with the multi target monitor resources (mtw1):

- diskw1
- diskw2

Error Threshold and Warning Threshold of multi target monitor resource (mtw1)

- Error Threshold        2
- Warning Threshold    0

Detailed settings of the monitor resource to be registered with the multi target monitor resource (mtw1)

- ◆ Disk monitor resource (diskw1)
  - Target Device Name:    /dev/sdb
  - Reactivation Threshold: 0
  - Failover Threshold:    0
  - Final Action:            No Operation
- ◆ Disk monitor resource (diskw2)
  - Target Device Name:    /dev/sdc
  - Reactivation Threshold: 0
  - Failover Threshold:    0
  - Final Action:            No Operation

- ◆ With the settings above, even if either of diskw1 and diskw2, which are registered as monitor resources of the multi target monitor resource detects an error, no actions for the monitor resource having the error are taken.
- ◆ Actions for an error set to the multi target monitor resource are executed when the status of both diskw1 and diskw2 become error, or when the status of two monitor resources become error and offline.

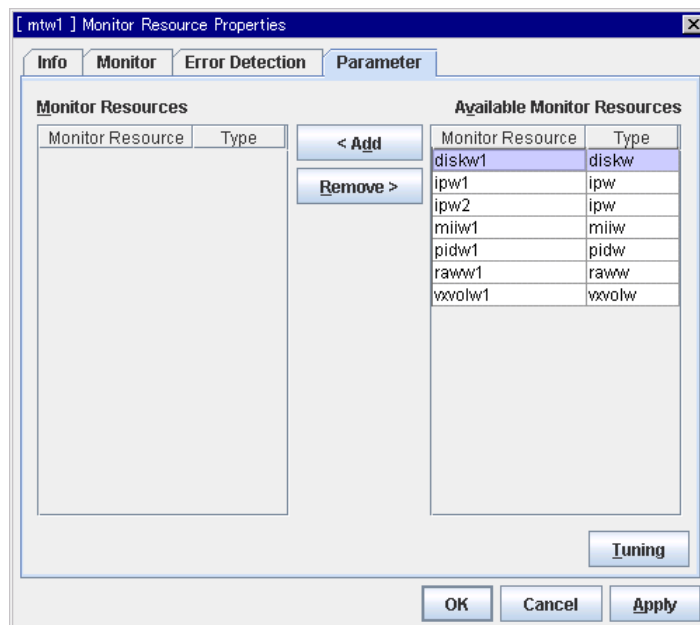
## Displaying and changing the details of the multi target monitor resource

1. Click the **Monitors** icon on the tree view displayed on the left pane of the Builder window.
2. List of monitor resources is displayed in the table view on the right side of the screen. Right-click the multi target monitor resource. Then click **Properties** and select **Parameter** tab.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

Monitor resources are grouped and the status of the group is monitored.

You can register up to 64 monitor resources in the **Monitor Resources**.

When the only one monitor resource set in the **Monitor Resources** is deleted, the multi target monitor resource is deleted automatically.



### Add

Click **Add** to add a selected monitor resource to **Monitor Resources**.

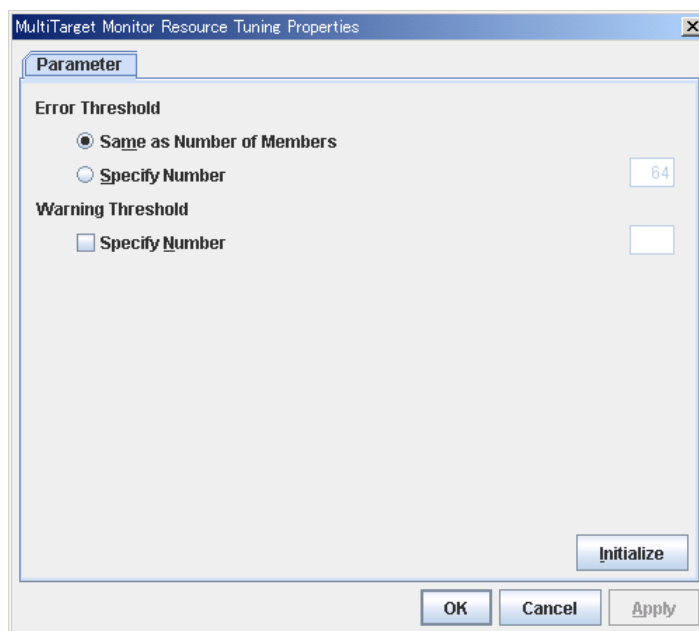
### Remove

Click **Remove** to delete a selected monitor resource from **Monitor Resources**.

## Tuning multi target monitor resource

1. From the tree view displayed in the left pane of the Builder, click the Monitors icon.
2. The list of monitor resources is displayed on the table view in the right pane of the window. Right-click the target multi target monitor resource name. Click Properties, and then click Parameters.
3. Click Tuning on the Details tab. The MultiTarget Monitor Resource Tuning Properties dialog box is displayed.
4. The settings of multi target monitor resource can be displayed and changed by following the description below.

### Parameter tab



### Error Threshold

Select the condition for multi target monitor resources to be determined as an error.

#### ◆ Same as Number of Members

The status of multi target monitor resources becomes “Error” when all monitor resources specified to be under the multi target monitor resource are failed, or when “Error” and “Offline” co-exist.

The status of multi target monitor resources becomes “Normal” when the status of all monitor resources specified to be under the multi target monitor resource are “Offline.”

#### ◆ Specify Number

The status of multi target monitor resources becomes “Error” when the number of monitor resources specified in **Error Threshold** becomes “Error” or “Offline.”

When the status of some monitor resources among those specified to be under the multi target monitor resource, specify how many monitor resources need to be “Error” or “Offline” to determine that the status of multi target monitor resource is “Error.”

### Warning Threshold

◆ When selected:

When the status of some monitor resources among those specified to be under the multi target monitor resource, specify how many monitor resources need to be “Error” or “Offline” to determine that the status of multi target monitor resource is “Caution.”


◆ When cleared:

Multi target monitor resources do not display an alert.

**Initialize**

Clicking **Initialize** resets the values of all items to the default values.

## Displaying the property of the multi target monitor resource with the WebManager

1. Start the WebManager
2. When you click an object for a multi target monitor resource  in the tree view, the following information is displayed in the list view.

Multi Target Monitor Name: mtw1		Details
Common		server1 server2
Properties		Value
Name		mtw1
Comment		
Monitor Resources		diskw1
		pidw1
		raww1
Status		Normal
Resource Status on Each Server		
Server Name		Status
server1		Online
server2		Online

Name: Multi target monitor resource name  
 Comment: Comment of the multi target monitor resource  
 Monitor Resources: List of monitor resources  
 Status: Multi target monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	mtw
Monitor Timing	Always
Target Resource	
Interval (sec)	30
Timeout (sec)	30
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting of monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspended Possibility:	Possibility of suspending monitoring

## Understanding virtual IP monitor resources

### Note on virtual IP monitor resources


Detailed settings are not required for virtual IP monitor resources.  
Use the resources when using virtual IP resources of ExpressCluster.

- ◆ Virtual IP monitor resource is created automatically when the virtual IP resource is created. One virtual IP monitor resource is created per virtual IP resource automatically.
- ◆ Virtual IP monitor resource cannot be deleted. It is deleted automatically at deletion of a virtual IP resource.
- ◆ Do not change the recovery target.
- ◆ Monitoring cannot be suspended or resumed by the `clpmonctrl` command or the WebManager.
- ◆ Virtual IP monitor resource regularly sends RIP packets to control a path of the virtual IP resource. If the target virtual IP resource is active while the cluster is suspended, the virtual IP monitor resource continues operating.

### Setting virtual IP monitor resources

Virtual IP monitor resource sends packets for dynamic routing of the routing table the virtual IP resource requires. The status of IP addresses activated by the virtual IP resources is not checked. There is no detailed setting for the virtual IP monitor resource.

## Displaying the virtual IP monitor resource property with the WebManager

- 1. Start the WebManager.
- 2. When you click an object for a virtual IP monitor resource  in the tree view, the following information is displayed in the list view.

VIP Monitor Name: vipw1

Details

Commonserver1server2

Properties	Value
Name	vipw1
Comment	vip monitor
Monitor Target	vip1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name:

Comment:

Monitor Target:

Status:

Virtual IP monitor resource name

Comment

The name of a Virtual IP resource to be monitored

Status of virtual IP monitor resource

Server Name:

Status:

Server name

Status of monitor resource of the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	vipw
Monitor Timing	Activating
Target Resource	vip
Interval (sec)	3
Timeout (sec)	30
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	vip
Recovery Target Type	Resource
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Impossible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Virtual IP resource name to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

## Understanding ARP monitor resources

ARP monitor resource sends ARP packets regularly to maintain and update the ARP table for active floating IP resources or virtual IP resources.

### Note on ARP monitor resources

For details on ARP broadcast packets that ARP monitor resource sends, see “Understanding floating IP resource”.

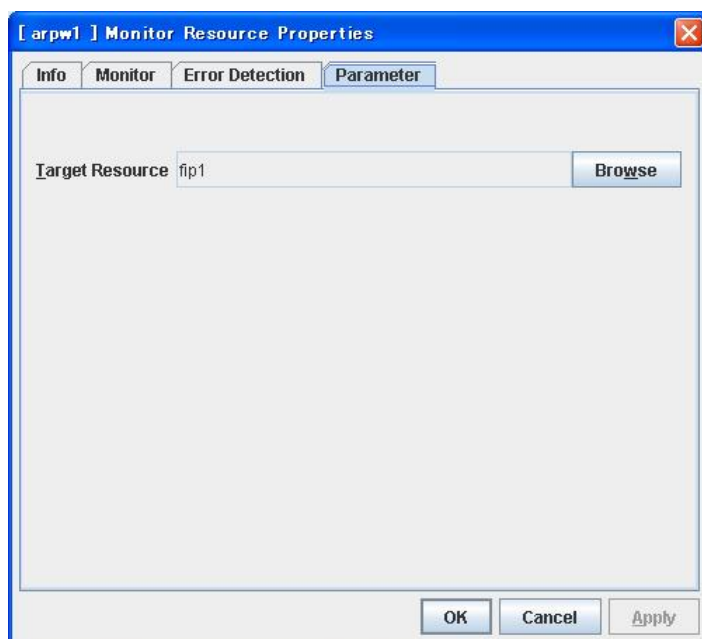
The status of the IP address activated by floating IP resource or virtual IP resource is not checked.

Only floating IP resource or virtual IP resource can be selected as a target monitoring resource of ARP monitor resource. On the ARP monitor resource setting, make sure to select a same resource for **Target Resource** on the **Monitor** tab and **Target Resource** on the **Parameter** tab.

Monitoring of the ARP monitor resource cannot be suspended or resumed by the `clpmonctrl` command or by the WebManager.

## Displaying and changing the ARP monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the name of the target ARP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



### Target Resource

Click **Browse** to display the dialog box to select a target resource. The names of clusters, groups, floating IP resources and virtual IP resources registered to a cluster are displayed in the tree view. Select the resource you want to set as a target resource, and then click **OK**.


---

### Note:

When you change the target resource, make sure to change the one configured on the **Monitor** tab.

---

## Displaying the ARP monitor resource property with the WebManager

1. Start the WebManager.
2. When you click an object for an ARP monitor resource  in the tree view, the following information is displayed in the list view.

ARP Monitor Name: arpw1		Details
Common	server1	server2
Properties		Value
Name	arpw1	
Comment		
Monitor Target	fip1	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Online	
server2	Offline	

Name:	ARP monitor resource name
Comment:	Comment on the ARP monitor resource
Monitor Target:	The name of a resource to be monitored
Status:	ARP monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	arpw
Monitor Timing	Activating
Target Resource	ManagementIP
Interval (sec)	30
Timeout (sec)	180
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Impossible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

# Understanding custom monitor resources

Custom monitor resources monitor system by executing an arbitrary script.

## Monitoring by custom monitor resources

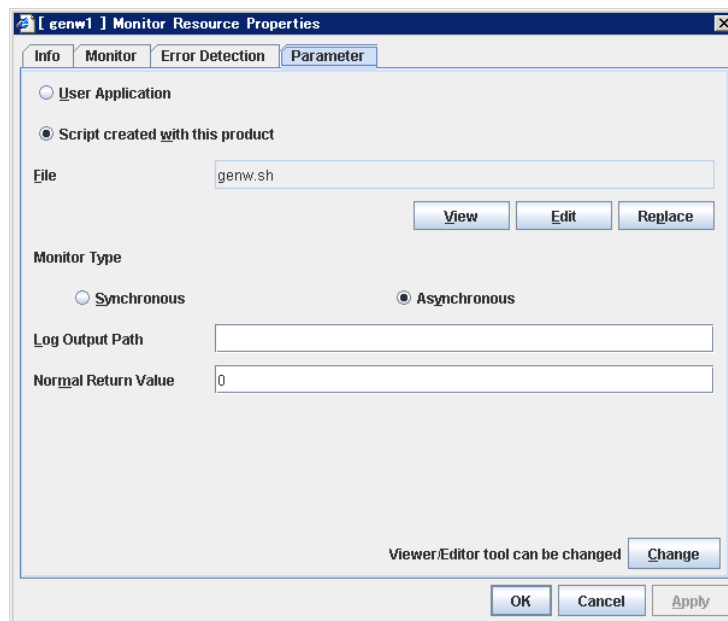
Custom monitor resources monitor system by an arbitrary script.

When Monitor Type is **Synchronous**, custom monitor resources regularly run a script and detect errors from its error code.

When Monitor Type is **Asynchronous**, custom monitor resources run a script upon start monitoring and detect errors if the script process disappears.

## Displaying and changing the details of the custom monitoring resources

1. Click Monitors on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target custom monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.



### User Application

Use an executable file (executable shell script file or execution file) on the server as a script. For the file name, specify an absolute path or name of the executable file of the local disk on the server.

Each executable files is not included in the cluster configuration information of the Builder. They must be prepared on each server since they cannot be edited nor uploaded by the Builder.

### Script created with this product

Specify a script file which is prepared by the Builder as a script with an absolute path of local disk on server.

**File** (Within 1023 bytes)

Specify a script to be executed (executable shell script file or execution file) when you select **User Application**.

**View**

Click here to display the script file with a editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

**Edit**

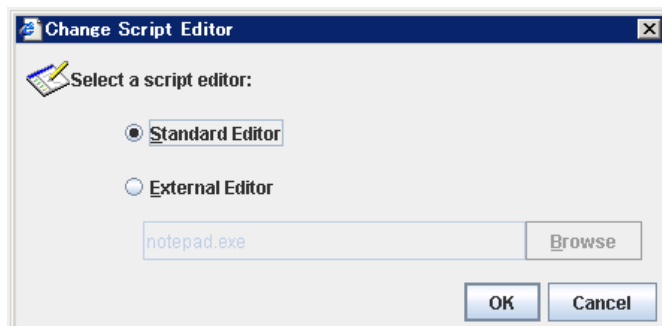
Click here to edit the script file with the editor when you select **Script created with this product**. Overwrite the script file to reflect the change. You cannot edit the script file if it is currently displayed or edited. You cannot modify the name of the script file.

**Replace**

Click here to replace the contents of a script file with the contents of the script file which you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not select binary files (applications), and so on.

**Change**

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

**Standard Editor**

Select this option to use the standard editor for editing scripts.

- Linux: vi (vi which is detected by the user's search path)
- Windows: Notepad (notepad.exe which is detected by the user's search path)

**External Editor**

Select this option to specify a script editor. Click **Browse** to select an editor.

To specify a CUI-based external editor on Linux, create a shell script.

The following is a sample shell script to run vi:

```
xterm -name clpedit -title " Cluster Builder " -n " Cluster Builder"
-e vi "$1"
```

**Monitor Type**

Select a monitor type.

- Synchronous (Default)

Custom monitor resources regularly run a script and detect errors from its error code.

- Asynchronous

Custom monitor resources run a script upon start monitoring and detect errors if the script process disappears.

#### Log Output Path (Within 1023 bytes)

Specify log output path for the script of custom monitor resource.

#### Normal Return Value (Within 1023 bytes)

When **Asynchronous** is selected for **Monitor Type**, set the values of script error code to be determined as normal. If you want to set two or more values here, separate them by commas like 0,2,3 or connect them with a hyphen to specify the range like 0-3.

Default value: 0

## Displaying the custom monitor resource properties with the Web Manager

1. Start the WebManager

([http://FIP\\_address\\_for\\_the\\_WebManager\\_group:port\\_number](http://FIP_address_for_the_WebManager_group:port_number) (the default value is 29003)).

2. Click a custom monitor resources object, , in the tree view. The following information is displayed in the list view.

Custom Monitor Name: genw1	
<div> <div>Common</div> <div>server1</div> <div>server2</div> <div>server3</div> <div>server4</div> </div>	
Properties	Value
Name	genw1
Comment	
Monitor Path	genw.sh
Status	Normal

Name: Custom monitor resource name  
 Comment: Comment of the custom monitor resource  
 Monitor Path: Path to the monitor script

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online
server3	Online
server4	Online

Server Name: Server name  
 Status: Status of the monitor resource on the given server

If you click **Details** button, the following information is displayed in the pop-up dialog box:

Properties	Value
Type	genw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Monitor Type	Synchronous
Log Output Path	

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of times activation is retried when an activation error is detected
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before start monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Monitor Type:	Execution method of monitor type
Log Output Path:	The output destination of the log

## Understanding DB2 monitor resources

DB2 monitor resource monitors DB2 database that operates on servers.

### Note on DB2 monitor resources

For the supported versions of DB2, see the *Getting Started Guide*.

This monitoring resource monitors DB2, using the CLI library of DB2. For this reason, it is required to execute “source *instance user home*/sqlib/db2profile” as root user. Write this in a start script.

If the code page of the database and the one of this monitor resource differ, this monitor resource cannot access to the DB2 database. Set an appropriate character code as necessary.

To check the code page of database, execute “db2 get db cfg for *Database\_name*.” For details, see DB2 manual.

If values of database name, instance name, user name and password specified by a parameter differ from the DB2 environment for monitoring, DB2 cannot be monitored. Error message is displayed. Check the environment.

### How DB2 monitor resources perform monitoring

DB2 monitor resource monitors the following:

Creates a table for monitoring on the database, and reads and writes the numeric value up to 5 digits by issuing the SQL statement.

This monitor resource determines the following results as an error:

- (1) An error is reported in a response to the database connection or the issued SQL statement
- (2) Written data and read data do not match

The SQL statement to be used is “create/drop/insert/update/select.”

## Displaying and changing the DB2 monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target DB2 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ db2w ] Monitor Resource Properties" with a close button in the top right. It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. The dialog contains the following fields:

Database Name	test
Instance	db2inst1
User Name	db2inst1
Password	ibmdb2
Table	db2watch
Character Set	ja_JP.eucJP
Library Path	/opt/IBM/db2/V8.2/lib/libdb2.so

At the bottom right, there are three buttons: "OK", "Cancel", and "Apply".

**Database Name** Within 255 bytes

Specify the database to be monitored. You must specify the database.

Default value: None

**Instance** Within 255 bytes

Specify the instance name of the database to be monitored. You must specify the instance name.

Default value: db2inst1

**User Name** Within 255 bytes

Specify the user name to log on to the database. You must specify the user name.

Specify the DB2 user who can access the specified database.

Default value: db2inst1

**Password** Within 255 bytes

Specify the password to log on to the database. You must specify the password.

Default value: ibmdb2

**Table** Within 255 bytes

Specify the name of a monitor table created on the database. You must specify the name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Be sure to set the name different from the reserved word in SQL statements.

Default value: db2watch

**Character Set**

Specify the character set of DB2. You must specify the character code.


Default value: **None**

**Library Path** Within 1023 bytes

Specify the home path to DB2. You must specify the path.

Default value: /opt/IBM/db2/V8.2/lib/libdb2.so

## Displaying the DB2 monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a DB2 monitor resource  in the tree view, the following information is displayed in the list view.

DB2 Monitor Name: db2w

Details

Common

server1

server2

Properties	Value
Name	db2w
Comment	
Database Name	test
Instance	db2inst1
Table	db2watch
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: DB2 monitor resource name  
 Comment: Comment on the DB2 monitor resource  
 Database Name: Monitor target database name  
 Instance: Instance of the monitor target database  
 Table: Monitor table name created on a database  
 Status: DB2 monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	db2w
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Character Set	en_US.iso88591
Library Path	/opt/IBM/db2/V8.2/lib/libdb2.so

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Character Set:	Character set of DB2
Library Path:	Library path of DB2

## Understanding FTP monitor resources

FTP monitor resources monitor FTP services that run on the server. FTP monitor resources monitor FTP protocol and they are not intended for monitoring specific applications. FTP monitor resources monitor various applications that use FTP protocol.

### FTP monitor resources

- Note 1** For monitoring target resources, specify exec resources etc. that start FTP. Monitoring starts after a target resource is activated. However, if FTP cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring**.
- Note 2** FTP service may produce operation logs for each monitoring. Configure FTP settings if this needs to be adjusted.

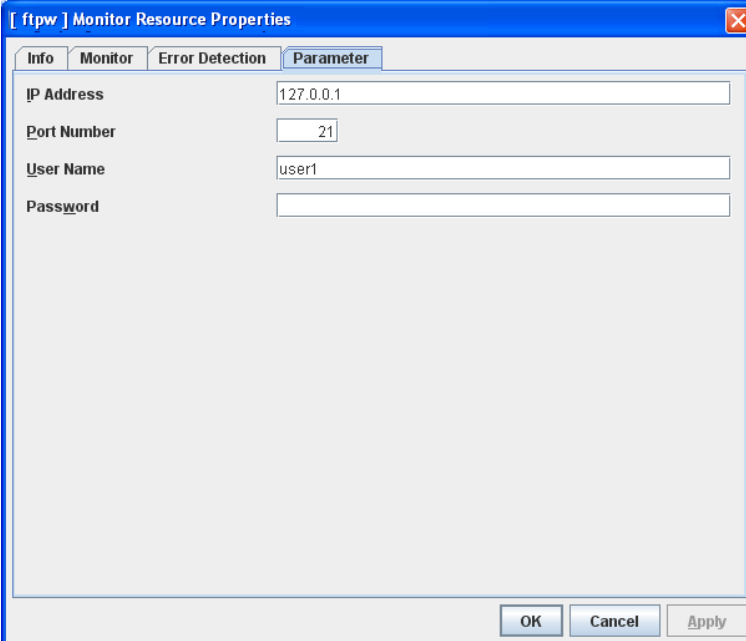
## Monitoring by FTP monitor resources

FTP monitor resources connect to the FTP server and execute the command for acquiring the file list. As a result of monitoring, the following is considered as an error:

- (1) When connection to the FTP service fails.
- (2) When an error is notified as a response to the FTP command.

## Displaying and changing the FTP monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target FTP monitor resource, and click the **Parameter** tab in the Monitor Resource Property window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

The image shows a screenshot of a software window titled "[ ftpw ] Monitor Resource Properties". It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter", with "Parameter" being the active tab. The window contains four labeled text input fields: "IP Address" with the value "127.0.0.1", "Port Number" with the value "21", "User Name" with the value "user1", and "Password" which is empty. At the bottom right of the window are three buttons: "OK", "Cancel", and "Apply".

### IP Address (Within 79 bytes )

Specify the IP address of the FTP server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

### Port No. (1-65535)

Specify the FTP port number to be monitored. You must specify a port number.

Default value: 21

**User Name** (Within 255 bytes)

Specify the user name to log on to FTP.


Default value: None

**Password** (Within 255 bytes)

Specify the password to log on to FTP. Click **Change** and enter the password in the dialog box.

Default value: None

## Displaying the FTP monitor resource properties with the WebManager

1. Start the WebManager.
2. Click a FTP monitor resources object , in the tree view. The following information is displayed in the list view.

FTP Monitor Name: ftpw

Details

Common

server1

server2

Properties	Value
Name	ftpw
Comment	ftp monitor
IP Address	127.0.0.1
Port	21
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name:	FTP monitor resource name
Comment:	Comment of the FTP monitor resource
IP Address:	IP address of the FTP server to be monitored
Port No.:	Port number of the FTP to be monitored
Status:	Status of the FTP monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

If you click the **Details** button, the following information is displayed in the pop-up dialogue.

Properties	Value
Type	ftpw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	3
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)
Nice Value	Nice value
Monitor Suspend Possibility	Possibility of suspending monitoring

# Understanding HTTP monitor resources

HTTP monitor resource monitors HTTP daemon that operates on servers.

## Note on HTTP monitor resources

For the supported versions of HTTP, see the *Getting Started Guide*.

## How HTTP monitor resources perform monitoring

HTTP monitor resource monitors the following:

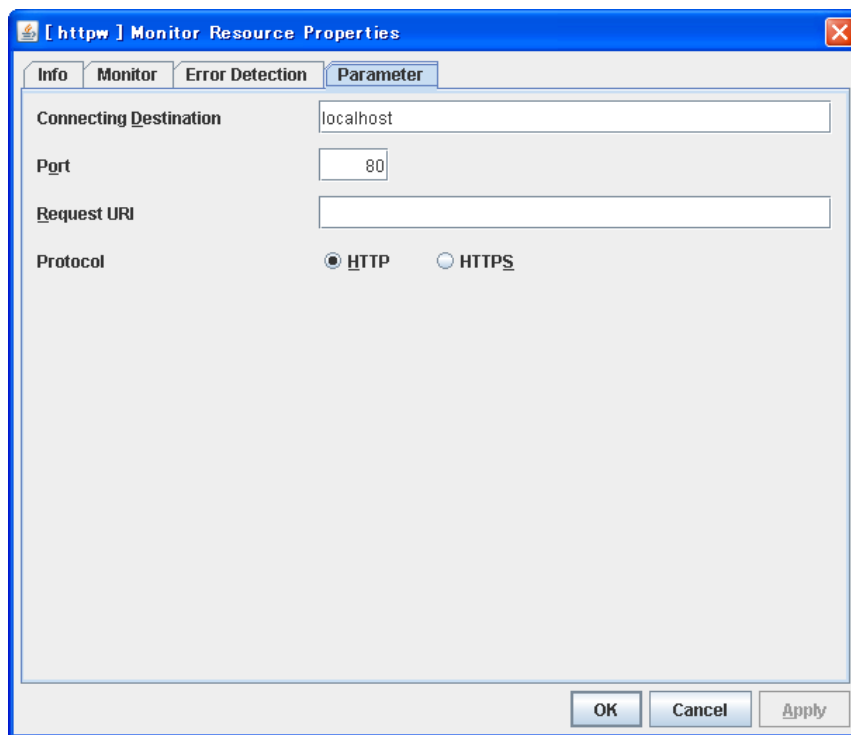
Monitors the HTTP daemon by connecting to the HTTP daemon on the server and issuing a HEAD request.

This monitor resource determines the following results as an error:

- (1) an error is notified during the connection to the HTTP daemon.
- (2) the response message to the HEAD request is not started with “/HTTP”
- (3) the status code for the response to the HEAD request is in 400s and 500s (when URI other than the default is specified to the request URI)

## Displaying and changing the HTTP monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target HTTP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



### **Server Name** (Within 255 bytes)

Specify the HTTP server name to be monitored. You must specify the name.

Default value: localhost

### **Port** (1 to 65535)

Specify the port number used for connecting the HTTP server. You must specify the number.

Default value: 80 (HTTP)

443 (HTTPS)

### **Request URI** (Within 255 bytes)

Set the request URI (for example: “/index.html”).


Default value: None

### **Protocol**

Configure protocol used for communication with and HTTP server.. In general, HTTP is selected. If you need to connect with HTTP over SSL, select HTTPS.

Default value: HTTP

## Displaying the HTTP monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for an HTTP monitor resource  in the tree view, the following information is displayed in the list view.

HTTP Monitor Name: httpw		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	httpw	
Comment		
Connecting Destination	localhost	
Port	80	
Request URI		
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name:	HTTP monitor resource name
Comment:	Comment on the HTTP monitor resource
Connecting Destination:	HTTP server name of monitor target
Port:	Port number of the HTTP server
Request URI:	Request URI
Protocol:	Protocol to be used for monitoring
Status:	HTTP monitor resource status
Server Name:	Server name
Status:	Status of the HTTP monitor resource

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	httpw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	10
Retry Count	3
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

## Understanding IMAP4 monitor resources

IMAP4 monitor resources monitor IMAP4 services that run on the server. IMAP4 monitor resources monitor IMAP4 protocol but they are not intended for monitoring specific applications. IMAP4 monitor resources monitor various applications that use IMAP4 protocol.

### IMAP4 monitor resources

- Note 1** For monitoring target resources, specify exec resources that start IMAP4 services. Monitoring starts after a target resource is activated. However, if IMAP4 services cannot be started immediately after a target resource is activated, adjust the time using **Wait Time to Start Monitoring**.
- Note 2** IMAP4 services may produce operation logs for each monitoring. Configure IMAP4 settings if this needs to be adjusted.

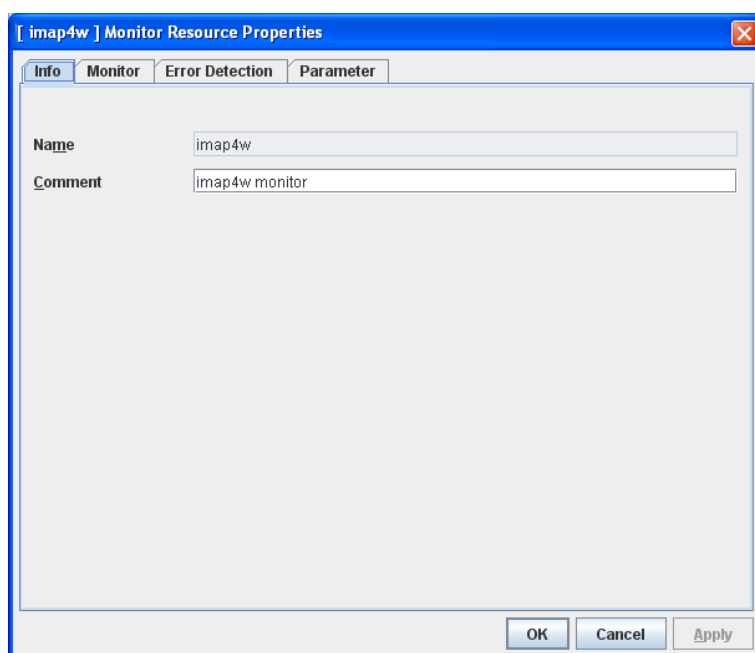
### Monitoring by IMAP4 monitor resources

IMAP4 monitor resources connect to the IMAP4 server and execute the command to verify the operation. As a result of monitoring, the following is considered as an error:

- (1) When connection to the IMAP4 server fails.
- (2) When an error is notified as a response to the command.

## Displaying and changing the IMAP4 monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target IMAP4 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.



### **IP Address** (Within 79 bytes )

Specify the IP address of the IMAP4 server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

### **Port No.** (1-65535)

Specify the port number of the IMAP4 to be monitored. You must specify this port number.

Default value: 143

### **User Name** (Within 255 bytes)

Specify the user name to log on to IMAP4.

Default value: None

**Password** (Within 255 bytes)

Specify the password to log on to IMAP4. Click Change and enter the password in the dialog box.


Default value: None

**Authentication Method**

Select the authentication method to log on to IMAP4. It must follow the settings of IMAP4 being used:

- **AUTHENTICATE LOGIN** (Default value)  
The encryption authentication method that uses the AUTHENTICATE LOGIN command.
- **LOGIN**  
The plaintext method that uses the LOGIN command.

## Displaying the IMAP4 monitor resource properties with the WebManager

1. Start the WebManager.
2. Click an IMAP4 monitor resources object, , in the tree view. The following information is displayed in the list view.

IMAP4 Monitor Name: imap4w [Details](#)

[Common](#) [server1](#) [server2](#)

Properties	Value
Name	imap4w
Comment	imap4w monitor
IP Address	127.0.0.1
Port	143
Authority Method	AUTHENTICATE LOGIN
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: IMAP monitor resource name  
 Comment: Comment of the IMAP monitor resource  
 IP Address: IP address of the IMAP server to be monitored  
 Port No.: Port number of the IMAP to be monitored  
 Certification Method: Authentication method to connect to IMAP4.  
 Status: Status of the IMAP monitor resource

Server Name: Server name  
 Status: Status of the monitor resource on the given server

If you click the **Details** button, the following information is displayed in the pop-up dialogue.

Properties	Value
Type	imap4w
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	3
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval(sec):	Interval between monitoring (in seconds)
Timeout(sec):	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring(sec):	Time to wait before starting of monitoring (in seconds)
Nice Value	Nice value
Monitor Suspend Possibility	Possibility of suspending monitoring

## Understanding MySQL monitor resources

MySQL monitor resource monitors MySQL database that operates on servers.

### Note on MySQL monitor resources

For the supported versions of MySQL, see the *Getting Started Guide*.

This monitor resource monitors MySQL using the libmysqlclient library of MySQL.

If this monitor resource fails, check that “libmysqlclient.so.xx” exists in the installation directory of the MySQL library.

If a value specified by a parameter differs from the MySQL environment for monitoring, an error message is displayed on the WebManager alert view. Check the environment.

### How MySQL monitor resources perform monitoring

MySQL monitor resource monitors the following:

Creates a table for monitoring on the database, and reads and writes the numeric value up to 5 digits by issuing the SQL statement.

This monitor resource determines the following results as an error:

- (1) An error is informed in a response to the database connection or the issued SQL statement
- (2) Written data and read data do not match

The SQL statement to be used is create/drop/insert/update/select.

## Displaying and changing the MySQL monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target MySQL monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ mysqlw ] Monitor Resource Properties" with a close button in the top right corner. It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. The form contains the following fields:

- Database Name:** A text box containing "test".
- IP Address:** A text box containing "127.0.0.1".
- Port:** A text box containing "3306".
- User Name:** A text box containing "user1".
- Password:** An empty text box.
- Table:** A text box containing "mysqlwatch".
- Storage Engine:** A dropdown menu with "MyISAM" selected.
- Library Path:** A dropdown menu with "/usr/lib/mysql/libmysqlclient.so.15" selected.

At the bottom right, there are three buttons: "OK", "Cancel", and "Apply".

**Database Name** (Within 255 bytes)

Specify the database name to be monitored. You must specify the name.

Default value: None

**IP Address** (Within 79 bytes)

Specify the IP address of the server to connect. You must specify the IP address.

Default value: 127.0.0.1

**Port** 1 to 65535

Specify the port number used for connection. You must specify the port number.

Default value: 3306

**User Name** (Within 255 bytes)

Specify the user name to log on to the database. You must specify the name.

Specify the MySQL user who can access the specified database.

Default value: None

**Password** (Within 255 bytes)

Specify the password to log on to the database.

Default value: None

**Table** (Within 255 bytes)

Specify the name of a monitor table created in the database. You must specify the name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Make sure to set the name different from the reserved word in SQL statements.

Default value: mysqlwatch

**Storage Engine**

Specify the storage engine of MySQL. You must specify the storage engine.


Default value: MyISAM

**Library Path** (Within 1023 bytes)

Specify the home path to MySQL. You must specify the path.

Default value: /usr/lib/mysql/libmysqlclient.so.15

## Displaying the MySQL monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a MySQL monitor resource  in the tree view, the following information is displayed in the list view.

MySQL Monitor Name: mysqlw		Details
Common	server1	server2
Properties		Value
Name		mysqlw
Comment		mysql monitor
Database Name		test
IP Address		127.0.0.1
Port		3306
Table		mysqlwatch
Status		Normal
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	MySQL monitor resource name
Comment:	Comment on the MySQL monitor resource
Database Name:	Monitor target database name
IP Address:	IP address for connecting MySQL server
Port:	Port number of MySQL
Table:	Table name for monitoring created on a database
Status:	MySQL monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	mysqlw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Storage Engine	MyISAM
Library Path	/usr/lib/mysql/libmysqlclient.so.15

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Storage Engine:	Storage engine of MySQL
Library Path:	Library path of MySQL

## Understanding NFS monitor resources

NFS monitor resource monitors NFS file server that operates on servers.

### Note on NFS monitor resources

For the supported versions of NFS, see the *Getting Started Guide*.

Specify the exports file for the shared directory to be monitored to enable the connection from a local server.

### How NFS monitor resources perform monitoring

NFS monitor resource monitors the following:

Connect to the NFS server and run NFS test command.

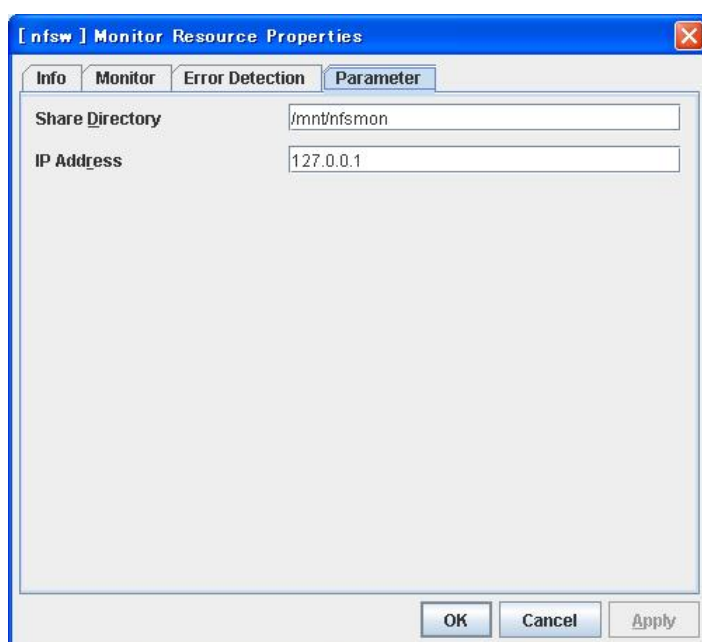
This monitor resource determines the following result as an error:

(1) Response to the NFS service request is invalid

When an error is repeated the number of times set to retry count, it is considered as NFS error.

## Displaying and changing the NFS monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target NFS monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



**Share Directory** (Within 1023 bytes)

Specify a directory for sharing files. You must specify the directory.


Default value: None

**IP Address** (Within 79 bytes)

Specify an IP address of the server that monitors NFS. You must specify the IP address.

Default value: 127.0.0.1

## Displaying the NFS monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a NFS monitor resource  in the tree view, the following information is displayed in the list view.

NFS Monitor Name: nfsw		Details
Common	server1	server2
Properties	Value	
Name	nfsw	
Comment	nfs monitor	
Share Directory	/mnt/nfsmon	
IP Address	127.0.0.1	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name: NFS monitor resource name  
 Comment: Comment on the NFS monitor resource  
 Share Directory: Shared name that NFS server exports  
 IP Address: IP address for connecting NFS server  
 Status: NFS monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	nfs
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	30
Timeout (sec)	60
Retry Count	5
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

# Understanding Oracle monitor resources

Oracle monitor resource monitors Oracle database that operates on servers.

## Note on Oracle monitor resources

For the supported versions of Oracle, see the *Getting Started Guide*.

This monitor resource monitors Oracle with the Oracle interface (Oracle Call Interface). For this reason, the library for interface (libclntsh.so) needs to be installed on the server for monitoring.

If values of a connection string, user name and password specified by a parameter are different from the Oracle environment for monitoring, Oracle monitoring cannot be done. Error message is displayed. Check the environment.

If DBA user authentication method is only the OS authentication and “NONE” is specified to “REMOTE\_LOGIN\_PASSWORDFILE” in the Oracle initialization parameter file, specify a database user without DBA authority.

In case of specifying a database user with DBA authority, an error occurs and monitoring cannot be executed.

Use the character set supported by OS when creating a database.

If Japanese is set to NLS\_LANGUAGE in the Oracle initialization parameter file, specify English by NLS\_LANG (environment variable of Oracle.) Specify the character set corresponds to the database.

If it is not specified, an alert message of Event ID (0) is not displayed to the alert view correctly.

However, as for an error of when connecting to the database such as incorrect user name and alert message may not be displayed correctly.

For the NLS parameter and NLS\_LANG settings, see the *Globalization Support Guide* by Oracle Corporation.

When **create/drop check box** is not selected, ExpressClustger does not create a table.

A table needs to be created manually with the following procedure.

```
sql> create table orawatch (num number(11,0) primary key);
sql> insert into orawatch values(0);
sql> commit;
```

## How Oracle monitor resources perform monitoring

Oracle monitor resource monitors the following:

Creates a table for monitoring on the database, and reads and writes the numeric value up to 5 digits by issuing the SQL statement.

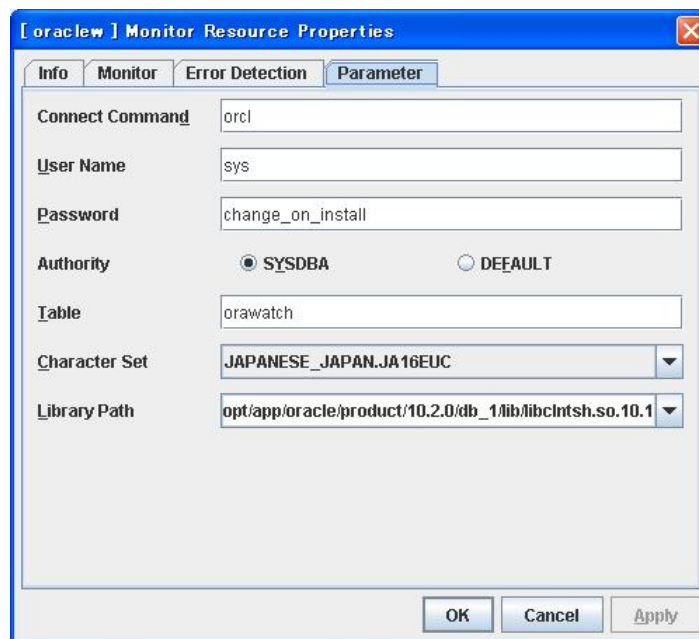
The monitor resource determines the following results as an error:

- (1) An error is informed in a response to the database connection or the issued SQL statement
- (2) Written data and read data do not match

The SQL statement to be used is “create/drop/insert/update/select.”

## Displaying and changing the Oracle monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target Oracle monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



### Monitor Type

Select the Oracle features to be monitored.

- Monitor Listener and Instance (default)  
Performance of connection process to database and to refer to/update database are monitored.
- Monitor Listener only  
Only performance of connection process to database is monitored. Select this option when you try to recover by restarting the Listener service upon connection error.
- Monitor Instance only  
Only performance of process to refer to/update database is monitored. If an error occurs on the connection process database, the error is ignored. Select this option to configure recovery operation for the errors except for connection process in conjunction with Oracle monitor resource in **Monitor Listener only**.

### Create and Drop Table in Monitoring

Specify whether or not creating and dropping table in monitoring is performed.

### Connect Command (Within 255 bytes)

Specify the connect string for the database to be monitored. You must specify the connect string.

Default value: None

**User Name** (Within 255 bytes)

Specify the user name to log on to the database. You must specify the name.

Specify the Oracle user who can access the specified database.

Default value: sys

**Password** (Within 255 bytes)

Specify the password to log on to the database.

Default value: change\_on\_install

**Authority**

Specify the database user authentication.

Default value: SYSDBA

**Table** (Within 255 bytes)

Specify the name of a monitor table created on the database. You must specify the name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Be sure to set the name different from the reserved word in SQL statements.

Default value: orawatch

**Character Set**

Specify the character set of Oracle. You must specify the character code.

Default value: JAPANESE\_JAPAN.JA16EUC

**Library Path** (Within 1023 bytes)

Specify the library path of Oracle Call Interface (OCI). You must specify the path.

Default value: /opt/app/oracle/product/10.2.0/db\_1/lib/libclntsh.so.10.1

## Displaying the Oracle monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for Oracle monitor resource  in the tree view, the following information is displayed in the list view.

Oracle Monitor Name: oraclew		Details
Common	server1	server2
Properties		Value
Name	oraclew	
Comment	oracle monitor	
Connect Command	orcl	
Authority	SYSDBA	
Table	orawatch	
Status	Normal	
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	Oracle monitor resource name
Comment:	Comment on the Oracle monitor resource
Connect Command:	Connect command corresponding to a database to be monitored
Authority:	Authority when accessing a database
Table:	Monitor table name created on a database
Status:	Oracle monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	oraclew
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Character Set	JAPANESE_JAPAN.JA16EUC
Library Path	/opt/app/oracle/product/10.2.0/db_1/lib/libcintsh.so.10.1
Monitor Method	listener and instance monitor
Monitor Action	0

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Character Set:	Character set of Oracle
Library Path:	Library path of Oracle
Monitor Method:	The method for monitoring Oracle
Monitor Action:	Whether or not to create/drop

## Understanding OracleAS monitor resources

OracleAS monitor resource monitors Oracle application server that operates on servers.

### Notes on OracleAS monitor resources

For the supported versions of Oracle application server, see the *Getting Started Guide*.

For the monitor target resource, specify exec resources etc. to start Oracle application server. Monitoring starts after the target resource is activated. If the Oracle application server cannot operate immediately after the target resource is activated, adjust the time by **Wait Time to Start Monitoring**.

If there is any component which does not start in Oracle application server instance when monitor target resources are activated, edit opmn.xml file to change the status of the component to “disabled”. For details on opmn.xml file, refer to Oracle application server manual.

Oracle application server itself may report operation logs etc. for every monitoring operation. To control this, configure the settings in Oracle application server accordingly.

### How OracleAS monitor resources perform monitoring

OracleAS monitor resource monitors the following:

It uses the OracleAS opmnctl command to monitor the application server.

OracleAS monitor resource determines the following result as an error:

- (1) When an error is informed in the status of the acquired application server

## Displaying and changing the OracleAS monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target OracleAS monitor resource, and click the **Parameter** tab in the **Properties** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a dialog box titled "[ oracleasw ] Monitor Resource Properties". It has four tabs: Info, Monitor, Error Detection, and Parameter. The Parameter tab is selected. The fields are as follows:

- Instance Name:** oracleas
- Install Path:** /home/ias/product/10.1.3.2/companionCDHome\_1
- Monitor Type:** component monitor
- Component Monitor:** ☒ All, ☐ Individual
- Component List:** (empty text area)

At the bottom right are buttons for OK, Cancel, and Apply.

### Instance name(Within 255bytes)

Specify the instance to be monitored. You must specify the instance.

Default value: None

### Install path (Within 1023 bytes)

Specify the install path to the Oracle application. You must specify the path.

Default value: /home/ias/product/10.1.3.2/companionCDHome\_1

### Monitor Type

Select the Oracle application server features to be monitored.

- Monitor both opmn process and component simultaneously  
Both opmn process activation/deactivation monitoring and component status monitoring are performed.
- Monitor opmn process only  
Only opmn process activation/deactivation monitoring is performed.

- **Monitor component only (default)**  
Only component status monitoring is performed.

### **Component Monitor**


Select whether you specify monitor target component individually when **Monitor both opmn process and component simultaneously** or **Component Monitor** is selected as Monitor Type.

- **All (default)**  
All components are monitored.
- **Individual**  
Only the component specified in **Component List**.

### **Component List** (Within 1023 byte)

Enter a target component name of **Monitor Component**. If you want to specify two or more components, separate them by comma “,”. Make sure to set this when **Individual** is selected in **Component Monitor**.

## Displaying and changing the OracleAS monitor resource peoperties with the WebManager

1. Start the WebManager.
2. When you click an object for Oracle monitor resource  in the tree view, the following information is displayed in the list view.

OracleAS Monitor Name: oracleasw

Details

Commonserver1server2

Properties	Value
Name	oracleasw
Comment	
Instance	orclas
Status	Normal

Resource Status on Each Server

Server Name	Status
server1	Offline
server2	Offline

Name	OracleAS monitor resource name
Comment	OracleAS monitor resource comment
Instance name	Name of the instance to be monitored
Status	Status of the OracleAS monitor resource
Server Name	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the pop-up dialog.

Properties	Value
Type	oracleasw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Install Path	/home/ias/product/10.1.3.2/companionCDHome_1
Monitor Method	2
Component List	

Type	Monitor resource type
Monitor Timing	Timing to start monitoring
Target Resource	Resource to be monitored
Interval (sec)	Interval between monitoring
Timeout (sec)	Time to elapse from detection of an error to establish
Retry Count	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target	Target to be recovered when an error is detected
Recovery Target Type	Type of target to be recovered when an error is detected
Reactivation Threshold	The number of reactivations to be made at detection of an error
Failover Threshold	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value	Monitor resource nice value
Monitor Suspend Possibility	Possibility of suspending monitoring
Install Path	Install path of OracleAS
Monitor Method:	The method for monitoring OracleAS
Component List:	The name of the target component

## Understanding POP3 monitor resources

POP3 monitor resources monitor POP3 services that run on the server. POP3 monitor resources monitor POP3 protocol but they are not intended for monitoring specific applications. POP3 monitor resources monitor various applications that use POP3 protocol.

### POP3 monitor resources

- Note 1** For monitoring target resources, specify exec resources etc. that start POP3 services. Monitoring starts after target resource is activated. However, if POP3 services cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring**.
- Note 2** POP3 services may produce operation logs for each monitoring. Configure the POP3 settings if this needs to be adjusted.

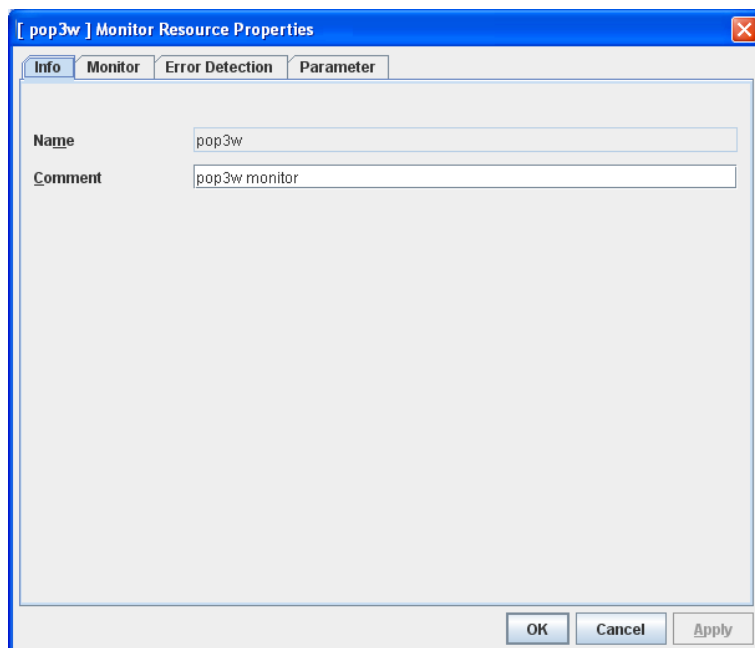
### Monitoring by POP3 monitor resources

POP3 monitor resources connect to the POP3 server and execute the command to verify the operation. As a result of monitoring, the following is considered as an error:

- (1) When connection to the POP3 server fails.
- (2) When an error is notified as a response to the command.

### Displaying and changing the POP3 monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target POP3 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

**IP Address** (Within 79 bytes )

Specify the IP address of the POP3 server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

**Port No.** (1-65535)

Specify the POP3 port number to be monitored. You must specify this port number.

Default value: 110

**User Name** (Within 255 bytes)

Specify the user name to log on to POP3.

Default value: None

**Password** (Within 255 bytes)

Specify the password to log on to POP3. Click **Change** and enter the password in the dialog box.


Default value: None

**Authentication Method**

Select the authentication method to log on to POP3. It must follow the settings of POP3 being used:

- APOP (Default value)  
The encryption authentication method that uses the APOP command.
- USER/PASS  
The plain text method that uses the USER/PASS command.

## Displaying the POP3 monitor resource properties with the WebManager

1. Start the WebManager.
2. Click the POP3 monitor resources object, , in the tree view. The following information is displayed in the list view.

POP3 Monitor Name: pop3w Details

Common server1 server2

Properties	Value
Name	pop3w
Comment	pop3w monitor
IP Address	127.0.0.1
Port	110
Authority Method	APOP
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: POP3 monitor resource name  
 Comment: Comment of the POP3 monitor resource  
 IP Address: IP address of the POP3 server to be monitored  
 Port No.: Port number of the POP3 to be monitored  
 Authentication Method: Authentication method to connect to POP3  
 Status: Status of the POP3 monitor resource

Server Name: Server name  
 Status: Status of the monitor resource on the given server

If you click the **Details** button, the following information is displayed in the pop-up dialogue.

Properties	Value
Type	pop3w
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	3
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval(sec):	Interval between monitoring (in seconds)
Timeout(sec):	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring(sec):	Time to wait before starting of monitoring (in seconds)
Nice value:	Nice Value
Monitor Suspend Possibility:	Possibility of suspending monitoring

# Understanding PostgreSQL monitor resource

PostgreSQL monitor resource monitors PostgreSQL database that operates on servers.

## Note on PostgreSQL monitor resources

For the supported versions of PostgreSQL, see the *Getting Started Guide*.

