

ExpressCluster[®] X 3.0 *for Solaris*

Reference Guide

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First Edition



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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

Section I Detailed reference of ExpressCluster functions

Chapter 1 Functions of the WebManager

Provides information on function of the ExpressCluster X WebManager.

Chapter 2 Functions of the Builder

Provides information on function of the ExpressCluster X Builder.

Chapter 3 ExpressCluster command reference

Provides information on commands available to use in ExpressCluster.

Section II Resource details

Chapter 4 Group resource details

Provides information on group resource which configures a failover group.

Chapter 5 Monitor resource details

Provides information on monitor resource which works as a monitoring unit in ExpressCluster.

Chapter 6 Heartbeat resources details

Provides information on heartbeat resource.

Chapter 7 Network partition resolution resources details

Provides information on heartbeat resource.

Chapter 8 Information on other monitor settings

Provides information on other monitoring settings.

Section III Maintenance information

Chapter 9 The system maintenance information

Provides maintenance information for ExpressCluster.

Chapter 10 Troubleshooting

Provides instruction on how to troubleshoot the problem.

Chapter 11 Error messages

Provides explanation on error messages displayed during ExpressCluster operation.

Appendix

Appendix A Supplementary information

Appendix B Glossary

Appendix C Index

ExpressCluster Documentation Set

The ExpressCluster manuals consist of the following three 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 ExpressCluster Integrated WebManager and for system engineers who are introducing Integrated WebManager. The details on the required items at the time of introducing the cluster system is explained in accordance with actual procedures.

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
Bold	Indicates graphical objects, such as fields, list boxes, menu selections, buttons, labels, icons, etc.	In User Name, type your name. On the File menu, click Open Database .
<i>Angled bracket within the command line</i>	Indicates that the value specified inside of the angled bracket can be omitted.	<code>clpstat -s[-h host_name]</code>
#	Prompt to indicate that a Solaris user has logged in as root user.	<code># clpctl -s -a</code>
<i>Monospace (courier)</i>	Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters.	<code>/Solaris/3.0/eng/server/</code>
<i>Monospace bold (courier)</i>	Indicates the value that a user actually enters from a command line.	Enter the following: <code># clpctl -s -a</code>
<i>Monospace italic (courier)</i>	Indicates that users should replace italicized part with values that they are actually working with.	<code>pkgadd -d expressclsbuilder-<version_number>- <release_number>-x86.pkg</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 Builder
- Chapter 3 ExpressCluster command reference

Chapter 1 Functions of the WebManager

This chapter describes the functions of the WebManager.

This chapter covers:

• Window of the WebManager	22
• Checking the status of each object in the tree view of WebManager	32
• Checking the cluster status on the WebManager list view	48
• Checking alerts on the WebManager.....	54
• Manually setting WebManager to stop and start	58
• Changing the settings without using the WebManager	59
• Setting usage limitations.....	60
• Operating a cluster by using the WebManager.....	64
• Limitations of the WebManager.....	65
• Error messages on the WebManager	66

Window of the WebManager

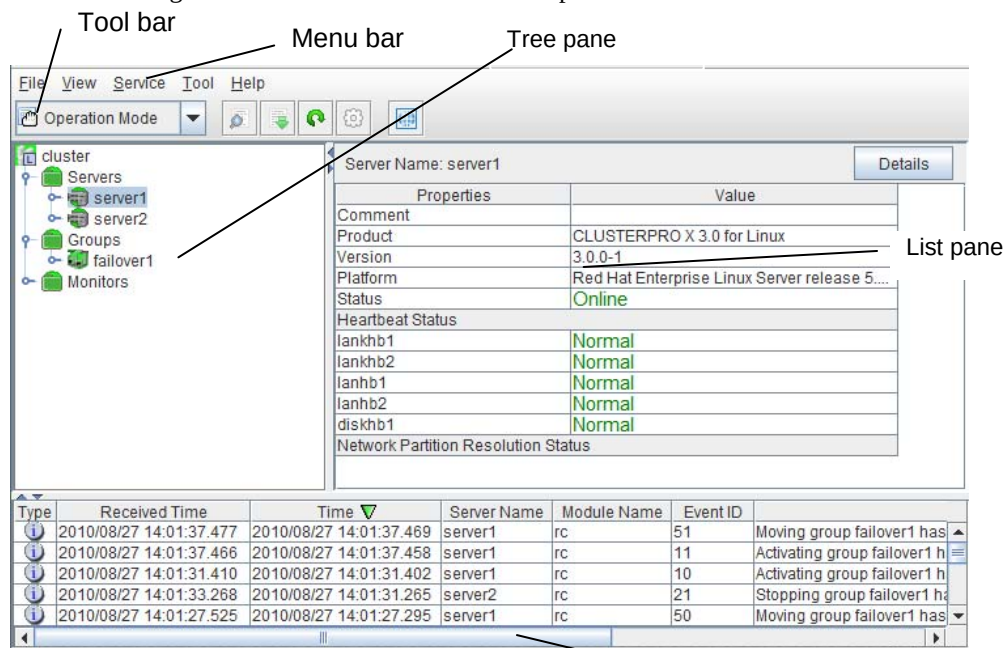
This chapter provides information about the WebManager window.

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 2 bars and 3 panes.



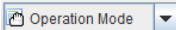
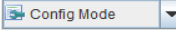
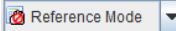
Menu bar

The following five menus can be selected.

- ◆ Files
- ◆ View
- ◆ Service
- ◆ Tool
- ◆ Help

Tool bars

If you click the combo box and 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.

Icon	Function	Refer to:
	Switches to the WebManager operation mode. This is the same as clicking View on the menu bar and then selecting Operation Mode.	Switching the operation modes of the WebManager (page 24)
	Switches to the WebManager config mode (Builder (online version)). This is the same as clicking View on the menu bar and then selecting Config Mode.	Switching the operation modes of the WebManager (page 24)
	Switches to the WebManager reference mode. This is the same as clicking View on the menu bar and then selecting Reference Mode.	Switching the operation modes of the WebManager (page 24)
	Searches for an alert. This is the same as clicking Tool on the menu bar and then selecting Alert Search.	"Searching for an alert by using the WebManager" (page 24)
	Collects logs. This is the same as clicking Tool on the menu bar and then selecting Collect cluster logs.	"Collecting logs by using the WebManager" (page 27)
	Performs reloading. This is the same as clicking Tool on the menu bar and then selecting Reload.	"Updating the WebManager information" (page 30)
	Displays the option. This is the same as clicking Tool on the menu bar and then selecting Option.	"Changing the WebManager screen layout" (page 30)
	Displays Integrated WebManager. This is the same as clicking Tool on the menu bar and then selecting Integrated WebManager .	Executing Integrated WebManager from the WebManager (page 30)

The current mode is displayed to the right of the icon.

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 in the top section and lists each server and group resource, whether each monitor resource is started or stopped, and comments in the bottom section.

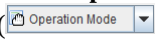
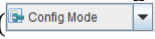
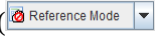
If you click the **Details** button located on the upper right of the view, further information will be displayed in a dialog. For more information, see “Checking the cluster status on the WebManager list view” on page 48.

Alert view

Shows messages describing ExpressCluster operating status. For further information, see “Checking alerts on the WebManager” on page 54.

Switching the operation modes of the WebManager

The WebManager has the following three operating modes:

- ◆ **Operation mode**
This mode allows the user to see the status of and operate the cluster.
Select **Operation Mode** on the **View** menu or click the **Operation Mode** on the combo box () on the toolbar to switch to the operation mode. However, if you used the reference mode password for login when starting the WebManager or connected to the WebManager from a client that is not allowed to perform operations, it is not possible to switch to the operation mode.
- ◆ **Config mode**
This mode allows the user to set up the cluster and change the settings. The WebManager in the config mode is called *Builder (online version)*. For details about operations in the config mode, see the next chapter.
Select **Config Mode** on the **View** menu or click the **Config Mode** on the combo box () on the toolbar to switch to the config mode. However, if you connected to the WebManager from a client that is not allowed to perform operations, it is not possible to switch to the config mode.
- ◆ **Reference mode**
This mode allows the user to see the cluster status, but not to operate the cluster.
Select **Reference Mode** on the **View** menu or click the **Reference Mode** on the combo box () on the toolbar to switch to the reference mode.

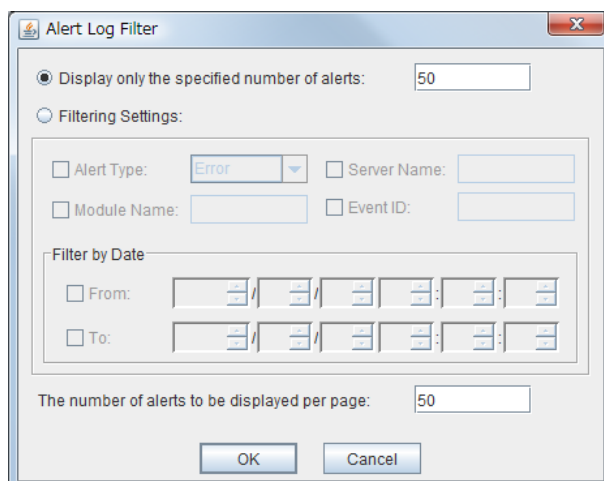
Searching for an alert by using the WebManager

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 on the WebManager” on page 54.

To search for an alert, click **Alert Search** on the **Tool** menu or click the alert search icon () on the toolbar. In the title view, click the **Filter Alerts** button to display the window for setting search conditions for an alert.



The image shows a dialog box titled "Alert Log Filter". It has two main sections. The first section has a radio button selected for "Display only the specified number of alerts:" with a text box containing the number "50". The second section, "Filtering Settings:", is currently unselected. It contains several fields: "Alert Type:" with a dropdown menu showing "Error", "Server Name:", "Module Name:", and "Event ID:". Below these is a "Filter by Date" section with "From:" and "To:" date pickers. At the bottom, there is a text box for "The number of alerts to be displayed per page:" with the value "50". "OK" and "Cancel" buttons are at the bottom right.

To search only the specified number of past alert logs:

1. Select **Display only the specified number of alerts.**
2. Enter the number of past alert logs to search, and then click **OK**. The specified number of past alerts are displayed.

Note:

The maximum alert number to enter can be 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
monp	Whole ExpressCluster
rc	Group/resource related
rm	Monitor resource related
nm	Heartbeat resource related
apisv	API related
lanhb	LAN heartbeat resource
diskhb	DISK heartbeat resource
comhb	COM heartbeat resource
disk	Disk resource
fip	Floating IP resource
vip	Virtual IP resource
vipw	VIP monitor resource
ddnsw	Dynamic DNS monitor resource

vmw	VM monitor resource
userw	User mode monitor resource
trnsv	External monitoring coordination related
cl	Cluster control command
cfmgr	Cluster configuration information operation library
logcmd	Message output command
mail	Mail alert related

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

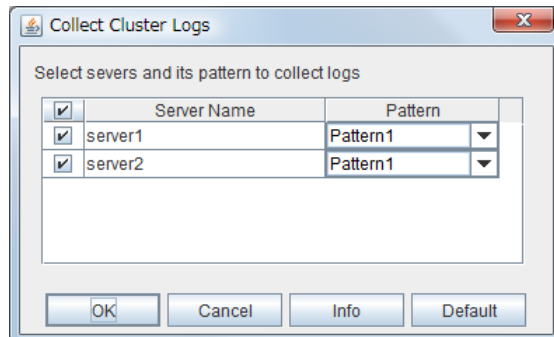
Event ID: Type in an event ID whose alerts you want to see.

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.

Collecting logs by using the WebManager

Clicking **Collect Cluster Logs** on the **Tool** menu or clicking the Collect Cluster logs icon () on the toolbar opens the log collection dialog box.



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 `clplogcc` command in Chapter 3, “ExpressCluster command reference”.

OK

Starts collect cluster logs and displays the dialog box of log collection progress.

Cancel

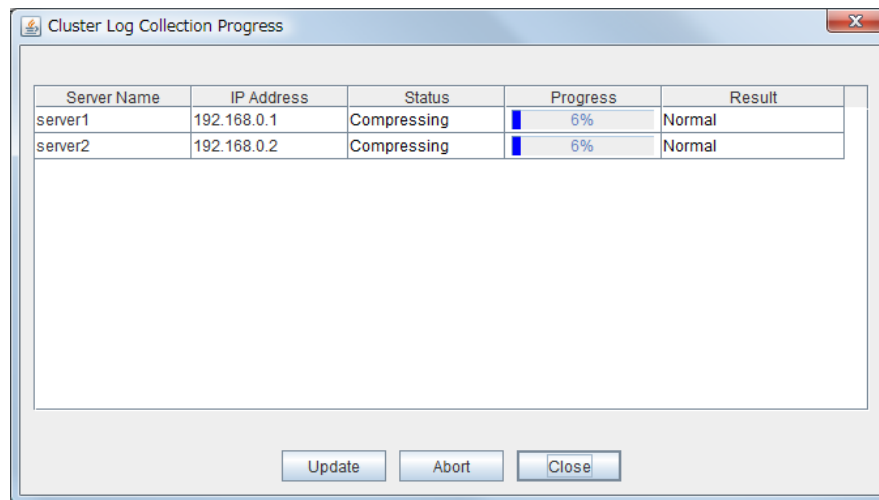
Closes this dialog box.

Info

Displays the information on each pattern.

Default

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

Cluster Log Collection Progress dialog box**Update**

Updates the dialog box of the **Cluster** log collection progress.

Abort

Aborts the **Cluster** log collection.

Close

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

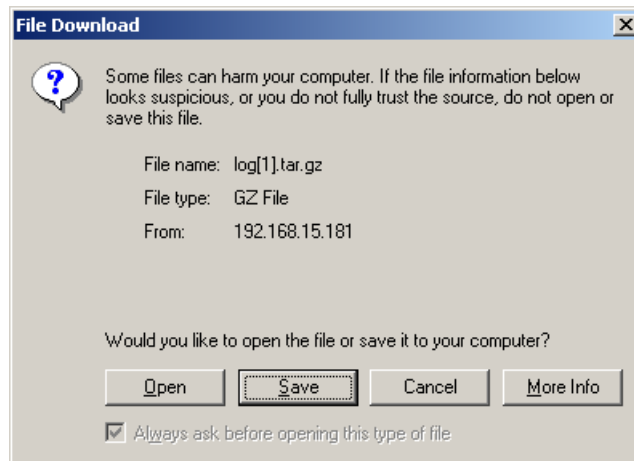
At this time, the display of the **Collect Cluster Logs** button has changed to the **Progress** button.

Click the **Progress** button to display the progress of log collection again.

Collect Cluster Logs Results

Result	Description
Normal	Cluster Log collection succeeded.
Abort	Cluster Log collection was cancelled by user.
Invalid Parameters	Internal error may have occurred.
Communication Error	Connecting error occurred.
Timeout	Timeout 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 **Cluster** log collection completes, the browser displays a dialog box that asks where you want to save the logs. Download the logs to any location.



(This image shows the case when using Internet Explorer 6.0 SP1.)

Note:

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

Note:

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

Updating the WebManager information

Click **Reload** on the **Tool** menu or click the reload icon () on the toolbar to update the information displayed in 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 icon or **Reload** on the **Tool** menu 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.

Changing the WebManager screen layout

The WebManager screen layout can be changed by clicking the split bar buttons or dragging the bars. This is useful, for example, when you want to display only a specific view.

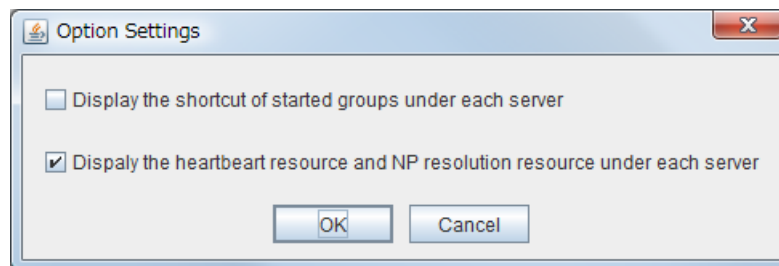
The split bars divide the views in the WebManager.



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

To change the display items on the tree view, click **Option** on the **Tool** menu or option icon () on the tool bar.

The following dialog is displayed. Check items you want to display.



Executing Integrated WebManager from the WebManager

To execute Integrated WebManager from the WebManager, click **Integrated WebManager** on the **Tool** menu or Integrated WebManager icon () on the tool bar.

Operating a cluster and cluster services on the WebManager

Operate cluster services on the WebManager by clicking each of the following items on the **Service** menu.

Suspend Cluster, Resume Cluster, Start Cluster, Stop Cluster, Restart Manager 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 suspended cluster. This menu can be selected only when all the servers in a cluster are suspended. The status of the group and the group resource of the resumed cluster when suspended is kept.
- ◆ **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.

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.

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	 Normal	All servers, group resources, and monitor resources are in a normal status.
		 Warning	One or more servers, or group resources, or monitor resource has an error or is in a warning status.
		 Error	All servers are down or in the error status.
(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)	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.
(6)	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.

No.	Icon		Status	Description
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.
(7)	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.
(8)	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.
(9)	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.
(10)	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.
(11)	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.
(12)	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.
(13)	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.

No.	Icon		Status	Description
(14)	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.
(15)	Volume manager resource		Online	Volume manager resource has been started.
			Error	Volume manager resource has an error.
			Offline or Unknown	Volume manager resource is stopped, or information cannot be acquired.
(16)	VM resources		Online	The VM resource has been started.
			Error	The VM resource has an error.
			Offline or Unknown	The VM resource is stopped, or no information has been acquired.
(17)	Dynamic DNS resources		Online	The Dynamic DNS resource has been started.
			Error	The Dynamic DNS resource has an error.
			Offline or Unknown	The Dynamic DNS resource is stopped, or no information has been acquired.
(18)	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.
(19)	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.
(20)	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.

No.	Icon		Status	Description
			Error	No servers can communicate with the IP address of the target.
			Unknown	No information is acquired.
(21)	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.
(22)	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.
(23)	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.
(24)	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.
(25)	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.
(26)	Custom monitor resource		Normal	Custom monitor resource is running normally.
			Warning	-

No.	Icon	Status	Description
		Error	Custom monitor resource has an error.
		Unknown	No information is acquired.
		Normal	The VM resource is running normally.
		Warning	There is a virtual machine error, or monitoring has been suspended on a server.
(27)		Error	VM has an error.
		Unknown	No information has been acquired.
		Normal	The enhancement driver is running normally.
		Warning	A server has received an error message, or monitoring is suspended on a server.
(28)		Error	The enhancement driver has an error.
		Unknown	No information has been acquired.
		Normal	The Dynamic DNS monitor resource is running normally.
		Warning	-
(29)		Error	The Dynamic DNS monitor resource has an error.
		Unknown	No information has been acquired.
		Normal	Oracle is running normally.
		Warning	Oracle monitor resource is suspended.
(30)		Error	Oracle has an error.
		Unknown	No information is acquired.
		Normal	PostgreSQL is running normally.
		Warning	PostgreSQL monitor resource is suspended.
(31)		Error	PostgreSQL has an error.
		Unknown	No information is acquired.
		Normal	MySQL is running normally.
		Warning	MySQL monitor resource is suspended.
(32)		Error	
		Unknown	

No.	Icon		Status	Description
			Error	MySQL has an error.
			Unknown	No information is acquired.
(33)	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.
(34)	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.
(35)	Volume manager monitor resource		Normal	Volume manager is running normally.
			Warning	Volume manager is not working in some server, or monitoring is suspended on some server.
			Error	Volume manager has an error.
			Unknown	Information cannot be acquired.

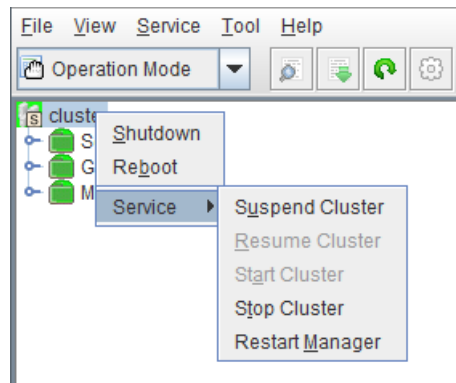
Operations from the WebManager

You can operate a cluster by right-clicking **(1) Cluster**, **(3) Individual server**, **(9) Individual group**, or **(16) VM resource** and choosing an operation.

When Failover is selected for Type:

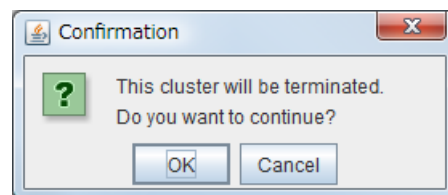
Objects of the cluster

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



◆ Shutdown

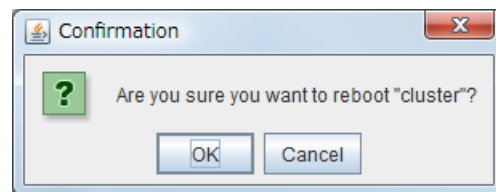
Shuts down all running servers. When you select **Shutdown**, the following dialog box is displayed for confirmation.



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.

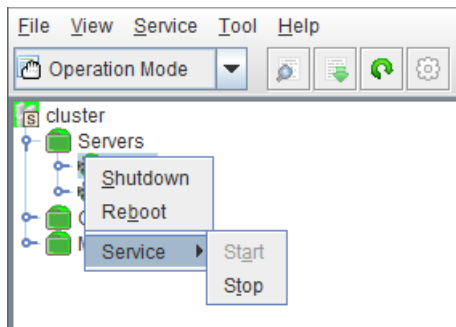


◆ Service

Clicking **Service** displays **Suspend Cluster**, **Resume Cluster**, **Start Cluster**, **Stop Cluster** and **Restart Manager**.

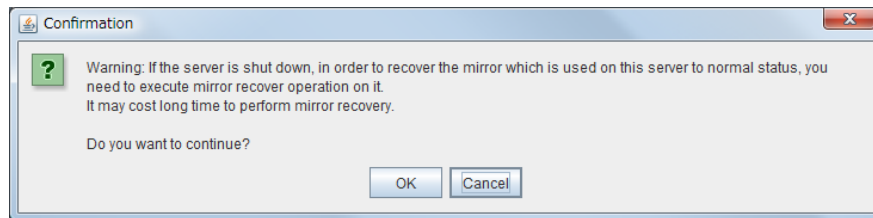
Individual server objects

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



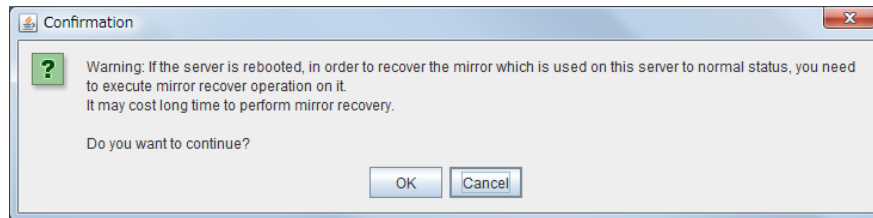
- ◆ Shut down

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



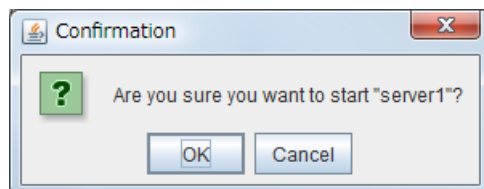
- ◆ Reboot

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

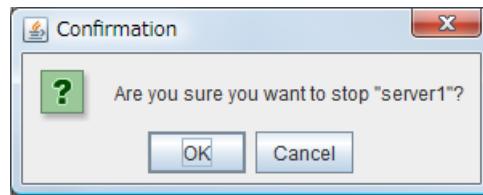


- ◆ Service

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

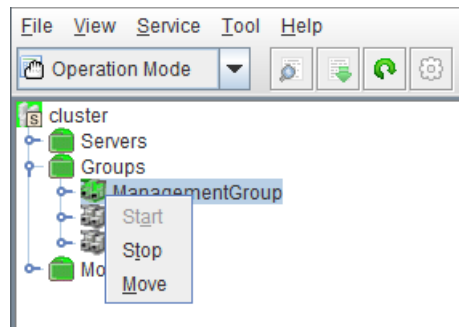


When you click **Stop** on **Service**, the selected server is stopped. When you select this operation, the following dialog box is displayed for confirmation.



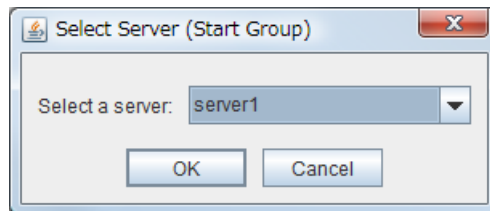
Individual group objects

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



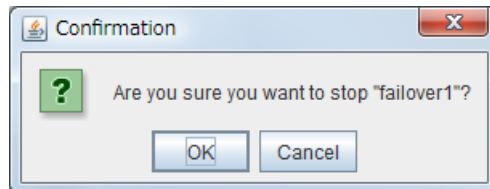
- ◆ Start (enabled only when the group is stopped)

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



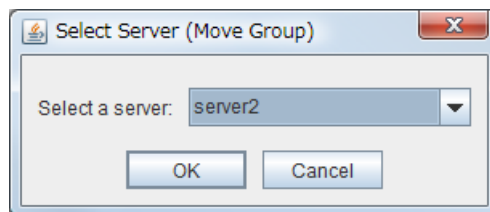
- ◆ Stop (enabled only when the group has been started up or when it has an error)

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



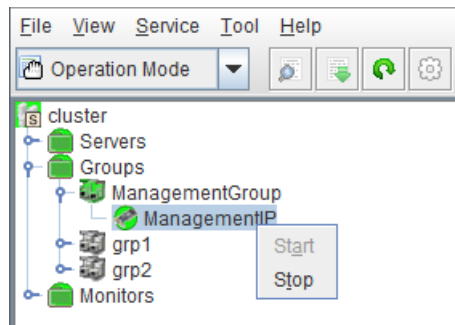
- ◆ Move (enabled only when the group has been started up)

Moves the selected group. The dialog box for choosing a server to which you want to move the selected group is displayed. The status of the group resource of moved group is kept.



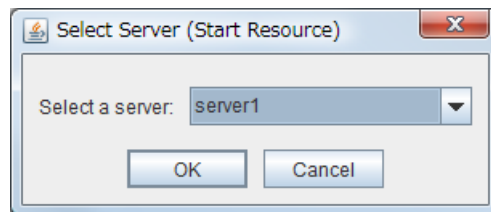
Individual group resource objects

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



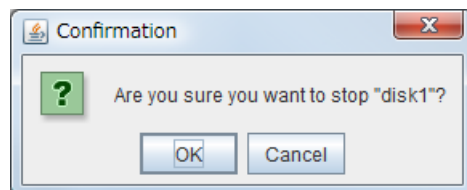
- ◆ Start (enabled only when the group is stopped)

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



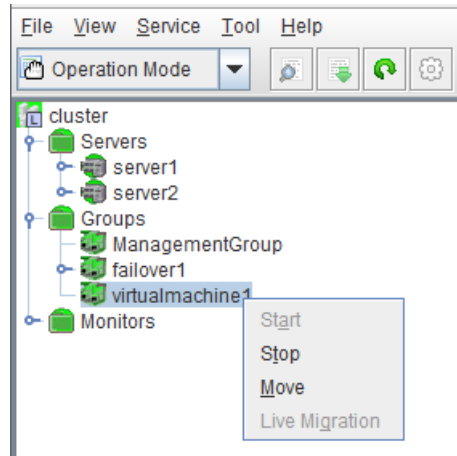
- ◆ Stop (enabled only when the group is running or it has an error)

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

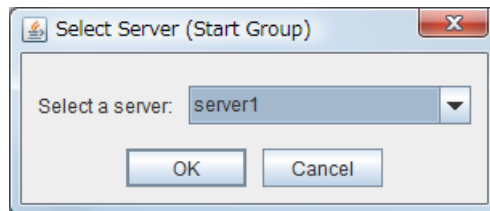


**When Virtual Machine is selected for Type:
Objects of the VM resource**

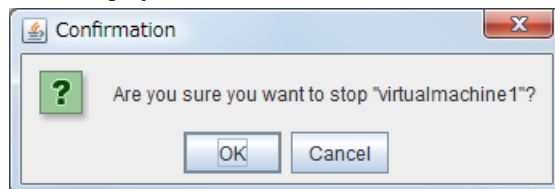
When you right-click a monitor resource object, the following shortcut menu is displayed.

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

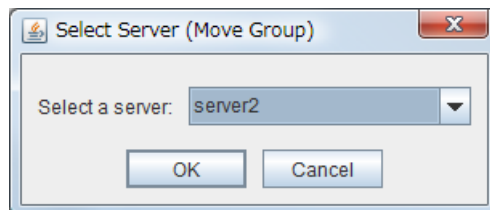
Starts up the selected group resource. The dialog box for choosing a server that starts up the selected group is displayed.

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

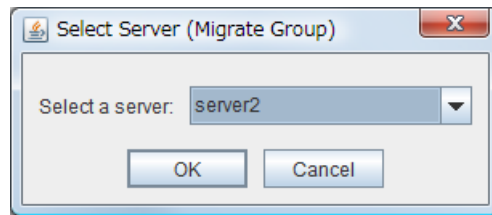
Stops the selected group resource. When you selected this operation, the following dialog box is displayed for confirmation.

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

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

**◆ Migrate (enabled only when the group has been started up)**

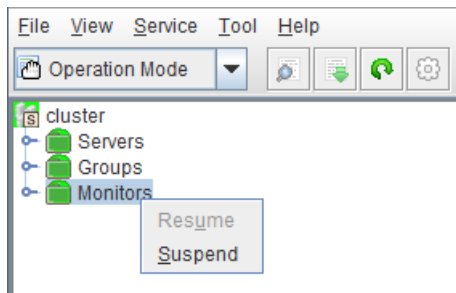
Migrates the selected group. The dialog box for selecting the server to which to migrate the selected group is displayed.



On the server selection screen, servers where groups can be started can be selected as the destination (except the current server and offline servers).

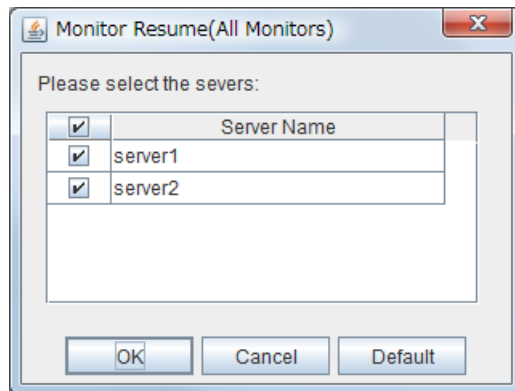
Monitors object

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



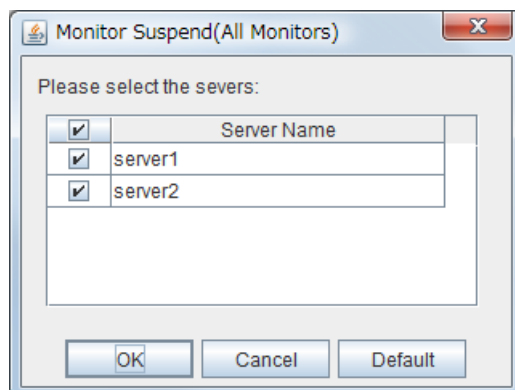
- ◆ Resume (enabled only when the monitor is suspended)

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.



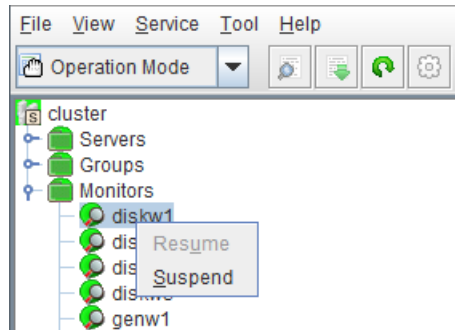
- ◆ Suspend (enabled only when the monitor is running)

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.



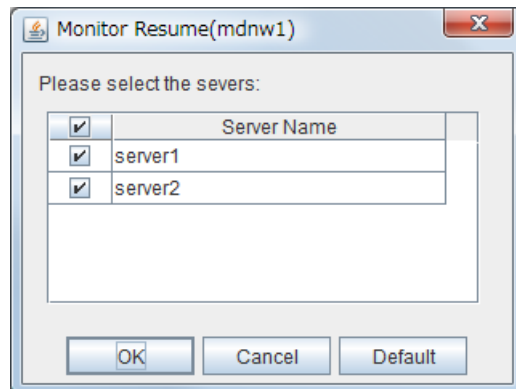
Individual monitor resource objects

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



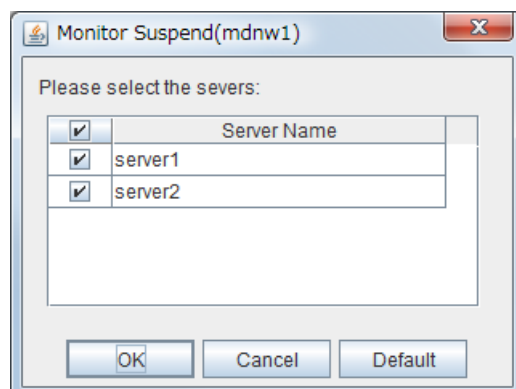
- ◆ Resume (enabled only when the monitor is suspended)

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.

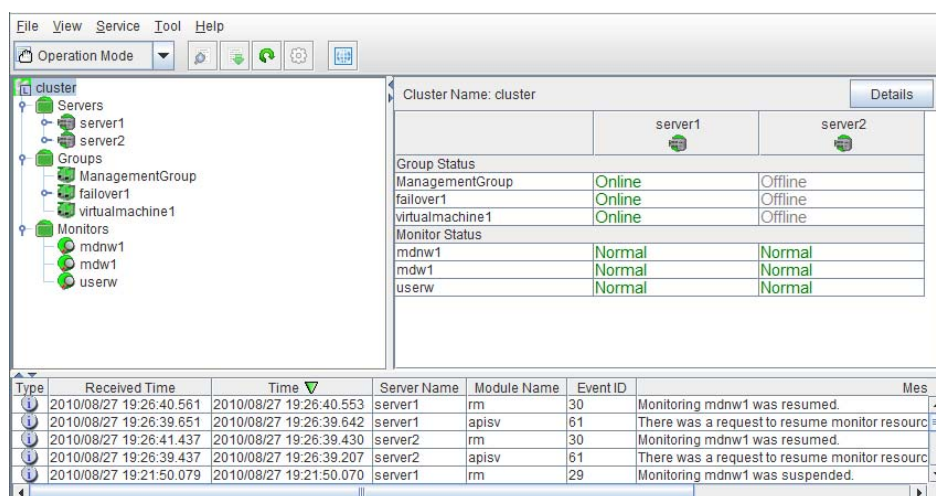


Checking the cluster status on the WebManager list view

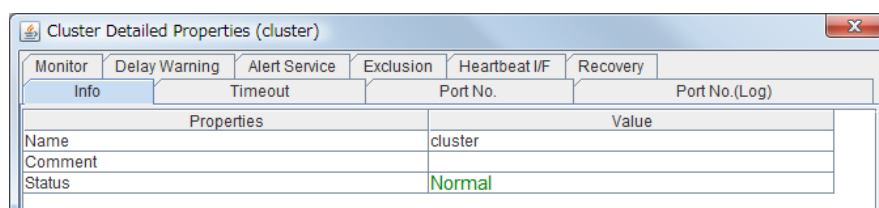
The detailed information on the selected object in the tree view of WebManager can be displayed.

To display information on the whole cluster

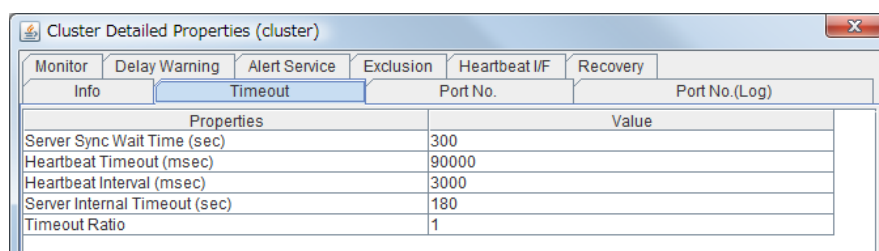
1. Start the WebManager.
2. In this tree view, click the object icon  for the cluster. In the list view in the right pane of the window, the **group status** and **monitor resource status** of each server are displayed.