This monitor resource uses the libpq library of PostgreSQL to monitor PostgreSQL.

If this monitor resource fails, set the application library path to the path where the libpq library of PostgreSQL exists.

If a value specified by a parameter differs from the PostgreSQL environment for monitoring, a message indicating an error is displayed on the alert view of the WebManager. Check the environment.

For client authentication, on this monitor resource, the following authentication methods that can be set to the “pg\_hba.conf” file has been checked its operation.

trust, md5, password

## How PostgreSQL monitor resources perform monitoring

PostgreSQL monitor resource monitors the following:

Creates a table for monitoring on the database, and reads and writes the numeric value up to 5 digits by issuing the SQL statement.

This monitor resource determines the following results as an error:

- (1) An error is informed in a response to the database connection or the issued SQL statement
- (2) Written data and read data do not match

The SQL statement to be used is create/insert/vacuum/select/drop.

## Displaying and changing the PostgreSQL monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target PostgreSQL monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ psqlw ] Monitor Resource Properties" with a close button in the top right corner. It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter", with "Parameter" currently selected. The "Parameter" tab contains several labeled text input fields and a dropdown menu:

- Database Name**: test
- IP Address**: 127.0.0.1
- Port**: 5432
- User Name**: postgres
- Password**: (empty)
- Table**: psqlwatch
- Library Path**: /usr/lib/libpq.so.3.0 (with a dropdown arrow)

At the bottom right of the dialog are three buttons: "OK", "Cancel", and "Apply".

### **Database Name** (Within 255 bytes)

Specify the database name to be monitored. You must specify the name.

Default value: None

### **IP Address** (Within 79 bytes)

Specify the IP address of the server to connect. You must specify the IP address.

Default value: 127.0.0.1

### **Port** (1 to 65535)

Specify the port number for connection. You must specify the number.

Default value: 5432

### **User Name** (Within 255 bytes)

Specify the user name to log on to the database. You must specify the name.

Specify the PostgreSQL user who can access the specified database.

Default value: postgres

### **Password** (Within 255 bytes)

Specify the password to log on to the database.

Default value: None

**Table** (Within 255 bytes)

Specify the name of a monitor table created in the database. You must specify the table name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Be sure to set the name different from the reserved word in SQL statements.


Default value: psqlwatch

**Library Path** (Within 1023 bytes)

Specify the home path to PostgreSQL. You must specify the path.

Default value: /usr/lib/libpq.so.3.0

## Displaying the PostgreSQL monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a PostgreSQL monitor resource  in the tree view, the following information is displayed in the list view.

PostgreSQL Monitor Name: psqlw		Details
Common		server1 server2
Properties		Value
Name		psqlw
Comment		
Database Name		test
IP Address		127.0.0.1
Port		5432
Table		psqlwatch
Status		Normal
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	PostgreSQL monitor resource name
Comment:	Comment on the PostgreSQL monitor resource
Database Name:	Monitor target database name
IP Address:	IP address for connecting to PostgreSQL server
Port:	Port number of PostgreSQL
Table:	Monitor table name created on a database
Status:	PostgreSQL monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	psqlw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Library Path	/usr/lib/libpq.so.3.0

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Library Path:	Library path of PostgreSQL

## Understanding Samba monitor resources

Samba monitor resource monitors samba file server that operates on servers.

### Note on Samba monitor resources

For the supported versions of samba, see the *Getting Started Guide*.

If this monitor resource fails, the parameter value and samba environment may not match. Check the samba environment

Specify the smb.conf file for the shared name to be monitored to enable a connection from a local server. Allow guest connection when the security parameter of the smb.conf file is “share.”

Samba functions except file sharing and print sharing

If the smbmount command is run on the monitoring server when the samba authentication mode is “Domain” or “Server,” it may be mounted as a user name specified by the parameter of this monitor resource.

### How Samba monitor resources perform monitoring

Samba monitor resource monitors the following:

By connecting to samba server and verify establishment of tree connection to resources of the samba server.

This monitor resource determines the following results as an error:

- (1) A response to samba service request is invalid.

## Displaying and changing the Samba monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target samba monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a Windows-style dialog box titled "[ sambaw ] Monitor Resource Properties". It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. Inside the dialog, there are five labeled input fields: "Share Name" with the value "samba", "IP Address" with "127.0.0.1", "Port" with "139", "User Name" with "user1", and "Password" which is empty. At the bottom right of the dialog are three buttons: "OK", "Cancel", and "Apply".

**Share Name** (Within 255 bytes)

Specify the shared name of samba server to be monitored. You must specify the name.

Default value: None

**IP Address** (Within 79 bytes)

Specify the IP address of samba server. You must specify the IP address.

Default value: 127.0.0.1

**Port** 1 to 65535

Specify the port number to be used by samba daemon. You must specify the port number.

Default value: 139

**User Name** (Within 255 bytes)

Specify the user name to log on to the samba service. You must specify the user name.


Default value: None

**Password** (Within 255 bytes)

Specify the password to log on to the samba service.

Default value: None

## Displaying the Samba monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a Samba monitor resource  in the tree view, the following information is displayed in the list view.

Samba Monitor Name: sambaw		Details
Common	server1	server2
Properties		Value
Name		sambaw
Comment		samba monitor
Share Name		samba
IP Address		127.0.0.1
Port		139
Status		Normal
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	Samba monitor resource name
Comment:	Comment on the Samba monitor resource
Share Name:	Share name of the monitor target samba server
IP Address:	IP address for connecting to samba server
Port:	Port number of the samba server
Status:	Samba monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	sambaw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	30
Timeout (sec)	60
Retry Count	5
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

## Understanding SMTP monitor resources

SMTP monitor resource monitors SMTP daemon that operates on servers.

### Note on SMTP monitor resources

For the supported versions of SMTP, see the *Getting Started Guide*.

If a state that the load average exceeds the RefuseLA value set in the sendmail.def file for a certain period of time, the monitoring commands may consider this as an error and perform failover.

### How SMTP monitor resources perform monitoring

SMTP monitor resource monitors the following:

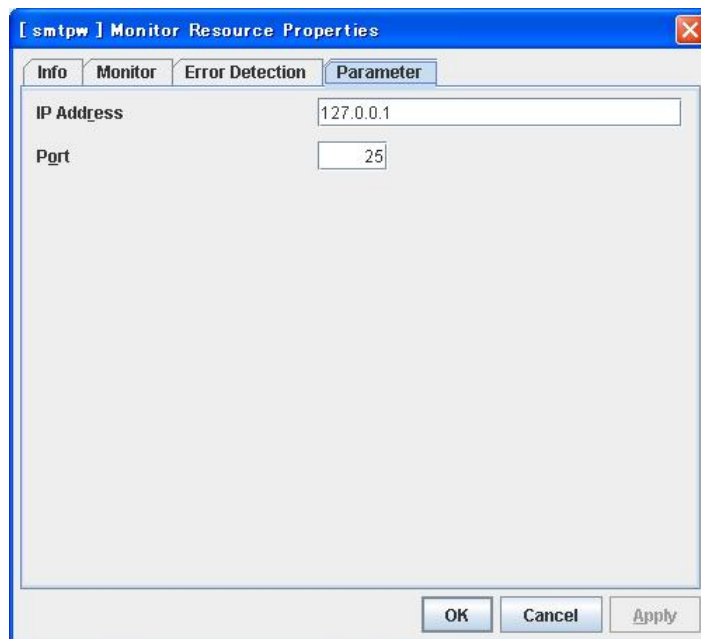
Monitors the SMTP daemon by connecting to the SMTP daemon on the server and issuing the NOOP command

This monitor resource determines the following result as an error:

- (1) An error reporting as the response to the SMTP daemon or issued NOOP command.

## Displaying and changing the SMTP monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target SMTP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



**IP Address** (Within 79 bytes)

Specify the IP address of the SMTP server to be monitored. You must specify the IP address.


Default value: 127.0.0.1

**Port** (1 to 65535)

Specify the port number used to connect to the SMTP server. You must specify the port number.

Default value: 25

## Displaying the SMTP monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a SMTP monitor resource  in the tree view, the following information is displayed in the list view.

SMTP Monitor Name: smtpw		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	smtpw	
Comment	smtp monitor	
IP Address	127.0.0.1	
Port	25	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name:	SMTP monitor resource name
Comment:	Comment on the SMTP monitor resource
IP Address:	IP address for connecting to SMTP server
Port:	Port number of the SMTP server
Status:	SMTP monitor resource status

Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	smtpw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	3
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring

## Understanding Sybase monitor resource

Sybase monitor resource monitors Sybase database that operates on servers.

### Note on Sybase monitor resources

For the supported versions of Sybase, see the *Getting Started Guide*.

This monitor resource monitors ASE using Open Client DB-Library/C of ASE.

If a value specified by a parameter differs from the ASE environment for monitoring, an error message is displayed on the WebManager alert view. Check the environment.

### How Sybase monitor resources perform monitoring

Sybase monitor resource monitors the following:

This monitor resource monitors the following:

Creates a table for monitoring on the database, and reads and writes the numeric value up to 5 digits (decimal number) by issuing the SQL statement.

This monitor resource determines the following results as an error:

- (1) An error is informed in a response to the database connection or the issued SQL statement
- (2) The written data and read data do not match

The SQL statement to be used is “create/drop/insert/update/select.”

## Displaying and changing the Sybase monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target Sybase monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ sybasew ] Monitor Resource Properties". It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. Inside the tab, there are several labeled text boxes and a dropdown menu:

- Database Name:** MyDB
- Database Server Name:** MyServer
- User Name:** sa
- Password:** (empty)
- Table:** sybwatch
- Library Path:** /opt/sybase/OCS-12\_5/lib/libsybdb.so (with a dropdown arrow)

At the bottom right of the dialog are three buttons: "OK", "Cancel", and "Apply".

### **Database Name** (Within 255 bytes)

Specify the database to be monitored. You must specify the database.

Default value: None

### **Database Server Name** (Within 255 bytes)

Specify the database server name to be monitored. You must specify the database server.

Default value: None

### **User Name** (Within 255 bytes)

Specify the user name to log on to the database. You must specify the user name.

Specify the Sybase user who can access the specified database.

Default value: sa

### **Password** (Within 255 bytes)

Specify the password to log on to the database.

Default value: None

### **Table** (Within 255 bytes)

Specify the name of a monitor table created in the database. You must specify the name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Make sure to set the name different from the reserved word in SQL statements.


Default value: sybwatch

**Library Path** (Within 1023 bytes)

Specify the home path to Sybase. You must specify the path.

Default value: /opt/sybase/OCS-12\_5/lib/libsybdb.so

## Displaying the Sybase monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a Sybase monitor resource  in the tree view, the following information is displayed in the list view.

Sybase Monitor Name: sybasew		Details
Common	server1	server2
Properties		Value
Name		sybasew
Comment		sybase monitor
Database Name		MyDB
Database Server Name		MyServer
Table		sybwatch
Status		Normal
Resource Status on Each Server		
Server Name		Status
server1		Offline
server2		Offline

Name:	Sybase monitor resource name
Comment:	Comment on the Sybase monitor resource
Database Name:	Monitor target database name
Database Server Name:	Monitor target database server name
Table:	Monitor table name created on a database
Status:	Sybase monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	sybasew
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Library Path	/opt/sybase/OCS-12_5/lib/libsybdb.so

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Library Path:	Library path of Sybase

# Understanding Tuxedo monitor resource

Tuxedo monitor resource monitors Tuxedo that operates on servers.

## Note on Tuxedo monitor resources

For the supported versions of Tuxedo, see the *Getting Started Guide*.

If any library of the Tuxedo such as libtux.so does not exist, monitoring cannot be performed.

## How Tuxedo monitor resources perform monitoring

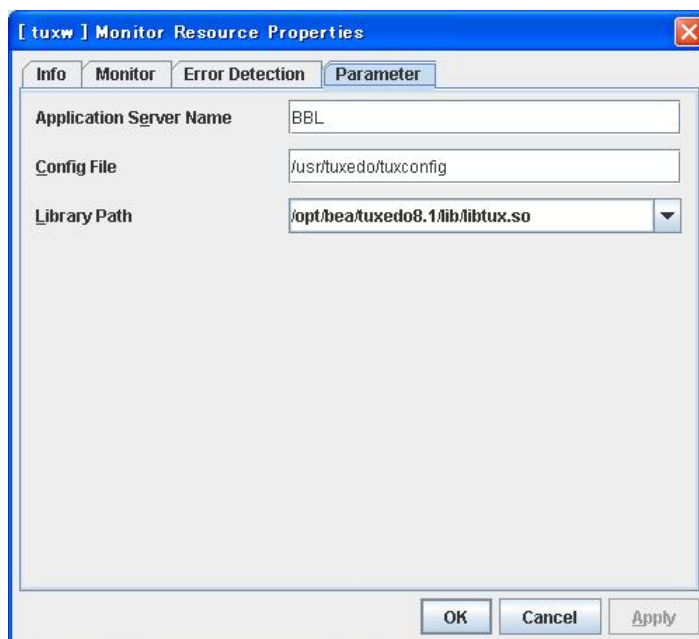
Tuxedo monitor resource monitors the following:

This monitor resource executes the application server monitoring by using the API of the Tuxedo. The command determines the following results as an error:

(1) An error is reported during the connection to the application server and/or the acquisition of the status.

## Displaying and changing the Tuxedo monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target Tuxedo monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.



**Application Server Name** (Within 255 bytes)

Specify the application server name to be monitored. You must specify the name.

Default value: BBL

**Config File** (Within 1023 bytes)

Specify the placement file name of Tuxedo. You must specify the name.


Default value: None

**Library Path** (Within 1023 bytes)

Specify the library path of Tuxedo. You must specify the path.

Default value: /opt/bean/tuxedo8.1/lib/libtux.so

## Displaying the Tuxedo monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a Tuxedo monitor resource  in the tree view, the following information is displayed in the list view.

Tuxedo Monitor Name: tuxw		Details
Common	server1	server2
Properties		Value
Name	tuxw	
Comment	tuxedo monitor	
Application Server Name	BBL	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name: Tuxedo monitor resource name  
 Comment: Comment on the Tuxedo monitor resource  
 Application Server Name: Monitor target application server name  
 Status: Tuxedo monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	tuxw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Config File	/tmp/aaaaaa
Library Path	/opt/bea/tuxedo8.1/lib/libtux.so

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Config File:	Configuration file path of Tuxedo
Library Path:	Library path of Tuxedo

## Understanding Weblogic monitor resources

Weblogic monitor resource monitors Weblogic that operates on servers.

### Note on Weblogic monitor resources

For the supported versions of Weblogic, see the *Getting Started Guide*.

A Java environment is required to start monitoring with this monitor resource. The application server system uses Java functions. Therefore if Java stalls, it may be recognized as an error.

### How Weblogic monitor resources perform monitoring

Weblogic monitor resource monitors the following:

Monitors applications by executing Ping with webLogic.Admin command.

This monitor resource determines the following results as an error:

- (1) An error reporting as the response to the Ping.

## Displaying and changing the Weblogic monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target Weblogic monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows the 'Monitor Resource Properties' dialog box with the 'Parameter' tab selected. The fields are as follows:

- IP Address:** 127.0.0.1
- Port:** 7002
- Account Shadow:**
  - ☐ On
  - ☒ Off
- Config File:** (empty text box)
- Key File:** (empty text box)
- User Name:** weblogic
- Password:** weblogic
- Authority Method:** DemoTrust (dropdown menu)
- Key Store File:** (empty text box)
- Domain Environment File:** domains/examples/setExamplesEnv.sh (dropdown menu)

Buttons at the bottom: OK, Cancel, Apply.

### IP Address (Within 79 bytes)

Specify the IP address of the server to be monitored. You must specify the IP address.

Default value: 127.0.0.1

### Port (1024 to 65535)

Specify the port number used to connect to the server. You must specify the number.

Default value: 7002

### Account Shadow

When you specify a user name and a password directly, select **Off**. If not, select **On**. You must specify the setting.

Default value: Off

### Config File (Within 1023 bytes)

Specify the file in which the user information is saved. You must specify the file if **Account Shadow** is **On**.

Default value: None

### Key File (Within 1023 bytes)

Specify the file in which the password required to access to a config file path is saved. Specify the full path of the file. You must specify the file if **Account Shadow** is **On**.

Default value: None

**User Name** (Within 255 bytes)

Specify the user name of Weblogic. You must specify the file if **Account Shadow** is **Off**.

Default value: weblogic

**Password** (Within 255 bytes)

Specify the password of Weblogic.

Default value: weblogic

**Authority Method**

Specify the authentication method when connecting to an application server. You must specify the method.

Default value: DemoTrust

**Key Store File** (Within 1023 bytes)

Specify the authentication file when authenticating SSL. You must specify this when the authentication method is **CustomTrust**.


Default value: None

**Domain Environment File** (Within 1023 bytes)

Specify the domain environment file name of Weblogic. You must specify the file name.

Default value: /opt/bea/weblogic81/samples/domains/examples/setExamplesEnv.sh

## Displaying the Weblogic monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a Weblogic monitor resource  in the tree view, the following information is displayed in the list view.

Weblogic Monitor Name: wlsw		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	wlsw	
Comment	weblogic monitor	
IP Address	127.0.0.1	
Port	7001	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name: Weblogic monitor resource name  
 Comment: Comment on the Weblogic monitor resource  
 IP Address: IP address for connecting to an application server  
 Port: Port number of Weblogic  
 Status: Weblogic monitor resource status

Server Name: Server name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	wlsrw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Authority Method	DemoTrust
Domain Environment File	/opt/bea/weblogic81/samples/domains/examples/setExamplesEnv.sh

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Authority Method:	Authority method of Weblogic
Domain Environment File:	Domain environment file of Weblogic

## Understanding Websphere monitor resources

Websphere monitor resource monitors Websphere that operates on servers.

### Note on Websphere monitor resources

For the supported versions of Websphere, see the *Getting Started Guide*.

A Java environment is required to start monitoring with this monitor resource. The application server system uses Java functions. If Java stalls, it may be recognized as an error.

### How Websphere monitor resources perform monitoring

Websphere monitor resource monitors the following:

This monitor resource monitors the following:

Executes monitoring of the application server by using the `serverStatus.sh` command.

The monitor resource determines the following result as an error:

(1) an error is reported with the state of the acquired application server.

## Displaying and changing the Websphere monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target Websphere monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ wasw ] Monitor Resource Properties". It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. Inside the tab, there are five labeled text fields: "Application Server Name" with the value "server1", "Profile Name" with the value "default", "User Name" with the value "user1", "Password" which is empty, and "Install Path" with a dropdown menu showing "/opt/IBM/WebSphere/AppServer". At the bottom right of the window are three buttons: "OK", "Cancel", and "Apply".

**Application Server Name** (Within 255 bytes)

Specify the application server name to be monitored. You must specify the name.

Default value: server1

**Profile Name** (Within 1023 bytes)

Specify the profile name of Websphere. You must specify the name.

Default value: default

**User Name** (Within 255 bytes)

Specify the user name of Websphere. You must specify the name.

Default value: None

**Password** (Within 255 bytes)

Specify the password of Websphere.


Default value: None

**Install Path** (Within 1023 bytes)

Specify the installation path of Websphere. You must specify the path.

Default value: /opt/IBM/WebSphere/AppServer

## Displaying the Websphere monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a WebManager monitor resource  in the tree view, the following information is displayed in the list view.

WebSphere Monitor Name: wasw Details

Common server1 server2

Properties	Value
Name	wasw
Comment	websphere monitor
Application Server Name	server1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Offline
server2	Offline

Name: Websphere monitor resource name  
 Comment: Comment on the Websphere monitor resource  
 Application Server Name: Monitor target application server name  
 Status: Websphere monitor resource status

Server Name: Server Name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	wasw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Profile Name	default
Install Path	/opt/IBM/WebSphere/AppServer

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Profile Name:	Profile name of Websphere
Install Path:	Install path of Websphere

## Understanding WebOTX monitor resources

WebOTX monitor resource monitors WebOTX that operates on servers.

### Note on WebOTX monitor resources

For the supported versions of WebOTX, see the *Getting Started Guide*.

A Java environment is required to start monitoring with this monitor resource. The application server system uses Java functions. If Java stalls, it may be recognized as an error.

### How WebOTX monitor resources perform monitoring

WebOTX monitor resource monitors the following:

This monitor resource monitors the following:

Executes monitoring of the application server by using the `otxadmin.sh` command.

The monitor resource determines the following result as an error:

(1) an error is reported with the state of the acquired application server.

## Displaying and changing the WebOTX monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target WebOTX monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

The screenshot shows a window titled "[ otxw ] Monitor Resource Properties". It has four tabs: "Info", "Monitor", "Error Detection", and "Parameter". The "Parameter" tab is selected. Inside the tab, there are five labeled input fields: "Connecting Destination" with the value "localhost", "Port" with the value "6212", "User Name" with the value "user1", "Password" which is empty, and "Install Path" with a dropdown menu showing "/opt/WebOTX". At the bottom right of the window are three buttons: "OK", "Cancel", and "Apply".

**Connecting Destination** (Within 255 bytes)

Specify the server name to be monitored. You must specify the name.

Default value: localhost

**Port** (1024 to 65535)

Specify the port number used to connect to the server. You must specify the number.

Default value: 6212

**User Name** (Within 255 bytes)

Specify the user name of WebOTX. You must specify the name.

Default value: None

**Password** (Within 255 bytes)

Specify the password of WebOTX.


Default value: None

**Install Path** (Within 1023 bytes)

Specify the installation path of WebOTX. You must specify the path.

Default value: /opt/WebOTX

## Displaying the WebOTX monitor resource properties with the WebManager

1. Start the WebManager.
2. When you click an object for a WebManager monitor resource  in the tree view, the following information is displayed in the list view.

WebOTX Monitor Name: otw		Details
<div>Common server1 server2</div>		
Properties	Value	
Name	otw	
Comment		
Connecting Destination	localhost	
Port	6212	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Offline	
server2	Offline	

Name: WebOTX monitor resource name  
 Comment: Comment on the WebOTX monitor resource  
 Connecting Destination: Monitor target application server name  
 Port: The port number used to connect to the server.  
 Status: WebOTX monitor resource status

Server Name: Server Name  
 Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed.

Properties	Value
Type	otbw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	60
Timeout (sec)	120
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Install Path	/opt/WebOTX

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval (sec):	Interval between monitoring (in seconds)
Timeout (sec):	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as an error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring (sec):	Time to wait before starting monitoring (in seconds)
Nice Value:	Monitor resource nice value
Monitor Suspend Possibility:	Possibility of suspending monitoring
Install Path:	Install path of WebOTX



# Chapter 7      Heartbeat resources details

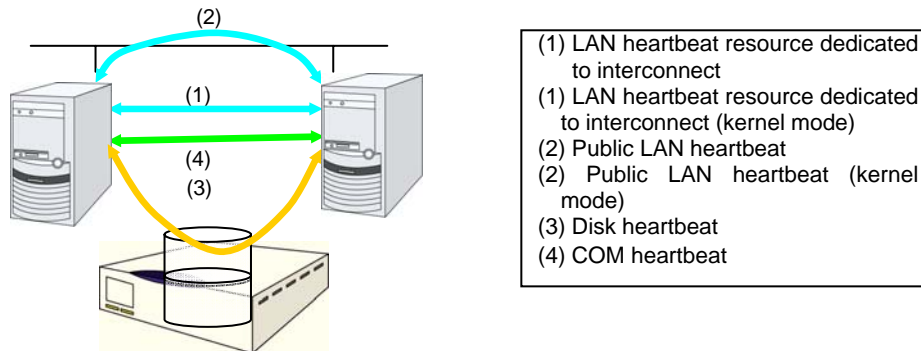
This chapter provides detailed information on heartbeat resources.

This chapter covers:

- What are heartbeat resources? ..... 866
- Understanding LAN heartbeat resources ..... 867
- Understanding kernel mode LAN heartbeat resources ..... 869
- Understanding disk heartbeat resources..... 871
- Understanding COM heartbeat resources ..... 874

## What are heartbeat resources?

Servers in a cluster monitor if other servers in the cluster are activated. For this monitoring, heartbeat resources are used.



Monitor resource name	Abbreviation	Functional overview
LAN heartbeat resource (1)(2)	lanhb	Uses a LAN to monitor if servers are activated. Used for communication within the cluster as well.
Kernel mode LAN heartbeat resource (1)(2)	lankhb	A kernel mode module uses a LAN to monitor if servers are activated.
Disk heartbeat resource (3)	diskhb	Uses a dedicated partition in the shared disk to monitor if servers are activated.
COM heartbeat resource (4)	comhb	Uses a COM cable connecting two servers to monitor if servers are activated.

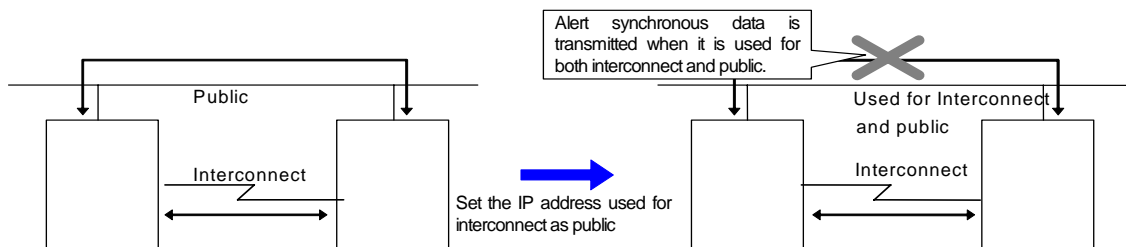
- ◆ You need to set at least one LAN heartbeat resource. It is recommended to set two or more LAN heartbeat resources.  
It is recommended to set both LAN heartbeat resource and kernel mode LAN heartbeat resource together.
- ◆ When you configure the settings of interfaces for disk heartbeat and COM heartbeat resources, follow the specifications described below

When a shared disk is used:	[Number of servers: up to 2] In principle, COM interface and disk interface [Number of servers: 3 or more] Disk interface
When a shared disk is not used:	[Number of servers: up to 2] COM interface


# Understanding LAN heartbeat resources

## LAN heartbeat resources

- Note 1** You need to set at least one LAN heartbeat resource. It is recommended to have two or more LAN heartbeat resources; the one dedicated to interconnect and the one shared with interconnect and public.
- Note 2** Communication data for alert synchronization is transmitted on an interface that is registered with the interconnect. You should consider network traffic when you configure the settings.
- Note 3** You can set the same IP address for the interconnect LAN interface and the public LAN interface. In this case, communication data for alert synchronization is transmitted.



## Displaying the property of a LAN heartbeat resource with the WebManager

1. Start the WebManager.
2. When you click an object for a LAN heartbeat resource, , in the tree view, the following information is displayed in the list view.

LAN Heartbeat Name: lanhb1		Details
Server Name	Status	
server1	Online	
server2	Online	

Server Name: Server name  
 Status: Status of the heartbeat resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	lanhb1
Type	lanhb
Comment	LAN Heartbeat
Status	Normal
IP Address	192.168.0.1

Name: LAN heartbeat resource name  
 Type: LAN heartbeat resource type  
 Comment: Comment of the LAN heartbeat resource  
 Status: Statuses of all LAN heartbeat resources  
 IP Address: IP address of the LAN used for LAN heartbeat

# Understanding kernel mode LAN heartbeat resources

## Environment where the kernel mode LAN heartbeat resources works

### Note:

This function is dependent on the distribution and kernel version. Refer to the Getting Started Guide before you configure the settings.

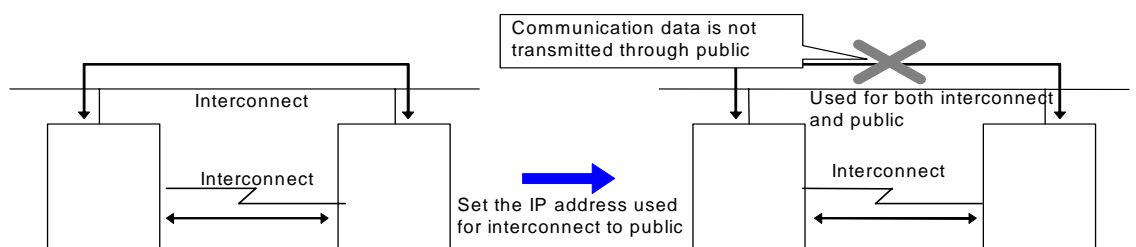
## The settings of the kernel mode LAN heartbeat resources

With the kernel mode driver module, kernel mode LAN heartbeat resource offer similar functions that LAN heartbeats provide. The kernel mode LAN heartbeat resources have the following features.


- ◆ Kernel mode LAN heartbeat resource is less likely to be impacted by load of OS since it uses the kernel mode driver. This reduces the misinterpreting disconnect of interconnection.
- ◆ When used with the keepalive settings to watch user mode monitor resource, the kernel mode LAN heartbeat resource allows reset to be recorded in other servers when the user mode stalling is detected.

## kernel mode LAN heartbeat resources

- Note 1** It is not recommended to specify only the kernel mode LAN heartbeat resource. Also specify LAN heartbeat resource also.
- Note 2** It is recommended to specify two or more kernel mode LAN heartbeat resources; the one dedicated to interconnect and the one shared with interconnect and public.
- Note 3** The communication data of alert synchronization is transmitted on an interconnect interface that is not registered to the public LAN interface. You should consider network traffic when you configure the settings.
- Note 4** You can set the same IP address to the interconnect LAN interface and the public LAN interface. In that case, the communication data of alert synchronization is not transmitted.



## Displaying the property of kernel mode LAN heartbeat resources with the WebManager

1. Start the WebManager.
2. When you click an object for a kernel mode LAN heartbeat resources, , in the tree view, the following information is displayed in the list view.

Kernel Mode LAN Heartbeat Name: lankhb1		Details
Server Name	Status	
server1	Online	
server2	Online	

Server Name: Server name

Status: Status of the heartbeat resource status on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	lankhb1
Type	lankhb
Comment	Kernel Mode LAN Heartbeat
Status	Normal
IP Address	10.0.0.1

Name: Kernel mode LAN heartbeat resource name

Type: Kernel mode LAN heartbeat resource type

Comment: Comment of the Kernel mode LAN heartbeat resource

Status: Status of all kernel mode LAN heartbeat resources

IP Address: IP address of the LAN used for kernel mode LAN heartbeat

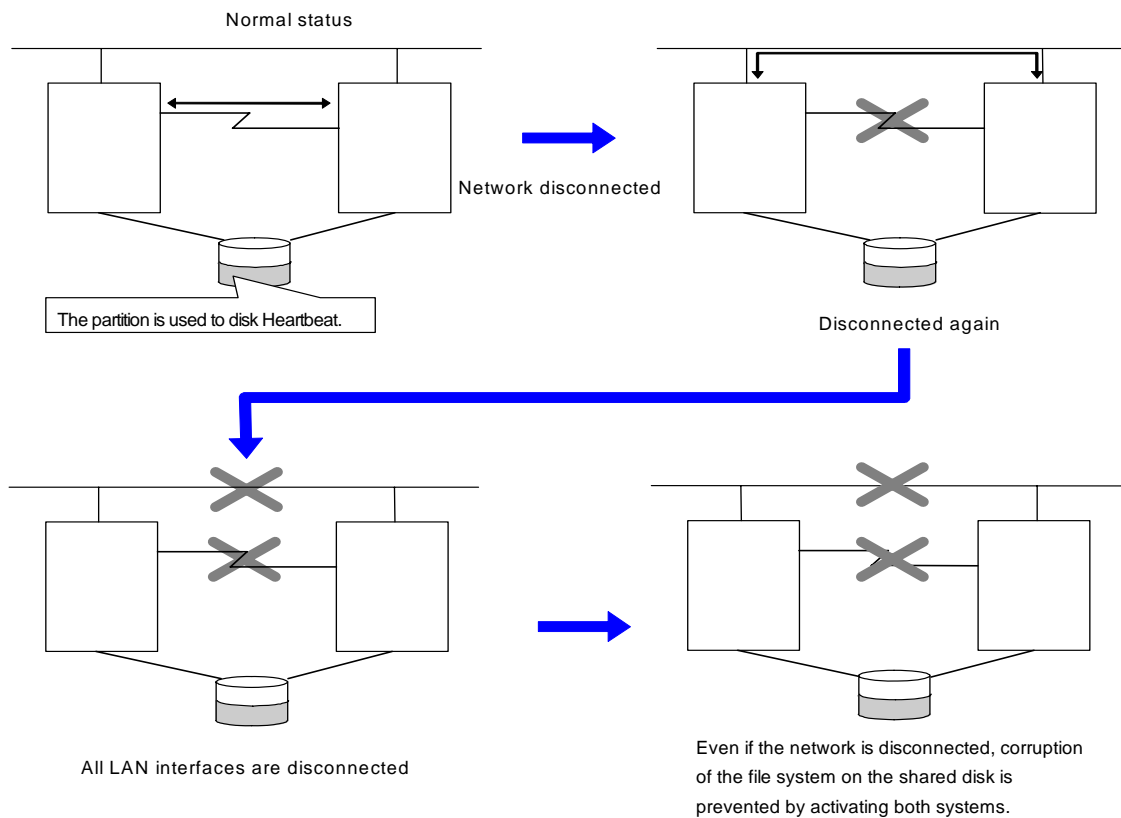
# Understanding disk heartbeat resources

## Setting the disk heartbeat resources

To use a heartbeat resource, you need to have the following settings.

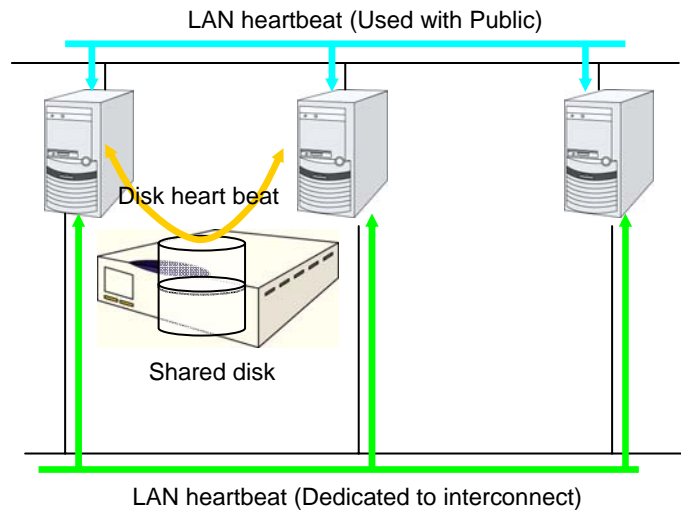
- Allocate a dedicated partition on the shared disk. (You do not need to create any file system.)
- Configure settings that allow all servers to access the dedicated partition on the shared disk by the same device name.

When a disk heartbeat resource is being used, it can be checked if other servers are active even if the network is disconnected.



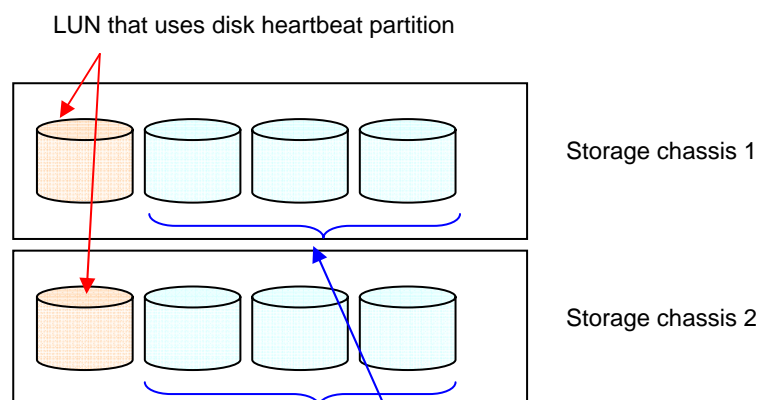
If the cluster consists of three or more servers, you can have a configuration using a disk heartbeat resource as below. You can configure the settings that allow usage of the disk heartbeat resource only among the servers in the cluster using the shared disk.

For more details, see "Disk IF tab" in Chapter 1, "Functions of the Builder."




## Disk heartbeat resources

- Note 1** It is recommended to use both a LAN heartbeat resource and a disk heartbeat resource when you use a shared disk.
- Note 2** It is recommended to use one or two disk heartbeat resources in the cluster even if you are using two or more LUNs. You should consider how heavy the disk is loaded when you configure the settings because a disk heartbeat resource reads and/or writes to the disk every heartbeat interval.
- Note 3** In each LUN, allocate a partition dedicated to a disk heartbeat. LUNs that do not use a disk heartbeat should also have a dummy partition because the file system can be damaged if device names are moved due to disk failure or other causes. Partitions dedicated to disk heartbeat should have the same number across all the LUNs.



LUNs that reserve dummy partition dedicated to a disk heartbeat for preventing improper access when the device name is incorrect. Reserved partition dedicated to heartbeat is not actually used.

## Displaying the property of the disk heartbeat resource with the WebManager

1. Start the WebManager.
2. When you click an object for a disk heartbeat resource,  in the tree view, the following information is displayed in the list view.

Disk Heartbeat Name: diskhb1		Details
Server Name	Status	
clg20	Online	
clg21	Online	

Server Name: Server name  
Status: Status of the heartbeat resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	diskhb1
Type	diskhb
Comment	DISK Heartbeat
Status	Normal
Device Name	/dev/sde1
RAW Device Name	/dev/raw/raw1


Name: Disk heartbeat resource name  
Type: Disk heartbeat resource type  
Comment: Comment of the disk heartbeat resource  
Status: Status of all disk heartbeat resources  
Device Name: Name of the disk devices used for disk heartbeat  
Raw Device Name: Raw device name dedicated to the disk heartbeat

## Understanding COM heartbeat resources

### Note on COM heartbeat resources

It is recommended to use a COM heartbeat resource if your environments allows. This is because using a COM heartbeat resource prevents activating both systems when the network is disconnected.

### Displaying the property of the COM heartbeat resource with the WebManager

1. Start the WebManager.
2. When you click an object for a COM heartbeat resource, , in the tree view, the following information is displayed in the list view.

COM Heartbeat Name: comhb1		Details
Server Name	Status	
server1	Online	
server2	Online	

Server Name:

Server name

Status:

Status of the heartbeat resource on the server

---

**Note:**

The COM heartbeat resource treats its own status as “Not used,” and does not use as a heartbeat status. The figure above indicates the status when the COM heartbeat resource under Server1 is selected by WebManager. In this case, the status of Server1 is set as “Not used,” and the status of standby Server2 becomes the one of a COM heartbeat resource.

---

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	comhb1
Type	comhb
Comment	COM Heartbeat
Status	Normal
Device Name	/dev/ttyS1

Name: COM heartbeat resource name  
Type: COM heartbeat resource type  
Comment: Comment of the COM heartbeat resource  
Status: Status of the COM heartbeat resource (logical sum of status)  
Device Name: Name of the COM device used for COM heartbeat



# Chapter 8      Network partition resolution resources details

This chapter provides detailed information on network partition resolution resources.

This chapter covers:

- Network partitions ..... 878
- Understanding the network partition resolution resources ..... 879
- Understanding network partition resolution by PING method ..... 880
- Not resolving network partition ..... 882

## Network partitions

Network partitioning, or “Split Brain” syndrome, refers to the status where all communication channels have problems and the network between servers is partitioned.

In a cluster system that is not equipped with solutions for “Split Brain Syndrome,” a failure on a communication channel cannot be distinguished from an error on a server. This can cause data corruption brought by access from multiple servers to the same resource. ExpressCluster, on the other hand, uses resources for network partition resolution to distinguish a failure on a server from “Split Brain Syndrome” when a heartbeat from a server is lost. If the lack of heartbeat is determined to be caused by the server’s failing, the system performs a failover by activating each resource and rebooting applications on a server running normally. When the lack of heartbeat is determined to be caused by “Brain Split” syndrome, emergency shutdown is executed because protecting data has higher priority over continuity of the operation.

## Understanding the network partition resolution resources

Servers in a cluster monitor other servers by using heartbeat resources. When all heartbeat resources are disconnected or other server is shut down by a server not in a cluster, the network partition is solved using network partition resolution resources. The following network partition resolution resource is provided.

Network partition resolution resources	Abbreviation	Function Overview
PING network partition resolution resource (PING method)	pingnp	A network partition is solved by determining a server that can communicate using the ping command.

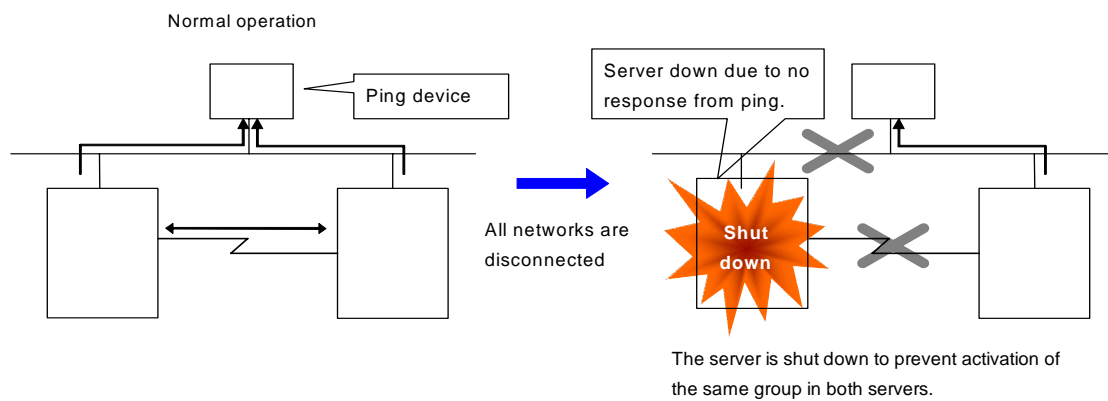
- ◆ If there is only one available LAN on the configuration, set the PING network partition resolution.

## Understanding network partition resolution by PING method

### Settings of the PING network partition resolution resources

To use PING network partition resolution resources, a device that is always active to receive and respond to the ping command (hereafter described as ping device) is required.

When the heartbeat from another server is lost but the ping device is responding to the ping command, the remote server is down. Failover starts. If there is no response to the ping command, it is determined that the local server is isolated from the network due to “Split Brain Syndrome,” and emergency shutdown takes place.




For more information, refers to “Ping I/F tab” in Chapter 3, “Function for the Builder.”

### Note on PING network partition resolution resource

When the status where no response returns from the ping command continues before heartbeat is lost, which is caused by a failure in the ping device, the network partitions cannot be solved. If heartbeat is lost in this status, a failover takes place in all servers. Because of this, using this method in a cluster with a shared disk can cause data corruption due to access to a resource from multiple servers.

## Displaying the properties of PING network partition resolution resources with the WebManager

1. Start the WebManager.
2. When you click an object for a PING network partition resolution resource  in the tree view, the following information is displayed in the list view.

PING Network Partition Resolution Resource Name: pingnp1		Details
Server Name	Status	
server1	Online	
server2	Online	

Server Name: Server name  
 Status: Status of the network partition resource on the given server

If you click the **Details** button, the following information is displayed.

Properties	Value
Name	pingnp1
Type	pingnp
Comment	ping resolution
Status	Normal
IP Address List	192.168.15.254
Ping Interval (sec)	5
Ping Timeout (sec)	3
Ping Retry Count	3

Name: Name of the PING network partition resolution resource  
 Type: Type of the PING network partition resolution resource  
 Comment: Comment of the PING network partition resolution resource  
 Status: Status (whole) of the PING network partition resolution resource  
 IP Address List: IP address list of ping device  
 Ping Interval (sec): Interval of the PING network partition resolution resource  
 Ping Timeout (sec): Timeout of the PING network partition resolution resource  
 Ping Retry Count: Retry count of the PING network partition resolution resource

## Not resolving network partition

When this method is selected, network partition resolution is not performed. Therefore, if a failure occurs on all the network channels between servers in a cluster, all servers fail over.

# Chapter 9      Information on other monitor settings

This chapter provides the information on the other monitor settings.

This chapter covers:

- Shutdown monitoring ..... 884
- Bonding..... 888
- Forced stop..... 892
- Chassis Identify..... 894
- Alert Service ..... 896

## Shutdown monitoring

### Shutdown monitoring

In shutdown monitoring, it is monitored if the OS is stalled when cluster or server shutdown is performed by an ExpressCluster command.  
If the cluster daemon assumes the OS is stalled, forced reset is executed.

### Displaying and changing the shutdown monitoring

- ◆ **Enable**

Shutdown is monitored. The timeout should be longer than the time for OS shutdown including the time during which application stops. It is recommended to choose **Enable** if you are using shared or mirror disks or hybrid disks.

- ◆ **Disable**

Shutdown is not monitored.

### Shutdown monitoring method

You can select how to monitor shutdown from:

- ◆ **softdog**

For this method, set the timer by using the softdog driver.

- ◆ **ipmi**

For this method, set the timer by using ipmiutil. If ipmiutil is not installed, you need to install it. For ipmi, see “Understanding user-mode monitor resource” on page 751.

- ◆ **keepalive**

For this method, set the clpkhb and clpka drivers of ExpressCluster are used to set the timer.

---

**Note:**

Make sure to check the distribution and kernel version that the clpkhb driver and the clpka driver support. Check them when applying security patches which are released by a distributor to the operating cluster (when the kernel version is changed).

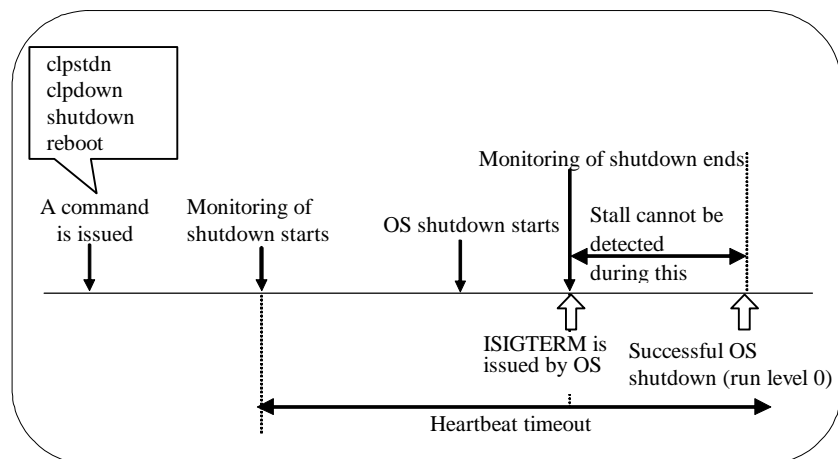
---

## Setting of SIGTERM

SIGTERM is issued when shutting down the OS. The range of shutdown stall monitoring and what will be performed at successful OS shutdown are determined by the setting, “Enable SIGTERM handler.” When the monitoring method is set to keepalive, what will be performed is the same as when softdog is set.

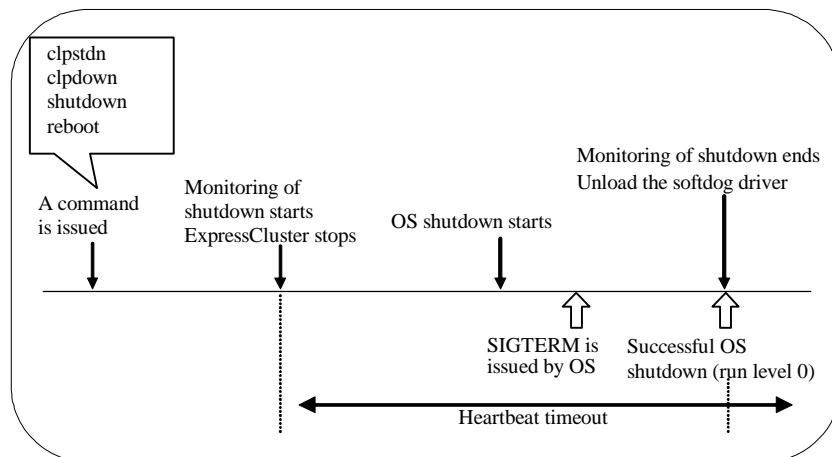
◆ Monitoring method: softdog

- Successful shutdown (when softdog is selected and SIGTERM is enabled)



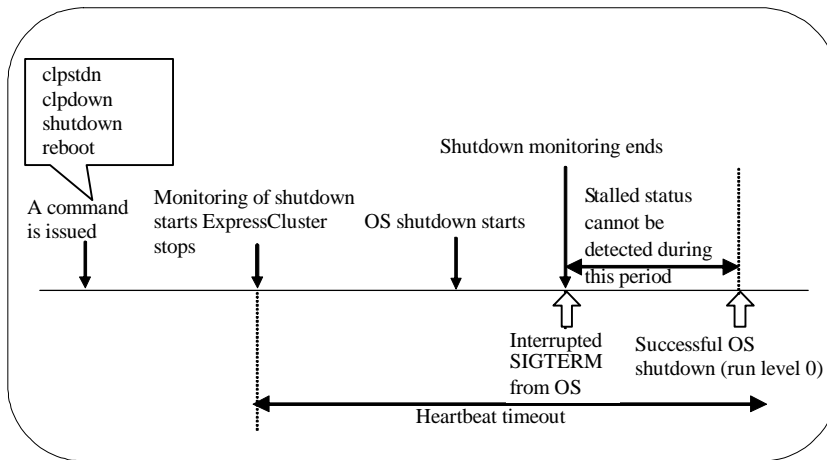
When SIGTERM is enabled, the stalled status cannot be detected because monitoring of the shutdown ends if the OS issues SIGTERM during shutdown.

- Successful shutdown (when softdog is selected and SIGTERM is disabled)



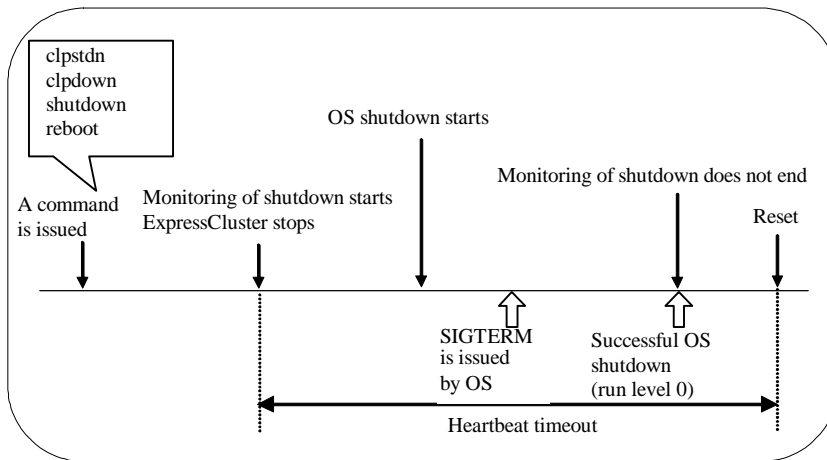
It is recommended to disable SIGTERM if softdog is selected as a method of monitoring.

- ◆ Monitoring method: ipmi
  - Successful shutdown (when ipmi is selected and SIGTERM is enabled)



When SIGTERM is enabled, the stalled status cannot be detected because monitoring of the shutdown ends if the OS issues SIGTERM during shutdown.

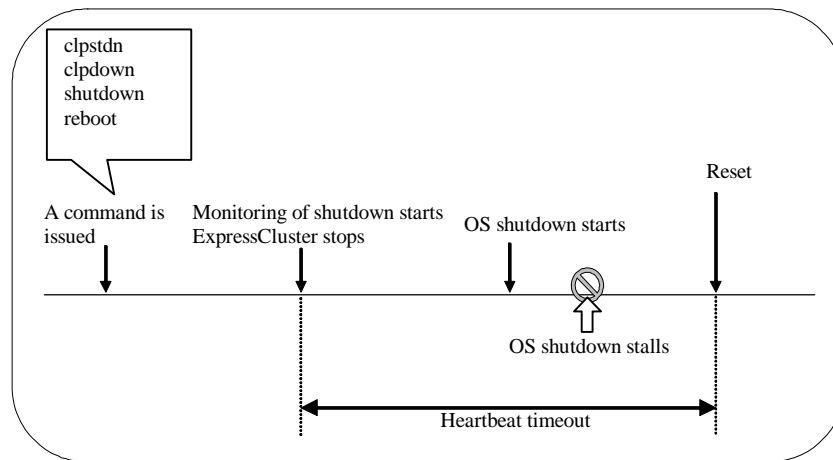
- Successful shutdown (when ipmi is selected and SIGTERM is disabled)



- Even if the shutdown is successful without any stalled status, a server is reset by ipmi.
- On a server that can be powered off by software, reset is not performed.

It is recommended to enable SIGTERM if ipmi is selected as a method of monitoring.

- ◆ When a stalled status occurs in OS shutdown.
  - When a stalled status in shutdown is detected



## Using heartbeat time-out

Use the time-out value for shutdown monitoring with the heartbeat time-out value.

## Time-out

Specify the time-out value when the heartbeat time-out value is not used as the time-out value for shutdown monitoring.

# Bonding

## Floating IP resource

### Notes

If you specify “active-backup” to bonding mode, the communication may be temporarily lost when switching slave interfaces.

### Bonding setting example

When you configure the settings for FIP resource by the Builder, separate the IP address and bonding device with "%" as described below.

Example: Setting “bond0” as device name, “192.168.1.3” as IP address

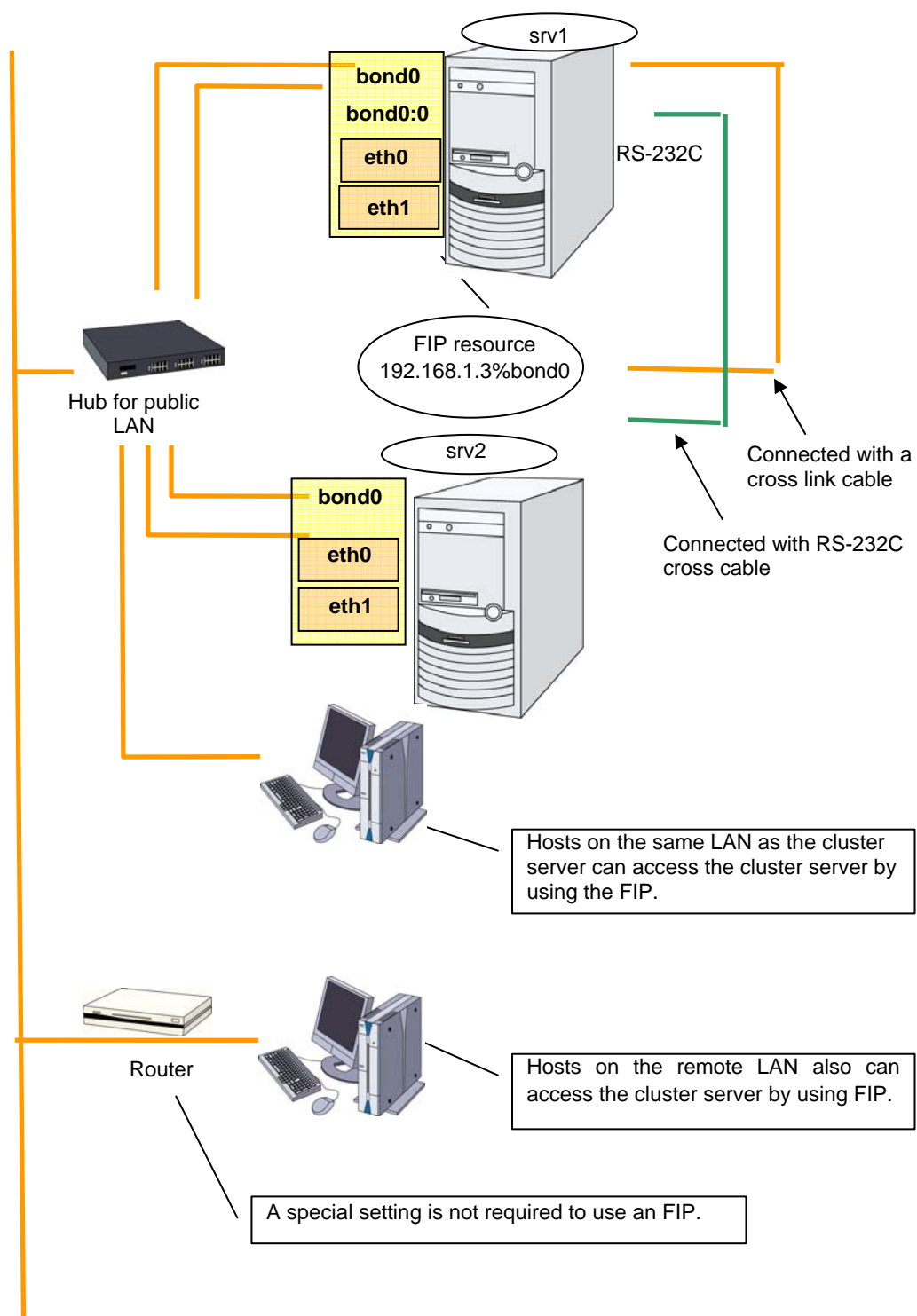


### Note:

For interconnection IP address, specify IP addresses only.

The following shows example settings to use FIP resource on bonding:

Bonding		
Device	Slave	Mode
bond0	eth0	- active-backup(1)
	eth1	- balance-tlb(5)
bond0	eth0	- active-backup(1)
	eth1	- balance-tlb(5)



When FIP resource is enabled on srv1 by ifconfig: (bonding mode is set to "balance-tlb(5).")

```
$ ifconfig
```

```
bond0    Link encap:Ethernet  HWaddr 00:00:01:02:03:04
         inet addr:192.168.1.1 Bcast:192.168.1.255
         Mask:255.255.255.0
         UP BROADCAST RUNNING MASTER MULTICAST MTU:1500 Metric:1
         RX packets:6807 errors:0 dropped:0 overruns:0 frame:0
         TX packets:2970 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:670032 (654.3 Kb)  TX bytes:189616 (185.1 Kb)
```

(1)

```
bond0:0  Link encap:Ethernet  HWaddr 00:00:01:02:03:04
         inet addr:192.168.1.3 Bcast:192.168.1.255
         Mask:255.255.255.0
         UP BROADCAST RUNNING MASTER MULTICAST MTU:1500 Metric:1
         RX packets:236 errors:0 dropped:0 overruns:0 frame:0
         TX packets:2239 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:0
         RX bytes:78522 (76.6 Kb)  TX bytes:205590 (200.7 Kb)
```

(2)

```
eth0     Link encap:Ethernet  HWaddr 00:00:01:02:03:04
         UP BROADCAST RUNNING SLAVE MULTICAST MTU:1500 Metric:1
         RX packets:3434 errors:0 dropped:0 overruns:0 frame:0
         TX packets:1494 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:332303 (324.5 Kb)  TX bytes:94113 (91.9 Kb)
         Interrupt:18 Base address:0x2800 Memory:fc041000-fc041038
```

```
eth1     Link encap:Ethernet  HWaddr 00:00:05:06:07:08
         UP BROADCAST RUNNING SLAVE MULTICAST MTU:1500 Metric:1
         RX packets:215 errors:0 dropped:0 overruns:0 frame:0
         TX packets:1627 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:77162 (75.3 Kb)  TX bytes:141394 (138.0 Kb)
         Interrupt:19 Base address:0x2840 Memory:fc042000-fc042038
```

```
eth2     Link encap:Ethernet  HWaddr 00:00:09:10:11:12
         inet addr:192.168.2.1 Bcast:192.168.2.255 Mask:
         255.255.255.0
         UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
         RX packets:47 errors:0 dropped:0 overruns:0 frame:0
         TX packets:1525 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:2820 (2.7 Kb)  TX bytes:110113 (107.5 Kb)
         Interrupt:24 Base address:0x3000 Memory:fc500000-fc500038
```

(3)

- (1) Device where eth0 and eth1 are bonding.  
Used the public LAN, and 2nd interconnect LAN
- (2) FIP enabled on bond0
- (3) Used for the 1st interconnect LAN

## Mirror disk connect

### Notes

It is not recommended to use a mirror disk connect on bonding since communication may be interrupted temporarily when switching slave interfaces. Depending on the timing of mirroring, mirror recovery may be performed after switching bonding has completed.

### An example of bonding setup

The following is an example of setting up bonding on a mirror disk connect:

Bonding			
Cluster Server	Device	Slave	Mode
srv1	bond0	eth1	- balance-rr(0)
		eth2	- active-backup(1) - balance-tlb(5)
srv2	bond0	eth1	- balance-rr(0)
		eth2	- active-backup(1) - balance-tlb(5)

## Forced stop

### What is Forced stop?

This function forcibly stops the failing server by the another normal server using the IPMI function when it is recognized that the server is failing.

### Conditions for performing forced stop

- ◆ Forced stop is not performed in the following cases:
  - When the failover group successfully stops before the server fails
  - When the server is shut down by the clpdown command, the OS shutdown command or WebManager and the failover group successfully stops
  - When the cluster is stopped by the clpcl command or WebManager and the failover group successfully stops
  - When the server fails and there is no failover group to perform failover from the failing server to another server (including when the failover group is not activated in the failing server)
- ◆ Forced stop is performed in the following case:
  - When the server is failing and there is a failover group to perform failover from the failing server to another server

### Commands to be used for forced stop

The ipmitool command or the hwreset command is used.

When the ipmitool command exists, use the ipmitool command. When the ipmitool command does not exist, use the hwreset command. If the commands are not installed, this function cannot be used.

Options for the ipmitool command	Options for the hwreset command	Information configured on the BMC tab of the server properties
-H [target IP address]	-N [target IP address]	IP address
-U [user name]	-U [user name]	User name
-P [password]	-P [password]	Password

See “IPMI command” for options used for the actions.

## Notes on the forced stop

- ◆ Versions of ipmiutil  
When you use the hwreset command, use ipmiutil 1.7.9-1 or later.
- ◆ Notes on ipmitool and hwreset  
See “IPMI commandIPMI command” in “Monitor Resource”.
- ◆ Impacts of forced stop  
When you use the forced stop function, the following functions are influenced because power off, reset, power cycle or NMI is forcibly performed regardless of the OS or server status.
  - Dump collection  
Since it is not recognized that dump files are being collected, power off, reset or power cycle is performed even though dump collection is being performed, so dump collection does not complete.
  - Power on within the heartbeat timeout  
When the server is powered on again for the purpose of maintenance etc. within heartbeat timeout, power off, reset, power cycle or NMI may occur after heartbeat timeout has elapsed.
- ◆ BMC network settings  
Configure the settings so that the IP address of the LAN port for BMC management and the IP address which OS uses can communicate with each other. This function cannot be used in the environment where the network for the BMC management is blocked.  
Set the same IP address that is configured in the LAN port for the BMC management to the BMC tab of the server properties.  
See the server’s manuals etc. for information on how to configure the IP address of the LAN port for the BMC management etc.

For configuration, see the **Recovery** tab in Cluster Properties and **BMC** tab in Server Properties.

## Supported commands

Operations have been checked for the following distributions and commands.

Distribution	Versions of ipmiutil or OpenIPMI-tools	Server
Red Hat Enterprise Linux AS 4 (update6)	OpenIPMI-tools-1.4.14-1.4E.20	Express5800/120Rg-1
Red Hat Enterprise Linux 5 (update1)	ipmiutil-1.7.9-1.x86_64.rpm	Express5800/120Rg-1
MIRACLE LINUX V4.0 SP2	OpenIPMI-tools-1.4.20-1.1AX	Express5800/120Rf-1
Asianux Server 3	OpenIPMI-tools-2.0.6-5.3	Express5800/120Rg-2

## Chassis Identify

### Chassis identify

This function allows for the other normal server to report the server failure by blinking the chassis ID lamp of a failing server by using the IPMI function when it recognizes that the server is failing

### Conditions for chassis ID lamp to blink

- ◆ The chassis ID lamp does not blink in the following cases:
  - When the status other than server status becomes abnormal
  - When cluster shutdown is performed
  - When all the servers in the cluster fail  
When the servers do not go down simultaneously, they blink for 250 seconds at the maximum, and eventually the chassis ID lamps of all servers go off.
  - When BMC of the failing server cannot communicate with the normal server
  - When there are normal servers in the cluster but ExpressCluster is stopped
- ◆ The chassis ID lamp blinks in the following cases (the above conditions for not blinking are given priority over these conditions when they overlap):
  - When some of the servers in the cluster fail due to some abnormality
  - When some of the servers in the cluster are shut down by the shutdown command of the OS.
  - When some of the servers in the cluster are shut down by the clpdown command or WebManager
  - When ExpressCluster is stopped by the clpcl command or WebManager in some of the servers in the cluster
  - When the init script (clusterpro) is made to be off in some of the servers in the cluster by the chkconfig and their OS is started
- ◆ Chassis ID lamp stops blinking and goes off in the following cases:
  - When there are normal servers in the cluster, and the server status of the failing server returns to normal

### Behavior of the chassis ID lamp blinking when the cluster stops

If the chassis ID lamp of a server in the cluster is in the blinking status when the cluster stops, the chassis ID lamp will behave as the following.

- It may keeps blinking for 250 seconds at the maximum.

### Commands to be used for chassis identify

The ipmitool command or the alarms command is used.

When the `ipmitool` command exists, use the `ipmitool` command. When the `ipmitool` command does not exist, use the `alarms` command. If the commands are not installed, this function cannot be used.

Options for the <code>ipmitool</code> command	Options for the <code>alarms</code> command	Information configured on the BMC tab of the server properties
-H [target IP address]	-N [target IP address]	IP address
-U [user name]	-U [user name]	Use name
-P [password]	-P [password]	Password

## Notes on Chassis identify

- ◆ Versions of `ipmiutil`  
When you use the `alarms` command, use `ipmiutil 1.7.9-1` or later.
- ◆ Notes on `ipmitool` and `hwreset`  
See “IPMI commandIPMI command” in “Monitor Resource”.
- ◆ BMC network settings  
Configure the settings so that the IP address of the LAN port for BMC management and the IP address which OS uses can communicate with each other. This function cannot be used in the environment where the network for the BMC management is blocked.  
Set the same IP address that is configured in the LAN port for the BMC management to the BMC tab of the server properties.  
See the server’s manuals etc. for information on how to configure the IP address of the LAN port for the BMC management etc.

For configuration, see Alert Service tab in “Cluster” and BMC tab in “Server” in this guide.

## Supported commands

Operations have been checked for the following distributions and commands.

Distribution	Versions of <code>ipmiutil</code> or <code>OpenIPMI-tools</code>	Server
Red Hat Enterprise Linux AS 4 (update6)	<code>OpenIPMI-tools-1.4.14-1.4E.20</code>	Express5800/120Rg-1
Red Hat Enterprise Linux 5 (update1)	<code>ipmiutil-1.7.9-1.x86_64.rpm</code>	Express5800/120Rg-1
MIRACLE LINUX V4.0 SP2	<code>OpenIPMI-tools-1.4.20-1.1AX</code>	Express5800/120Rf-1
Asianux Server 3	<code>ipmiutil-1.7.9-1.x86_64.rpm</code>	Express5800/120Rg-2
Oracle Enterprise Linux 5	<code>OpenIPMI-tools-2.0.6-5.el5.4</code>	Express5800/120Rg-2

## Alert Service

### What is Alert Service?

ExpressCluster X Alert Service (hereafter Alert Service) is a function to report failures mentioned above found in ExpressCluster-installed cluster systems to system administrators in remote locations.

Failures are reported in two ways, each serving a different purpose.

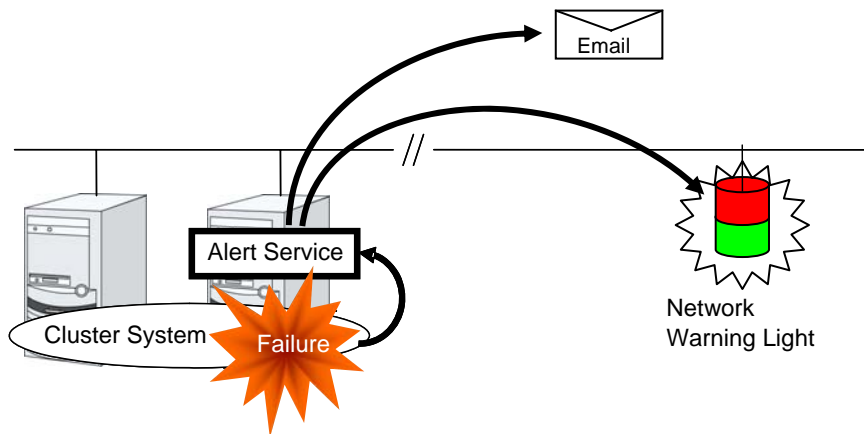
**(1) E-mail report**

Alert messages in the WebManager are sent by e-mail to administrators.

**(2) Network Warning light**

The network warning light is a visual display of the status of the server. When the server shuts down successfully, the network warning light goes off.

The e-mail report and the network warning light function work independently of each other.



Alert Service allows you to:

- ◆ Receive information about failures while not physically located in the same place as the management PC. This is achieved via e-mail reporting function.
- ◆ Receive e-mail messages on your mobile phone.
- ◆ Visually be alerted of failures by viewing the network warning light.

### Notes on Alert Service

- ◆ To use this function, ExpressCluster X Alert Service 2.1 for Linux is required.
- ◆ The task of Alert Service is to send the first report of failure but not to examine or find the cause of failure. When a failure occurs, instead of using the Alert Service, try other methods, such as viewing ExpressCluster logs or syslog, to find out the cause of the error.

## Mail report actions

Alert Service sends the same messages as the WebManager. See “Messages reported by syslog, alert and/or mail” in Chapter 12, “Error messages” in the *Reference Guide* for information on which messages to be sent.

You can change the alerts that are reported by e-mail. For more information, see Alert Service Tab in “Cluster” in this guide.

## Network Warning Light status

A network warning light changes its status when:

**(1)** the server is started

When the server starts up successfully, warning light changes to green.

**(2)** the server shuts down

When the server shuts down successfully, warning light goes off.

**(3)** the server fails

When the server fails, its warning light flashes in red. If all servers in the cluster fail, the warning light of the server that failed last will not work because the network warning light is controlled by a normal server that monitors other servers.

Once the network warning light is lit or starts flashing, it will not go off until the cluster shuts down. Run the `clpdn1000s` command introduced in the following section to put the light out. For more information on the `clpdn1000s` command, see “ExpressCluster command reference” in the *Reference Guide*.



## **Section III    Maintenance information**

This section provides information on operation and maintenance of the ExpressCluster system.

- Chapter 10 The system maintenance information
- Chapter 11 Troubleshooting
- Chapter 12 Error messages



# Chapter 10    The system maintenance information

This chapter provides information you need for maintenance of your ExpressCluster system. Resources to be managed are described in detail.

This chapter covers:

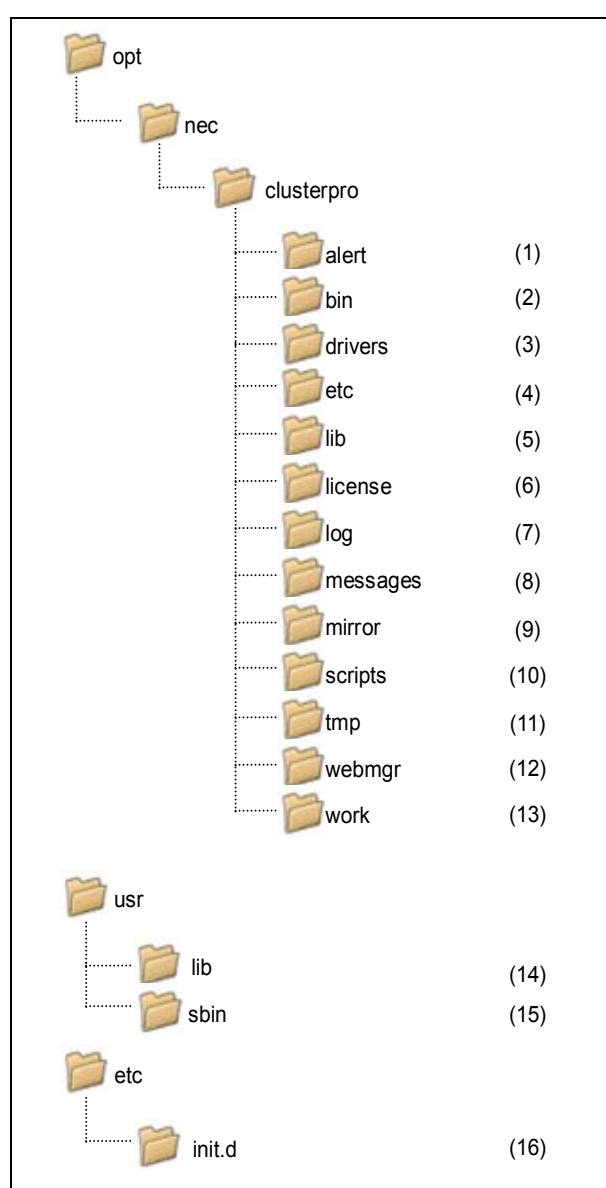
• Directory structure of ExpressCluster.....	902
• Communication ports .....	904
• Cluster driver device information .....	906
• What causes servers to shut down .....	907
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## Directory structure of ExpressCluster

**Note:**

You will find executable files and script files that are not described in Chapter 4, “ExpressCluster command reference” under the installation directory. Run these files only with ExpressCluster. Any failure or trouble caused by executing them by applications other than ExpressCluster is not supported.

ExpressCluster directories are structured as described below:



1. Directory for alert synchronization  
This directory stores ExpressCluster Alert Synchronization's modules and management files.
2. Directory for cluster modules  
This directory stores the ExpressCluster Server's executable files.
3. Directory for cluster drivers
  - Mirror driver  
This directory stores the executable files of the data mirror driver.
  - Kernel mode LAN heartbeat, keepalive driver  
This directory stores the executable files of the kernel mode LAN heartbeat and keepalive driver.
4. Directory for cluster configuration data  
This directory stores the cluster configuration files and policy file of each module.
5. Directory for cluster libraries  
This directory stores the ExpressCluster Server's library.
6. Directory for licenses  
This directory stores licenses for licensed products.
7. Directory for module logs  
This directory stores logs produced by each module.
8. Directory for report messages (alert, syslog, mail)  
This directory stores alert, syslog and mail messages reported by each module.
9. Directory for mirror disk and hybrid disk  
This directory stores the executable files and policy files etc. of the modules for mirror disk and hybrid disk.
10. Directory for EXEC resource script of group resources  
This directory stores EXEC resource scripts of group resources.
11. Directory for temporary files  
This directory stores archive files created when logs are collected.
12. Directory for the WebManager  
This directory stores the ExpressCluster WebManager's modules and management files.
13. Directory for module tasks  
This is a work directory for modules.
14. /usr/lib (usr/lib64)  
This directory stores the symbolic links to the ExpressCluster Server's library. When the architecture of the ExpressCluster Server is x86\_64 or ppc64, this directory is /usr/lib64.
15. /usr/sbin  
This directory stores the symbolic links to the ExpressCluster Server's executable files.
16. /etc/init.d  
This directory stores the ExpressCluster Server's Start/Stop scripts.

## Communication ports

ExpressCluster uses several port numbers. Change the firewall settings so that ExpressCluster can use some port numbers.

The following is the list of port numbers used in ExpressCluster:

Server to Server (Roopback in Server)					
					Used for
Server	Automatic allocation <sup>1</sup>	–	Server	29001/TCP	Internal communication
Server	Automatic allocation	–	Server	29002/TCP	Data transfer
Server	Automatic allocation	–	Server	29002/UDP	Heartbeat
Server	Automatic allocation	–	Server	29003/UDP	Alert synchronization
Server	Automatic allocation	–	Server	29004/TCP	Communication between mirror agents
Server	Automatic allocation	–	Server	29006/UDP	Heartbeat (kernel mode)
Server	Automatic allocation	–	Server	XXXX <sup>2</sup> /TCP	Mirror disk resource data synchronization
Server	Automatic allocation	–	Server	XXXX <sup>3</sup> /TCP	Communication between mirror drivers
Server	Automatic allocation	–	Server	XXXX <sup>4</sup> /TCP	keepalive between mirror drivers
Server	Automatic allocation	–	Server	icmp	Communication between mirror drivers  Duplication check of FIP/VIP resource  Mirror agent
Server	Automatic allocation	–	Server	XXXX <sup>5</sup> /UDP	Internal communication for log

WebManager to Server					
					Used for
WebManager	Automatic allocation	–	Server	29003/TCP	http communication

Server connected to the Integrated WebManager to target server					
					Used for
Server connected to	Automatic	–	Server	29003/TCP	http

the Integrated WebManager	allocation				communication
---------------------------	------------	--	--	--	---------------

Others					
					Used for
Server	Automatic allocation	–	Network warning light	514/TCP	Network warning light control
Server	Automatic allocation	–	BMC Management LAN of the server	623/UDP	BMC control (Forced stop/chassis identify)
Server	Automatic allocation	–	Monitoring target	icmp	IP monitor
Server	Automatic allocation	–	NFS Server	icmp	Monitoring if NFS server of NAS resource is active
Server	Automatic allocation	–	Monitoring target	icmp	Monitoring target of PING method of network partition resolution resource

1. In automatic allocation, a port number not being used at a given time is allocated.
2. This is a port number used on a mirror disk/hybrid disk resource basis and is set when creating mirror disk resource or hybrid disk. A port number 29051 is set by default. When you add a mirror disk resource or hybrid disk, this value is automatically incremented by 1. To change the value, click **Detail** tab of **Mirror Disk Resource Properties** or **Hybrid Disk Resource Properties** in the Builder. For more information, refer to Chapter 5, “Group resource details” in Reference Guide.
3. This is a port number used on a mirror disk resource/hybrid disk basis and is set when creating mirror disk resource or hybrid disk. A port number 29031 is set by default. When you add a mirror disk resource or a hybrid disk, this value is automatically incremented by 1. To change the value, click **Detail** tab of **Mirror Disk Resource Properties** or **Hybrid Disk Resource Properties** in the Builder. For more information, refer to Chapter 5, “Group resource details” in Reference Guide.
4. This is a port number used on a mirror disk resource/hybrid disk basis and is set when creating mirror disk resource or hybrid disk. A port number 29071 is set by default. When you add a mirror disk resource/hybrid disk, this value is automatically incremented by 1. To change the value, click **Detail** tab of **Mirror Disk Resource Properties** or **Hybrid Disk Resource Properties** in the Builder. For more information, refer to Chapter 5, “Group resource details” in Reference Guide.
5. In the **Port Number (log)** tab in **Cluster Properties**, select **UDP** for log communication, and use the port number configured at Port Number. The default log communication method, **UNIX Domain**, does not use a communication port.

## Cluster driver device information

- The mirror driver uses 218 as the major number. Make sure that no other driver uses this major number.
- The kernel mode LAN heartbeat driver uses 10 as the major number, and 240 as the minor number. Make sure that no other driver uses these major and minor numbers.
- The keepalive driver uses 10 as the major number, and 241 as the minor number. Make sure that no other driver uses these major and minor numbers.

## What causes servers to shut down

When any one of the following errors occurs, ExpressCluster shuts down, resets servers, or performs panic of servers to protect resources.

### Final action for an error in resource activation or deactivation

When the final action for errors in resource activation/deactivation is specified as one of the following:

Final action	Result
The cluster daemon stops and the OS shuts down.	Causes normal shutdown after the group resources stop.
The cluster daemon stops and the OS reboots.	Causes normal reboot after the group resources stop.
Sysrq Panic	Performs a panic upon group resource activation/deactivation error.
Keepalive Reset	Performs a reset upon group resource activation/deactivation error.
Keepalive Panic	Performs a panic upon group resource activation/deactivation error.
BMC Reset	Performs a reset upon group resource activation/deactivation error.
BMC Power Off	Performs a power off upon group resource activation/deactivation error.
BMC power Cycle	Performs a power cycle upon group resource activation/deactivation error.
BMC NMI	Causes NMI upon group resource activation/deactivation error.

### Final action at detection of an error in monitor resource

When the final action for errors in monitor resource monitoring is specified as one of the following:

Final action	Result
Stop cluster daemon and shut down the OS	Causes normal shutdown after the group resources stop.
Stop cluster daemon and reboot the OS	Causes normal reboot after the group resources stop.
Sysrq Panic	Causes panic when an error is detected in monitor resource.
Keepalive Reset	Causes reset when an error is detected in monitor resource.
Keepalive Panic	Causes panic when an error is detected in monitor resource.
BMC Reset	Causes reset when an error is detected in monitor resource.
BMC Power Off	Causes power off when an error is detected in monitor resource.

BMC Power Cycle	Causes power cycle when an error is detected in monitor resource.
BMC NMI	Causes NMI when an error is detected in monitor resource.

## Forced stop action

When forced stop is configured as “used”.

Final action	Result
BMC reset	Causes reset in the failing server in which a failovergroup existed.
BMC power off	Causes power off in the failing server in which a failovergroup existed.
BMC power cycle	Causes power cycle in the failing server in which a failovergroup existed.
BMC NMI	Causes NMI in the failing server in which a failovergroup existed.

## Emergency cluster shutdown

When an abnormal termination is detected in any of the following processes, ExpressCluster causes the normal shutdown after the group resources stopped.

- `clprc`
- `clprm`
- `clpnm`
- `clpmdagent`

## Resource deactivation error in stopping the ExpressCluster daemon

When deactivating a resource by running `clpcl -t`, which stops the ExpressCluster daemon fails, ExpressCluster causes a shutdown.

## Stall detection in user space

When a server stalls longer than the heartbeat time-out, ExpressCluster causes the OS hardware reset.

## Stall detection during shutdown process

When a server comes to stall in the process of the OS shutdown, ExpressCluster causes the OS hardware to reset.

## Recovery from network partitioning

When any network partition resolution resources are not set, if all heartbeats are disrupted (network partitioning), both servers failover to each other. As a result, groups are activated on both servers. Even when network partition resolution resources are set, groups may be activated on both servers.

If interconnections are recovered from this condition, ExpressCluster causes shutdown on both or one of the servers.

For details of network partitioning, see “When network partitioning occur” on page 973.

## Network partition resolution

In a cluster system where network partition resolution resources are configured, the network partition resolution is performed when all heartbeats are interrupted (network partition). If this is determined to be caused by the network partitions, some or all servers are shut down.

For details on the network partition resolution see “Details on network partition resolution resources” in this guide.

## **Mirror disk error ~For Replicator~**

When an error occurs in a mirror disk, the mirror driver causes reset.

## **Hybrid disk error ~For Replicator DR~**

When an error occurs in a hybrid disk, the mirror driver causes reset.

## Configuring the settings to temporarily prevent execution of failover

Follow the steps below to temporarily prevent failover caused by a failed server or detection of an error during monitoring from occurring.

1. Temporarily adjust time-out

By temporarily adjusting time-out, you can prevent a failover caused by a failed server from occurring.

The `clptoratio` command is used to temporarily adjust time-out. Run the `clptoratio` command on one of the servers in the cluster.

(Example) To prevent a failover for an hour when the heartbeat time-out is set to 90 seconds:

```
clptoratio -r 40 -t 1h
```

See Chapter 4, “ExpressCluster command reference” for more information on the `clptoratio` command.

2. Suspending monitoring operation of monitor resources

By suspending monitoring operations, a failover caused by monitoring can be prevented.

The `clpmonctrl` command is used to suspend monitoring. Run the `clpmonctrl` command on all servers in the cluster.

(Example) To suspend all monitoring operations:

```
clpmonctrl -s
```

See Chapter 4, “ExpressCluster command reference” for more information on the `clpmonctrl` command.

Follow the steps below to cancel the settings that prevent a failover when such settings are no longer necessary.

1. Cancel the temporarily adjusted time-out

Cancel temporary adjustment of time-out. Run the `clptoratio` command on one of the servers in the cluster.

```
clptoratio -i
```

See Chapter 4, “ExpressCluster command reference” for more information on the `clptoratio` command.

2. Resume monitoring operation by monitor resources

Resume the monitoring operation. Run the `clpmonctrl` command on all servers in the cluster.

(Example) To resume all monitoring operations:

```
clpmonctrl -r
```

See Chapter 4, “ExpressCluster command reference” for more information on the `clpmonctrl` command.

## How to replace a server with a new one ~For a shared disk~

### When using online version Builder

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Install the ExpressCluster Server to the new server.  
For details, see Chapter 3, “Installing ExpressCluster” in the Installation and Configuration Guide. The server on which you installed the ExpressCluster Server should be restarted after the installation.
2. Start the online version Builder on the WebManager you connected to.
3. Upload the cluster configuration data on the Builder.
4. Start the services of a new server on the WebManager. For details on how to start services, see “Operating a cluster by using the WebManager” in Chapter 1, “Functions of the WebManager.”

### When using offline version Builder

Before you replace a server in the cluster with a new one, make sure to have the configuration data floppy disk that contains the information at the time a cluster was added (or if the configuration has been modified, the latest configuration data) with you.

If you do not have the above-mentioned floppy disk, you can back up the data with the `clpcfctrl` command. For details, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference.”

1. Install the ExpressCluster Server to the new server.  
For details, see Chapter 3, “Installing ExpressCluster” in the *Installation and Configuration Guide*.
2. Hand-carry the floppy disk.  
Insert the cluster configuration data floppy disk in the server where you installed the ExpressCluster Server. The server on which you installed the ExpressCluster Server should be restarted after the installation.
3. Distribute the configuration data in the floppy disk to servers.  
Do either A or B depending on the floppy disk type you used to save data by the Builder.
  - A To use the floppy disk saved by the Builder on Linux, run the following command.  

```
clpcfctrl --push -l
```
  - B To use the floppy disk (1.44-MB formatted) saved by the Builder on Windows, or on Linux for use on Windows, run the following command.  

```
clpcfctrl --push -w
```

You see the following message if the data has successfully been distributed.

```
Command succeeded. (code:0)
```

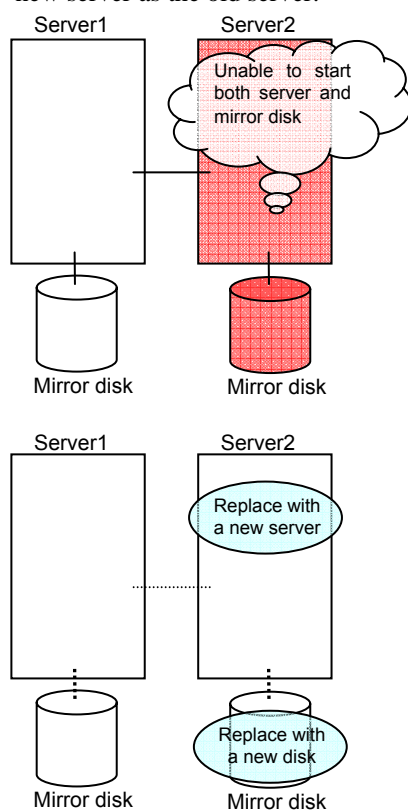
For information on troubleshooting `clpcfctrl` problems, see Chapter 4, “ExpressCluster command reference” in this guide.
4. Remove the cluster configuration data floppy disk from the drive. Restart the server on which the ExpressCluster Server was installed.

## How to replace a server with a new one ~For a mirror disk~

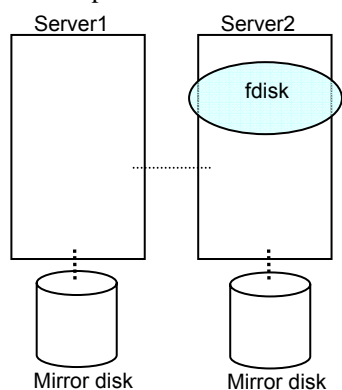
### Replacing a server and its mirror disk (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Replace the failed server machine and the disk. Set the same IP address and host name in the new server as the old server.



2. Create partitions in the new disk by executing the fdisk command.



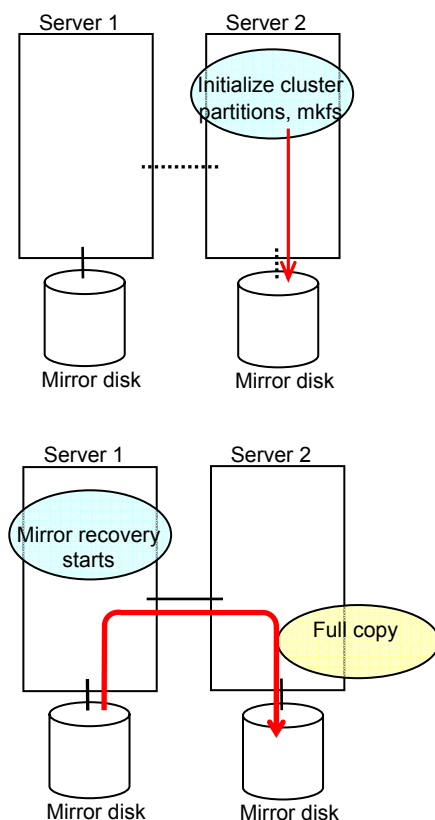
Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the Installation and Configuration Guide. The server on which you installed the ExpressCluster Server should be restarted after the installation.

3. When using the disk that was used as a mirror disk before, initialize the cluster partition.
4. Start the online version Builder on the WebManager you connected to.
5. Upload the cluster configuration data on the online version Builder. When uploading the data completes, restart the replaced server.
6. After the server is restarted, the cluster partitions in the new disk will be initialized and a file system will be created in the data partition. Disk mirroring is automatically recovered if the auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 993 and “Recovering mirror using the WebManager” on page 1000.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Mirror-related commands” in Chapter 4, “ExpressCluster command reference” in this guide.

```
clpmdstat --mirror < mirror_disk_resource_name (Example: md1) >
```



## Replacing a server and its mirror disk (when using offline version Builder)

Before you replace a server in the cluster with a new one, make sure to have the configuration data floppy disk that contains the information at the time server was added to the cluster (or if the configuration has been modified, the latest configuration data) with you.

If you do not have the above-mentioned floppy disk at hand, you can back up the data with the `clpcfctrl` command. For details, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference” in this guide.

---

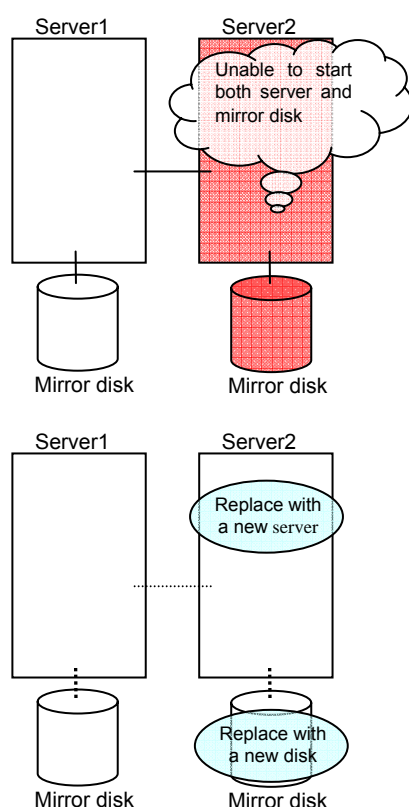
### Related Information:

For detailed information on the `clpcfctrl` command, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference” in this guide.

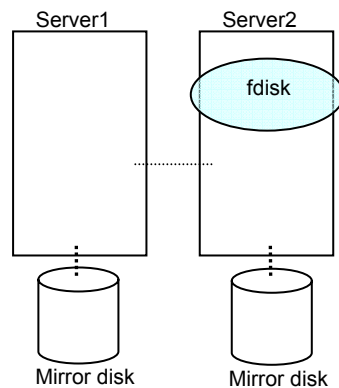
To see how to stop and start daemons, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.

---

1. Replace the failed server machine and the disk. Set the same IP address and host name in the new server as the old server.



2. Create partitions in the new disk by executing the fdisk command.



3. Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the *Installation and Configuration Guide*.
4. Hand-carry the floppy disk. Insert the cluster configuration data floppy disk in the server where you installed the ExpressCluster Server. The server on which you installed the ExpressCluster Server should be restarted after the installation.
5. Distribute the configuration data in the floppy disk to servers. Do either A or B depending on the floppy disk type you used to save data by the Builder.
  - A To use the floppy disk saved by the Builder on Linux, run the following command.
 

```
clpcfctrl --push -l
```
  - B To use the floppy disk (1.44-MB formatted) saved by the Builder on Windows, or on Linux for use on Windows, run the following command.
 

```
clpcfctrl --push -w
```

You see the following message if the data has successfully been distributed.

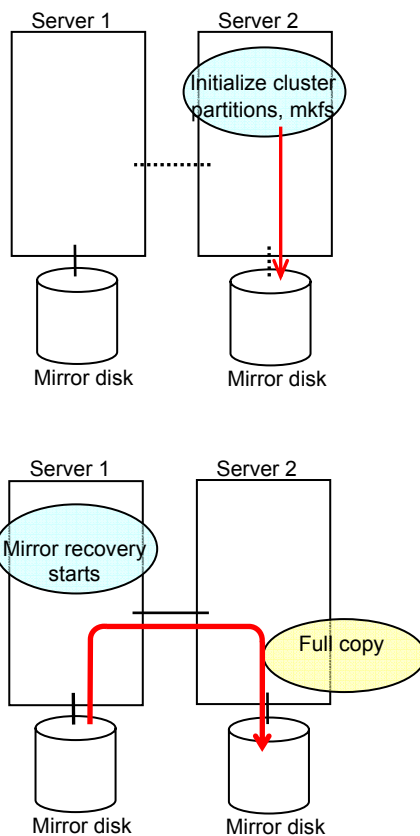
```
Command succeeded. (code:0)
```

For troubleshooting of clpcfctrl problems, see Chapter 4, “ExpressCluster command reference” in this guide.
6. When using the disk that was used as a mirror disk before, initialize the cluster partition.
7. Remove the cluster configuration data floppy disk from the floppy disk drive. Restart the server that the ExpressCluster Server was installed.
8. After the server is restarted, the cluster partitions in the new disk will be initialized and a file system will be created in the data partition. Disk mirroring is automatically recovered if the auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 993 and “Recovering mirror using the WebManager” on page 1000.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Mirror-related commands” in Chapter 4, “ExpressCluster command reference” in this guide.

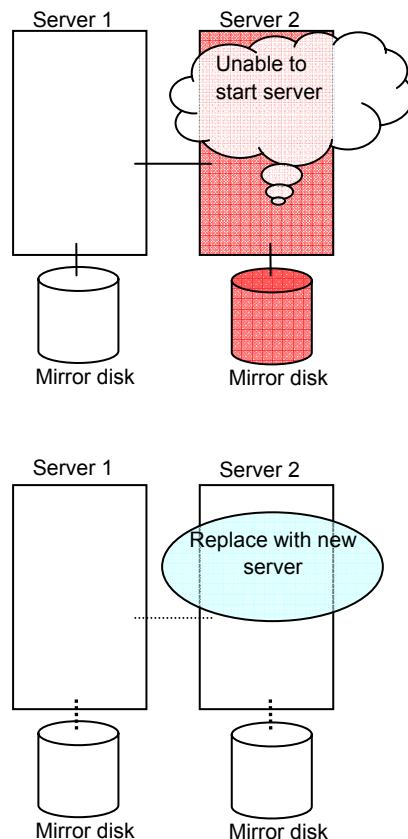
```
clpmdstat --mirror < mirror_disk_resource_name (Example: md1) >
```



## Using the mirror disk of the failed server (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Replace the failed server machine but continue using the mirror disk of the failed server. Set the same IP address and host name in the new server as before.



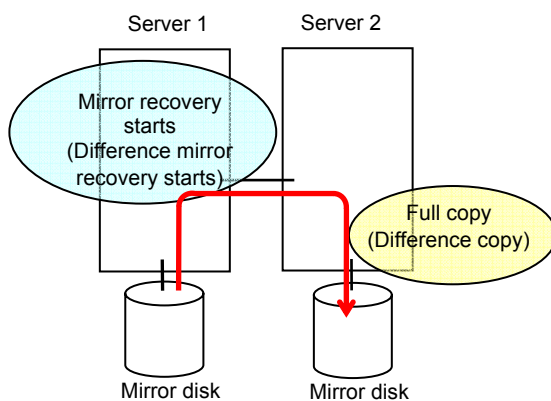
Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the Installation and Configuration Guide. Restart the server on which the ExpressCluster Server was installed.

2. Start the online version Builder on the WebManager you connected to.
3. Upload the cluster configuration data on the online version Builder. When uploading the data completes, restart the replaced server.
4. If there is no difference in mirror disks, you can immediately start the operation after restarting the server. On the other hand, if there is any difference in mirror disks, you have to recover the mirroring data after restarting the server.  
The disk mirroring is automatically recovered when auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 993 and “Recovering mirror using the WebManager” on page 1000.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Mirror-related commands” in Chapter 4, “ExpressCluster command reference.”

```
clpmdstat --mirror < mirror_disk_resource_name (Example: md1)>
```



## Using the mirror disk of the failed server (when using offline version Builder)

Before you replace a server in the cluster with a new one, make sure to have the configuration data floppy disk that contains the information at the time server was added to the cluster (or if the configuration has been modified, the latest configuration data) with you.

If you do not have the above-mentioned floppy disk at hand, you can back up the data with the `clpcfctrl` command. For details, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference” in this guide.

---

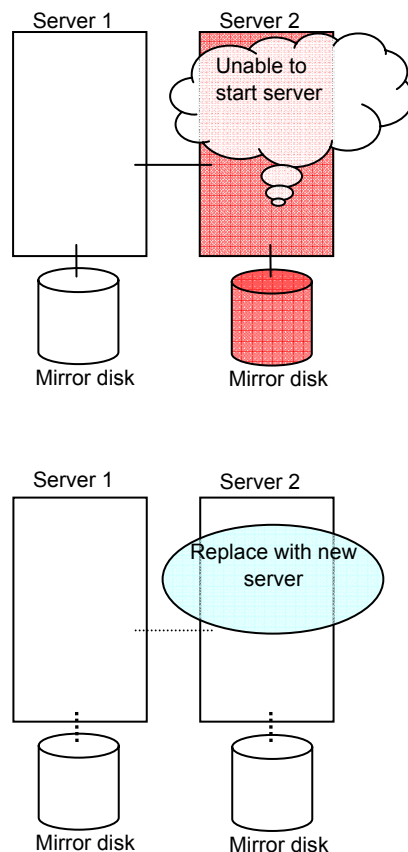
**Related Information:**

For detailed information on the `clpcfctrl` command, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference” in this guide.

To see how to stop and start daemons, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.

---

1. Replace the failed server machine but continue using the mirror disk of the failed server. Set the same IP address and host name in the new server as before.



2. Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the *Installation and Configuration Guide*.

3. Hand-carry the floppy disk. Insert the cluster configuration data floppy disk in the server where you installed the ExpressCluster Server. The server on which you installed the ExpressCluster Server should be restarted after the upload.
4. Distribute the configuration data in the floppy disk to servers. Do either A or B depending on the floppy disk type you used to save data by the Builder.

A To use the floppy disk saved by the Builder on Linux, run the following command.

```
clpcfctrl --push -l
```

B To use the floppy disk (1.44-MB formatted) saved by the Builder on Windows, or on Linux for use on Windows, run the following command.

```
clpcfctrl --push -w
```

You see the following message if the data has successfully been distributed.

```
Command succeeded. (code:0)
```

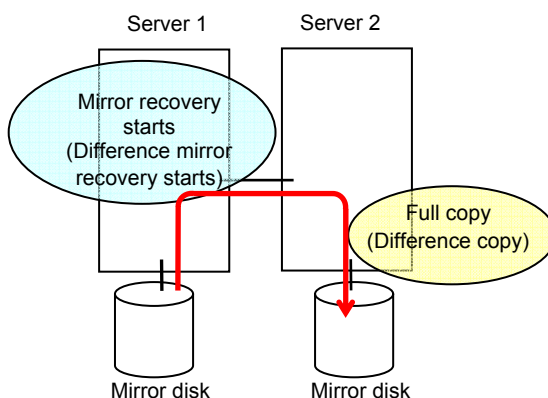
For troubleshooting of clpcfctrl problems, see Chapter 4, “ExpressCluster command reference” in this guide.

5. Remove the cluster configuration data floppy disk from the floppy disk drive. Restart the server on which the ExpressCluster Server was installed.
6. If there is no difference in mirror disks, you can immediately start the operation after restarting the server. On the other hand, if there is any difference in mirror disks, you have to recover the mirroring data after restarting the server.  
The disk mirroring is automatically recovered when auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 993 and “Recovering mirror using the WebManager” on page 1000.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Mirror-related commands” in Chapter 4, “ExpressCluster command reference.”

```
clpmdstat --mirror < mirror_disk_resource_name (Example: md1) >
```

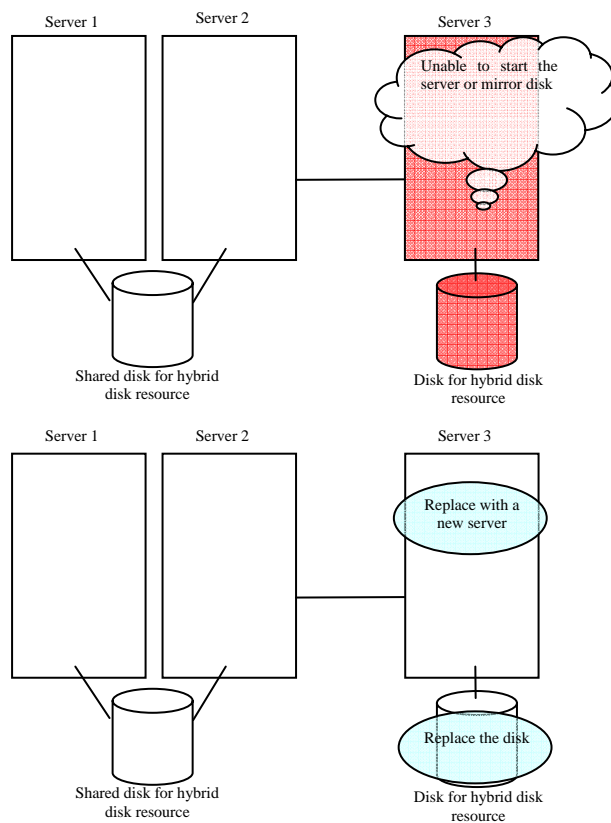


## How to replace a server with a new one ~For a hybrid disk~

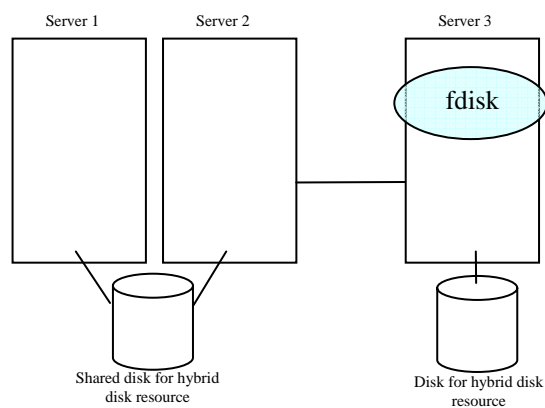
### Replacing a server and its non-shared hybrid disk (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Replace the failed server machine and the disk. Set the same IP address and host name in the new server as the old server.



2. Create partitions in the new disk by executing the fdisk command.



3. Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the Installation and Configuration Guide. The server on which you installed the ExpressCluster Server should be restarted after the installation.
4. Start the online version Builder on the WebManager you connected to.
5. Upload the cluster configuration data on the online version Builder.
6. Execute the `clphdinit` command in the replaced server.

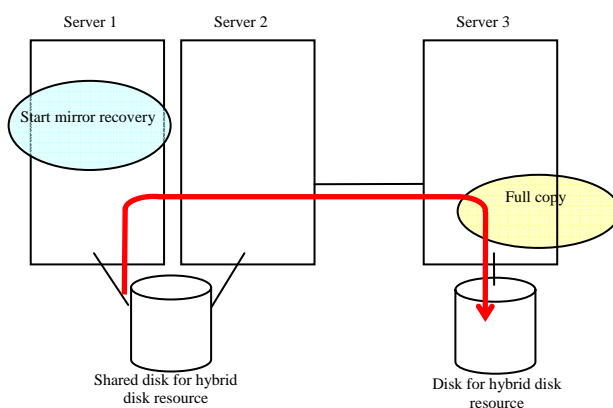
```
# clphdinit --create force <Hybrid disk resource name (Example: hd1)>
```

7. Restart the replaced server.
8. After the server is restarted, disk mirroring is automatically recovered if the auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 99364 and “Recovering mirror using the WebManager” on page 100070.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Hybrid disk operation command” in Chapter 4, “ExpressCluster command reference” in this guide.

```
clphdstat --mirror < hybrid_disk_resource_name (Example: hd1)>
```



## Replacing a server and a hybrid disk of the shared disk (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

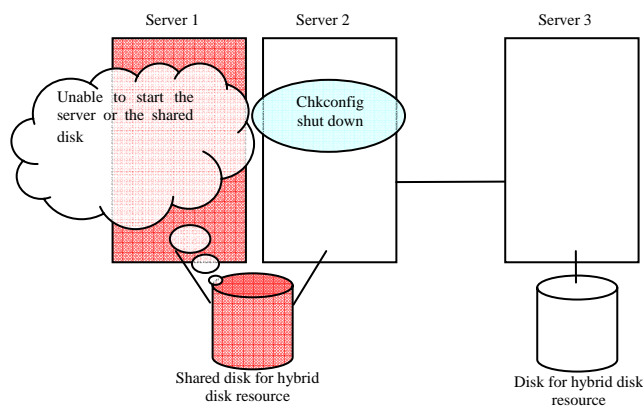
1. Run the `chkconfig` command in the following order and configure the settings not to start the ExpressCluster services in the server that was connected to the failing server via the shared disk. In SUSE Linux, run the command with the `--force` option.

```
# chkconfig --del clusterpro
```

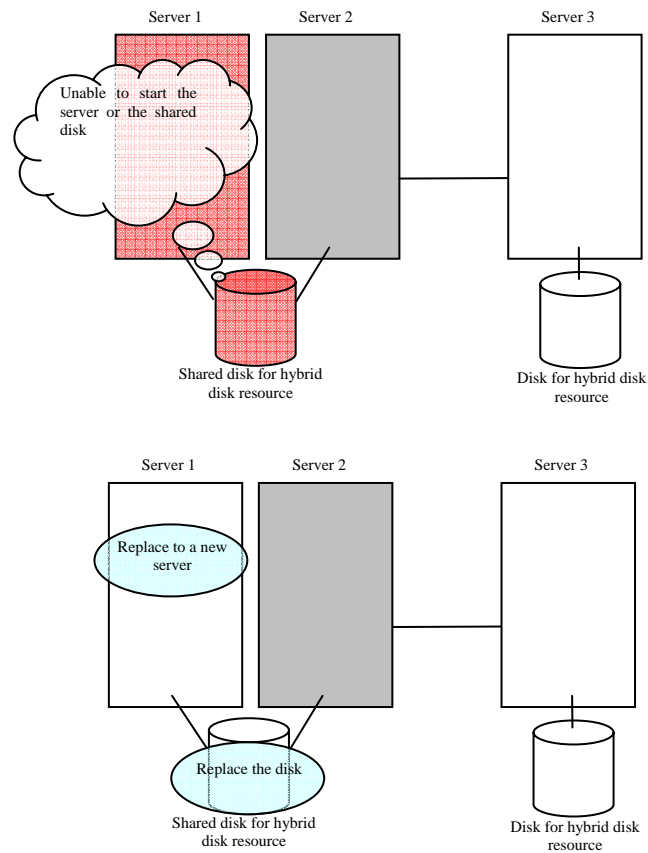
```
# chkconfig --del clusterpro_md
```

2. Shut down the server that was connected to the failing server via the shared disk by running the OS shutdown command etc.