3. In the following dialog box, click the **Details** button to display the following information.



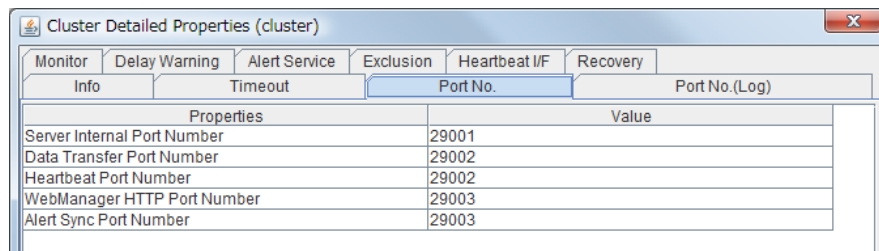
Name: Cluster name
 Comment: Comment for the cluster
 Status: Status of the cluster



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



Cluster Detailed Properties (cluster)	
Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery	
Info Timeout Port No. Port No.(Log)	
Properties	Value
Server Internal Port Number	29001
Data Transfer Port Number	29002
Heartbeat Port Number	29002
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:

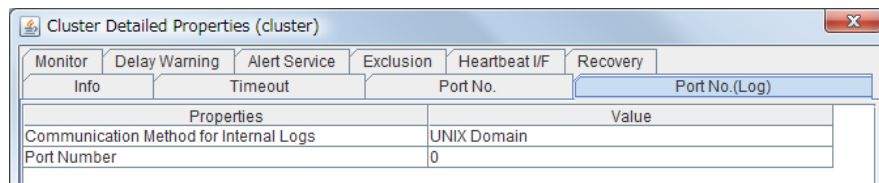
Port number for kernel-mode heartbeat

WebManager HTTP Port Number:

Port number for WebManager

Alert Sync Port Number:

Port number for alert synchronization



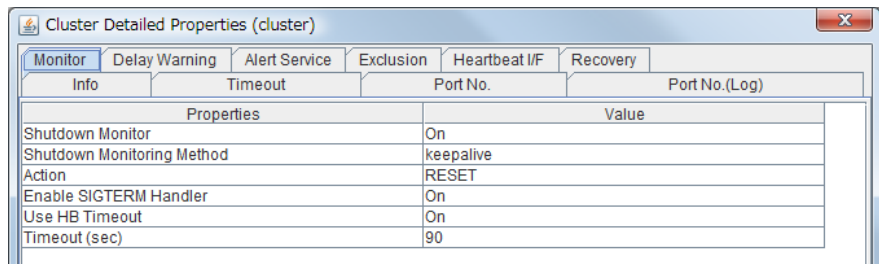
Cluster Detailed Properties (cluster)	
Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery	
Info Timeout Port No. Port No.(Log)	
Properties	Value
Communication Method for Internal Logs	UNIX Domain
Port Number	0

Communication method for Internal Logs:

Communication method used for logs

Port Number:

Port number used for logs



Cluster Detailed Properties (cluster)	
Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery	
Info Timeout Port No. Port No.(Log)	
Properties	Value
Shutdown Monitor	On
Shutdown Monitoring Method	keepalive
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:

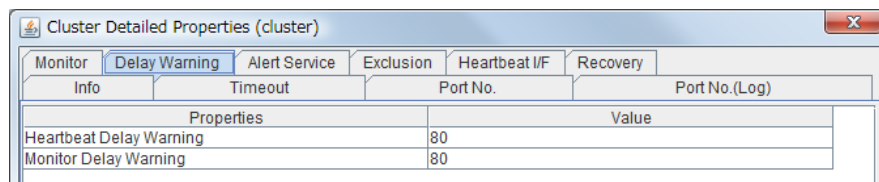
Whether or not to enable SIGTERM

Use HB Timeout:

Whether or not to use HB time-out

Timeout (sec):

Timeout (in seconds)



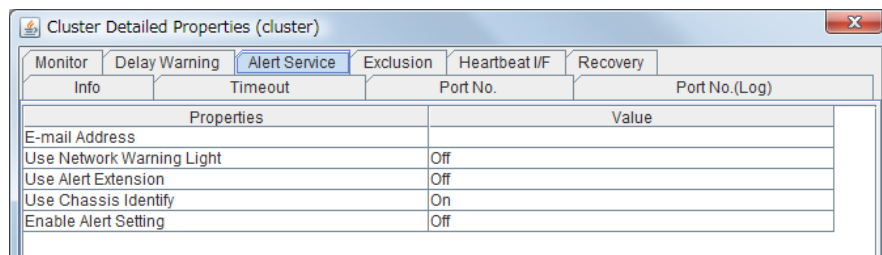
Cluster Detailed Properties (cluster)	
Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery	
Info Timeout Port No. Port No.(Log)	
Properties	Value
Heartbeat Delay Warning	80
Monitor Delay Warning	80

Heartbeat Delay Warning:

Heartbeat delay warning (%)

Monitor Delay Warning:

Monitor delay warning (%)



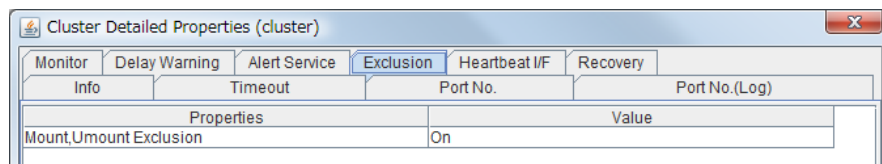
Cluster Detailed Properties (cluster)

Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery

Info Timeout Port No. Port No.(Log)

Properties	Value
E-mail Address	
Use Network Warning Light	Off
Use Alert Extension	Off
Use Chassis Identify	On
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 Chassis Identify: Whether or not to use a chassis identify function
 Enable Alert Setting: Whether or not to use the alert setting



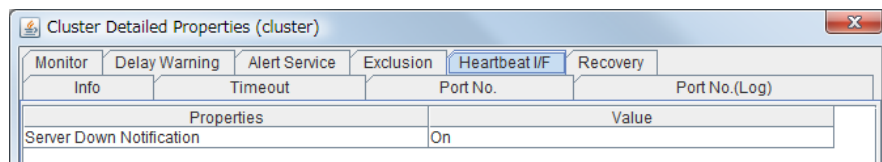
Cluster Detailed Properties (cluster)

Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery

Info Timeout Port No. Port No.(Log)

Properties	Value
Mount,Umount Exclusion	On

Mount, Umount Exclusion: Whether or not to exclude mount or unmount command



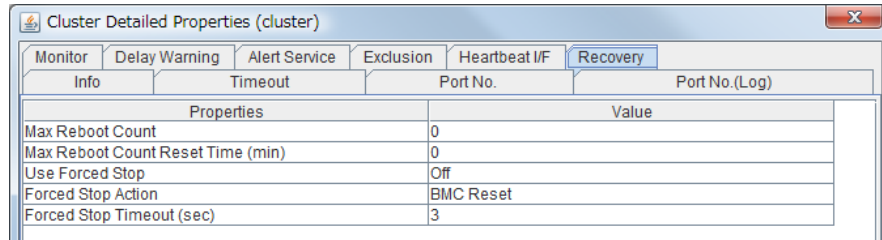
Cluster Detailed Properties (cluster)

Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery

Info Timeout Port No. Port No.(Log)

Properties	Value
Server Down Notification	On

Server Down Notification: Server down notification



Cluster Detailed Properties (cluster)

Monitor Delay Warning Alert Service Exclusion Heartbeat I/F Recovery

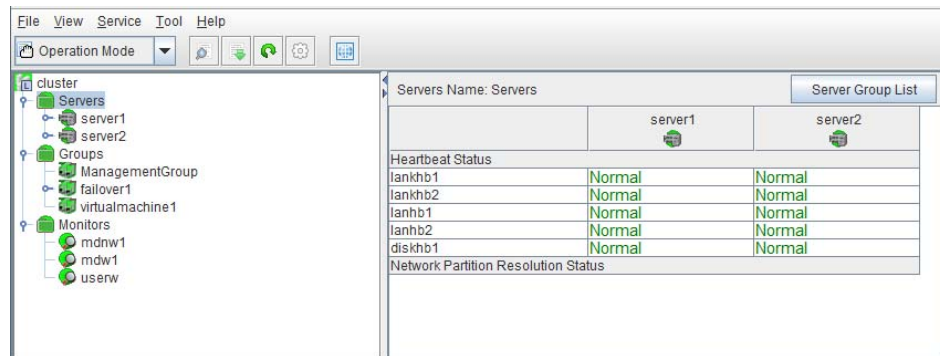
Info Timeout Port No. Port No.(Log)

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

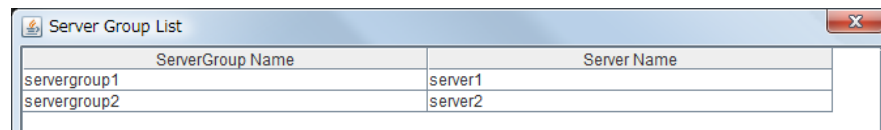
Max Reboot Count: Maximum reboot count
 Max Reboot Count Reset Time (min): Maximum reboot count reset time (in minutes)
 Use forced stop: Whether or not to use a forced stop function
 Max Reboot Count: Maximum reboot count
 Forced stop timeout: Wait time till the activation of failover group is started after a forced stop function is performed (in seconds)

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

1. Start the WebManager.
2. In the top section of the right window pane, the heartbeat status and the network partition resolution status list on each server are displayed.



Additionally, click **Server Group List** button to display the information of the server group on the pop up dialog.



Checking the status of individual server in the WebManager list view

1. Start the WebManager.
2. In the tree view, select the object of an individual server . The **Server Comment**, **Product**, **Version**, **Platform**, **Status** of the server are displayed.

Server Name: server1		Details
Properties	Value	
Comment		
Product	CLUSTERPRO X 3.0 for Solaris	
Version	3.0.0-1	
Platform	SunOS	
Status	Online	
Heartbeat Status		
lanhb1	Normal	
lanhb2	Normal	
diskhb1	Normal	
comhb1	Normal	
Network Partition Resolution Status		
pingnp1	Normal	

Comment:

Product:

Version:

Platform

Status:

Comment for the server

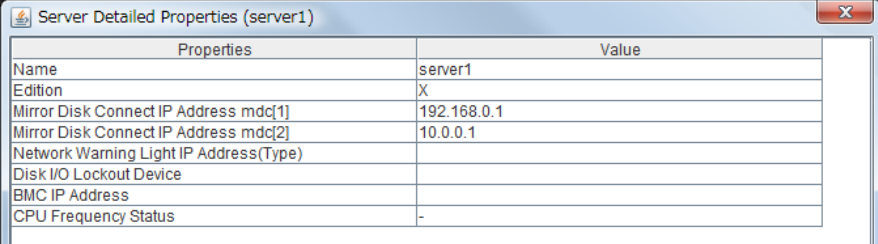
Product name

Version (identical to the RPM version value)

Platform

Status of the server

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



Properties	Value
Name	server1
Edition	X
Mirror Disk Connect IP Address mdc[1]	192.168.0.1
Mirror Disk Connect IP Address mdc[2]	10.0.0.1
Network Warning Light IP Address(Type)	
Disk I/O Lockout Device	
BMC IP Address	
CPU Frequency Status	-

Name:	Server name
Edition:	Edition
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

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 the list of statuses on each server are displayed in the list view.

Checking alerts on 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 mdnw1 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 11:11:01.607	2005/09/14 11:10:58.917	server1	nm	3	Resource comhb1 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 11:10:59.283	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 pldw2 start.

For meanings of alert messages, see Chapter 11, “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. For the list of module name types, see “Searching for an alert by using the WebManager” in this chapter.

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
diskhb	Disk heartbeat resource
comhb	COM heartbeat resource
disk	Disk resource
fip	Floating IP resource
vip	Virtual IP resource
vipw	Virtual IP monitor resource
vhostw	Virtual host name monitor resource
userw	User mode monitor resource
cl	Cluster start, stop command
cfctrl	Cluster generation, cluster information and backup 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	2008/09/22 21:16:10.733	server4
	2008/09/22 21:16:10.637	2008/09/22 21:16:10.637	server4
	2008/09/22 21:16:10.569	2008/09/22 21:16:10.569	server4
	2008/09/22 21:15:55.830	2008/09/22 21:15:55.830	server4
	2008/09/22 21:15:55.725	2008/09/22 21:15:55.725	server4
	2008/09/22 21:15:55.614	2008/09/22 21:15:55.614	server4
	2008/09/22 21:15:55.555	2008/09/22 21:15:55.555	server4
	2008/09/22 20:42:09.602	2008/09/22 20:42:09.602	server1
	2008/09/22 20:41:44.408	2008/09/22 20:41:44.408	server1
	2008/09/22 20:41:44.310	2008/09/22 20:41:44.310	server1
	2008/09/22 20:41:43.571	2008/09/22 20:41:43.571	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: Info ▲

Received Time: 2010/08/27 20:04:22.878 ▼

Time: 2010/08/27 20:04:22.870

Server Name: server1

Module Name: rm

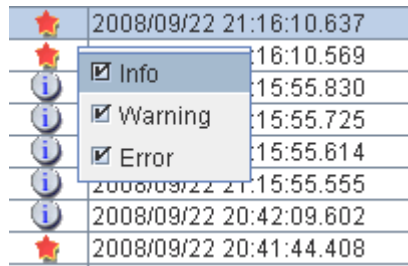
Event ID: 50

Message:

The number of licenses is 8. (BASE30)

Close

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.



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

```
# /opt/nec/clusterpro/etc/init.d/clusterpro_alertsync stop
# /opt/nec/clusterpro/etc/init.d/clusterpro_webmgr stop
```

To start

```
# /opt/nec/clusterpro/etc/init.d/clusterpro_webmgr start
# /opt/nec/clusterpro/etc/init.d/clusterpro_alertsync start
```

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 `svcadm` command to control startup and stop of the WebManager-related daemon.

To prevent WebManager from starting up

```
# svcadm disable clusterpro_alertsync  
# svcadm disable clusterpro_webmgr
```