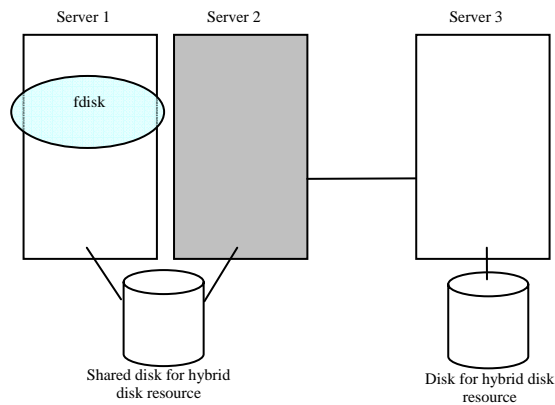
If you want to keep the operation during replacement, move the group to server 3.



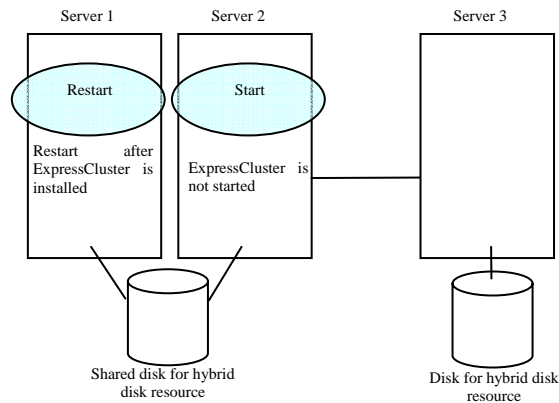
3. Replace the failed server machine and the shared disk. Set the same IP address and host name in the new server as the old server.



4. Create disk partitions from the replaced server by executing the fdisk command.



5. Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the *Installation and Configuration Guide*. The server on which you installed the ExpressCluster Server should be restarted after the installation. Start the server that was connected to the failing server via the shared disk.



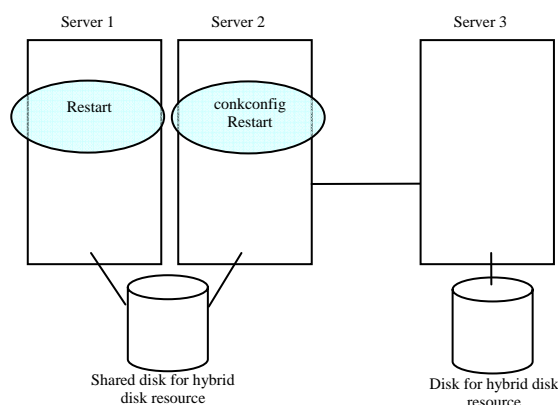
6. Start the online version Builder on the WebManager you connected to.
7. Upload the cluster configuration data from the online version Builder.
8. On the replaced server, run the clphdinit command.

```
# clphdinit --create force <hybrid disk resource name (example: hd1) >
```

9. Configure the settings to start the ExpressCluster services in the server that was connected to the failing server via the shared disk by running the chkconfig command.

```
# chkconfig --add clusterpro_md
# chkconfig --add clusterpro
```

10. Restart the replaced server and then the server that was connected to the failing server via the shared disk.



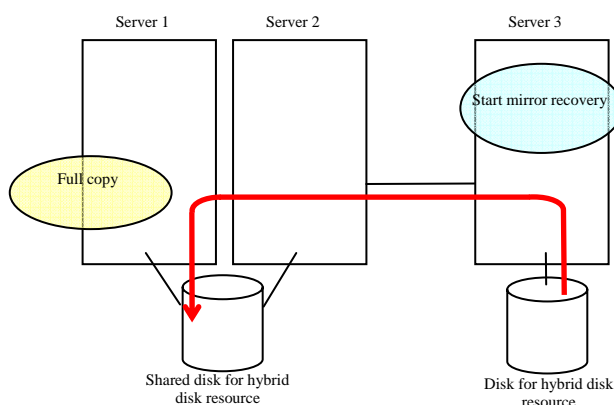
11. After the server is restarted, disk mirroring is automatically recovered if the auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to “Recovering mirror with a command” on page 993 and “Recovering mirror using the WebManager” on page 1000.

The destination server of disk mirroring is the current server of the server group to which the shared disk is connected (The figure below shows an example where the server 1 is the current server).

In mirror recovery, the data is fully copied.

Check that mirror recovery has completed by running the following command, or by using WebManager. For details, see “Hybrid disk operation command” in “Chapter 4 ExpressCluster command reference” in this manual.

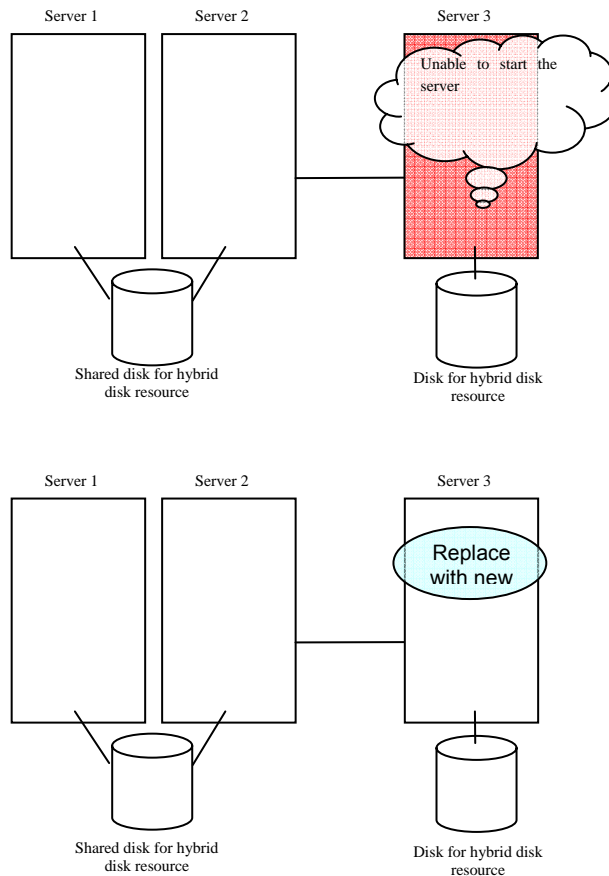
**clphdstat --mirror <hybrid disk resource name (example: hd1)>**



## Using the disk of the failed server (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Replace the failed server machine but continue using the disk of the failed server. Set the same IP address and host name in the new server as before.



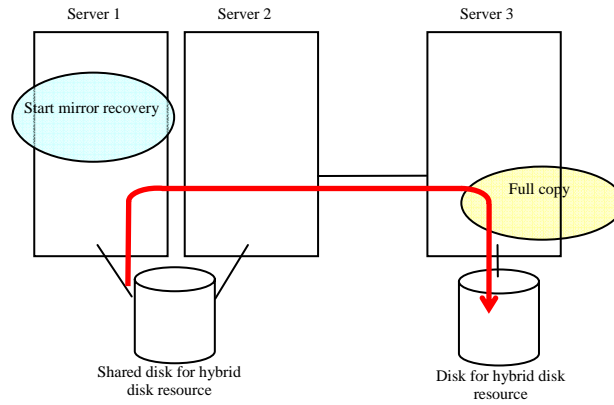
Install the ExpressCluster Server on the new server. For details, see Chapter 3, "Installing ExpressCluster" in the Installation and Configuration Guide. Restart the server on which the ExpressCluster Server was installed.

2. Start the online version Builder on the WebManager you connected to.
3. Upload the cluster configuration data on the online version Builder. When uploading the data completes, restart the replaced server.
4. If there is no difference in mirror disks, you can immediately start the operation after restarting the server. On the other hand, if there is any difference in mirror disks, you have to recover the mirroring data after restarting the server. The disk mirroring is automatically recovered when auto-mirror recovery is enabled. If not, you have to manually recover disk mirroring. For information on recovery of disk mirroring, refer to "Recovering mirror with a command" on page 993 and "Recovering mirror using the WebManager" on page 1000.

In mirror recovery, the data is fully copied.

Confirm that mirroring is successfully recovered by using the WebManager or by running the following command. For details, see “Mirror-related commands” in Chapter 4, “ExpressCluster command reference.”

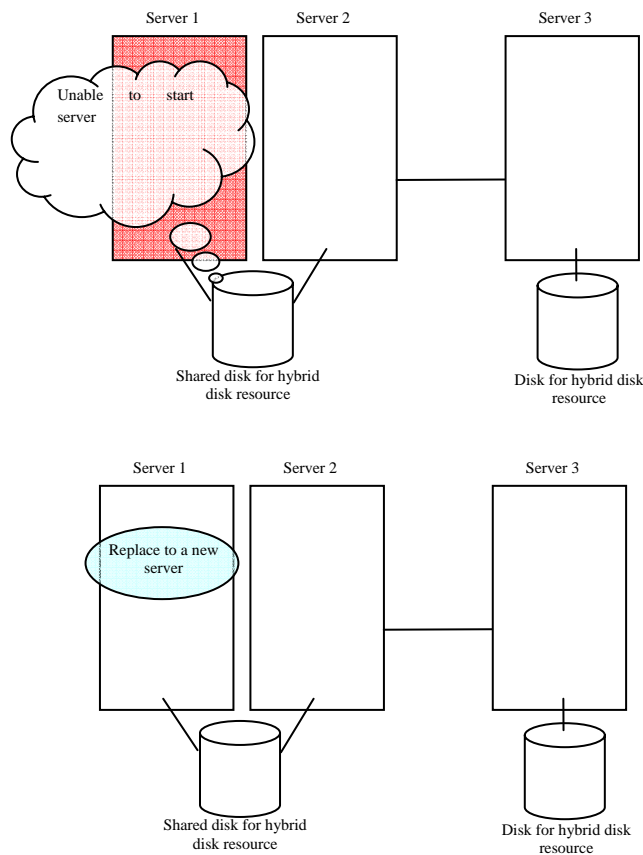
**clpmdstat --mirror < hybrid\_disk\_resource\_name (Example: hd1) >**



## Replacing a server to which the shared disk is connected (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the IP address of a server that is not to be replaced.

1. Replace the failed server machine and the shared disk. Set the same IP address and host name in the new server as the old server.



2. Install the ExpressCluster Server on the new server. For details, see Chapter 3, “Installing ExpressCluster” in the *Installation and Configuration Guide*. Restart the server on which the ExpressCluster Server was installed.
3. Start the online version Builder on the WebManager you connected to.
4. Upload the cluster configuration data on the online version Builder. When uploading the data completes, restart the replaced server.

## Wait time for synchronized cluster startup

Even all servers in a cluster are powered on simultaneously, it does not always mean that ExpressCluster will start up simultaneously on all servers. ExpressCluster may not start up simultaneously after rebooting the cluster following shutdown. Because of this, with ExpressCluster, if one server is started, it waits for other servers in the cluster to start.

By default, 5 minutes is set to the startup synchronization time. To change the default value, click **Cluster Properties** in the Builder, click **Timeout** tab, and select **Synchronize Wait Time**.

For more information, see the description for the Timeout tab in Chapter 3, “Functions of the Builder” of this guide.

## Changing disk resources file system

### How to change disk resources file system (when using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the actual IP address of any server.

To change the disk resource file system, follow the steps below:

1. From the **Service** menu on the WebManager, click **Stop Cluster**.
2. Run the following command.

For example, when the disk resources partition device is /dev/sdb5:

```
# clproset -w -d /dev/sdb5
```

This makes disk partition of disk resources readable/writable regardless of the ExpressCluster behavior.

---

**Note:**

Do not use this command for any other purposes.

If you use this command when the ExpressCluster daemon is active, the file system may be corrupted.

---

3. Create the file system in the partition device.
4. Run the following command to set the disk resources partition to ReadOnly.

For example, when the disk resources partition device is /dev/sdb5:

```
# clproset -o -d /dev/sdb5
```

5. Start the online version Builder on the WebManager you connected to.
6. Change the configuration data of disk resource file system by using the Builder.
7. Upload the cluster configuration data on the Builder.
8. From the **Service** menu on the WebManager, click **Start Cluster**.

The settings reflecting the changes become effective.

### How to change disk resources file system (when using offline version Builder)

To change the disk resource file system, follow the steps below:

1. Stop the ExpressCluster daemon.

```
# clpcl -t -a
```

2. Back up the cluster configuration data in a floppy disk. Do either A or B depending on the floppy disk type you used to save the data by Builder:

A To back up data in a floppy disk for the Builder working on Linux Web browser, run the following command:

```
# clpcfctrl --pull -l
```

B To back up data in a floppy disk for the Builder working on Windows Web browser, run the following command:

```
# clpcfctrl --pull -w
```

3. Run the following command.

For example, when the disk resources partition device is `/dev/sdb5`:

```
# clproset -w -d /dev/sdb5
```

This makes disk partition of disk resources readable/writable regardless of the ExpressCluster behavior.

---

**Note:**

Do not use this command for any other purposes.

If you use this command when the ExpressCluster daemon is active, the file system may be corrupted.

---

4. Create the file system in the partition device.
5. Run the following command to set the disk resources partition to ReadOnly.  
For example, when the disk resources partition device is `/dev/sdb5`:

```
# clproset -o -d /dev/sdb5
```
6. Change the configuration data of disk resource file system by using the Builder.
7. Distribute the configuration data in the floppy disk to the server. Do either A or B depending on the floppy disk type you used to save the data by the Builder:
  - A If you use the floppy disk created by the Builder for Linux, run the following command:

```
# clpcfctrl --push -l
```
  - B If you use the floppy disk (1.44-MB formatted) created by the Builder for Windows, run the following command:

```
# clpcfctrl --push -w
```
8. Remove the floppy disk from the floppy disk drive.

The settings reflecting the changes become effective at next ExpressCluster daemon startup.

## Changing offset or size of a partition on mirror disk resource

Follow the procedure below when changing the offset (location) or size of the data partition or cluster partition configured on a mirror disk resource after the operation of a cluster is started.

---

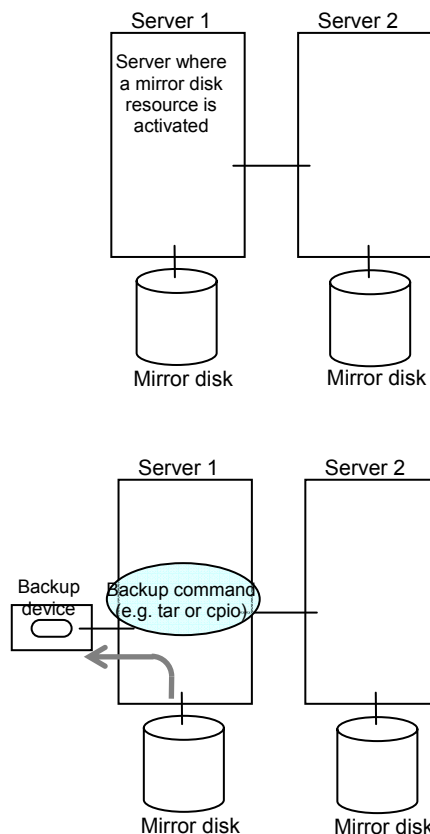
**Note:**

Be sure to follow the steps below to change them. Mirror disk resources may not function properly if you change the partition specified as a data partition or cluster partition only by `fdisk`.

---

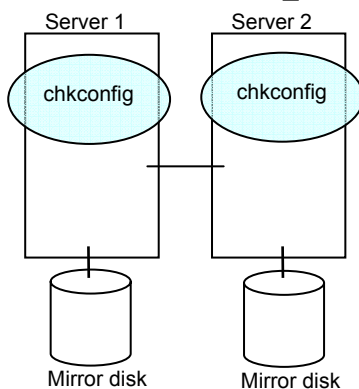
## When not changing a device name of a partition on mirror disk resource

1. Check the name of a mirror disk resource whose size you want to change by the `clpstat` command or by the WebManager.
2. On the server where a group with a mirror disk resource whose size you want to change is activated, back up the data in a partition to a device such as tape. Note that backup commands that access a partition device directly are not supported. This step is not required if there is no problem to discard the data on a mirror disk resource.

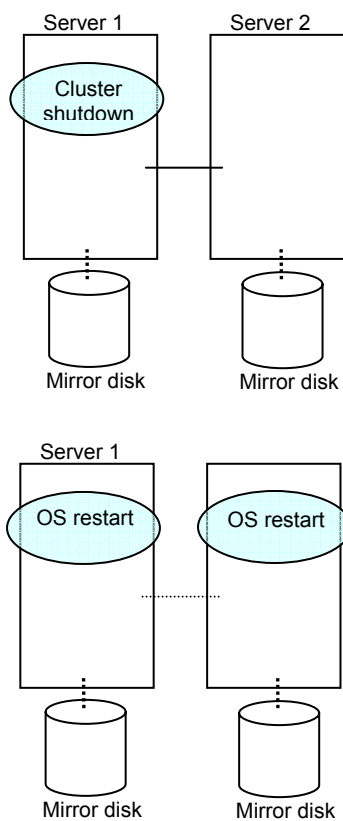


3. Run the `chkconfig` command in the following order not to start the ExpressCluster services. In SUSE Linux, run the command with the `--force` option.

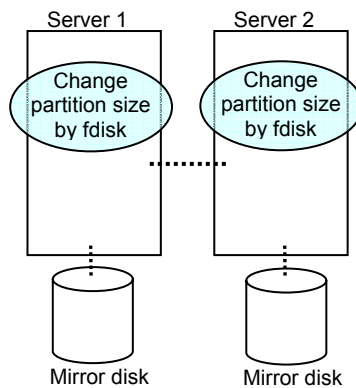
```
# chkconfig --del clusterpro
# chkconfig --del clusterpro_md
```



4. Shut down a cluster, and then restart the OS.  
To shut down a cluster, run the `clpstdn` command on either of a server, or execute a cluster shutdown on the WebManager.

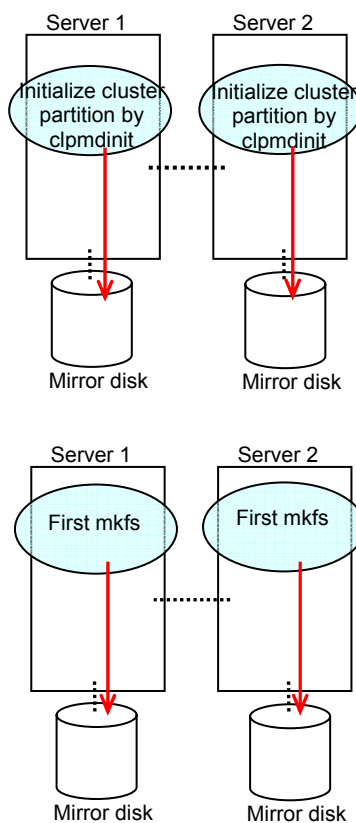


5. On both servers, run the fdisk command to change the offset or size of a partition.



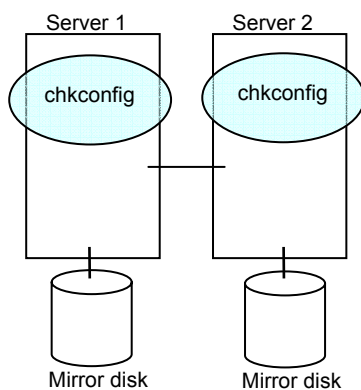
6. Change and upload the cluster configuration data. See "Uploading data only" in "Online version Builder", "Modifying the cluster configuration data" or "Uploading data only" in "Offline version Builder" in the *Installation and Configuration Guide* to change the hybrid disk resource.  
Refer to the relevant procedures since they vary between the online version Builder or the offline version Builder.
7. Run the following command on both servers.

```
# clpmdinit --create force <Mirror_disk_resource_name>
```



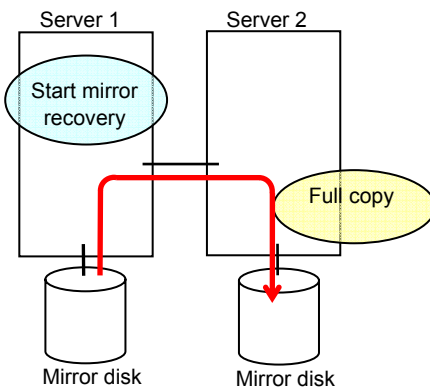
8. Run the chkconfig command in the following order to start the ExpressCluster services.

```
# chkconfig --add clusterpro_md
# chkconfig --add clusterpro
```

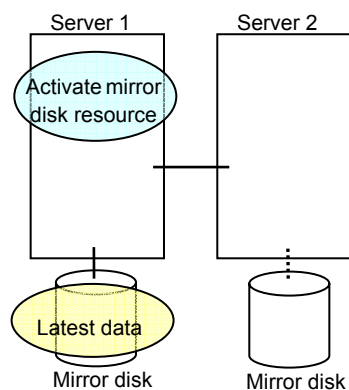


9. Run the reboot command to restart both servers. The servers are started as a cluster.
10. After a cluster is started, the same process as the initial mirror construction at cluster creation is performed. Run the following command or use the WebManager to check if the initial mirror construction is completed.

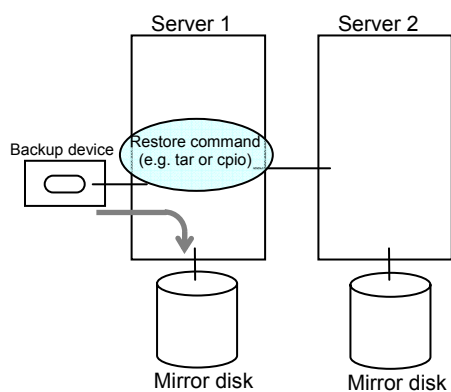
```
# clpmdstat --mirror <Mirror_disk_resource_name>
```



11. When the initial mirror construction is completed and a failover group starts, a mirror disk resource becomes active.

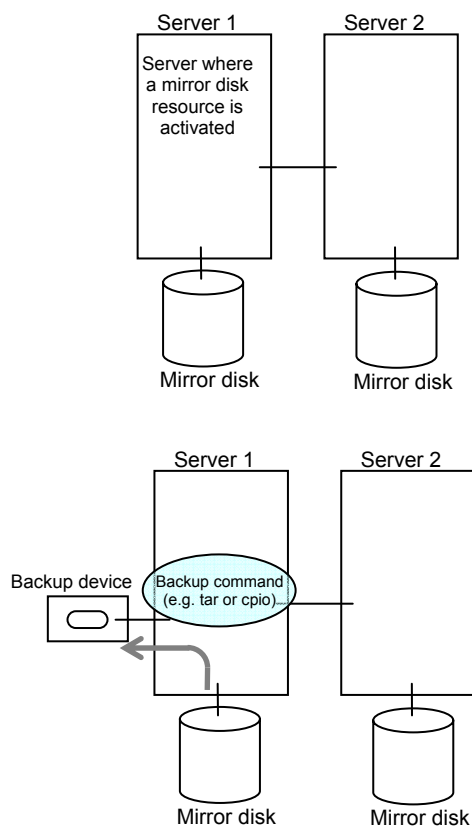


12. On the server where a group with a mirror partition whose size you changed is activated, restore the data you backed up. Note that backup commands that access a partition device directly are not supported. This step is not required if there is no problem to discard the data on a mirror disk resource.



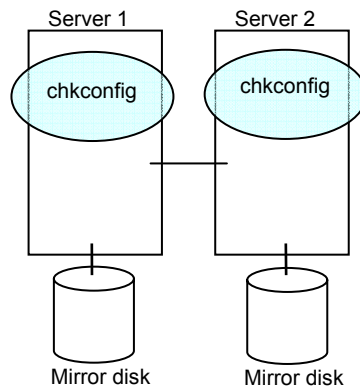
## When changing a device name of a partition on mirror disk resource

1. Check the name of a mirror disk resource whose size you want to change by the `clpstat` command or by the WebManager.
2. On the server where a group with a mirror disk resource whose size you want to change is activated, back up the data in a partition to a device such as tape. Note that backup commands that access a partition device directly are not supported. This step is not required if destroying the data on a mirror disk resource does not cause any problem.

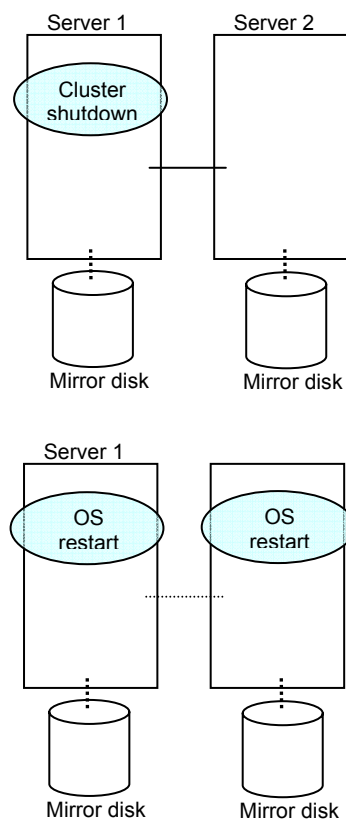


3. Run the `chkconfig` command in the following order not to start the ExpressCluster services. In SUSE Linux, execute the command with the *--force* option.

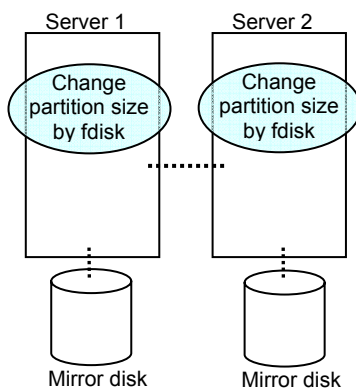
```
# chkconfig --del clusterpro
# chkconfig --del clusterpro_md
```



4. Shut down a cluster, and then restart the OS.  
To shut down a cluster, run the `clpstdn` command on either of a server, or execute a cluster shutdown on the WebManager.

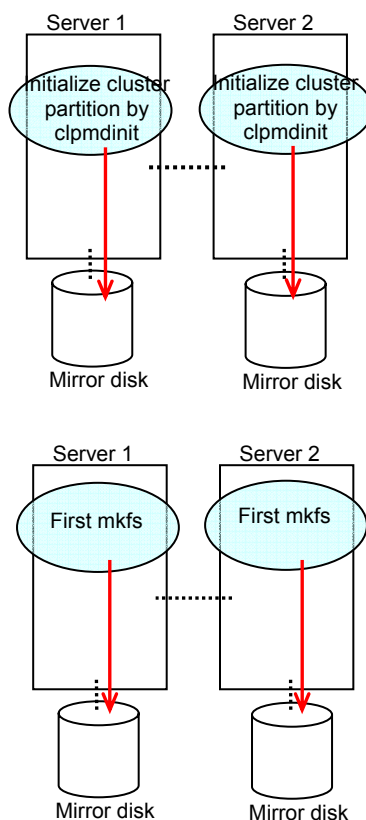


5. On both servers, run the fdisk command to change the offset or size of a partition.



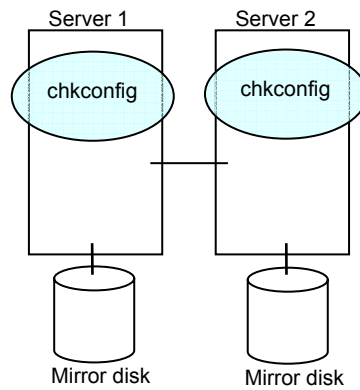
6. Change and upload the cluster configuration data. Change a mirror disk resource by referring to “Uploading data only (Online version Builder) or “Uploading data only (Offline version Builder) in “Modifying the cluster configuration data without using a floppy disk” in the *Installation and Configuration Guide*. See the corresponding steps as those are different depending on using the online or offline version Builder.
7. Run the following command on the both servers.

```
# clpmdinit --create force <Mirror_disk_resource_name>
```



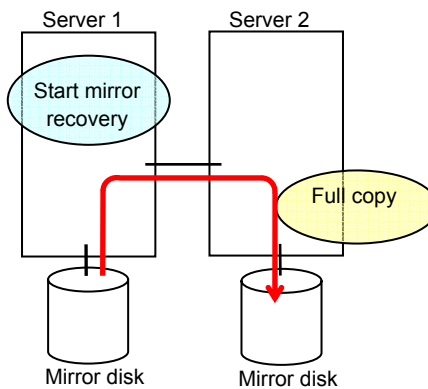
8. Run the `chkconfig` command in the following order to start the ExpressCluster services.

```
# chkconfig --add clusterpro_md
# chkconfig --add clusterpro
```

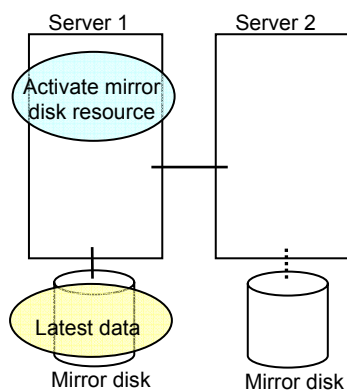


9. Run the `reboot` command to restart both servers. The servers are started as a cluster.
10. After a cluster is started, the same process as the initial mirror construction at cluster creation is performed. Run the following command or use the WebManager to check if the initial mirror construction is completed.

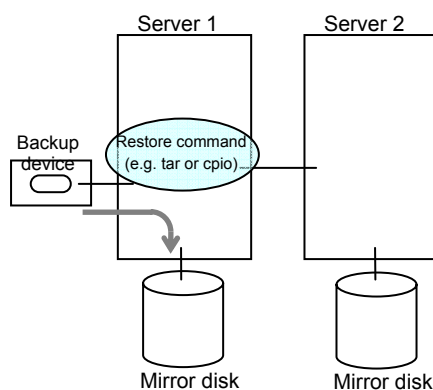
```
# clpmdstat --mirror <Mirror_disk_resource_name>
```



11. When the initial mirror construction is completed and a failover group starts, a mirror disk resource becomes active.



12. On the server where a group with a mirror partition whose size you changed is activated, restore the data you backed up. Note that backup commands that access a partition device directly are not supported.  
This step is not required if there is no problem to discard the data on a mirror disk resource.



## Changing offset or size of a partition on hybrid disk resource

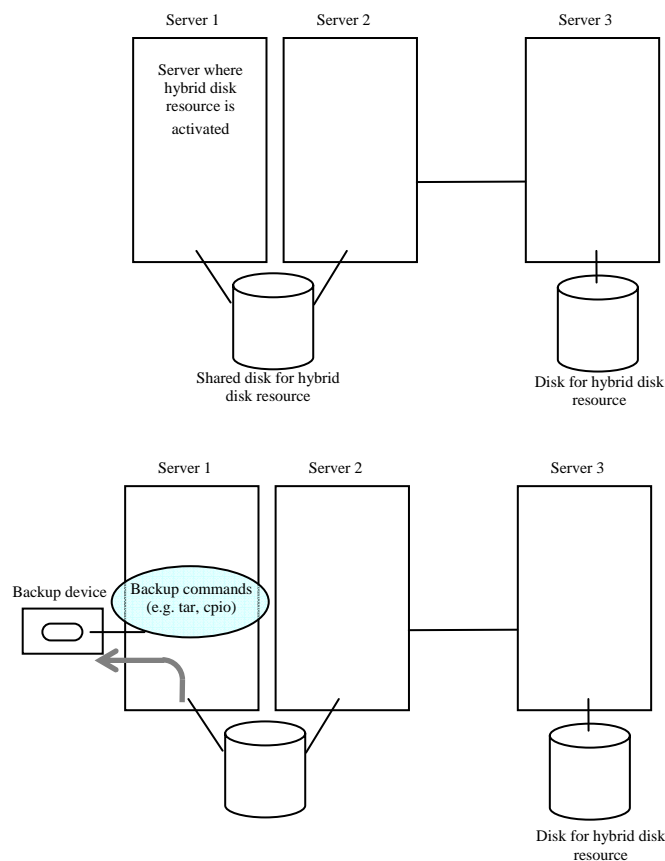
Follow the procedure below when changing the offset (location) or size of the data partition or cluster partition configured on a hybrid disk resource after the operation of a cluster is started.

**Note:**

Be sure to follow the steps below to change them. Hybrid disk resources may not function properly if you change the partition specified as a data partition or cluster partition only by `fdisk`.

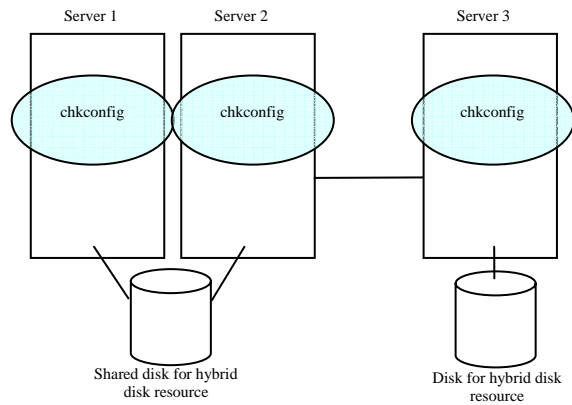
## When not changing a device name of a partition on hybrid disk resource

1. Check the name of a hybrid disk resource whose size you want to change by the `clpstat` command or by the WebManager.
2. On the server where a group with the hybrid disk resource whose size you want to change is activated, back up the data in a partition to a device such as tape. Note that backup commands that access a partition device directly are not supported. This step is not required if there is no problem to discard the data on the hybrid disk resource.

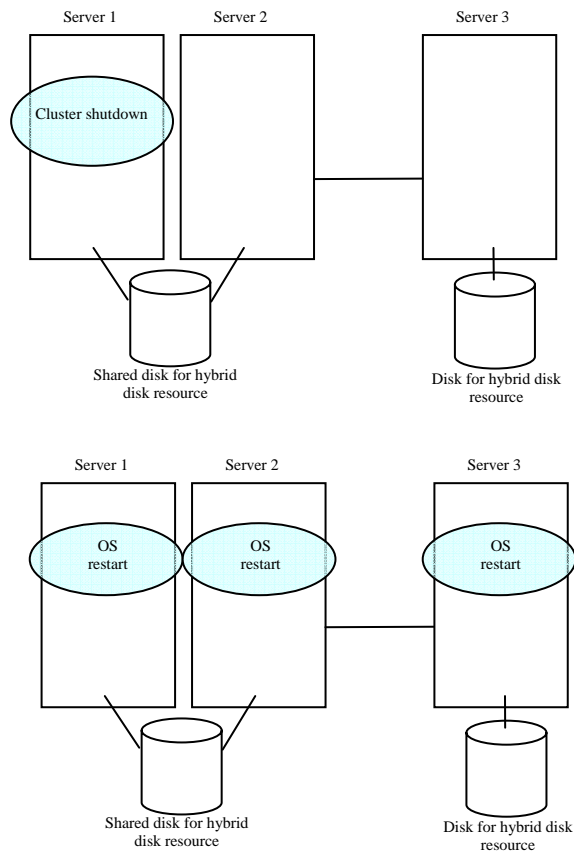


3. Run the `chkconfig` command in the following order not to start the ExpressCluster services. In SUSE Linux, run the command with the `--force` option.

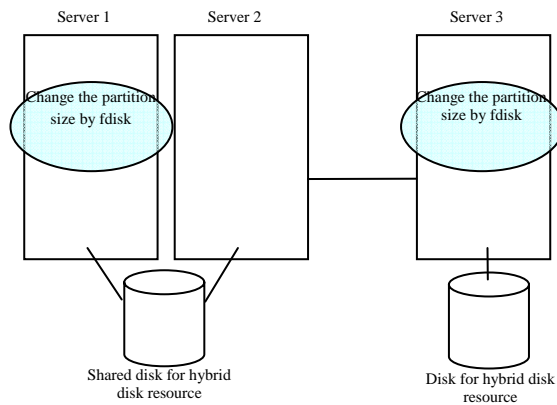
```
# chkconfig --del clusterpro
# chkconfig --del clusterpro_md
```



4. Shut down a cluster, and then restart the OS.  
To shut down a cluster, run the `clpstdn` command on either of a server, or execute a cluster shutdown on the WebManager.

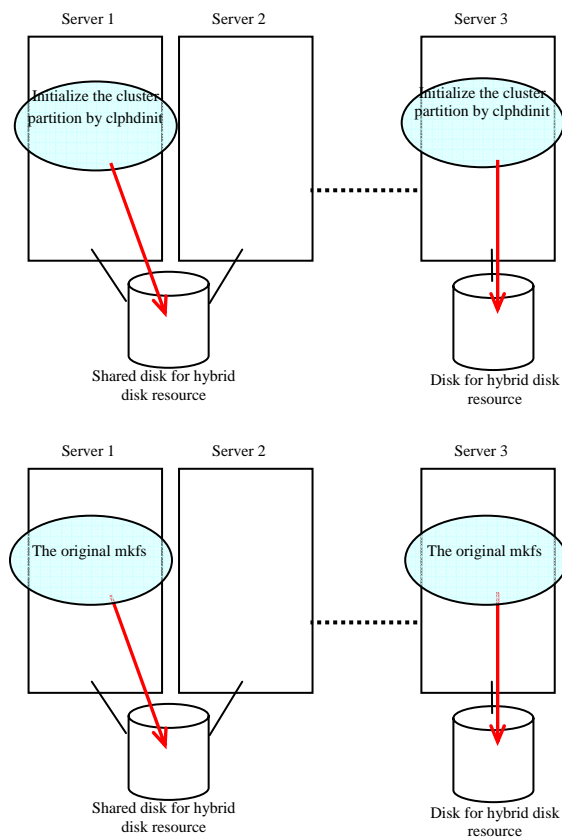


5. Run the fdisk command on a server to change the offset or size of a partition. When servers are connected to the shared disk, run the fdisk from either of the servers for the change.



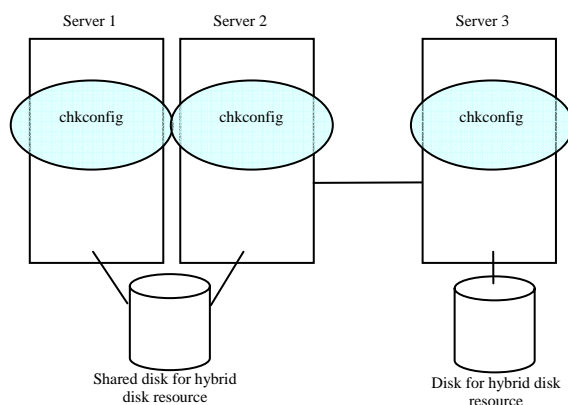
6. Run the following command on a server. When servers are connected to the shared disk, run the command on the server where the command in previous step was executed.

```
# clpmdinit --create force <Mirror_disk_resource_name>
```



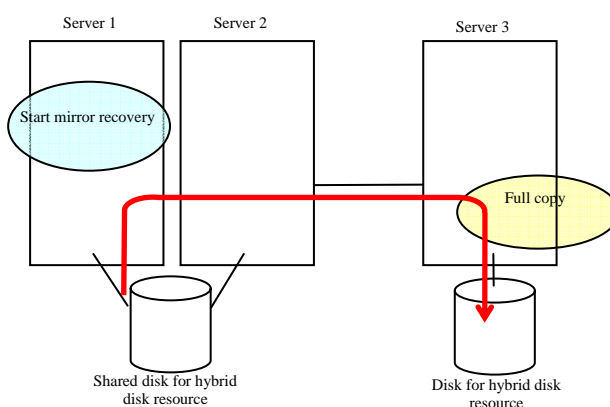
7. Run the chkconfig command in the following order to start the ExpressCluster services.

```
# chkconfig --add clusterpro_md
# chkconfig --add clusterpro
```

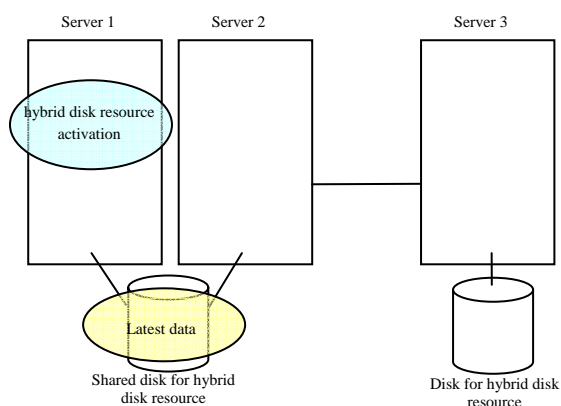


8. Run the reboot command to restart all servers. The servers are started as a cluster.
9. After the cluster is started, the same process as the initial mirror construction at cluster creation is performed. Run the following command or use the WebManager to check if the initial mirror construction is completed.

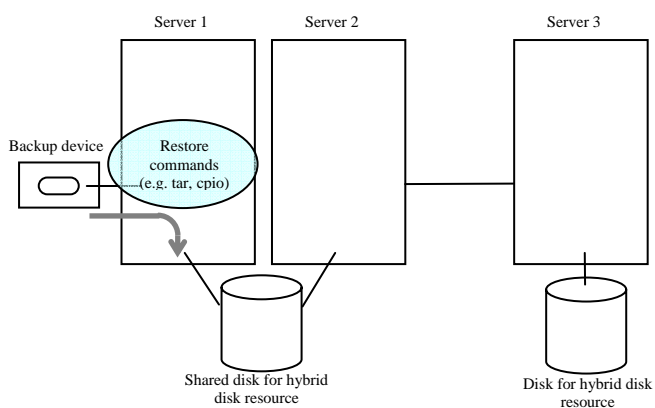
```
# clphdstat --mirror <hybrid_disk_resource_name>
```



10. When the initial mirror construction is completed and a failover group starts, a hybrid disk resource becomes active.

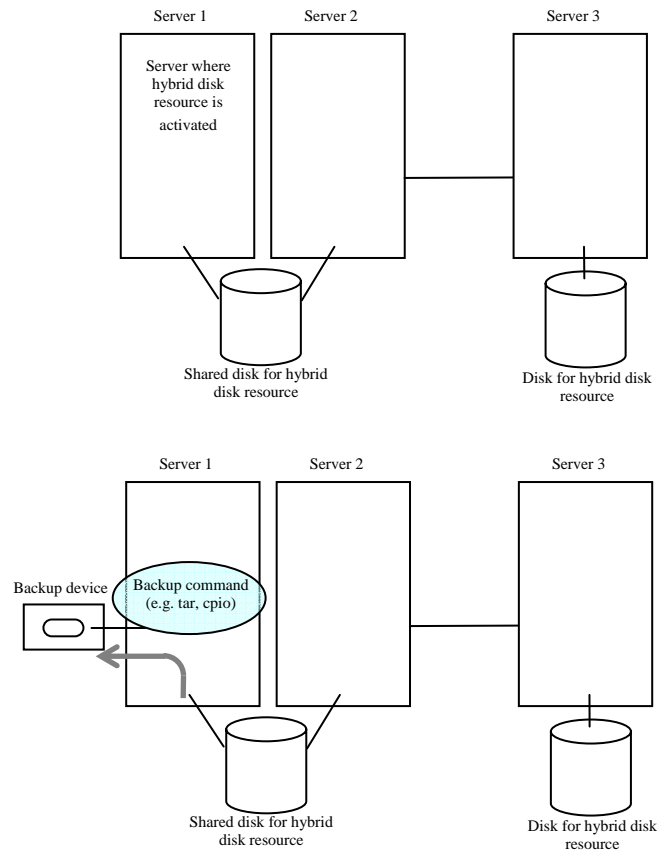


11. On the server where a group with the partition whose size you changed is activated, restore the data you backed up. Note that backup commands that access a partition device directly are not supported. This step is not required if there is no problem to discard the data on a hybrid disk resource.



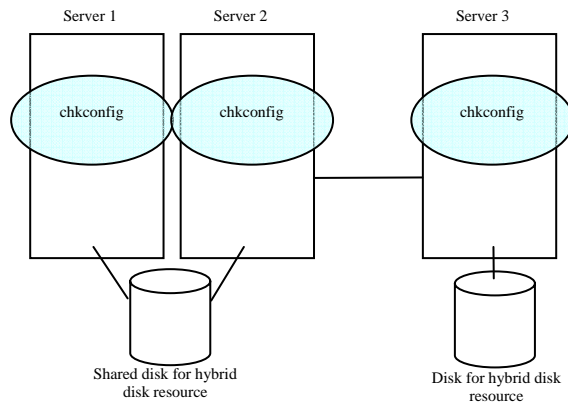
## When changing a device name of a partition on hybrid resource

1. Check the name of a hybrid disk resource whose size you want to change by the `clpstat` command or by the WebManager.
2. On the server where a group with the hybrid disk resource whose size you want to change is activated, back up the data in a partition to a device such as tape. Note that backup commands that access a partition device directly are not supported. This step is not required if destroying the data on the hybrid disk resource does not cause any problem.

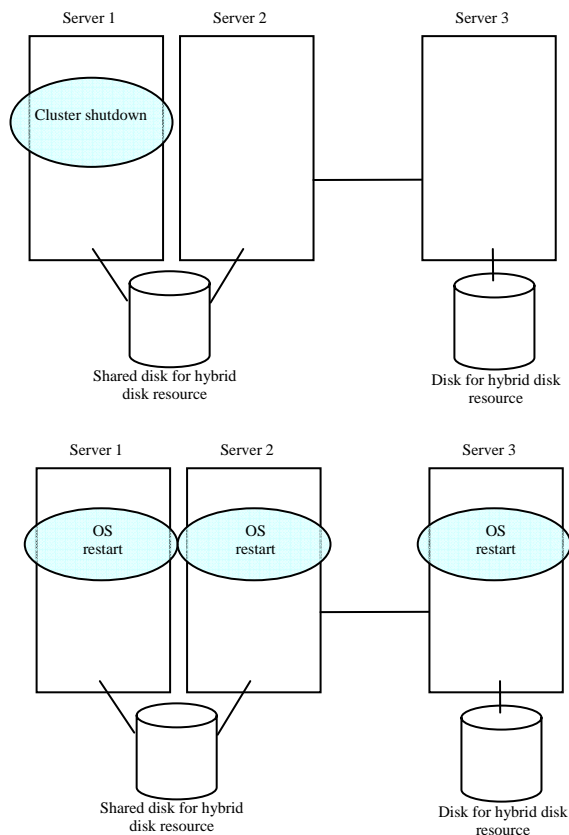


3. Run the `chkconfig` command in the following order not to start the ExpressCluster services. In SUSE Linux, run the command with the `--force` option.

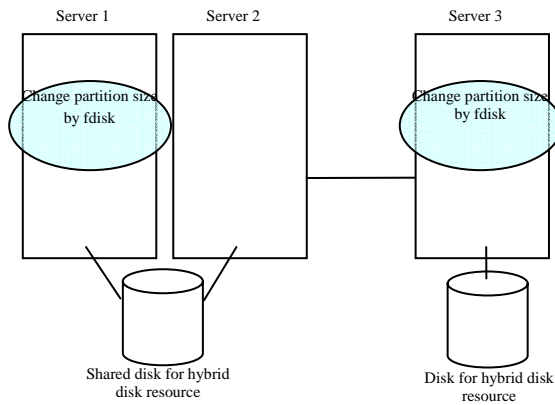
```
# chkconfig --del clusterpro
# chkconfig --del clusterpro_md
```



4. Shut down a cluster, and then restart the OS.  
To shut down a cluster, run the `clpstdn` command on either of a server, or execute a cluster shutdown on the WebManager.



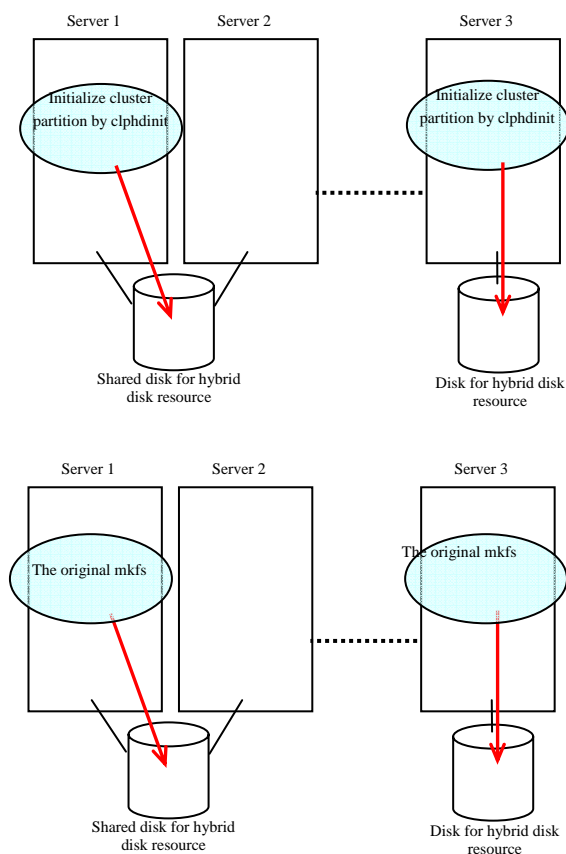
5. On a server, run the fdisk command to change the offset or size of a partition. When servers are connected to the shared disk, run the fdisk command from either of servers to change.



6. Change and upload the cluster configuration data. Change a hybrid disk resource by referring to “Uploading data only (Online version Builder) or “Uploading data only (Offline version Builder) in “Modifying the cluster configuratkon data without using a floppy disk” in the *Installation and Configuration Guide*. See the corresponding steps as those are different depending on using the online or offline version Builder.

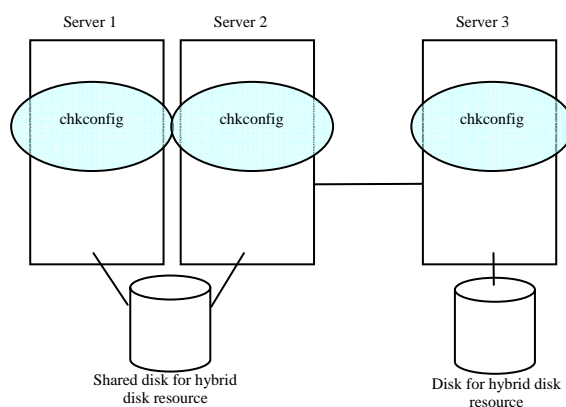
7. Run the following command on the the server. When servers are connected to the shared disk, execute the command on the server where the command was executed in step 5.

```
# clphdinit --create force <Hybrid_disk_resource_name>
```



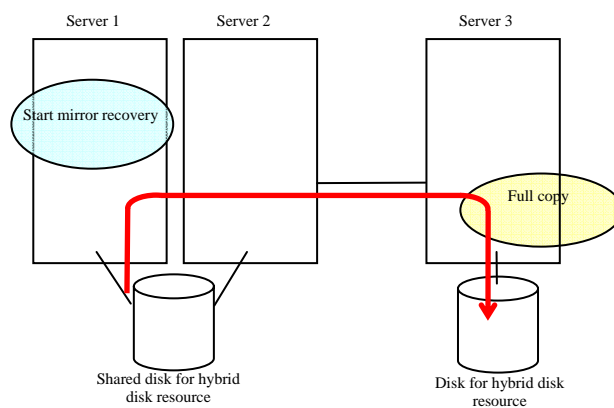
8. Run the chkconfig command in the following order to start the ExpressCluster services.

```
# chkconfig --add clusterpro_md
# chkconfig --add clusterpro
```

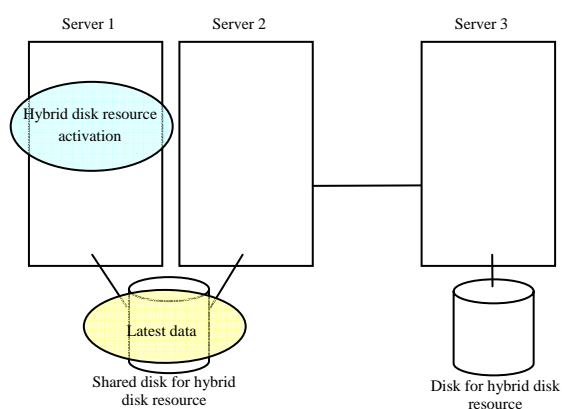


9. Run the reboot command to restart all servers. The servers are started as a cluster.
10. After the cluster is started, the same process as the initial mirror construction at cluster creation is performed. Run the following command or use the WebManager to check if the initial mirror construction is completed.

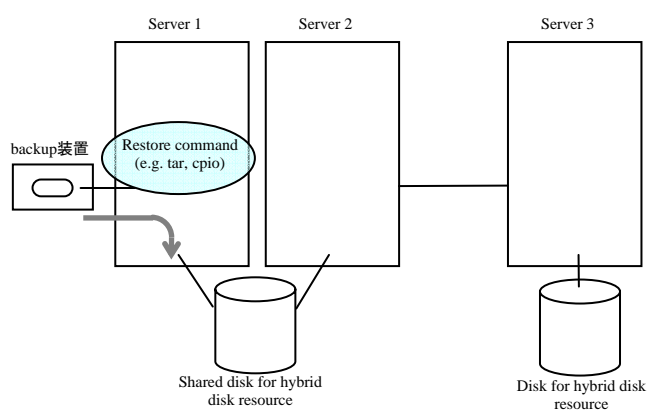
```
# clphdstat --mirror <Hybrid_disk_resource_name>
```



11. When the initial mirror construction is completed and a failover group starts, a hybrid disk resource becomes active.



12. On the server where a group with the partition whose size you changed is activated, restore the data you backed up. Note that backup commands that access a partition device directly are not supported. This step is not required if there is no problem to discard the data on the hybrid disk resource.



## Changing the server configuration (add/delete)

### Adding a server (when using online version)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the actual IP address of any server.

---

**Important:**

When adding a server in changing the cluster configuration, do not make any other changes such as adding a group resource.

---

1. Make sure that the cluster is working normally. Restart the server on which the ExpressCluster Server was installed.  
Install the ExpressCluster Server on a new server. For details, see “Installing the ExpressCluster X RPM” in the Installation and Configuration Guide.
2. From the **Service** menu on the WebManager, click **Suspend Cluster**.
3. Start the online version Builder on the WebManager you connected to.
4. Upload the updated cluster configuration data on the Builder.
5. From the **Service** menu on the WebManager, click **Restart Manager** and then **Resume Cluster**.

---

**Note:** If you resume the cluster from the WebManager, the error message “**Failed to resume the cluster. Click the Reload button, or try again later.**” is displayed, but ignore it. This is displayed because the new server has not been suspended.

---

6. Restart the added server.
7. Click **Reload** on the WebManager to verify the cluster is properly working.

### Adding a server (when using offline version Builder)

To add a server to/from a cluster, first it is required to prepare the floppy disk where the latest cluster configuration data is stored.

If you do not have the floppy disk with the latest data created (or changed its configuration by the Builder) at hand, you can back up the data with the `clpcfctrl` command.

---

**Important:**

When adding a server in changing the cluster configuration, do not make any other changes such as adding a group resource.

---

1. Make sure that the cluster is working normally. Restart the server on which the ExpressCluster Server was installed.  
Install the ExpressCluster Server on a new server. For details, see “Installing the ExpressCluster X RPM” in the Installation and Configuration Guide.
2. Change the cluster configuration data (in the prepared floppy disk) by the Builder.
3. On the current master server of the cluster system, run the `clpcl --suspend` command to suspend the ExpressCluster daemon of the master server.
4. Insert the floppy disk into the floppy disk driver of the master server.

5. Distribute the configuration data in the floppy disk from the master server. Do either A or B depending on the floppy disk type you used to save the data by the Builder:
  - A If your floppy disk has the data saved by the Builder on Linux, run the following command:  

```
clpcfctrl --push -l --nocheck
```
  - B If your floppy disk (1.44-MB formatted) has the data saved by the Builder on Windows, or has the data for Windows saved by the Builder on Linux, run the following command:  

```
clpcfctrl --push -w --nocheck
```

The following message is shown if the data has successfully been distributed.

```
Command succeeded. (code:0)
```
6. From the **Service** menu on the WebManager, click **Restart Manager** and then run clpcl —resume on the master server to resume the ExpressCluster daemon.  
The following error message is always displayed for the added server. This is because the added server is not suspended. Ignore the message and proceed to the next step.  

```
Resume server : Failed invalid server status.  
(server : Added server name)
```
7. Restart the added server.
8. Click **Reload** on the WebManager to verify the cluster is properly working.

## Deleting a server (When using online version Builder)

Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the actual IP address of any server.

---

### Important:

When adding a server in changing the cluster configuration, do not make any other changes such as adding a group resource.

---

1. Make sure that the cluster is working normally. If any group is active on the server you are going to delete, move the group to another server.
2. From the **Service** menu on the WebManager, click **Stop Cluster**.
3. Uninstall the ExpressCluster Server from the server you are going to delete.  
To see how to uninstall the ExpressCluster Server, see Chapter 9, “Uninstalling the ExpressCluster Server” in the *Installation and Configuration Guide*.
4. Start the online version Builder on the WebManager you connected to.
5. Upload the updated cluster configuration data on the Builder.
6. From the **Service** menu on the WebManager, click **Restart Manager** and then **Start Cluster**.
7. Click **Reload** on the WebManager to verify the cluster is properly working.

## Deleting a server (When using offline version Builder) - When no mirror disk resources are used in a cluster -

To delete a server from a cluster, first it is required to prepare the floppy disk where the latest cluster configuration data is stored.

If you do not have the floppy disk with the latest data created (or changed its configuration by the Builder) at hand, you can back up the data with the clpcfctrl command.

---

**Important:** When deleting a server in changing the cluster configuration, do not make any other changes such as adding a group resource.

---

1. Make sure that the cluster is working normally. If any group is active on the server you are going to delete, move the group to another server.
2. On a server in the cluster other than the one you are going to delete or on the master server if any, run the `clpcl -suspend` command to suspend the ExpressCluster daemon.
3. Uninstall the ExpressCluster Server from the server you are going to delete. To see how to uninstall the ExpressCluster Server, see Chapter 9, “Uninstalling the ExpressCluster Server” in the *Installation and Configuration Guide*.
4. Change the cluster configuration (in the prepared floppy disk) by using the Builder.
5. Run the `clpcfctrl` command on the master server to apply the configuration data to the servers. Do either A or B depending on the floppy disk type you used to save the data by the Builder:
  - A If your floppy disk has the data saved by the Builder on Linux, run the following command.  
  
`clpcfctrl --push -l --nocheck`
  - B If your floppy disk (1.44-MB formatted) has the data saved by the Builder on Windows, or has the data for Windows saved by the Builder on Linux, run the following command.  
  
`clpcfctrl --push -w --nocheck`

The following message is shown if the data has successfully been distributed.

**Command succeeded. (code:0)**
6. Run the `clpcl -resume` command to resume the ExpressCluster daemon on the master server.
7. Click **Reload** on the WebManager to verify the cluster is properly working.

## Deleting a server (When using offline version Builder) - When mirror disk resources are used in a cluster -

To add a server to a cluster, first it is required to prepare the floppy disk where the latest cluster configuration data is stored.

If you do not have the floppy disk with the latest data created (or changed its configuration by the Builder) at hand, you can back up the data with the `clpcfctrl` command.

---

**Important:** When deleting a server in changing the cluster configuration, do not make any other changes such as adding a group resource.

---

1. Make sure that the cluster is working normally. If any group is active on the server you are going to delete, move the group to another server.
2. On a server in the cluster other than the one you are going to delete or on the master server if any, run the `clpcl -t -a` command to stop the ExpressCluster daemon.
3. Uninstall the ExpressCluster Server from the server you are going to delete. To see how to uninstall the ExpressCluster Server, see Chapter 9, “Uninstalling the ExpressCluster Server” in the *Installation and Configuration Guide*.
4. Change the cluster configuration (in the prepared floppy disk) by using the Builder.

5. Run the `clpcfctrl` command on the master server to apply the configuration data to the servers. Do either A or B depending on the floppy disk type you used to save the data by the Builder:

A If your floppy disk has the data saved by the Builder on Linux, run the following command.

```
clpcfctrl --push -l --nocheck
```

B If your floppy disk (1.44-MB formatted) has the data saved by the Builder on Windows, or has the data for Windows saved by the Builder on Linux, run the following command.

```
clpcfctrl --push -w --nocheck
```

The following message is shown if the data has successfully been distributed.

```
Command succeeded. (code:0)
```

6. Run the `clpcl -s -a` command to start the ExpressCluster daemon on the master server.
7. Click **Reload** on the WebManager to verify the cluster is properly working.

## Changing the server IP address

To change the server IP address after you have started the cluster system operation, follow the instructions below.

### Changing the interconnect IP address / mirror disk connect IP address

1. Use the `clpstat` command or the WebManager to verify all servers in the cluster are working normally.
2. Back up the cluster configuration data. Use the `clpcfctrl` command to back up the data in a floppy disk.  
If you have the floppy disk that contains the data at the cluster creation, use that floppy disk.
3. Use the Builder to change the server IP address based on the cluster configuration data in the floppy disk, and then save it in the floppy disk
4. Disable the startup settings of the ExpressCluster daemon in all servers in the cluster. For more information, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.
5. Use the `clpstdn` command or the WebManager to shut down the cluster, and then restart all servers.
6. Change the IP address. If a server reboot is required after changing the IP address, run the reboot command or use other means on the server where the IP address has changed.
7. Verify the changed IP address is valid by running the ping command or using other means.
8. Distribute the cluster configuration data to all the servers. Use the `clpcfctrl` command to deliver the data from the floppy disk.
9. Enable the startup settings of the ExpressCluster daemon in all servers in the cluster.
10. Run the reboot command or use other means on all servers in the cluster to reboot them.
11. Use the `clpstat` command or the WebManager to verify all servers in the cluster are working normally.

## Changing only the subnet mask of the interconnect IP address

1. Use the `clpstat` command or the WebManager to verify all servers in the cluster are working normally.
2. Back up the cluster configuration data. Use the `clpcfctrl` command to back up the data in a floppy disk.  
If you have the floppy disk that contains the data at the cluster creation, use that floppy disk.
3. Use the Builder to change the server IP address based on the cluster configuration data in the floppy disk, and then save it in the floppy disk.
4. Disable startup settings of the ExpressCluster daemon in all servers in the cluster.
5. Use the `clpstdn` command or the WebManager to shut down the cluster, and then restart all servers.
6. Change the subnet mask of the IP address. If server reboot is required after changing the subnet mask of IP address, run the `reboot` command or use other means on the server where the subnet mask of the IP address has been changed.
7. Verify the changed IP address is valid by running the `ping` command or using other means.
8. Distribute the cluster configuration data to all servers. Use the `clpcfctrl` command to deliver the data from the floppy disk.
9. Enable the startup settings of the ExpressCluster daemon in all servers in the cluster.
10. Run the `reboot` command or use other means on all the servers in the cluster.
11. Use the `clpstat` command or the WebManager to verify all the servers in the cluster are working normally.

## Changing the public LAN IP address

To change the public LAN IP address, follow the instructions for changing the interconnect IP address.

## Changing only the subnet mask of the public LAN IP address

To change the subnet mask of the public LAN IP address, follow the instructions for changing the subnet mask of the interconnect IP address.

## Changing the host name

Follow the steps below if you want to change the host name of a server after you have started the cluster system operation.

### Changing the host name

1. Use the `clpstat` command or the WebManager to verify all the servers in the cluster are working normally.
2. Back up the cluster configuration data. Use the `clpcfctrl` command to back up the data in a floppy disk. .  
If you have the floppy disk that contains the data at the cluster creation, use that floppy disk
3. Use the Builder to change the host name of your target server based on the cluster configuration data in the floppy disk, and then save it in the floppy disk.
4. Disable the startup settings of the ExpressCluster daemon in all servers in the cluster. For the details, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.
5. Use the `clpstdn` command or the WebManager to shut down the cluster, and then restart all the servers.
6. Change the host name. If the server needs to be rebooted after changing the host name, run the reboot command or use other means on the server.
7. Verify the changed host name is valid by running the ping command or using other means.
8. Distribute the cluster configuration data to all the servers. Use the `clpcfctrl` command to deliver the data from the floppy disk.
9. Enable the startup settings of the ExpressCluster daemon in all servers in the cluster.
10. Run the reboot command or use other means on all the servers in the cluster to reboot them.
11. Use the `clpstat` command or the WebManager to verify all the servers in the cluster are in the normal status.

---

**Related Information:**

For detailed information on the `clpcfctrl` command, see “Creating a cluster and backing up configuration data (`clpcfctrl` command)” in Chapter 4, “ExpressCluster command reference” of this guide.

To see how to stop and start daemons, see “Disabling the ExpressCluster daemon” in the *Installation and Configuration Guide*.

---



# Chapter 11    Troubleshooting

This chapter provides instructions for troubleshooting problems with ExpressCluster.  
This chapter covers:

- Troubleshooting.....964
- Troubleshooting problems with VERITAS volume manager.....1005
- When a kernel page allocation error occurs ~ For Replicator / Replicator DR~ .....1011

## Troubleshooting

The following provides instructions for troubleshooting problems you experience in operating the ExpressCluster system.

### When the ExpressCluster system does not start or end

A cluster system starts working by restarting servers after installing ExpressCluster. If your cluster system does not behave properly, check the following:

1. Registration of cluster configuration data

The cluster configuration data should be registered with all servers (which will form a cluster system) when you cluster them. If the cluster configuration data does not exist in the following path, the data may not be registered yet. Check it is registered.

```
/opt/nec/clusterpro/etc/clp.conf
```

If the cluster configuration data does not exist in the above path, see Chapter 4, “Creating the Cluster Configuration Data Using the Builder” in the *Installation and Configuration Guide* for registering the data.

2. Server names and IP addresses in the cluster configuration data

Check the server names and IP addresses are valid.  
(# hostname, # ifconfig...)

3. License registration

The license may not be registered yet. Run the following command on all servers in the cluster to confirm the license is registered:

```
# clplcns -l -p PRODUCT-ID
```

Use the product ID for **PRODUCT-ID**, which is specified in the -p option. See Chapter 4, “ExpressCluster command reference” in this guide for more information on product IDs.

If you are using the trial version license, confirm if it is not expired yet.

4. ExpressCluster run level

Run the following command to check the run level of ExpressCluster:

```
# chkconfig --list clusterpro
clusterpro    0:off 1: off  2: off  3: on   4: off  5:on  6:
off
```

5. Cluster process status

Run the following command to check if ExpressCluster is working properly:

```
# ps -ef | grep clp
root    1669      1 0 00:00 ? 00:00:00 clpmonp --event -a 2 -r
0 -w 0
root    1670    1669 0 00:00 ? 00:00:00 clpevent
root    1684      1 0 00:00 ? 00:00:00 clpmonp --trnsv -a 2 -r
0 -w 0
root    1685    1684 0 00:00 ? 00:00:00 clptrnsv
root    1784      1 0 00:00 ? 00:00:00
/opt/nec/clusterpro/bin/clppm
root    1796    1795 0 00:00 ? 00:00:00 clprc
root    1809    1808 0 00:00 ? 00:00:00 clprm
root    1813    1812 0 00:00 ? 00:00:00 clpnm
root    1818    1813 0 00:00 ? 00:00:00 clplanhb
root    1820    1813 0 00:00 ? 00:00:00 clpdiskhb
root    1822    1813 0 00:00 ? 00:00:00 clpcomhb
```

```

root    1823    1813 0 00:00 ? 00:00:00    clplankhb

root    1935      1 0 00:00 ? 00:00:00    clpmonp --webmgr -a 2
-o -start -r 0 -w 0
root    1936    1935 0 00:00 ? 00:00:00    clpwebmc -start
root    1947      1 0 00:00 ? 00:00:00    clpmonp --webalert -a
2 -r 0 -w 0
root    1948    1947 0 00:00 ? 00:00:00    clpaltd

```

If you can check the run statuses of the following processes by executing the ps command, ExpressCluster is working properly.

- Event process and data transfer process

```

root    1685    1684 0 00:00 ? 00:00:00    clptrnsv
root    1669      1 0 00:00 ? 00:00:00    clpmonp -event
root    1670    1669 0 00:00 ? 00:00:00    clpevent
root    1684      1 0 00:00 ? 00:00:00    clpmonp -trnsv

```

If the event process is not started yet, the process manager described in the following section will not start.

- Process manager

```

root    1784      1 0 00:00 ? 00:00:00
/opt/nec/clusterpro/bin/clppm

```

By starting up this process, the following processes are generated. Therefore, if any error such as error in cluster configuration data file is detected, ExpressCluster will not start.

```

clprc
clprm
clpnm

```

- Resource control process:

```

root    1796    1795 0 00:00 ? 00:00:00    clprc

```

\* This process can start up even if no group resources are registered yet.

- Resource monitor process:

```

root    1809    1808 0 00:00 ? 00:00:00    clprm

```

\* This process can start up even if no monitor resources are registered yet.

- Server management process:

```

root    1813    1812 0 00:00 ? 00:00:00    clpnm

```

- Heartbeat process:

```

root    1813    1821 0 00:00 ? 00:00:00    clpcomhb
root    1813    1817 0 00:00 ? 00:00:00    clplanhb
root    1813    1819 0 00:00 ? 00:00:00    clpdiskhb
root    1823    1813 0 00:00 ? 00:00:00    clplankhb

```

If a disk heartbeat resource has been added to the heartbeat resources in the cluster configuration data, clpdiskhb is started. If a COM interface has been added, clpcomhb is started. If a kernel mode LAN heartbeat resource has been added, clplankhb is started.

- WebManager process:

```

root    1936    1935 0 00:00 ? 00:00:00    clpwebmc -start

```

- Alert process:

```

root    1948    1947 0 00:00 ? 00:00:00    clpaltd

```

The display style of the `ps` command may look different from the above depending on the distribution.

## 6. Cluster process status ~ for Replicator~

Run the following commands to check if ExpressCluster is working properly:

```
# ps -ef | grep clp
root 1669      1 0 00:00 ? 00:00:00 clpmonp --event -a 2 -r
0 -w 0
root 1670      1669 0 00:00 ? 00:00:00 clpevent
root 1684      1 0 00:00 ? 00:00:00 clpmonp --trnsv -a 2 -r
0 -w 0
root 1685      1684 0 00:00 ? 00:00:00 clptrnsv
root 1696      1 0 00:00 ? 00:00:00 clpmonp --mdagent -a 5
-r 0 -w 30
root 1697      1696 0 00:00 ? 00:00:00 clpmdagent
root 1784      1 0 00:00 ? 00:00:00
/opt/nec/clusterpro/bin/clppm
root 1796      1795 0 00:00 ? 00:00:00 clprc
root 1809      1808 0 00:00 ? 00:00:00 clprm
root 1813      1812 0 00:00 ? 00:00:00 clpnm
root 1818      1813 0 00:00 ? 00:00:00 clplanhb
root 1822      1813 0 00:00 ? 00:00:00 clpcomhb
root 1823      1813 0 00:00 ? 00:00:00 clplankhb
root 1935      1 0 00:00 ? 00:00:00 clpmonp --webmgr -a 2
-o -start -r 0 -w 0
root 1936      1935 0 00:00 ? 00:00:00 clpwebmc -start
root 1947      1 0 00:00 ? 00:00:00 clpmonp --webalert -a
2 -r 0 -w 0
root 1948      1947 0 00:00 ? 00:00:00 clpalttd
```

If you can check the run statuses of the following processes by executing the `ps` command, ExpressCluster is working properly.

- Event process, data transfer process, and mirror agent
 

```
root 1696      1 0 00:00 ? 00:00:00 clpmonp --mdagent
-a 5 -r 0 -w 30
root 1697      1696 0 00:00 ? 00:00:00 clpmdagent
```

If the event process is not started yet, the process manager in the following section will not start.

- Process manager
 

```
root 1784      1 0 00:00 ? 00:00:00
/opt/nec/clusterpro/bin/clppm
```

By starting up this process, the following processes are generated. Therefore, if any error such as error in cluster configuration data file is detected, ExpressCluster will not start.

```
clprc
clprm
clpnm
```

- Resources control process:
 

```
root 1796      1795 0 00:00 ? 00:00:00 clprc
```

\* This process can start up even if no group resources are registered yet.
- Resource monitor process:
 

```
root 1809      1808 0 00:00 ? 00:00:00 clprm
```

\* This process can start up even if no monitor resources are registered yet.

- Server management process:

```
root 1813 1812 0 00:00 ? 00:00:00 clpnm
```

- Heartbeat process:

```
root 1822 1813 0 00:00 ? 00:00:00 clpcomhb
root 1818 1813 0 00:00 ? 00:00:00 clplanhb
root 1823 1813 0 00:00 ? 00:00:00 clplankhb
```

If a COM heartbeat resource has been added to the heartbeat resources in the cluster configuration data, clpcomhb is started. If a kernel mode LAN heartbeat resource has been added, clplankhb is started.

- WebManager process:

```
root 1936 1935 0 00:00 ? 00:00:00 clpwebmc -start
```

- Alert process:

```
root 1948 1947 0 00:00 ? 00:00:00 clpaltd
```

The display style of the ps command may look different from the above depending on the distribution.

#### 7. Loading of the mirror driver ~For Replicator~

Run the lsmod command. Check that the run result of lsmod contains the following loadable module.

```
Liscal
```

#### 8. Loading of the kernel mode LAN heartbeat driver ~For kernel mode LAN heartbeat resource~

Run the lsmod command. Check that the run result of lsmod contains the following loadable module.

```
clpkhb
```

#### 9. Loading of the keepalive driver ~For userw user-mode monitor resource (keepalive)~

Run the lsmod command. Check that the run result of lsmod contains the following loadable module.

```
clpka
```

## 10. Normal startup of the cluster from syslog

To see ExpressCluster processes are working properly by looking into syslog, find the following messages.

- To check the process manager's startup:  
`<type: pm><event: 1> Cluster daemon has started properly...`
- To check heartbeat resources' activation:  
`<type: nm><event: 3> Resource lanhb1 of server server1 up.`  
`<type: nm><event: 3> Resource diskhb1 of server server1 up.`  
`<type: nm><event: 1> Server server1 up.`  
`<type: nm><event: 3> Resource diskhb1 of server server2 up.`  
`<type: nm><event: 1> Server server2 up.`  
`<type: nm><event: 3> Resource lanhb1 of server server2 up.`  
You will see the above messages when the followings are specified for heartbeat resources in a 2-node configuration.

lanhb1      LAN heartbeat resources  
diskhb1     Disk heartbeat resources

- To check group resources' activation:  
`<type: rc><event: 10> The start processing of a group grp1 started.`  
`<type: rc><event: 30> The start processing of a resource fip1 started.`  
`<type: rc><event: 31> The start processing of a resource fip1 ended.`  
`<type: rc><event: 30> The start processing of a resource disk1 started.`  
`<type: rc><event: 31> The start processing of a resource disk1 ended.`  
`<type: rc><event: 11> The start processing of a group grp1 ended.`

You will see the above messages when the group resource, grp1, is activated on server1. The group resources' configuration data is as follows:

fip1          Floating IP addresses resources  
disk1        Shared disk resources

- To check monitor resources' startup:  
`<type: rm><event: 1> Monitor userw start.`  
`<type: rm><event: 1> Monitor ipw1 start.`  
You will see the above messages when the monitor resources are specified as follows:

userw        User space monitor resources  
ipw1        IP monitor resources

- To check license consistency:  
Product version  
`<type: rm><event: 50> The number of license is 2. (BASE10)`  
You will see the above message when 2-CPU license is registered.  
Trial version  
`<type: rm><event: 51> Period of trial is till 2003/09/30. (BASE10)`

# 11. Successful startup of the cluster ~For Replicator~

To see ExpressCluster processes are working properly by looking into syslog, find the following messages.

- To check the mirror agent's startup:  
`<type: mdagent><event: 1> Agent has started successfully.`
- To check the mirror driver's startup:  
`<init_module> registered device at major 218, nmp count is 4`
- To check the process manager's startup:  
`<type: pm><event: 1> Cluster daemon has started properly...`
- To check heartbeat resources' activation:  
`<type: nm><event: 3> Resource lanhb1 of server server1 up.`  
`<type: nm><event: 1> Server server1 up.`  
`<type: nm><event: 3> Resource lanhb1 of server server2 up.`  
`<type: nm><event: 1> Server server2 up.`

You will see the above messages when the following is specified for heartbeat resources in a 2-node configuration.

lanhb1      LAN heartbeat resources

- To check group resources' activation:  
`<type: rc><event: 10> The start processing of a group grp1 started.`  
`<type: rc><event: 30> The start processing of a resource fip1 started.`  
`<type: rc><event: 31> The start processing of a resource fip1 ended.`  
`<type: rc><event: 30> The start processing of a resource md1 started.`  
`<type: rc><event: 31> The start processing of a resource md1 ended.`  
`<type: rc><event: 11> The start processing of a group grp1 ended.`  
 You will see the above messages when the group resource, grp1, is activated on server1. The group resources' configuration data is as follows;

fip1          Floating IP addresses resources  
md1          Mirror disk resources

- To check start of monitoring by monitoring resources:  
`<type: rm><event: 1> Monitor userw start.`  
`<type: rm><event: 1> Monitor ipw1 start.`  
`<type: rm><event: 1> Monitor mdw1 start.`  
`<type: rm><event: 1> Monitor mdw1 start.`

You will see the above messages when the monitor resources are specified as follows;

userw      User space monitor resources  
ipw1      IP monitor resources  
mdw1      Mirror disk monitor resources  
mdnw1      Mirror disks connect monitor resources

- To check license consistency:  
 Product version  
`<type: rm><event: 50> The number of license is 2. (BASE20)`  
 You will see the above message when a 2-CPU license is registered.  
 Trial version  
`<type: rm><event: 51> Period of trial is till 2006/09/30. (BASE20)`

# 12. Free disk space

Run the `df` command to check the size of the free disk space in the file system that contains `/opt/nec/clusterpro`. For details on the disk space to be used by the ExpressCluster Server, see Chapter 3, “Installation requirements for ExpressCluster” in *Getting Started with Guide*.

13. Usage of memory or OS resource

Run the `top` or `free` command to check the OS memory usage and CPU utilization.

## When activating or deactivating group resources fails

If any error is detected in activation of a group resource, detailed error information is logged in the alert and syslog. Examine the logs to find the cause of the error and take appropriate action for it.

1. Floating IP resource

Check that the specified IP address is not already used on the network or you have not specified an IP address of a wrong network segment.

For more information on errors, see Floating IP resources on 1079.

2. Disk resources

Check that the device and mount point exist, and the file system is configured.

For more information on errors, see “Disk resources” on page 1080.

3. EXEC resources

Check that the script path is correct and what is scripted is appropriate.

For more information on errors, see “EXEC resources” on page 1082.

4. Mirror disk resources ~For Replicator~

Check that the devices and mount points exist, and the cluster partitions and data partitions are allocated. Check the file system specified for mirror disk resources is available as well.

For more information on errors, see “Mirror disk resources” on page 1083.

## When a monitor resource error occurs

If a monitor resource detects any error, detailed information on error is logged in the alert and syslog. Examine the logs to find the cause of the error and take appropriate action for it.

1. Error detected by the IP monitor resource

Check that you can send packets with the ping command, and other network segments are routed if any.

For more information on errors, see “IP monitor resources” on page 1089.

2. Error detected by the disk monitor resource

Check that a disk device exists. If you are using a shared disk, check SCSI or fibre cables are securely connected to the shared disk.

For more information on errors, see “Disk monitor resources” on page 1089.

3. Error detected by the PID monitor resource

Check that the process to be monitored exists by using a command, such as ps command.

For more information on errors, see “PID monitor resources” on page 1091.

4. Error detected by the raw monitor resource

Check that a disk device exists. If you are using a shared disk, check SCSI or fibre cables are securely connected to the shared disk.

For more information on errors, see “Raw monitor resources” on page 1091.

5. Error detected by the user space monitor resource

Check that you can load the softdog.o driver by the insmod command, and the user space is not heavily loaded.

For more information on errors, see “User mode monitor resources” on page 1092.

6. Error detected by the mirror disk monitor resource ~For Replicator~  
Check that the disk devices exist, and the cluster partitions and data partitions are allocated. Confirm that the Mirror Agent is active.  
For more information on errors, see “Mirror disk monitor resources” on page 1093.
7. Error detected by the mirror disks connect monitor resource ~For Replicator~  
Check that the mirror disk is connected and the Mirror Agent is active.  
For more information on errors, see “Mirror disk connect monitor resources” on page 1096.
8. VxVM daemon monitor resource  
Check how the VxVM config daemon is running.  
For more information on errors, see “VxVM daemon monitor resources” on page 1096.
9. Error detected by the VxVM volume monitor resource  
Check if VxVM is running normally.  
For more information on errors, see “VxVM volume monitor resources” on page 1097.
10. Error detected by the NIC Link Up/Down monitor resource  
Check how the NIC of the server is connected to the network device.  
For more information on errors, see “NIC link up/down monitor resources” on page 1097.

## When a heartbeat time-out occurs

Possible causes of heartbeat time-out between servers are listed below:

Cause	Solution
Disconnection of LAN/disk/COM cables	For disk or COM cables, check if the cables are connected securely.  For LAN cables, check that you can send packets with the ping command.
Heavily loaded user space (resulting in misinterpreted heartbeat time-out)	Run the following command in advance to extend the heartbeat time-out when running an application that can make the OS heavily loaded for a long time.  <code># clptoratio -r 3 -t 1d</code>  The above mentioned command triples the heartbeat time-out for 24 hours.

## When network partitioning occurs

Network partitioning indicates that all communication routes are blocked between servers. This section describes how you can check whether or not the network is partitioned and what you should do about it. The following examples assume that you have registered LAN kernel mode LAN, disk and COM for heartbeat resources in a 2-node cluster configuration.

When all heartbeat resources are normal (the network is not partitioned), the result of executing the clpstat command is:

### When you run the command on server1

```
# clpstat -n

===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
*server0 : server1
server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Online]
    HB    0  1  2  3  4  5

-----
server0 : o  o  o  o  o  o
server1 : o  o  o  o  o  o

[on server1 : Online]
    HB    0  1  2  3  4  5

-----
server0 : o  o  o  o  o  o
server1 : o  o  o  o  o  o
```

**When you run the command on server2****# clpstat -n**

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
server0  : server1
*server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Online]
    HB  0  1  2  3  4  5

-----

server0 : o  o  o  o  o  o  o
server1 : o  o  o  o  o  o  o

[on server1 : Online]
    HB  0  1  2  3  4  5

-----

server0 : o  o  o  o  o  o  o
server1 : o  o  o  o  o  o  o

=====
```

When the network is partitioned, the result of executing the clpstat command is what is described below. Both servers recognize each other that the counterpart is down.

When you run the command on server1

```
# clpstat -n
```

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
*server0 : server1
  server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Online]
  HB  0  1  2  3  4  5

-----

server0 : o  o  o  o  o  o
server1 : x  x  x  x  x  x

[on server1 : Offline]
  HB  0  1  2  3  4  5

-----

server0 : -  -  -  -  -  -
server1 : -  -  -  -  -  -

=====
```

**When you run the command on server2****# clpstat -n**

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
server0  : server1
*server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Offline]
  HB   0  1  2  3  4  5

-----

server0 : -  -  -  -  -  -
server1 : -  -  -  -  -  -

[on server1 : Online]
  HB   0  1  2  3  4  5

-----

server0 : x  x  x  x  x  x
server1 : o  o  o  o  o  o

=====
```

Shut down both servers immediately if the network is partitioned. Check the following for heartbeat resources.

1. LAN heartbeat resource
  - LAN cable status
  - Network interface status
2. Kernel mode LAN heartbeat resource
  - LAN cable status
  - Network interface status
3. Disk heartbeat resource
  - Disk cable status
  - Disk device status
4. COM heartbeat resource
  - COM cable status

If interconnection LAN is recovered from the network partitioning, ExpressCluster causes the servers to shut down.

If ExpressCluster detects that the same group is active on multiple servers, it causes the servers to shut down.

For the replicator, depending on the server shutdown timing, the statuses of mirror disk resources may not be the same after rebooting the server.

Depending on the timing of server shutdown, the status of mirror disk resources may be the one requiring forced mirror recovery, mirror recovery, or normal.

## When all interconnection LANs are disconnected

This section describes how to check the status when all interconnections (LAN heartbeat resources, kernel mode LAN heartbeat resources) between the servers are disconnected. The following examples assume that you have registered LAN, disk and COM for heartbeat resources in a 2-node cluster configuration. (You cannot register disks for the replicator.)

The following shows that the results of executing the `clpstat` command when all interconnections are disconnected and the disk and COM are normal. Both servers recognize that the other server is running.

### When you run the command on server1

```
# clpstat -n
```

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
*server0 : server1
  server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Warning]
  HB   0  1  2  3  4  5
-----
server0 : o  o  o  o  o  o
server1 : x  x  x  x  o  o

[on server1 : Warning]
  HB   0  1  2  3  4  5
-----
server0 : -  -  -  -  -  -
server1 : -  -  -  -  -  -
=====
```

### When you run the command on server2

```
# clpstat -n
```

```
===== HEARTBEAT RESOURCE STATUS =====
Cluster : cluster
  server0 : server1
*server1 : server2

HB0 : lanhb1
HB1 : lanhb2
HB2 : lankhb1
HB3 : lankhb2
HB4 : diskhb1
HB5 : comhb1

[on server0 : Warning]
```

```

      HB   0   1   2   3   4   5
-----
server0 : -   -   -   -   -   -
server1 : -   -   -   -   -   -

[on server1 : Warning]
      HB   0   1   2   3   4   5
-----
server0 : x   x   x   x   o   o
server1 : o   o   o   o   o   o
=====

```

A failover does not occur when all interconnections are disconnected like the example above because communication can be achieved by disk heartbeats and COM heartbeats.

However, interconnections must be recovered as soon as possible because commands communicated by interconnections become unavailable.

Check the following for heartbeat resources:

#### 1 LAN heartbeat resources

- LAN cable status
- Network interface status

#### 2 Kernel mode LAN heartbeat resources

- LAN cable status
- Network interface status

When interconnects are also used as mirror disk connect in the replicator, a mirror break occurs if the interconnections (mirror disconnects) are disconnected. Run mirror recovery after restoring the interconnections.

## Unavailable commands when interconnections are disconnected

Commands for cluster construction		
Command	Description	Remarks
clpcfctrl	Distributes the configuration information created by the Builder to the servers registered in the configuration information. Backs up the cluster configuration information to be used by the Builder.	The configuration information cannot be distributed to other servers.
clplcncs	Registers and displays the licenses of the product and trial versions of this product.	The license cannot be distributed to other servers.
Commands for showing status		
Command	Description	Remarks
clpstat	Displays the cluster status and settings information.	Statuses of other servers cannot be retrieved.
Commands for cluster operation		
Command	Description	Remarks
clpci	Starts, stops, suspends and resumes the ExpressCluster daemon.	Other servers cannot be operated, suspended or resumed.
clpdown	Stops the ExpressCluster daemon and shuts down a server registered in the configuration information.	Other servers cannot be operated.
clpstdn	Stops the ExpressCluster daemon in the entire cluster, and shuts down all servers.	Other servers cannot be operated.
clpgrp	Starts, stops and moves groups.	Only groups on the local server can be stopped.
clprsc	Starts, stops and moves resources.	Resources of other servers cannot be operated.
clptoratio	Extends and displays time-out values of all servers in the cluster.	Time-out ratios of other servers cannot be set.
Commands for logs		
Command	Description	Remarks
clplogcc	Collects logs and OS information.	Logs of other servers cannot be collected.
Commands for mirror (only for the Replicator)		
Command	Description	Remarks
clpmdstat	Displays the status and settings information of mirroring	The mirror status of the remote server cannot be retrieved.
clpmdctrl	Activates/inactivates mirror disk resources and recovers mirroring. Displays/changes the settings of the maximum number of request queues.	Do not use this command since mirror disk resources of both servers may be activated.
Commands for hybrid disk (only for the Replicator DR)		
Command	Description	Remarks
clphdstat	Displays the status and settings information of hybrid disk resource.	The status of the remote server cannot be retrieved.
clphdctrl	Activates/inactivates mirror disk resources	Do not use this

	and recovers mirroring. Displays/changes the settings of the maximum number of request queues.	command since hybrid disk resources of both servers may be activated.
--	------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------

## Mounting mirror disks manually

This section describes how to manually mount mirror disks when you cannot start ExpressCluster due to some sort of failure.

## Normally mounting mirror disk when mirroring is available

Follow the steps below when ExpressCluster data mirror daemon can be activated while the ExpressCluster daemon cannot be.

1. Run the following command on the server where you want to mount disks.  

```
clpmdctrl --active <mirror_disk_resource_name (Example: md1)>
```
2. The mount point of mirror disk resources becomes accessible. Written data is mirrored to the other server.

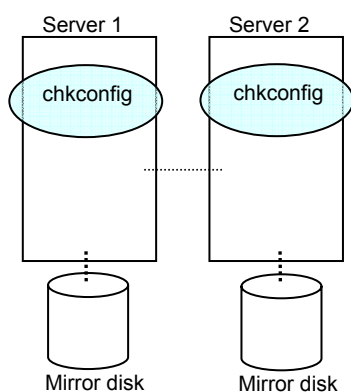
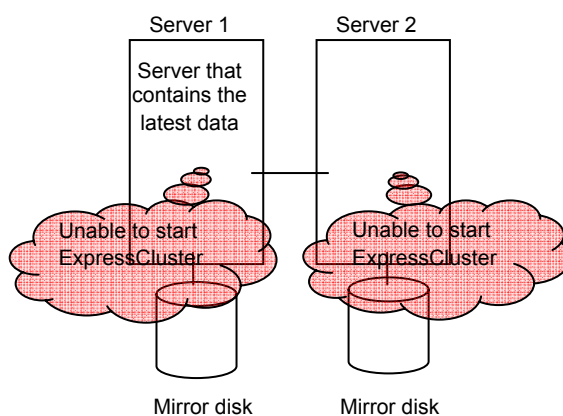
## Forcibly mounting mirror disk when mirroring is not available

Follow the steps below to save data on mirror disks when both the ExpressCluster daemon and the ExpressCluster data mirror daemon cannot be activated.

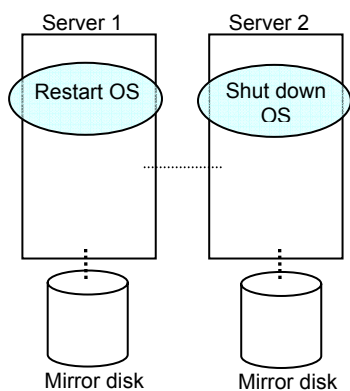
However, the mirroring status up to the moment just before both the ExpressCluster daemon and ExpressCluster data mirror daemon became unable to be activated must be normal, or you must know which server has the latest data.

1. Run the `chkconfig` command in the following order to set ExpressCluster services not to start.

```
chkconfig --del clusterpro_alertsync
chkconfig --del clusterpro_webmgr
chkconfig --del clusterpro
chkconfig --del clusterpro_md
chkconfig --del clusterpro_trn
chkconfig --del clusterpro_evt
```

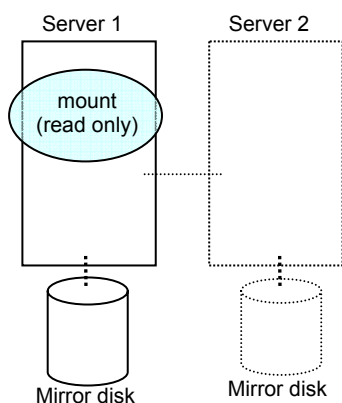


2. Run the reboot command to restart the server that has the latest data or that activated the mirror disk resources last time. Shut down the other server with the shutdown command.

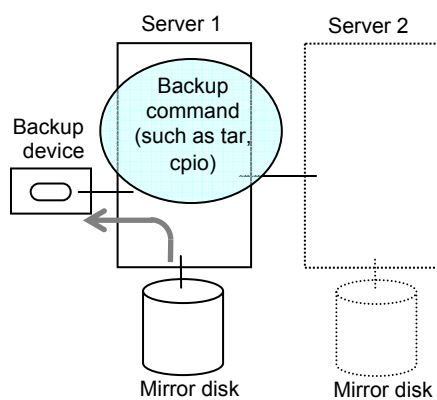


3. Run the mount command to mount a data partition on a mirror disk in the read-only mode.

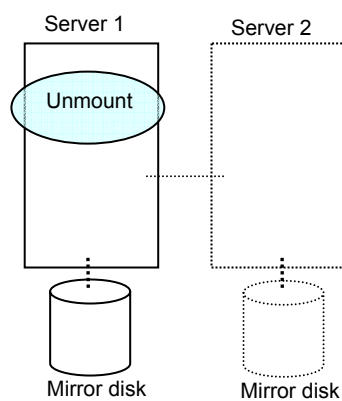
(Example) `mount -r -t ext3 /dev/sdb5 /mnt`



4. Back up the data in the data partition on a DAT tape or other media.



5. Unmount the mounted data partition.



## Mounting hybrid disks manually

This section describes how to manually mount hybrid disks when you cannot start ExpressCluster due to a failure or any other reasons.

## Normally mounting mirror disk when mirroring is available

Follow the steps below when ExpressCluster data mirror daemon can be activated while the ExpressCluster daemon cannot be.

1. Run the following command on the server where you want to a mount disk.  
**`clphdctrl --active <hybrid_disk_resource_name (Example: hd1)>`**
2. The mount point of hybrid disk resource becomes accessible. Written data is mirrored to the other server group.

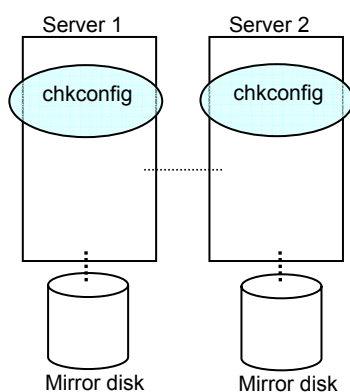
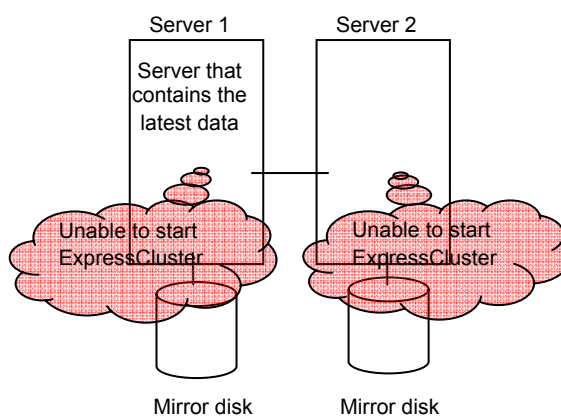
## Forcibly mounting mirror disk when mirroring is not available

Follow the steps below to save data on hybrid disks when both the ExpressCluster daemon and the ExpressCluster data mirror daemon cannot be activated.

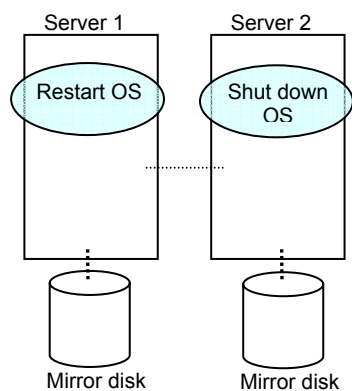
This can be performed provided the mirroring status up to the moment just before both the ExpressCluster daemon and ExpressCluster data mirror daemon became unable to be activated was normal, or you know which server has the latest data.

1. Run the `chkconfig` command in the following order to set ExpressCluster services not to start.

```
chkconfig --del clusterpro_alertsync
chkconfig --del clusterpro_webmgr
chkconfig --del clusterpro
chkconfig --del clusterpro_md
chkconfig --del clusterpro_trn
chkconfig --del clusterpro_evt
```

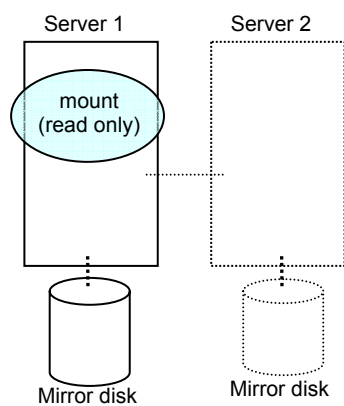


2. Run the reboot command to restart the server that has the latest data or that activated the hybrid disk resources last time. Shut down other servers with the shutdown command.

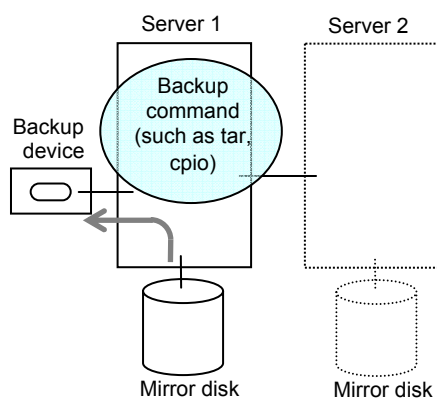


3. Run the mount command to mount the data partition on the hybrid disk in the read-only mode.

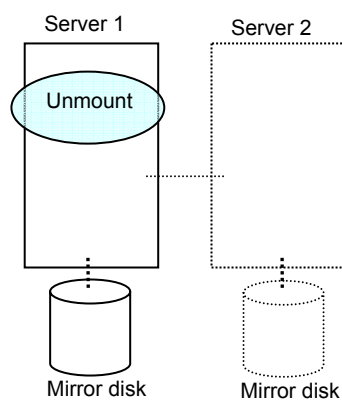
(Example) `mount -r -t ext3 /dev/sdb5 /mnt`



4. Back up the data in the data partition on a DAT tape or other medium.



5. Unmount the mounted data partition.



## Manually running mkfs to mirror disk or hybrid disk

To recreate the file system of a mirror partition without changing the cluster or mirror configuration, follow the steps below:

1. Confirm that the cluster is in the normal status.
2. If you need to back up the data, see “Backup/Restoration Procedures” in Chapter 8, “Operating the ExpressCluster” in the *Installation and Configuration Guide* for the procedure.
3. Stop the group which has the mirror disk resources that you want to run the mkfs command.
4. Run the following command on the server where you will run mkfs.  
For mirror disk:  

```
clpmdctrl --active -nomount <mirror_disk_resource_name>  
(Example: md1)>
```

  
For hybrid disk:  

```
clphdctrl --active -nomount <hybrid_disk_resource_name>  
(Example: hd1)>
```
5. Run the mkfs command to configure a file system.  
Because disks are mirrored, the mkfs command is also run on the other server.  
  
(Example) 

```
mkfs -t ext3 <mirror_partition_device_name> (Example:  
/dev/NMP1)>
```
6. If you need to restore the backup data, see “Backup/Restoration Procedures” in Chapter 8, “Operating the ExpressCluster” in the *Installation and Configuration Guide* for the procedure.
7. After confirming the completion of the file system creation, run the following command:  
For mirror disk:  

```
clpmdctrl --deactive <mirror_disk_resource_name> (Example:  
md1) >
```

  
For mirror disk:  

```
clphdctrl --deactive <hybrid_disk_resource_name> (Example: md1)>
```

## Recovering from mirror breaks

When the auto-mirror recovery is enabled, no special operation is required. Mirroring is automatically recovered. However, if mirroring needs to be recovered forcibly, execution of a command or operations for forcible mirror recovery using the WebManager are required.

The difference mirror recovery function is disabled in the forcible mirror recovery and the data is fully copied. If the auto-mirror recovery is disabled, you have to recover mirroring by executing a command or using the WebManager.

## Automatically recovering from mirroring

When the auto-mirror recovery is enabled, mirroring is recovered under the following conditions:

1. Mirror disk resources or hybrid disk resources are active.

2. The server where mirror disk resources or hybrid disk resources are active contains the latest data.
3. Servers in the cluster are in the normal status, and you can verify their mirroring statuses.
4. The data among the servers is not the same.

The auto-mirror recovery is not performed if any of the following applies.

1. One of the servers is not started.
2. You cannot confirm the mirroring status of the other server.
3. There is no server whose mirror status is normal.
4. The mirror status is pending (hybrid disk resources only)

For information on how to verify the progress of recovering mirroring, see “Checking the mirror recovery progress with a command” on page 993 and “Checking the mirror recovery progress from the WebManager” on page 999.

## Checking the mirror break status with a command

Run the following command to view the mirror break statuses.

For mirror disk:

```
clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdstat --mirror <hybrid_disk_resource_name (Example: hd1)>
```

You can view the statuses of mirror disk resource or hybrid disk resource by running the clpmdstat command or clphdstat command.

### 1. When normal:

Mirror Status: Normal

md1	server1	server2
-----		
Mirror Color	GREEN	GREEN

### 2. When the mirror recovery is required:

Mirror Status: Error

Total Difference: 1%

md1	server1	server2
-----		
Mirror Color	GREEN	RED
Lastupdate Time	2004/03/04 17:30:05	--
Break Time	2004/03/04 17:30:05	--
Disk Error	OK	OK
Difference Percent	1%	--

### 3. When the forcible mirror recovery is required:

Mirror Status: Error

Total Difference: 1%

md1	server1	server2
-----		
Mirror Color	RED	RED
Lastupdate Time	2004/03/09 14:07:10	2004/03/09 13:41:34
Break Time	2004/03/09 14:06:21	2004/03/09 13:41:34
Disk Error	OK	OK
Difference Percent	1%	1%

**4.** While the mirroring is being recovered:

See “Checking the mirror recovery progress with a command” on page 993.

## Checking the mirror recovery progress with a command

Run the following command to view the progress of recovering mirroring.

For mirror disk:

```
clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdstat --mirror <hybrid_disk_resource_name (Example: hd1)>
```

You will see the following data while mirroring is being recovered.

Mirror Status: Recovering

md1	server1	server2
-----		
Mirror Color	YELLOW	YELLOW
Recovery Status	Value	
-----		
Status:	Recovering	
Direction:	server1 -> server2	
Percent:	7%	
Used Time:	00:00:09	
Remain Time:	00:01:59	

You will see the following information when the mirror recovery is successfully completed.

Mirror Status: Normal

md1	server1	server2
-----		
Mirror Color	GREEN	GREEN

## Recovering mirror with a command

Run the following command to start the mirror recovery.

For mirror disk:

```
clpmdctrl --recovery <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdctrl --recovery <hybrid_disk_resource_name (Example: hd1)>
```

When FastSync Option is enabled, only the difference data is recovered. Therefore, the mirror recovery takes less time than when FastSync Option is disabled.

This command immediately returns the control once the mirror recovery starts. For information on how to verify the mirror recovery progress, see “Checking the mirror recovery progress with a command” on page 993 and “Checking the mirror recovery progress from the WebManager” on page 999.

## Running the forcible mirror recovery with a command

If ExpressCluster cannot determine which server contains the latest data, you have to run the forcible mirror recovery.

In this case, you have to manually identify the server that holds the latest data, and perform the forcible mirror recovery.

The difference mirror recovery function is disabled in the forcible mirror recover, and the data is fully copied.

Identify the server that holds the latest data by any of the following means:

- Using Mirror Disk Helper of the WebManager
  1. Right-click **Servers** in the WebManager tree to start Mirror Disk Helper.
  2. On the main screen of Mirror Disk Helper, display the detailed data of the mirror disk resources you want to see.
  3. Click the Details button.
  4. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.
- Using the clpmdstat or clphdstat command

Confirmation method is the same as Mirror Disk Helper of the WebManager except that you use a command.

1. Run the following command.

For mirror disk:

```
clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdstat --mirror <hybrid_disk_resource_name (Example: hd1)>
```

2. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.

- Using data on mirror disks

This method is not recommended because the data may be corrupted if anything goes wrong in the procedure. Perform the following steps on both servers to identify which has the latest data.

1. Confirm all groups are stopped.
2. Mount the data partition in the ¥ read only mode by referring to “Forcibly mounting mirror disk when mirroring is not available” on page 983.
3. Logically examine the data on the mount point.
4. Unmount the data partition.

When you have identified the server holding the latest data, run the following command to start the forcible mirror recovery.

For mirror disk:

```
clpmdctrl --force <server_containing_the_latest_data>  
<mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdctrl --force <server_containing_the_latest_data>  
<hybrid_disk_resource_name (Example: hd1)>
```

The clpmdctrl or clphdctrl command immediately returns the control once the forcible mirror recovery starts. For information on how to check the forcible mirror recovery progress, see “Checking the mirror recovery progress with a command” on page 993 and “Checking the mirror recovery progress from the WebManager” on page 999.