To get WebManager to start up

```
# svcadm enable clusterpro_webmgr  
# svcadm enable 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 apply the settings, see “WebManager tab” in Chapter 2, “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 2, “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

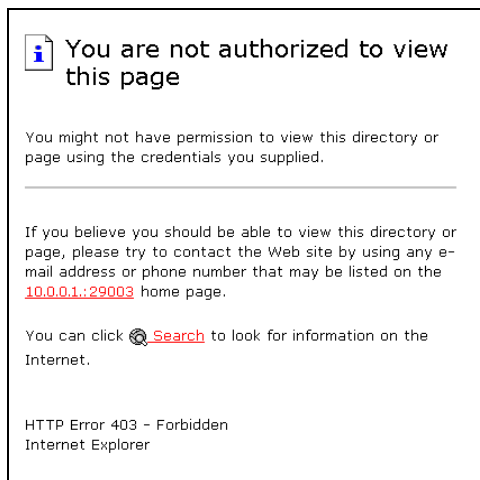
Limiting the access by using client IP addresses

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

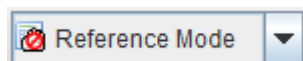
Add IP addresses to **IP Addresses of the Accessible Clients** on the **WebManager** tab in the **Cluster Properties** of the Builder. See “WebManager tab” in Chapter 2, “Functions of the Builder”.

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 Mode** 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.

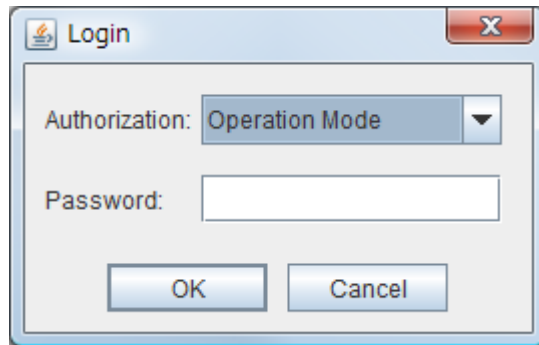
- ◆ Shutdown and shutdown reboot of a cluster
- ◆ Shutdown and shutdown reboot of servers
- ◆ Starting, stopping, and moving each group
- ◆ Starting the Builder

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.

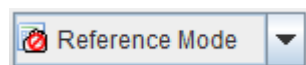
Once password limitation of the WebManager is set, the following authorization dialog box is displayed when trying to access the WebManager by setting a password.



You can log on to the WebManager by selecting **Operation Mode** or **Reference Mode** 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 Mode** 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
- ◆ Starting the Builder

For the information on switching the authorization after log on and/or log out, “Switch authorization of the WebManager” in Chapter 2 “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

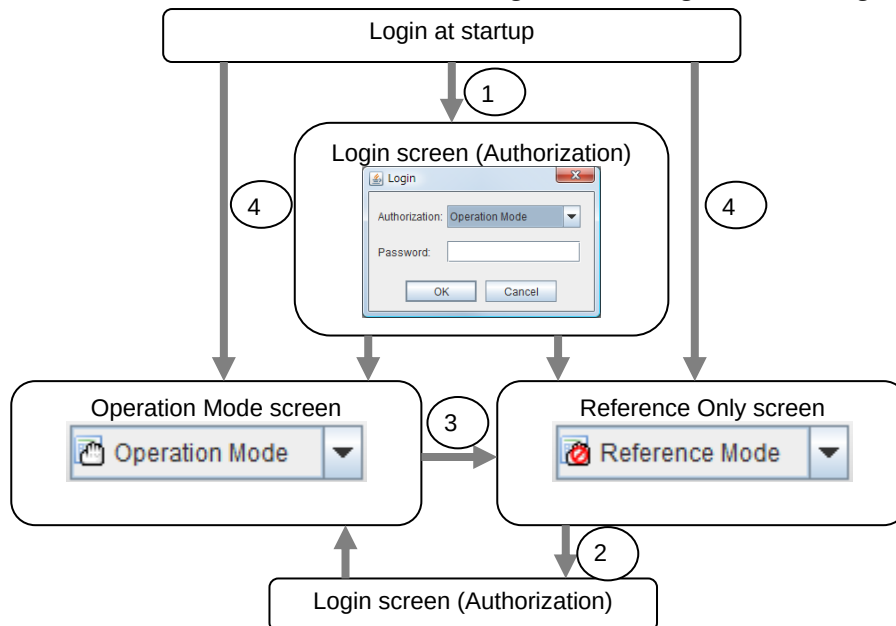
* Authorization cannot be selected.

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.**”

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 group 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.**”

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 apply the latest status. Information displayed by the WebManager does not always apply the latest status. To acquire the latest information, click the reload icon on the toolbar or **Reload** on the **Tool** menu.
- ◆ 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 icon on the toolbar or **Reload** on the **Tool** menu to acquire the latest information.
- ◆ If you use a Solaris 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 WebManager 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.
- ◆ 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 timeout occurred.	Internal timeout may occur when a time-consuming task is performed. Check the status after the timeout 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 clplogcc 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.
Error	Invalid configuration data.	Failed to acquire the cluster configuration data.	Check the information on the cluster configuration.

Level	Message	Cause	Solution
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	Operable 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.
Warning	The cluster tree obtained from the server may not be completed.	An error occurred while acquiring the server's status.	Try reloading later.

Level	Message	Cause	Solution
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.
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.

Level	Message	Cause	Solution
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 apply added alerts to the search results, close the window displaying the search results and perform search again.
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.
Error	Failed to get server list.	Failed to get a server list.	Check if other log collections are performed. Retry after others are completed. Reload after waiting for a while.
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.

Level	Message	Cause	Solution
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.
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 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.	-
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.	-

Level	Message	Cause	Solution
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.
Error	Specified server name was not found.	The specified server is not found.	Click the Reload button to display the latest status of a cluster, and try again.
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	Failed to get server list.	Failed to acquire the server list.	Shut down and reboot a cluster.
Error	Command(mount) return error.	Failed in operation, because an error occurred in executing the mount command.	Make sure that mount option that is supported by file system is configured.
Error	Command(fsck) return error.	Failed in operation, because an error occurred in executing the fsck command.	Make sure that the fsck option supported by file system exists.
Error	Failed to start the cluster "{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 or by the clpcl command may not be applied on the display. The name of the cluster is displayed where {0} is represented.	Click the Reload button to display the latest status of a cluster, and try again.

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

Level	Message	Cause	Solution
Error	Failed to suspend the monitor "{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 or by the clpmonctrl command may not be applied on the display. The name of the monitor resource is displayed where {0} is represented.	Click the Reload 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.	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 applied on the display. The name of the monitor resource is displayed where {0} is represented.	Click the Reload 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.	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 applied on the display.	Click the Reload button to display the latest status of a cluster, and try again.
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 applied on the display.	Click the Reload 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 IP Addresses of the Accessible Client 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 applied on the display. The name of the resource is displayed where {0} is represented.	Click the Reload button to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
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 applied on the display. The name of the monitor resource is displayed where {0} is represented.	Click the Reload 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 applied on the display.	Click the Reload 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 applied on the display.	Click the Reload button to display the latest status of a cluster, and try again.
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	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}.	- Select the other server. - Check the shared disk.
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}.	- Select the other server. - Check the shared disk.

Chapter 2 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

Click the setup mode icon on the toolbar on the WebManager screen or **Setup Mode** on the **View** menu to switch to this 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:

In this document, *Builder* refers to the online version of Builder, which runs in the WebManager setup mode, and the offline version of Builder, which runs on the management PC.

“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 3.0 for Solaris
- ◆ If you close the Web browser (by clicking Exit from the File 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 Reload from the Tool menu or clicking reload icon 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 120 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

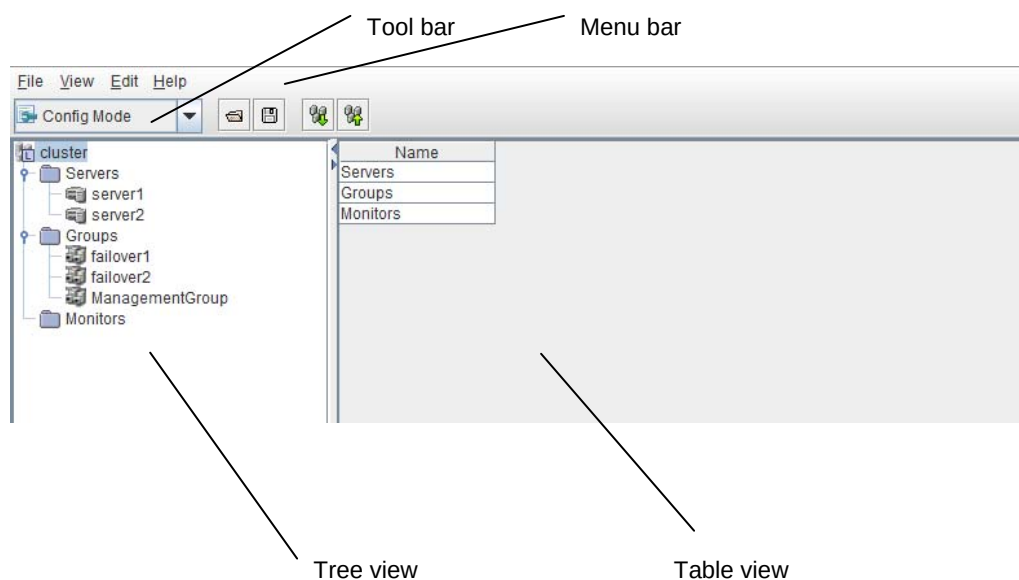
- ◆ If you change the screen resolution while the Builder is running, the Java VM stack trace (example: NullPointerException) may be logged on the Java console. The Builder can keep running.
- ◆ If you press **Esc** while a pull-down menu of your browser is displayed, the Java VM stack trace (example: 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.
- ◆ On the **Alert Log** tab (see “Alert Log tab” on page 125), 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	Cluster	Represents the cluster.	Displays cluster names.
2	Servers	Represents a set of servers in the clusters	Displays servers.
3	Server	Represents each server	Displays server names.
2	Groups	Represents a set of groups in the clusters	Displays groups.
3	Group	Represents each group.	Displays group names.
2	Monitors	Represents a set of monitor resources in the clusters	Displays monitors.

Table view

Table for cluster name selection

Displays objects under the root hierarchy.

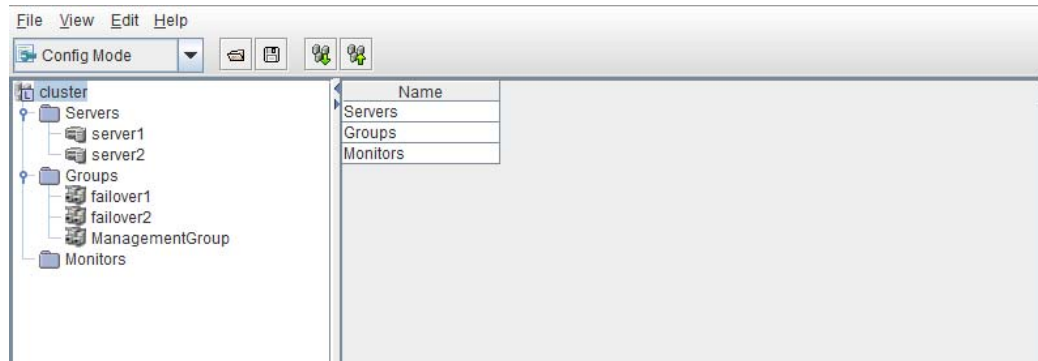
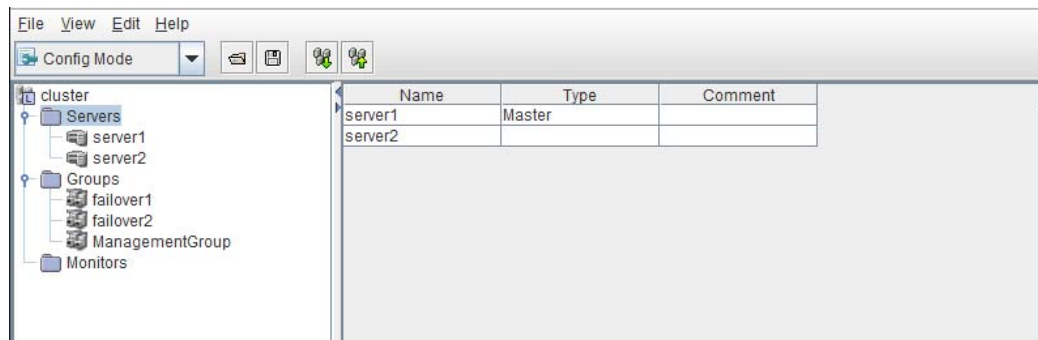


Table for server selection

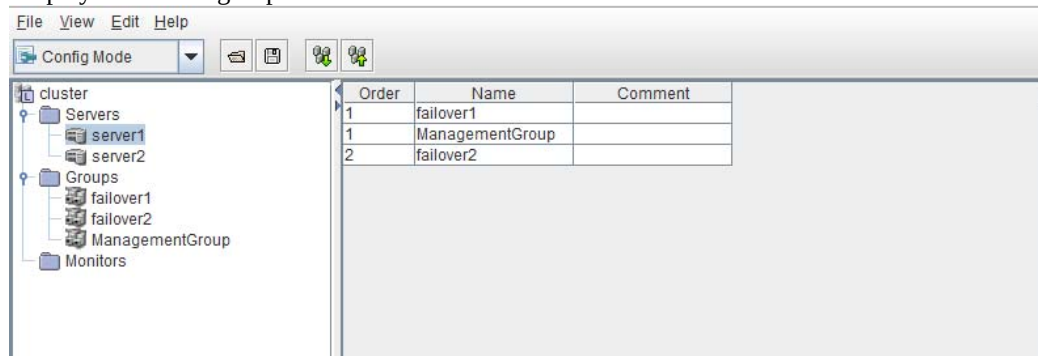
Displays the failover priorities of the groups.



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

Table for server name selection

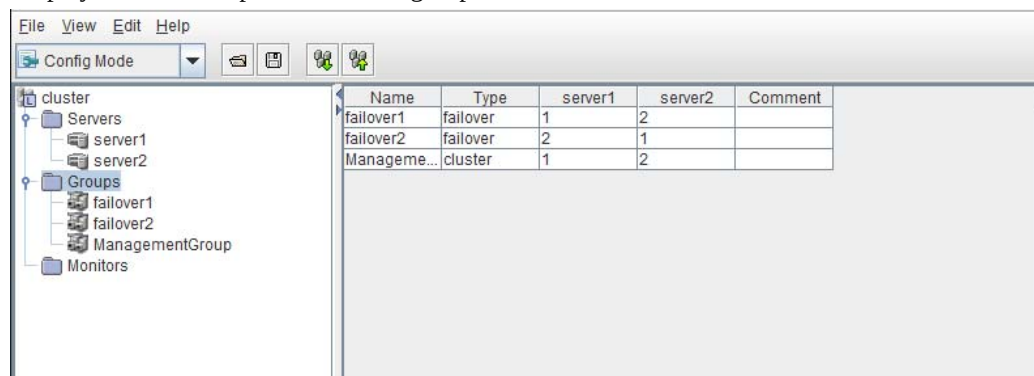
Displays the list of groups allowed to start on the selected server



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 group selection

Displays the failover priorities of the groups.

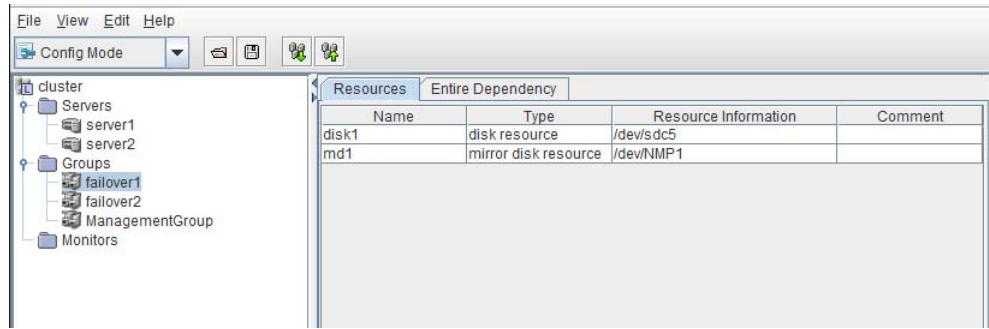


Column name	Overview
Name	Displays the group names in alphanumerical order.
Type	Displays the group type.
Server names (The number of columns dynamically increases or decreases according to the number of servers)	Represents the startup order of groups on the servers displayed by column names. The top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

Table for group name selection

Resources

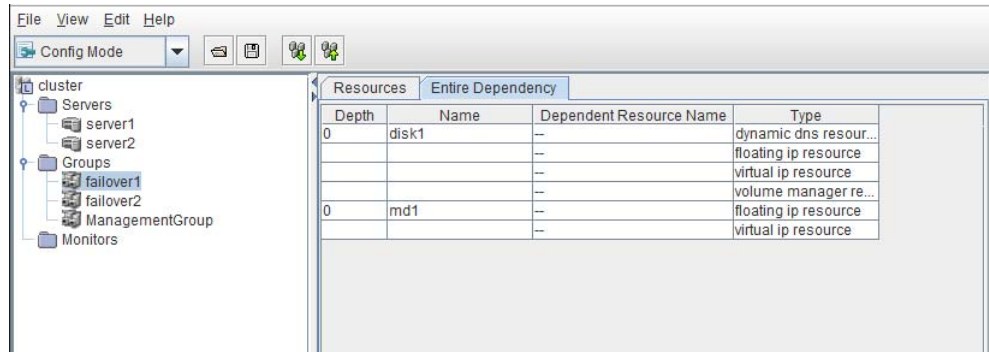
Group resources in the selected group are listed.



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.

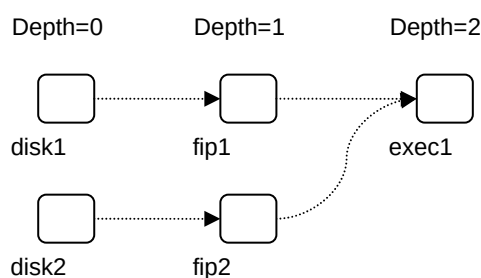
Dependency List

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.

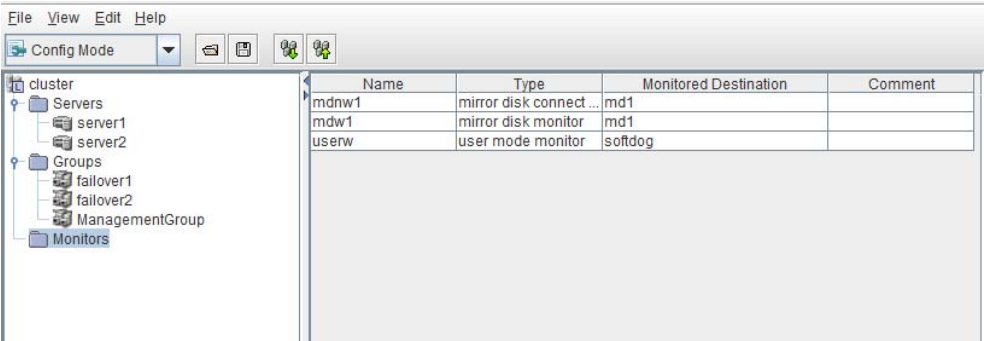


The dependencies in this figure are listed below. These are not the default dependencies, but specified with resource names.

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.



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.

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 88)
 <i>cluster_name</i>	Remove Cluster	Removing an object (on page 97)
	Rename Cluster	Renaming an object (on page 98)
	Properties	Properties (on page 98)
 Servers	Server Definition	Definition (on page 96)
	Properties	Properties (on page 98)
 <i>server_name</i>	Remove Server	Removing an object (on page 97)
	Rename Server	Renaming an object (on page 98)
	Properties	Properties (on page 98)
 Monitor Resources	Add monitor resource	Adding an object (on page 96)
 Groups	Add Group	Adding an object (on page 96)
	Add Group for WebManager	Chapter 5 “Creating the cluster configuration data” in the <i>Installation and Configuration Guide</i>
 <i>group_name</i>	Add Resource	Adding an object (on page 96)
	Remove Group	Removing an object (on page 97)
	Rename Group	Renaming an object (on page 98)
	Properties	Properties (on page 98)
<i>group_resource_name</i>	Remove Resource	Removing an object (on page 97)
	Rename Resource	Renaming an object (on page 98)
	Properties	Properties (on page 98)
<i>monitor_resource_name</i>	Remove Monitor Resource	Removing an object (on page 97)
	Rename Monitor Resource	Renaming an object (on page 98)
	Properties	Properties (on page 98)

Using a tool bar of the Builder

The Builder provides a toolbar:



Note:

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

For details about the icons used to switch to the operation mode, the config mode, or the reference mode, which are common to the WebManager, see “Window of the WebManager, Main pane of the WebManager, Toolbars” in Chapter 1, “Functions of the WebManager”.

If you click the combo box and icons on the toolbar specific to the Builder screen, 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
	This is the same as clicking File on the menu bar and selecting Open .	“Opening the configuration file” (on page 89)
	Saves a file. This is the same as clicking File on the menu bar and then selecting Save .	“Saving the configuration file” (on page 90)
	Get the configuration. This is the same as clicking Download the Configuration File on the File menu.	“Get the configuration file (online version only)” (on Page 90)
	Apply the configuration. This is the same as clicking Upload the Configuration File on the File menu.	“Apply the configuration file (online version only)” (on Page 91)

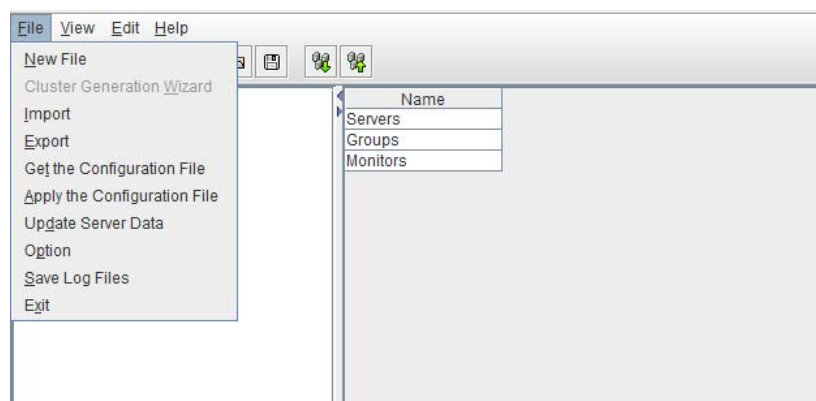
Using the menu bar of the Builder

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

When you select **File**, the following pull-down menu is displayed.

Menu	Functional overview
New File	Creates a cluster.
Cluster Generation Wizard	Opens the cluster generation wizard.
Import	Read the cluster configuration information file.
Export	Save the configuration information as the cluster configuration information file.
Get the Configuration File	Connect to the cluster and get the current configuration information (online version only).
Apply the Configuration File	Apply the configuration information to the cluster (online version only).
Update Server Data	Update the server IP address and the device information (online version only).
Option	Starts the Option dialog box.
Save log files	Starts the Save Logs dialog box.
Exit	Exits the Builder.



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 90.

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” in the *Installation and Configuration Guide*.

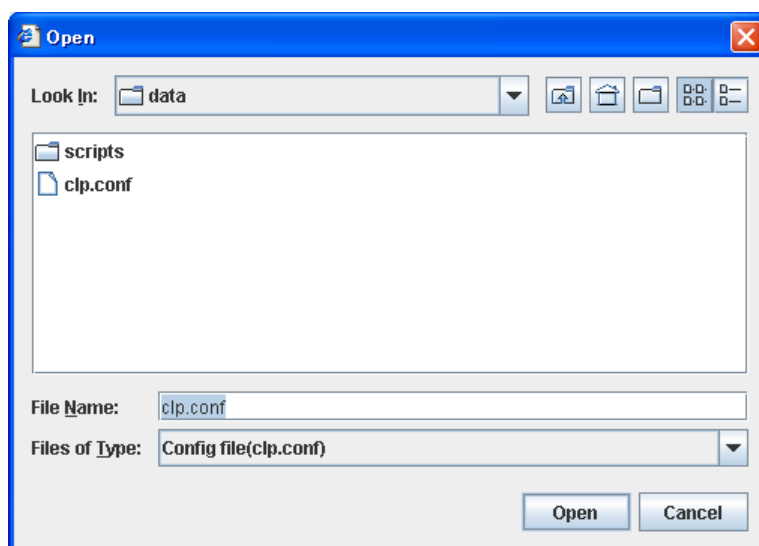
Opening the configuration file

Select **Import** 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 Windows



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

Saving the configuration file

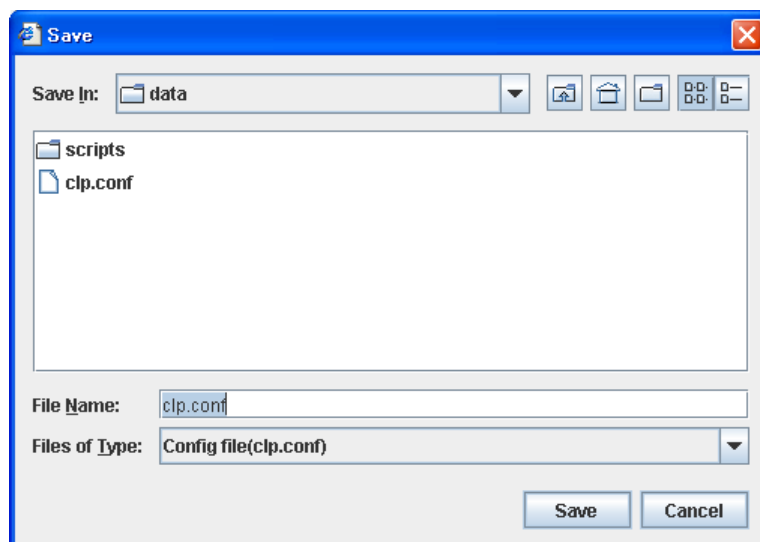
Click **Export** to save the cluster configuration data you are editing. This menu becomes available if you have created a cluster configuration data. Save the file as “clp.conf.”

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

- ◆ The server exists.
- ◆ LAN heartbeat resource exists.

How to use:

- ◆ For Windows



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

Get 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 90.

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**.

Apply 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 3 “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 was stopped. There is one or 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 --push command)” in Chapter 3 “ExpressCluster command reference.”
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.

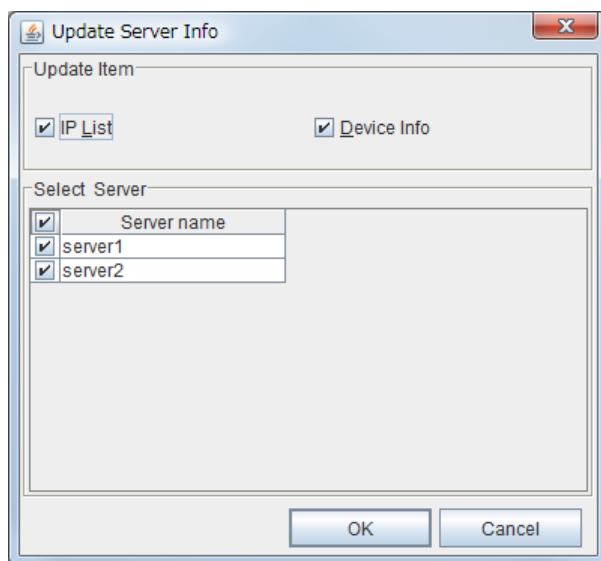
```
clpcfctrl --push -x "Directory where the cluster configuration data  
has been saved" --force
```

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

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

Update Server Data (online version)

Get the information of the specified server.



Update Item

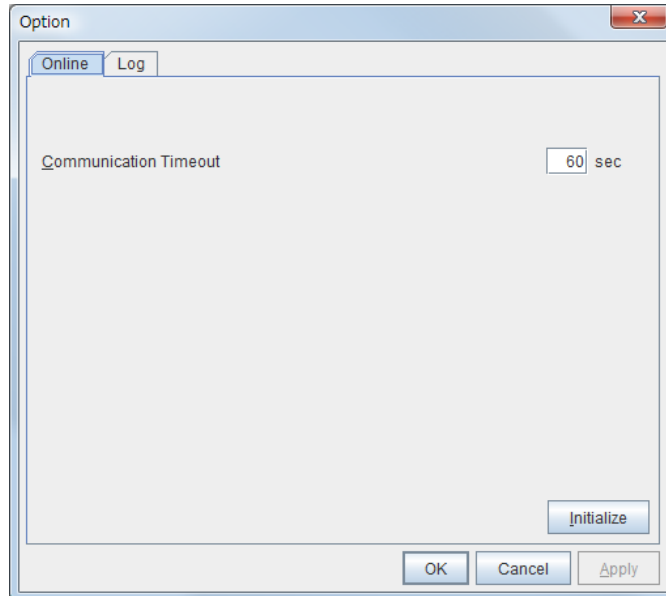
- ◆ IP List
Get the IP address list.
- ◆ Device Info
Get the device information of disk and COM.

Select Server

Specify the servers from which the information is gotten. By clicking the checkbox on the table title, the status of all the server checkbox can be changed at once.

Changing communication settings

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

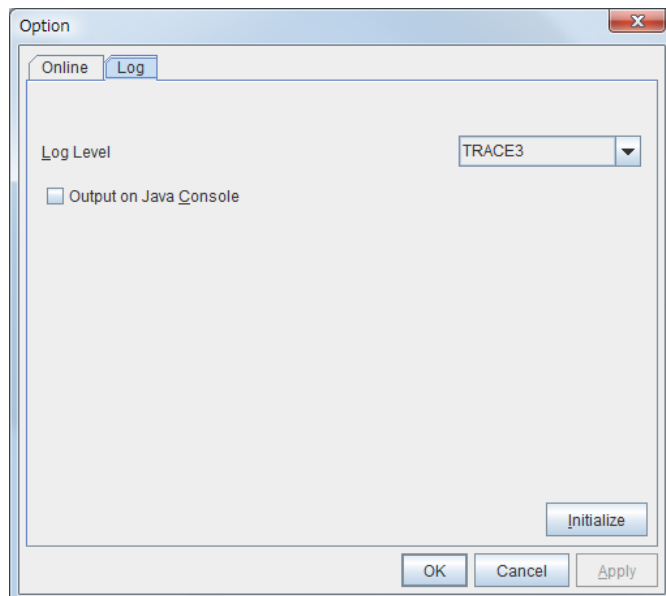


Communication Timeout (0 to 999)

This is the timeout value when accessing a server.

Changing the log level settings of Builder

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



Log Level

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

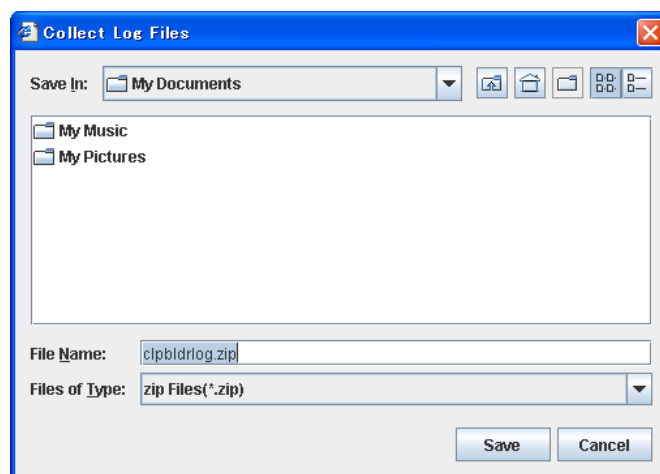
- **ERROR**
Select this to read only error-level logs.
- **WARNING**
Select this to read warning-level and error-level logs.
- **INFORMATION**
Select this to read information-level, warning-level, and error-level logs.
- **TRACE1,2,3**
Select this to read logs of internal trace, and those from the information, 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 **Save Log Files** 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 90.

Select **No** if you do not need to save the changes.

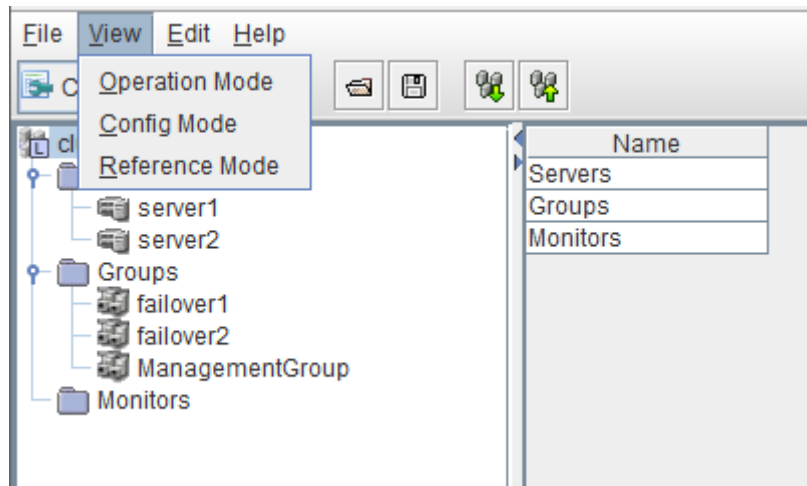
Exit from the Builder discarding the changes you made in the cluster configuration data.

View menu

Select **View** menu and the following pull down menu is displayed.

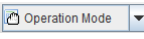
View menu is not displayed on offline version.

Menu	Function description
Operation Mode	Switch to the Operation Mode
Config Mode	Switch to the Config Mode
Reference Mode	Switch to the Reference Mode



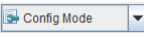
Operation Mode

Switches from the currently displayed mode to the WebManager operation mode.

This is the same as selecting the  icon from the drop-down menu on the toolbar.

Configuration Mode

Switches from the currently displayed mode to the Builder setup mode.

This is the same as selecting the  icon from the drop-down menu on the toolbar.

Reference Mode

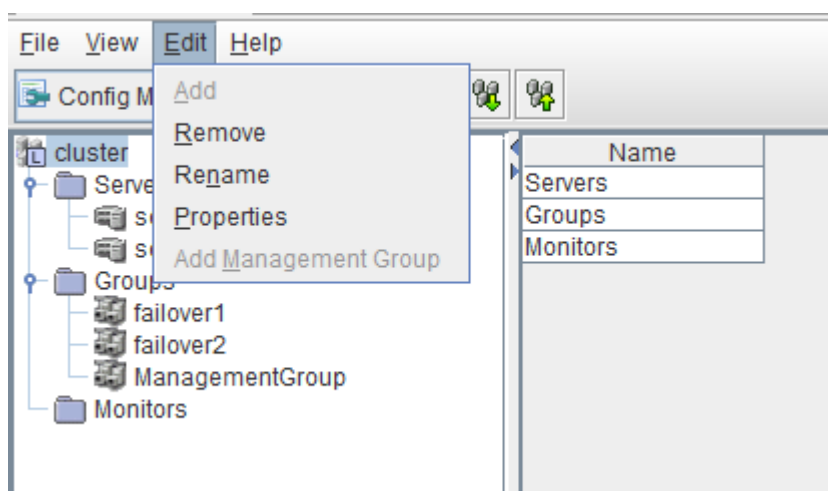
Switches from the currently displayed mode to the WebManager reference mode.

This is the same as selecting the  icon from the drop-down menu on the toolbar.

Edit menu

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

Menu	Functional overview
Add	Adds an object.
Remove	Deletes the selected object.
Rename	Renames the selected object.
Properties	Displays the properties of the selected object.
Add Management Group	Adds a management group.



Adding an object

Displays the wizard for adding a cluster, server, group, group resource, monitor resource. For details, see Chapter 5, “Creating the cluster configuration data” 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
group_name	Group resource
Monitor Resources	Monitor resource
Servers	Server

Removing an object

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

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

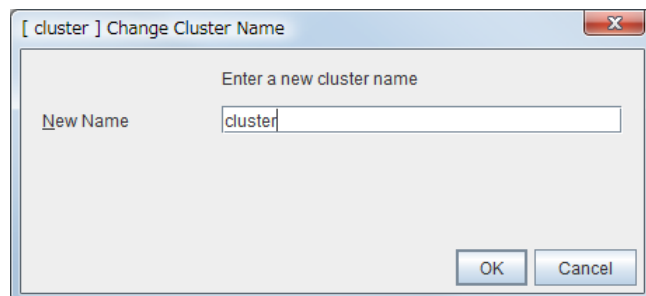
You cannot remove an object if any of the following conditions is met:

If select	Conditions	How to change
Cluster Name	None	
Server Name	- There is no other server. - The server is the only server where the group can start up.	Cluster stop, start
Group Name	- A recovery target of monitor resource¹. - Has group resources.	Cluster stop, start
Group Resource Name	- A recovery target of monitor resource¹. - A target object of monitor resource monitoring timing¹. - Other group resources in the same group depend on it.	Cluster stop, start
Monitor Resource Name	- A virtual IP monitor resource	Cluster suspend, resume

¹ 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 or monitor resource.



The following are restrictions for each of the objects.

If select	Naming rules	How to change
Group Name	- Only alphanumeric characters, hyphen (-), underscore (_) and space are allowed for names. - Up to 31 characters (31 bytes) - Names cannot start or end with a hyphen (-) or space.	Cluster stop, start
Group Resource Name		Cluster stop, start
Cluster Name Monitor Resource Name		Cluster suspend, resume
Server Name	- 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. - Up to 255 characters (255 bytes) - Neither hyphen (-) nor space can be the first or last letter in names. - A name consisting of only numbers is not allowed. - Underscores (_) cannot be used. - "localhost" cannot be used as a server name.	When changing a server name, you have to be careful. For the procedure of change, see Chapter 9, "The system maintenance information" in the Reference Guide.

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

Properties

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

For details, see "Parameter details" on page 100.

Help Menu

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**.

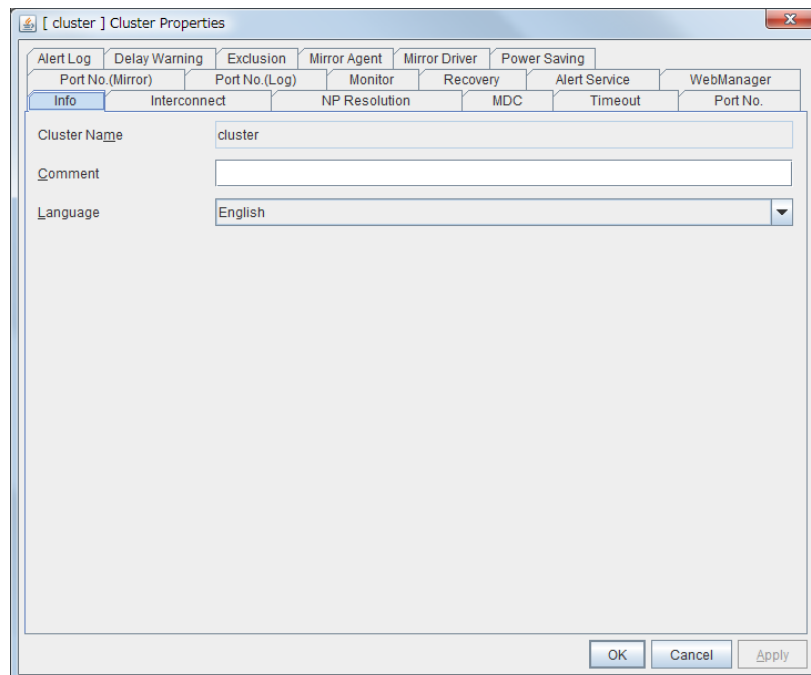
Parameter details

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.



Cluster Name

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

Comment (up to 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
- ◆ Chinese

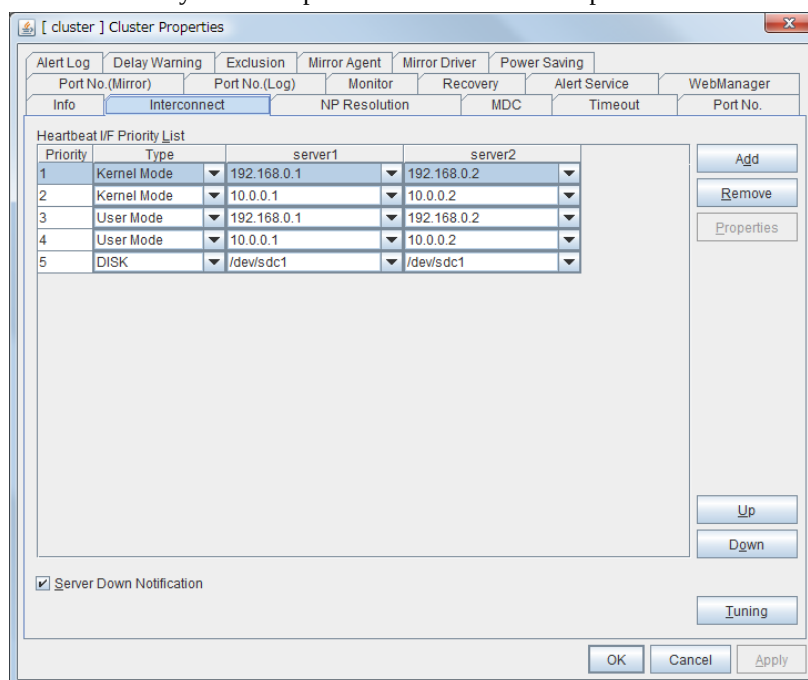
WebManager and the results of clpstat command are displayed in the language set in the **Language** settings on the cluster properties.

* Run the clpstat command in the environment where the font of the specified language can be 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 the specified language may be needed.

Interconnect tab

This tab allows you to set up network communication paths between cluster servers.



The **Communication paths between servers** list displays network communication paths between servers in the cluster.

Add

Adds a communication path. To specify the IP address of the communication path for each server, click a cell in each server's column, and then select or enter the address. If some servers are not connected on the communication path, leave the cells for all the unconnected servers empty.

Remove

Removes a communication path. Select the column of the communication path to remove, and then click **Remove** to remove the selected path.

Properties

Displays DISK heartbeat properties window. This is only available only when the type is DISK.

Up, Down

If multiple interconnects are set up, the communication path for which the **Priority** column contains the smallest number is prioritized for use for control communication between the cluster and server. To change the priority, change the order of selected rows with **Up** or **Down**.

It is recommended to specify a higher priority for the interconnect communication path than any other paths.

Tuning

Displays heartbeat I/F tuning property window.

Priority

Displays the priority order of the interconnect.

Server column

Entry differs depending on the type.

- ◆ **Kernel Mode, User Mode, Mirror Communication Only**

Enter IP address. Set blank to the not used communication path.

- ◆ **DISK**

Enter disk device. Set blank when not using DISK device.

- ◆ **COM**

Enter COM device. Set blank when not using COM device.

Notes: More than one IP addresses which belong to the same network address cannot exist in a single server. And also, inclusive relation cannot exist like the following relation.

IP address:10.1.1.10, subnet mask:255.255.0.0

IP address:10.1.2.10, subnet mask:255.255.255.0

Server down notification

When a server stops successfully (including a shutdown or reboot), the server is reported to be down to other servers in the cluster. You can perform failovers faster by reporting this in advance.

When there is a failure to deactivate groups when a server stops (including a shutdown or reboot), or when other abnormalities occur, other servers are not notified of the server that went down regardless of the server down notification settings.

- ◆ When **Follow the default dependence** is selected:

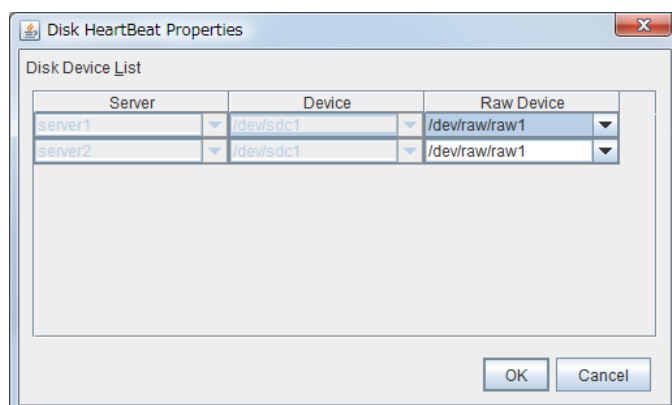
A server going down is reported.

- ◆ When **Follow the default dependence** is not selected:

A server going down is not reported.

DISK HeartBeat Properties

Displays DISK heartbeat properties.



Server

Displays server list.

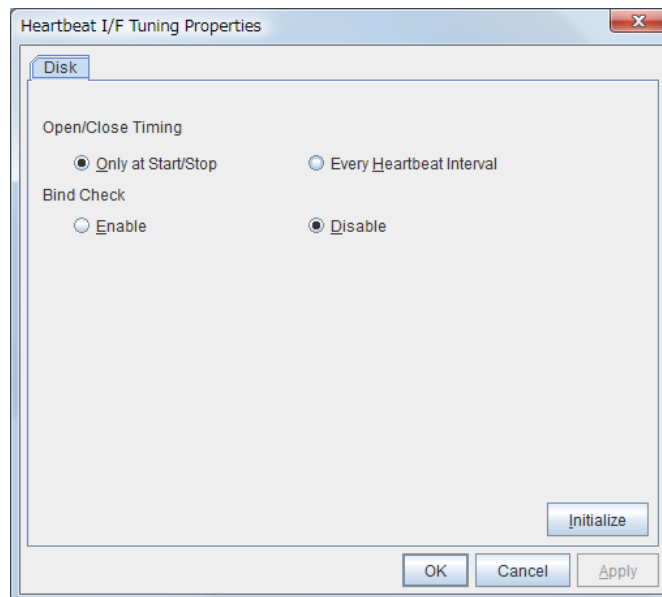
Device

Displays the device configured in the previous window.

Raw Device

When using RAW device, set RAW device by selecting or entering directly.

When not using RAW device, set blank.

Heartbeat I/F Tuning Properties◆ **Open/Close Timing**

- (1). 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.
- (2). 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**

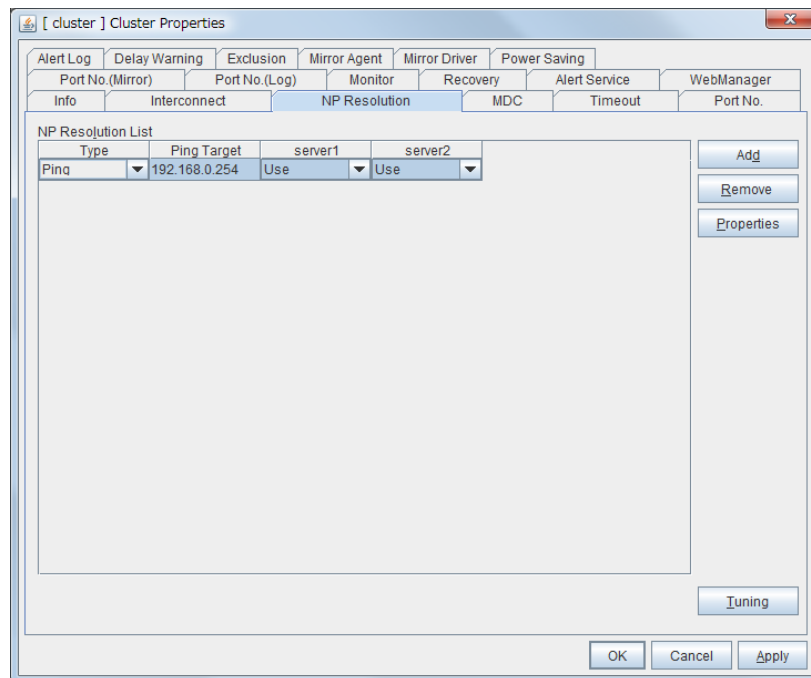
- (1). Enable
Checks if raw device for disk heartbeat is not bound to the actual device other than for disk heartbeat. Binding raw device is not performed if it is bound to the actual device other than for disk heartbeat. When binding a disk is not performed, the status of disk heartbeat resource becomes offline.
- (2). 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.

NP Resolution tab

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



Add

Add network partition resolution I/F. Click the Ping target column cell and set the IP address. Click the cell of each server and set **Use** or **Do Not Use**.

Remove

Remove network partition resolution I/F. Select network partition resolution I/F to be removed and click **Remove**, then the selected network partition resolution I/F is removed.

Properties

Display the Ping NP property window.

Tuning

Display network partition resolution tuning property window.

Type

Set the type of network partition resolution I/F. Ping is selectable.

Ping Target

Set Ping target.

Server name

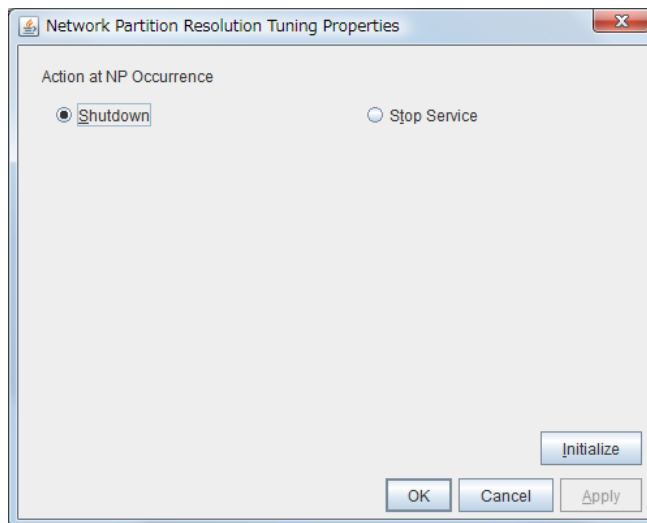
Select either **Use** or **Do Not Use**.

Ping NP Properties

The screenshot shows the 'Ping NP Properties' dialog box. It is divided into three main sections: 'Interface', 'IP Address', and 'Detailed Settings'. The 'Interface' section contains a table with columns 'Group', 'No', and 'IP Address'. It has one row with Group 1, No 192.168.0.254, and IP Address 192.168.0.254. There are 'Add' and 'Remove' buttons. The 'IP Address' section contains a table with columns 'IP Address' and 'IP Address'. It has one row with IP Address 192.168.0.254. There are 'Add', 'Remove', and 'Edit' buttons. The 'Detailed Settings' section has three input fields: 'Interval' (5 sec), 'Timeout' (3 sec), and 'Retry Count' (3 time). There is an 'Initialize' button. At the bottom are 'OK' and 'Cancel' buttons.

- ◆ Add Group List
 - (1). Add group.
 - (2). The maximum number of registered group is 16.
- ◆ Remove Group List
 - (1). Remove the selected group.
- ◆ Add IP Address List
 - (1). Add IP address to the selected group.
 - (2). The maximum number of registered IP address is 16.
 - (3). Maximum 256 IP addresses are able to be registered to a single Ping NP, 16 kind of IP addresses are registerable (The same kind of IP addresses can be used).
- ◆ Remove IP Address List
 - (1). Remove the selected IP address from the list.
- ◆ Edit
 - (1). Edit the selected IP address.
- ◆ Interval
 - (1). Set the Ping interval.
- ◆ Timeout
 - (1). Set the Ping timeout.
- ◆ Retry Count
 - (1). Set the retry count.
- ◆ Initialize
 - (1). Set the interval, timeout and retry count to the default values.

Network Partition Resolution Tuning Properties



- ◆ Action at NP Occurrence
 - (1). Shutdown
Shutdown the server in network partition.
 - (2). Stop Service
Stop the cluster service of the server in network partition.
- ◆ Initialize
 - (1). Set the actions at NP occurrence to the default settings.

Timeout tab

Specify values such as timeout on this tab.

The screenshot shows the 'Cluster Properties' dialog box with the 'Timeout' tab selected. The dialog has a title bar with a close button. Below the title bar are several tabs: Alert Log, Delay Warning, Exclusion, Mirror Agent, Mirror Driver, Power Saving, Port No.(Mirror), Port No.(Log), Monitor, Recovery, Alert Service, WebManager, Info, Interconnect, NP Resolution, MDC, Timeout, and Port No. The 'Timeout' tab is active, showing four input fields: 'Server Sync Wait Time' set to 5 min, 'Heartbeat Interval' set to 3 sec, 'Heartbeat Timeout' set to 90 sec, and 'Server Internal Timeout' set to 180 sec. An 'Initialize' button is located below the input fields. At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons.

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 timeout.

◆ 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 timeout should be longer than the interval.
- To perform the shutdown monitoring (see Port No. tab on page 108), this timeout should be longer than the time it takes to shut down applications and the operating system.

Server Internal Timeout (1 to 9999)

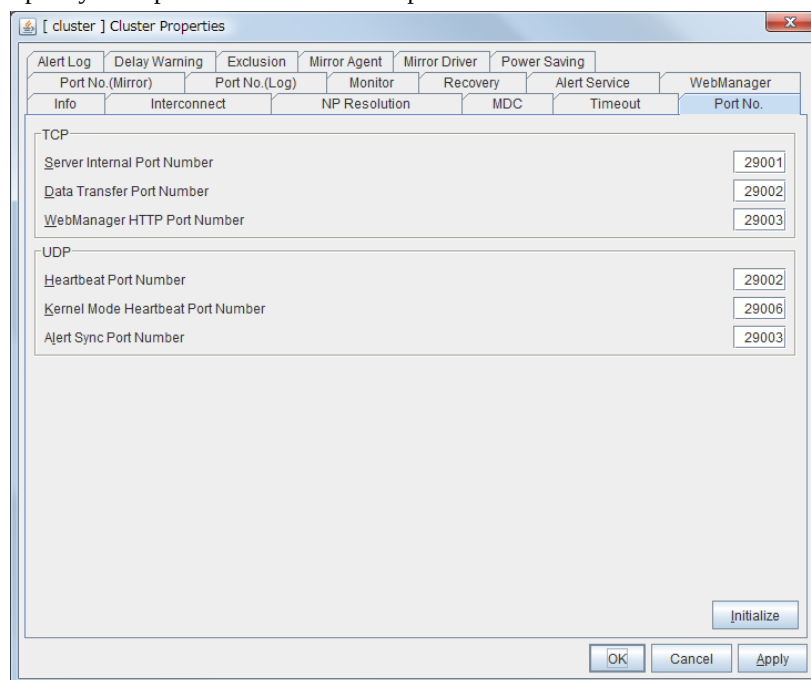
The timeout to be used in the ExpressCluster Server internal communications.

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.



TCP

No TCP port numbers can be overlapped.

- ◆ **Server Internal Port Number** (1 to 65535³)

This port number is used for internal communication.

- ◆ **Data Transfer Port Number** (1 to 65535³)

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

- ◆ **WebManager HTTP Port Number** (1 to 65535³)

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 65535³)

This port number is used for heartbeat.

- ◆ **Alert Sync Port Number** (1 to 65535²)

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

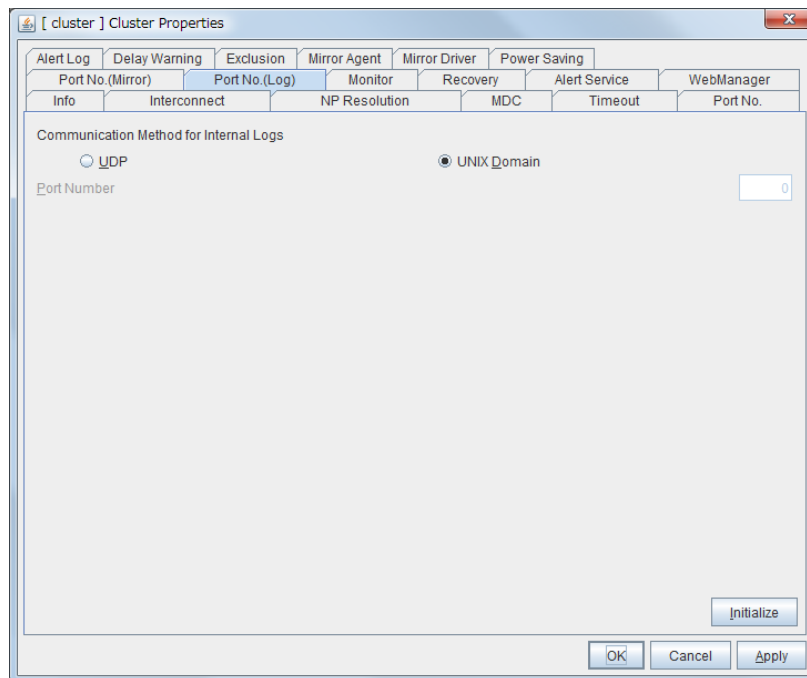
Initialize

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

² It is strongly recommended not to use well-known ports, especially reserved ports from 1 to 1023.

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 65535³)

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

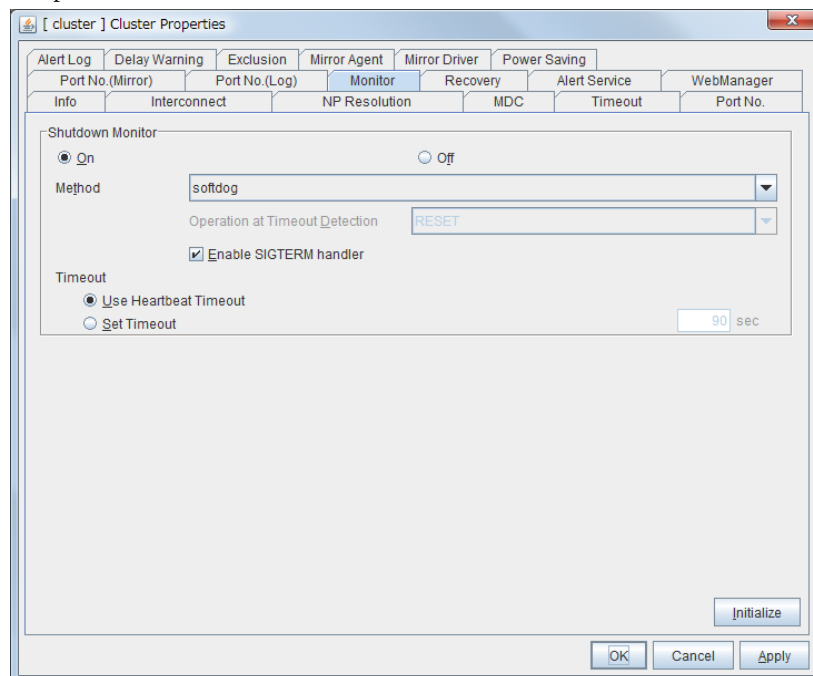
Initialize

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

³ It is strongly recommended not to use well-known ports, especially reserved ports from 1 to 1023.

Monitor tab

Configure the settings for monitoring. For details on the shutdown monitor and reboot limit, see Chapter 5, “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 service 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 timeout than the time required to shut down applications and the operating system (see “Timeout tab”). If you use shared disks, it is recommended to select **On**.

◆ Off:

If selected, the shutdown monitor is not performed.

- **Method**

Select the shutdown monitor method from:

- keepalive

For the details on the monitor method, see “Shutdown monitoring method” in Chapter 8, “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 8, “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**

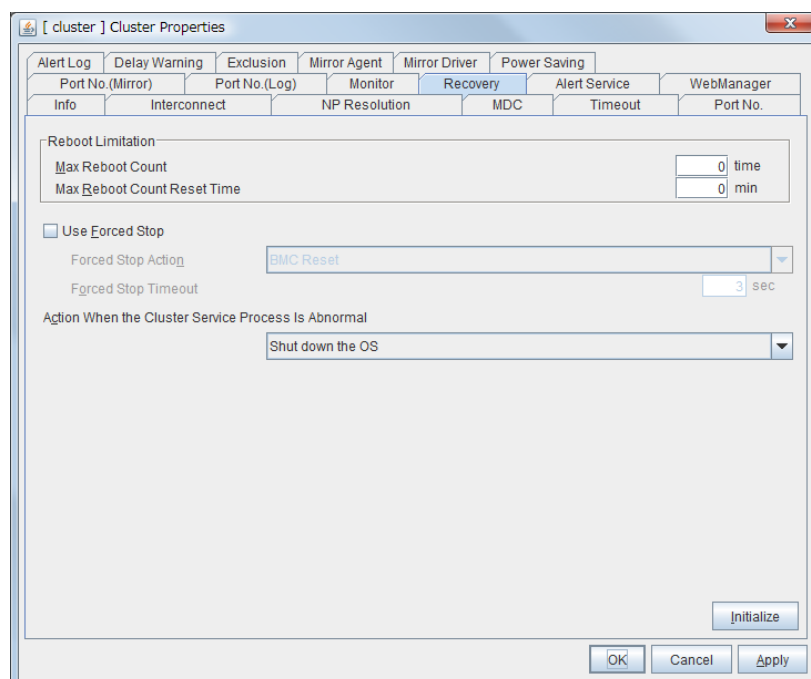
Select this for heartbeat timeout to work in conjunction with shutdown monitoring timeout.

- **Timeout (2 to 9999)**

Specify a timeout when the heartbeat timeout value is not used as shutdown monitoring timeout.

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 ipmitool command.

◆ BMC Power off

Use this to power off the server by using 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 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 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

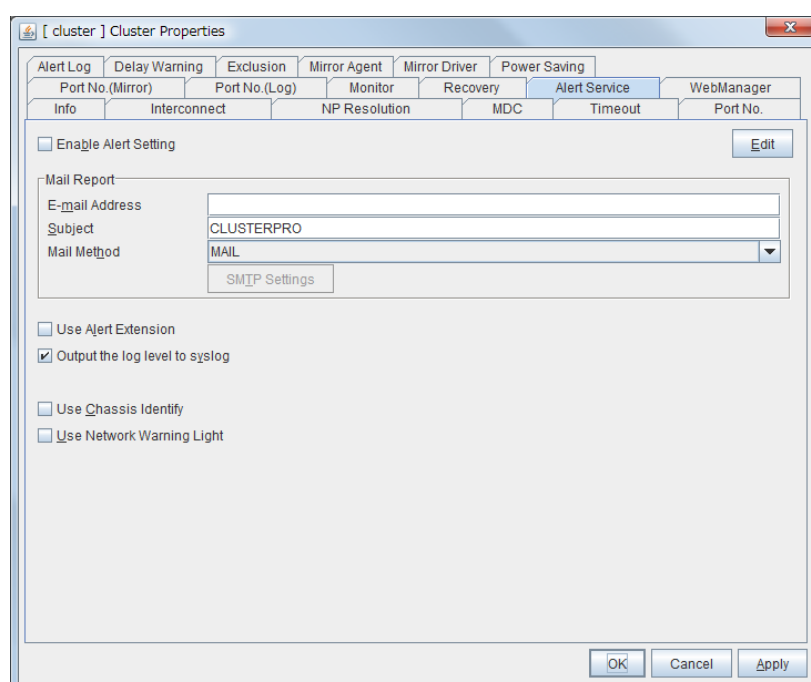
Configure the settings for the mail report function, the network warning light and the report destination.

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 3.0 for Solaris.



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 (up to 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 (up to 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

Output Log Level to syslog

Output the level of internal logs Builder outputs during operation to syslog.

Use Chassis Identify

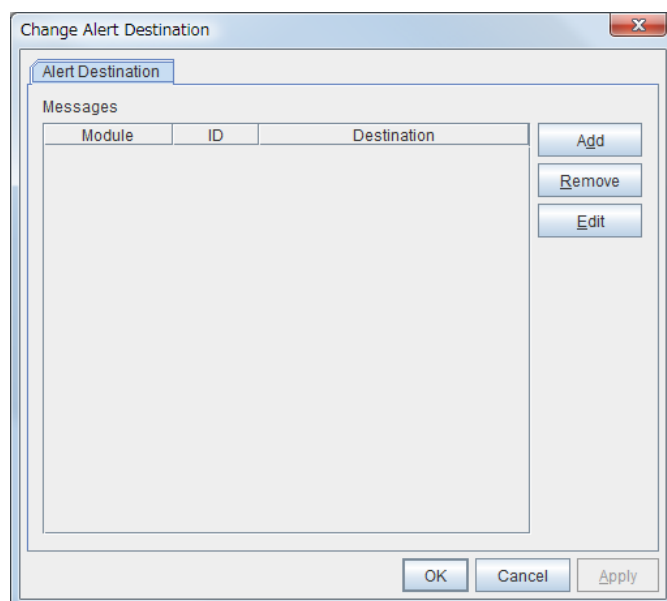
Configure whether or not to enable **Use Chassis Identify**.

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 (up to 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 WebManager.

◆ **Mail Report**

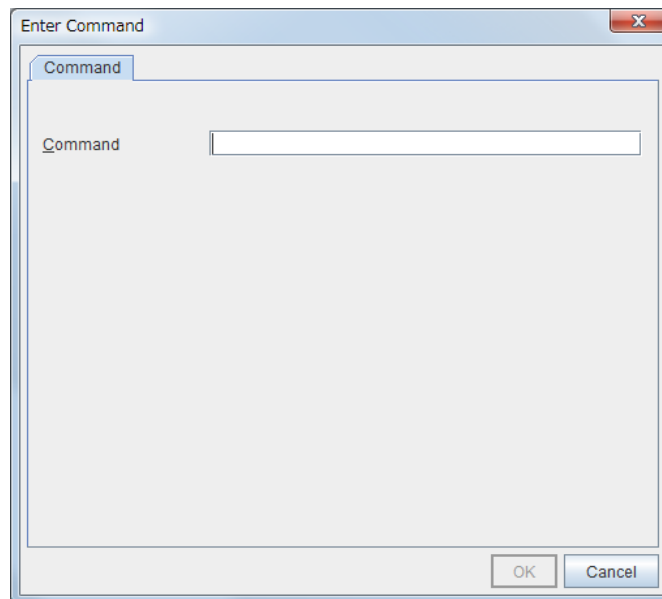
This sends message by using the mail report function.

◆ **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 to execute 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%%`. Since blank characters can be included in `%%MSG%%`, if you specify this for an argument of commands, specify this as `\\"%%MSG%%\\"`.

Remove

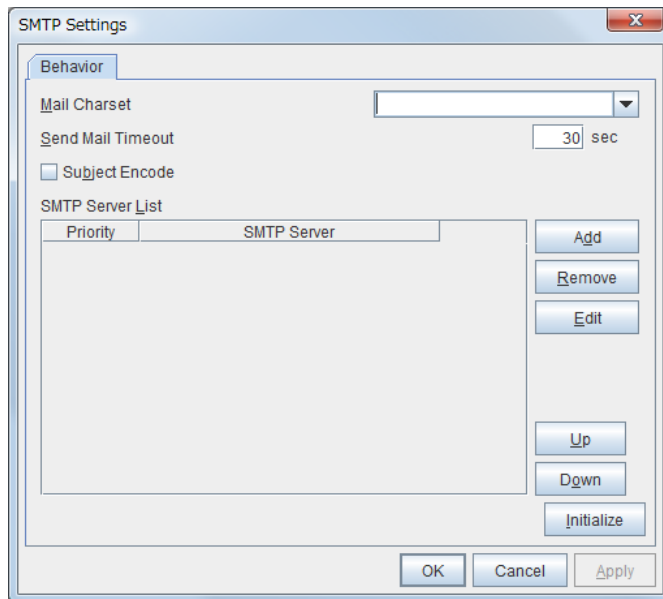
Click this to remove a command of alert extension function. Select the command, and then, click **Remove**.

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 Charset (up to 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

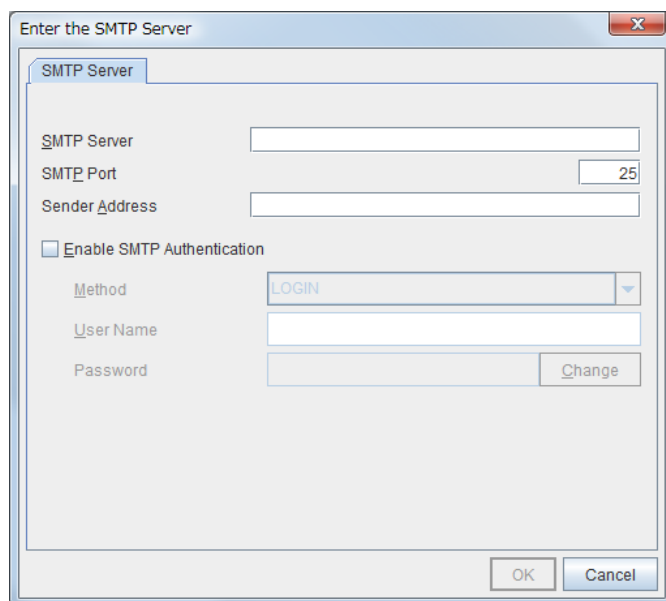
Select whether or not to encode the subject of e-mails.

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 (up to 255 bytes)**

Configure the IP address of the SMTP server.

SMTP Port (1-65535)

Configure the port number of the SMTP server.

Sender Address (up to 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 (up to 255 bytes)

Configure the user name used for SMTP authentication.

Password (up to 255 bytes)

Configure the password used for SMTP authentication.

Remove

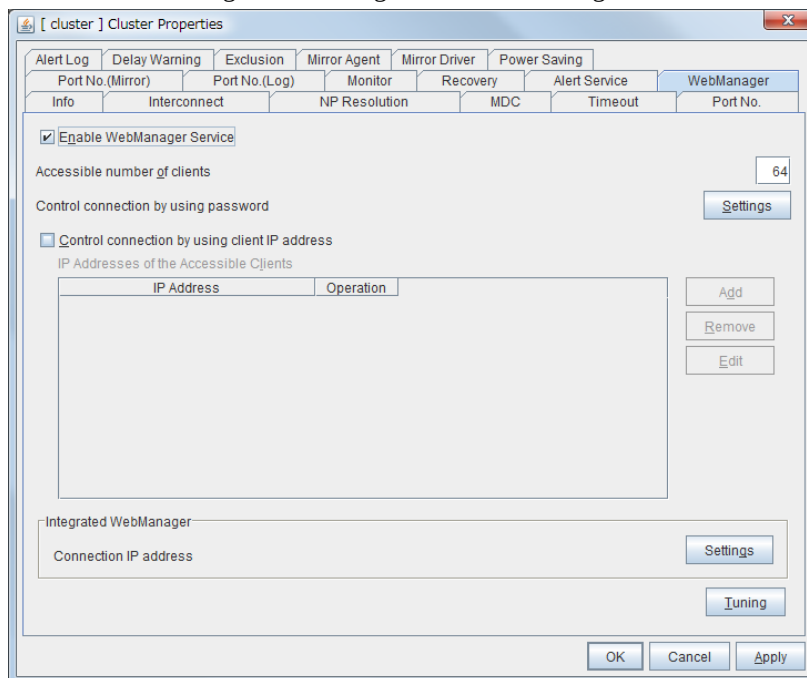
Select this to remove the SMTP server.

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 Service

Enables the WebManager Service..

◆ When selected:

The WebManager Service. is enabled.

◆ When cleared:

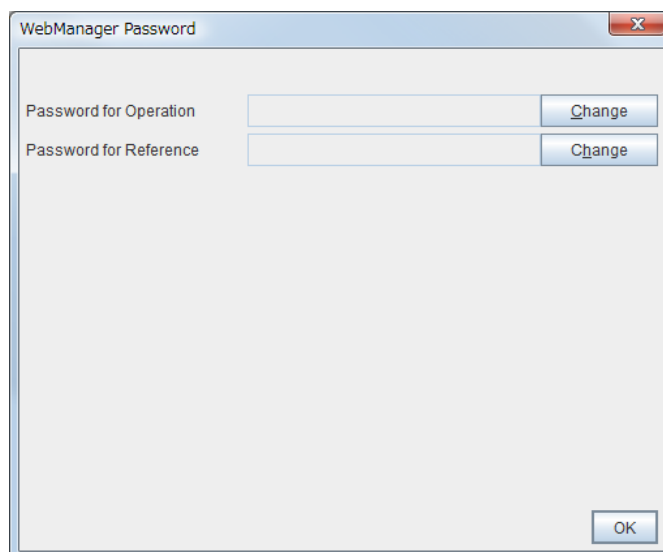
The WebManager Service is disabled.

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.

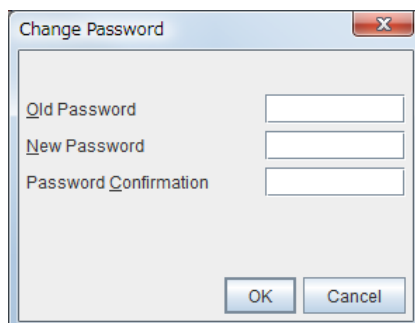


◆ Password for Operation

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: (up to 255 bytes)**

Enter the current password. If the password is not set, leave it blank.

- **New Password: (up to 255 bytes)**

Enter a new password. When deleting the old password, leave it blank.

- **Password Confirmation: (up to 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:

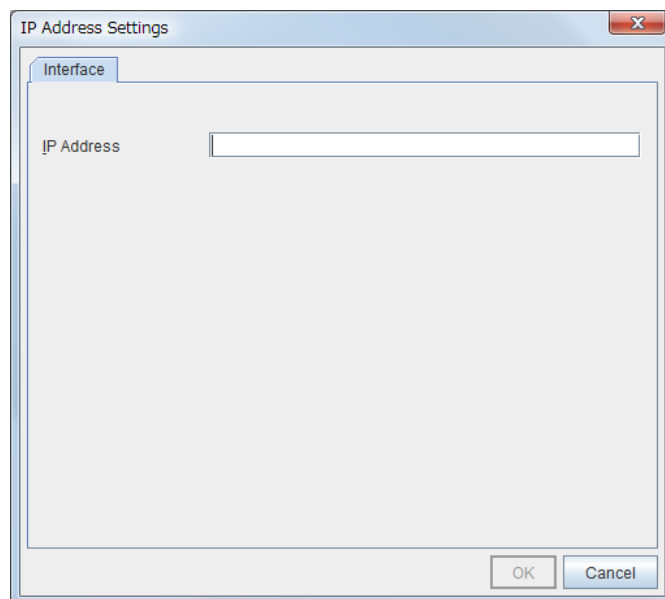
Add, **Remove** and **Edit** buttons are enabled.

◆ 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 (up to 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.

Note:

The client IP address used to allow this connection is also used to restrict connections for external operations using clprexec.

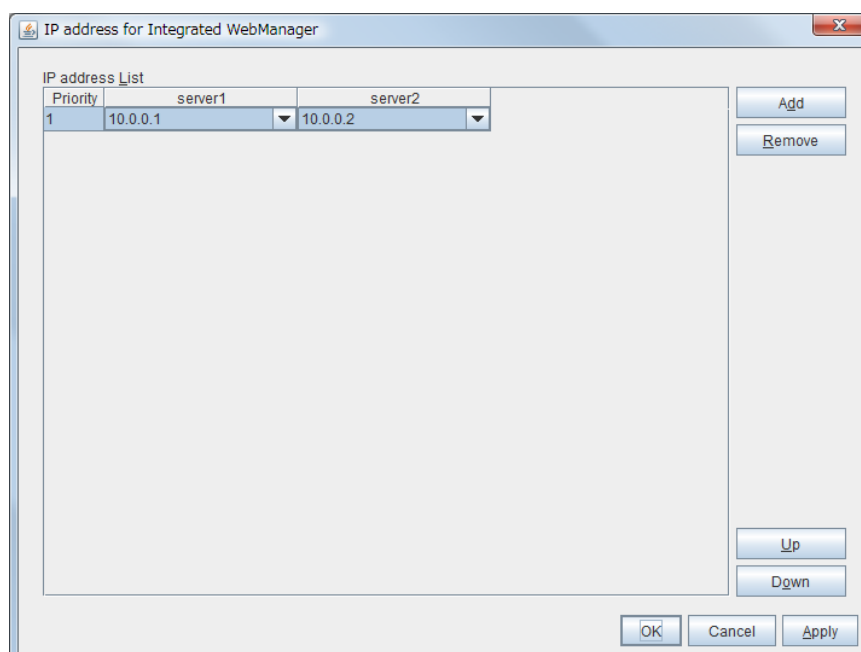
Control connection by using client IP address

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.

IP address for Integrated WebManager

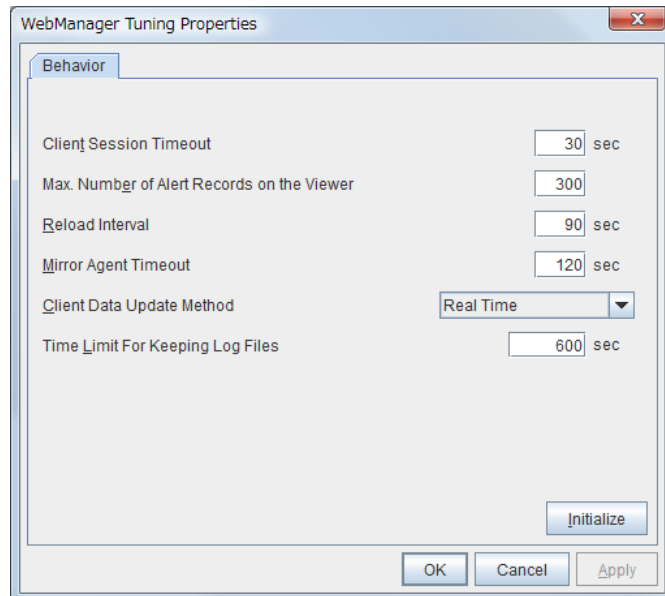
Click the **Settings** button to open the IP address dialog box for the Integrated WebManager.



- ◆ Add
Add IP addresses for the Integrated WebManager. Click the column cell of each server and select or enter IP address for the IP address of each server. For the communication path not connected to some server, set blank to the server cell of which the server is not connected.
- ◆ Remove
Remove the communication path. Select the communication path to be removed and click **Remove**, then the selected path is removed.
- ◆ Up, Down
When configuring more than one IP addresses for the Integrated WebManager, the communication path with smaller number of **Priority** column is used preferentially for the control communication among the cluster servers. When changing the priority, click **Up** and **Down** to change the order of the selected row.

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 timeout. A timeout 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.

◆ **Client Data Update Method**

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

- **Polling**
Updates the data regularly.
- **Real Time**
Updates the data in real time.

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

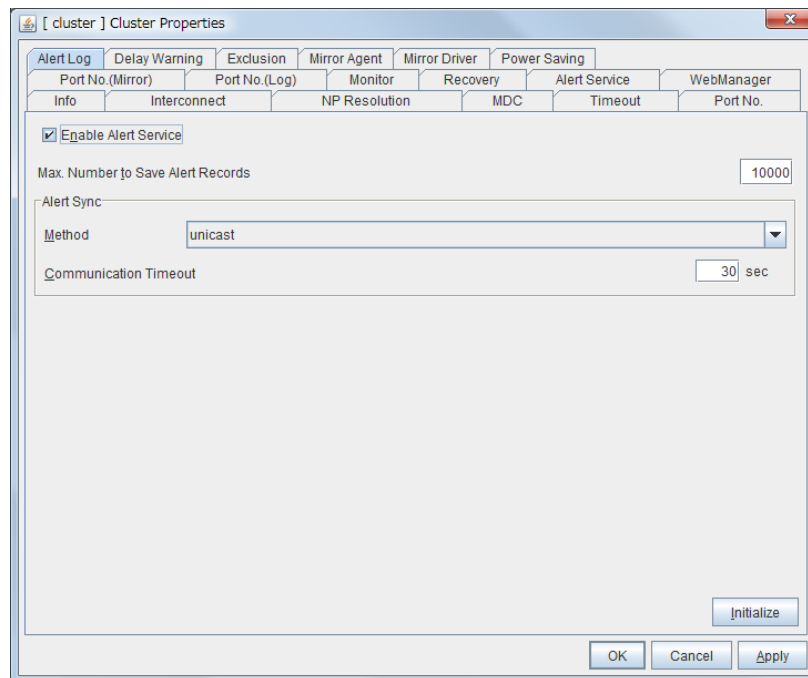
Specify the expiration period for deleting log collection information that is temporarily stored on a server. Log information on a server will be deleted if the expiration period is exceeded after the dialog box prompting saving log collection information is displayed.

◆ **Initialize**

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

Alert Log tab

Configure the settings for the alert log.



Enable Alert Service

Select this to start alert service for the server.

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

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

Specify the maximum number of alert records that can be retained. Alert service 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)

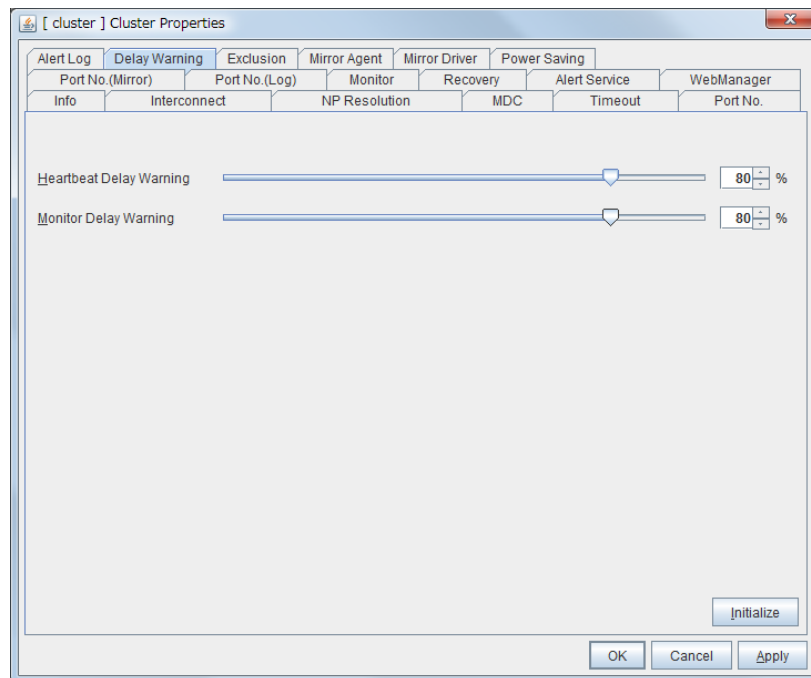
Specify a communication timeout. A communication timeout is determined if the time specified here elapses after the last communication between Alert service and servers.