When the forcible mirror recovery is successfully completed, activate the groups. The mirror disks or hybrid disks become available.

## Running the forcible mirror recovery with a command only on one server

In some cases, you cannot start one of the servers due to a hardware or OS failure, and the server that can be started may not have the latest data. If you want to start applications at least on the server that can be started, you can perform the forcible mirror recovery on that server.

However, remember that if you do this, the data on the server where you run this command becomes the latest data no matter which server actually has it. Therefore, even if you are able to start the other server later, you cannot handle the data in that server as the latest one. Make sure you understand the consequence before running the following command.

Run the following command to start the forcible mirror recovery:

For mirror disk:

```
clpmdctrl --force <server_name> <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

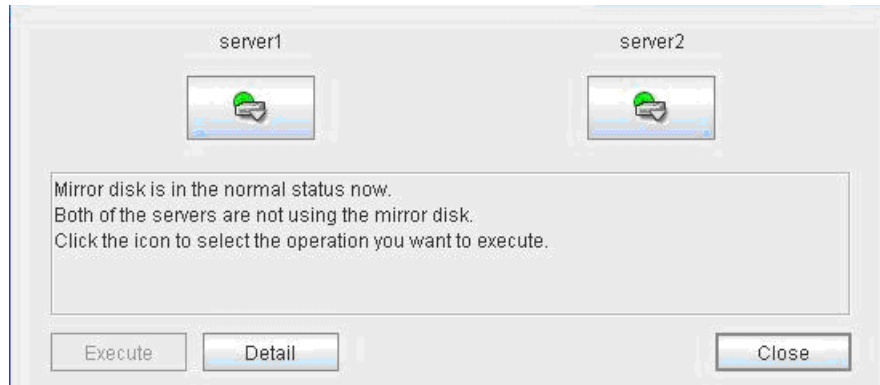
```
clphdctrl --force <server_name> <hybrid_disk_resource_name (Example: hd1)>
```

After running the command, you can activate the groups and use the mirror disks or hybrid disks.

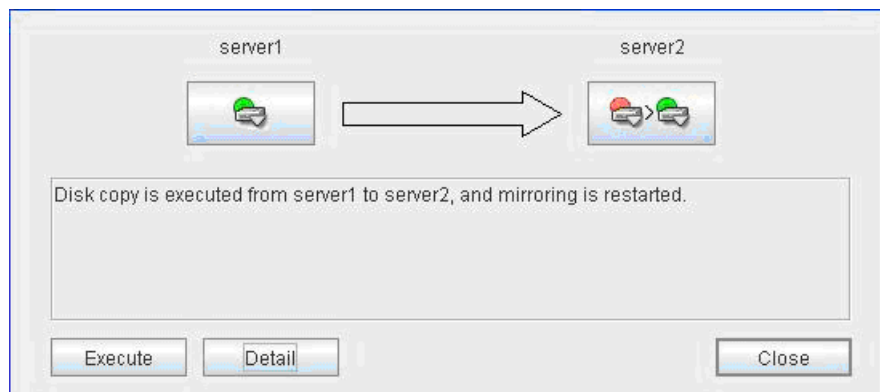
## Checking the mirror break status from the WebManager

You can see the mirror break status by starting Mirror Disk Helper from the WebManager. (The following is an example of mirror disk resource. The color of icons, what the statuses mean and description are the same for hybrid disk resources, although the screen display is different.)

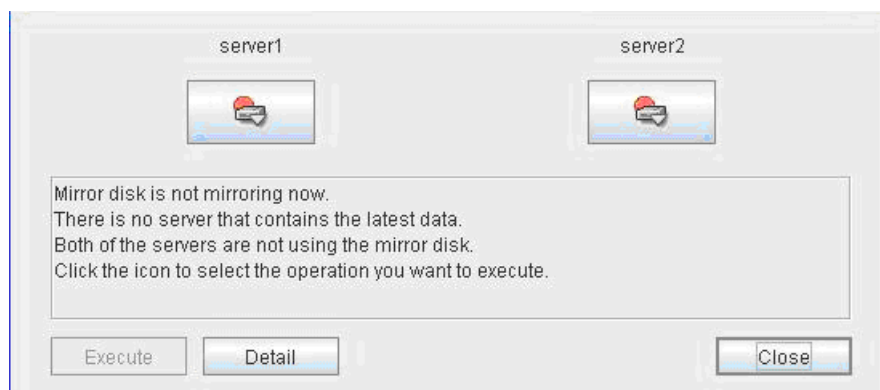
- When normal:



- When mirror recovery is required:



- When forcible mirror recovery is required:



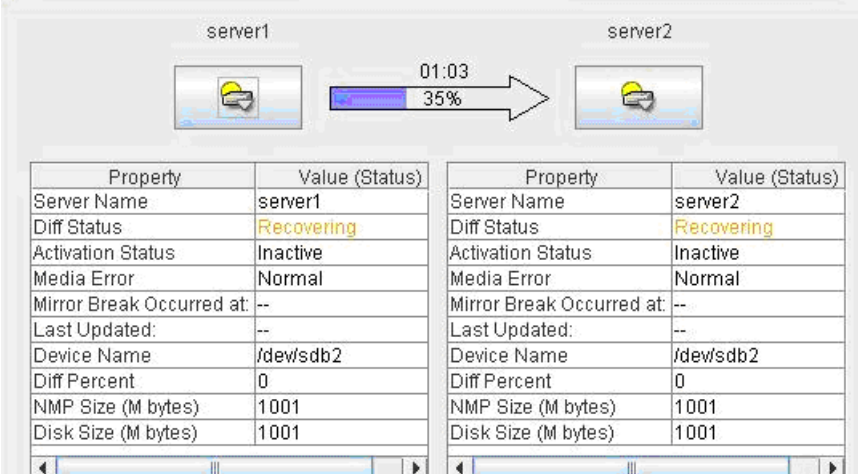
- While mirror recovery is in progress:

See “Checking the mirror recovery progress from the WebManager” on page 999.

## Checking the mirror recovery progress from the WebManager

Start Mirror Disk Helper from the WebManager to view the mirror recovery progress. (The following is an example of mirror disk resource. The color of icons, what the statuses mean and description are the same for hybrid disk resources, although the screen display is different.)

You will see the following screen during the mirror recovery.

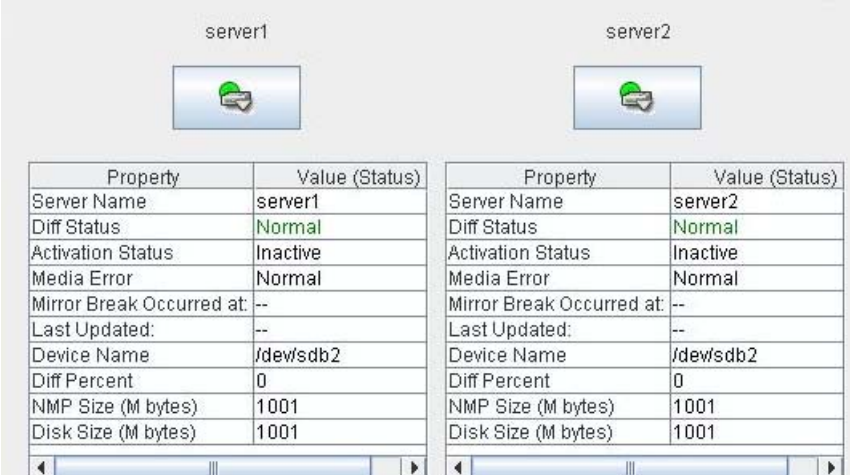


The screenshot displays the WebManager interface for a mirror disk resource. At the top, a progress bar shows the recovery progress from server1 to server2, with a time estimate of 01:03 and 35% completion. Below the progress bar, two tables show the properties and values for server1 and server2.

Property	Value (Status)
Server Name	server1
Diff Status	Recovering
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Property	Value (Status)
Server Name	server2
Diff Status	Recovering
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

You will see the following screen when the mirror recovery is successfully completed.



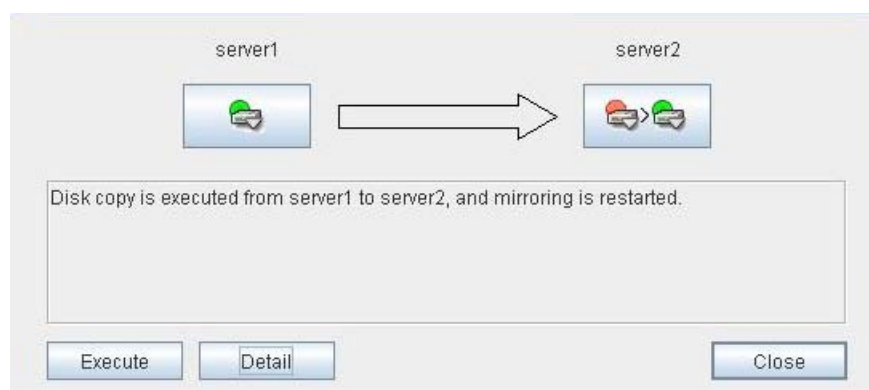
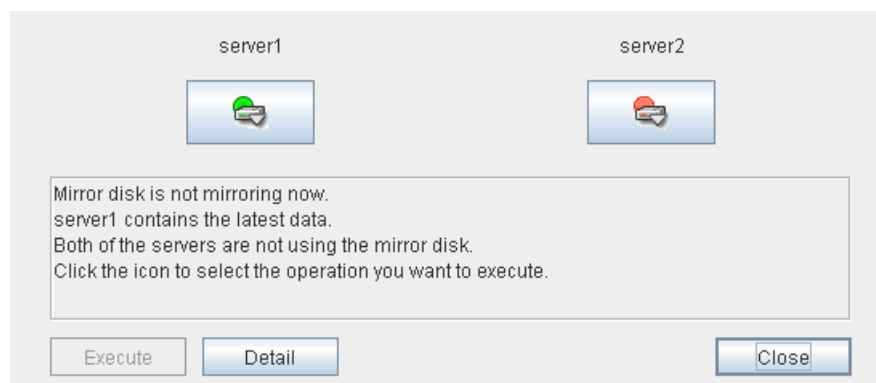
The screenshot displays the WebManager interface after the mirror recovery is successfully completed. The progress bar is no longer present, and both server1 and server2 now show a 'Normal' status in the Diff Status field.

Property	Value (Status)
Server Name	server1
Diff Status	Normal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

Property	Value (Status)
Server Name	server2
Diff Status	Normal
Activation Status	Inactive
Media Error	Normal
Mirror Break Occurred at:	--
Last Updated:	--
Device Name	/dev/sdb2
Diff Percent	0
NMP Size (M bytes)	1001
Disk Size (M bytes)	1001

## Recovering mirror using the WebManager

Start Mirror Disk Helper from the WebManager to start mirror recovery. See “Functions of the WebManager” for Mirror Disk Helper.



For information on how to check the mirror recovery progress, see “Checking the mirror recovery progress with a command” on page 993 and “Checking the mirror recovery progress from the WebManager” on page 999.

## Running the forcible mirror recovery using the WebManager

When ExpressCluster cannot determine which server has the latest data, you have to perform the forcible mirror recovery. In this case, you have to manually identify the server which holds the latest data, and perform the forcible mirror recovery.

The difference mirror recovery function is disabled in the forcible mirror recovery and the data is fully copied.

Identify the server that has the latest data by any of the following methods:

- Using Mirror Disk Helper of the WebManager
  1. Right-click **Servers** in the WebManager tree to start the Mirror Disk Helper.
  2. On the main screen of Mirror Disk Helper, display the detailed data of the mirror disk resources you want to see.
  3. Click the **Details** button.
  4. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.

- Using the clpmdstat command or clphdstat command

Confirm method is the same as Mirror Disk Helper of the WebManager except that you use a command.

1. Run the following command:

For mirror disk:

```
clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
```

For hybrid disk:

```
clphdstat --mirror <hybrid_disk_resource_name (Example: hd1)>
```

2. See the last update time stamp (Last Data Updated Time) to identify the server which contains the latest data. However, this Last Data Updated Time depends on the operating system's clock.

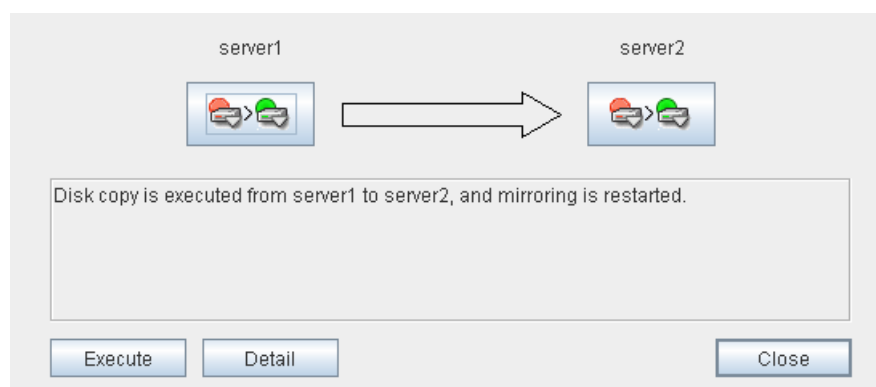
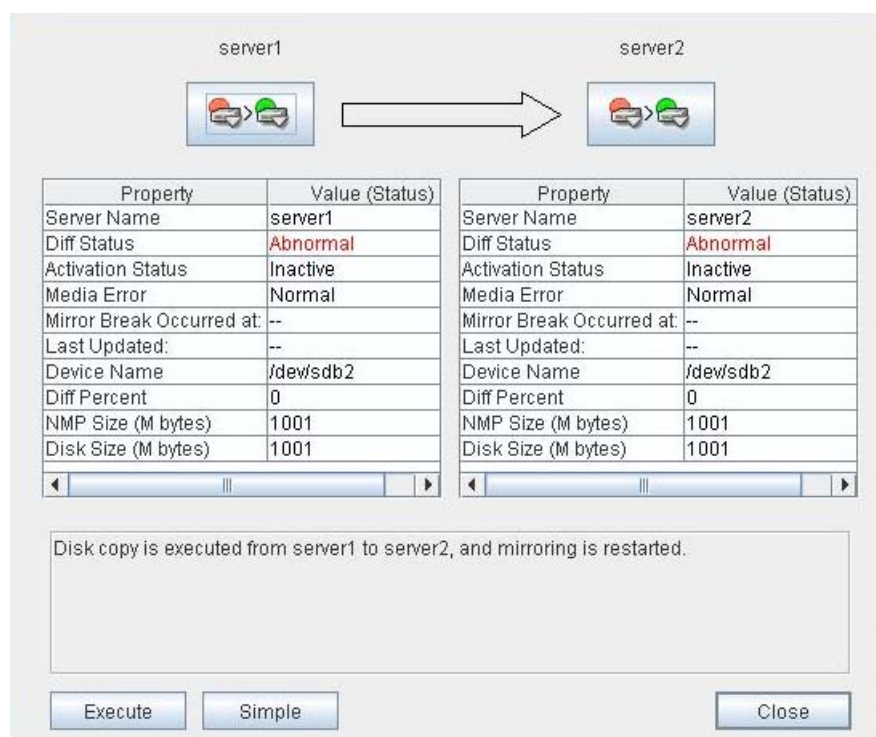
- Using data on mirror disks

This is not recommended because the data may be corrupted destroyed if anything goes wrong in the procedure.

Perform the following steps on both servers to identify which has the latest data.

1. Confirm that all groups are inactive.
2. See "Forcibly mounting mirror disk when mirroring is not available" on page 983.
3. Logically examine the data on the mount point.
4. Unmount the data partition.

When you have identified the server containing the latest data, start the Mirror Disk Helper from the WebManager to start the forcible mirror recovery. See “Functions of the WebManager” for Mirror Disk Helper.



For information on how to check the forcible mirror recovery progress, see “Checking the mirror recovery progress with a command” on page 993 and “Checking the mirror recovery progress from the WebManager” on page 999.

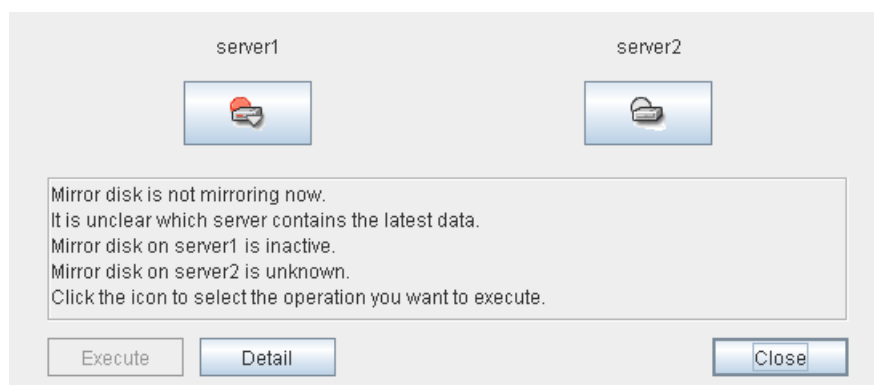
When the forcible mirror recovery is successfully completed, you can activate the groups and use the mirror disks.

## Running the forcible mirror recovery from the WebManager only on one Server

In some cases, you cannot start one of the servers due to a hardware or OS failure, and the server that can be started may not have the latest data. If you want to start applications at least on the server that can be started, you can perform the forcible mirror recovery on that server.

However, remember that if you do this, the data on the server where you run this command becomes the latest data no matter which server actually has it. Therefore, even if the other server becomes available later, you cannot handle the data in that server as the latest one. Make sure you understand the consequence before running the following command.

Start the Mirror Disk Helper from the WebManager to start the forcible mirror recovery. See “Functions of the WebManager” for Mirror Disk Helper.



When the forcible mirror recovery is successfully completed, you can activate the groups and use the mirror disks.

## Changing current server on hybrid disk

Conditions in which current server can be changed is as follows:

Hybrid disk status		Whether or not current server can be changed	
Server group 1	Server group 2	Server group 1	Server group 2
error/deactivated	error/deactivated	Yes	Yes
normal/deactivated	error/deactivated	Yes	Yes
error/deactivated	normal/deactivated	Yes	Yes
normal/deactivated	normal/deactivated	Yes	Yes
normal/activated	error/deactivated	No	Yes
error/deactivated	normal/activated	Yes	No
normal/activated	normal/deactivated	No	No
pending/deactivated	pending/deactivated	Yes	Yes

## Changing current server with a command

Run the following command on the server which you want to make current server to change the current server of hybrid disk.

```
clphdctrl --setcur <hybrid_disk_resource_name(Example:hd1)>
```

## Changing current server with WebManager

Start Mirror Disk Helper from WebManager. See “Functions of the WebManage” for Mirror Disk Helper.

# Troubleshooting problems with VERITAS volume manager

This section describes how to handle trouble when using VERITAS volume manager.

## Modifying the VERITAS volume manager configuration

Whether or not the OS needs to be restarted determines the steps for changing the VERITAS Volume Manager configuration.

- If the OS does not need to be restarted when changing the configuration, see “When the OS does not need to be restarted to change the configuration of VERITAS Volume Manager (when using the online version Builder)” or “When the OS does not need to be restarted to change the configuration of VERITAS Volume Manager (when using the offline version Builder).”
- If the OS needs to be restarted when changing the configuration, see “When restart of the OS is necessary to change the configuration of VERITAS Volume Manager.”

### When the OS does not need to be restarted to change the configuration of VERITAS Volume Manager (when using the online version Builder)

1. Connect to the WebManager with a management IP address. If you do not have any management IP address, connect to it by using the actual IP address of any server.
2. From the **Service** menu on the WebManager, click **Stop Cluster**.
3. Change the configuration of VERITAS Volume Manager.
4. Start the online version Builder on the WebManager you connected to.
5. Change the settings of the resource using the Builder.
6. Upload the cluster configuration data on the Builder.
7. From the **Service** menu on the WebManager, click **Start Cluster**.

The settings will be effective.

### When the OS does not need to be restarted to change the configuration of VERITAS Volume Manager (when using the offline version Builder)

1. Back up the cluster configuration data on a floppy disk.  
Choose Step A or B depending on the type of OS that uses the Builder.
  - A. Run the command below to make a backup of the Builder which operates on the Web browser of Linux on a floppy disk.  
`clpcfctrl --pull -l`
  - B. Run the command below to make a backup of the Builder which operates on the Web browser of Windows on a floppy disk.  
`clpcfctrl --pull -w`

See a separate guide, Chapter 4, “ExpressCluster command reference” for the troubleshooting of the clpcfctrl command.
2. Stop the cluster.  
`clpctl -t -a`
3. Change the configuration of VERITAS Volume Manager.

4. Change the settings of the resource using the Builder
5. Load the configuration information in the floppy disk to server. Choose Step A or B depending on the type of the floppy disk you created with the Builder.

- A. Run the command below to use the floppy disk with the information you created with the Builder for Linux.

```
clpcfctrl --push -l
```

- B. Run the command below to use the floppy disk with the information you created with the Builder for Windows (1.44 MB, formatted on Windows OS).

```
clpcfctrl --push -w
```

For troubleshooting of the clpcfctrl command, see Chapter 4, “ExpressCluster command reference” in this guide.

6. Remove the information floppy disk from the floppy disk drive.

The settings will be effective next time the group is activated.

#### **When restart of the OS is necessary to change the configuration of VERITAS Volume Manager**

1. Back up the cluster configuration data on a floppy disk. Choose Step A or B depending on the type of OS that uses the Builder.

- A. Run the command below to make a backup of the Builder which operates on the Web browser of Linux on a floppy disk.

```
clpcfctrl --pull -l
```

- B. Run the command below to make a backup of the Builder which operates on the Web browser of Windows on a floppy disk.

```
clpcfctrl --pull -w
```

For troubleshooting of the clpcfctrl command, see Chapter 4, “ExpressCluster command reference” in this guide.

2. Run the chkconfig command as shown below on all servers to stop the ExpressCluster services from starting.

```
chkconfig --del clusterpro_alertsync  
chkconfig --del clusterpro_webmgr  
chkconfig --del clusterpro_  
chkconfig --del clusterpro_md
```

3. Stop the ExpressCluster daemon.

```
clpcl -t -a
```

4. Change the configuration of VERITAS Volume Manager, and restart the OS.
5. Change the settings of resources using the Builder.
6. Load the configuration information in the floppy disk to the server. Choose Step A or B depending on the type of the floppy disk you created with the Builder.
  - A. Run the command below to use the floppy disk with the information you created with the Builder for Linux.

```
clpcfctrl --push -l
```

- B. Run the command below to use the floppy disk with the information you created with the Builder for Windows (1.44 MB format).

```
clpcfctrl --push -w
```

For troubleshooting of the clpcfctrl command, see Chapter 4, “ExpressCluster command reference” in this guide.

7. Remove the information floppy disk from the floppy disk drive.
8. Run the chkconfig command shown below on all servers to start the ExpressCluster services.

```
chkconfig --add clusterpro_md  
chkconfig --add clusterpro_  
chkconfig --add clusterpro_webmgr  
chkconfig --add clusterpro_alertsync
```

9. Restart all servers.

The services will be effective next time the OS is started.

## Operations of ExpressCluster when VERITAS volume manager fails

See procedures in “To change the cluster configuration data,” if you do not wish to failover groups or the final action to take place when a problem occurs in VERITAS Volume Manager and an error is detected in the VxVM disk group resource and/or VxVM volume resource.

See procedures in “Restoring the cluster configuration information,” if you wish to recover from a VERITAS Volume Manager error and to establish control again by using the ExpressCluster.

### To change the cluster configuration data

1. Start all servers at run level 1.
2. Run the `chkconfig` command shown below on all servers to stop the ExpressCluster services from starting.

```
chkconfig --del clusterpro_alertsync
chkconfig --del clusterpro_webmgr
chkconfig --del clusterpro
chkconfig --del clusterpro_md
```

3. Restart all servers.
4. Make a backup of the cluster configuration data on a floppy disk. Choose Step A or B depending on the type of OS that uses the Builder.

- A. Run the command shown below to make a backup of the Builder which operates on the Web browser of Linux on a floppy disk.

```
clpcfctrl --pull -l
```

- B. Run the command below to make a backup of the Builder which operates on the Web browser of Windows on a floppy disk.

```
clpcfctrl --pull -w
```

For troubleshooting of the `clpcfctrl` command, see Chapter 4, “ExpressCluster command reference.”

5. In case the configuration information should be restored, make another copy of cluster configuration in a floppy disk according to the procedures described in Step 4. Store the information floppy disk because it will be used in “Restoring the cluster configuration information.”
6. Change the resource settings using the Builder.

- VxVM disk group resource
- VxVM volume resource

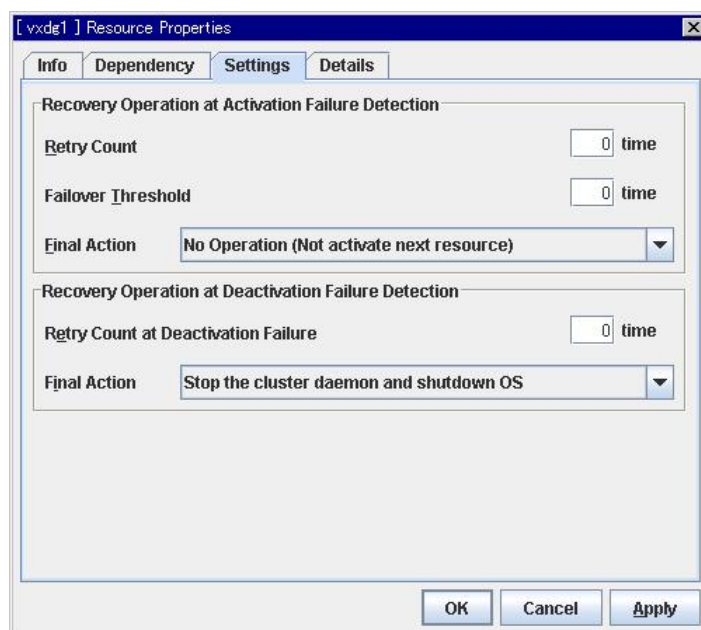
For these group resources, make the following settings on the **Settings** tab of the **Resource Properties** window:

#### Recovery operation at activation failure

Retry Count at Activation Failure	0 time
Failover Threshold	0 time
Final Action	No Operation (Next Resource Are Activated)

#### Recovery operation at deactivation failure

Retry Count at Deactivation Failure	0 time
Final Action	No Operation (Next Resource Are Deactivated)

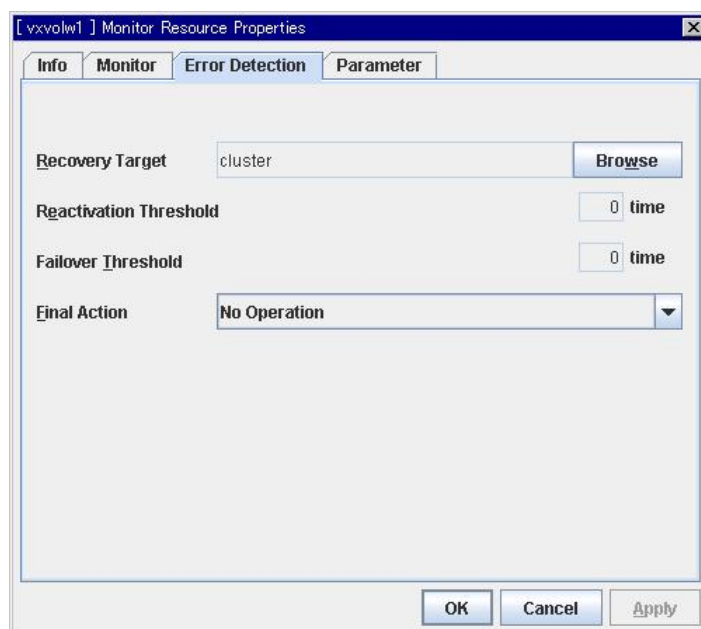


- VxVM daemon monitor resource
- VxVM volume monitor resource

For these monitor resources, make the following settings on the **Error Detection** tab of the **Monitor Resources Properties** window:

#### Error Detection

Reactivation Threshold	0 time
Failover Threshold	0 time
Final Action	No Operation



7. Load the configuration information in the floppy disk to the server. Choose Step A or B depending on the version of the floppy disk that you created with the Builder.

- A. Run the command below to use the floppy disk you created with the Builder for Linux.

```
clpcfctrl --push -l
```

- B. Run the command below to use the floppy disk you created with the Builder for Windows (1.44 MB formatted).

```
clpcfctrl --push -w
```

For troubleshooting of the clpcfctrl command, see Chapter 4, “ExpressCluster command reference” in this guide.

8. Remove the information floppy disk from the floppy disk drive.
9. Run the chkconfig command shown below on all servers to start the ExpressCluster services.

```
chkconfig --add clusterpro_md  
chkconfig --add clusterpro  
chkconfig --add clusterpro_webmgr  
chkconfig --add clusterpro_alertsync
```

10. Restart all servers.

The services will be effective next time the OS is started.

### **Restoring the cluster configuration information**

1. Stop the ExpressCluster daemon using the command shown below if the ExpressCluster daemon is running.

```
clpcl -t -a
```

2. Load the configuration information of the floppy disk created in Step 5 of “To change the cluster configuration data” to the server. Choose Step A or B depending on the version of the floppy disk that you backed up.

- A. Run the command below to use the floppy disk that you backed up for Linux.

```
clpcfctrl --push -l
```

- B. Run the command below to use the floppy disk that you backed up for Windows (1.44 MB formatted).

```
clpcfctrl --push -w
```

For troubleshooting of the clpcfctrl command, see Chapter 4, “ExpressCluster command reference” in this guide.

3. Remove the information floppy disk from the floppy disk drive.

The setting will be effective next time the ExpressClusterrpro daemon is activated.

## When a kernel page allocation error occurs ~ For Replicator / Replicator DR~

When the ExpressCluster Replicator is running on the Turbolinux 10 Server, the following message may be recorded. However, in some cases, this message may not be recorded depending on the memory size and the I/O load.

```
kernel: [kernel_module_name]: page allocation failure. order:X,  
mode:0xXX
```

When the ExpressCluster Replicator is running on the Turbolinux 10 Server, the following messages may be recorded. However, the in some cases, this message may not be recorded depending on the memory size and the I/O load.