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 5, “Monitor resource details” for more information.



Heartbeat Delay Warning (0 to 100)

Set a percentage of heartbeat timeout 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.

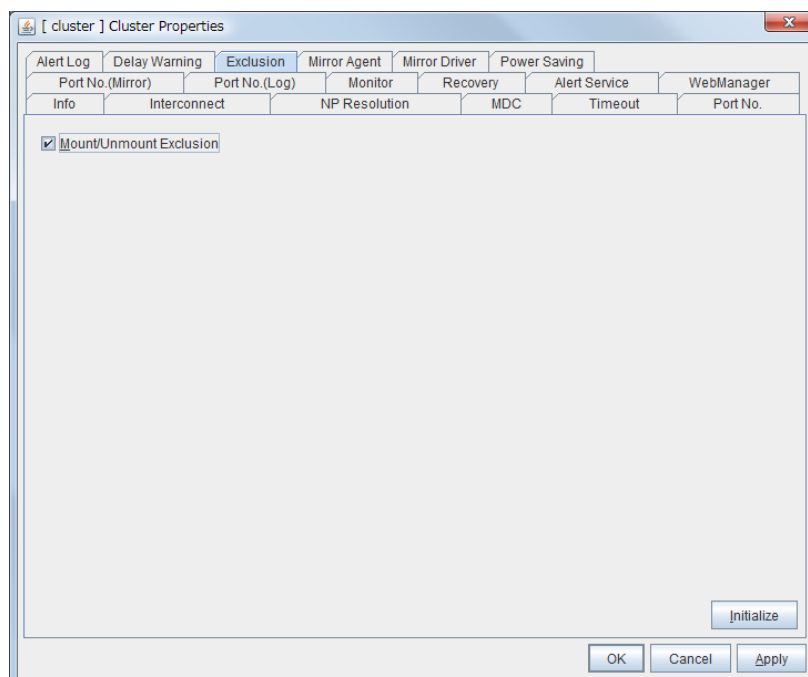
Monitor Delay Warning (0 to 100)

Set a percentage of monitor timeout 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 Command Exclusion

Specify the exclusion of mount and unmount of the file systems executed in disk resource and NAS resource. If this option is selected, 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

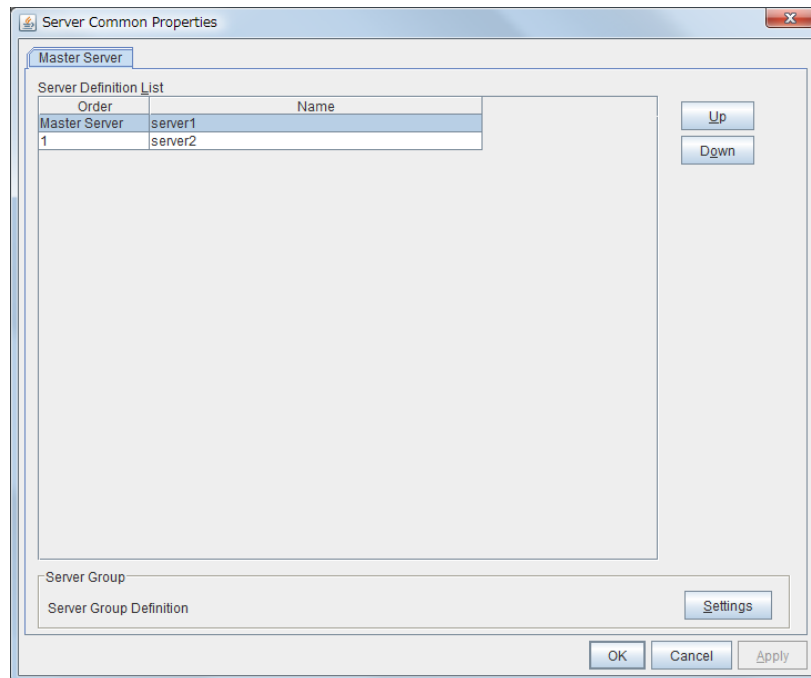
Use **Initialize** to reset the values to the default value. Clicking the **Initialize** button resets the value of all items to the default value.

Server Common Properties

Configure setting information of all servers in Servers Properties.

Master Server Tab

Configure the priority order of the servers and the server group. All the registered servers are displayed. Master server is the server to keep the master of cluster configuration information. And also, it is the server of the highest priority order.

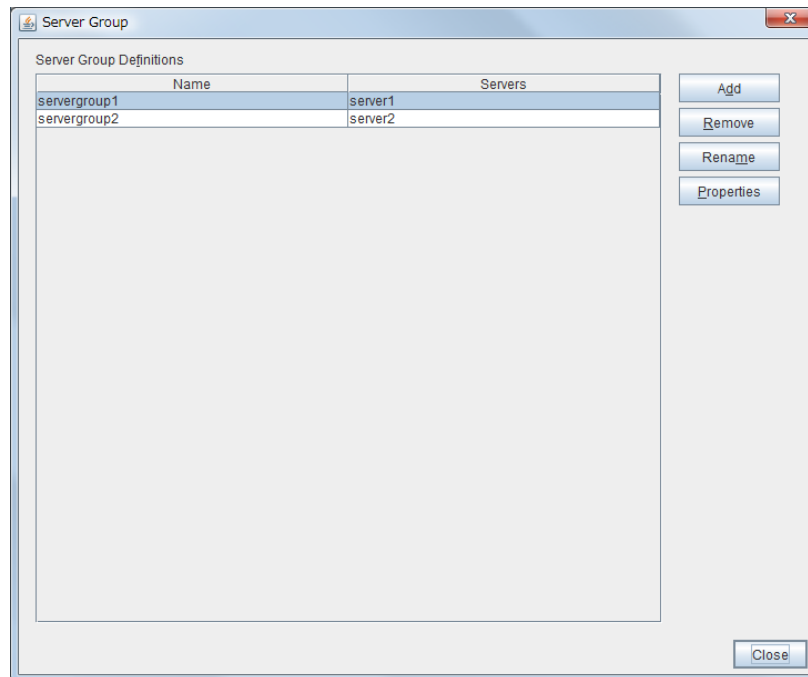


Up, Down

Used when changing the priority order of the servers. Select the server to be changed from the server definition list, and select **Up** or **Down**. The selected row moves.

Settings

Used when configuring the server group. Select **Settings** and the **Server Group** dialog box is displayed.



◆ Add

Add server groups. The wizard windows for adding the server group is displayed. For the details, see Chapter 5, “Creating the cluster configuration data” in *Installation and Configuration Guide*.

◆ Remove

The confirmation dialog box is displayed. When removing, select **Yes**. Then the selected server group is removed. When not removing, select **No**.

When the following conditions are matched, the server group cannot be removed.

Selected target	Conditions that the server group cannot be removed	Application method
Server group name	The server group is registered as the server group of the failover group.	Cluster stop Mirror Agent stop Mirror Agent start Cluster start

◆ Rename

The change server group name dialog box of the selected server group is displayed.



There are the following naming rules

Selected target	Naming rules	Application method
Server group name	- There are naming rules that are the same as the host name of TCP/IP that can be set by the OS. - Up to 31 characters (31 bytes). - Names cannot start or end with a hyphen (-) or a space. - A name consisting of only numbers is not allowed.	Cluster stop Mirror Agent stop Mirror Agent start Cluster start

Names should be unique (case-insensitive) in the server group.

◆ Properties

Display the properties of the selected server group.

◆ Name

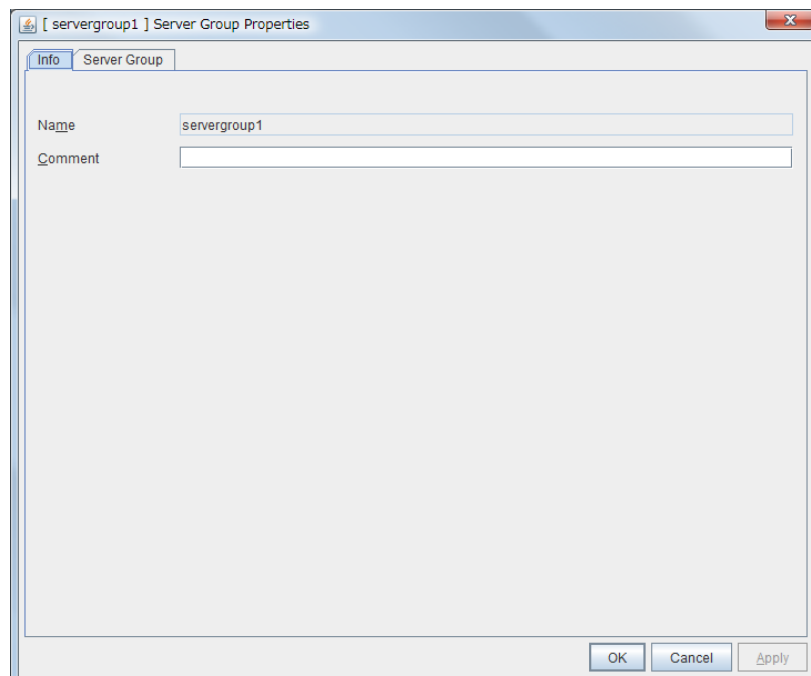
Display the server group name.

◆ Servers

Display the server names which belong to the server group.

◆ Server Group Properties - Info tab

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



Name

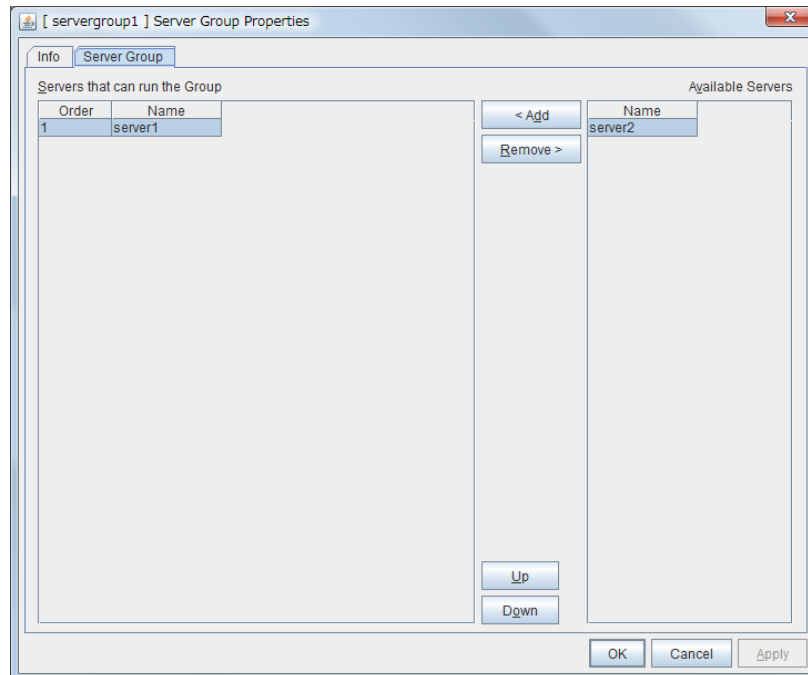
The selected server name is displayed. You cannot change the name here.

Comment(Within 127 bytes)

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

◆ Server Group Properties - Server Group

Configure the server group settings.

**Add**

Add the selected server in **Available Servers** to **Servers that can run the Group**.

Remove

Remove the selected server in **Servers that can run the Group** from the list.

Up, Down

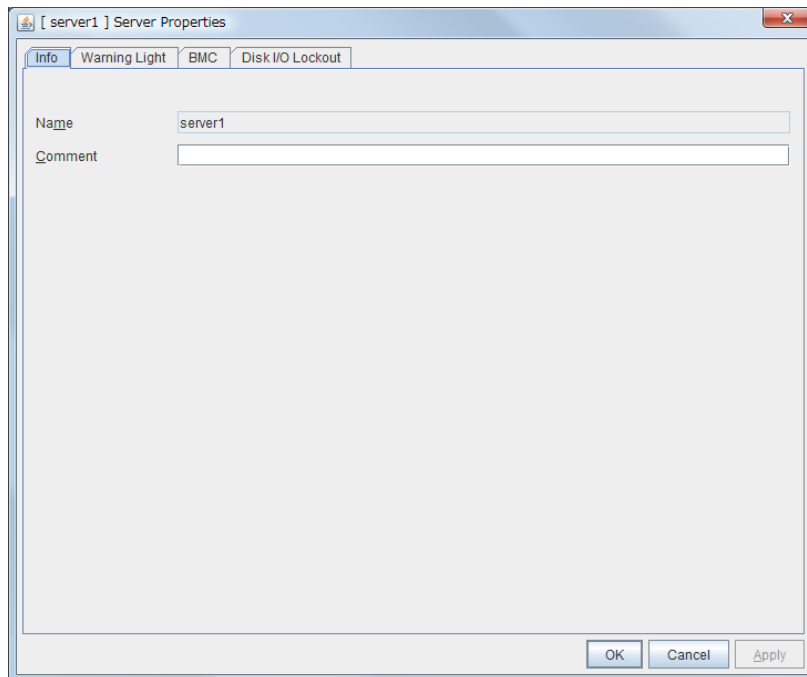
Used when changing the priority order of the server. Select the server to be changed from **Servers that can run the Group**, and select **Up** or **Down**. The selected row moves.

Server properties

Configure individual settings on each server constructing the cluster in Server Properties.

Info tab

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



Name

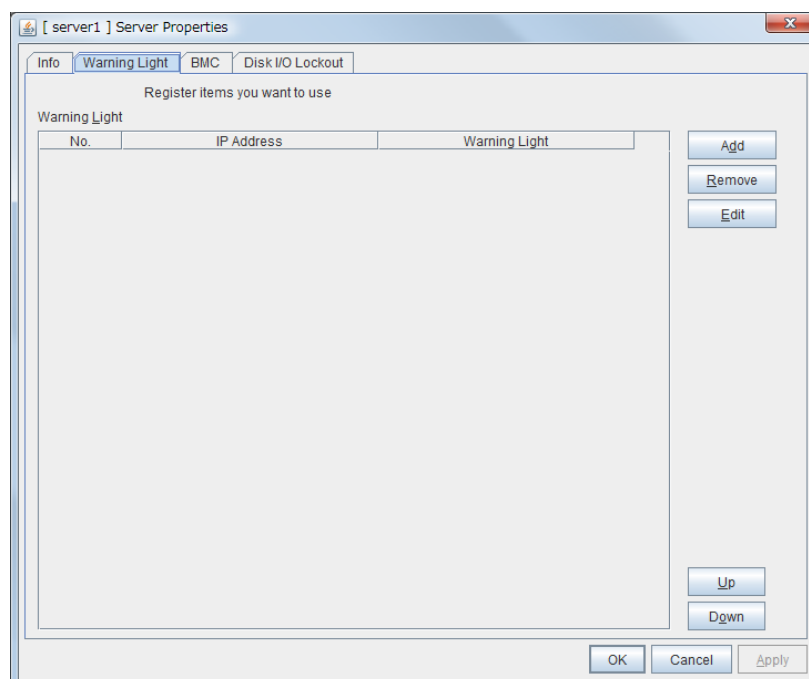
The selected server name is displayed. You cannot change the name here.

Comment (up to 127 bytes)

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

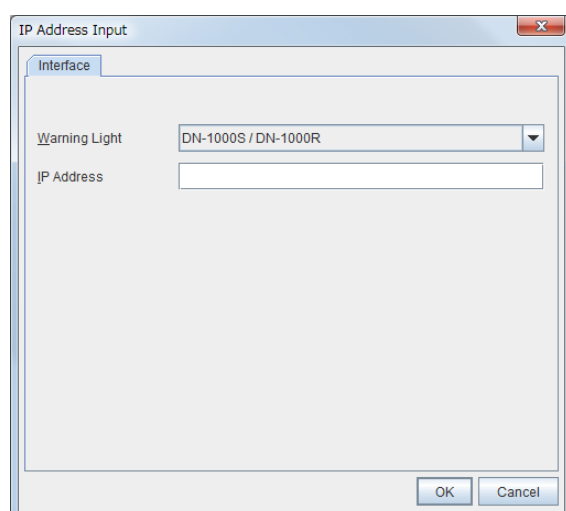
Warning Light tab

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 (up to 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.

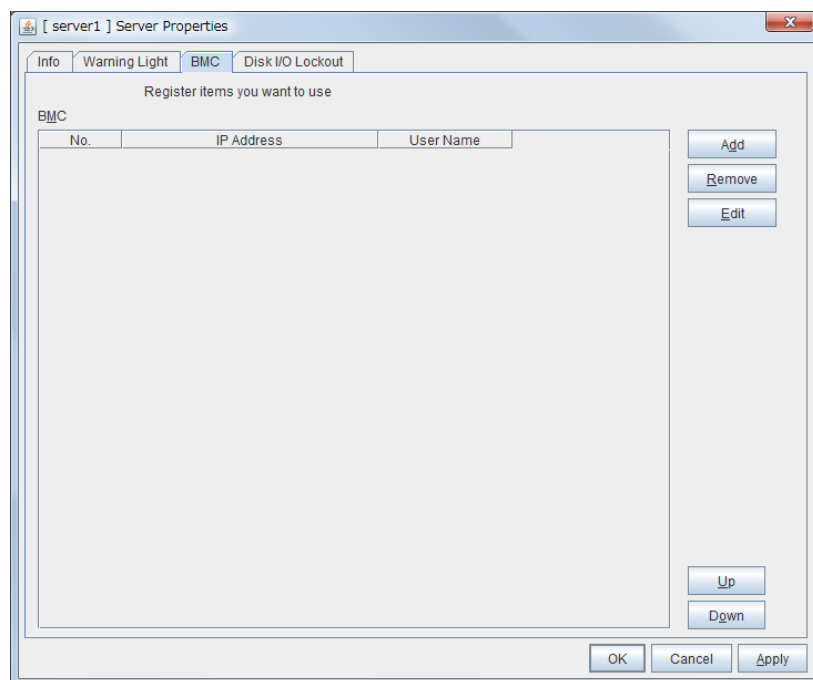
Edit

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

BMC tab

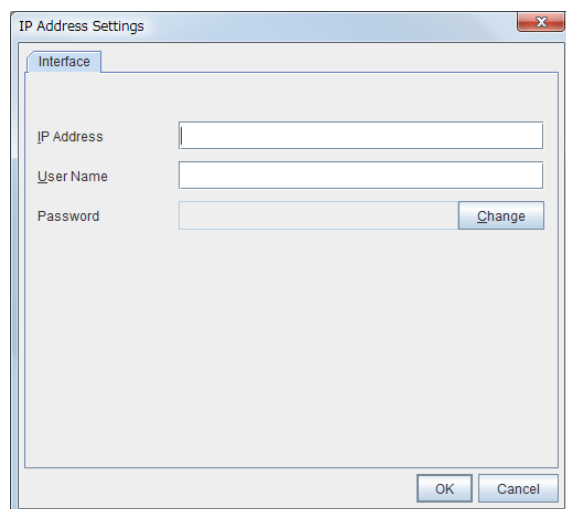
Configure a LAN port for managing BMC when using the forced stop and the chassis identify.

Configure one for each server.



Add

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



- ◆ IP Address (up to 80 bytes)

Enter the IP address set for the LAN port for managing BMC.

◆ User Name (up to 255 bytes)

Enter the user name with administrator privilege from the user names configured in BMC.

The valid length of user name varies depending on the ipmitool command and the specification of BMC of the server.

◆ Password (up to 255 bytes)

Enter the password of the user configured above.

The valid length of password varies depending on the ipmitool command and the BMC specifications 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

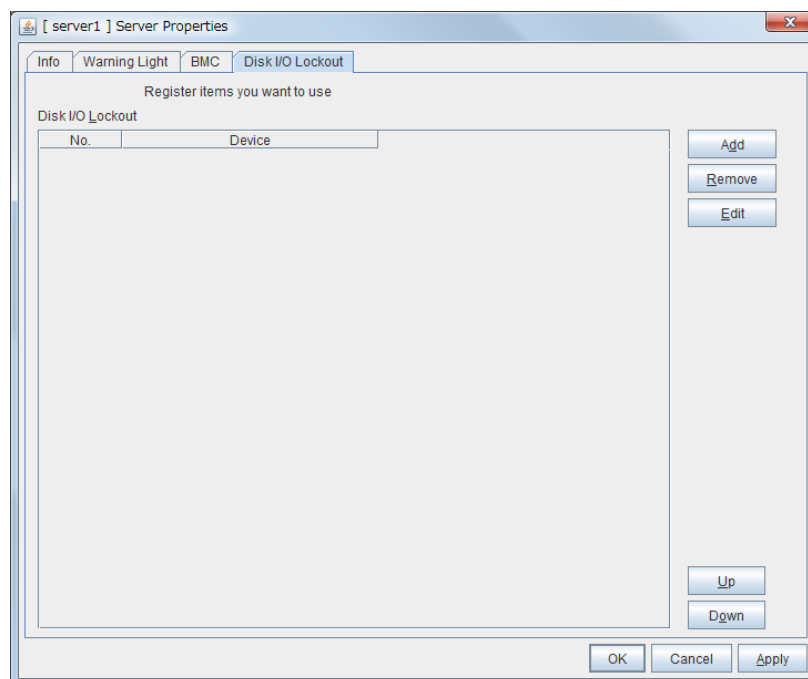
Use this button to modify the settings. Select the target setting, and then, click **Edit**. The **IP Address Settings** dialog box is displayed.

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.

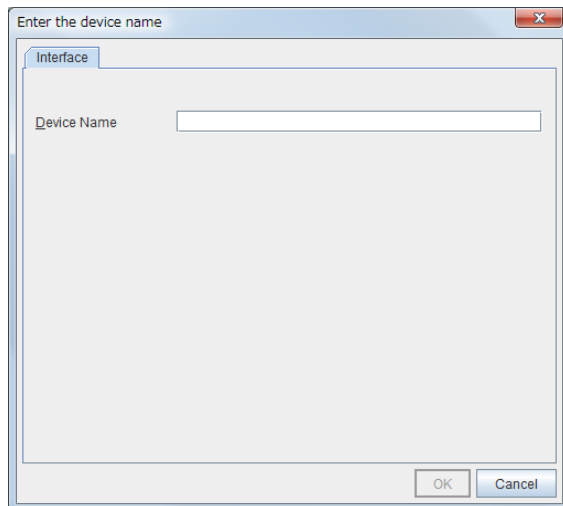
Disk I/O Lockout tab

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.

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 apply changes of parameters on servers.

Applicable method is marked with “O.”

Priority	How to apply	Refer to:
1	Uploading data and shutting down, restarting a cluster	Installation and Configuration Guide Chapter 7 “Modifying the cluster configuration data”
2	Stopping a cluster, and stopping a mirror agent, and then uploading data	
3	Uploading data after stopping a cluster	
4	Uploading data after stopping a group	
5	Uploading data after stopping a resource	
6	Uploading data after suspending a cluster	
7	Uploading data after suspending a monitor	
8	Uploading data and restarting the WebManager	
9	Uploading data only	

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

Cluster

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Cluster Properties										
Info Tab										
Cluster Name	-						O			
Comment	-									O
Language	English						O		O	
Interconnect Tab										
Communication Path (Add, Remove, Up, Down)	-		O							
Type							O		O	
Kernel mode, User mode, IP Address							O		O	
DISK Device							O		O	
COM Device							O		O	
Server Down Notification	On									O
Disk Heart Beat Properties										
Raw Device							O			
Network Partition Resolution Definition Tab										
Ping Target							O			
Server							O			
Ping NP Properties										
Interval	5 seconds						O			
Timeout	3 seconds						O			

Retry Count	3 times									O				
Network Partition Resolution Tuning Properties														
Action at NP Occurrence	Shutdown									O				
Timeout Tab														
Server Sync Wait Time	5 minutes													O
Heartbeat Interval	3 seconds									O				
Heartbeat Timeout	90 seconds									O				
Server Internal Timeout	180 seconds									O				
Port No. Tab														
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		
Port No. (Mirror) Tab⁴														
Mirror Agent Port Number	29004		O											
Port No. (Log) Tab														
Communication Method for Internal Logs	Unix Domain	O												
Port Number	-	O												
Monitor Tab														
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
Recovery Tab														
Max Reboot Count	zero									O				
Max Reboot Count Reset Time	0 minute									O				
Use Forced Stop	Off													O
Forced Stop Action	BMC reset													O
Forced Stop Timeout	3 seconds													O
Action for Cluster Service Process Error	OS shutdown													O
Alert Service Tab														
Enable Alert Setting	Off									O				
E-mail Address	Blank (Function disabled)													O
Subject	EXPRESSCLUS TER													O
Mail Method	MAIL													O
Use Alert Extension	Off	O												
Output the log level to syslog	On									O				
Use Chassis Identify	Off													O
User Network Warning Light	Off									O				
Alert Destination Tab														
Messages (Add, Remove, Edit)	-													O
Message Tab														
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

⁴ It does not apply to IA64 and PPC64.

Servers

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Server Common Properties										
Master Server Tab										
Order(Up, Down)	-						0		0	
Server Group Definition										
Server Group Definitions										
Add	The order you added to "Servers that can run the Group."		0							
Remove	-		0							
Rename	-		0							
Server Group Properties										
Info										
Comment										0
Server Group										
Add	-		0							
Remove	-		0							
Order(Up, Down)	The order you added to "Servers that can run the Group."		0							

Server

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Add Server ⁵	-									
Remove Server ⁵	-									
Server Properties										
Info Tab										
Name ⁶	-									
Comment	-									
Warning Light Tab										
I/F No. (Add, Remove)	The order you added I/Fs									
IP Address (Edit, Up, Down)	-									
Warning Light Type	-									
BMC Tab										
No (Add, Remove)	The order you added									
IP Address (Edit)	-									
User Name	-									
Password	-									
Disk I/O Lockout Tab										
I/F No. (Add, Remove)	The order you added I/Fs									
Device (Edit, Up, Down)	-									

⁵ For details on how to add or remove a server, see Section III on this guide.

⁶ 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.

Group

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Add Group	-						0			
Remove Group	-						0			
Group Properties										
Info Tab										
Use Server Group Settings(Changes to On)	Off		0							
Use Server Group Settings(Changes to Off)	Off		0							
Name	failover				0		0			
Comment	-									0
Startup Server Tab(Server)										
Failover is possible at all servers (Changes to On)	On						0			
Failover is possible at all servers (Changes to Off)	On						0			
Order (Up, Down)	The order you added to "Servers that can run the Group."						0			
Name (Add)	-						0			
Name(Delete)	-		0							
Startup Server Tab (Server Group)										
Order (Up, Down)	The order you added to "Servers that can run the Group."		0							
Name (Add)	-		0							
Name(Delete)	-		0							
Attributes Tab										
Startup Attribute	Auto Startup						0			
Failover Attribute	Auto Failover - Use the startup server settings						0			
Failback Attribute	Manual Failback						0			
Failover Exclusive Attribute	Off						0			

Group Resource (Common)

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Add Group Resource	-						0			
Remove Group Resource	-				0		0			
Add Group Resource (Mirror Disk Resource, Hybrid Disk Resource)			0							
Remove Group Resource (Mirror Disk Resource, Hybrid Disk Resource)			0							
Group Resource Common Properties										
Info Tab										
Name	Each resource default value				0		0			
Comment	-									0
Recovery Operation										
Edit Script										
Select User Application Enter application path (Edit)	-									0
Select Script created with this product Script content (Edit)	-									0
Timeout	5(serc)									0

Exec resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Exec Resource Properties										
Dependence Tab										
Follow the default dependence	On - floating IP resources - virtual IP resources - disk resources - NAS resources - Dynamic DNS resource - Volume manager resource						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Retry Count at Activation Failure	zero						0			
Maximum Failover Count	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
Details Tab										
Type (User Application, Script Created with this product)	Script Created with this product									0
User Application Enter the application path (Edit)	-									0
Script Created with this product Script codes (Edit)	-									0
Exec Resource Tuning Properties										
Parameter Tab										
Start Script Synchronous, Asynchronous	Synchronous									0
Start Script Timeout	1800 seconds						0			
Stop Script Synchronous, Asynchronous	Synchronous									0

Parameters	Default	How to change									
		1	2	3	4	5	6	7	8	9	
Disk Resource Properties											
Dependence Tab											
Follow the default dependence	On • floating IP resources • virtual IP resources • Dynamic DNS resource • Volume manager resource						0				
Dependent Resources (Add, Remove)	-						0				
Recovery Operation Tab											
Retry Count at Activation Failure	zero						0				
Maximum Failover Count	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 service and shut down OS.						0				
Execute Script before Final Action	Off									0	
Details Tab											
Device Name	-					0					
Raw Device Name	-					0					
Mount Point	-					0					
File System	-									0	
Disk Type	disk					0					
Disk Resource Tuning Properties											
Mount Tab											
Mount Option	rw									0	
Timeout	60 seconds						0				
Retry Count	3 times						0				
Unmount Tab											
Timeout	60 seconds						0				
Retry Count	3 times						0				
Forced operation when error is detected	kill										
Fsck Tab											
fsck Option	-y										
fsck Timeout	1800 seconds						0				
fsck action before mount	Execute at Specified Count										
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	7	8	9
FIP Resource Tuning Properties										
Dependence Tab										
Follow the default dependence	On (No default is set)						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Retry Count at Activation Failure	5 times						0			
Maximum Failover Count	1 time						0			
Final Action at Activation Failure	No Operation (Next resources are not activated).						0			
Execute Script before Final Action	Off									0
Retry Count at Deactivation Failure	zero						0			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.						0			
Execute Script before Final Action	Off									0
Details Tab										
IP Address	-					0				
FIP Resource Tuning Properties										
Parameter Tab										
Ifconfig Timeout	60 seconds						0			
ping Interval	1 second						0			
ping Timeout	1 second						0			
ping Retry Count	zero						0			
ping Forced FIP Activation	Off									0
ARP Send Count	1 time						0			
Deactivity Check Tab										
Ipconfig Status at Failure	Not Failure									0
Ping Status at Failure	Not Failure									0

Virtual IP resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Virtual IP Resource Properties										
Dependence Tab										
Follow the default dependence	On (No default dependence)						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Retry Count at Activation Failure	1 time						0			
Maximum Failover Count	1 time						0			
Final Action at Activation Failure	No Operation (Next resources are not activated).						0			
Execute Script before Final Action	Off									0
Retry Count at Deactivation Failure	1 time						0			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.						0			
Execute Script before Final Action	Off									0
Details Tab										
IP Address	-					0				
NIC Alias Name	-					0				
Destination IP Address	-					0				
Source IP Address	-					0				
Send Interval	10 seconds					0				

User Routing Protocol	-					0				
Virtual IP Resource Tuning Properties										
Parameter Tab										
ifconfig Timeout	60 seconds					0				
Ping Interval	1 second					0				
Ping Timeout	1 second					0				
Ping Retry Count	Zero					0				
Ping Forced VIP Activation	Off									0
ARP Send Count	1 time					0				
Deactivity Check Tab										
ifconfig Status at Failure	Not Failure									0
ping Status at Failure	Not Failure									0
RIP Tab										
Next Hop IP Address	-					0				
Metric	1					0				
Port Number	520					0				
RIPng Tab										
Metric	1					0				
Port Number	521					0				

NAS resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
NAS Resource Properties										
Dependence Tab										
Follow the default dependence	On • floating IP resources • virtual IP resources • Dynamic DNS resources						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Retry Count at Activation Failure	zero						0			
Maximum Failover Count	1 time						0			
Final Action at Activation Failure	No Operation (Next resources are not activated).						0			
Execute Script before Final Action	Off									0
Retry Count at Deactivation Failure	zero						0			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.						0			
Execute Script before Final Action	Off									0
Details Tab										
Server Name	-					0				
Shared Name	-					0				
Mount Point	-					0				
File System	nfs									0
NAS Resource Tuning Properties										
Mount Tab										
Mount Option	rw									0
Timeout	60 seconds						0			
Retry Count	3 times						0			
Unmount Tab										
Timeout	60 seconds						0			
Retry Count	3 times						0			
Forced operation when error is detected	kill									0
NAS Tab										
ping Timeout	10 seconds						0			

Volume manager resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Volume Manager Resource Properties										
Dependency Tab										
Follow the default dependence	On • Floating IP resources • Virtual IP resources • Dynamic DNS resources						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Activation Retry Threshold	0 times						0			
Maximum Failover Count	One time						0			
Final Action at Activation Failure	No operation (Do not activate the next resource.)						0			
Execute Script before Final Action	Off									0
Retry Count at Deactivation Failure	0 times						0			
Final Action at Deactivation Failure	Stop the cluster service and shut down the OS.						0			
Execute Script before Final Action	Off									0
Details Tab										
Volume Manager	LVM					0				
Target Name	-					0				
Volume Manager Resource Tuning Properties										
Import Tab										
Import Timeout	60						0			
Start Volume Timeout	60						0			
Clear Host ID	On						0			
Force Option at Import	Off						0			
Export Tab										
Stop Volume Timeout	60						0			
Flush Timeout	60						0			
Export Timeout	60						0			

VM resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
VM Resource Properties										
Dependency Tab										
Follow the default dependence	On • disk resource • mirror disk resource • hybrid disk resource • NAS resource • Volume manager resource						0			
Dependent Resources (Add, Remove)	-						0			
Recovery Operation Tab										
Activation Retry Threshold	0 times						0			
Maximum Failover Count	One time						0			
Final Action at Activation Failure	No operation (Do not activate the next resource.)						0			
Execute Script before Final Action	Off									0
Deactivation Retry Threshold	0 times						0			
Final Action at Deactivation Failure	Stop the cluster service and shut down the OS.						0			
Execute Script before Final Action	Off									0

Parameters	Default	How to change									
		1	2	3	4	5	6	7	8	9	
Dynamic DNS Resource Properties											
Dependency Tab											
Follow the default dependence	On - Floating IP resources - Virtual IP resources						0				
Dependent Resources (Add, Remove)	-						0				
Recovery Operation Tab											
Activation Retry Threshold	One time						0				
Maximum Failover Count	One time						0				
Final Action at Activation Failure	No operation (Do not activate the next resource.)						0				
Execute Script before Final Action	Off									0	
Retry Count at Deactivation Failure	One time						0				
Final Action at Deactivation Failure	Stop the cluster service and shut down the OS						0				
Execute Script before Final Action	Off									0	
Details Tab											
Virtual Host Name	-					0					
IP Address	-					0					
DDNS Server	-					0					
Port Number	53					0					
Authentication Key Name	-					0					
Authentication Key Value	-					0					

Monitor resource (common)

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Add monitor resource	-						0			
Remove Monitor Resource	-						0			
Monitor Resources Common Properties										
Info Tab										
Name	-						0			
Comment	-									0
Recovery Action Tab										
Edit Script										
Select User Application Enter application path (Edit)	-									0
Select Script created with this product Script content (Edit)	-									0
Timeout	5(sec)									0

Disk monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Disk Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Always						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			
Monitor(special) Tab										
Method	READ									0
Monitor Target	-									0
Monitor Target Raw Device Name	-									0
I/O size	2000000 bytes									0

IP monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
IP Monitor Resource Properties										
Monitor(common)Tab										
Interval	30 seconds						0			
Timeout	30 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Always						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
IPAddress(Add, Remove, Edit)	-									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			

Virtual IP monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Virtual IP Monitor Resource Properties⁷										
Monitor(common)										
Interval	3 seconds						0			
Timeout	30 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active (fixed)						0			
Target Resource	Virtual IP resource name						0			
Nice Value	0						0			
Recovery Action Tab										
Recovery Target	Virtual IP resource name						0			
Maximum Reactivation Count	3 times						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			

⁷ You can upload the data if a cluster is suspended. However, you should stop and resume a cluster to reflect the data.

PID monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Pid Monitor Resource Properties										
Monitor(common)Tab										
Interval	5 seconds						0			
Timeout	60 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			

User space monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
User Space Monitor Resource Properties										
Monitor(common) Tab										
Interval	3 seconds						0			
Timeout	90 seconds						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Use heartbeat interval and timeout	On							0		
Method	softdog							0		
Operation at Timeout Detection	RESET							0		
Open/Close Temporary File	Off							0		
Write	Off							0		
Size	10000 bytes							0		
Create Temporary Thread	Off							0		

NIC Link Up/Down monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
NIC Link Up/Down Monitor Resource Properties										
Monitor(common) Tab										
Interval	10 seconds						0			
Timeout	60 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	3 times						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Always						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Recovery Target	-									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	zero						0			
Execute migration before failing over	off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			

Multi target monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Multi Target Monitor Resource Properties										
Monitor(common) Tab										
Interval	30 seconds						0			
Timeout	30 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Always						0			
Target Resource	-						0			
Nice Value	0						0			
Monitor(special) Tab										
Recovery Target	-									0
Multi Target Monitor Resource Tuning Properties										
Parameter Tab										
Error Threshold	Same as Number of Members									0
Specify Number	64									0
Warning Threshold	Off									0
Specify Number	-									0
Recovery Action Tab										

Recovery Target	-						0			
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	No Operation						0			

Custom monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Custom Monitor Resource Properties ⁸										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	zero						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Always (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All Servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Monitor Script Path Type	Script created with this product							0		
Monitor Script Type	Synchronous							0		
Log Output Path	-							0		
Normal Return Value of Monitor Script	0							0		
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	3 (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	Stop group						0			

⁸ It does not apply to IA64 and PPC64.

Volume manager monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Volume Manager Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	off						0			
Retry Count	One time						0			
Wait Time to Start Monitoring	0 seconds						0			
Monitor Timing	Always (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Volume Manager	LVM							0		
Target Name	-									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	0 times (if the recovery target is not a cluster)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	0 times (if the recovery target is not a cluster)						0			
Execute Script before Final Action	On									0
Final Action	No action is taken.						0			

VM monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
VM Monitor Resource Properties										
Monitor(common) Tab										
Interval	10 seconds						0			
Timeout	30 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	0 times						0			
Wait Time to Start Monitoring	0 seconds						0			
Monitor Timing	Always (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Wait Time for External Migration	15 seconds						#	0		
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	Three times						0			

Execute migration before failing over	Off						0			
Maximum Failover Count	One time						0			
Execute Script before Final Action	On									0
Final Action	No action is taken.						0			

Message receive monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Message Receive Monitor Resource Properties										
Monitor(common) Tab										
Interval	10 seconds						0			
Timeout	30 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	0 times						0			
Wait Time to Start Monitoring	0 seconds						0			
Monitor Timing	Always (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Category	NIC						0			
Keyword	-						0			
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	0 times						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	0 times						0			
Execute Script before Final Action	Off									C
Final Action	No action is taken.						0			

Dynamic DNS monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Dynamic DNS Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	100 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	0 times						0			
Wait Time to Start Monitoring	0 seconds						0			
Monitor Timing	Always (fixed)						0			
Target Resource	Dynamic DNS resource name						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Recovery Action Tab										

Recovery Target	Dynamic DNS resource name						0			
Maximum Reactivation Count	Three times						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	One time (if the recovery target is not a cluster)						0			
Execute Script before Final Action	Off									0
Final Action	No action is taken.						0			

MySQL monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
MySQL Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	2 times						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Database Name	-									0
IP Address	127.0.0.1									0
Port	3306									0
User Name	-									0
Password	-									0
Table	mysqlwatch									0
Storage Engine	MyISAM									0
Library Path	/usr/lib/mysql/libmysqlclient.so.15									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	Stop cluster service and shutdown OS						0			

NFS monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Nfs Monitor Resource Properties										
Monitor(common) Tab										
Interval	30 seconds						0			
Timeout	60 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	5 times						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)							0			
Monitor(special) Tab										
Share Directory	-									0
IP Address	127.0.0.1									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	Stop cluster service and shutdown OS						0			

Oracle monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Oracle Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	2 times						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)							0			
Monitor(special) Tab										
Monitor Method	monitor listener and instance						0			
Connect Command	-									0
User Name	sys									0
Password	change_on_install									0

Authority	SYSDBA									0
Create and Drop Table in Monitoring	On						0			
Table	orawatch									0
Character Set	JAPANESE_JAPAN.JA16EUC									0
Library Path	/opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1									0
Collect Details at the Time of Error	disabled						0			
Collection Timeout	12 seconds						0			
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	Stop cluster service and shutdown OS						0			

PostgreSQL monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
PostgreSQL Monitor Resource Properties										
Monitor(common) Tab										
Interval	60 seconds						0			
Timeout	120 seconds						0			
Collect the dump file of the monitor process at timeout occurrence	Off						0			
Retry Count	2 times						0			
Wait Time to Start Monitoring	0 second						0			
Monitor Timing	Active (fixed)						0			
Target Resource	-						0			
Nice Value	0						0			
Error Detection Server										
Error Detection Server	All servers						0			
Servers that can run the Group (Add, Remove)	-						0			
Monitor(special) Tab										
Database Name	-									0
IP Address	127.0.0.1									0
Port	5432									0
User Name	postgres									0
Password	-									0
Table	psqlwatch									0
Library Path	/usr/lib/libpq.so.3.0									0
Recovery Action Tab										
Recovery Target	-						0			
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0			
Execute Script before Final Action	Off									0
Final Action	Stop cluster service and shutdown OS						0			

Samba monitor resource

Parameters	Default	How to change									
		1	2	3	4	5	6	7	8	9	
Samba Monitor Resource Properties											
Monitor(common) Tab											
Interval	30 seconds						0				
Timeout	60 seconds						0				
Collect the dump file of the monitor process at timeout occurrence	Off						0				
Retry Count	5 times						0				
Wait Time to Start Monitoring	0 second						0				
Monitor Timing	Active						0				
Target Resource	-						0				
Nice Value	0						0				
Error Detection Server											
Error Detection Server	All servers						0				
Servers that can run the Group (Add, Remove)	-						0				
Monitor(special) Tab											
Share Name	-									C	
IP Address	127.0.0.1									C	
Port	139									C	
User Name	-									C	
Password	-									C	
Recovery Action Tab											
Recovery Target	-						0				
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0				
Execute migration before failing over	Off						0				
Maximum Failover Count	1 time (if the recovery target is other than clusters)						0				
Execute Script before Final Action	Off									C	
Final Action	Stop cluster service and shutdown OS						0				

Upper limits of registration

	Builder version	You can register up to
Cluster	3.0.0-1 or later	1
Server	3.0.0-1 or later	32
Group	3.0.0-1 or later	64
Group resource (Per group)	3.0.0-1 or later	128
Monitor resource	3.0.0-1 or later	512
Heartbeat resource	3.0.0-1 or later	128
Network partition resolution resource	3.0.0-1 or later	64

Chapter 3 ExpressCluster command reference

This chapter describes commands that are used on ExpressCluster.

This chapter covers:

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• Collecting logs (clplogcc command)	228
• Creating a cluster and backing up configuration data (clpcfctrl command)	235
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• Controlling chassis identify lamp (clpledctrl command).....	274
• Processing inter-cluster linkage (clptrnreq command)	276
• Requesting processing to cluster servers (clprexec command).....	278
• Controlling cluster activation synchronization wait processing (clpbwctrl command).....	282

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.	235
clplcncs	Registers and refers to the product or test version license of this product.	252
Commands for displaying status		
Command	Description	Page
clpstat	Displays the cluster status and configuration information.	165
Commands for cluster operation		
Command	Description	Page
clpcl	Starts, stops, suspends, or resumes the ExpressCluster daemon.	216
clpdown	Stops the ExpressCluster daemon and shuts down the server.	221
clpstdn	Stops the ExpressCluster daemon across the whole cluster and shuts down all servers.	222
clpgrp	Starts, stops, or moves groups. This command also migrates groups.	223
clptoratio	Extends or displays the various timeout values of all servers in the cluster.	243
clpmonctrl	Suspends or resumes monitor resources on a single server.	258
clpregctrl	Displays or initializes the reboot count on a single server.	270
clprsc	Stops or resumes group resources	266
clpledctrl	The clpledctrl command controls the chassis identify function.	274
clptrnreq	The clptrnreq command requests a server to execute a process.	276
clprexec	The clprexec command requests that an ExpressCluster server execute a process from external monitoring.	276
clpbwctrl	The clpbwctrl command controls the cluster activation synchronization wait processing.	282
Log-related commands		
Command	Description	Page
clplogcc	Collects logs and OS information.	228
clplogcf	Modifies and displays a configuration of log level and the file size of log output.	246
Script-related commands		
Command	Description	Page
clplogcmd	Writes texts in the exec resource script to create a desired message to the output destination	256

Other commands		
Command	Description	Page
clplamp	Lights off the warning light of the specified server.	273

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 --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 or 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.
--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.
--grp [<i>group_name</i>]		Displays group configuration information. By specifying the name of a group, you can display only the information on the specified group resource.

	--rsc [<i>resource_name</i>]	Displays group resource configuration information. By specifying the name of a group resource, you can display only the information on the specified group resource.
	--mon [<i>monitor_name</i>]	Displays monitor resource configuration information. By specifying the name of a monitor resource, you can display only the information on the specified resource.
	--detail	Displays more detailed information on the setting.
	-h <i>hostname</i>	Acquires information from the server specified with <i>hostname</i> . Acquires information from the command running server (local server) when the -h option is omitted.
Return Value	0	Success
	Other than 0	Failure
Remarks	According to the combination of options, configuration information shows information in various forms.	
Notes	This command must be executed by a user with the root privilege. 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 a 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 timeout occurred in the ExpressCluster internal communication. If timeout keeps occurring, set the internal communication timeout longer.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

Common entry examples

Displaying the status of the cluster (-s option)

The following is an example of display when you run the clpstat command with the -s option or without any option:

Example of a command entry

```
# clpstat -s
```

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/dsk/c3t0d0s5->See (6)
    exec1        : Online          exec resource1
    fip1         : Online          10.0.0.11
  failover2.....: Online          failover group2
    current      : server2
    disk2        : Online          /dev/dsk/c3t0d0s6
    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
=====
```

Explanation of each item

- (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 214.

Displaying a group map (-g option)

To display a group map, run the `clpstat` command with the `-g` option.

Example of a command entry

```
# clpstat -g
```

Example of the display after running the command:

```
===== GROUPMAP INFORMATION =====
Cluster : cluster                      -> See (1)
*server0 : server1                     -> See (2)
server1  : server2                     -> See (2)

-----
server0 [o] : failover1[o] failover2[o] -> See (3)
server1 [o] : failover3[o]              -> See (3)
=====
```

Explanation of each item

- (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 214.

Displaying the status of monitor resources (-m option)

To display the status of monitor resources, run the `clpstat` command with the `-m` option.

Example of a command entry

```
# clpstat -m
```

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
=====
```

Explanation of each item

- (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 214.

Displaying the status of heartbeat resources (-n option)

To display the status of heartbeat resources, run `clpstat` command with the `-n` option.

Example of a command entry

```
# clpstat -n
```

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
=====
```

Explanation of each item

- (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 214.

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 (-p option)

To display the status of network partition resolution resources, run `clpstat` command with the `-p` option.

Example of a command entry

```
# clpstat -p
```

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
=====
```

Explanation of each item

- (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 214.

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 (--cl option)

To display the configuration data of a cluster, run the clpstat command with the -i, --cl, --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 a command entry

```
# clpstat --cl --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Cluster : cluster]                                -> see (1)
Comment: failover cluster                          -> see (2)
<Timeout>
Server Sync Wait Time (sec)      : 300             -> see (3)
Heartbeat Timeoutv (msec)       : 90000            -> see (4)
Heartbeat Interval (msec)       : 3000             -> see (5)
Server Internal Timeout (sec)    : 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
                                : UNIX Domain      -> see (14)
Port Number                     : 0                 -> see (15)
<Monitor>
Shutdown Monitor                : On              -> see (16)
Shutdown Monitoring Method      : keepalive     -> see (17)
Enable SIGTERM Handler         : On            -> see (18)
Use HB Timeout                  : On            -> see (19)
Timeout (sec)                   : 90            -> see (20)
<Delay Warning>
Heartbeat Delay Warning         : 80            -> see (21)
Monitor Delay Warning           : 80            -> see (22)
<Alert Service>
E-mail Address                  :               -> see (23)
Use Network Warning Light      : Off           -> see (24)
Use Alert Extension             : Off           -> see (25)
Use Chassis Identify           : Off           -> see (26)
Enable Alert Setting            : Off           -> see (27)
<Exclusion>
Mount,Umount Exclusion          : On            -> see (28)
<Heartbeat I/F>
Server Down Notification        : On            -> see (29)
<Recovery>
Max Reboot Count                : 1             -> see (30)
Max Reboot Count Reset Time (min) : 0             -> see (31)
Use Forced Stop                 : On            -> see (32)
Forced Stop Action               : BMC Power Off -> see (33)
Forced Stop Timeout (sec)       : 30            -> see (34)
=====
```

- ◆ 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 timeout (in milliseconds)
(5) Heartbeat Interval	: Heartbeat send interval (in milliseconds)
(6) Server Internal Timeout	: Internal communication timeout (in seconds)
(7) Timeout Ratio	: Current timeout 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
<Monitoring>	
(16) Shutdown Monitor	: Shutdown monitor
(17) Shutdown Monitoring Method	: Shutdown monitor method
(18) Enable SIGTERM Handler	: Enable SIGTERM
(19) Use HB Timeout	: Use HB timeout
(20) Timeout (sec)	: Timeout (in seconds)
<Delay Warning>	
(21) Heartbeat Delay Warning	: Delay warning of heartbeat resource (%)
(22) Monitor Delay Warning	: Delay warning of monitor resource (%)
<Alert Service>	
(23) E-mail Address	: Address to which notice mails are sent
(24) Use Network Warning Light	: Network warning light
(25) Use Alert Extension	: Alert extension function
(26) Use Chassies Identify	: Chassies Identify
(27) Enable Alert Setting	: Alert report configuration
<Exclusion>	
(28) Mount, Umount Exclusion	: Mount, unmount command exclusion

<Heartbeat I/F>

(29) Server Down Notification : Server down notification

<Recovery>

(30) Max Reboot Count : Maximum reboot count

(31) Max Reboot Count Reset Time (min) : Time (in minutes) to reset the maximum reboot count

(32) Use Forced Stop : Forced stop

(33) Forced Stop Action : Forced stop action

(34) Forced Stop Timeout (sec) : Forced stop timeout (in seconds)

Displaying only the configuration data of certain servers (--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 3.0 for Solaris
                                                    -> see (3)
  Internal Version                                : 3.0.0-1           -> see (4)
  Edition                                           : X                 -> see (5)
  Platform                                          : SunOS             -> see (6)
  IP Address                                       : 10.0.0.1          -> see (7)
  Network Warning Light IP Address
                                                    : 10.0.0.10         -> see (8)
  BMC IP Address                                  : 10.0.0.11         -> see (9)
=====
```

◆ 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 OS
- (7) IP Address : Public LAN address
- (8) Network Warning Light IP Address : Network warning light IP address
- (9) BMC IP Address : BMC IP address

Displaying only the resource information of certain heartbeats (--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 1st line to the 3rd 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/rdisk/c3t0d0s0 -> see (1)
<server2>
Device Name                                   : /dev/rdisk/c3t0d0s0
=====
```

Explanation of each item

- (1) Device Name : Disk heartbeat device

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/ttya          -> see (1)
<server2>
Device Name          : /dev/ttya
=====

```

Explanation of each item

(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
=====

```

Explanation of each item

(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 3.0 for Solaris
Internal Version : 3.0.0-1
Edition         : X
Platform        : SunOS
IP Address       : 10.0.0.1
Network Warning Light IP Address
                  : 10.0.0.10
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/rdisk/c3t0d0s0
[HB3 : comhb1]
Type            : comhb
Comment         : COM Heartbeat
Device Name     : /dev/ttya
[Server1 : server2]
Comment          : server2
Product          : ExpressCluster X 3.0 for Solaris
Internal Version : 3.0.0-1
Edition         : X

```

```
Platform           : SunOS
IP Address         : 10.0.0.2
Network Warning Light IP Address
                   : 10.0.0.10
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/rdisk/c3t0d0s0
[HB3 : comhb1]
  Type             : comhb
  Comment          : COM Heartbeat
  Device Name      : /dev/ttya
=====
```

Displaying only the configuration data of certain groups (--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.

Explanation of each item

- (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
No Exclusion : 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 (--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] (1)
Type : disk (2)
Comment : /dev/sdb5 (3)
Failover Threshold : 1 (4)
Retry Count at Activation Failure : 0 (5)
Final Action at Activation Failure : No Operation (6)
      (Next Resources Are Not Activated)
Execute Script before Final Action : Off (7)
Retry Count at Deactivation Failure : 0 (8)
Final Action at Deactivation Failure: No Operation (9)
      (Next Resources Are Not Activated)
Execute Script before Final Action : Off (10)
Depended Resources : fip1 (11)
Disk Type : disk (12)
File System : ext3 (13)
Device Name : /dev/sdb5 (14)
Raw Device Name : (15)
Mount Point : /mnt/sdb5 (16)
Mount Option : rw (17)
Mount Timeout (sec) : 60 (18)
Mount Retry Count : 3 (19)
Fsck Action When Mount Failed : Execute (20)
Unmount Timeout (sec) : 60 (21)
Unmount Retry Count : 3 (22)
Action at Unmount Failure : kill (23)
Fsck Option : -y (24)
Fsck Timeout (sec) : 1800 (25)
Fsck Action Before Mount : Execute at Specified Count (26)
Fsck Interval : 3 (27)
Re-restoration of Reiserfs : None (28)
=====
```

- ◆ The items written in the 1st to 9th line are common to all group resources.
- ◆ The items described in the 4th to the 9th line, the 12th line and the 14th to the 24th 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.

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.

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) Disk Type : Disk type

(13) File System : File system

(14) Device Name : Device name

(15) Raw Device Name : RAW Device name

(16) Mount Point : Mount point

(17) Mount Option : Mount option

(18) Mount Timeout (sec) : Mount time-out (in seconds)

(19) Mount Retry Count : Mount retry count

(20) Fsk Action When Mount Failed : fsck at mount failure

(21) Unmount Timeout (sec) : Unmount time-out (in seconds)

(22) Unmount Retry Count : Unmount retry count

(23) Action at Unmount Failure : Action at unmount failure

kill : Forces termination of the process accessing the mount point

none: Takes no action

(24) Fsk Option : fsck option

(25) Fsk Timeout : fsck time-out (in seconds)

(26) Fsk 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

(27) Fsk Interval : fsck interval

(28) Re-restoration of Reiserfs : Re-install Reiserfs

Execute: Executes

None: Takes no action

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)
=====
```

Explanation of each item

(1) IP Address	: Floating IP address
(2) Ping Timeout (sec)	: Timeout 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	: Floating IP 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)
```

Explanation of each item

(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 timeout (in seconds)
(6) Stop Script Timeout (sec)	: Stop Script timeout (in seconds)
(7) Log Output Path	: Destination for message output when running the Script

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)
Ping Timeout (sec)                : 10             -> see (10)
=====
```

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 timeout (in seconds)
- (7) Mount Retry Count : Mount retry count
- (8) Unmount Timeout (sec) : Unmount timeout (in seconds)
- (9) Unmount Retry Count: Unmount retry count
- (10) Ping Timeout (sec) : ping timeout (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)
  RIP 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 : e1000g0 -> 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 : e1000g0 -> 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/dsk/c3t0d0s5
    Device Name                         : /dev/dsk/c3t0d0s5
    File System                         : zfs
    Mount Point                        : /mnt/disk1
  [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/dsk/c3t0d0s6
    Device Name                         : /dev/dsk/c3t0d0s6
    File System                         : zfs
    Mount Point                        : /mnt/disk2
  [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
=====

```

Example of a command entry (For volume manager resource)

```
# clpstat --rsc volmgr --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Resource2 : volmgr1]
  Type                               : volmgr
  Comment                             :
  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  : 1
  Final Action at Deactivation Failure  : Stop Cluster Service And
                                     OS Shutdown
  Execute Script before Final Action   : Off
  Depended Resources                   : ddns
  Volume Manager                       : LVM (1)
  Target                              : vol1 (2)
  Import Timeout (sec)                 : 300 (3)
  Start Volume Timeout (sec)           : 60 (4)
  Clear Host ID                       : On (5)
  Force Import                        : On (6)
  Export Timeout (sec)                 : 300 (7)
  Flush Timeout (sec)                  : 60 (8)
  Stop Volume Timeout (sec)            : 60 (9)
  Force Export                         : On (10)
=====
```

Explanation of each item

(1) Volume Manager	: Volume Manager
(2) Target	: Target name
(3) Import Timeout (sec)	: Import timeout
(4) Start Volume Timeout (sec)	: Start volume timeout
(5) Clear Host ID	: Clear host ID
(6) Force Import	: Force Import
(7) Export Timeout (sec)	: Export Timeout
(8) Flush Timeout (sec)	: Flush Timeout
(9) Stop Volume Timeout (sec)	: Stop volume timeout
(10) Force Export	: Force export

Example of a command entry (For VM resource)

```
# clpstat --rsc vm1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Resource0 : vm1]
  Type                : vm
  Comment              :
  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   :
  VM Type               : KVM (1)
  VM Name               : kvm-17net=qos1 (2)
  UUID                 : 6b3e3895-db9b-
                        6b82-ec94-2240c232e271
                        (3)
  VM path               : (4)
  Library Path          : /usr/lib64/
                        libvirt.so.0.6.3
                        (5)
  vCenter               : (6)
  Resource pool name    : (7)
  Timeout Of Request    : 30 (8)
  Timeout Of Start      : 0 (9)
  Timeout Of Stop       : 240 (10)
=====
```

Explanation of each item

(1) VM Type	: Type of virtual machine
(2) VM Name	: Name of virtual machin
(3) UUID	: UUID(Universally Unipue Identifier)
(4) VM path	: Virtual machine path
(5) Library Path	: Library path
(6) vCenter	: Host name of vCenter
(7) Resource pool name	: Resource pool name
(8) Timeout Of Request	: Request timeout
(9) Timeout Of Start	: Wait time to start virtual machine
(10) Timeout Of Stop	: Wait time to stop virtual machine

Example of a command entry (For Dynamic DNS resource)

```
# clpstat --rsc ddns1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Resource1 : ddns1]
Type                               : ddns
Comment                           :
Failover Threshold                 : 1
Retry Count at Activation Failure  : 1
Final Action at Activation Failure : No Operation
                                   (Next Resources Are Not Activated)
Execute Script before Final Action : Off
Retry Count at Deactivation Failure : 1
Final Action at Deactivation Failure : Stop Cluster Service And
                                   OS Shutdown
Execute Script before Final Action : Off
Depended Resources                 :
DNS Server                         : 10.0.0.10          (1)
Port Number                        : 53                (2)
Virtual Host Name                   : xxx.example.com   (3)
IP Address                         : 10.0.0.1           (4)
=====
```

Explanation of each item

(1) DNS Server	: IP address of DDNS Server
(2) Port Number	: Port number of the DDNS server
(3) Virtual Host Name	: Virtual host name
(4) IP Address	: IP address

Displaying only the configuration data of a certain monitor resource (--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] (1)
Type : diskw (2)
Comment : disk_monitor1 (3)
Monitor Timing : Always (4)
Target Resource : (5)
Interval(sec) : 60 (6)
Timeout(sec) : 120 (7)
Retry Count : 0 (8)
Final Action : No Operation (9)
Execute Script before Final Action: Off (10)
Recovery Target : disk1 (11)
Recovery Target Type : Resource (12)
Reactivation Threshold : 3 (13)
Failover Threshold : 1 (14)
Wait Time to Start Monitoring (sec): 0 (15)
Nice Value : 0 (16)
Monitor Suspend Possibility : Possible (17)
Gather Dump When Timeout : Off (18)
Execute Migration Before Failover: Off (19)
Method : READ (20)
Monitor Target : /dev/sdb5 (21)
Target RAW Device Name : (22)
I/O Size (byte) : 2000000 (23)
=====
```

- ◆ The items written in the 1st to the 15th line are common to all monitor resources.
- ◆ The items described in the 4th to the 15th 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 timeout (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
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
- (18) Gather Dump When Timeout : Gather dump when timeout occurs
On
Gather
Off
Do not gather
- (19) Execute Migration Before Failover : Execute migration before failover
On
Execute
Off
Do not execute

Explanation of each item

- (20) Method : Monitor method
TUR
For details, see “Understanding the disk monitor resources” in Chapter 5 “Monitor resource details.”

READ

For details, see “Understanding the disk monitor resources” in Chapter 5 “Monitor resource details.”

READ(raw)

For details, see “Understanding the disk monitor resources” in Chapter 5 “Monitor resource details.”

WRITE(FILE)

For details, see “Understanding the disk monitor resources” in Chapter 5 “Monitor resource details.”

- (21) Monitor Target : Monitor target
- (22) Target RAW Device Name : Name of monitor target RAW device
- (23) I/O size (byte) : Monitoring I/O size (in bytes)

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 Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  IP Addresses        : 192.168.15.254      (1)
=====
```

Explanation of each item

(1) IP Addresses : IP address of the monitor target

Example of a command entry (For PID monitor resource)

```
# clpstat --mon pidw1 --detail
```

```
===== 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 Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Target PID          : 1197 (1)
=====
```

Explanation of each item

(1) Target PID : Monitor target PID

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 Suspend Possibility : Possible
Gather Dump When Timeout : Off
Execute Migration Before Failover: Off
Method              : softdog (1)
Action              : RESET (2)
Use HB interval and timeout : On (3)
Open/Close Temporary File : On (4)
with Writing        : On (5)
Size (byte)         : 10000 (6)
Create Temporary Thread : On (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 (in bytes)
(7) Create Temporary Thread	: Create temporary thread

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 Suspend Possibility : Possible
Gather Dump When Timeout : Off
Execute Migration Before Failover: Off
Monitor Target      : eth0 (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 Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Monitor Resources   : diskw1
                     : ipw3
                     : raww1
(1)
```

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 : vipw1]
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 Suspend Possibility : Impossible
Gather Dump When Timeout : Off
Execute Migration Before Failover: Off
Monitor Target      : vip1 (1)
=====
```

Explanation of each item

(1) Monitor Target : Monitor target resource

Example of a command entry (For custom monitor resource)

```
# clpstat --mon genw --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor0 : genw]
Type                               : genw
Comment                            :
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                    : exec
Recovery Target Type               : Resource
Reactivation Threshold              : 3
Failover Threshold                 : 1
Wait Time to Start Monitoring (sec): 0
Nice Value                         : 0
Monitor Suspend Possibility        : Possible
Gather Dump When Timeout           : Off
Execute Migration Before Failover: Off
Monitor Path                       : genw.sh (1)
Monitor Type                       : Synchronous (2)
Log Output Path                    : /var/log/testlog (3)
=====
```

Explanation of each item

(1) Monitor Path	: Target monitor resource
(2) Monitor Type	: Monitor type
(3) Log Output Path	: Log output path

Example of a command entry (For volume manager monitor resource)

```
# clpstat --mon volmgrw --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor0 : volmgrw]
  Type                               : volmgrw
  Comment                             :
  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                    : exec
  Recovery Target Type                : Resource
  Reactivation Threshold              : 3
  Failover Threshold                  : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value                         : 0
  Monitor Suspend Possibility         : Possible
  Gather Dump When Timeout            : Off
  Execute Migration Before Failover: Off
  Volume Manager                     : lvm (1)
  Target                             : vol1 (2)
=====
```

Explanation of each item

- (1) Volume Manager : Volume manager
- (2) Target : Device name of the logical disk

Example of a command entry (For message receive monitor resource)

```
# clpstat --mon mrw --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor0 : mrw]
  Type                : mrw
  Comment              :
  Monitor Timing       : Always
  Target Resource      :
  Interval(sec)        : 10
  Timeout (sec)        : 30
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action : Off
  Recovery Target      : exec
  Recovery Target Type : Resource
  Reactivation Threshold : 3
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Category             : NIC (1)
  Keyword              : (2)
```

Explanation of each item

(1) Category	: Category
(2) Keyword	: Keyword

Example of a command entry (For VM monitor resource)

```
# clpstat --mon vmw1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor1 : vmw1]
  Type                : vmw
  Comment              :
  Monitor Timing       : Always
  Target Resource      :
  Interval (sec)       : 10
  Timeout (sec)        : 30
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action: Off
  Recovery Target      : vm1
  Recovery Target Type : Resource
  Reactivation Threshold : 0
  Failover Threshold   : 0
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  virtual machine resource name : vm1 (1)
=====
```

Explanation of each item

(1) Virtual machine resource name : Name of virtual machine resource

Example of a command entry (For Dynamic DNS monitor resource)

```
# clpstat --mon ddns1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor0 : ddns1]
  Type                : ddns1
  Comment              :
  Monitor Timing       : Always
  Target Resource      : ddns1
  Interval(sec)        : 60
  Timeout (sec)        : 76
  Retry Count          : 0
  Final Action         : No Operation
  Execute Script before Final Action : Off
  Recovery Target      : ddns1
  Recovery Target Type  : Resource
  Reactivation Threshold : 3
  Failover Threshold   : 1
  Wait Time to Start Monitoring (sec): 0
  Nice Value           : 0
  Monitor Suspend Possibility : Impossible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Monitor Target       : ddns1 (1)
=====
```

Explanation of each item

(1) Monitor Target : Monitor target

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 Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Database Name         : test (1)
  IP Address            : 127.0.0.1 (2)
  Port                 : 3306 (3)
  Table                : mysqlwatch (4)
  Storage Engine        : MyISAM (5)
  Library Path          : /usr/lib64/libmysqlclient.so.15 (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 Suspend Possibility        : Possible
Gather Dump When Timeout           : Off
Execute Migration Before Failover: Off
Shared Directory                   : /mnt/nfsmon           (1)
IP Address                         : 127.0.0.1              (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                   : 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
Gather Dump When Timeout        : Off
Execute Migration Before Failover: Off
Connect Command                  : orcl (1)
Authority                        : SYSDBA (2)
Table                           : orawatch (3)
Character Set                    : JAPANESE_JAPAN.JA16EUC (4)
Library Path                    :
                                /opt/oracle/product/1.0.0.1/lib/libclntsh.so.10.1 (5)
Monitor Method                   : listner and instance monitor (6)
Monitor Action                   : 1 (7)
=====
```

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
- (6) Monitor Method : Method for monitoring Oracle
- (7) Monitor Action : Execute or do not execute create/drop
- 0
Execute
- 1
Do not execute

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     : 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
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Database Name       : test (1)
  IP Address          : 127.0.0.1 (2)
  Port                : 5432 (3)
  Table               : psqlwatch (4)
  Library Path        : /usr/lib/libpq.so.3.0 (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 Suspend Possibility : Possible
  Gather Dump When Timeout : Off
  Execute Migration Before Failover: Off
  Share Name          : samba (1)
  IP Address           : 127.0.0.1 (2)
  Port                : 139 (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

Displaying the configuration data of a resource specified for an individual server (`-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 (-i option)

By specifying the -i option, you can display the configuration information that is shown when --cl, --sv, --hb, --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, --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 Heartbeat resource status display	Online	Starting
	Offline	Offline Pending
	Warning	Heartbeat resource failure
	Unknown	Status unknown
Group map display Monitor resource status display	o	Starting
	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

Group		
Function	Status	Description
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

Group Resource		
Function	Status	Description
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

Monitor Resource		
Function	Status	Description
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 *timeout*]

clpcl -r [-a] [-h *hostname*]

clpcl --suspend [--force] [-w *timeout*]

clpcl --resume

Description	This command starts, stops, suspends, or resumes the cluster daemon.	
Option	-s	Starts the cluster daemon.
	-t	Stops the cluster daemon.
	-r	Restarts the cluster daemon.
	--suspend	Suspends the entire cluster.
	-w <i>timeout</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 timeout 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 timeout x 2) seconds.
	--resume	Resumes the entire cluster. The status of group resource of the cluster when suspended is kept.
	-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.
Return Value	0	Success
	Other than 0	Failure

Notes	This command must be executed by a user with the root privilege. 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 <pre># clpcl -s</pre> Example 2: Activating the cluster daemon in server1 from server0 <pre># clpcl -s -h server1</pre> Start server1 : Command succeeded. If a server name is specified, the display after running the command should look similar to above. Start <i>hostname</i> : Execution result (If the activation fails, cause of the failure is displayed) Example 3: Activating the cluster daemon in all servers <pre># clpcl -s -a</pre> 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 <i>hostname</i> : Execution result (If the activation fails, cause of the failure is displayed) Example 4: Stopping the cluster daemon in all servers <pre># clpcl -t -a</pre> If all the servers are stopping, wait for cluster daemon of each server. 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 the 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
- clpmonctrl
- clpmonctr(excluding -c, -v))
- clpstat

Error Messages

Message	Cause/Solution
Log in as root.	Log on as a 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.

Message	Cause/Solution
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 timeout occurred in the HA Cluster internal communication. If timeout keeps occurring, set the internal communication timeout longer.
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 timeout 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 timeout period. Check the status of the server.

Message	Cause/Solution
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.

Shutting down a specified server (clpdown command)

clpdown	The clpdown command shuts down a specified server.	
Command line	clpdown [-r] [-h <i>hostname</i>]	
Description	This command stops the cluster daemon and shuts down a server.	
Option	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.
Return Value	0	Success
	Other than 0	Failure
Remarks	This command runs the following commands internally after stopping the cluster daemon. Without any option specified Shut down With the -r option specified reboot	
Notes	This command must be executed by a user with the root privilege. For the name of a server for the -h option, specify the name of a server in the cluster.	
Example of a command entry	Example 1: Stopping and shutting down the cluster daemon in the local server <pre># clpdown</pre> Example 2: Shutting down and rebooting server1 from server0 <pre># clpdown -r -h server1</pre>	
Error Message	See “Operating the cluster (clpcl command)” on page 216.	

Shutting down the entire cluster (clpstdn command)

clpstdn	The clpstdn command shuts down the entire cluster.	
Command line		
clpstdn [-r] [-h <i>hostname</i>]		
Description	This command stops the cluster daemon in the entire cluster and shuts down all servers.	
Option	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.
Return Value	0	Success
	Other than 0	Failure
Notes	This command must be executed by a user with the root privilege. For the name of a server for the -h option, specify the name of a server in the cluster. 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.	
Example of a command entry	Example 1: Shutting down the cluster	
	# clpstdn	
	Example 2: Performing the cluster shutdown reboot	
	# clpstdn -r	
Error Message	See “Operating the cluster (clpcl command)” on page 216.	