```
/proc/sys/vm/min_free_kbytes
```

The maximum specifiable value for min\_free\_kbytes value varies depending on the physical memory size of the server. The following table shows the maximum specifiable min\_free\_kbytes values:

Physical memory size (Mbyte)	Max value
1024	1024
2048	1448
4096	2048
8192	2896
16384	4096



# Chapter 12    Error messages

This chapter provides information on error messages you might encounter in operating ExpressCluster.  
This chapter covers:

• Messages .....	1014
• Messages reported by syslog, alert and mail .....	1014
• Driver syslog messages .....	1067
• Detailed information in activating and deactivating group resources.....	1079
• Detailed info of monitor resource errors.....	1089

## Messages

ExpressCluster X 2.1 does not support event log (syslog) monitoring of NEC ESMPRO Agent.

ExpressCluster X 2.1 does not notify events occurring on ExpressCluster to NEC Express Report Service.

## Messages reported by syslog, alert and mail

### Note:

facility = daemon (0x00000018), identity = “expresscls” are displayed on syslogs. The “Event type” on the following list is the log level of the syslog.

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
pm	Info	1	Starting the cluster daemon...	The ExpressCluster daemon has started properly.	-	•	•	
pm	Info	2	Shutting down the cluster daemon...	The ExpressCluster daemon is being stopped.	-	•	•	
pm	Info	3	Shutdown monitoring is started...	The shutdown monitoring started.	-	•	•	
pm	Error	10	The cluster daemon has already started.	The ExpressCluster daemon is already active.	Check the status of the ExpressCluster daemon.	•	•	
pm	Error	11	A critical error occurred in the cluster daemon.	A fatal error occurred in the ExpressCluster daemon.	The run user may not be root user, or memory or OS resources may not be sufficient. Check them.	•	•	•
pm	Error	12	A problem was detected in XML library.	A problem was detected in the XML library.	Memory or OS resources may not be sufficient. Check them.	•	•	
pm	Error	13	A problem was detected in cluster configuration data.	A problem was detected in the cluster configuration data.	Check the cluster configuration data by using the Builder.	•	•	•
pm	Error	14	No cluster configuration data is found.	The cluster configuration data does not exist.	Create the cluster configuration data by using the Builder, and upload the data on all servers in the cluster.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
pm	Error	15	No information about this server is found in the cluster configuration data.	The local server information does not exist in the cluster configuration data.	Check the cluster configuration data by using the Builder.	•	•	
pm	Error	20	Process %1 was terminated abnormally.	The %1 process was abnormally terminated.	Memory or OS resources may not be sufficient. Check them.	•	•	•
pm	Error	21	The system will be stopped because the cluster daemon process terminated abnormally.	The ExpressCluster daemon process was abnormally terminated. The system will be shut down.	Inactivating group resources may have failed. Take appropriate action according to the group resource message.	•	•	
pm	Error	22	An error occurred when initializing process %1.(return code:%2)	%1 process initialization error.	The event process may not be activated. See "Troubleshooting" on page 964.	•	•	•
pm	Info	23	The system will be stopped.	The system will be shut down.	-	•	•	
pm	Info	24	The cluster daemon will be stopped.	The ExpressCluster daemon will be stopped.	-	•	•	
pm	Info	25	The system will be rebooted.	The system will be restarted.	-	•	•	
pm	Info	26	Process %1 will be restarted.	The %1 process will be restarted.	-	•	•	
pm	Info	30	Received a request to stop the system from %1.	A request from %1 to stop the system has been received.	-	•	•	
pm	Info	31	Received a request to stop the cluster daemon from %1.	A request from %1 to stop the ExpressCluster daemon has been received.	-	•	•	
pm	Info	32	Received a request to reboot the system from %1.	A request from %1 to restart the system has been received.	-	•	•	
pm	Info	33	Received a request to restart the cluster daemon from %1.	A request from %1 to restart the ExpressCluster daemon has been received.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
pm	Info	34	Received a request to resume the cluster daemon from %1.	A request from %1 to resume the cluster has been received.	-	•	•	
pm	Info	35	Received a request to suspend the cluster daemon from %1.	A request from %1 for cluster suspension has been received.	-	•	•	
pm	Info	36	Received a request to panic by sysrq from %1.	A request from %1 for panic by sysrq has been received.	-	•	•	
pm	Info	37	Received a request to reset by keepalive driver from %1.	A request from %1 for reset by keepalive has been received.	-	•	•	
pm	Info	38	Received a request to panic by keepalive driver from %1.	A request from %1 for panic by keepalive has been received.	-	•	•	
pm	Info	39	Received a request to reset by BMC from %1.	A request from %1 for reset by BMC has been received.	-	•	•	
pm	Info	40	Received a request to power down by BMC from %1.	A request from %1 for power-down by BMC has been received.	-	•	•	
pm	Info	41	Received a request to power cycle by BMC from %1.	A request from %1 for power-cycle by BMC has been received.	-	•	•	
pm	Info	42	Received a request to send NMI by BMC from %1.	A request from %1 for sending NMI by BMC has been received.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
pm	Error	66	An attempt to panic by sysrq from %1 failed.	An attempt to perform panic by sysrq from %1 failed.	Make sure that the system is configured to be able to use sysrq.	•	•	
pm	Error	67	An attempt to reset by keepalive driver from %1 failed.	An attempt to reset by keepalive driver from %1 failed.	Check if the environment supports the keepalive driver.	•	•	
pm	Error	68	An attempt to panic by keepalive driver from %1 failed.	An attempt to perform panic by keepalive driver from %1 failed.	Check if the environment supports the keepalive driver.	•	•	
pm	Error	69	An attempt to reset by BMC from %1 failed.	An attempt to reset by BMC from %1 failed.	Check if the hwreset command can be used.	•	•	
pm	Error	70	An attempt to power down by BMC from %1 failed.	An attempt to power down by BMC from %1 failed.	Check if the hwreset command can be used.	•	•	
pm	Error	71	An attempt to power cycle by BMC from %1 failed.	Failed to power cycle by BMC from %1.	Check if the hwreset command can be used.	•	•	
pm	Error	72	An attempt to send NMI by BMC from %1 failed.	Failed to send NMI by BMC from %1 failed.	Check if the hwreset command can be used.	•	•	
nm	Info	1	Server %1 has started.	Server %1 has started.	-	•	•	
nm	Info	2	Server %1 has been stopped.	Server %1 has stopped.	-	•	•	•
nm	Info	3	Resource %1 of server %2 has started.	Resource %1 has started on Server %2.	-	•	•	
nm	Info	4	Resource %1 of server %2 has stopped.	Resource %1 has stopped on Server %2.	-	•	•	
nm	Info	5	Waiting for all servers to start.	Waiting for all the servers to start up has started.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
nm	Info	6	All servers have started.	All the servers have started.	-	•	•	
nm	Info	7	Timeout occurred during the wait for startup of all servers.	Timeout occurred while waiting for all the servers to start up.	-	•	•	
nm	Error	8	Timeout occurred during the wait for startup of all servers. (Cannot communicate with some servers.)	Timeout occurred while waiting for all the servers to start up. (Internal communication with some servers is unavailable.)	Check that an error is not occurring on network adapter, or network is properly connected.	•	•	
nm	Error	10	Status of resource %1 of server %2 is unknown.	Resources %1 status is unknown on Server %2.	Check that cable or network settings of the %1 resource are correctly configured.	•	•	•
nm	Error	20	Process %1 was terminated abnormally.	Process %1 was abnormally terminated.	Memory or OS resources may not be sufficient. Check them.	•	•	•
nm	Info	21	The system will be stopped.	The system will be shut down.	-	•	•	
nm	Info	22	The cluster daemon will be stopped.	The ExpressCluster daemon will be stopped.	-	•	•	
nm	Info	23	The system will be rebooted.	The system will be restarted.	-	•	•	
nm	Info	24	Process %1 will be restarted.	The process %1 will be restarted.	-	•	•	
nm	Error	30	Network partition was detected. Shut down the server %1 to protect data.	The network partition was detected. Server %1 will be shut down to protect data.	All the heartbeats cannot be used. Make sure that an error is not occurring on network adapter, or network is properly connected. Check the status of shared disk when using DISKHB. When using COMHB, check the COM cable is properly connected.	•	•	
nm	Error	31	An error occurred while confirming the network partition. Shut down the server %1.	An error occurred while the network partition is being confirmed. Server %1 will be shut down to protect data.	Make sure that an error is not occurring on network partition solution resource.	•	•	
nm	Error	32	Shut down the server %1. (reason:%2)	Server %1 will be shut down. (reason:%2)	All the heartbeats cannot be used. Make sure that an error is not occurring on network adapter, or	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
					network is properly connected. Check the status of shared disk when using DISKHB. When using COMHB, check the COM cable is properly connected.			
nm	Error	33	Cluster service will be stopped. (reason:%1)	Cluster service will be stopped. (reason:%1)	Sort out the cause showed in the "reason".	•	•	
nm	Error	34	The combination of the network partition resources is invalid. (server name:%1)	The combination of the network partition resolution resources is invalid. (server name:%1)	Check the cluster configuration information.	•	•	
nm	Error	35	Failed to start the resource %1. Server name:%2	Starting the resource %1 failed. Server name:%2	Make sure that an error is not occurring on network partition resolution resource.	•	•	
nm	Info	36	The network partition %1 of the server %2 has been recovered to the normal status.	The network partition %1 of the server %2 has been recovered to the normal status.	-	•	•	
nm	Error	37	The network partition %1 of the server %2 has an error.		Make sure that an error is not occurring on network partition resolution resource.	•	•	
nm	Error	38	The resource %1 of the server %2 is unknown.		Check the cluster configuration information.	•	•	
nm	Info	39	The server %1 cancelled the pending failover.		-	•	•	
nm	Error	80	Cannot communicate with server %1.	An internal communication with server %1 is unavailable.	Make sure that an error is not occurring on network adapter, or network is properly connected.	•	•	
nm	Info	81	Recovered from internal communication error with server %1.	An internal communication with the server %1 has recovered from the abnormal status.	-	•	•	
rc	Info	10	Activating group %1 has started.	The group %1 has started.	-	•	•	
rc	Info	11	Activating group %1 has completed.	Starting the group %1 has completed.	-	•	•	
rc	Error	12	Activating group %1 has failed.	Starting the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	20	Stopping group %1 has started.	Stopping the group %1 has started.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Info	21	Stopping group %1 has completed.	Stopping the group %1 has completed.	-	•	•	
rc	Error	22	Stopping group %1 has failed.	Stopping the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Error	23	Server %1 is not in a condition to start group %2.	Server %1 is not in a condition to start group %2.	The group of the absolute exclusive attributes cannot be started on the server on which the group of the absolute exclusive attributes has already started. Stop the group of the absolute exclusive attributes, and then execute it again.	•	•	
rc	Info	30	Activating %1 resource has started.	Starting the resource %1 has started.	-		•	
rc	Info	31	Activating %1 resource has completed.	Starting the resource %1 has completed.	-		•	
rc	Error	32	Activating %1 resource has failed.(%2 : %3)	Starting the resource %1 has failed.	See “Detailed information in activating and deactivating group resources” on page in this guide.	•	•	•
rc	Info	40	Stopping %1 resource has started.	Stopping the resource %1 has started.	-		•	
rc	Info	41	Stopping %1 resource has completed.	Stopping the resource %1 has completed.	-		•	
rc	Error	42	Stopping %1 resource has failed.(%2 : %3)	Stopping the resource %1 has failed.	See “Detailed information in activating and deactivating group resources” on page 1079.	•	•	•
rc	Info	50	Moving group %1 has started.	Moving the group %1 has started.	-	•	•	
rc	Info	51	Moving group %1 has completed.	Moving the group %1 has completed.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	52	Moving group %1 has failed.	Moving the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	60	Failover group %1 has started.	Failover of the group %1 has started.	-	•	•	
rc	Info	61	Failover group %1 has completed.	Failover of the group %1 has completed.	-	•	•	
rc	Error	62	Failover group %1 has failed.	Failover of the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Error	63	Server %1 is not in a condition to move group %2.	Server %1 is not in a condition to move group %2.	Check the status of the server where groups are to be moved. If there is no such server, the server name is not output in %1.	•	•	
rc	Info	70	Restarting group %1 has started.	Restarting the group %1 has started.	-	•	•	
rc	Info	71	Restarting group %1 has completed.	Restarting the group %1 has completed.	-	•	•	
rc	Error	72	Restarting group %1 has failed.	Restarting the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	80	Restarting resource %1 has started.	Restarting the resource %1 has started.	-	•	•	
rc	Info	81	Restarting resource %1 has completed.	Restarting the resource %1 has completed.	-	•	•	
rc	Error	82	Restarting resource %1 has failed.	Restarting the resource %1 has failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	83	Starting a single resource %1.	A single resource %1 is being started.	-	•	•	
rc	Info	84	A single resource %1 has been started.	A single resource %1 has been started.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	85	Failed to start a single resource %1.	Starting a single resource %1 has failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Error	86	Server %1 is not in a condition to start a single resource %2.	Server %1 is not in a condition to start a single resource %2.	Confirm the status of the server or group.	•	•	
rc	Info	87	Stopping a single resource %1.	A single resource %1 is being stopped.	-	•	•	
rc	Info	88	A single resource %1 has been stopped.	A single resource %1 has been stopped.	-	•	•	
rc	Error	89	Failed to stop a single resource %1.	Stopping a single resource %1 failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	90	All the servers in the cluster were shut down.	The cluster was shut down.	-	•	•	
rc	Info	91	The server was shut down.	The server was shut down.	-	•	•	
rc	Error	92	Group %1 has started on more than one server.	The group %1 is active on more than one server.	The server will automatically be shut down. See "Recovery from network partitioning" on page 909.	•	•	•
rc	Warning	100	Restart count exceeded the maximum value %1. Final action of resource %2 will not be executed.	Restart count exceeded the maximum of %1. Final action of resource %2 will not be executed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	121	The CPU frequency has been set to high.	-	-	•	•	
rc	Info	122	The CPU frequency has been set to low.	-	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Info	124	CPU frequency setting has been switched to automatic control by cluster.	-	-	•	•	
rc	Error	140	CPU frequency control cannot be used.	-	Check BIOS settings and kernel settings.	•	•	
rc	Error	141	Failed to set the CPU frequency to high.	-	Check BIOS settings and kernel settings. Check if the cluster daemon is started. Check if the configuration is set so that CPU frequency control is used.	•	•	
rc	Error	142	Failed to set the CPU frequency to low.	-	Check BIOS settings and kernel settings. Check if the cluster daemon is started. Check if the configuration is set so that CPU frequency control is used.	•	•	
rc	Error	144	Failed to switch the CPU frequency setting to automatic control by cluster.	-	Check if the cluster daemon is started. Check if the configuration is set so that CPU frequency control is used.	•	•	
rc	Info	160	Script before final action upon activation failure in resource %1 started.	-	-	•	•	
rc	Info	161	Script before final action upon activation failure in resource %1 completed.	-	-	•	•	
rc	Info	160	Script before final action upon deactivation failure in resource %1 started.	-	-	•	•	
rc	Info	161	Script before final action upon deactivation failure in resource %1 completed.	-	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	180	Script before final action upon activation failure in resource %1 failed.		Check the cause of the script failure and take measures.	•	•	
rc	Error	180	Script before final action upon deactivation failure in resource %1 failed.		Check the cause of the script failure and take measures.	•	•	
rc	Info	200	Resource(%1) will be reactivated since activating resource(%2) failed.	Resource %2 will be reactivated since starting resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	201	Group(%1) will be moved to server(%2) since activating resource(%3) failed.	Group %1 will be moved to server %2 since activating resource %3 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	202	Group(%1) will be stopped since activating resource(%2) failed.	Group %1 will be stopped since activating resource %2 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	203	Cluster daemon will be stopped since activating resource(%1) failed.	Cluster daemon will be stopped since activating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	204	System will be halted since activating resource(%1) failed.	System will be shut down since activating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	205	System will be rebooted since activating resource(%1) failed.	System will be rebooted since activating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	206	Activating group(%1) will be continued since failover process failed.	Starting group %1 will be continued since failover process failed.	Take appropriate action by following the group resource messages.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Info	220	Resource(%1) will be stopping again since stopping resource(%2) failed.	Resource %1 will be deactivated again since deactivating resource %2 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	222	Group(%1) will be stopped since stopping resource(%2) failed.	Group %1 will be stopped since deactivating resource %2 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	223	Cluster daemon will be stopped since stopping resource(%1) failed.	Cluster daemon will be stopped since deactivating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	224	System will be halted since stopping resource(%1) failed.	System will be shut down since deactivating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	225	System will be rebooted since stopping resource(%1) failed.	System will be rebooted since deactivating resource %1 failed.	Take appropriate action by following the group resource messages.	•	•	
rc	Info	240	System panic by sysrq is requested since activating resource(%1) failed.	System panic by sysrq is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	241	System reset by keepalive driver is requested since activating resource(%1) failed.	System reset by keepalive driver is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	242	System panic by keepalive driver is requested since activating resource(%1) failed.	System panic by keepalive driver is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	243	System reset by BMC is requested since activating resource(%1) failed.	System reset by BMC is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Info	244	System power down by BMC is requested since activating resource(%1) failed.	System power down by BMC is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	245	System power cycle by BMC is requested since activating resource(%1) failed.	System power cycle by BMC is requested since activating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	246	NMI send by BMC is requested since activating resource(%1) failed.	NMI send by BMC is requested since activating resource (%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Error	260	An attempt to panic system by sysrq due to failure of resource(%1) activation failed.	An attempt to panic system by sysrq since activating resource (%1) failed.	Check the system is configured to be able to use sysrq.	•	•	
rc	Error	261	An attempt to reset system by keepalive driver due to failure of resource (%1) activation failed.	An attempt to reset system by keepalive driver due to failure of resource (%1) activation failed.	Check if the usage environment supports the keepalive driver.	•	•	
rc	Error	262	An attempt to panic system by keepalive driver due to failure of resource (%1) activation failed.	An attempt to panic system by keepalive driver due to failure of resource (%1) activation failed.	Check if the usage environment supports the keepalive driver.	•	•	
rc	Error	263	An attempt to reset system by BMC due to failure of resource(%1) activation failed.	An attempt to reset system by BMC due to failure of resource(%1) activation failed.	Check if the hwreset command can be used.	•	•	
rc	Error	264	An attempt to power down system by BMC due to failure of resource (%1) activation failed.	An attempt to power down system by BMC due to failure of resource (%1) activation failed.	Check if the hwreset command can be used.	•	•	
rc	Error	265	An attempt to power cycle system by BMC due to failure of resource(%1) activation failed.	An attempt to power cycle system by BMC due to failure of resource(%1) activation failed.	Check if the hwreset command can be used.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	266	An attempt to send NMI by BMC due to failure of resource(%1) activation failed.	An attempt to send NMI by BMC due to failure of resource (%1) activation failed.	Check if the hwreset command can be used.	•	•	
rc	Info	280	System panic by sysrq is requested since deactivating resource(%1) failed.	System panic by sysrq is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	281	System reset by keepalive driver is requested since deactivating resource(%1) failed.	System reset by keepalive driver is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	282	System panic by keepalive driver is requested since deactivating resource(%1) failed.	System panic by keepalive driver is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	283	System reset by BMC is requested since deactivating resource(%1) failed.	System reset by BMC is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	284	System power down by BMC is requested since deactivating resource(%1) failed.	System power down by BMC is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	285	System power cycle by BMC is requested since deactivating resource(%1) failed.	System power cycle by BMC is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Info	286	Sending NMI by BMC is requested since deactivating resource(%1) failed.	Sending NMI by BMC is requested since deactivating resource(%1) failed.	Cope with the problem by referring to the message of the group resource.	•	•	
rc	Error	300	An attempt to panic system by sysrq due to failure of resource(%1) deactivation failed.	An attempt to panic system by sysrq due to failure of resource(%1) deactivation failed.	Check the system is configured to be able to use sysrq.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	301	An attempt to reset system by keepalive driver due to failure of resource(%1) deactivation failed.	An attempt to reset system by keepalive driver due to failure of resource(%1) deactivation failed.	Check if the usage environment supports the keepalive driver.	•	•	
rc	Error	302	An attempt to panic system by keepalive driver due to failure of resource(%1) deactivation failed.	An attempt to panic system by keepalive driver due to failure of resource(%1) deactivation failed.	Check if the usage environment supports the keepalive driver.	•	•	
rc	Error	303	An attempt to reset system by BMC due to failure of resource(%1) deactivation failed.	An attempt to reset system by BMC due to failure of resource(%1) deactivation failed.	Check if the hwreset command can be used.	•	•	
rc	Error	304	An attempt to power down system by BMC due to failure of resource(%1) deactivation failed.	An attempt to power down system by BMC due to failure of resource(%1) deactivation failed.	Check if the hwreset command can be used.	•	•	
rc	Error	305	An attempt to power cycle system by BMC due to failure of resource(%1) deactivation failed.	An attempt to power cycle system by BMC due to failure of resource(%1) deactivation failed.	Check if the hwreset command can be used.	•	•	
rc	Error	306	An attempt to send NMI by BMC due to failure of resource(%1) deactivation failed.	An attempt to send NMI by BMC due to failure of resource(%1) deactivation failed.	Check if the hwreset command can be used.	•	•	
rc	Info	400	System power down by BMC is requested. (destination server : %1)	System power down by BMC has been requested. (destination server: %1)	-	•	•	
rc	Info	401	System power cycle by BMC is requested. (destination server : %1)	System power cycle by BMC has been requested. (destination server: %1)	-	•	•	
rc	Info	402	System reset by BMC is requested. (destination server : %1)	System power reset by BMC has been requested. (destination server: %1)	-	•	•	
rc	Info	403	Sending NMI by BMC is requested. (destination server : %1)	Sending NMI by BMC has been requested. (destination server: %1)	-	•	•	
rc	Error	420	An attempt to power down system by BMC failed. (destination server : %1)	An attempt to power down system by BMC failed. (destination server: %1)	Check if the ipmitool command or the hwreset command can be used.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rc	Error	421	An attempt to power cycle system by BMC failed. (destination server : %1)	An attempt to power cycle system by BMC failed. (destination server: %1)	Check if the ipmitool command or the hwreset command can be used.	•	•	
rc	Error	422	An attempt to reset system by BMC failed. (destination server : %1)	An attempt to reset system by BMC failed. (destination server: %1)	Check if the ipmitool command or the hwreset command can be used.	•	•	
rc	Error	423	An attempt to send NMI by BMC failed. (destination server : %1)	An attempt to send NMI by BMC failed. (destination server: %1)	Check if the ipmitool command or the hwreset command can be used.	•	•	
rm	Info	1	Monitoring %1 has started.	Monitoring the %1 has started.	-	•	•	
rm	Info	2	Monitoring %1 has stopped.	Monitoring the %1 has stopped.	-	•	•	
rm	Info	3	%1 is not monitored by this server.	This server does not monitor the %1.	-	•	•	
rm	Warning	4	Warn monitoring %1. (%2 : %3)	The status of the %1 monitor resource is warned.	See "Detailed info of monitor resource errors" on page 1089.	•	•	
rm	Warning	5	The maximum number of monitor resources has been exceeded. (registered resource is %1)	The maximum number of monitor resources is exceeded.	Check the cluster configuration data by using the Builder.	•	•	
rm	Warning	6	Monitor configuration of %1 is invalid. (%2 : %3)	The monitor configuration of %1 is invalid.	Check the cluster configuration data by using the Builder.	•	•	
rm	Error	7	Failed to start monitoring %1.	Starting monitoring of %1 has failed.	Memory or OS resources may not be sufficient. Check them.	•	•	•
rm	Error	8	Failed to stop monitoring %1.	Stopping monitoring of %1 has failed.	Memory or OS resources may not be sufficient. Check them.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rm	Error	9	Detected an error in monitoring %1. (%2 : %3)	A problem is detected in monitoring %1.	See “Detailed info of monitor resource errors” on page 1089.  When a monitor time-out is detected, the following message appears in parentheses.  (99 : Monitor was time-out.)	•	•	•
rm	Info	10	%1 is not monitored.	%1 is not monitored.	-	•	•	
rm	Info	12	Recovery target %1 has stopped because an error was detected in monitoring %2.	The recovery target %1 is stopped because a problem was detected in monitoring %2.	-	•	•	
rm	Info	13	Recovery target %1 has restarted because an error was detected in monitoring %2.	The recovery target %1 is restarted because a problem was detected in monitoring %2.	-	•	•	
rm	Info	14	Recovery target %1 failed over because an error was detected in monitoring %2.	Failover of the recovery target %1 has been done because a problem has been detected in monitoring %2.	-	•	•	
rm	Info	15	Stopping the cluster has been required because an error was detected in monitoring %1.	Cluster shutdown is requested because a problem was detected in monitoring %1.	-	•	•	
rm	Info	16	Stopping the system has been required because an error was detected in monitoring %1.	System shutdown is requested because a problem was detected in monitoring %1.	-	•	•	
rm	Info	17	Rebooting the system has been required because an error was detected in monitoring %1.	System reboot is requested because a problem was detected in monitoring %1.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rm	Error	18	Attempted to stop the recovery target %1 due to the error detected in monitoring %2, but failed.	Attempted to stop the recovery target %1 due to monitoring error of %2, but failed.	Check the status of %1 resource.	•	•	
rm	Error	19	Attempted to restart the recovery target %1 due to the error detected in monitoring %2, but failed.	Attempted to restart the recovery target %1 due to error in monitoring %2, but failed.	Check the status of %1 resource.	•	•	
rm	Error	20	Attempted to fail over %1 due to the error detected in monitoring %2, but failed.	Attempted to fail over the recovery target %1 due to error in monitoring %2, but failed.	Check the status of %1 resource.	•	•	
rm	Error	21	Attempted to stop the cluster due to the error detected in monitoring %1, but failed.	Attempted to shut down the cluster due to error in monitoring %1, but failed.	Memory or OS resources may not be sufficient. Check them.	•	•	
rm	Error	22	Attempted to stop the system due to the error detected in monitoring %1, but failed.	Attempted to shut down the system due to error in monitoring %1, but failed.	Memory or OS resources may not be sufficient. Check them.	•	•	
rm	Error	23	Attempted to reboot the system due to the error detected in monitoring %1, but failed.	Attempted to restart the system due to error in monitoring %1, but failed.	Memory or OS resources may not be sufficient. Check them.	•	•	
rm	Error	24	The group of %1 resource is unknown.	The group that %1 resource belongs to is unknown.	The cluster configuration data may be inconsistent. Check the data.	•	•	
rm	Warning	25	Recovery will not be executed since the recovery target %1 is not active.	The recovery target %1 is not recovered because %1 is not activated.		•	•	
rm	Info	26	%1 status changed from error to normal.	Monitoring of %1 returned to normal from error.		•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rm	Info	27	%1 status changed from error or normal to unknown.	Monitoring of %1 has changed from normal or error to unknown.	Memory or OS resources may not be sufficient. Check them.	•	•	
rm	Error	28	Initialization error of monitor process. (%1 : %2)	Initialization error of monitoring process.	Memory or OS resources may not be sufficient. Check them.	•	•	
rm	Info	29	Monitoring %1 was suspended.	Monitoring of %1 is suspended.	-	•	•	
rm	Info	30	Monitoring %1 was resumed.	Monitoring of %1 is resumed.	-	•	•	
rm	Info	31	All monitors were suspended.	All monitoring are suspended.	-	•	•	
rm	Info	32	All monitors were resumed.	All monitoring are resumed.	-	•	•	
rm	Info	35	System panic by sysrq has been required because an error was detected in monitoring %1.	System panic by sysrq has been required because an error was detected in monitoring %1.	-	•	•	
rm	Error	36	Attempted to panic system by sysrq due to the error detected in monitoring %1, but failed.	Attempted to panic system by sysrq due to the error detected in monitoring %1, but failed.	Check the system is configured to be able to use sysrq.	•	•	
rm	Info	37	System reset by keepalive driver has been required because an error was detected in monitoring %1.	System reset by keepalive driver has been required because an error was detected in monitoring %1.	-	•	•	
rm	Error	38	Attempted to reset system by keepalive driver due to the error detected in monitoring %1, but failed.	Attempted to reset system by keepalive driver due to the error detected in monitoring %1, but failed.	Check if the usage environment supports the keepalive driver.	•	•	
rm	Info	39	System panic by keepalive driver has been required because an error was detected in monitoring %1.	System panic by keepalive driver has been required because an error was detected in monitoring %1.	-	•	•	
rm	Error	40	Attempted to panic system by keepalive driver due to the error detected in monitoring %1, but failed.	Attempted to panic system by keepalive driver due to the error detected in monitoring %1, but failed.	Check if the usage environment supports the keepalive driver.	•	•	
rm	Info	41	System reset by BMC has been required because an error was detected	System reset by BMC has been required because an error was detected in monitoring %1.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
			in monitoring %1.					
rm	Error	42	Attempted to reset system by BMC due to the error detected in monitoring %1, but failed.	Attempted to reset system by BMC due to the error detected in monitoring %1, but failed.	Check if the hwreset command can be used.	•	•	
rm	Info	43	System power down by BMC has been required because an error was detected in monitoring %1.	System power down by BMC has been required because an error was detected in monitoring %1.	-	•	•	
rm	Error	44	Attempted to power down system by BMC due to the error detected in monitoring %1, but failed.	Attempted to power down system by BMC due to the error detected in monitoring %1, but failed.	Check if the hwreset command can be used.	•	•	
rm	Info	45	System power cycle by BMC has been required because an error was detected in monitoring %1.	System power cycle by BMC has been required because an error was detected in monitoring %1.	-	•	•	
rm	Error	46	Attempted to power cycle system by BMC due to the error detected in monitoring %1, but failed.	Attempted to power cycle system by BMC due to the error detected in monitoring %1, but failed.	Check if the hwreset command can be used.	•	•	
rm	Info	50	The number of licenses is %1. (%2)	The number of cluster licenses is %1.	-	•	•	
rm	Info	51	The trial license is effective until %4s/%.2s/%.2s. (%1)	The trial version license will expire on %1.	-	•	•	
rm	Warning	52	The number of licenses is insufficient. The number of insufficient licenses is %1. (%2)	You do not have enough licenses.	Purchase and register the license as many as you need.	•	•	
rm	Error	53	The license is not registered. (%1)	The license is not registered.	Purchase and register the license.	•	•	
rm	Error	54	The trial license has expired in %4s/%.2s/%.2s. (%1)	Your trial version license is expired.	Register the valid license.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rm	Error	55	The registered license is invalid. (%1)	The registered license is invalid.	Register the valid license.	•	•	
rm	Error	56	The registered license is unknown. (%1)	The registered license is unknown.	Register the valid license.	•	•	
rm	Error	57	Stopping the cluster is required since license (%1) is invalid.	Cluster shutdown was requested due to the invalid license.	Register the valid license.	•	•	•
rm	Error	58	Stopping the cluster due to invalid license (%1) failed.	Shutting down the cluster due to the invalid license has failed.	Register the valid license.	•	•	
rm	Error	59	The trial license is valid from %4s/%.2s/%.2s. (%1)	The trial version license is not yet effective.	Register the valid license.	•	•	
rm	Warning	71	Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5)	A monitoring delay was detected while monitoring %1. Current timeout value is %2 (seconds) x %3 (tick count per second). The value actually measured when the delay was detected is %4 (tick count). The delay warning rate %5 (in %) has been exceeded.	Check how the server where monitoring delay was detected is loaded and reduce the load	•	•	
					You need to set longer time-out if the monitoring time-out is detected.			
rm	Info	81	Script before final action upon failure in monitor resource %1 started.			•	•	
rm	Info	82	Script before final action upon failure in monitor resource %1 completed.			•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
rm	Error	83	Script before final action upon failure in monitor resource %1 failed.		Check the cause of the script failure and take measures.	•	•	
lanhb	Warning	71	Heartbeats sent from HB resource %1 of server %2 are delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in heartbeats from the heartbeat resource %1 of the server %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server %2 is loaded, and reduce the load.	•	•	
					You need to set a longer time-out value to avoid a heartbeat time-out.			
lanhb	Warning	72	Heartbeats sent from HB resource %1 are delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred while sending heartbeats of the heartbeat resource %1. The destination server is %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count) The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
lanhb	Warning	73	Heartbeats received by HB resource %1 are delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in receiving heartbeats of the heartbeat resource %1. The source server is %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
lankhb	Warning	71	Heartbeats sent from HB resource %1 of server %2 are delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in heartbeats from the heartbeat resource %1 of the server %2. Current	Check how the server %2 is loaded, and reduce the load.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
			3*%4 actual-time=%5 delay warning rate=%6)	timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	You need to set a longer time-out value if a heartbeat time-out occurs.			
lankhb	Warning	73	Heartbeats received from HB resource %1 is delayed.(timeout=% 2*%3 actual-time=%4 delay warning rate=%5)	A delay occurred in receiving heartbeats of the heartbeat resource %1. The source server is %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
diskhb	Error	10	Device(%1) of resource(%2) does not exist.	The device does not exist.	Check the cluster configuration data.	•	•	
diskhb	Error	11	Device(%1) of resource(%2) is not a block device.	The device does not exist.	Check the cluster configuration data.	•	•	
diskhb	Error	12	Raw device(%1) of resource(%2) does not exist.	The device does not exist.	Check the cluster configuration data.	•	•	
diskhb	Error	13	Binding device(%1) of resource(%2) to raw device(%3) failed.	The device does not exist.	Check the cluster configuration data.	•	•	
diskhb	Error	14	Raw device(%1) of resource(%2) has already been bound to other device.	Raw device %1 in resource %2 is bound to other device.	Configure the raw device not being used.	•	•	
diskhb	Error	15	File system exists on device(%1) of resource(%2).	File system exists in device %1 of resource %2.	Delete a file system if device %1 is used.	•	•	
diskhb	Info	20	Resource %1 recovered from initialization error.	Resource %1 recovered from initialization error.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
diskhb	Warning	71	Heartbeats sent from HB resource %1 of server %2 are delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in heartbeats from the heartbeat resource %1 of the server %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server %2 is loaded, and reduce the load.	•	•	
					You need to set a longer time-out value if a heartbeat time-out occurs.			
diskhb	Warning	72	Heartbeat write of HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6).	A delay occurred in writing the heartbeats of the heartbeat resource %1. %2 is the server to which the data is written. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
diskhb	Warning	73	Heartbeat read of HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in reading heartbeats of the heartbeat resource %1. The source server is %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
comhb	Info	1	Device (%1) does not exist.	The device does not exist.	Check the cluster configuration data.	•	•	
comhb	Info	2	Failed to open the device (%1).	Failed to open the device.	Memory or OS resources may not be sufficient. Check them.	•	•	
comhb	Warning	71	Heartbeats sent from HB resource %1 of server %2 are	A delay occurred in heartbeats from the heartbeat resource %1 of the server %2. Current	Check how the server %2 is loaded, and reduce the load.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
			delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)	timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	You need to set a longer time-out value if a heartbeat time-out occurs.			
comhb	Warning	72	Heartbeat write of HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6).	A delay occurred in writing the heartbeats of the heartbeat resource %1. %2 is the server to which the data is written. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
comhb	Warning	73	Heartbeat read of HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in reading heartbeats of the heartbeat resource %1. The source server is %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.			
					You need to set a longer time-out value if a heartbeat time-out occurs.			
monp	Error	1	An error occurred when initializing monitored process %1. (status=%2)	Initialization error in the process %1 to be monitored.	Memory or OS resources may be insufficient, or the cluster configuration data is inconsistent. Check them.	•	•	
					One of the following process messages below will be displayed if the cluster configuration data has not been registered. This does not cause any problem.			
					+ mdagnt (For LE)			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
					+ webmgr + webalert			
monp	Error	2	Monitor target process %1 terminated abnormally. (status=%d)	The process %1 to be monitored was abnormally terminated.	Memory or OS resources may not be sufficient. Check them.	•	•	
monp	Info	3	Monitor target process %1 will be restarted.	The process %1 to be monitored will be restarted.	-	•	•	
monp	Info	4	The cluster daemon will be stopped since the monitor target process %1 terminated abnormally.	The cluster will be shut down because the process %1 to be monitored was abnormally terminated	-	•	•	
monp	Error	5	Attempted to stop the cluster daemon, but failed.	Attempted to shut down the cluster, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•	
monp	Info	6	The system will be stopped since the monitor target process %1 terminated abnormally.	The system will be shut down because the process %1 to be monitored was abnormally terminated.	-	•	•	
monp	Error	7	Attempted to stop the system, but failed. (status=%#x)	Attempted to shut down the system, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•	
monp	Info	8	System will be rebooted since monitor target process %1 terminated abnormally.	The system will be restarted because the process %1 to be monitored was abnormally terminated.	-	•	•	
monp	Error	9	Attempted to reboot the system, but failed. (status=%#x)	Attempted to restart the system, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
md hd	Error	1	Failed to activate mirror disk. %1(Device:%2)	Failed to activate %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) Failed to open I/O port.	1) Failed to open the port. Check the cluster configuration data.			
				2) The local server doesn't have the latest data.	2) The local server does not have the latest data. You have to perform the mirror recovery.			
				3) Communication to the remote server failed.	3) Failed to communicate with the remote server. Check the connection status of mirror.			
				4) The remote server is active.	4). The remote server has already been activated. Check the status of the mirror disk resource.			
				5) The local server is already active.	5) The local server has already been activated. Check the status of the mirror disk resource.			
				6) Mount operation failed.	6) Mounting has failed. Check if there is any mount point, or mount option or other data is correct in the cluster configuration data.			
				7) NPM size of the local server is greater than that of the remote server.	7) The NMP size of the local server is greater than that of the remote server. Execute the forcible mirror recovery using the remote servers as the one to be mirrored.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				8) Failed to set writable mode for data partition	8) Reboot the server on which the resources are attempted to be activated.  A failover may occur when the server is started again.			
md hd	Info	2	fsck to %1 has started.	fsck has started in %1.	-	•	•	
md hd	Info	3	fsck to %1 was successful.	fsck has successfully completed in %1.	-	•	•	
md hd	Error	4	Failed to deactivate mirror disk. %1(Device:%2)	Failed to inactivate %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The mirror disk has already been deactivated.	1) Inactivation is already done. Check the status of the mirror disk resource.			
				2) Umount operation failed.	2) Failed to unmount. Check that the file system of the mirror disk resource is not busy.			
md hd	Warning	24	One of the servers is active, but the NMP sizes of mirror disks are not the same. (Device:%s)	Either of servers is active, but NMP sizes do not match.	Execute the forcible mirror recovery using the active servers as the one to be mirrored.	•	•	
md hd	Error	37	%1 of %2 failed (ret=%3).	Command %1 of device %2 failed with return value %3.	See manual for command %1.	•	•	
md hd	Warning	38	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the command manually.	Specify the option %3 manually to run the command %1.	•	•	
md hd	Info	39	%1 of %2 with %3 option has started.	Command %1 of the device %2 has started by specifying the option %3.	-	•	•	
mdagent	Info	1	The Mirror Agent has started successfully.	The Mirror Agent has started successfully.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdagent	Error	2	Failed to start Mirror Agent. %1	Failed to start the Mirror Agent. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) Agent is running.	1) Agent is already activated.			
				2) Command clpmdinit is running.	2, 3) The clpmdinit or clpmdchng command is running. Confirm that the command has completed, then try again.			
				3) Command clpmdchng is running.				
				4) IP address in the config file is invalid.	4, 5, 6) Check the cluster configuration data.			
				5) Server name in the config file is invalid.				
				6) There is an error in config file.				
				7) Failed to initialize socket server.	7) Memory or OS resources may not be sufficient. Check them.			
mdagent	Info	3	The Mirror Agent has stopped successfully.	The Mirror Agent was successfully terminated.	-	•	•	
mdagent	Error	4	Failed to stop the Mirror Agent.	Failed to stop the Mirror Agent.	The cluster may not be activated yet, or memory or OS resources may not be sufficient. Check them.	•	•	
mdadm	Error	1	Failed to activate mirror disk. %1(Device:%2)	Failed to activate %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) Failed to open I/O port.	1) Failed to open the port. Check the cluster configuration data.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				2) The local server doesn't have the latest data.	2) The local server does not have the latest data. The mirror recovery needs to be performed.			
				3) Communication to the remote server failed.	3) Failed to communicate with the remote server. Check the connection status of mirror disk.			
				4) The remote server is active.	4) The remote server has already been activated. Check the status of the mirror disk resource.			
				5) The local server is already active.	5) The local server has already been activated. Check the status of the mirror disk resource.			
				6) Mount operation failed.	6) Mounting has failed. Check if there is any mount point, or mount option or other data is correct in the cluster configuration data.			
				7) NPM size of the local server is greater than that of the remote server.	7) The NMP size of the local server is greater than that of the remote server. Execute the forcible mirror recovery using the remote servers as the one to be mirrored.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				8) One of other inter-connection works well except mirror disk connections.	8) Check that the mirror connect LAN does not have any problem.			
				9) Replicator license is invalid or expired.	9) Register the valid license.			
mdadm	Info	2	fsck to %1 has started.	fsck has started in %1.	-	•	•	
mdadm	Info	3	fsck to %1 was successful.	fsck has successfully completed in %1.	-	•	•	
mdadm	Error	4	Failed to deactivate mirror disk. %1(Device:%2)	Failed to inactivate %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The mirror disk has already been deactivated.	1) Inactivation is already done. Check the status of the mirror disk resource.			
				2) Umount operation failed.	2) Failed to unmount. Check that the file system of mirror disk resources is not busy.			
mdadm	Error	5	Failed to recover the mirror. %1(Device:%2)	The mirror recovery failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	•

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				1) The recovery is in progress.	1) The mirror recovery is in progress. Try again when the mirror recovery has completed.			
				2) The destination server is active.	2) The mirror disk resource is already activated on the copy destination server. Check the status of the mirror disk resource.			
				3) Cannot determine the mirror recovery direction.	3) The mirror recovery direction cannot be determined. The forcible mirror recovery needs to be performed.			
				4) The source server is abnormal.	4) The copy source server has a problem. Check the Mirror Agent status.			
				5) NMP size of recovery destination is smaller.	5) Change the direction of the mirror recovery. If the direction cannot be changed, replace the mirror disk of the mirror recovery destination server to allocate sufficient size of data partition. Or, run the fdisk command to allocate sufficient size of data partition.			
				6) Replicator license is invalid or expired.	6) Register the valid license.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdadm	Info	6	Mirror recovery of %1 was completed successfully.	The mirror recovery has successfully completed in %1.	-	•	•	
mdadm	Info	7	Mirror recovery mode is %1.(Device:%2)	The mirror recovery mode is %1.	-	•	•	
mdadm	Info	8	The number of Replicator Option licenses is %1. (%2)	The number of Replicator Option licenses is %1. (%2)	-	•	•	
mdadm	Info	9	The trial license is effective until %1. (%2)	The trial version license expires on %1.	-	•	•	
mdadm	Error	10	The registered license is unknown. (%1)	The registered license is unknown.	Register the valid license.	•	•	
mdadm	Error	11	The registered license is invalid. (%1)	The registered license is invalid.	Register the valid license.	•	•	
mdadm	Error	12	The license is not registered. (%1)	The license is not registered.	Purchase and register the license.	•	•	
mdadm	Warning	13	The number of licenses %1 is insufficient. (%2)	You do not have enough licenses.	Purchase and register the license as many as you need.	•	•	
mdadm	Error	14	The trial license expired in %1. (%2)	Your trial version license is expired.	Register the valid license.	•	•	
mdadm	Error	15	The trial license is effective from %1. (%2)	The trial version license is not yet effective.	Register the valid license.	•	•	
mdadm	Info	16	Initial mirror recovery of %1 has started.	Initial mirror building has started in %1.	-	•	•	
mdadm	Info	17	Mirror recovery of %1 has started.	The mirror recovery has started in %1.	-	•	•	
mdadm	Info	18	Initial mirror recovery of %1 was successful.	The initial mirror building has successfully completed in %1.	-	•	•	
mdadm	Error	19	Failed to perform initial mirror recovery. %1(Device:%2)	The initial mirror building has failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	•

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				<p>1) The recovery is in progress.</p> <p>2) The destination server is active.</p> <p>3) Cannot determine the mirror recovery direction.</p> <p>4) The source server is abnormal.</p>	<p>1) The mirror recovery is in progress. Try again when the mirror recovery has completed.</p> <p>2) Resources have been activated on the copy destination server. Check the status of the mirror disk resource.</p> <p>3) The mirroring direction cannot be determined. The forcible mirror recovery needs to be performed.</p> <p>4) The copy source server has a problem. Check the Mirror Agent status.</p>			
mdadm	Info	20	Initial mirror recovery was not executed following the configuration. (Device:%1)	The initial mirror is not constructed as indicated by the settings.	-	•	•	
mdinit hdinit	Info	21	Mirror partition mkfs was executed. (Device:%1)	mkfs for the mirror partition has been executed.	-	•	•	
mdinit hdinit	Info	22	Mirror partition mkfs was not executed following the configuration. (Device:%1)	mkfs for the mirror partition has not been executed as indicated by the settings.	-	•	•	
mdadm	Info	23	Forced mirror recovery was canceled. Execute the command "clpmdctrl --force" to resume the mirror recovery. (Device:%1)	Forced mirror recovery has been cancelled. Run clpmdctrl --force when resuming the mirror recovery.	Run the clpmdctrl --force command to resume the mirror recovery.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdadm	Warning	24	One of the servers is active, but NMP size of mirror disks are not the same. (Device:%1)	Either of servers is active, but NMP sizes do not match.	Execute the forcible mirror recovery using the active servers as the one to be mirrored.	•	•	
mdadm	Info	25	The NMP sizes of both servers' disks have been successfully synchronized. (Device:%1)	NMP sizes of both servers have successfully been synchronized.	-	•	•	
mdadm	Error	28	Mirror recovery data has been successfully synchronized. NMP size synchronization has failed. (Device:%1)	The mirror recovery data has successfully been synchronized. However, synchronizing NMP sizes failed.	Execute the forcible mirror recovery again.	•	•	
mdadm	Error	30	The license information was removed after the cluster was started.	The license was valid when a cluster was started, but it is deleted.	Register a valid license.	•	•	
mdadm	Error	31	Failed to isolate the mirror. %1(Device:%2)	Failed to isolate %2. The message below is displayed on %1.		•	•	
				1) Replicator license is invalid or expired.	Register the valid license.			
mdadm	Error	32	Failed to force active the mirror. %1(Device:%2)	Failed to forcibly activate %2. The message below is displayed on %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) Failed to open I/O port.	1) Failed to open the port. Check the configuration information of the cluster.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				2) Mount operation failed.	2) Failed in mount operation. Check if the mount point exists. Or make sure that the cluster configuration information such as mount option is correct.			
				3) Replicator license is invalid or expired.	3) Register the valid license.			
mdadm	Error	33	Failed to force recovery the mirror. %s(Device: %s)	Failed to forcibly recover %2. The message below is displayed on %1.		•	•	
				1) Replicator license is invalid or expired.	1) Register the valid license.			
mdadm	Info	34	Mirror isolate of %1 was completed successfully.	Succeeded to isolate the mirror resource %1.	-	•	•	
mdadm	Info	35	Mirror force active of %1 was completed successfully.	Succeeded to forcibly activate %1.	-	•	•	
mdadm	Info	36	Mirror force recovery of %s was completed successfully.	Succeeded to forcibly recover %1.	-	•	•	
mdadm	Error	37	%1 of %2 failed(ret=%3).	Command %1 of device %2 failed with return value %3.	See manual for command %1.	•	•	
mdadm	Warning	38	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the command manually.	Specify the option %3 manually to run the command %1.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdadm	Info	39	%1 of %2 with %3 option has started.	Command %1 of the device %2 has started by specifying option %3.	-	•	•	
mdadm	Info	40	Failed to write to cluster partition of hybrid disk(%1).	Writing to cluster partition %1 failed.	Restart the server.	•	•	
mdadm	Info	41	Timeout in writing to cluster partition of hybrid disk(%1).	Writing to cluster partition %1 has timed out.	-	•	•	
mdadm	Info	42	Failed to read from cluster partition of hybrid disk(%1).	Reading cluster partition %1 failed.	Restart the server.	•	•	
mdadm	Info	43	Timeout in reading from cluster partition of hybrid disk(%1).	Reading cluster partition %1 has timed out.	-	•	•	
mdctrl hdctrl	Error	1	Failed to activate mirror disk.%1(Device:%2)	Failed to activate %2. One of the following messages is logged in %1.  1) Failed to open I/O port.  2) The local server doesn't have the latest data.  3) Communication to the remote server failed.	What you should do is determined by the message displayed in the %1.  1) Failed to open the port. Check the cluster configuration data.  2) The local server does not have the latest data. The mirror recovery needs to be performed.  3) Failed to communicate with the remote server. Check the connection status of the mirror disk.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				4) The remote server is active.	4) The remote server has already been activated. Check the status of the mirror disk resource.			
				5) The local server is already active.	5) The local server has already been activated. Check the status of the mirror disk resource.			
				6) Mount operation failed.	6) Mounting has failed. Check if there is any mount point, or mount option or other data is correct in the cluster configuration data.			
				7) NPM size of the local server is greater than that of the remote server.	7) The NMP size of the local server is greater than that of the remote server. Execute the forcible mirror recovery using the remote server as the one to be mirrored.			
				8) Failed to set writable mode for data partition	8) Reboot the server on which resource activation was attempted. A failover may occur when the server is started again.			
mdctrl hdctrl	Info	2	fsck of %1 has started.	fsck has started in %1.	-	•	•	
mdctrl hdctrl	Info	3	fsck of %1 was successful.	fsck has successfully completed in %1.	-	•	•	
mdctrl hdctrl	Error	4	Failed to deactivate mirror disk.%1(Device:%2)	Failed to inactivate %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				1) The mirror disk has already been deactivated.	1) Inactivation is already done. Check the status of the mirror disk resource.			
				2) Umount operation failed.	2) Failed to unmount. Check that the file system of the mirror disk resources is not busy.			
mdctrl hdctrl	Error	5	Failed to recover mirror.%1(Device:%2)	The mirror recovery failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The recovery is in progress.	1) The mirror recovery is in progress. Try again when the mirror recovery has completed.			
				2) The destination server is active.	2) The mirror disk resources have been activated on the copy destination server. Check the status of the mirror disk resource.			
				3) Can not judge the recovery direction.	3) The mirror recovery direction cannot be determined. The forcible mirror recovery needs to be performed.			
				4) The source server is abnormal.	4) The copy source server has a problem. Check the Mirror Agent status.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				5) NMP size of recovery destination is smaller.	5) Execute forcible mirror recovery by using the remote server as a source of mirroring or replace the disk of the mirror recovery destination by a disk having enough size. Or, run the fdisk command to allocate sufficient size of data partition.			
mdctrl hdctrl	Info	7	Mirror recovery mode is %1.(Device:%2)	The mirror recovery mode is %1.	-	•	•	
mdctrl hdctrl	Info	16	Initial mirror recovery of %1 has started.	Initial mirror building has started in %1.	-	•	•	
mdctrl hdctrl	Info	17	Mirror recovery of %1 has started.	The mirror recovery has started in %1.	-	•	•	
mdctrl hdctrl	Info	18	Initial mirror recovery of %1 was successful.	The initial mirror building has successfully completed in %1.	-	•	•	
mdctrl hdctrl	Error	19	Failed to perform initial mirror recovery. %1(Device:%2)	The initial mirror building has failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The recovery is in progress.	1) The mirror recovery is in progress. Try again when the mirror recovery has completed.			
				2) The destination server is active.	2) The resource is already activated on the copy destination server. Check the status of the mirror disk resource.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				3) Cannot judge the recovery direction.	3) The mirror recovery direction cannot be determined. The forcible mirror recovery needs to be performed.			
				4) The source server is abnormal.	4) The copy source server has a problem. Check the status of the Mirror Agent status.			
mdctrl hdctrl	Info	20	Initial mirror recovery was not executed following the configuration. (Device:%1)	The initial mirror is not constructed as indicated by the settings.	-	•	•	
mdctrl hdctrl	Error	31	Failed to isolate the mirror. %1(Device:%2)	Failed to isolate %2. The message below is displayed on %1.		•	•	
				1) Replicator license is invalid or expired.	Register the valid license.			
mdctrl hdctrl	Error	32	Failed to force active the mirror. %1(Device:%2)	Failed to forcibly activate %2. The message below is displayed on %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) Failed to open I/O port.	1) Failed to open the port. Check the configuration information of the cluster.			
				2) Mount operation failed.	2) Failed in mount operation. Check if the mount point exists. Or make sure that the cluster configuration information such as mount option is correct.			

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
				3) Replicator license is invalid or expired.	3) Register the valid license.			
mdctrl hdctrl	Error	33	Failed to force recovery the mirror. %s(Device:%s)	Failed to forcibly recover %2. The message below is displayed on %1.		•	•	
				1) Replicator license is invalid or expired.	1) Register the valid license.			
mdctrl hdctrl	Info	34	Mirror isolate of %1 was completed successfully.	Succeeded to isolate the mirror resource %1.	-	•	•	
mdctrl hdctrl	Info	35	Mirror force active of %1 was completed successfully.	Succeeded to forcibly activate %1.	-	•	•	
mdctrl hdctrl	Info	36	Mirror force recovery of %s was completed successfully.	Succeeded to forcibly recover %1.	-	•	•	
mdctrl hdctrl	Error	37	%1 of %2 failed(ret=%3).	Command %1 of the device %2 failed with return value of %3.	See the manual of command %1.	•	•	
mdctrl hdctrl	Warning	38	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the command manually.	Specify the option %3 manually to run the command %1.	•	•	
mdctrl hdctrl	Info	39	%1 of %2 with %3 option has started.	Command %1 of the device %2 has started by specifying the option %3.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdw hdw	Error	5	Failed to recover the mirror.%1(Device:%2)	The mirror recovery failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The recovery is in progress.	1) The mirror recovery is in progress. Try again when the mirror recovery has completed.			
				2) The destination server is active.	2) The mirror disk resource is already activated on the copy destination server. Check the status of the mirror disk resource.			
				3) Cannot judge the recovery direction.	3) The mirror recovery direction cannot be determined. The forcible mirror recovery needs to be performed.			
				4) The source server is abnormal.	4) The copy source server has a problem. Check the Mirror Agent status.			
				5) NMP size of recovery destination is smaller.	5) Execute forcible mirror recovery by using the remote server as a source of mirroring or replace the disk of the mirror recovery destination by a disk having enough size. Or, run the fdisk command to allocate sufficient size of data partition.			
mdw hdw	Info	7	Mirror recovery mode is %1.(Device:%2)	The mirror recovery mode is %1.	-	•	•	
mdw hdw	Info	16	Initial mirror recovery of %1 has started.	Initial mirror building has started in %1.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mdw hdw	Info	17	Mirror recovery of %1 has started.	The mirror recovery has started in %1.	-	•	•	
mdw hdw	Info	18	Initial mirror recovery of %1 was successful.	The initial mirror building has successfully completed in %1.	-	•	•	
mdw hdw	Error	19	Failed to perform initial mirror recovery.%1(Device:%2)	The initial mirror building has failed in %2. One of the following messages is logged in %1.	What you should do is determined by the message displayed in the %1.	•	•	
				1) The recovery is in progress.	1) The mirror recovery is in progress. Try again when the mirror recovery has completed.			
				2) The destination server is active.	2) The resource is already activated on the copy destination server. Check the status of the mirror disk resource.			
				3) Cannot judge the recovery direction.	3) The mirroring direction cannot be determined. The forcible mirror recovery needs to be performed.			
				4) The source server is abnormal.	4) The copied source server has a problem. Check the Mirror Agent status.			
mdw hdw	Info	20	Initial mirror recovery was not executed following the configuration. (Device:%1)	The initial mirror is not constructed as indicated by the settings.	-	•	•	
fip	Error	10	IP address %1 already exists on the network.	The IP address %1 exists on the network.	Check if the IP address is already used on the network.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
fip	Info	11	IP address %1 will be forcefully activated.	The IP address %1 will be forcibly activated.	-	•	•	
vip	Error	10	IP address %1 already exists on the network.	The IP address %1 already exists on the network.	Check if the IP address is not already used on the network.	•	•	
vip	Info	11	IP address %1 will be forcefully activated.	The IP address %1 will be forcefully activated.	-	•	•	
disk	Info	10	%1 of %2 has started.	Command %1 of the device %2 has been started.	-	•	•	
disk	Info	11	%1 of %2 was successful.	Command %1 of the device %2 was successful.	-	•	•	
disk	Error	12	%1 of %2 failed (ret=%3).	Command %1 of the device %2 failed with return value of %3.	See the manual of command %1.	•	•	
disk	Warning	13	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the command manually.	Specify the option %3 manually to run the command %1.	•	•	
disk	Info	14	%1 of %2 with %3 option has started.	Command %1 of the device %2 has started by specifying the option %3.	-	•	•	
vxdg	Info	10	Successfully imported VxVM disk group with -c option that clears host ID information. (DiskGropu:%1)	The disk group %1 was imported by the -c option.	-	•	•	
vxdg	Warning	11	Successfully imported VxVM disk group with -f option that forces the import. (DiskGropu:%1)	The disk group %1 was imported by the -f option.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
vxvol	Info	10	fsck of %1 has started.	fsck of %1 has been started.	-	•	•	
vxvol	Info	11	fsck of %1 was successful.	fsck of %1 was successful.	-	•	•	
vxvol	Error	12	%1 of %2 failed (ret=%3).	Command %1 of device %2 failed with return value %3.	Refer to the %1command manual.	•	•	
vxvol	Warning	13	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to specify the %3 option to execute the command %1 of the device %2. Execute the command manually.	Specify the %3 option manually to run the %1 command.	•	•	
vxvol	Info	14	%1 of %2 with %3 option has started.	Command %1 of device %2 has been started by specifying the %3 option.	-	•	•	
cl	Info	1	There was a request to start %1 from the %2.	There was a request to start %1 from the %2.	-	•	•	
cl	Info	2	There was a request to stop %1 from the %2.	There was a request to stop %1 from the %2.	-	•	•	
cl	Info	3	There was a request to suspend %1 from the %2.	There was a request to suspend %1 from the %2.	-	•	•	
cl	Info	4	There was a request to resume %s from the %s.	There was a request to resume %1 from the %2.	-	•	•	
cl	Error	11	A request to start %1 failed(%2).	A request to start %1 failed.	Check the status of the cluster.	•	•	
cl	Error	12	A request to stop %1 failed(%2).	A request to stop %1 failed.	Check the status of the cluster.	•	•	
cl	Error	13	A request to suspend %1 failed(%2).	A request to suspend %1 failed.	Check the status of the cluster.	•	•	
cl	Error	14	A request to resume %1 failed(%2).	A request to resume %1 failed.	Check the status of the cluster.	•	•	
cl	Error	15	A request to %1 cluster failed on some servers(%2).	A request to %1 cluster failed on some servers.	Check the status of the cluster.	•	•	
mail	Error	1	The license is not registered. (%1)	Purchase and register a license.	-	•	•	
mail	Error	2	The trial license has expired in %1. (%2)	Register a valid license.	-	•	•	
mail	Error	3	The registered license is invalid. (%1)	Register a valid license.	-	•	•	
mail	Error	4	The registered license is unknown. (%1)	Register a valid license.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
mail	Error	5	mail failed(%s).(SMTP server: %s)	Mail report failed.	Check if there is no error in SMTP server, or there is no problem in communication with SMTP server.	•	•	
mail	Info	6	mail succeeded.(SMTP server: %s)	Mail report succeeded.	-	•	•	
userw	Warning	1	Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5)	Detected a monitor delay in monitoring %1. Current timeout is %2(sec) x %3(tick count per sec). Actual measurement when delay is detected is %4(tick count) and exceeded delay warning ratio %5(%).	-	•	•	
vipw	Warning	1	Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5)	A monitor delay was detected in monitoring %1. The current timeout value is %2 (second) x %3 (tick count/second). The actual value at the delay detection is %4 (tick count), and exceeded the delay warning point %5 (%).	-	•	•	
apisv	Info	1	There was a request to stop cluster from the %1(IP=%2).	There was a request to stop cluster from server %1 where %2 is active.	-	•	•	
apisv	Info	2	There was a request to shutdown cluster from the %1(IP=%2).	There was a request to shut down cluster from server %1 where %2 is active.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
apisv	Info	3	There was a request to reboot cluster from the %1(IP=%2).	There was a request to reboot cluster from server %1 where %2 is active.	-	•	•	
apisv	Info	4	There was a request to suspend cluster from the %1(IP=%2).	There was a request to suspend cluster from server %1 where %2 is active.	-	•	•	
apisv	Info	10	There was a request to stop server from the %1(IP=%2).	There was a request to stop server from server %1 where %2 is active.	-	•	•	
apisv	Info	11	There was a request to shutdown server from the %1(IP=%2).	There was a request to shut down server from server %1 where %2 is active.	-	•	•	
apisv	Info	12	There was a request to reboot server from the %1(IP=%2).	There was a request to reboot server from server %1 where %2 is active.	-	•	•	
apisv	Info	30	There was a request to start group(%1) from the %2(IP=%3).	There was a request to start group from server %1 where %2 is active.	-	•	•	
apisv	Info	31	There was a request to start all groups from the %1(IP=%2).	There was a request to start all groups from server %1 where %2 is active.	-	•	•	
apisv	Info	32	There was a request to stop group(%1) from the %2(IP=%3).	There was a request to stop group from server %1 where %2 is active.	-	•	•	
apisv	Info	33	There was a request to stop all groups from the %1(IP=%2).	There was a request to stop all groups from server %1 where %2 is active.	-	•	•	
apisv	Info	34	There was a request to restart group(%1) from the %2(IP=%3).	There was a request to restart group from server %1 where %2 is active.	-	•	•	
apisv	Info	35	There was a request to restart all groups from the %1(IP=%2).	There was a request to start all groups from server %1 where %2 is active.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
apisv	Info	36	There was a request to move group(%1) from the %2(IP=%3).	There was a request to move group (%1) from server %2 where %3 is active.	-	•	•	
apisv	Info	37	There was a request to move group from the %1(IP=%2).	There was a request to move group from server %1 where %2 is active.	-	•	•	
apisv	Info	38	There was a request to failover group(%1) from the %2(IP=%3).	There was a request to fail over group (%1) from server %2 where %3 is active.	-	•	•	
apisv	Info	39	There was a request to failover group from the %1(IP=%2).	There was a request to fail over group from server %1 where %2 is active.	-	•	•	
apisv	Info	50	There was a request to start resource(%1) from the %2(IP=%3).	There was a request to start resource (%1) from server %2 where %3 is active.	-	•	•	
apisv	Info	51	There was a request to start all resources from the %1(IP=%2).	There was a request to start all resources from server %1 where %2 is active.	-	•	•	
apisv	Info	52	There was a request to stop resource(%1) from the %2(IP=%3).	There was a request to start resource (%1) from server %2 where %3 is active.	-	•	•	
apisv	Info	53	There was a request to stop all resources from the %1(IP=%2).	There was a request to stop all resources from server %1 where %2 is active.	-	•	•	
apisv	Info	54	There was a request to restart resource(%1) from the %2(IP=%3).	There was a request to start resource (%1) from server %2 where %3 is active.	-	•	•	
apisv	Info	55	There was a request to restart all resources from the %1(IP=%2).	There was a request to start all resources from server %1 where %2 is active.	-	•	•	
apisv	Info	60	There was a request to suspend monitor resources from the %1(IP=%2)	There was a request to suspend monitor resources from %1.	-	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
apisv	Info	61	There was a request to resume monitor resources from the %1(IP=%2).	There was a request to resume monitor resources from %1.	-	•	•	
apisv	Info	70	There was a request to set CPU frequency level from the %1(IP=%2).	There was a request to set CPU clock from %1.	-	•	•	
apisv	Error	101	A request to stop cluster was failed(0x%08x).	Failed to stop the cluster.	Check the cluster status.	•	•	
apisv	Error	102	A request to shutdown cluster was failed(0x%08x).	Failed to shut down the cluster.	Check the cluster status.	•	•	
apisv	Error	103	A request to reboot cluster was failed(0x%08x).	Failed to reboot the cluster.	Check the cluster status.	•	•	
apisv	Error	104	A request to suspend cluster was failed(0x%08x).	Failed to suspend the cluster.	Check the cluster status.	•	•	
apisv	Error	110	A request to stop server was failed(0x%08x).	Failed to stop the server.	Check the server status.	•	•	
apisv	Error	111	A request to shutdown server was failed(0x%08x).	Failed to shut down the server.	Check the server status.	•	•	