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 [grpname] [-h hostname] [-a hostname]
```

```
clpgrp -l [grpname] [-h hostname] [-a hostname]
```

Description This command starts, deactivates or moves groups. This command also migrates groups.

Option	-s [group_name]	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 [group_name]	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 group_name	Moves a specified group. If no group name is specified, all the groups are moved. The status of the group resource of the moved group is kept.
	-h hostname	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 hostname	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.
	-l	Migrates data to the specified group. The group type must always be the migration type. If no group name is specified, all the migration groups active on the server are migrated.

Return Value	0	Success
	Other than 0	Failure

Notes **This command must be executed by a user with the root privilege.**

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.

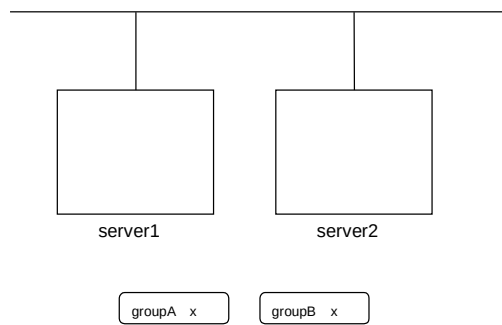
Example: The cluster has two servers and two groups.

Failover policy of group

groupA server1 -> server2

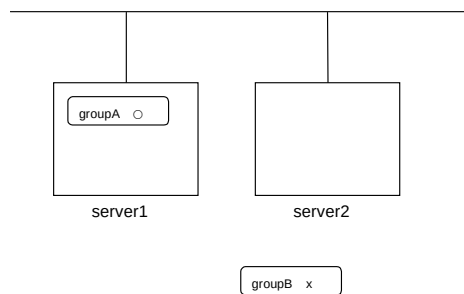
groupB server2 -> server1

1. Both groups are stopped.



2. Run the following command on server1.

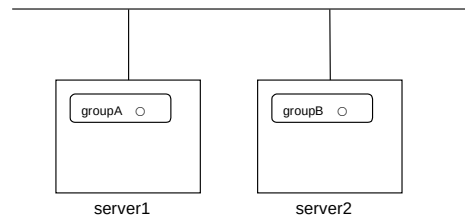
```
# clpgrp -s groupA
```



GroupA starts in server1.

3. Run the following command in server2.

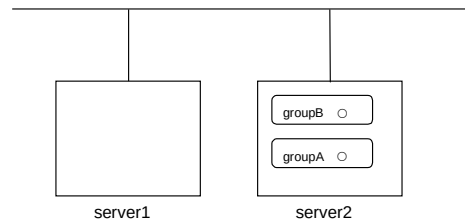
```
# clpgrp -s
```



All groups that are currently stopped but can be started start in server2.

4. Run the following command in server1

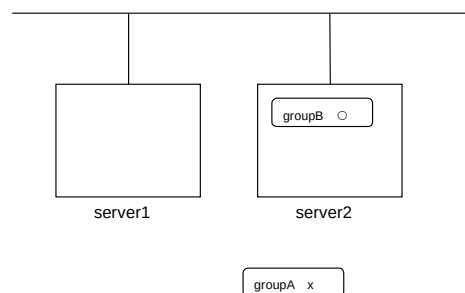
```
# clpgrp -m groupA
```



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.

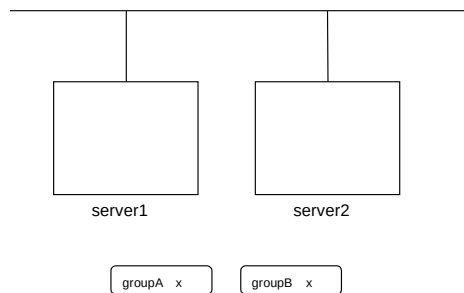
```
# clpgrp -t
```

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

Message	Cause/Solution
Log in as root.	Log on as a 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 timeout occurred in the ExpressCluster internal communication. If timeout keeps occurring, set the internal communication timeout longer.
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 timeout 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.

Message	Cause/Solution
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.
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]
```

Description This command collects information including logs and the OS information by accessing the data transfer server.

Option	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>targetnode</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.

Return Value	0	Success
	Other than 0	Failure

Remarks Since log files are compressed by tar.gz, add the xzf option to the tar command to decompress them.

Notes

This command must be executed by a user with the root privilege.

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	Timeout 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

Message	Cause/Solution
Log in as root.	Log on as a 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/ka

All installed packages (pkginfo execution result)

ExpressCluster version (pkginfo -l NECclusterpro execution result)

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)

Service start configuration information (svcs -pl execution results)

GLIB version (pkginfo -l SUNWglib execution result)

Kernel loadable module configuration (/etc/name_to_major)

Kernel ring buffer(Execution result of dmesg)

File system (/etc/fstab)

IPC resource (ipcs execution result)

System (uname -a execution result)

Network statistics (netstat execution result IPv4/IPv6)

Information collected at an emergency OS shutdown (See “Collecting information when a failure occurs ” on page 234.)

XML library version (pkginfo -l SUNWlxml execution result)

Static host table (/etc/hosts)

File system export table (exportfs -v execution result)

User resource limitations (ulimit -a execution result)

OS locale

Terminal session environment value (export execution result)

Time zone (env -date execution result)

Work area of ExpressCluster server

Monitoring options

This information is collected if options are installed.
Collected dump information when the monitor resource timeout occurred
Collected Oracle detailed information when Oracle monitor resource abnormality was detected

- (2) syslog
syslog (/var/adm/messages)
Syslogs for the number of generations specified (/var/adm/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:
/etc/vfstab
/etc/syslog.conf
/etc/syslog-ng/syslog-ng.conf
System information(sysdef -i execution result and sysdef -d sysdef -d execution result)
Kernel ring buffer (dmesg execution result)
Processor information(psrinfo execution result)
ifconfig (the result of running ifconfig -a)
df (the result of running df)
raw device information (the result of running raw -qa)
kernel module load information (the result of running modinfo)
host name, domain name information (the result of running hostname, domainname)

- (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.

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/adm/messages
/var/adm/messages.1
/var/adm/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”

Log files are compressed by tar.gz. Decompress them by gzip command and expand them with 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.

```
# clogcc -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
- ◆ Information created by running a command
 - Results of the sysdef
 - Results of the sysctl -a
 - Results of the ps
 - Results of the ipcs
 - Results of the netstat -i
 - Results of the ifconfig -a
 - Results of the df

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 -w [-c hostname|IP] [-h hostname|IP] [-p portnumber]
                        [-x directory] [--force] [--nocheck]
```

Description This command delivers the configuration data created by the Builder to servers.

Option	--push	Specify this option when delivering the data. You cannot omit this option.
	-w	Specify this option when using the configuration information with the data saved by the Builder on Windows. When -w is not specified, distribute the current cluster configuration information of a command executing server.
	-c <i>hostname IP</i>	Specifies a server to access for acquiring a list of servers. Specify a host name or IP address.
	-h <i>hostname IP</i>	Specifies a server to which configuration data is delivered. Specify host name or IP address. When this option is omitted, configuration data is delivered to all servers.
	-p <i>portnumber</i>	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.
	-x <i>directory</i>	Specify this option when delivering configuration data to the specified directory. This option is used with -w. When -w is specified, configuration data saved by the Builder on Windows is used.
	--force	Forcibly delivers the cluster configuration data even when the server on which data transfer does not start exists.
	--nocheck	When this option is specified, cluster configuration data is not checked. Use this option only when deleting a server.

Return Value	0	Success
	Other than 0	Failure

Notes

This command must be executed by a user with the root privilege.

When you run this command, access the 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

Example of command execution

Example 1: When delivering configuration data from the configuration data saved by the Builder on Windows to a specified server

```
# clpcfctrl --push -w -h 10.0.0.11 -x <directory path that configuration data exists>
```

The upload is completed successfully.(cfmgr:0)

Command succeeded.(code:0)

Example 2: When 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 a 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 package.
Failed to load the cfctrl policy file. Reinstall the RPM.	Reinstall the ExpressCluster Server package.

Message	Cause/Solution
Failed to get the install path. Reinstall the RPM.	Reinstall the ExpressCluster Server package.
Failed to get the cfctrl path. Reinstall the RPM.	Reinstall the ExpressCluster Server package.
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.
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 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.
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.
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 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.

Message	Cause/Solution
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 -w [-h hostname|IP] [-p portnumber]  
                  [-x directory]
```

Description	This command backs up cluster configuration data to be used for the Builder.	
Option	--pull	Specify this option when performing backup. You cannot omit this option.
	-w	Specify this option when backing up data that is used for the Builder on Windows.
	-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.
	-x <i>directory</i>	Backs up the configuration data in the specified directory. Use this option with -w. When -w is specified, configuration data is saved in the format which can be loaded by the Builder on Windows.
Return Value	0	Success
	Other than 0	Failure
Notes	This command must be executed by a user with the root privilege. 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: Backing up configuration information about the specified server for the Builder on Windows <pre># clpcfctrl --pull -w -h 10.0.0.11 <saving directory path></pre> Command succeeded.(success.(code:0))	

Error Message

Message	Cause/Solution
Log in as root.	Log on as a 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 package.
Failed to load the cfctrl.pol file. Reinstall the RPM	Reinstall the ExpressCluster Server package.
Failed to get the install path. Reinstall the RPM.	Reinstall the ExpressCluster Server package.
Failed to get the cfctrl path. Reinstall the RPM.	Reinstall the ExpressCluster Server package
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 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 command)

clptoratio

The clptoratio command extends or displays the current timeout ratio.

Command line

clptoratio -r *ratio* -t *time*

clptoratio -i

clptoratio -s

Description

This command displays or temporarily extends the various timeout values of the following on all servers in the cluster.

- + Monitor resource
- + Heartbeat resource
- + Alert synchronous service
- + WebManager service

The current timeout ratio is displayed.

Option

-r <i>ratio</i>	Specifies the timeout ratio. Use 1 or larger integer. The maxim timeout ratio is 10,000. If you specify "1," you can return the modified timeout ratio to the original as you can do so when you are using the -i option.
-t <i>time</i>	Specifies the extension period. 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
-i	Sets back the modified timeout ratio.
-s	Refers to the current timeout ratio.

Return Value

0	Success
Other than 0	Failure

Remarks

When the cluster is shutdown, the timeout ratio you have set will become ineffective. However, if any server in the cluster is not shutdown, the timeout ratio and the extension period that you have set will be maintained.

With the -s option, you can only refer to the current timeout ratio. You cannot see other information such as remaining time of extended period.

You can see the original timeout value by using the status display command.

Heartbeat timeout

```
# clpstat --cl --detail
```

Monitor resource timeout

```
# clpstat --mon monitor resource name --detail
```

- Notes**
- This command must be executed by a user with the root privilege.**
- Make sure that the cluster daemon is activated in all servers in the cluster.
- When you set the timeout ratio, make sure to specify the extension period. However, if you set “1” for the timeout ratio, you cannot specify the extension period.
- You cannot specify a combination such as “2m3h,” for the extension period.
- Example of a command entry**
- Example 1:** Doubling the timeout ratio for three days
- ```
clptoratio -r 2 -t 3d
```
- Example 2:** Setting back the timeout ratio to original
- ```
# clptoratio -i
```
- Example 3:** Referring to the current timeout ratio
- ```
clptoratio -s
```
- present toratio : 2
- The current timeout ratio is set to 2.

**Error Message**

| Message                                                                                             | Cause/Solution                                                               |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Log in as root.                                                                                     | Log on as a 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. | Timeout has occurred in the internal communication of ExpressCluster. If it occurs frequently, set the internal communication timeout 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 command)

**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.<br><br>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.<br><br>You can specify one of the following for a log level.<br><br>1, 2, 4, 8, 16, 32<br><br>You can see more detailed information as the log level increases.<br><br>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.<br><br>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>        | <b>This command must be executed by a user with the root privilege.</b><br><br>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 a 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 |
|--------|--------------------|------------------------------------------------------------|----------------------------|
| apicl  | libclpapicl.so.1.0 | API client library                                         | y                          |
| apisv  | libclpapisv.so.1.0 | API server                                                 | y                          |
| cl     | clpcl              | Cluster startup and stop command                           | y                          |
| cfctrl | clpcfctrl          | Cluster generation, cluster information and backup command | y                          |
| cfmgr  | libclpcfmgr.so.1.0 | Cluster configuration data operation library               | y                          |
| down   | clpdown            | Server stopping command                                    | y                          |
| grp    | clpgrp             | Group startup, stop, move, and migration command           | y                          |
| rsc    | clprsc             | Group resource startup and stop command                    | y                          |

| Type     | Module             | Description                                                        | The Express Cluster Server |
|----------|--------------------|--------------------------------------------------------------------|----------------------------|
| haltp    | clpuserw           | Shutdown stalling monitoring                                       | y                          |
| lcns     | libclplcns.so.1.0  | License library                                                    | y                          |
| lcnsc    | clplcnsc           | License registration command                                       | y                          |
| ledctrl  | clpledctrl         | Chassis identify control command                                   | y                          |
| logcc    | clplogcc           | Collect Logs command                                               | y                          |
| logcf    | clplogcf           | Log level and size modification command                            | y                          |
| logcmd   | clplogcmd          | Alert producing command                                            | y                          |
| mail     | clpmail            | Mail Report                                                        | y                          |
| monctrl  | clpmonctrl         | Monitoring control command                                         | y                          |
| nm       | clpnm              | Node map management                                                | y                          |
| pm       | clppm              | Process management                                                 | y                          |
| rc/rc_ex | clprc              | Group and group resource management                                | y                          |
| reg      | libclpreg.so.1.0   | Reboot count control library                                       | y                          |
| regctrl  | clpregctrl         | Reboot count control command                                       | y                          |
| rm       | clprm              | Monitor management                                                 | y                          |
| stat     | clpstat            | Status display command                                             | y                          |
| stdn     | clpstdn            | Cluster shutdown command                                           | y                          |
| toratio  | clptoratio         | Timeout ratio modification command                                 | y                          |
| trncl    | libclptrncl.so.1.0 | Transaction library                                                | y                          |
| trnreq   | clptrnreq          | Inter-cluster processing request command                           | y                          |
| rexec    | clprexec           | External monitoring link processing request command                | y                          |
| bwctrl   | clpbwctrl          | Cluster activation synchronization wait processing control command | y                          |
| trnsv    | clptrnsv           | Transaction server                                                 | y                          |
| alert    | clpaltinsert       | Alert                                                              | y                          |
| webmgr   | clpwebmc           | WebManager                                                         | y                          |
| webalert | clpaltd            | Alert synchronization                                              | y                          |
| disk     | clpdisk            | Disk resource                                                      | y                          |
| disk_ex  | clpdisk            | Disk resource                                                      | y                          |
| exec     | clpexec            | Exec resource                                                      | y                          |
| fip      | clpfip             | FIP resource                                                       | y                          |
| nas      | clpnas             | NAS resource                                                       | y                          |
| vip      | clpvip             | Virtual IP resource                                                | y                          |
| volmgr   | clpvolmgr          | Volume manager resource                                            | y                          |
| vm       | clpvm              | VM resource                                                        | y                          |
| ddns     | clpddns            | Dynamic DNS resource                                               | y                          |
| diskw    | clpdiskw           | Disk monitor resource                                              | y                          |

| Type    | Module              | Description                       | The Express Cluster Server |
|---------|---------------------|-----------------------------------|----------------------------|
| ipw     | clpipw              | IP monitor resource               | y                          |
| miiw    | clpmiiw             | NIC link up/down monitor resource | y                          |
| mtw     | clpmtw              | Multi target monitor resource     | y                          |
| pidw    | clppidw             | PID monitor resource              | y                          |
| userw   | clpuserw            | User mode monitor resource        | y                          |
| vipw    | clpvipw             | Virtual IP monitor resource       | y                          |
| volmgrw | clpvolmgrw          | Volume manager monitor resource   | y                          |
| vmw     | clpvmw              | VM monitor resource               | y                          |
| ddnsw   | clpddnsw            | Dynamic DNS monitor resource      | y                          |
| mrw     | clpmrw              | Message receive monitor resource  | y                          |
| comhb   | clpcomhb            | COM heartbeat                     | y                          |
| diskhb  | clpdiskhb           | Disk heartbeat                    | y                          |
| lanhb   | clplanhb            | LAN heartbeat                     | y                          |
| pingnp  | libclppingnp.so.1.0 | PING network partition resolution | y                          |
| exping  | libclppingnp.so.1.0 | PING network partition resolution | y                          |
| oraclew | clp_oraclew         | Oracle monitor resource           | y                          |
| psqlw   | clp_psqlw           | PostgreSQL monitor resource       | y                          |
| mysqlw  | clp_mysqlw          | MySQL monitor resource            | y                          |
| sambaw  | clp_sambaw          | Samba monitor resource            | y                          |
| nfs     | clp_nfs             | NFS monitor resource              | y                          |

**Default log levels and log file sizes**

| Type     | Level | Size (byte) |
|----------|-------|-------------|
| apicl    | 4     | 5000000     |
| apisv    | 4     | 5000000     |
| cfmgr    | 4     | 1000000     |
| cl       | 4     | 1000000     |
| cfctrl   | 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     |
| relpath  | 4     | 1000000     |
| stat     | 4     | 1000000     |
| stdn     | 4     | 1000000     |
| toratio  | 4     | 1000000     |
| trncl    | 4     | 2000000     |
| trnreq   | 4     | 1000000     |
| rexec    | 4     | 1000000     |
| trnsv    | 4     | 2000000     |
| alert    | 4     | 4000000     |
| webmgr   | 4     | 1000000     |
| webalert | 4     | 1000000     |
| disk     | 4     | 1000000     |
| disk_ex  | 4     | 2000000     |
| exec     | 4     | 1000000     |

| Type     | Level | Size (byte) |
|----------|-------|-------------|
| fip      | 4     | 1000000     |
| nas      | 4     | 1000000     |
| vip      | 4     | 1000000     |
| volmgr   | 4     | 1000000     |
| vm       | 4     | 1000000     |
| ddns     | 4     | 1000000     |
| bwctrl   | 4     | 1000000     |
| diskw    | 4     | 1000000     |
| ipw      | 4     | 1000000     |
| miw      | 4     | 1000000     |
| mtw      | 4     | 1000000     |
| mysqlw   | 4     | 1000000     |
| nfs      | 4     | 1000000     |
| oraclew  | 4     | 1000000     |
| pidw     | 4     | 1000000     |
| psqlw    | 4     | 1000000     |
| sambaw   | 4     | 1000000     |
| userw    | 4     | 1000000     |
| vipw     | 4     | 1000000     |
| volmgrw  | 4     | 1000000     |
| vmw      | 4     | 1000000     |
| ddnsw    | 4     | 1000000     |
| mrw      | 4     | 1000000     |
| comhb    | 4     | 1000000     |
| diskhb   | 4     | 1000000     |
| lanhb    | 4     | 1000000     |
| pingnp   | 4     | 1000000     |
| exping   | 4     | 1000000     |
| clpka *1 | -     | 0           |

\* If the module's size is zero, its log will not be produced.

\*1 Output destination of log is syslog.

## Managing licenses (clplcnscl command)

**clplcnscl** The clplcnscl command manages licenses.

### Command line:

```
clplcnscl -i [licensefile] -p productid
```

```
clplcnscl -l -p productid
```

```
clplcnscl -d -p productid
```

**Description** This command registers, refers to and remove the licenses of the product version and trial version of this product.

**Option**

|                  |                                                                                                                                                                                                        |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -i [licensefile] | Registers licenses.<br>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. |
| -l               | Refers to the license.                                                                                                                                                                                 |
| -d               | Deletes the license.                                                                                                                                                                                   |
| -p productid     | Specifies the product ID of a licensed product.                                                                                                                                                        |

Cluster product

| Product ID | License product name                              |
|------------|---------------------------------------------------|
| BASE30     | ExpressCluster X 3.0 for Solaris                  |
| BASE30     | ExpressCluster X 3.0 for Solaris VM               |
| DBAG30     | ExpressCluster X Database Agent 30 for Solaris    |
| FSAG30     | ExpressCluster X File Server Agent 30 for Solaris |
| ALRT30     | ExpressCluster X Alert Service 30 for Solaris     |

**Return Value**

|   |                                                                                                                                                                                                                                                                                                                  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Normal termination                                                                                                                                                                                                                                                                                               |
| 1 | Normal termination (with licenses not synchronized)<br>*This means that license synchronization failed in the cluster at the time of license registration.<br>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**

```
clplcnscl -i -p BASE30
```

**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 [0(Virtual OS)] or [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 BASE30
```

for referring

```
clplcns -l -p BASE30
```

**to the license**

## 1. Product version

```
< Cluster CPU License EXPRESSCLUSTER X 3.0 for Solaris
<PRODUCT> >

Seq... 1

Key..... A1234567-B1234567-C1234567-D1234567

The number of license... 2

Status... valid
```

## 2. Trial version

```
< Cluster CPU License EXPRESSCLUSTER X 3.0 for Solaris
<TRIAL> >

Seq... 1

Key..... A1234567-B1234567-C1234567-D1234567

User name... NEC

Start date..... 2011/01/01

End date..... 2011/12/31

Status..... valid
```

**Notes**

**This command must be executed by a user with the root privilege.**

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 Installation and Configuration Guide for information on cluster generation. |
| Log in as root.                                                                                                                                     | You are not authorized to run this command. Log on as a 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.                                                                                                                                                                                                           |

## Outputting messages (clplogcmd 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>      | -m <i>message</i>                                                                                                                                                                                       | 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.<br><br>You may use alphabets, numbers, and symbols. See below (*) for notes on them. |
|                     | --syslog                                                                                                                                                                                                | Specify the output destination from syslog, alert, and mail. (Multiple destinations can be specified.)                                                                                                                                                                                                                                             |
|                     | --alert                                                                                                                                                                                                 | This parameter can be omitted. The syslog and alert will be the output destinations when the parameter is omitted.)                                                                                                                                                                                                                                |
|                     | --mail                                                                                                                                                                                                  | See “Directory structure of ExpressCluster” in Chapter 9, “The system maintenance information” for more information on output destinations.                                                                                                                                                                                                        |
|                     | -i <i>eventID</i>                                                                                                                                                                                       | Specify event ID. The maximum value of event ID is 10000.<br><br>This parameter can be omitted. The default value 1 is set when the parameter is omitted.                                                                                                                                                                                          |
|                     | -l <i>level</i>                                                                                                                                                                                         | 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.<br><br>This parameter can be omitted. The default value INFO is set when the parameter is omitted.<br><br>See “Checking alerts using the WebManager” for more information.              |
|                     |                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                    |
| <b>Return Value</b> | 0                                                                                                                                                                                                       | Success                                                                                                                                                                                                                                                                                                                                            |
|                     | Other than 0                                                                                                                                                                                            | Failure                                                                                                                                                                                                                                                                                                                                            |
| <b>Notes</b>        | <b>This command must be executed by a user with the root privilege.</b><br><br>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 is 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]
clpmonctrl -c [-m resource_name ...]
clpmonctrl -v [-m resource_name ...]
```

---

**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 suspend or resume monitor resources on all the servers in a cluster.

---

|                     |                                                                                                                                                |                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Description</b>  | This command suspends and/or resumes monitor resources on a single server, and displays and/or reset the times counter of the recovery action. |                                                                                              |
| <b>Option</b>       | -s                                                                                                                                             | Suspends monitoring                                                                          |
|                     | -r                                                                                                                                             | Resumes monitoring                                                                           |
|                     | -c                                                                                                                                             | Resets the times counter of the recovery action.                                             |
|                     | -v                                                                                                                                             | Displays the times counter of the recovery action.                                           |
|                     | -m                                                                                                                                             | Specifies one or more monitor resources to be controlled.                                    |
|                     | resource_name                                                                                                                                  | This option can be omitted. All monitor resources are controlled when the option is omitted. |
|                     | ...                                                                                                                                            |                                                                                              |
|                     | -w wait_time                                                                                                                                   | 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 timeout                                                              |

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 :Caution]

 server0 [o]: Suspend
 server1 [o]: Online

 Monitor1 [miw1:Caution]

 server0 [o]: Suspend
 server1 [o]: Online

 Monitor2 [userw :Caution]

 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 [miw1:Normal]

 server0 [o]: Online
 server1 [o]: Online

 Monitor2 [userw :Normal]

 server0 [o]: Online
 server1 [o]: Online

=====
```



**Example 3:** When displaying the times counter of the recovery action of all monitor resource.

```
clpmonctrl -v

Resource : ipw1
Failover Count : 3/3
Restart Count : 1/1
FinalAction Count : 0[No Operation]

Resource : miw1
Failover Count : 1/1
Restart Count : 0/0
FinalAction Count : 0[No Operation]

Resource : userw
Failover Count : 0/0
Restart Count : 0/0
FinalAction Count : 0[-]

Command succeeded.
```

**Example 4:** When resetting the times counter of the recovery action of all monitor resource

```
clpmonctrl -c

Command succeeded.

clpmonctrl -v

Resource : ipw1
Failover Count : 0/3
Restart Count : 0/1
FinalAction Count : 0[No Operation]

Resource : miw1
Failover Count : 0/1
Restart Count : 0/0
FinalAction Count : 0[No Operation]

Resource : userw
Failover Count : 0/0
Restart Count : 0/0
FinalAction Count : 0[-]

Command succeeded.
```

**Example 5:** 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 :Caution]

 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 6:** 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
```

**Example 7:** When displaying the times counter of the recovery action of IP monitor resource.

```
clpmonctrl -v -m ipw1
```

---

|                   |                   |
|-------------------|-------------------|
| Resource          | : ipw1            |
| Failover Count    | : 3/3             |
| Restart Count     | : 1/1             |
| FinalAction Count | : 0[No Operation] |

---

Command succeeded.

**Example 8:** When resetting the times counter of the recovery action of IP monitor resource

```
clpmonctrl -c -m ipw1

Command succeeded.

clpmonctrl -v -m ipw1
```

---

|                   |                   |
|-------------------|-------------------|
| Resource          | : ipw1            |
| Failover Count    | : 0/3             |
| Restart Count     | : 0/1             |
| FinalAction Count | : 0[No Operation] |

---

Command succeeded.

|                |                                                                                                                                                                                                                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Remarks</b> | 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.                                                                                                                                            |
| <b>Notes</b>   | <p>Run this command as root user.</p> <p>Check the status of monitor resource by using the status display <code>clpstat</code> command or WebManager.</p> <p>Before you run this command, use the <code>clpstat</code> command or WebManager to verify that the status of monitor resources is in either “Online” or “Suspend.”</p> |

**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 a 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.<br>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.<br>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.<br>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<br>Check the cluster configuration data by using the Builder.<br><br>%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.<br><br>%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.<br><br>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.<br><br>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
 exec1 : Online
failover2 : Online
 current : server2
 fip2 : 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
 exec1: Online
failover2: Online
 current: server2
 fip2: 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
 exec1: Online
 failover2: Online
 current: server2
 fip2: 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.<br>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 until the other server starts or the wait time times out, and then start the group resources.                                                                 |
| No operable group resource exists in the server.                                                                                         | Check there is a possible 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.<br>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.                                                                                            |

## Controlling reboot count (clpregctrl command)

**clpregctrl**      The clpregctrl command controls reboot count limitation.

**Command line:**

```
clpregctrl --get
clpregctrl -g
clpregctrl --clear -t type -r registry
clpregctrl -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 4, “Group resource detail for reboot count limitation.

**Notes**

**This command must be executed by a user with the root privilege.**

**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 a root user.                              |
| The command is already executed.<br>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.                                        |

## Turning off warning light (clplamp command)

### clplamp

The clpdn1000s command turns **the warning light off**.

Command line:

|                |                                 |
|----------------|---------------------------------|
| <b>clplamp</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. |
|--------------|-------------------------------------------------------------------|

## Controlling chassis identify lamp (clpledctrl 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.<br>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.<br><br>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 a root user.                                          |
| Invalid option.                                                                          | The command line option is invalid. Specify the correct option. |
| Could not connect to the data transfer server.<br>Check if the server has started up.    | Check if the server has started up.                             |
| Could not connect to all data transfer servers.<br>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.<br>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.<br>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.               |

## Processing inter-cluster linkage (clptrnreq 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:<br><br>GRP_FAILOVER      Group failover<br>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.<br><br>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.<br><br>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.<br><br>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.<br><br>If the -w option is not specified, the command 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.

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 a root user.                                                                                                                                  |
| Invalid option.                                                                          | The command line option is invalid. Specify the correct option.                                                                                         |
| Could not connect to the data transfer server.<br>Check if the server has started up.    | Check if the server has started up.                                                                                                                     |
| Could not connect to all data transfer servers.<br>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.<br>Check it.                                                                                                       |
| EXEC_SCRIPT %s : Specified script(%s) is not executable.                                 | The specified script could not be executed.<br>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.<br>Check it.                                                                                                     |
| Internal error. Check if memory or OS resource is sufficient.                            | Check if the memory or OS resource is sufficient.                                                                                                       |

## Requesting processing to cluster servers (clprexec command)

**clprexec**                      This command requests that a server execute a process.

**Command line:**

```
clprexec --failover ([group_name] | [-r resource_name])
 -h IP [-w timeout] [-p port_number] [-o logfile_path]

clprexec --script script_file -h IP [-p port_number] [-w timeout] [-o logfile_path]

clprexec --notice ([mrw_name] | [-k monitor_type[.monitor_target]])
 -h IP [-p port_number] [-w timeout] [-o logfile_path]

clprexec --clear ([mrw_name] | [-k monitor_type[.monitor_target]])
 -h IP [-p port_number] [-w timeout] [-o logfile_path]
```

**Description**              This command is an expansion of the existing clptnreq command and has additional functions such as issuing a processing request (error message) from the external monitor to the ExpressCluster server.

|               |                             |                                                                                                                                                                                                                                                                                                                       |
|---------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Option</b> | <b>--failover</b>           | Requests group failover. Specify a group name for <i>group_name</i> .<br><br>When not specifying the group name, specify the name of a resource that belongs to the group by using the -r option.                                                                                                                     |
|               | <b>--script script_name</b> | Requests script execution.<br><br>For <i>script_name</i> , specify the file name of the script to execute (such as a shell script or executable file).<br><br>The script must be created in the work/rexec directory, which is in the directory where ExpressCluster is installed, on each server specified using -h. |
|               | <b>--notice</b>             | Sends an error message to the ExpressCluster server.<br><br>Specify a message receive monitor resource name for <i>mrw_name</i> .<br><br>When not specifying the monitor resource name, specify the category and keyword of the message receive monitor resource by using the -k option.                              |
|               | <b>--clear</b>              | Requests changing the status of the message receive monitor resource from "Abnormal" to "Normal."<br><br>Specify a message receive monitor resource name for <i>mrw_name</i> .<br><br>When not specifying the monitor resource name, specify the category and keyword of the message                                  |

|                  |                                                                                                                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | receive monitor resource by using the -k option.                                                                                                                                                                                                                                                                      |
| -h IP Address    | <p>Specify the IP addresses of ExpressCluster servers that receive the processing request.</p> <p>Up to 32 IP addresses can be specified by separating them with commas.</p> <p>* If this option is omitted, the processing request is issued to the local server.</p>                                                |
| -r resource_name | Specify the name of a resource that belongs to the target group for the processing request when the --failover option is specified.                                                                                                                                                                                   |
| -k mon_type      | <p>For <i>mon_type</i>, specify the category specified for the message receive monitor when the --notice or --clear option is specified.</p> <p>To specify the keyword of the message receive monitor resource, specify them by separating them with dot after <i>category</i>.</p>                                   |
| -p port_number   | <p>Specify the port number.</p> <p>For <i>port_number</i>, specify the data transfer port number specified for the server that receives the processing request.</p> <p>The default value, 29002, is used if this option is omitted.</p>                                                                               |
| -o logfile_path  | <p>For <i>logfile_path</i>, specify the file path along which the detailed log of this command is output.</p> <p>The file contains the log of one command execution.</p> <p>* If this option is not specified on a server where ExpressCluster is not installed, the log is always output to the standard output.</p> |
| -w timeout       | <p>Specify the command timeout time. The default, 30 seconds, is used if this option is not specified.</p> <p>A value from 5 to MAXINT can be specified.</p>                                                                                                                                                          |

|                     |              |                              |
|---------------------|--------------|------------------------------|
| <b>Return Value</b> | 0            | Completed successfully.      |
|                     | Other than 0 | Terminated due to a failure. |

- Notes**
- When issuing error messages **by** using the `clprexec` command, the message receive monitor resources for which **an action to take in ExpressCluster server when an error occurs** is specified must be registered and started.
- The command version is output to the standard output when the command is executed.
- The command checks whether the character string specified for the `--script` option includes "\", "/" or "." because a relative path must not be specified.
- The server that has the IP address specified for the `-h` option must satisfy the following conditions:
- = ExpressCluster X3.0 or later must be installed.
  - = ExpressCluster must be running.
  - = `mrw` must be set up and running.
  - = `TransactionServer` must be running.

**Examples**      **# clprexec --failover failover1 -h 10.0.0.1 -p 29002**

**Example 2:** This example shows how to issue a request to fail over the group to which the group resource (`exec1`) belongs to ExpressCluster server 1 (10.0.0.1):

**# clprexec --failover -r exec1 -h 10.0.0.1**

**Example 3:** This example shows how to issue a request to execute the script (`script1.sh`) on ExpressCluster server 1 (10.0.0.1):

**# clprexec --script script1.sh -h 10.0.0.1**

**Example 4:** This example shows how to issue an error message to ExpressCluster server 1 (10.0.0.1):

\*mrw1 set, category: earthquake, keyword: scale3

- This example shows how to specify a message receive monitor resource name:

**# clprexec --notice mrw1 -h 10.0.0.1 -w 30 -p /tmp/clprexec/ lprexec.log**

- This example shows how to specify the category and keyword specified for the message receive monitor resource:

**# clprexec --notice -k earthquake.scale3 -h 10.0.0.1 -w 30 -p /tmp/clprexec/clprexec.log**

**Example 5:** This example shows how to issue a request to change the monitor status of `mrw1` to ExpressCluster server 1 (10.0.0.1):

\*mrw1 set, category: earthquake, keyword: scale3

This example shows how to specify a message receive monitor resource name:

**# clprexec --clear mrw1 -h 10.0.0.1**

- This example shows how to specify the category and keyword specified for the message receive monitor resource:

**# clprexec --clear -k earthquake.scale3 -h 10.0.0.1**

**Error messages**

| Message                                                                               | Cause/solution                                                                                                                                                           |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| rexec_ver:%s                                                                          | -                                                                                                                                                                        |
| %s %s : %s succeeded.                                                                 | -                                                                                                                                                                        |
| %s %s : %s will be executed from now.                                                 | Check the processing result on the server that received the request.                                                                                                     |
| %s %s : Group Failover did not execute because Group(%s) is offline.                  | -                                                                                                                                                                        |
| %s %s : Group migration did not execute because Group(%s) is offline.                 | -                                                                                                                                                                        |
| Invalid option.                                                                       | Check the command argument.                                                                                                                                              |
| Could not connect to the data transfer servers. Check if the servers have started up. | Check whether the specified IP address is correct and whether the server that has the IP address is running.                                                             |
| Command timeout.                                                                      | Check whether the processing is complete on the server that has the specified IP address.                                                                                |
| All servers are busy. Check if this command is already run.                           | This command might already be running. Check whether this is so.                                                                                                         |
| %s %s : This server is not permitted to execute clprexec.                             | Check whether the IP address of the server that executes the command is registered in the list of client IP addresses that are not allowed to connect to the WebManager. |
| %s %s : Specified monitor resource(%s) does not exist.                                | Check the command argument.                                                                                                                                              |
| %s failed in execute.                                                                 | Check the status of the ExpressCluster server that received the request.                                                                                                 |

## Controlling cluster activation synchronization wait processing (clpbwctrl command)

### clpbwctrl

The clpbwctrl command controls the cluster activation synchronization wait processing.

#### Command line:

clpbwctrl -c

clpbwctrl -h

**Description** This command skips the cluster activation synchronization wait time that occurs if the server is started when the cluster services for all the servers in the cluster are stopped.

**Option**

|             |                                                                 |
|-------------|-----------------------------------------------------------------|
| -c,--cancel | Cancels the cluster activation synchronization wait processing. |
| -h,--help   | Displays the usage.                                             |

**Return Value**

|              |                              |
|--------------|------------------------------|
| 0            | Completed successfully.      |
| Other than 0 | Terminated due to a failure. |

**Notes** This command must be executed by a user who has root privileges.

**Examples** This example shows how to cancel the cluster activation synchronization wait processing:

```
#c clpbwctrl -c
```

Command succeeded.

#### Error messages

| Message                                         | Cause/solution                                                                                                           |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Log in as root                                  | Log in as a root user.                                                                                                   |
| Invalid option.                                 | The command option is invalid. Specify correct option.                                                                   |
| Cluster service has already been started.       | The cluster has already been started. It is not in startup synchronization waiting status.                               |
| The cluster is not waiting for synchronization. | The cluster is not in startup synchronization waiting processing. The cluster service stop or other causes are possible. |
| Command Timeout.                                | Command execution timeout.                                                                                               |
| Internal error.                                 | Internal error occurred.                                                                                                 |

## Section II      Resource details

This section provides detailed information on the resources that constitute a cluster.

|           |                                                |
|-----------|------------------------------------------------|
| Chapter 4 | Group resource details                         |
| Chapter 5 | Monitor resource details                       |
| Chapter 6 | Heartbeat resources details                    |
| Chapter 7 | Network partition resolution resources details |
| Chapter 8 | Information on other monitor settings          |





## Chapter 4      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 list and supported ExpressCluster versions..... | 286 |
| • Attributes common to group resources .....                      | 287 |
| • Displaying and changing the settings of group properties .....  | 304 |
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| • Understanding EXEC resources .....                              | 328 |
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## Group resources list and supported ExpressCluster versions

The following is the number of group resources that can be registered for each 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 328)          | 2.1.0-1~          |
| Disk resource           | disk         | See “Understanding disk resource.” (Page 359)           | 2.1.0-1~          |
| Floating IP resource    | fip          | See “Understanding floating IP resource.” (Page 368)    | 2.1.0-1~          |
| Virtual IP resource     | vip          | See “Understanding virtual IP resources” (Page 379)     | 2.1.0-1~          |
| NAS resource            | nas          | See “Understanding NAS resource.” (Page 391)            | 2.1.0-1~          |
| Volume manager resource | volmgr       | See “Understanding Volume Manager resource” (Page 398)  | 2.1.0-1~          |
| VM Resource             | vm           | See “Understanding VM resources” (on page 404)          | 3.0.0-1~          |
| Dynamic DNS resource    | ddns         | See “Understanding Dynamic DNS resources” (on page 409) | 3.0.0-1~          |

# Attributes common to group resources

A group is a failover unit. Rules regarding the failover operations (failover policies) can be specified for a group.

## Understanding the group type

The following two types of groups exist: virtual machine groups and failover groups.

### - Virtual machine groups

Failovers (migration) are performed on a virtual machine basis. However, for ExpressCluster X3.0, failovers cannot be performed by using the WebManager or a group command. One VM resource and multiple disk resources can be registered with each virtual machine group. Other types of resources cannot be registered.

### - Failover groups

These groups are used to perform failovers on an operation basis. These groups are used to group up resources necessary to continue an operation. However, no VM resource can be registered. Up to 128 group resources can be registered with each group.

## Understanding the group properties

The following properties can be specified for each group:

### - Server that can run the group

Select a server that can run the group from the servers in the cluster.

Specify the order of servers that can run the group and the priority according to which the group is started.

### - Group startup attribute

Specify automatic or manual startup as the group startup attribute.

For automatic startup, the group is automatically started on the server that can run the group and has the highest priority when the cluster is started.

For manual startup, the group is not started when the server is started. Manually start the group by using the WebManager or clpgrp command after the server is started. For details about the WebManager, see Chapter 1, “Functions of the WebManager.” For details about the clpgrp command, see Chapter 4, “ExpressCluster command reference.”

### - Failover exclusive attribute

The failover exclusive attribute specifies the exclusive group attribute during a failover. However, this attribute cannot be specified under the following conditions:

If **Virtual machine group** is specified as the group type

When failover attribute is one of **Fail over dynamically**, **Prioritize the failover policies in the server group** or **Allow only manual failovers between sites**.

The following failover exclusive attributes exist:

### No exclusion

Exclusion is not performed during a failover. The usable failover destination server that has the highest priority is used for a failover.

### Normal exclusion

Exclusion is performed during a failover. The usable failover destination server that has not run another normal exclusion group and has the highest priority is used for a failover.

However, exclusion is not performed if other normal exclusion groups have already been started on all the usable failover destination servers. The usable failover destination server that has the highest priority is used for a failover.

### Complete exclusion

Exclusion is performed during a failover. The usable failover destination server that has not run another complete exclusion group and has the highest priority is used for a failover.

However, a failover is not performed if other complete exclusion groups have already been started on all the usable failover destination servers.

---

#### Note:

Exclusion is not performed between normal exclusion groups and complete exclusion groups. Normal exclusion performs exclusion among normal exclusion groups while complete exclusion performs exclusion among complete exclusion groups. In either case, this action does not apply to groups for which exclusion is not specified.

---

### - Failover attribute

The failover attribute can be used to specify the failover mode. The following failover attributes can be specified.

#### Automatic failover

A heartbeat timeout or error detection by a group or monitor resource triggers an automatic failover.

For an automatic failover, the following options can be specified.

##### - Use the startup server settings

The failover destination is determined according to the priority of the servers that can run the group.

##### - Fail over dynamically

The failover destination is determined by considering the statuses of each server's monitor or failover group, and then a failover is performed.

The failover destination is determined in the following way.

| Determination factor                         | Condition              | Result                                               |
|----------------------------------------------|------------------------|------------------------------------------------------|
| Monitor resource registered in the blacklist | Error (all servers)    | A failover is not performed.                         |
|                                              | Normal (single server) | A normal server is used as the failover destination. |

|                                                    |                           |                                                                                       |
|----------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------|
|                                                    | Normal (multiple servers) | The error levels are compared.                                                        |
| Number of servers that have the lowest error level | 1                         | The server with the lowest error level is used as the failover destination.           |
|                                                    | Two or more               | The operation levels of the servers that have the lowest error level are compared.    |
| Number of servers with the lowest operation level  | 1                         | The server that has the lowest operation level is used as the failover destination.   |
|                                                    | Two or more               | The running server that has the highest priority is used as the failover destination. |

**Note:**

**Blacklist**

If a monitor resource registered in the blacklist has detected an error, that server is not regarded as a usable failover destination.

In 3.0.0-1, the following monitor resources are registered in the blacklist.

- IP monitor resource
- NIC link up/down monitor resource

The monitor resources registered in the blacklist cannot be changed.

**Error level**

This is the number of monitor resources that have detected errors.

**Operation level**

This is the number of failover groups that have been started or are being started.

- Prioritize the failover policies in the server group

If a server in the same server group can be used as the failover destination, this server is preferably used. The server that can run the failover group and has the highest priority among the running servers is used as the failover destination.

If no server in the same server group can be used as the failover destination, a server in another server group is used as the failover destination.

- Allow only a manual failover between server groups

An automatic failover is performed only if a server within the same server group is the destination.

If no servers in the same server group can be used as the failover destination, failing over to a server in another server group is not automatically performed.

To move the group to a server in another server group, use the WebManager or clpgrp command.

**Manual failover**

A failover is not automatically performed when a heartbeat timeout occurs. Manually start a failover by using the WebManager or clpgrp command. However, even when manual failover is specified, an automatic failover is performed if a group resource or monitor resource detects an error.

- Failback attribute

Specify automatic or manual failback. However, This cannot be specified when the following conditions match.

- Failover attribute is **Fail over dynamically**.

For automatic failback, an automatic failback is performed when the server that has the highest priority is started after a failover.

For manual failback, no failback occurs even when the server is started.

## Understanding failover policy

A failover policy is a priority that determines a server to be the failover destination among multiple servers. It is required to configure the failover policy not to cause heavy loads to certain servers at a failover.

The following describes how servers behave differently depending on failover policies when a failover occurs by using example of the server list that can fail over and failover priority of the list.

<Symbol description>

| Server status | Description                            |
|---------------|----------------------------------------|
| O             | Normal (properly working as a cluster) |
| ×             | Stopped (cluster is stopped)           |

3-node configuration:

| Group | Priority order of servers       |                                 |                                 |
|-------|---------------------------------|---------------------------------|---------------------------------|
|       | 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                         |

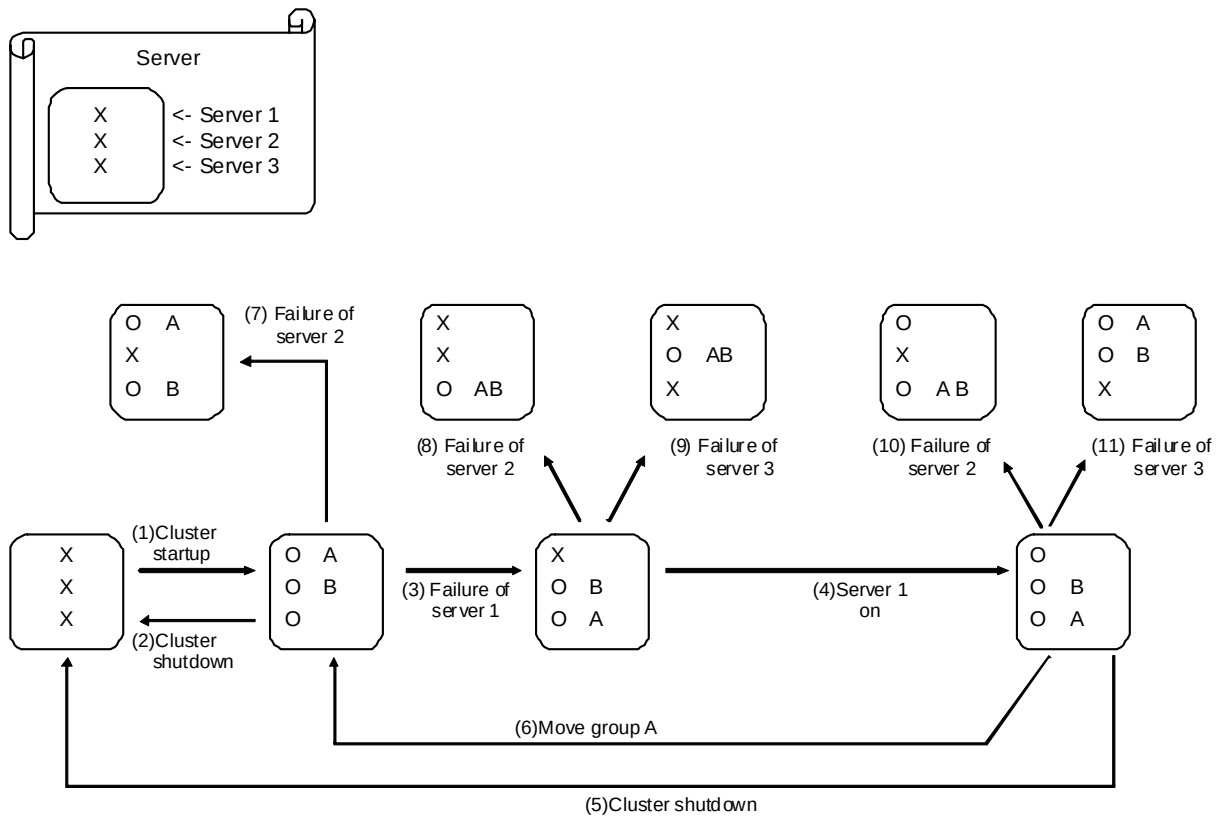
2-node configuration:

| Group | Priority order of servers       |                                 |
|-------|---------------------------------|---------------------------------|
|       | 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 attribute is set to auto startup and the failback attribute set to manual failback for both Group A and B.

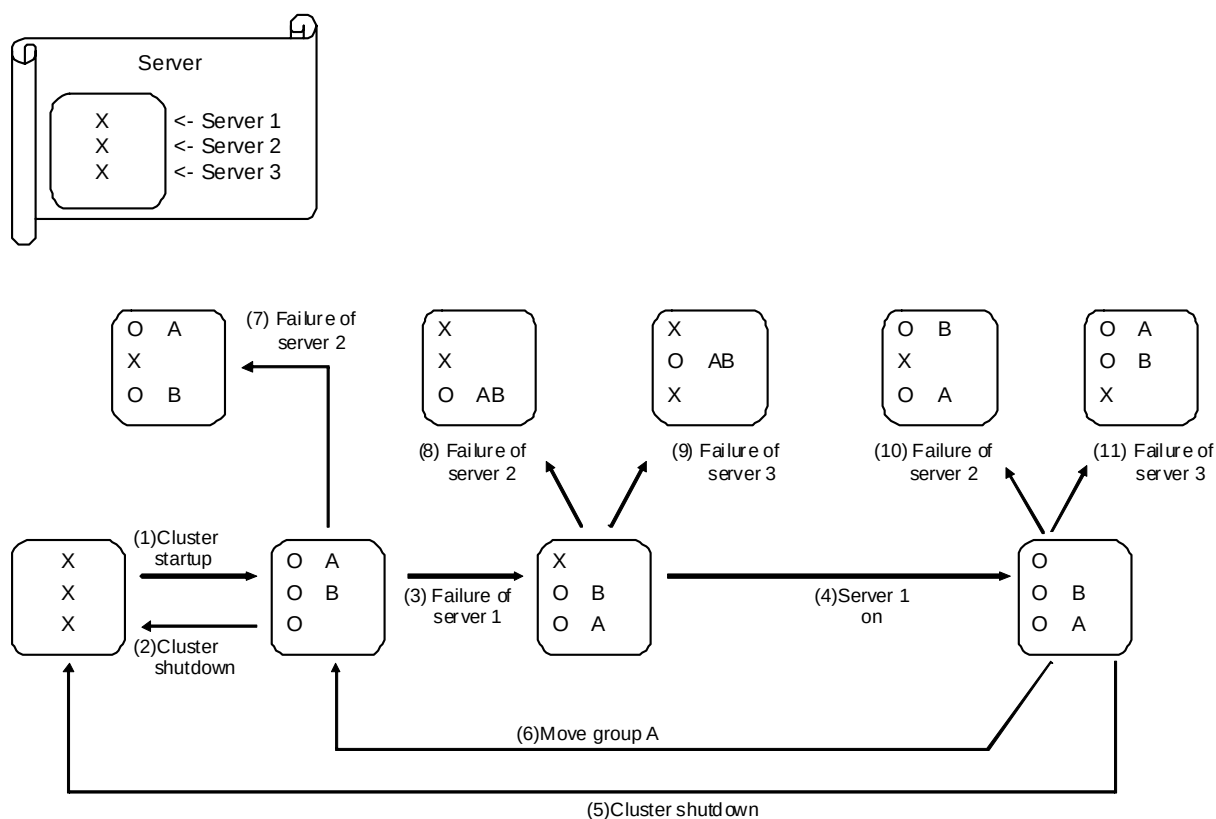
- ◆ If groups of different failover exclusive attribute co-exist in a cluster, they do not interfere with each other. For example, a group of full exclusive attribute may start on a server where a group of non-exclusive attribute is active, and vice versa.
- ◆ For groups whose failover exclusive attribute are normal or full, the server that 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.

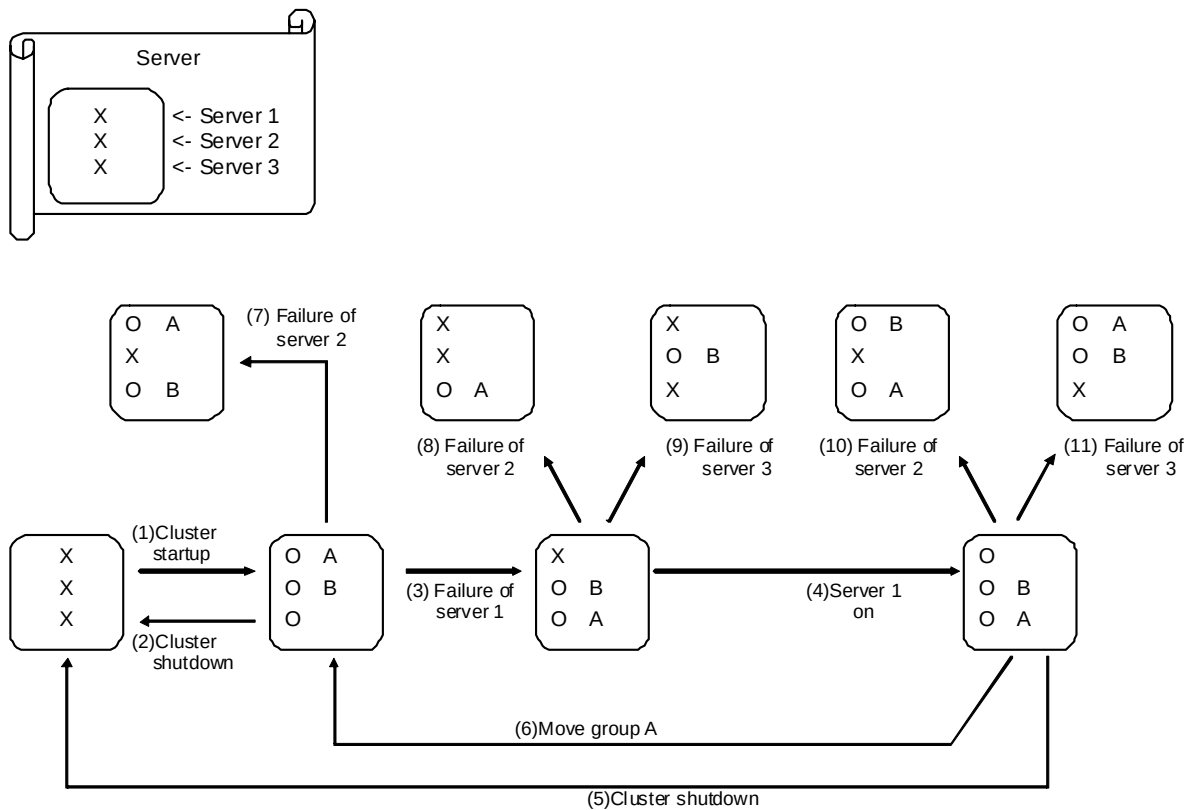
**When the failover exclusive attribute for Group A and B is set to Normal:**



- (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 group A
- (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.

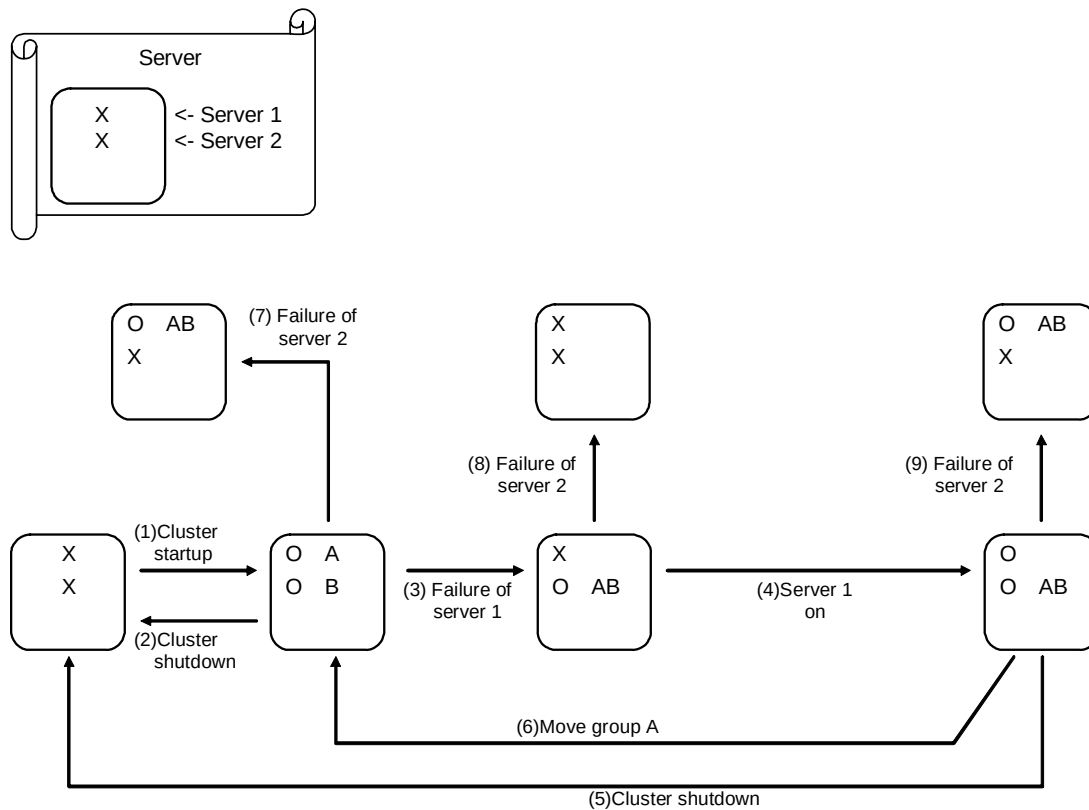


**When the failover exclusive attribute for Group A and B is set to Absolute:**



- (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 group A
- (7) Failure of server2: Fails over to the next priority server.
- (8) Failure of server2: Does not failover (Group B stops).
- (9) Failure of server3: Does not failover (Group A 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 Group A.
- (4) Server1 power on
- (5) Cluster shutdown
- (6) Move group A
- (7) Failure of server2: Fails over to the standby server of Group B.
- (8) Failure of server2
- (9) Failure of server2: 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:

- ◆ The following describes the steps when an error in activation of group resources is detected:
  - When an error in activation of group resources is detected, activation.
  - When activation retries fail as many times as the number set to **Retry Count at Activation Failure**, failover is performed.
  - If the failover fails as many times as the number set to **Failover Threshold**, the final action is performed.
- ◆ The following describes the steps 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:

Number of activation retries and failover is 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 retries count and failover count is reset in a server where the group activation is successful.

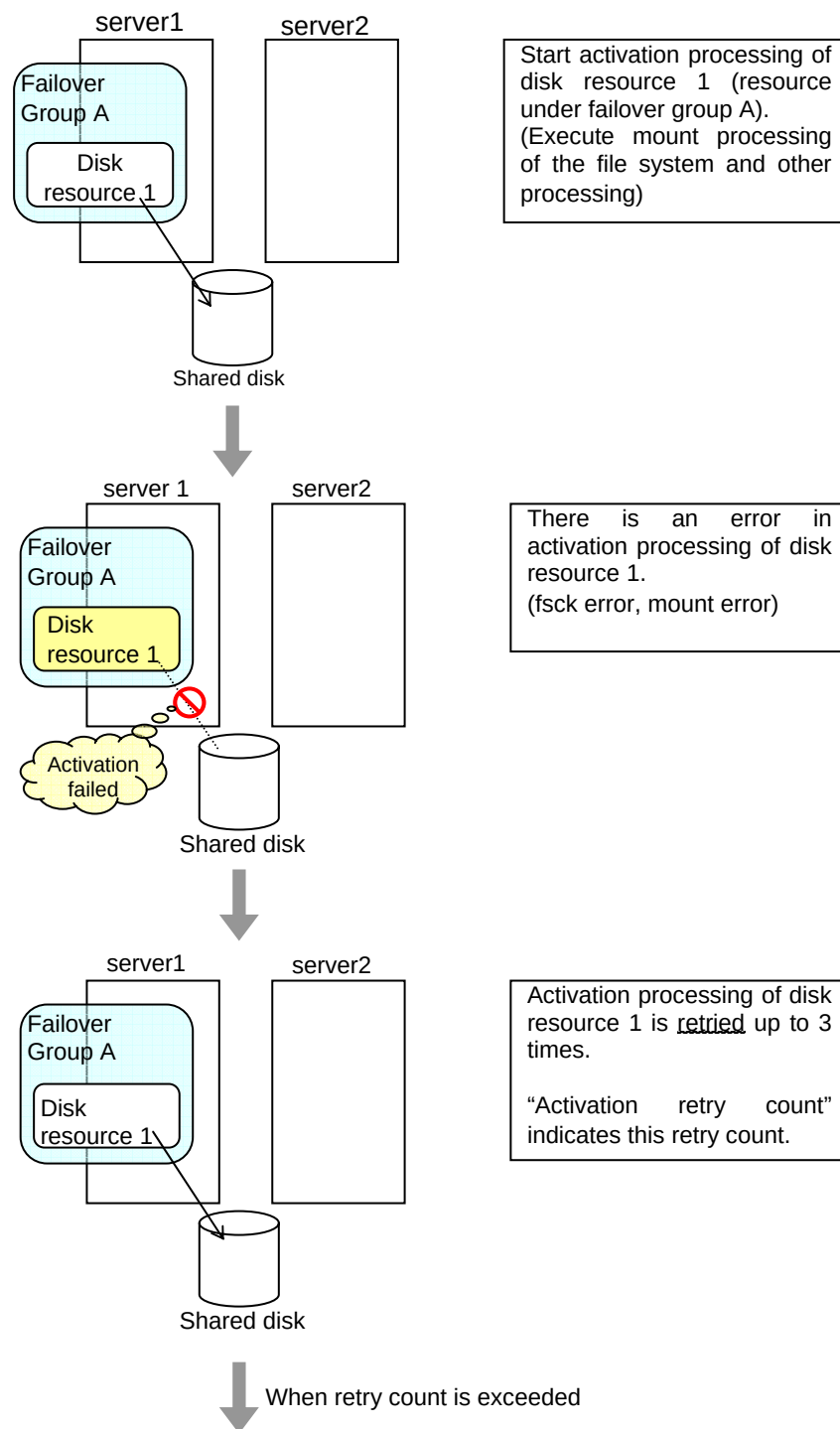
Note that a failed recovery action is also counted as one for the activation retries count or failover count.

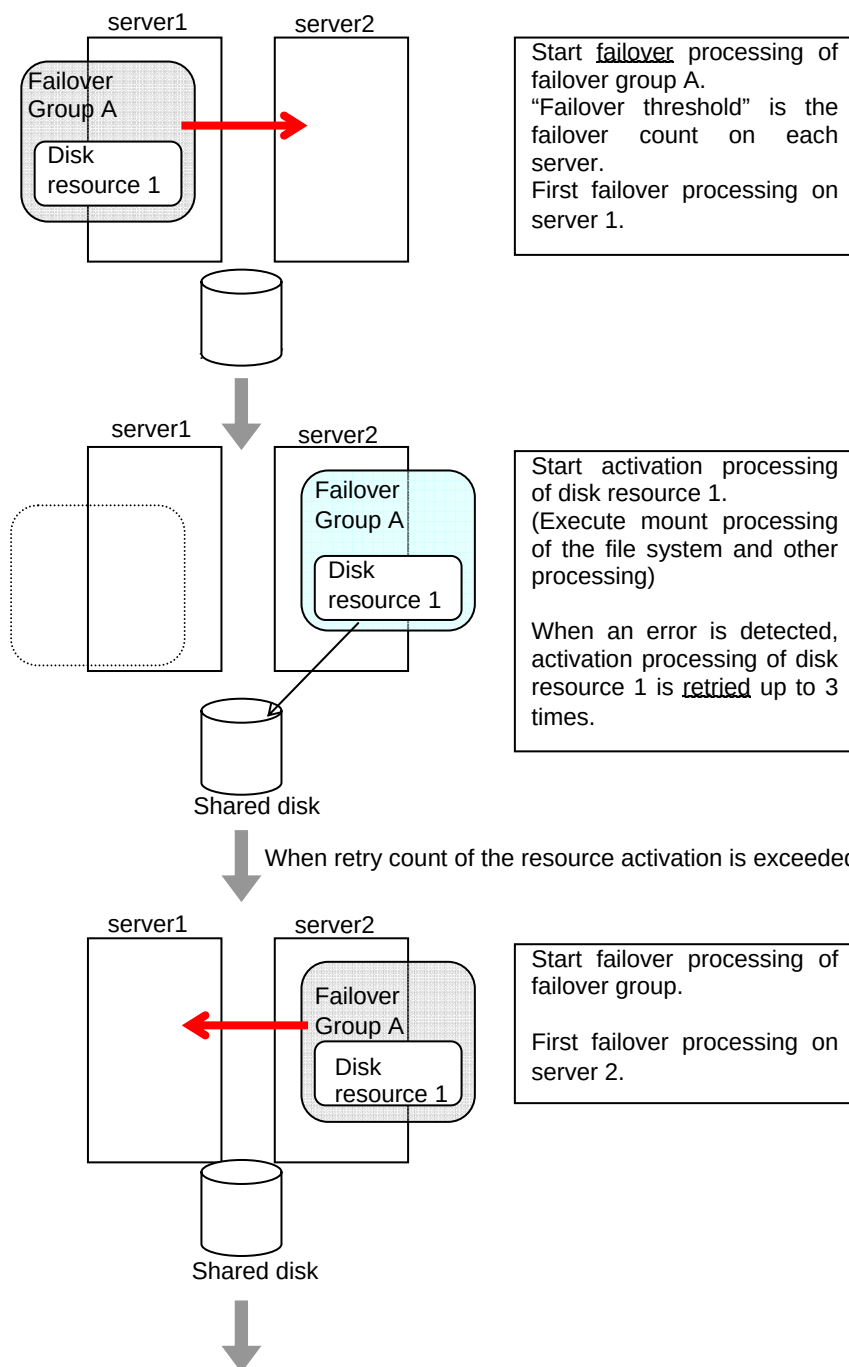
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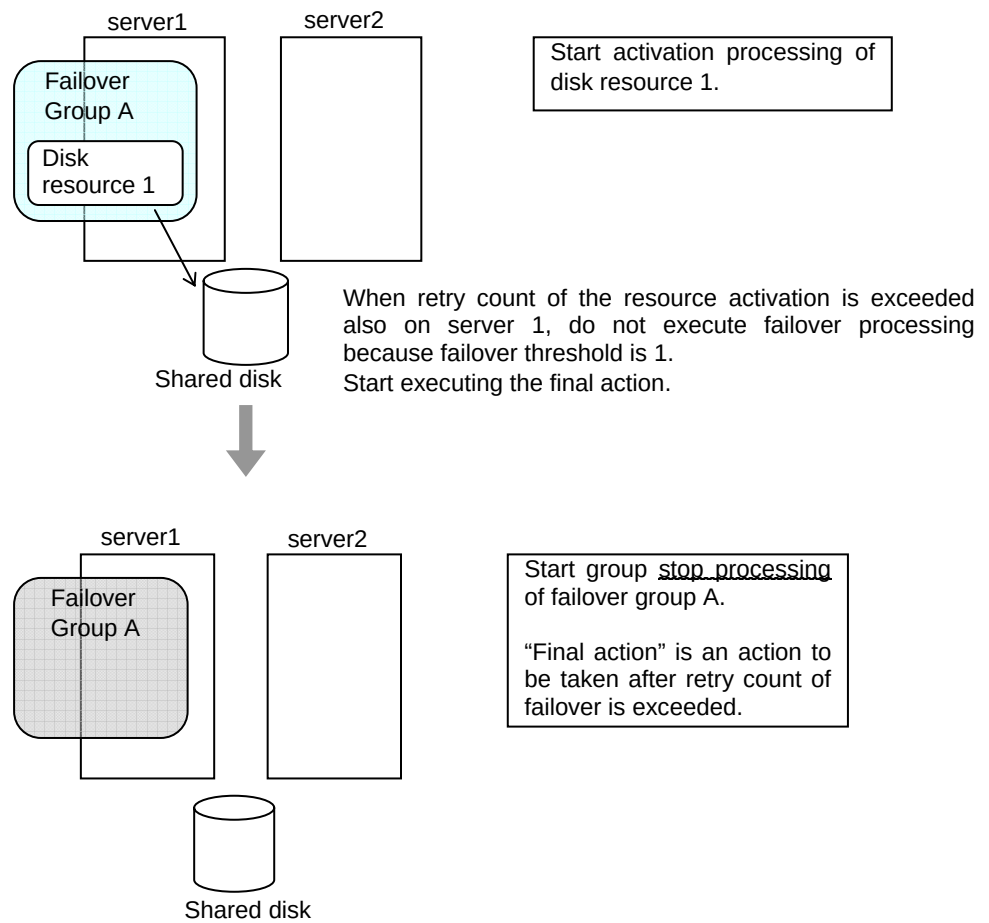
The following describes how an error in activation of a group resource is detected.

When the following settings are configured:

|                                   |            |
|-----------------------------------|------------|
| Retry Count at Activation Failure | 3 times    |
| Failover Threshold                | 1 time     |
| Final Action                      | Stop Group |







## Reboot count limit

If **Stop cluster daemon and shutdown OS**, **Stop cluster daemon and reboot OS**, **keepalive reset**, **keepalive panic**, **BMC reset**, **BMC power off**, **BMC power cycle** or **BMC NMI** 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 `clpregctrl` command to reset this number. See “Reboot count control command” in Chapter 3, “ExpressCluster command reference” for details of the `clpregctrl` command.

---

The following describes the flow of operations when the limitation of reboot count is set as shown below:

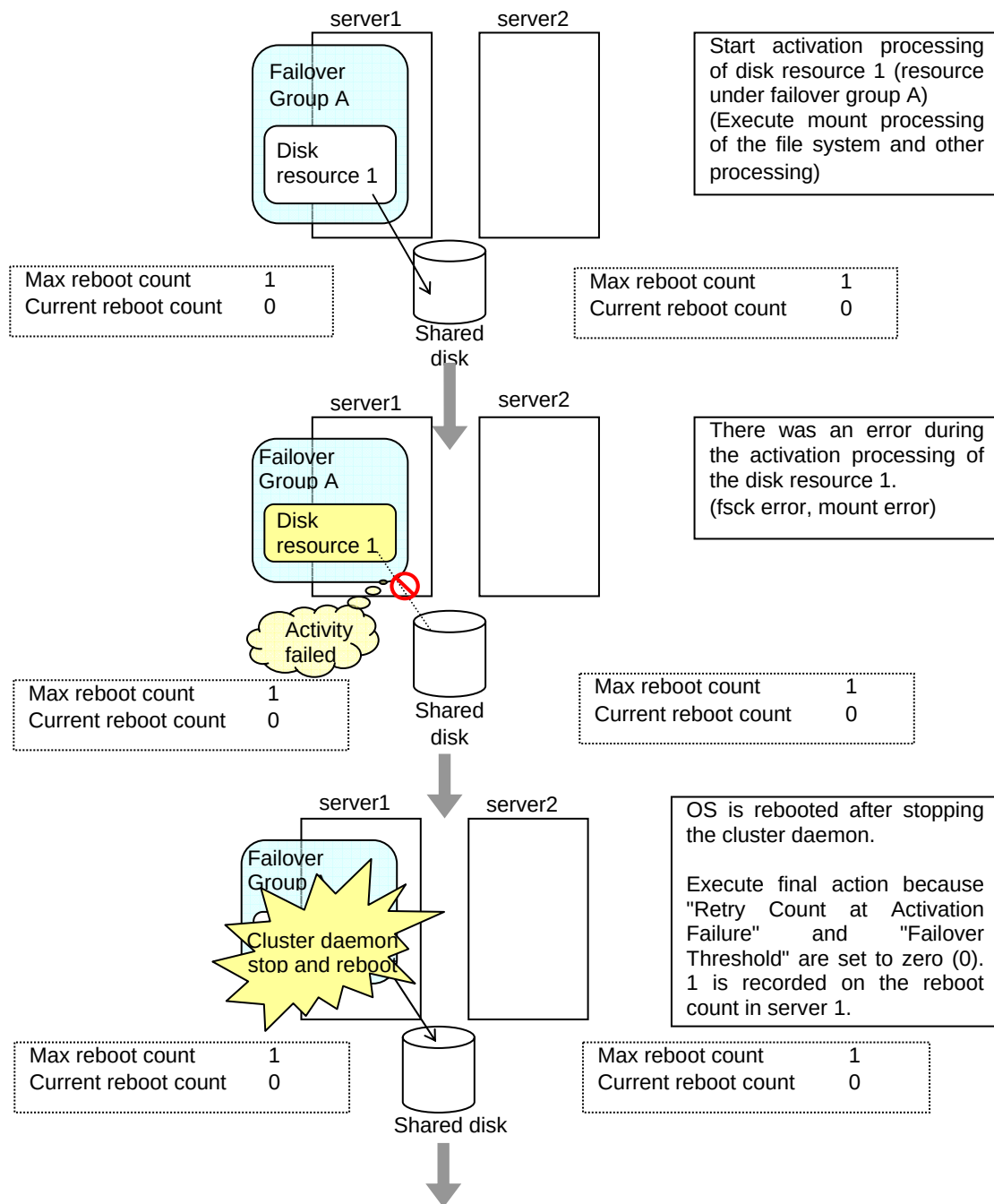
As a final action, **Stop cluster daemon and reboot OS** is executed once because the maximum reboot count is set to one (1).

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.

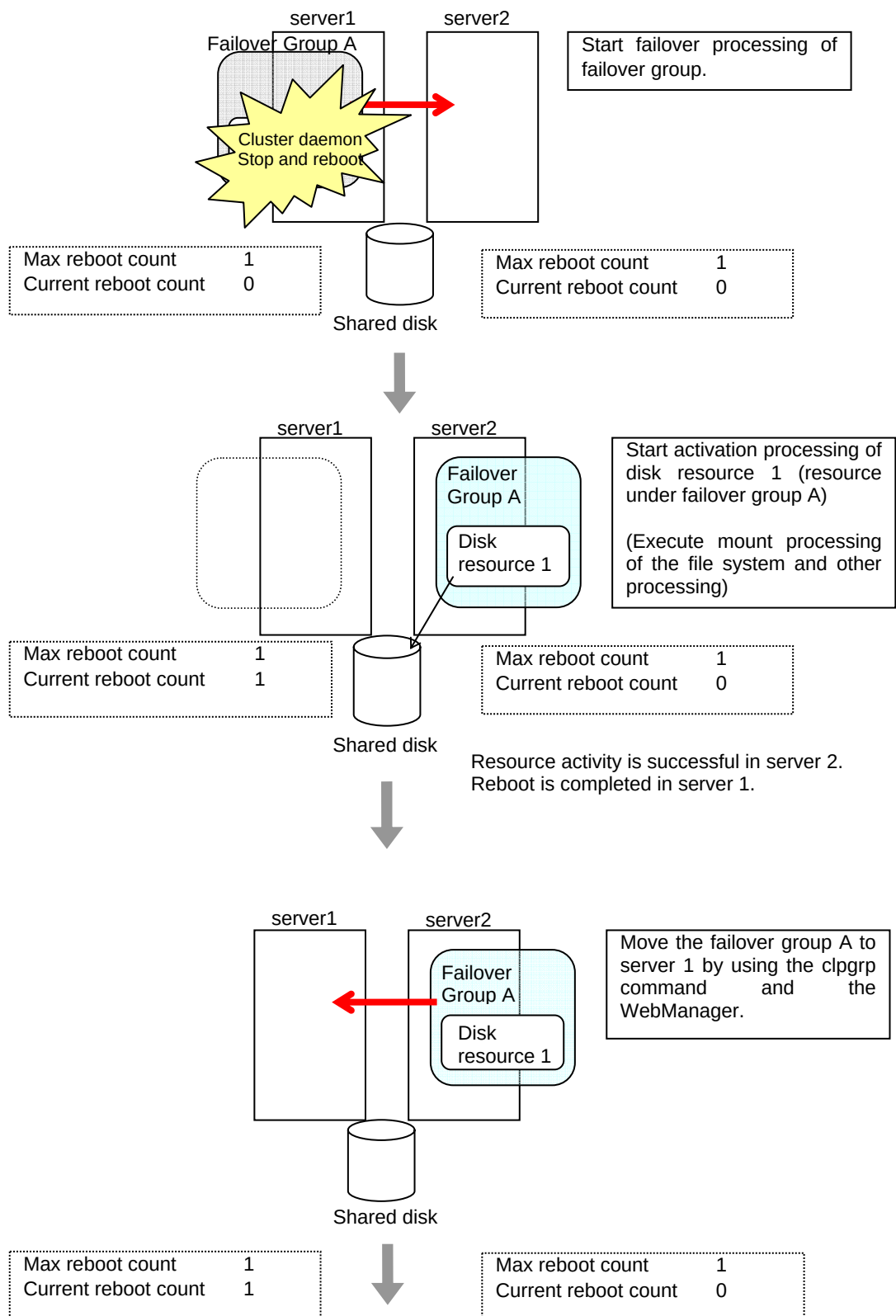
### Setting example

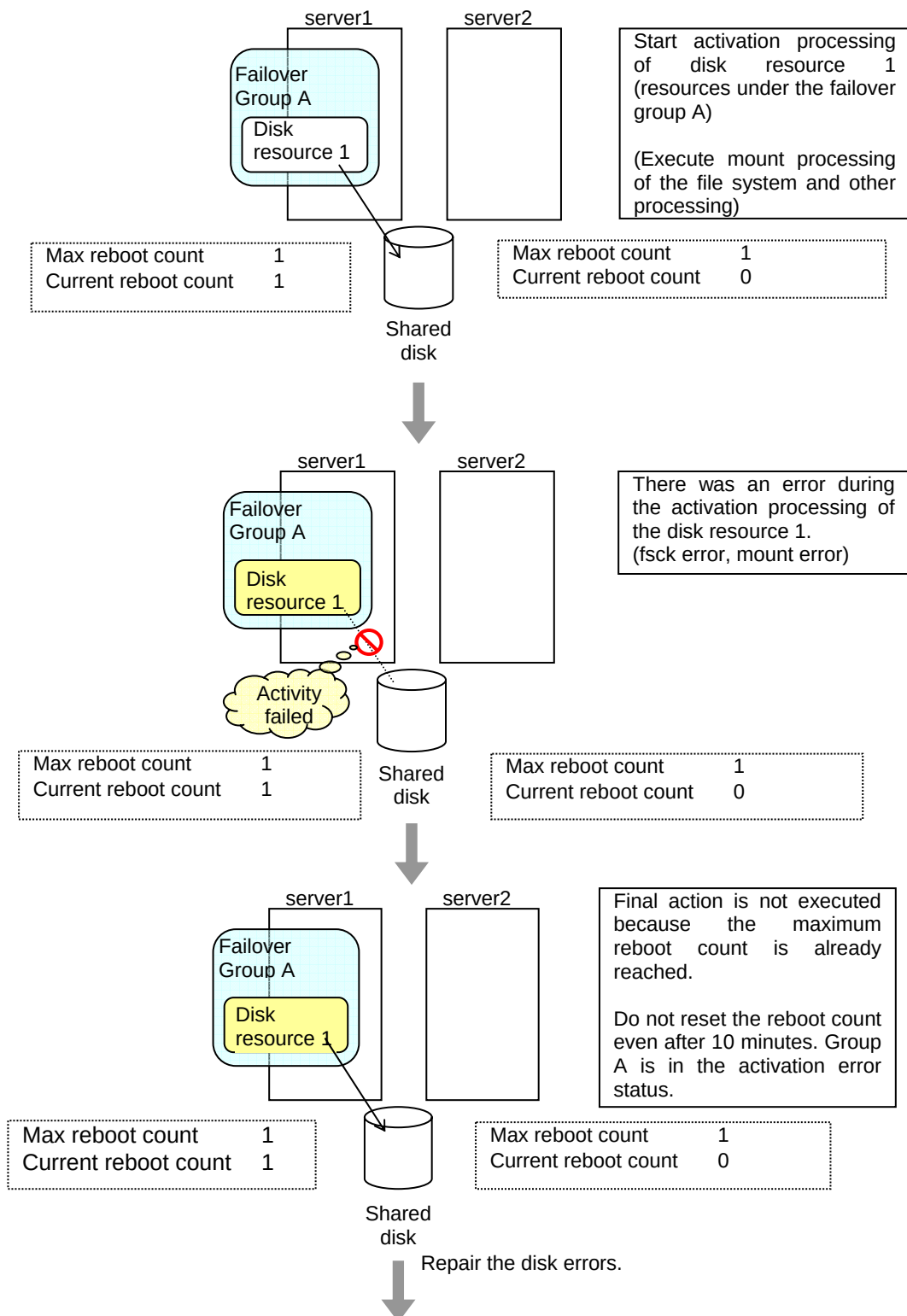
|                                   |                                   |
|-----------------------------------|-----------------------------------|
| Retry Count at Activation Failure | 0 time                            |
| Failover Threshold                | 0 time                            |
| Final Action                      | Stop cluster daemon and reboot OS |
| Max Reboot Count                  | 1 time                            |

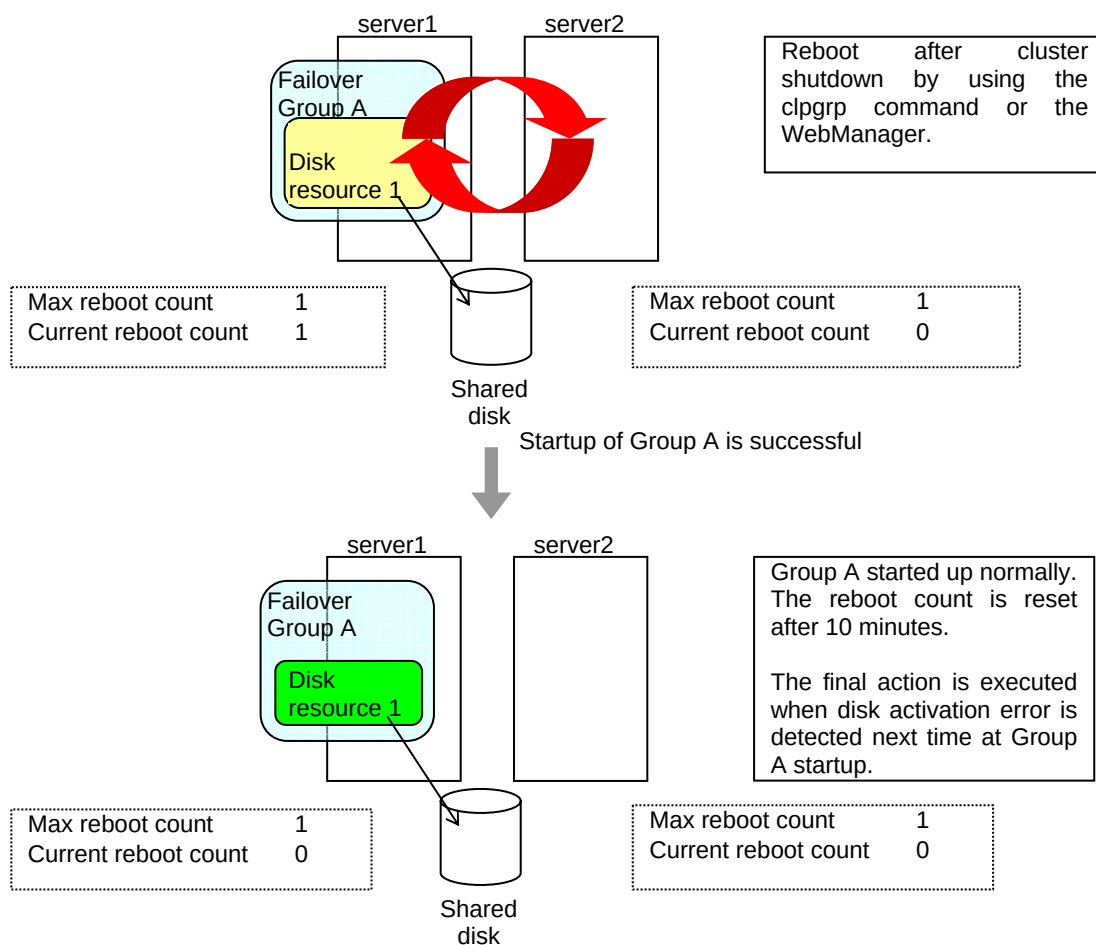
Max Reboot Count Reset Time 10 minutes











## Resetting the reboot count

Run the `clpregctl` command to reset the reboot count. For details on the `clpregctl` command, see Chapter 3, “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 (within 127 bytes) 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)

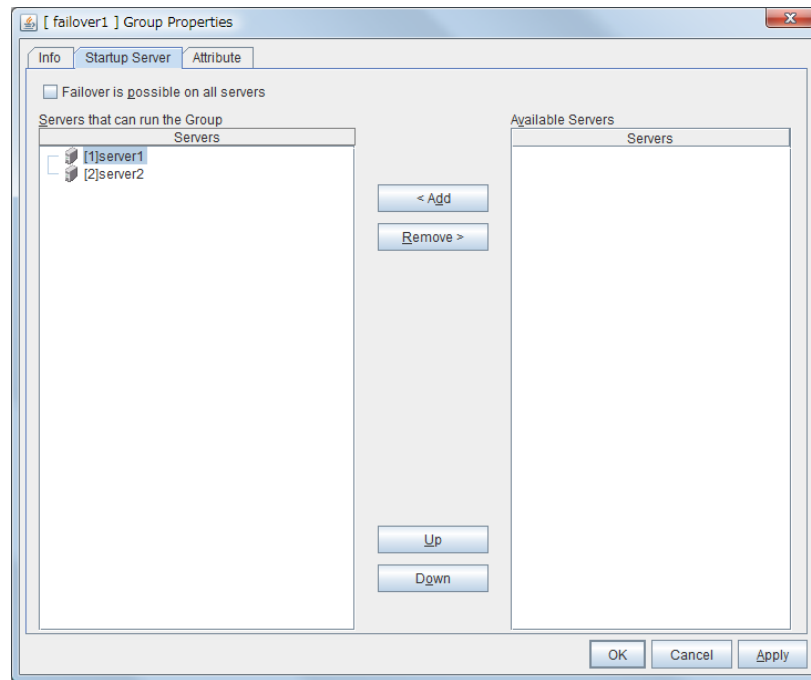
There are two types of settings for the server that starts up the group: starting up the group on all servers or on only the specified servers and server groups that can run the group.