apisv	Error	112	A request to reboot server was failed(0x%08x).	Failed to reboot the server.	Check the server status.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
apisv	Error	130	A request to start group(%1) was failed(0x%08x).	Failed to start the group (%1).	Take appropriate action by following the message of group start failure output by the RC.	•	•	
apisv	Error	131	A request to start all groups was failed(0x%08x).	Failed to start all the groups.	Take appropriate action by following the message of group start failure output by the RC.	•	•	
apisv	Error	132	A request to stop group(%1) was failed(0x%08x).	Failed to stop the group (%1).	Take appropriate action by following the message of group stop failure output by the RC.	•	•	
apisv	Error	133	A request to stop all groups was failed(0x%08x).	Failed to stop all the groups.	Same as above.	•	•	
apisv	Error	136	A request to move group(%1) was failed(0x%08x).	Failed to move the group (%1).	Take appropriate action by following the message of group move failure output by the RC.	•	•	
apisv	Error	138	A request to failover group(%1) was failed(0x%08x).	Failed to fail over the group (%1).	Take appropriate action by following the message of group failover failure output by the RC.	•	•	
apisv	Error	139	A request to failover group was failed(0x%08x).	Failed to fail over all groups.	Same as above.	•	•	
apisv	Error	150	A request to start resource(%1) was failed(0x%08x).	Failed to start the resource (%1).	Take appropriate action by following the message of resource start failure output by the RC.	•	•	–
apisv	Error	152	A request to stop resource(%1) was failed(0x%08x).	Failed to stop the resource (%1).	Take appropriate action by following the message of resource stop failure output by the RC.	•	•	–

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
dapisv	Error	154	A request to restart resource(%1) was failed(0x%08x).	Failed to start the resource (%1) again.	Take appropriate action by following the message of resource restart failure output by the RC.	•	•	–
apisv	Error	155	A request to restart all resources was failed(0x%08x).	Failed to start all resources again.	Same as above.	•	•	
apisv	Error	160	A request to suspend monitor resource was failed(0x%08x).	Failed to suspend monitor resource.	Check the monitor resource status.	•	•	
apisv	Error	161	A request to resume monitor resource was failed(0x%08x).	Failed to resume monitor resource.	Same as above.	•	•	
apisv	Error	170	A request to set CPU frequency was failed(0x%08x).	Failed to set CPU frequency.	Take appropriate action by following the message of CPU frequency set failure output by the RC.	•	•	
dn1000s	Error	1	The license is not registered. (%1)	The license is not registered.	Purchase and register a license.	•	•	
dn1000s	Error	2	The trial license has expired in %1. (%2)	The trial license has expired.	Register a valid license.	•	•	
dn1000s	Error	3	The registered license is invalid. (%1)	The registered license is invalid.	Register a valid license.	•	•	
dn1000s	Error	4	The registered license is unknown. (%1)	The registered license is unknown.	Register a valid license.	•	•	

Module type	Event type	Event ID	Message	Description	Solution	Reported to		
						alert	syslog	mail
dn1000s	Info	5	Notice by the network warning light succeeded.	Notice by the network warning light succeeded.	-	•	•	
dn1000s	Error	6	Error in executing result of warning light command.(%d)	An error occurred in the network warning light command.	Respond according to the error code.	•	•	
dn1000s	Error	7	Failed to execute warning light command.(%d)	Executing the network warning light command failed.	Memory or OS resources may be insufficient.	•	•	

# Driver syslog messages

## Mirror Driver

Module Type	Event type	Message	Description	Solution
liscal	Info	Registered blkdev with major=%1.	Successfully loaded the mirror driver.	-
liscal	Error	Failed to register blkdev with major=%1.	Failed to load the mirror driver.	-
liscal	Info	Unregistered blkdev with major=%1.	Successfully unloaded the mirror driver.	-
liscal	Info	Failed unregister blkdev with major=%1.	Failed to unload the mirror driver.	-
liscal	Error	NMP%1 wrong command input(%2).	The request for the NMP device is not correct.	-
liscal	Info	NMP%1 killing thread....OK	The thread was successfully terminated.	-
liscal	Info	Failed to malloc bitmap_offset.	The physical memory is insufficient.	-
liscal	Info	Failed to malloc wq, to continue.	The physical memory is insufficient.	-
liscal	Info	"NMP(%1) failed to alloc bitmap queue."	Physical memory is not sufficient.	The physical memory is running out. Add physical memories, or terminate unnecessary applications.  The maximum number of request queues may be too great. Specify a smaller number. For information on how to change the number, see this guide.
liscal	Info	Failed to malloc wait_queue head.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc buffer.	Same as above.	Same as above.
liscal	Info	Failed to malloc write_bmp_queue.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc wait_queue head.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc liscal_trans_request, to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc req->var, to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc buffer head.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc liscal_trans_request, start(%2) end(%3), to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc req->var, start(%2) end(%3), to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc buf_head, start(%2) end(%3), to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc liscal_send_ack2_queue.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc liscal_bio_request.	Same as above.	Same as above.

Module Type	Event type	Message	Description	Solution
liscal	Info	NMP%1 read bitmap from CP error(%2).	Disk I/O has failed.	<p>If this message appears during operation, a physical error is occurring in a mirror disk. See this guide to replace the mirror disk and to recover mirroring.</p> <p>If this message is displayed while constructing a cluster, check the settings of the cluster partition in the cluster configuration data.</p>
liscal	Info	liscal_bitmap_readwrite return error(%1).	Same as above.	Same as above.
liscal	Info	NMP%1 I/O incomplete.	Same as above.	Same as above.
liscal	Error	NMP%1 disk I/O error(%2).	Same as above.	Same as above.
liscal	Info	Disk I/O error when write disk error flag.	Same as above.	Same as above.
liscal	Info	NMP%1 com port is closed, exit.	The mirror recovery has failed.	Check the mirror disk connection status. Or, the load of the CPU and mirror disk connect may be too heavy.
liscal	Info	NMP(%1) com port has already closed, to abort recovery.	Same as above.	Same as above.
liscal	Info	NMP%1 socket binding failed(%2).	Failed to establish connection between servers, or communication between servers failed.	<p>Check the mirror disk connection settings in the cluster configuration data.</p> <p>Check the mirror disk connection status.</p>
liscal	Info	Failed to create socket(%1).	Same as above.	Same as above.
liscal	Info	Failed to receive NMP %1 data part (%2)	Same as above.	Same as above.
liscal	Info	Failed to connect to NMP %1 (%2).	Same as above.	<p>Check the mirror disk connection settings in the cluster configuration data.</p> <p>Check the mirror disk connection status.</p> <p>The connection time-out value may be too small. Specify a greater value. For information on how to change the value, see this guide.</p>
liscal	Info	NMP%1 Failed to create send ack2 socket failed(%2).	Same as above.	<p>Check the mirror disk connection settings in the cluster configuration data.</p> <p>Check the mirror disk connection status.</p>
liscal	Info	NMP%1 Failed to create hb client socket failed(%2).	Same as above.	Same as above.
liscal	Info	Failed to accept NMP %1 (%2).	Same as above.	Same as above.

Module Type	Event type	Message	Description	Solution
liscal	Info	NMP%1 deciding connection type failed(%2)	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send ack2(%2)	Same as above.	Same as above.
liscal	Info	"NMP%1 failed to receive ack2 packet(%2).	Same as above.	Same as above.
liscal	Info	Failed to receive NMP%1 data part (%2).	Same as above.	Same as above.
liscal	Info	NMP%1 send head part failed(%2), start(%3) end(%4), to abort.	Same as above.	Same as above.
liscal	Error	NMP%1 send head part(secnr=%2) failed(%3), close com_port and exit.	Same as above.	Same as above.
liscal	Info	NMP%1 second send data failed(%2), to release socket.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send data part(secnr=%2 length=%3).	Same as above.	Same as above.
liscal	Info	NMP%1 send data part failed(%2), start(%3) end(%4), to abort.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send RawWriteAck(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 failed to receive head part(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send ack1(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 send icmp_packet error(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send hb(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 failed to receive hb packet(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send hb reply(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 second send data failed(%2), to release socket.	Same as above.	Same as above.
liscal	Info	NMP%1 Received wrong section. <magic = %2>	The unexpected data was received in the communication among servers.	A failure may occur on mirror disk connect. Check the connection status of the mirror disk connect.  The mirror disk connect may be used by an application other than ExpressCluster. Do not let the applications other than ExpressCluster access the mirror disk connect. For the ports used by ExpressCluster, refer to "Communication ports" and "Cluster driver device information."
liscal	Info	NMP%1 rcv msg error(%2).	Same as above.	Same as above.
liscal	Info	NMP%1 head part received is wrong. (magic=%2, cmd=%3)	Same as above.	Same as above.
liscal	Info	NMP%1 receive wrong magic data.	Same as above.	Same as above.

Module Type	Event type	Message	Description	Solution
liscal	Info	NMP%1 to exec second send(%2).	A communication retry occurred between servers.	Check that neither mirror disk connection nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run.
liscal	Info	NMP%1 failed to send data part(%2), start(%3) end(%4), try again.	Same as above.	Check that neither mirror disk connection nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run.  The send time-out value may be too small. Specify a greater value. For information on how to change the value, see this guide.
liscal	Info	NMP%1 sendForceComClose: sending failed(%2).	The mirror disk connection was temporarily disconnected.	This is not an immediate problem on operation, but the mirror disk connection may be disconnected due to a problem on the remote server. Check messages on the other server, then, take countermeasures.
liscal	Info	NMP%1 open I/O port OK.	I/O to the mirror partition device is opened.	-
liscal	Info	NMP%1 close I/O port OK.	I/O to the mirror partition device is closed.	-
liscal	Info	NMP%1 I/O port is closed, mount(%2), io(%3).	Data synchronization in data partitions is canceled.	The mirror partition device is not mounted. Check the mirror disk resource statuses.
liscal	Info	NMP%1 data received, but com=%2 mount=%3, skip to write.	Data synchronization in data partitions is canceled.	The mirror partition device is not mounted. Check the mirror disk resource statuses.
liscal	Info	NMP%1 cannot find a network to use.	No network is available for the mirror disk connection.	Check the cluster configuration data. Check the mirror disk connection status.
liscal	Info	NMP%1 nmp->bmp_size_in_sec(%2) is invalid.	The size of the bitmap is invalid. The cluster partition may be set incorrectly.	Check the settings of the cluster partition in the cluster configuration data.
liscal	Info	NMP%d failed to malloc bitmapoffset.	The size of physical memory is not sufficient.	The physical memory is running out. Add physical memories, or terminate unnecessary applications.

Module Type	Event type	Message	Description	Solution
				The maximum number of the request queues may be too large. Enter a smaller number. See this guide to change the value.
liscal	Info	liscal_get_bitmap_valid_num_main return error(%1)	Failed to obtain the bitmap information.	Same as above.
liscal	Info	NMP%1 write bitmap from cp error(%2).	The size of physical memory is not sufficient. Or I/O to the disk failed.	The physical memory is running out. Add physical memories, or terminate unnecessary applications. The maximum number of the request queues may be too large. Enter a smaller number. See this guide to change the value.  If this message is displayed during operation, a physical error is occurring in the mirror disk. See this guide to replace the mirror disk and to recover mirror.
liscal	Info	NMP is null, BUG, minor:%1	NMP does not exist.	Check the cluster configuration data.  Check the mirror disk connection status.
liscal	Info	NMP%d device does not exist.	NMP does not exist.	Same as above.
liscal	Info	There is no trans_table available for NMP%1. Cancel recovery process.	The number of NMPs recovering mirror has exceeded the upper limit.	Check the number of NMPs in the cluster configuration data.
liscal	Info	NMP%1 current NMP has been already locked.	Multiple mirror recovery processes attempted to handle the same data block.	An internal error occurred in the mirror driver. After restarting the OS, execute the mirror recovery.
liscal	Info	NMP%1 failed to receive data(%2), start(%3) end(%4), to abort.	Failed to receive data during mirror recovery.	Check that neither mirror disk connection nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, but may be a cause of mirror break in the long run.  The value set to time-out for receiving may be too small. Set a larger value. See this guide to change the value.
liscal	Info	Failed to allocate memory.	The size of physical memory is not sufficient.	The physical memory is running out. Add physical memories, or terminate unnecessary applications.

Module Type	Event type	Message	Description	Solution
				The maximum number of the request queues may be too large. Use a smaller number. See this guide to change the value.
liscal	Info	NMP%1 socket create error(%2).	Failed to create a socket.	Same as above.
liscal	Info	NMP%1 open com port OK.	Opened the communication port between the servers.	-
liscal	Info	NMP%1 close com port OK.	Closed the communication port between the servers.	-
liscal	Info	NMP%1 open mount port OK.	Opened I/O to mirror partition device.	-
liscal	Info	NMP%1 close mount port OK.	Closed I/O to the mirror partition device.	-
liscal	Info	NMP%1 close com port.	Closed the communication port between the servers.	-
liscal	Info	NMP%d mirrorbreak, write CP.	Mirror break occurred. Either there is a problem with mirror connection, or I/O to the disk failed in the remote server.	Check that neither mirror disk connection nor the operating system is loaded heavily.  If this message is displayed during operation, a physical error is occurring with the mirror disk. See this guide to replace the mirror disk and to recover mirror.  If this message is displayed while constructing a cluster, check the settings of the cluster partition in the cluster configuration data.
liscal	Error	Could not create a proc file liscalstat.	Failed to create /proc/liscalstat file.	The physical memory is running out. Add physical memories, or terminate unnecessary applications.  The maximum number of request queues may be too great. Specify a smaller value. For information on how to change the value, see this guide.
liscal	Error	Could not create a proc file liscalininner.	Failed to create /proc/liscalininner file.	The physical memory is running out. Add physical memories, or terminate unnecessary applications.  The maximum number of request queues may be too great. Specify a smaller value. For information on how to change the value, see this guide.

Module Type	Event type	Message	Description	Solution
liscal	Error	NMP%1 failed to malloc liscal_wait_ack2_queue	The size of physical memory is not sufficient	The physical memory is running out. Add physical memories, or terminate unnecessary applications.  The maximum number of request queues may be too great. Specify a smaller value. For information on how to change the value, see this guide.
liscal	Error	NMP%1 failed to malloc end_io_para, send ack1 having the failure immediately.	Same as above.	Same as above.
liscal	Error	NMP%1 failed to malloc send_ack1_queue.	Same as above.	Same as above.
liscal	Error	Warning! NMP%1 disk I/O error. System will reboot.	Failed in I/O to the disk.	When the message is displayed during operation, a physical error is occurring on the mirror disk. Replace the mirror disk by referring to the <i>Reference Guide</i> , and then operate the mirror recovery.  When the message is displayed while the cluster is being configured, check the configuration information of the cluster.
liscal	Error	ERROR:MOUNT PORT is opened	There is an activated mirror disk resource when unloading the mirror driver.	Check the mirror disk resource status.
liscal	Error	ERROR:NMP%1 is busy.	The mirror partition device is busy.	Check the mirror disk resources is not accessed.
liscal	Info	NMP%1 the ratio value is invalid, ratio:%2	The timeout ratio set to NMP[%1] is not correct.	The time-out ratio should be other than 0 (zero).
liscal	Info	NMP%d ack_timeout is invalid. The default settings will be used instead.	The value set to "Ack Timeout" is not correct. The default value is used.	Check the value set to "Ack Timeout."
liscal	Info	NMP%d receive_normal_timeout is invalid. The default settings will be used instead.	The value set to "Receive Timeout" is not correct. The default value is used.	Check the value set to "Receive Timeout."
liscal	Info	Invalid Bitmap refresh interval value. The default settings will be used instead.	The value set to "Bitmap Refresh Interval" is not correct. The default value is used.	Check the value set to "Bitmap Refresh Interval."
liscal	Info	NMP%1 send head part failed(%2), start(%3) end(%4), loopnum(%5) to abort.	Failed to send the data on which the mirror recovery is being processed.	Check the mirror disk connection status.  Check the status of the remote server.  Check the Mirror Agent of the remote server is terminated.

Module Type	Event type	Message	Description	Solution
liscal	Info	NMP%1 failed to clear the bitmap.	Failed to clear bitmap difference. Mirror device where error has occurred is NMP%1.	Shut down and reboot a cluster.
liscal	Info	The init value is invalid,mode:%1.	Flag settings of the operation mode is invalid. Mirror device where error has occurred is NMP%1.	Configuration file may be edited directly in the file. Check the file using the Builder.
liscal	Info	NMP%1 sync switch flag is invalid, flag:%2.	Value of data synchronization flag is invalid. Mirror device where error has occurred is NMP%d.	Configuration file may be edited directly in the file. Check the file using the Builder.
liscal	Error	Failed to allocate nmp->recover_buff.	The physical memory is not sufficient.	The physical memory is not sufficient. Add a physical memory or terminate unnecessary applications.
liscal	Info	NMP%1 new thread: liscal_send_data_thread(%2).	The ID of data sending thread is displayed.	-
liscal	Info	NMP%1 sync switch flag is set to ON	Data synchronization becomes effective.	-
liscal	Info	NMP%1 sync switch flag is set to OFF	Data synchronization becomes disabled.	-
liscal	Info	NMP%1 sync_mode flag is invalid, flag:%2.	The value of data synchronization method is invalid. The mirror device where an error has occurred is NMP%1.	The setting file may be directly edited. Check the setting file information using the Builder.
liscal	Info	Waiting for NMP%1 i/o request queue empty timeout, write bitmap.	Timeout occurred in clearing data send queue at inactive. Write bitmap.	-
liscal	Info	NMP%1 failed to malloc liscal_bio_request.	The physical memory is insufficient.	The physical memory is insufficient. Add more physical memory or terminate unneeded applications.
liscal	Info	NMP%1 failed to malloc vec_size.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc vec_offset.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc data buffer.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to malloc buffer_list node.	Same as above.	Same as above.
liscal	Info	NMP%1 failed to send data part(secnr=%2 length=%3).	Failed to send the data.	Check the connection status of the mirror disk connect, or add the physical memory, or terminate unneeded applications.
liscal	Info	NMP%1's send queue is full. Mirror break.	Data send queue has become full. The mirror break status is set.	-
liscal	Error	NMP%1 failed to send vec_offset (secnr=%2)(%3), close com port and exit.	Failed in the mirror synchronization.	Check the connection status of mirror disk connect.
liscal	Error	NMP%1 failed to send data part because sector was not found (bi_idx/bi_vcnt: %2/%3).	OS may be operating in unstable status. Failed in data synchronization.	Restart the local server.

Module Type	Event type	Message	Description	Solution
liscal	Error	NMP%1 ip_version(%2) or mdc_cnt(%3) input error.	The IP address or the number of mirror disk connect is invalid.	The setting file may be directly edited. Check the setting file information using the Builder.
liscal	Error	NMP%1 failed to alloc list.	The physical memory is insufficient.	The physical memory is Insufficient. Add more physical memory or terminate unneeded applications.
liscal	Error	NMP%1 failed to alloc knetwork_info.	Same as above.	Same as above.
liscal	Error	NMP%1 failed to alloc nmp->send_ack2_queue.sys_var.	Same as above.	Same as above.
liscal	Error	NMP%1 failed to alloc nmp->network_list.network_list_lock.	Same as above.	Same as above.
liscal	Info	NMP%1 new thread: liscal_ack2_svr_thread(%2).	The ID of ack2 receive thread is displayed.	-
liscal	Info	NMP%1 new thread: liscal_hb_svr_thread(%2).	The ID of mirror driver heartbeat thread is displayed.	-
liscal	Info	NMP%1 hb_interval is invalid. The default settings will be used instead.	The mirror driver heartbeat interval is invalid. The mirror device where an error has occurred is NMP%1.	The setting file may be directly edited. Check the setting file information using the Builder.
liscal	Error	The nmp_minor passed to driver is null.	NMP minor is invalid.	Restart the local server.
liscal	Info	NMP%1 hb_rcv_timeout is invalid. The default setting will be used instead.	The setting value of <b>Receive Timeout</b> is invalid. The initial value will be used.	Check the setting value of <b>Receive Timeout</b> .
liscal	Info	NMP%1 connect_timeout is invalid. The default settings will be used instead.	The setting value of <b>Connection Timeout</b> is invalid. The initial value will be used.	Check the setting value of <b>Connection Timeout</b> .
liscal	Info	NMP%1 send_timeout is invalid. The default settings will be used instead.	The setting value of <b>Send Timeout</b> is not correct. The initial value will be used.	Check the setting value of <b>Send Timeout</b> .
liscal	Info	NMP%1 keepalive_timeout is invalid. The default settings will be used instead.	The setting value of <b>Monitor Timeout</b> is invalid. The initial value will be used.	Check the setting value of <b>Monitor Timeout</b> .
liscal	Info	NMP%d ack_timeout is invalid. The maximum number will be used instead.	The setting value of Ack timeout exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-
liscal	Info	NMP%d receive_normal_timeout is invalid. The maximum number will be used instead.	The setting value of <b>Receive Timeout</b> exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-

Module Type	Event type	Message	Description	Solution
liscal	Info	NMP%d hb_recv_timeout is invalid. The maximum number will be used instead.	The setting value of Receive Timeout exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-
liscal	Info	NMP%d connect_timeout is invalid. The maximum number will be used instead.	The setting value of <b>Connection timeout</b> exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-
liscal	Info	NMP%d send_timeout is invalid. The maximum number will be used instead.	The setting value of <b>Send timeout</b> exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-
liscal	Info	NMP%d keepalive_timeout is invalid. The maximum number will be used instead.	The setting value of <b>Monitor timeout</b> exceeds the predefined maximum value in adjusting the time-out ratio. The maximum value will be used.	-
liscal	Info	NMP%1 new thread: liscal_accept_thread(%2).	The IDs of data and ack1 receive thread are displayed.	-
liscal	Info	NMP%1 new thread: liscal_hb_client_thread(%2).	The ID of driver heartbeat processing thread is displayed	-
liscal	Info	NMP%1 new thread: liscal_send_ack1_thread(%2).	The ID of ack1 send thread is displayed.	-
liscal	Info	NMP%1 new thread: liscal_send_ack2_thread(%2).	The ID of ack2 send thread is displayed.	-
liscal	Info	NMP%1 new thread: liscal_write_make_request_thread(%2).	The ID of standby side data writing thread is displayed.	-
liscal	Info	New thread: liscal_disk_error_operate_thread(%1).	The ID of disk writing error check thread is displayed.	-
liscal	Info	New thread: liscal_local_bitmap_write_thread(%1).	The ID of active side bitmap writing thread is displayed.	-
liscal	Info	New thread: liscal_remote_bitmap_write_thread(%1).	The ID of standby side bitmap writing thread is displayed.	-
liscal	Info	New thread: timer_disconnection_thread(%1).	The ID of ack1 timeout processing thread is displayed.	-

## Kernel mode LAN heartbeat driver

Module Type	Event type	Message	Description	Solution
clpkhb	Info	Kernel Heartbeat has been stopped.	The clpkhb driver was successfully unloaded.	-

Module Type	Event type	Message	Description	Solution
clpkhb	Error	Failed to allocate memory!	The size of physical memory is not sufficient	The physical memory is running out. Add physical memories, or terminate unnecessary applications.
clpkhb	Info	Kernel heartbeat was Initialized by %1.	The clpkhb driver was successfully initialized by the [%1] module.	-
clpkhb	Info	Kernel heartbeat was terminated by %1.	The clpkhb driver was successfully terminated by the [%1] module.	-
clpkhb	Error	Invalid argument, resource name is not correct!	The resource name passed to the clpkhb driver is incorrect.	Check if the resource name is set correctly.
clpkhb	Info	The rcv thread has been created, pid : %1	rcv thread has been created, pid : %1	-
clpkhb	Info	The send thread has been created, pid : %1	send thread has been created, pid : %1	-
clpkhb	Info	Killed the send thread successfully.	killing send thread succeed	-
clpkhb	Info	Killed the rcv thread successfully.	killing rcv thread succeed	-
clpkhb	Error	Failed to create sending socket address, err = %d	The size of physical memory is not sufficient	The physical memory is running out. Add physical memories, or terminate unnecessary applications.
clpkhb	Error	Failed to bind socket, err = %1.	Failed to bind a socket.	Check the status of operating system. The communication port for clpkhb may be used already. Check the usage status of the communication port.
clpkhb	Error	Failed to send data to %1, err = %2	Failed to send data.	Check the status of the network for clpkhb communication.
				Check the status of the remote server.
clpkhb	Error	sock_rcvmsg failed, error = %d	Failed to receive data.	Check that the setting information is correct.
				The remote server may be down. Check if the server is active.
clpkhb	Info	Receiving operation was interrupted by ending signal.	The receive thread is terminated by the termination signal.	-
clpkhb	Error	sock_rcvmsg failed, error = %d	Failed to receive data.	If the server is not down, check the status of the network for clpkhb.

Module Type	Event type	Message	Description	Solution
clpkhb	Info	Packet's edition or version is not matched	Data from the server with different edition and version was received.	Heartbeats can be received and/or sent even when this message is displayed.  Check the edition and version of servers in the cluster.
clpkhb	Info	clpka: <server priority: %1> <reason: %2> <process name: %3>system reboot.	A reset message was received from another server. The "priority:%1" server was reset because the "reason: %2" problem occurred in the "process name: %3" process.	Check the status of the server where the reset occurred.
clpkhb	Error	Failed to allocate memory.	An invalid packet was received.	Another application may be sending data to the port for clpkhb. Check the status of the port.

## Keepalive driver

Module Type	Event type	Message	Description	Solution
clpka	Info	Kernel Keepalive was initialized successfully.	The clpka driver was successfully loaded.	-
clpka	Error	Cannot register miscdev on minor=%1 (err=%2)	Failed to load the clpka driver.	Check the distribution and kernel support the kernel mode LAN heartbeat.
clpka	Info	Kernel Keepalive v1.0 was released successfully.	The clpka driver was successfully unloaded.	-
clpka	Error	Failed to allocate memory!	The size of physical memory is not sufficient	The physical memory is running out. Add physical memories, or terminate unnecessary applications.

## Detailed information in activating and deactivating group resources

### Floating IP resources

Module type	Type	Return value	Message	Description	Solution
fip	Error	3	Command failed. (%1, ret=%2)	Failed in executing the command %1. The return value is %2.	Analyze the failure from the return value of the command.
fip	Error	11	Command failed. (%1(%2), errno=%3)	An error has occurred in executing the command.	Memory or OS resources may not be sufficient. Check them.
fip	Error	14	IP address did not exist.	Failed to get the IP address list.	Confirm that the OS can use the TCP/IP protocol.
fip	Error	15	IP address was already used.	The IP address is already used.	Check the IP address is not already used.
fip	Error	15	This ip address was already used. IP=%1	The specified IP address exists on the same network.	Check if the specified IP address is not used on the network.
fip	Error	17	Fip interface was not found.	Floating IP address interface was not found.	Check if the FIP address network is the same as the server's real IP address.
fip	Error	others	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

### Virtual IP resource

Module type	Type	Return value	Message	Description	Solution
vip	Error	3	Command failed. (%1, ret=%2)	Failed in executing the command %1. The return value is %2.	Analyze the failure from the return value of the command.
vip	Error	11	Command failed. (%1(%2), errno=%3)	An error has occurred in executing the command.	Memory or OS resources may not be sufficient. Check them.
vip	Error	14	IP address did not exist.	Failed to acquire the list of IP addresses.	Check the OS is in the environment that supports the TCP/IP protocol.
vip	Error	15	IP address was already used.	The IP address is already used.	Check if the IP address is not already used.
vip	Error	15	This ip address was already used. IP=%1	The specified IP address exists on the same network.	Check if the specified IP address is not already used on the network.
vip	Error	17	Vip interface was not found.	The specified interface was not found.	Check if the specified interface exists on the server.

Module type	Type	Return value	Message	Description	Solution
vip	Error	Others	Internal error. (status=%1)	Other internal error was occurred.	Memory or OS resources may not be sufficient. Check them.

## Disk resources

Module type	Type	Return value	Message	Description	Solution
disk	Error	1	Resource name was invalid. (%1)	The resource name is invalid.	Check the resource name is consistent with the information in the cluster configuration data.
disk	Error	1	Group name was invalid. (%1)	The group resource name is invalid.	Check the group name is consistent with the information in the cluster configuration data.
disk	Error	1	Resource was not in config. (%1)	The resource name does not exist in the cluster configuration data.	Check the resource name is consistent with the information in the cluster configuration data.
disk	Error	1	Group was not in config. (%1)	The group resource name does not exist in the cluster configuration data.	Check the group resource name is consistent with the information in the cluster configuration data.
disk	Error	1	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
disk	Error	1	Mount point was already mounted. (%1)	The device has already been mounted.	Check if the specified device is unmounted.
disk	Error	1	Mount point was not mounted. (%1)	The mount point was not mounted.	An active resource may have been manually unmounted. Check its status.
disk	Error	1	Mount point was invalid. (%1)	The mount point is invalid.	Check the mount point exists.
disk	Error	1	Creating of mount point was failed. (%1)	Failed to create the mount point.	Memory or OS resources may not be sufficient. Check them.
disk	Error	1	Max recover retry over. (%1, retry=%2)	The number of retries made for activating the device has exceeded the maximum retry count.	Check the cluster configuration data is correct.
disk	Error	1	Command path was invalid. (%1)	The execution path is invalid.	Check the command execution path.
disk	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.

Module type	Type	Return value	Message	Description	Solution
disk	Error	1	Command failed. (%1, ret=%2)	The command %1 failed. Its return value is %2.	Troubleshoot the problem by using the return value from the command.
disk	Error	1	Command failed. (%1(%2), errno=%3)	The device operation terminated abnormally.	Memory or OS resources may not be sufficient. Check them.
disk	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## NAS resources

Module Type	Type	Return value	Message	Description	Solution
nas	Error	1	Resource name was invalid. (%1)	The resource name is invalid.	Check the resource name is consistent with the information in the cluster configuration data.
nas	Error	1	Group name was invalid. (%1)	The group resource name is invalid.	Check the group name is consistent with the information in the cluster configuration data.
nas	Error	1	Resource was not in config. (%1)	The resource name does not exist in the cluster configuration data.	Check the resource name is consistent with the information in the cluster configuration data.
nas	Error	1	Group was not in config. (%1)	The group resource name does not exist in the cluster configuration data.	Check the group resource name is consistent with the information in the cluster configuration data.
nas	Error	1	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
nas	Error	1	Mount point was already mounted. (%1)	The resource on the NAS server has already been mounted.	Check if the specified resource in the NAS server is unmounted.
nas	Error	1	Mount point was not mounted. (%1)	The mount point was not mounted.	The active resource may have been manually unmounted. Check its status.
nas	Error	1	Mount point was invalid. (%1)	The mount point is invalid.	Check the mount point exists.
nas	Error	1	Creating of mount point was failed. (%1)	Failed to create the mount point.	Memory or OS resources may not be sufficient. Check them.
nas	Error	1	Max recover retry over. (%1, retry=%2)	The number of retries made for mounting resource on the NAS server has exceeded the	Check that the cluster configuration data is correct.

Module Type	Type	Return value	Message	Description	Solution
				maximum retry count.	
nas	Error	1	Command path was invalid. (%1)	The execution path is invalid.	Check the command execution path.
nas	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
nas	Error	1	Command failed. (%1, ret=%2)	The command %1 failed. Its return value is %2.	Troubleshoot the problem by using the return value from the command.
nas	Error	1	Command failed. (%1(%2), errno=%3)	An error occurred while running the command.	Memory or OS resources may not be sufficient. Check them.
nas	Error	1	Internal error. (status=%1)	Other internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

## EXEC resources

Module Type	Type	Return value	Message	Description	Solution
exec	Error	1	Termination code %1 was returned.	An exit code other than 0 (zero) was returned as the result of a synchronous script or application.	There may be a problem in the content of the script. Check the script is correct.  The application may have abnormally terminated. Check how the application is working.
exec	Error	1	Command was not completed within %1 seconds.	A synchronous script or application did not successfully complete within the specified time.	There may be a problem in the content of the script. Check if the script is correct.  The application may be stalling. Check if the application is working properly.  You may be able to identify the cause from the logs in both cases. For details about logging settings, see "Parameter details" in Chapter 3, "Functions of the Builder" of this guide.
exec	Error	1	Command was aborted.	A synchronous script or application terminated abnormally.	The application may have abnormally terminated. Check how the application is working.  Memory or OS resources may not be

Module Type	Type	Return value	Message	Description	Solution
					sufficient. Check them.
exec	Error	1	Command was not found. (error=%1)	The application does not exist.	The path to the application may be invalid. Check it in the cluster configuration data
exec	Error	1	Command string was invalid.	The application path is invalid.	Check the application path in the cluster configuration data.
exec	Error	1	Log string was invalid.	The log output path is invalid.	Check the log output path in the cluster configuration data.
exec	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## Mirror disk resources

Module Type	Type	Return value	Message	Description	Solution
md	Error	1	Need to start mirror agent at first.	The Mirror Agent is not active.	Check if the Mirror Agent is activated.
md	Error	2	Options or parameters are invalid.	Parameters are invalid.	Check the cluster configuration data is correct.
md	Error	4	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
md	Error	10	NMP size of local server is bigger, can not active	The server cannot activate the mirror disk resource since the size of NMP of the local server is larger than that of the remote server.	Execute the forcible mirror recovery using the remote server as the one to be mirrored.
md	Error	30	Internal error[status=%1]	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.
md	Error	77	Mirror disk was not in config.(%1)	Configuration data of the mirror disk resource is invalid.	Check the cluster configuration data is correct.
md	Error	79	Failed to get cluster partition information.	Failed to obtain the cluster partition data.	Check the partition is allocated and the operating system can recognize the disk.
md	Error	80	Mount point was already mounted.(%1)	The mount point has already been mounted.	Check if the mount point of the mirror disk resource has been mounted manually.
md	Error	81	The local server has not the latest data.(%1)	The local server does not have the latest data.	Perform the mirror recovery.

Module Type	Type	Return value	Message	Description	Solution
md	Error	82	Failed to set cluster partition information.	Failed to access the cluster partition.	Check if the partition is allocated, and the operating system can recognize the disk.
md	Error	83	Command timeout(%1, timeout=%2)	The system command timed out.	It took longer than expected to run the system command.  Tune the mount time-out, unmount time-out, and fsck time-out values. For details, see Chapter 3, "Functions of the Builder" of this guide.
md	Error	84	Mount point was not mounted. (%1)	The mirror disk resource is not mounted.	Check if it has manually been unmounted. Check the memory. ExpressCluster controls mounting and unmounting. Do not mount or unmount it manually.
md	Error	87	Creating of mount point was failed. (%1)	Failed to create the mount point.	Check mount point has been specified in the cluster configuration data.  Check if the mount point exists.
md	Error	89	Command failed. (%1)	Failed to run the system command.	Check if mount, unmount and fsck commands exist.

## Hybrid disk resources

Module Type	Type	Return value	Message	Description	Solution
hd	Error	1	Need to start mirror agent at first.	The Mirror Agent is not active.	Check if the Mirror Agent is activated.
hd	Error	2	Options or parameters are invalid.	Parameters are invalid.	Check the cluster configuration data is correct.
hd	Error	4	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
hd	Error	10	NMP size of local server is bigger, can not active	The server cannot activate the mirror disk resource since the size of NMP of the local server is larger than that of the remote server.	Execute the forcible mirror recovery using the remote server as the one to be mirrored.
hd	Error	12	The local server is not current server.	Resources cannot be operated because the local server is not current server.	Operate the resources after acquiring the condition where current priority can be acquired in the local server or

Module Type	Type	Return value	Message	Description	Solution
					acquiring the current priority.
hd	Error	30	Internal error[status=%1]	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.
hd	Error	77	Hybrid disk was not in config.(%1)	Configuration data of the hybrid disk resource is invalid.	Check the cluster configuration data is correct.
hd	Error	79	Failed to get cluster partition information.	Failed to obtain the cluster partition data.	Check the partition is allocated and the operating system can recognize the disk.
hd	Error	80	Mount point was already mounted.(%1)	The mount point has already been mounted.	Check if the mount point of the mirror disk resource has been mounted manually.
hd	Error	81	The local server has not the latest data.(%1)	The local server does not have the latest data.	Perform the mirror recovery.
hd	Error	82	Failed to set cluster partition information.	Failed to access the cluster partition.	Check if the partition is allocated, and the operating system can recognize the disk.
hd	Error	83	Command timeout(%1, timeout=%2)	The system command timed out.	It took longer than expected to run the system command.  Tune the mount time-out, unmount time-out, and fsck time-out values. For details, see Chapter 3, "Functions of the Builder" of this guide.
hd	Error	84	Mount point was not mounted. (%1)	The mirror disk resource is not mounted.	Check if it has manually been unmounted. Check the memory. ExpressCluster controls mounting and unmounting. Do not mount or unmount it manually.
hd	Error	87	Creating of mount point was failed. (%1)	Failed to create the mount point.	Check mount point has been specified in the cluster configuration data.  Check if the mount point exists.
hd	Error	89	Command failed. (%1)	Failed to run the system command.	Check if mount, unmount and fsck commands exist.
hd	Error	90	Failed to be current server.	Current priority cannot be acquired.	Check if hybrid disk resource is activated.  If the hybrid disk is beingrecovered or

Module Type	Type	Return value	Message	Description	Solution
					current priority is being processed in another server, wait for a while.

## Raw resources

Module Type	Type	Return value	Message	Description	Solution
raw	Error	1	Resource name was invalid. (%1)	The resource name is invalid.	Check if the resource name is consistent with the information in the cluster configuration data.
raw	Error	1	Group name was invalid. (%1)	The group resource name does not exist in the cluster configuration data.	Check if the group resource name is consistent with the information in the cluster configuration data.
raw	Error	1	Resource was not in config. (%1)	The resource name does not exist in the cluster configuration data.	Check if the resource name is consistent with the information in the cluster configuration data.
raw	Error	1	Group was not in config. (%1)	The group resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
raw	Error	1	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
raw	Error	1	Command path was invalid. (%1)	The execution path is invalid.	Check the command execution path.
raw	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
raw	Error	1	Command failed. (%1, ret=%2)	Command %1 failed. The return value of the command is %2.	Troubleshoot this based on the return value from the command.
raw	Error	1	Command failed. (%1(%2), errno=%3)	The device operation terminated abnormally.	Memory or OS resources may not be sufficient. Check them.
raw	Error	1	Raw device was already bound. (%1)	The raw device is already bound by another device.	Check if a unique raw device is set in the cluster.
raw	Error	1	Device was invalid. (%1)	The device name is invalid.	Check if block device is set correctly.
raw	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## VxVM disk group resources

Module Type	Type	Return value	Message	Description	Solution
vx dg	Error	1	Resource name was invalid. (%1)	The resource name is invalid.	Check the resource name is consistent with the information in the cluster configuration data.
vx dg	Error	1	Group name was invalid. (%1)	The group resource name is invalid.	Check the group name is consistent with the information in the cluster configuration data.
vx dg	Error	1	Resource was not in config. (%1)	The resource name does not exist in the cluster configuration data.	Check the resource name is consistent with the information in the cluster configuration data.
vx dg	Error	1	Group was not in config. (%1)	The group resource name does not exist in the cluster configuration data.	Check the group resource name is consistent with the information in the cluster configuration data.
vx dg	Error	1	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
vx dg	Error	1	Command path was invalid. (%1)	The execution path is invalid.	Check the command execution path.
vx dg	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
vx dg	Error	1	Command failed. (%1, ret=%2)	The command %1 of VxVM failed. The return value of the command is %2.	Troubleshoot the problem by using the return value from the command.
vx dg	Error	1	Command failed. (%1(%2), errno=%3)	The device operation terminated abnormally.	Memory or OS resources may not be sufficient. Check them.
vx dg	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## VxVM volume resource

Module Type	Type	Return value	Message	Description	Solution
vx vol	Error	1	Resource name was invalid. (%1)	The resource name is invalid.	Check the resource name is consistent with the information in the cluster configuration data.
vx vol	Error	1	Group name was invalid. (%1)	The group resource name is invalid.	Check the group name is consistent with the information in the cluster configuration data.
vx vol	Error	1	Resource was not in config. (%1)	The resource name does not exist in the cluster configuration	Check the resource name is consistent with the information in the

Module Type	Type	Return value	Message	Description	Solution
				data.	cluster configuration data.
vxvol	Error	1	Group was not in config. (%1)	The group resource name does not exist in the cluster configuration data.	Check the group resource name is consistent with the information in the cluster configuration data.
vxvol	Error	1	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
vxvol	Error	1	Mount point was already mounted. (%1)	The device has already been mounted.	Check if the specified device has been unmounted.
vxvol	Error	1	Mount point was not mounted. (%1)	The mount point was not mounted.	The active resource may have been manually unmounted. Check its status.
vxvol	Error	1	Mount point was invalid. (%1)	Mount point is invalid.	Check the mount point exists.
vxvol	Error	1	Creating of mount point was failed. (%1)	Failed to create the mount point.	Memory or OS resources may not be sufficient. Check them.
vxvol	Error	1	Max recover retry over. (%1, retry=%2)	The number of retries made for activating the device has exceeded the maximum retry count.	Check the cluster configuration data is correct.
vxvol	Error	1	Command path was invalid. (%1)	The execution path is invalid.	Check the command execution path.
vxvol	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
vxvol	Error	1	Command failed. (%1, ret=%2)	The command %1 failed. Its return value is %2.	Troubleshoot this based on the return value from the command.
vxvol	Error	1	Command failed. (%1(%2), errno=%3)	The device operation terminated abnormally.	Memory or OS resources may not be sufficient. Check them.
vxvol	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## Detailed info of monitor resource errors

### IP monitor resources

Module Type	Type	Return value	Message	Description	Solution
ipw	Error	1	Ping cannot reach. (ret=%1) IP=%2...	The packet by the ping command did not reach.	Check if you can ping the IP address. If you fail, check the status of the device that has the IP address or the network interface.
ipw	Error	2	Ping was failed. (ret=%1) IP=%2...	The ping command failed.	Memory or OS resources may not be sufficient. Check them.
ipw	Error	5	Ping was failed by timeout. IP=%s...	The ping command failed due to timeout.	The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
ipw	Error	6	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

### Disk monitor resources

Module Type	Type	Return value	Message	Description	Solution
diskw	Error	12	ioctl was failed. (err=%1) Device=%2	Failed to control the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.
diskw	Error	13	ioctl was failed by timeout. Device=%1	The device control failed due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	14	Open was failed. (err=%1) File=%2	Opening the file failed.	Check if there is a directory whose name is similar to the file name, the disk to be monitored is properly connected, powered on, or does not have any problem.  Memory or OS resources may not be sufficient. Check them.
diskw	Error	15	Open was failed by timeout. File=%1	Opening the file failed due to timeout.	Check the disk to be monitored is properly

Module Type	Type	Return value	Message	Description	Solution
					connected, powered on, or does not have any problem.  The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	16	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  Memory or OS resources may not be sufficient. Check them.
diskw	Error	17	Read was failed by timeout. Device=%1	Failed to read from the device due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	18	Write was failed. (err=%1) File=%2	Writing to the file failed.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. Memory or OS resources may not be sufficient. Check them.
diskw	Error	19	Write was failed by timeout. File=%1	Writing to the file failed due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	22 23 24 25 26 27 28 29 30	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

Module Type	Type	Return value	Message	Description	Solution
		31 32 34 40 43 44			
diskw	Error	41	SG_IO failed. (sg_io_hdr_t info:%1 SG_INFO_OK_MASK: %2)	SG_IO failed.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.
diskw	Error	42	Parameter was invalid. File=%1	The specified file name is invalid.	Do not specify the file whose name starts with /dev. Specify a normal file.

## PID monitor resources

Module Type	Type	Return value	Message	Description	Solution
pidw	Error	1	Resource %1 was not found.	The resource is not found.	Check the cluster configuration data by using the Builder.
pidw	Error	1	Process does not exist. (pid=%1)	The process does not exist.	The process to be monitored disappeared for some reason.
pidw	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

## Raw monitor resources

Module Type	Type	Return value	Message	Description	Solution
raww	Error	12	Device was invalid. Device=%1	The specified real device is invalid.	Check the device name of the raw monitor resource by using the Builder.
raww	Error	14	Open was failed. (err=%1) Device=%2	Failed to open the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  Memory or OS resources may not be sufficient. Check them.
raww	Error	15	Open was failed by timeout. Device=%2	Failed to open the device due to timeout.	Check the disk to be monitored is loaded, the disk device exits, and the disk is properly

Module Type	Type	Return value	Message	Description	Solution
					connected, powered on, or does not have any problem.  The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
raww	Error	16	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  Memory or OS resources may not be sufficient. Check them.
raww	Error	17	Read was failed by timeout. Device=%1	Failed to read from device due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.  The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
raww	Error	33	Already bound for other. Rawdevice=%1 Device=%2	The raw device is already bound by another real device.	The specified raw device is already bound by another real device. Change the raw device name by using the Builder.
raww	Error	34	Popen was failed. (err=%1)	popen failed.	Memory or OS resources may not be sufficient. Check them.
raww	Error	36	Bind was failed. Rawdevice=%1 Device=%2	Bind failed.	Bind was failed. Change the raw device name using the Builder.
raww	Error	37	Stat was failed. (err=%1) Device=%2	stat failed.	stat failed. Change the real device name by using the Builder.
raww	Error		Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	-

## User mode monitor resources

Module Type	Type	Return value	Message	Description	Solution
userw	Error	1	Initialize error. (%1)	An error was detected while initializing the process.	Check if softdog.o and /dev/watchdog exist.

## Mirror disk monitor resources

Module Type	Type	Return value	Message	Description	Solution
mdw	Error	1	Need to start mirror agent at first.	The Mirror Agent is not activated.	Check the Mirror Agent is active.
mdw	Error	2	Options or parameters are invalid.	The parameter is invalid.	Check the cluster configuration data is correct.
mdw	Error	4	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
mdw	Error	5	Monitor config error.(%1)	The configuration data of the mirror disk monitor resource is incorrect.	Check if the cluster configuration data is correct.
mdw	Error	30	Internal error[status=%1]	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.
mdw	Error	51	Remote driver status is unknown.	Failed to get the other server status.	Check if the Mirror Agent is activated on the remote server. Check mirror disk connection status. Check if the IP address in the cluster configuration data is correct.
mdw	Error	52	Remote driver is abnormal.	The mirror driver on the remote server has a problem.	Restart the remote server.
mdw	Error	53	Local driver is abnormal.	The mirror driver on the local server has a problem.	Restart the local server.
mdw	Error	54	Both drivers are abnormal.	The mirror drivers on the local and remote servers have a problem.	After cluster shutdown, restart the both servers.
mdw	Error	58	Local mirror disk status is unknown or not constructed.(%1)	The mirror disk status is unknown on the local server, or the initial mirror construction is not performed yet.	You have to perform the initial mirror construction.
mdw	Error	63	Local mirror disk is abnormal. (%1)	The mirror disk has a problem on the local server.	The local server does not have the latest data. The mirror recovery needs to be performed.
mdw	Error	64	Remote mirror disk is abnormal.(%1)	Mirror disk is abnormal on the remote server.	The remote server does not have the latest data. The mirror recovery needs to be performed.
mdw	Error	65	Both mirror disks are abnormal.(%1)	The mirror drivers on the local and remote servers have a problem.	The forcible mirror recovery needs to be performed.
mdw	Error	66	Mirror disk was activated on both servers.(%1)	Mirror disk resources have been activated on	When activation of mirror disk resource is

Module Type	Type	Return value	Message	Description	Solution
				both servers.	detected on both servers, the servers shut down automatically. Restart the servers.  See the description for the module type rc and event ID 92 in "Messages reported by syslog, alert and mail" on page 1014 and "Recovery from network partitioning" on page 909 for details.
mdw	Error	70	NMP size of recovery destination is smaller, can not recover	A mirror cannot be recovered since the size of NMP of the server on which the mirror is to be recovered is smaller than that of the server to be mirrored.	Change the direction of the mirror recovery. Or, run the fdisk command on the server on which a mirror is to be recovered to allocate sufficient size of data partition.
mdw	Error	100	The recovery is in progress. (%1)	Mirror recovery is in progress.	Wait until mirror recovery is successfully completed.

## Hybrid disk monitor resources

Module Type	Type	Return value	Message	Description	Solution
hdw	Error	1	Need to start mirror agent at first.	The Mirror Agent is not activated.	Check the Mirror Agent is active.
hdw	Error	2	Options or parameters are invalid.	The parameter is invalid.	Check the cluster configuration data is correct.
hdw	Error	4	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
hdw	Error	5	Monitor config error.(%1)	The configuration data of the mirror disk monitor resource is incorrect.	Check if the cluster configuration data is correct.
hdw	Error	13	Both hybrid disks are pending.	Mirror status of both servers is pending.	Confirm the mirror status. Execute full mirror recovery, forced recovery or resource activation.
hdw	Error	15	Local hybrid disk is pending. Remote hybrid disk status is unknown.	Status of hybrid disk of other server cannot be acquired. Local server is pending. It cannot be specified which server has the latest data.	Check the inter connect. When it is confirmed that the local server has the latest data, activate the resource in the local server. When it is confirmed that the other server has the latest data, start the other

Module Type	Type	Return value	Message	Description	Solution
					server and activate the resource in the server.
hdw	Error	30	Internal error[status=%1]	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.
hdw	Error	51	Remote driver status is unknown.	Failed to get the other server status.	Check if the Mirror Agent is activated on the remote server. Check mirror disk connection status. Check if the IP address in the cluster configuration data is correct.
hdw	Error	52	Remote driver is abnormal.	The mirror driver on the remote server has a problem.	Restart the remote server.
hdw	Error	53	Local driver is abnormal.	The mirror driver on the local server has a problem.	Restart the local server.
hdw	Error	54	Both drivers are abnormal.	The mirror drivers on the local and remote servers have a problem.	After cluster shutdown, restart the both servers.
hdw	Error	58	Local hybrid disk status is unknown or not constructed.(%1)	The hybrid disk status is unknown on the local server, or the initial mirror construction is not performed yet.	You have to perform the initial mirror construction.
hdw	Error	63	Local hybrid disk is abnormal. (%1)	The hybrid disk has a problem on the local server.	The local server does not have the latest data. The mirror recovery needs to be performed.
hdw	Error	64	Remote hybrid disk is abnormal.(%1)	Hybrid disk is abnormal on the remote server.	The remote server does not have the latest data. The mirror recovery needs to be performed.
hdw	Error	65	Both hybrid disks are abnormal.(%1)	The hybrid drivers on the local and remote servers have a problem.	The forcible mirror recovery needs to be performed.
hdw	Error	66	Hybrid disk was activated on both servers.(%1)	Hybrid disk resources have been activated on both servers.	When activation of mirror disk resource is detected on both servers, the servers shut down automatically. Restart the servers.  See the description for the module type rc and event ID 92 in "Messages reported by syslog, alert and mail" on page 1014 and "Recovery from network partitioning" on page

Module Type	Type	Return value	Message	Description	Solution
					909 for details.
hdw	Error	70	NMP size of recovery destination is smaller, can not recover	A mirror cannot be recovered since the size of NMP of the server on which the mirror is to be recovered is smaller than that of the server to be mirrored.	Change the direction of the mirror recovery. Or, run the fdisk command on the server on which a mirror is to be recovered to allocate sufficient size of data partition.
hdw	Error	100	The recovery is in progress. (%1)	Mirror recovery is in progress.	Wait until mirror recovery is successfully completed.

## Mirror disk connect monitor resources

Module Type	Type	Return value	Message	Description	Solution
mdnw hdnw	Error	1	Need to start mirror agent at first.	The Mirror Agent is not activated.	Check the Mirror Agent is active.
mdnw hdnw	Error	2	Options or parameters are invalid.	The parameter is invalid	Check the cluster configuration data is correct.
mdnw hdnw	Error	4	Getting of config was failed.	Failed to obtain the cluster configuration data.	Check the cluster configuration data exists.
mdnw hdnw	Error	5	Monitor config error.(%1)	The configuration data of the mirror disk connect monitor resource is incorrect.	Check the cluster configuration data is correct.
mdnw hdnw	Error	30	Internal error[status=%1]	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.
mdnw hdnw	Error	31	Network was interrupted	The mirror disk connection is not connected.	Check the mirror disk connection status.

## VxVM daemon monitor resources

Module Type	Type	Return value	Message	Description	Solution
vxdw	Error	10	Command was failed. Command=%1	The command %1 failed.	The command %1 failed. Check how the VxVM config daemon is working.
vxdw	Error	11	Option was invalid.	The option is invalid.	Check the cluster configuration data by using the Builder.
vxdw	Error	23	Thread timeout. Command=%1 Timeout=%2	The thread to run the command timed out.	The monitoring process timed out for some reason. Check it.
vxdw	Error	27	Popen was failed. (err=%1)	popen failed.	Memory or OS resources may not be

Module Type	Type	Return value	Message	Description	Solution
					sufficient. Check them.
vxdw	Error		Internal error. (status=%d)	An error other than the errors mentioned above has occurred.	-

## VxVM volume monitor resources

Module Type	Type	Return value	Message	Description	Solution
vxvolw	Error	11	Option was invalid.	The option is invalid.	Check the cluster configuration data by using the Builder.
vxvolw	Error	12	Open was failed. (err=%1) Device=%2	Failed to open the device.	Check VxVM is working properly. Memory or OS resources may not be sufficient. Check them.
vxvolw	Error	13	Open was failed by timeout. Device=%1	Failed to open the device due to timeout.	Check VxVM is working properly. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
vxvolw	Error	14	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check VxVM is working properly. Memory or OS resources may not be sufficient. Check them.
vxvolw	Error	15	Read was failed by timeout. Device=%1	Failed to read from the device due to timeout.	Check VxVM is working properly. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
vxvolw	Error	32	Stat was failed. (err=%1) Device=%2	stat failed.	stat failed. Check the raw device name of the VxVM monitor resource using the Builder.
vxvolw	Error		Internal error. (status=%d)	Other internal error has occurred.	-

## NIC link up/down monitor resources

Module Type	Type	Return value	Message	Description	Solution
miiw	Error	1	Option was invalid.	The option is invalid.	Check the cluster configuration data by using the Builder.

Module Type	Type	Return value	Message	Description	Solution
miiw	Error	4	Config was invalid. (err=%1) %2	The cluster configuration data is invalid.	Check the cluster configuration data by using the Builder.
miiw	Error	10	Get address information was failed. (err=%1)	Failed to obtain the socket address of the IPv4 or IPv6 address family.	Check if the kernel configuration supports the TCP/IP networking (IPv4 or IPv6).
miiw	Error	11	Socket creation was failed. (err=%1)	Failed to create a socket.	Memory or OS resources may not be sufficient. Check them.
miiw	Error	12	ioctl was failed. (err=%1) Device=%2 Request=%3	The control request to the network driver has failed.	Check the network driver supports the control request of %3. See Chapter 6, "Monitor resource details" of this guide.
miiw	Error	13	MII was not supported or no such device. Device=%1	Either MII is not supported by NIC or the monitoring target does not exist.	See Chapter 6, "Monitor resource details" of this guide. Check the network interface name using a command such as ifconfig if the monitoring target does not exist.
miiw	Error	20	NIC %1 link was down.	NIC link failed.	Check that the LAN cable is connected properly
miiw	Error	98	Internal error. (status=%d)	Other internal error has occurred.	-

## ARP monitor resource

Module Type	Type	Return value	Message	Description	Solution
arpw	Error	1	Initialize error.	A failure was detected during initialization.	Memory or OS resources may not be sufficient. Check them.
arpw	Error	2	Not found IP address.	Could not find the IP address.	Check the status of a resource to be monitored.
arpw	Error	3	Socket creation error.	An error occurred in creating a socket.	Memory or OS resources may not be sufficient. Check them.
arpw	Error	4	Socket I/O error.	A failure occurred in control request to the network driver.	-
arpw	Error	5	Packet send error.	Failed to send ARP packet.	Check if packets can be sent from the IP address using such as the ping command.

arpw	Error	90	Memory allocate error.	Failed to allocate the internal memory.	Memory or OS resources may not be sufficient. Check them.
arpw	Error	92	Timeout.	Timeout has occurred in monitoring.	-

## Virtual IP monitor resource

Module Type	Type	Return value	Message	Description	Solution
vipw	Error	1	Initialize error.	A failure was detected during initialization.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	2	Invalid interface. (err=%1)	Interface name of NIC is invalid.	Check the cluster configuration information using the Builder. Or check the interface name of NIC exists.
vipw	Error	3	Get IP Address information error. (err=%1)	Failed to acquire the socket address of IPv4 or IPv6 address family.	Check that the kernel configuration supports TCP/IP networking (IPv4 or IPv6).
vipw	Error	4	Socket creation error. (err=%1)	Failed to create a socket.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	5	Socket option error. (err=%1)	Failed to set the socket option.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	6	Socket bind error. (err=%1)	Failed to bind a socket with the IP address from which a socket is sent.	Check the cluster configuration information using the Builder. Or check the interface name of NIC exists.
vipw	Error	7	Socket I/O error. (err=%1)	Failed in control request to network driver.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	8	Packet send error. (err=%1)	Failed to send RIP packet.	Check if packet can be sent from the IP address using such as the ping command.
vipw	Error	90	Memory allocation error. (err=%1)	Failed to allocate internal memory.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	92	Timeout.	Timeout occurred in monitoring.	-
vipw	Error	98	Internal error. (status=%1)	Other internal error occurred.	-

## Monitoring option monitor resource

Monitor resources of monitoring options use common messages. Module types are different for each monitoring option monitor resource.

Monitoring resource	option	monitor	Module type
DB2 monitor resource			db2w
FTP monitor resource			ftpw
HTTP monitor resource			httpw
IMAP4 monitor resource			imap4w
MySQL monitor resource			mysqlw
NFS monitor resource			nfs
Oracle monitor resource			oraclew
OracleAS monitor resource			oracleasw
POP3 monitor resource			pop3w
PostgreSQL monitor resource			psqlw
Samba monitor resource			sambaw
SMTP monitor resource			smtpw
Sybase monitor resource			sybasew
Tuxedo monitor resource			tuxw
Websphere monitor resource			wasw
Weblogic monitor resource			wls
WebOTX monitor resource			otxw

Module type	Type	Return value	Message	Description	Solution
(see the list above)	Error	1	Init error. [%1, ret=%2] %3: license/XML/log/share mem/library	license/XML/log/share memory module initialization error Failed in Dynamic Library Load.	OS may be heavily loaded. Check the status of OS.
(see the list above)	Error	2	Get config information error. [ret=%1]	Failed to acquire the setting information.	Check the cluster configuration information using the Builder.
(see the list above)	Error	3	Invalid parameter.	The setting information of Config file/Policy file is invalid.  Command parameter is invalid.	Check the cluster configuration information using the Builder.
(see the list above)	Error	4	Detected function exception. [%1, ret=%2] %3: function name	A failure was detected.	Check the cluster configuration information using the Builder.  The OS may be heavily loaded. Check it.
(see the list above)	Error	5	Failed to connect to %1 server. [ret=%2] %3:	Failed to connect to the monitor target.  The actual module type is displayed in %1.	Check the status of the monitor target.
(see the list above)	Error	6	Detected authority error.	Failed in the user authentication.	Check the user name, password, and access

Module type	Type	Return value	Message	Description	Solution
above)					right.
(see the list above)	Error	7	Failed to execute SQL statement (%1). [ret=%2] %3:	Failed to execute SQL statement (%1). The actual module type is displayed in %1.	Check the cluster configuration information using the Builder.
(see the list above)	Error	8	Failed to access with %1. %2:	Failed in data access with monitor target. The actual module type is displayed in %1.	Check the status of monitor target.
(see the list above)	Error	9	Detected error in %1. %2:	A failure occurred on monitor target. The actual module type is displayed in %1.	Check the status of monitor target.
(see the list above)	Error	10	User was not superuser.	A user does not have the right as root user.	The user who executed the operation may not have a root user right. Or, memory or OS resources may not be sufficient. Check them.
(see the list above)	Error	11	Detected timeout error.	Communication timeout has occurred.	OS may be heavily loaded. Check it.
(see the list above)	Error	12	Can not found library. (libpath=%1, errno=%2)	Failed to load the library from the specified location.	Check where the library is located.
(see the list above)	Error	40	The license is not registered.	The license is not registered.	Check if the valid license is registered.
(see the list above)	Error	41	The registration license overlaps.	The registered license already exists.	Check if the valid license is registered.
(see the list above)	Error	42	The license is invalid.	The license is invalid.	Check if the valid license is registered.
(see the list above)	Error	43	The license of trial expired by %1. %2: <i>Validity_date</i>	The license of trial is expired. The actual validity date is displayed in <i>Validity_date</i> .	-
(see the list above)	Error	44	The license of trial effective from %1. %2: <i>Validity_date</i>	The trial liscense has not become effective yet. The actual validity date is displayed in <i>Validity_date</i> .	-
(see the list above)	Error	99	Internal error. (status=%1)	An internal error was detected.	-



# Appendix

- Appendix A Glossary
- Appendix B Index



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## Appendix A. Glossary

<b>Interconnect</b>	A dedicated communication path for server-to-server communication in a cluster. (Related terms: Private LAN, Public LAN)
<b>Virtual IP address</b>	IP address used to configure a remote cluster.
<b>Management client</b>	Any machine that uses the WebManager to access and manage a cluster system.
<b>Startup attribute</b>	A failover group attribute that determines whether a failover group should be started up automatically or manually when a cluster is started.
<b>Shared disk</b>	A disk that multiple servers can access.
<b>Shared disk type cluster</b>	A cluster system that uses one or more shared disks.
<b>Switchable partition</b>	A disk partition connected to multiple computers and is switchable among computers. (Related terms: Disk heartbeat partition)
<b>Cluster system</b>	Multiple computers are connected via a LAN (or other network) and behave as if it were a single system.
<b>Cluster shutdown</b>	To shut down an entire cluster system (all servers that configure a cluster system).
<b>Cluster partition</b>	A partition on a mirror disk or a hybrid disk. Used for managing mirror disks or hybrid disks. (Related term: Disk heartbeat partition)
<b>Active server</b>	A server that is running for an application set. (Related term: Standby server)
<b>Secondary server</b>	A destination server where a failover group fails over to during normal operations. (Related term: Primary server)
<b>Standby server</b>	A server that is not an active server. (Related term: Active server)
<b>Disk heartbeat partition</b>	A partition used for heartbeat communication in a shared disk type cluster.
<b>Data partition</b>	A local disk that can be used as a shared disk for switchable partition. Data partition for mirror disks or hybrid disks. (Related term: Cluster partition)
<b>Network partition</b>	All heartbeat is lost and the network between servers is partitioned. (Related terms: Interconnect, Heartbeat)

<b>Node</b>	A server that is part of a cluster in a cluster system. In networking terminology, it refers to devices, including computers and routers, that can transmit, receive, or process signals.
<b>Heartbeat</b>	Signals that servers in a cluster send to each other to detect a failure in a cluster. (Related terms: Interconnect, Network partition)
<b>Public LAN</b>	A communication channel between clients and servers. (Related terms: Interconnect, Private LAN)
<b>Failover</b>	The process of a standby server taking over the group of resources that the active server previously was handling due to error detection.
<b>Failback</b>	A process of returning an application back to an active server after an application fails over to another server.
<b>Failover group</b>	A group of cluster resources and attributes required to execute an application.
<b>Moving failover group</b>	Moving an application from an active server to a standby server by a user.
<b>Failover policy</b>	A priority list of servers that a group can fail over to.
<b>Private LAN</b>	LAN in which only servers configured in a clustered system are connected. (Related terms: Interconnect, Public LAN)
<b>Primary (server)</b>	A server that is the main server for a failover group. (Related term: Secondary server)
<b>Floating IP address</b>	Clients can transparently switch one server from another when a failover occurs. Any unassigned IP address that has the same network address that a cluster server belongs to can be used as a floating address.
<b>Master server</b>	The server displayed on top of the <b>Master Server</b> in <b>Cluster Properties</b> in the Builder.
<b>Mirror disk connect</b>	LAN used for data mirroring in mirror disk or hybrid disk. Mirror connect can be used with primary interconnect.
<b>Mirror disk type cluster</b>	A cluster system that does not use a shared disk. Local disks of the servers are mirrored.

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## Appendix B. Index

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