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 2 “Functions of the Builder.”

When selecting servers and server groups that can run the group, you can select any server or server group from those registered to the cluster. You can also change the startup priority of servers and server groups that can run the group.

Run the following steps when setting the server group which start up the failover 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. When setting the servers that can run the group, check **Use Server Group Settings** in **Info** tab off.
3. Select the **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.



4. 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 to 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**.

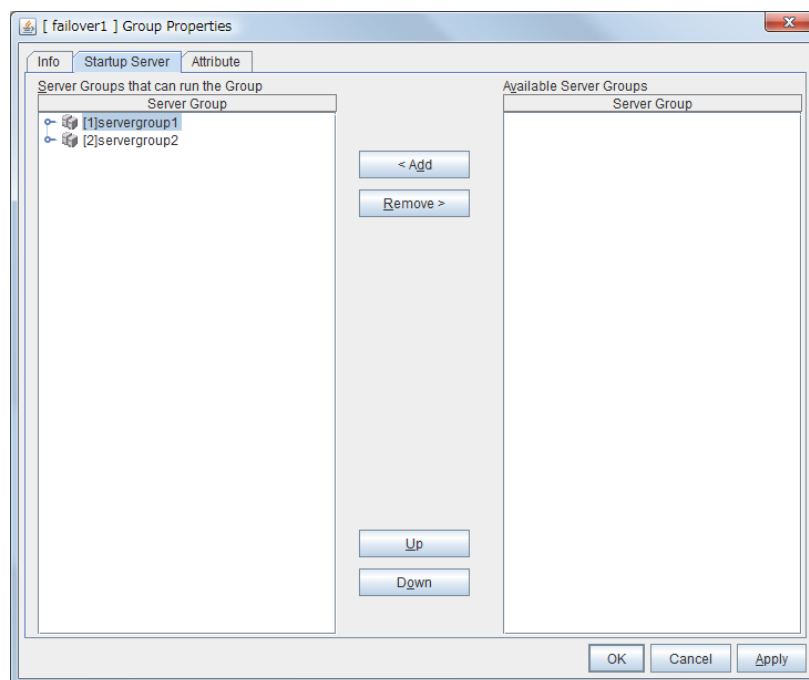
#### **Up, Down**

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.

## 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 starts up 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. When using the settings of the server group, check **Use Server Group Settings** on.
3. 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.



4. 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

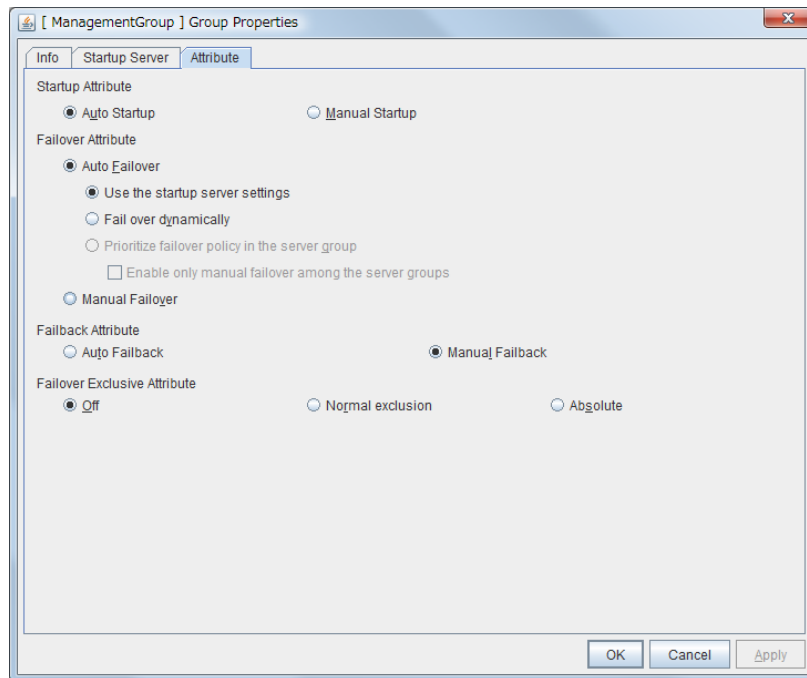
Use this button to remove a server group from server groups you use. Select a server group that you want to remove from **Available Server Groups**, and then click **Remove**. The server is added to **Server Groups that can run the Group**.

### **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 Attribute**, **Failback Attribute**, and **Failover Exclusive 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 explicitly start the group from the WebManager or by using the clpgrp command (active state).

### Failover Attribute

Select if the failover is automatically performed when a server fails.

- **Auto Failover**  
Failover is executed automatically. In addition, the following options can be selected.
  - **Use the startup server settings**  
This is the default setting.
  - **Fail over dynamically**  
The failover destination is determined by considering the statuses of each server's monitor or failover group at the time of the failover.



If this option button is selected, all the failover exclusive attribute and failback attribute parameters are reverted to the default values and grayed out.

- **Prioritize the failover policies in the server group**

This function controls failovers between sites (between server groups).

However, if no server group is specified for the failover group, the display for failovers between sites is grayed out.

If this option button is selected, the failover exclusive attribute is changed to the default value and the display is grayed out. The **Allow only manual failovers between sites** check box can be selected only when this option button is selected.

If the **Prioritize the failover policies in the server group** option button is selected, the failover policies in the same server group take priority when determining the failover destination.

If the **Prioritize the failover policies in the server group** option button and **Allow only manual failover between sites** check box are selected, failovers across server groups are not automatically performed. Manually move groups between server groups.

- **Manual Failover**  
Failover is not executed automatically.

#### **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.

- **Auto Failback**  
Failback is executed automatically.
- **Manual Failback**  
Failback is not executed automatically.

#### **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).

# Displaying and changing the settings of group resources

You can display and change the settings of the group resources under the **Resource Properties** tab 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**). You can only enter one byte English characters.

---

**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)

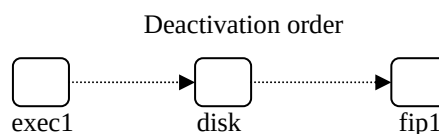
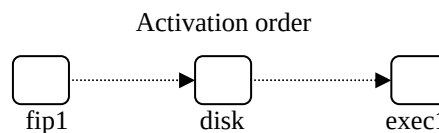
By specifying dependency among group resources, the order of activation can be specified.

- ◆ 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 the relevant group.

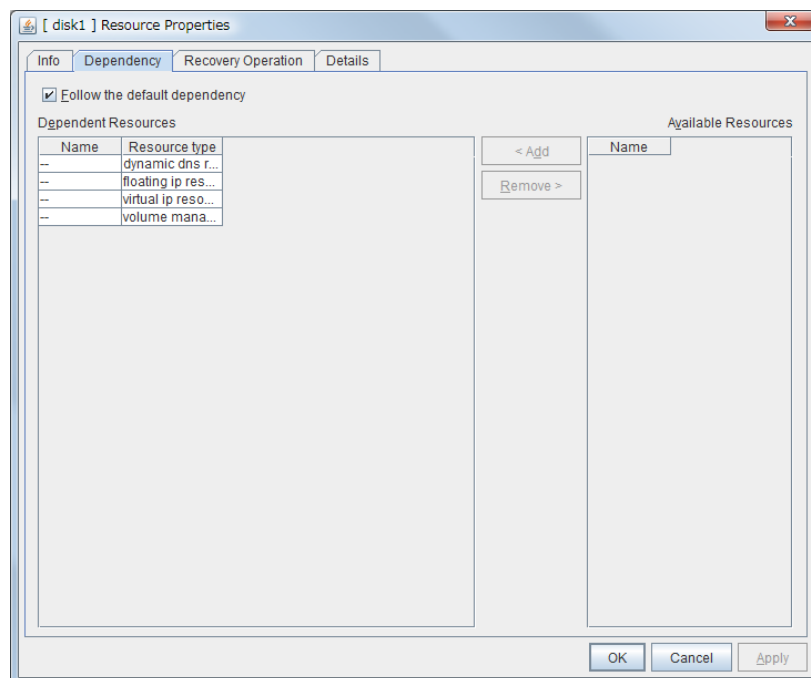
| Resources |       | Entire Dependency       |                      |
|-----------|-------|-------------------------|----------------------|
| Depth     | Name  | Dependent Resource Name | Type                 |
| 0         | fip1  | none                    |                      |
| 1         | disk1 | 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. Added group resources in Dependent Resources are also not shown either.



**Follow the default dependence**

Specify 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 2, “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**.

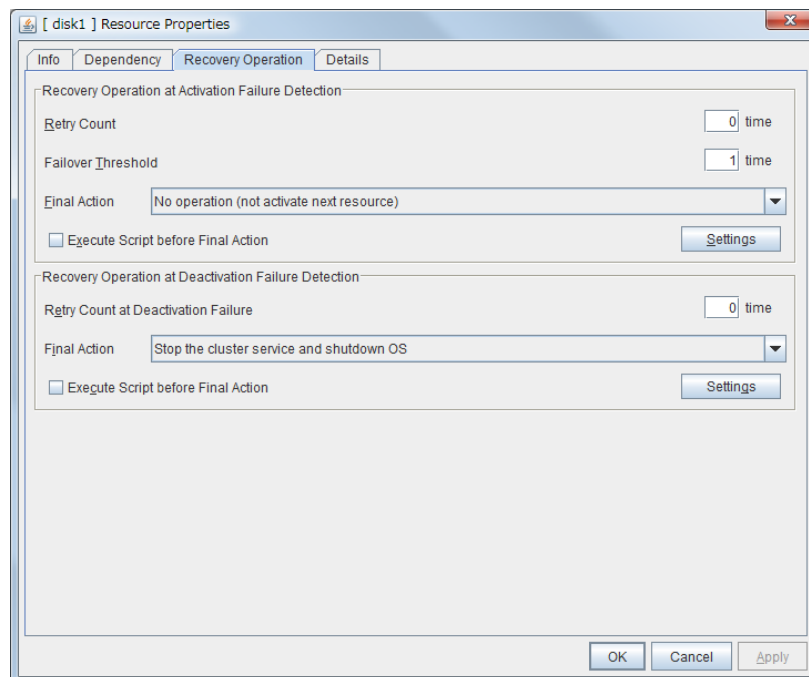
**Remove**

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 **Recovery Operation** 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 **Recovery Operation** 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 the number of 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 the number of 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 the next resource):**  
Activates a group resource which depends on the group resource where an activation error is detected.
- **No Operation (Do not activate the 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 service:**  
Stops the cluster service of the server of which an activation error is detected.
- **Stop cluster service and shutdown OS:**  
Stops the cluster service of the server of which an activation error is detected, and shuts down the OS.
- **Stop cluster service and reboot OS:**  
Stops the cluster service of the server where an activation error is detected, and restarts the OS.
- **keepalive Reset:**  
Resets the OS with using the clpka driver.

---

**Note:**

If resetting keepalive fails, the OS is shut down.

---

- **keepalive Panic:**  
Performs the OS panic with using the clpka driver.

---

**Note:**

If performing the keepalive panic fails, the OS is shut down.

---

- **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 is not installed or the ipmitool 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 is not installed or the ipmitool 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 is not installed or ipmitool 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 is not installed or ipmitool command does not run.

#### **Execute Script before Final Action**

Select whether or not to run the script before executing final action when an activation failure is detected.

- When selected:  
A script/command runs before executing final action. To configure the script/command setting, click **Settings**.
- When not selected:  
No script/command is run.

#### **Retry Count at Deactivation Failure (0 to 99)**

Enter the number of 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 (Do not deactivate next resource):**  
Do not deactivate a group resource which depends on the group resource where an error in deactivation 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 cluster service and shutdown OS:**  
Stop the cluster daemon on the server of which error in deactivation is detected, and shut down the OS.
- **Stop cluster service and reboot OS:**  
Stop the cluster daemon on the server where an error in deactivation is detected, and restart the OS.
- **keepalive Reset:**  
Resets the OS with using the clpka driver.

---

**Note:**

If resetting keepalive fails, the OS is shut down.

---

- **keepalive Panic:**  
Performs the OS panic with using the clpka driver.

---

**Note:**

If performing the keepalive panic fails, the OS is shut down.

---

- **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 is not installed or the ipmitool 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 is not installed or the ipmitool 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 is not installed or ipmitool 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 is not installed or ipmitool command does not run.

#### Execute Script before Final Action

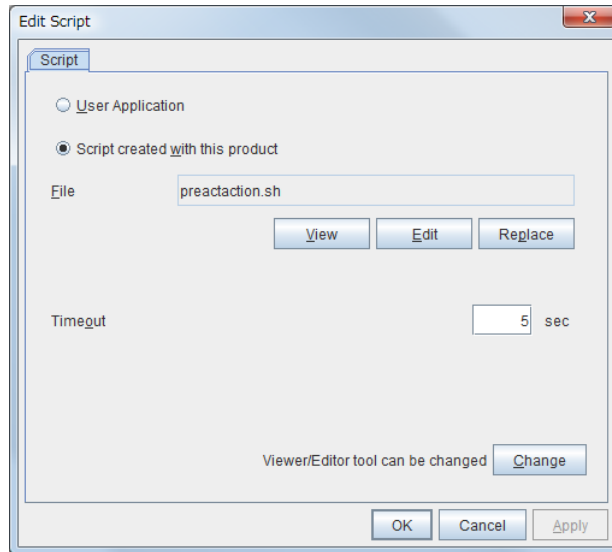
Select whether script is run or not before executing final action when a deactivation failure is detected.

- **When selected:**  
A script/command is run before executing final action. To configure the script/command settings, click **Settings**.
- **When not selected:**  
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 **Recovery Operation** 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 **Recovery Operation** 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 applied. 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 apply 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

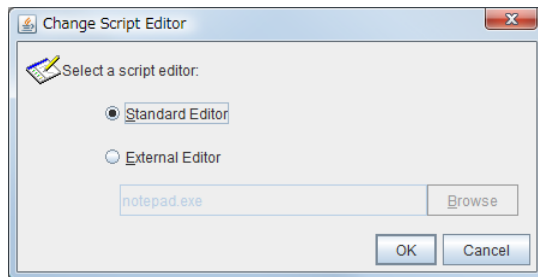
Click here to replace the contents of a script file with the contents of the script file that you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not 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 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.

- Windows: Notepad (notepad.exe which is detected by the user's search path)

## External Editor

Select this option to specify a script editor arbitrarily. Click **Browse** to select an editor.

## 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.

| Groups Name: Groups |                                                                                              |                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|                     | server1<br> | server2<br> |
| Group Status        |                                                                                              |                                                                                                |
| ManagementGroup     | Online                                                                                       | Offline                                                                                        |
| failover1           | Online                                                                                       | Offline                                                                                        |

Group Status

Status of each group

## 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: failover1 |         | Details |
|-----------------------|---------|---------|
| Properties            | Value   |         |
| Comment               |         |         |
| Status                | Online  |         |
| Started Server        | server1 |         |
| Resource Status       |         |         |
| disk1                 | Online  |         |
| md1                   | Online  |         |

If you click **Details** button, the following information is displayed:

| Group Detailed Properties (failover1) |                                                    |
|---------------------------------------|----------------------------------------------------|
| Properties                            | Value                                              |
| Name                                  | failover1                                          |
| Type                                  | failover                                           |
| Startup Attribute                     | Auto Startup                                       |
| Failover Exclusive Attribute          | No Exclusion                                       |
| Failback Attribute                    | Manual Failback                                    |
| Failover Attribute                    | Auto (The order of servers that can run the Group) |
| Servers that can run the Group        | (1)server1                                         |
|                                       | (2)server2                                         |

Name:

Group name

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            | 2.1.0-1~          |
| Floating IP resource     | 2.1.0-1~          |
| Virtual IP resource      | 2.1.0-1~          |
| Dynamic DNS resource     | 3.0.0-1           |
| Virtual machine resource | 3.0.0-1           |

---

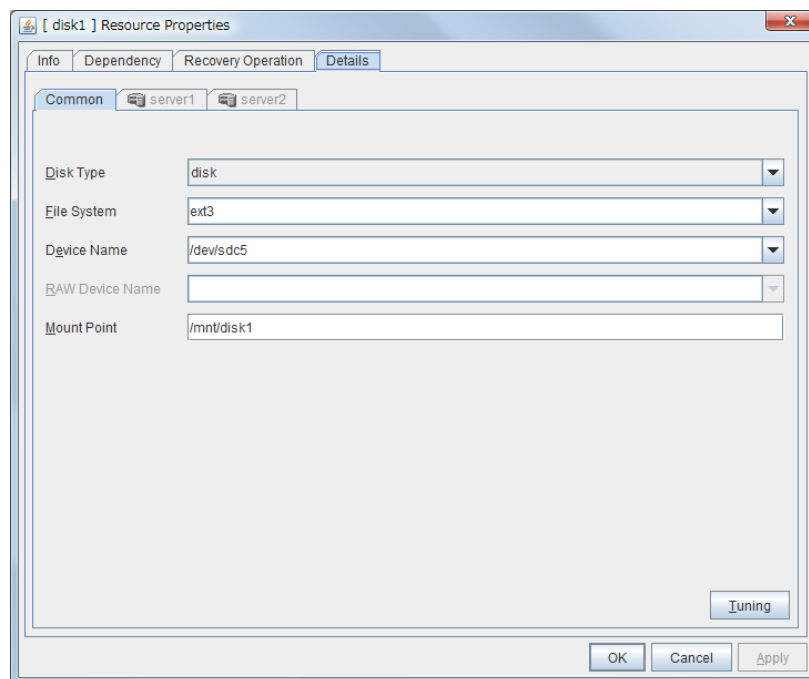
### Note:

Some parameters of virtual IP resources should be configured for individual servers.

---

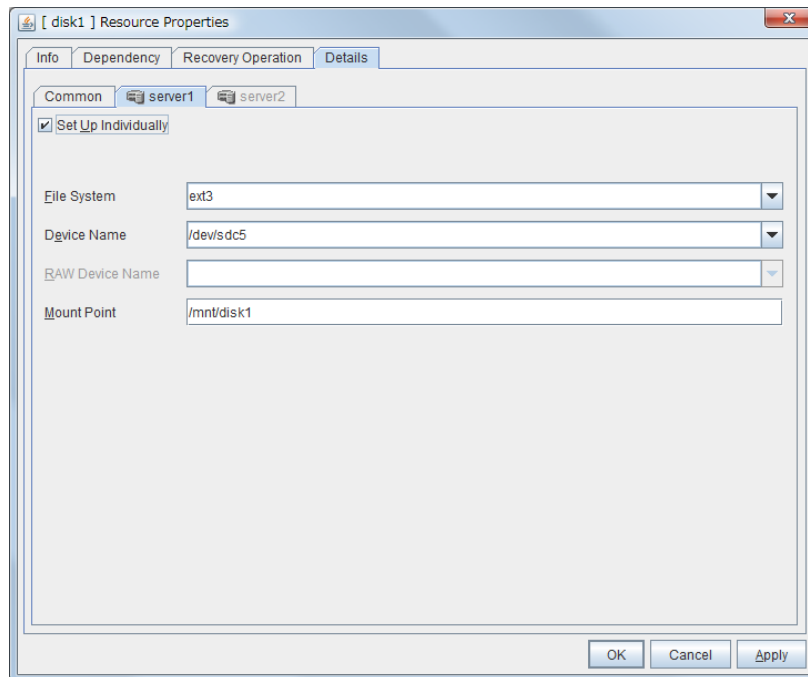
For parameters that can be set for individual servers, see the descriptions of parameters on each group resource. On those parameters, the **Server Individual Setup** icon is displayed.

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**.

---

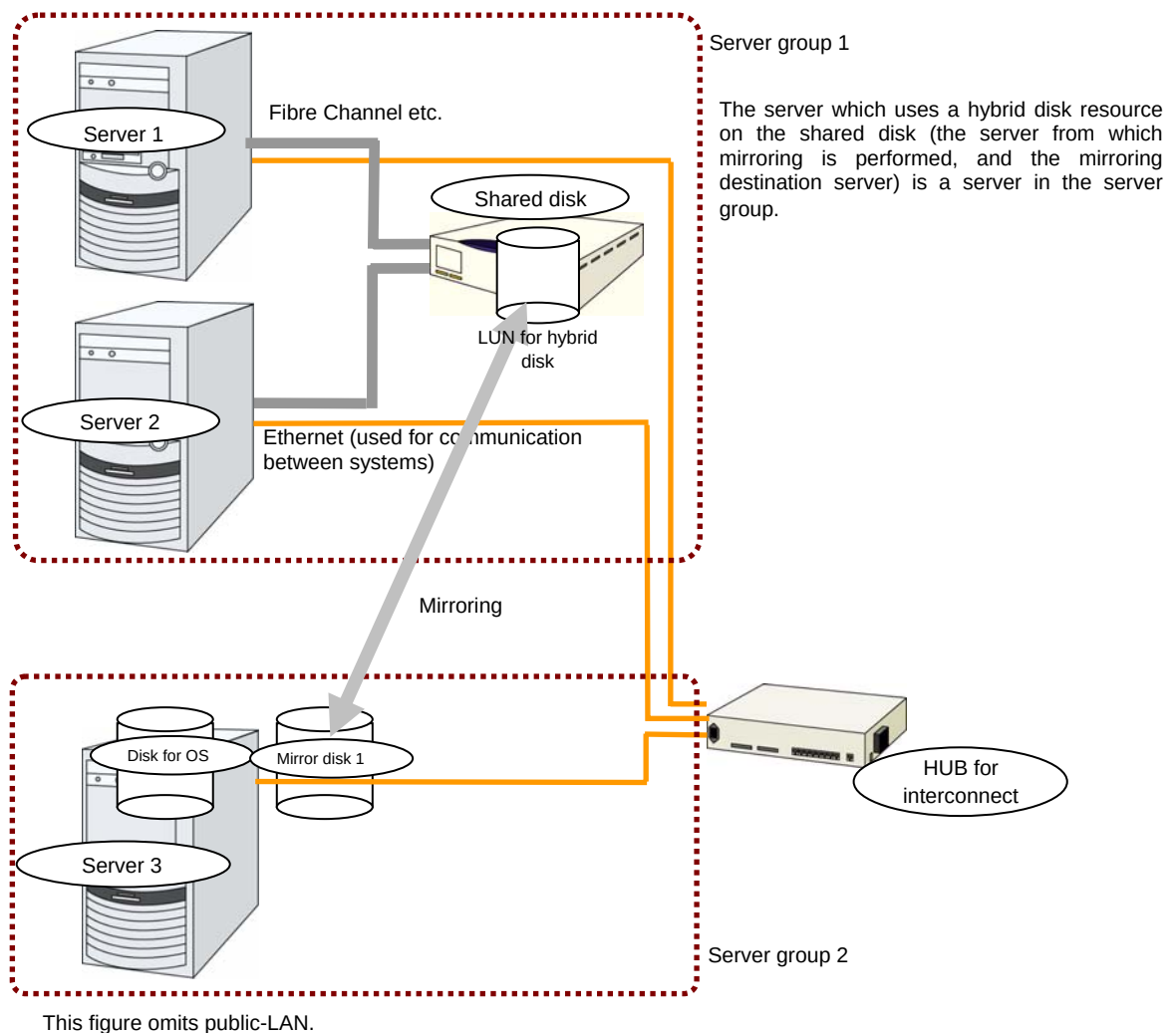
# Understanding server groups

This section explains about server groups.

Server groups are mainly 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 Definition** 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 Servers icon, and then click Properties.
2. Server Common Properties is displayed. Click Settings in Server Group.
3. Server Group is displayed. Click Rename.
4. 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 Server icon, and then click Properties.
2. Server Common Properties is displayed. Click Settings in Server Group.
3. Server Group is displayed. Click Properties.
4. On the Info tab, the server group name and comment are displayed. Enter a new comment.

---

**Note:**

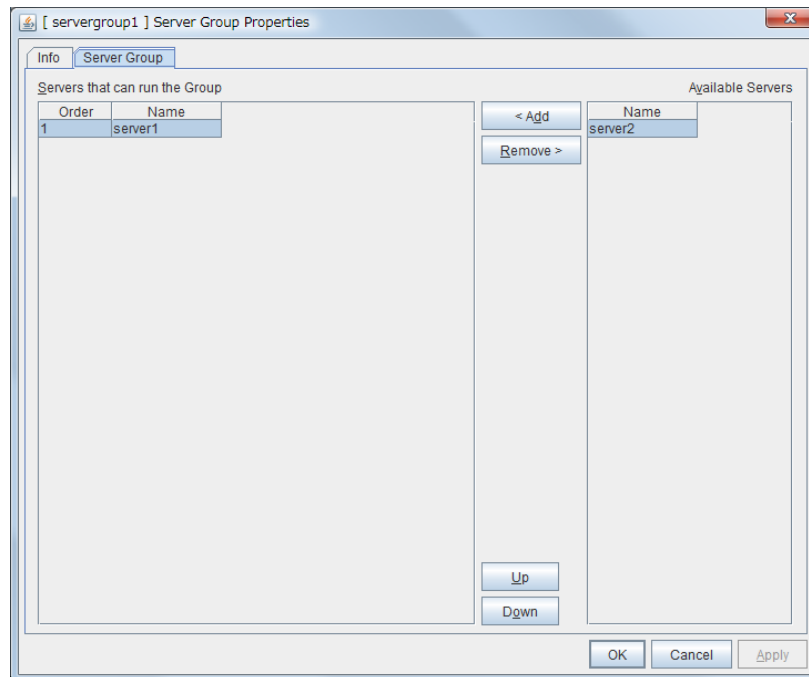
You cannot change the server group name on the **Info** tab. To change the group name, see above "Renaming a server group (Server group properties)".

---

## 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 **Servers** icon, and then click **Properties**.
2. **Server Common Properties** is displayed. Click **Settings** in **Server Group**.
3. **Server Group** is displayed. Click **Properties**.
4. Select the **Server Group** tab. 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.



5. 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 Servers object  . The following will be displayed in the list view.

| Servers Name: Servers               |                                                                                              | Server Group List                                                                              |
|-------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|                                     | server1<br> | server2<br> |
| Heartbeat Status                    |                                                                                              |                                                                                                |
| lanhb1                              | Normal                                                                                       | Normal                                                                                         |
| lanhb2                              | Normal                                                                                       | Normal                                                                                         |
| lanhb1                              | Normal                                                                                       | Normal                                                                                         |
| lanhb2                              | Normal                                                                                       | Normal                                                                                         |
| diskhb1                             | Normal                                                                                       | Normal                                                                                         |
| Network Partition Resolution Status |                                                                                              |                                                                                                |

3. Click **Server Group List** button.

| Server Group List |             |
|-------------------|-------------|
| ServerGroup Name  | Server Name |
| servergroup1      | server1     |
| servergroup2      | server2     |

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. You can 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

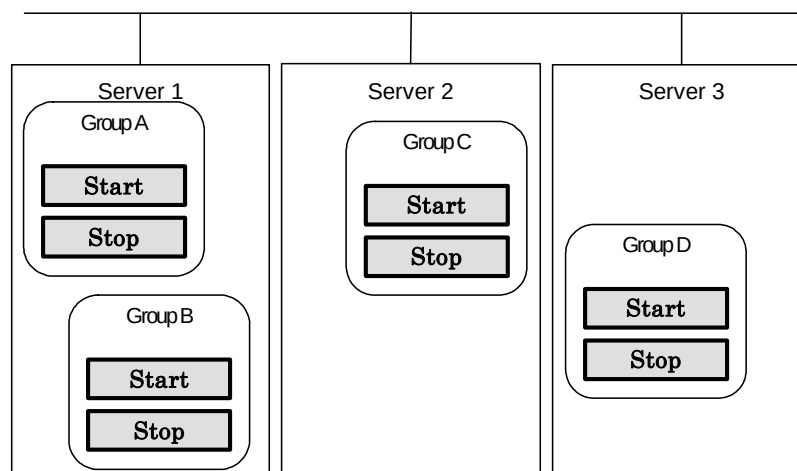
By default, exec resources depend on the following group resource types:

| Group resource type     |
|-------------------------|
| FIP Resource            |
| Virtual IP resource     |
| Disk Resource           |
| NAS Resource            |
| VM Resource             |
| Volume Manager Resource |
| Dynamic DNS 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.



Start:     Start script  
Stop:     Stop script

## 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<br>...script starting factor              | START                         | The script was run:<br>- by starting a cluster;<br>- by starting a group;<br>- on the destination server by moving a group;<br>- on the same server by restarting a group due to the detection of a monitor resource error; or<br>- 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:<br>- by the failure of the server;<br>- due to the detection of a monitor resource error; or<br>- because activation of group resources failed.                                                                                                                                       |
| CLP_FACTOR<br>...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<br>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<br>...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<br>...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<br>...partition connection information on shared disks                        | SUCCESS                                   | There was no partition where connection had failed.                                                                                                                                                                                      |
|                                                                                        | FAILURE                                   | There was one or more partition where connection had failed.                                                                                                                                                                             |
| CLP_PRIORITY<br>... 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).<br><br>If CLP_PRIORITY is 1, it means that the script is run on the primary server. |
| CLP_GROUPNAME<br>...Group name                                                         | Group name                                | Represents the group name that the script belongs.                                                                                                                                                                                       |
| CLP_RESOURCENAME<br>...Resource name                                                   | Resource name                             | Represents the resource name that the script belongs.                                                                                                                                                                                    |
| CLP_PID<br>...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.

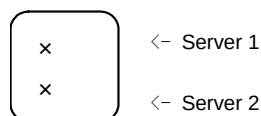
| Server | Server status                          |
|--------|----------------------------------------|
| O      | Normal (properly working as a cluster) |
| X      | Stopped (cluster is stopped)           |

(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:

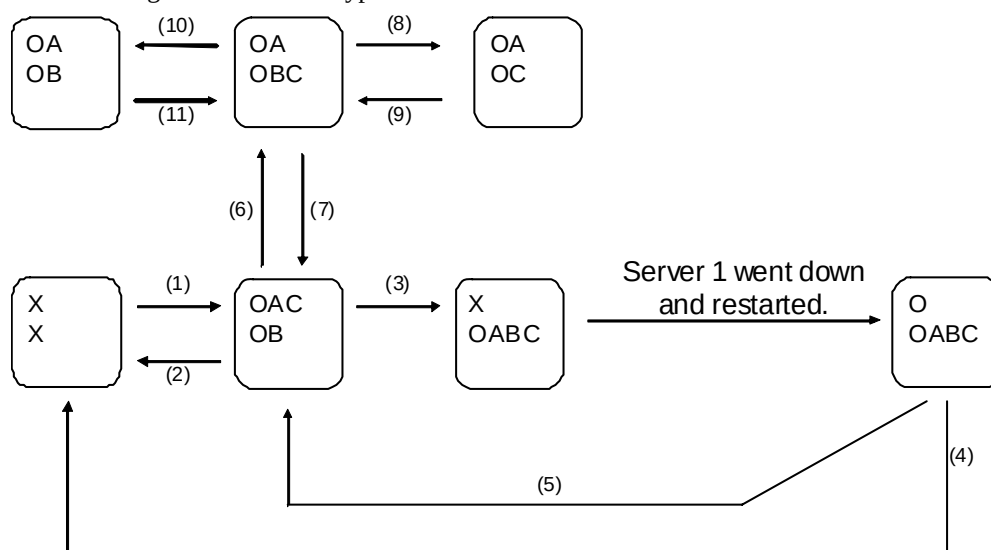
| Group | 1 <sup>st</sup> priority server | 2 <sup>nd</sup> priority server |
|-------|---------------------------------|---------------------------------|
| A     | server1                         | server2                         |
| B     | server2                         | server1                         |
| C     | server1                         | server2                         |

- ◆ The upper server is referred to as server1 and the lower one as server2.



<Cluster status transition diagram>

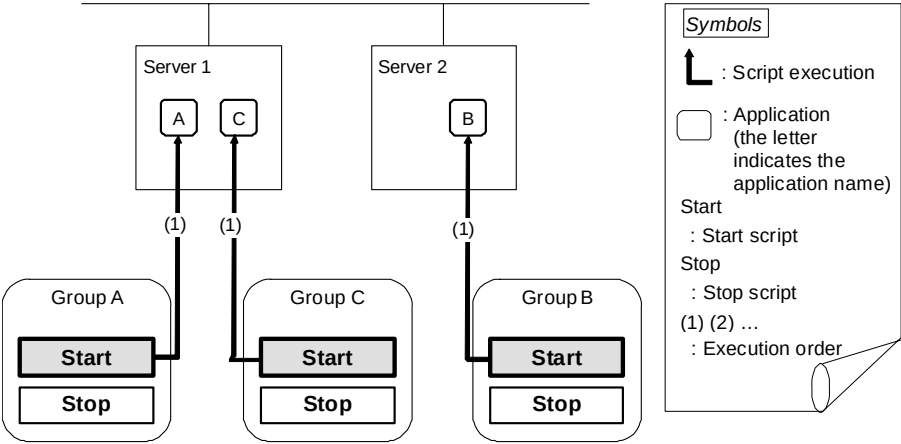
This diagram illustrates a typical status transition of cluster.



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.



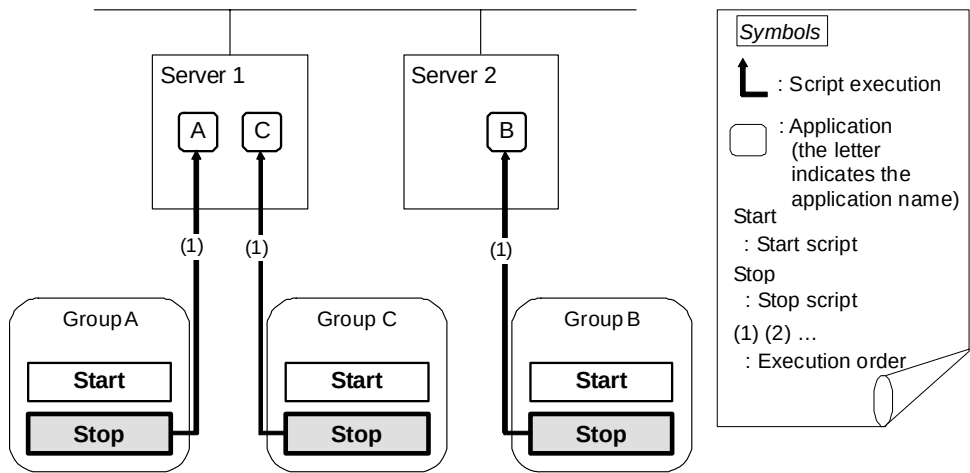
Environment variables for Start

| 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).



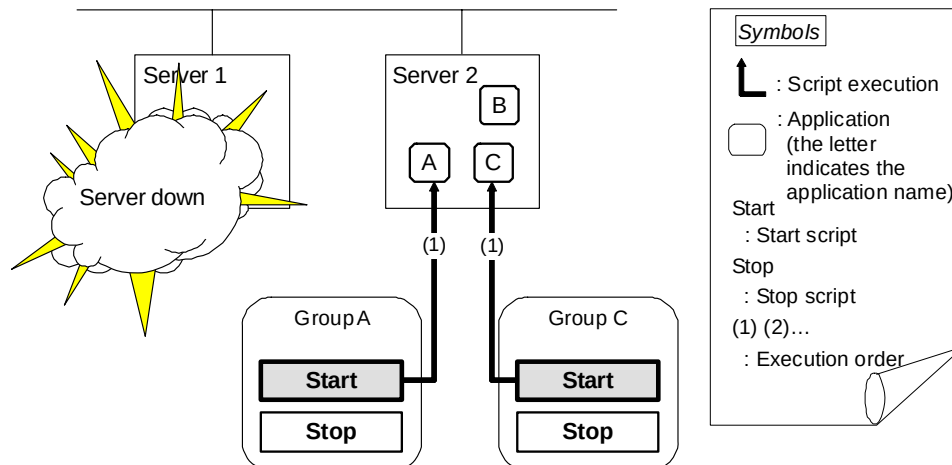
Environment variables for Stop

| 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.

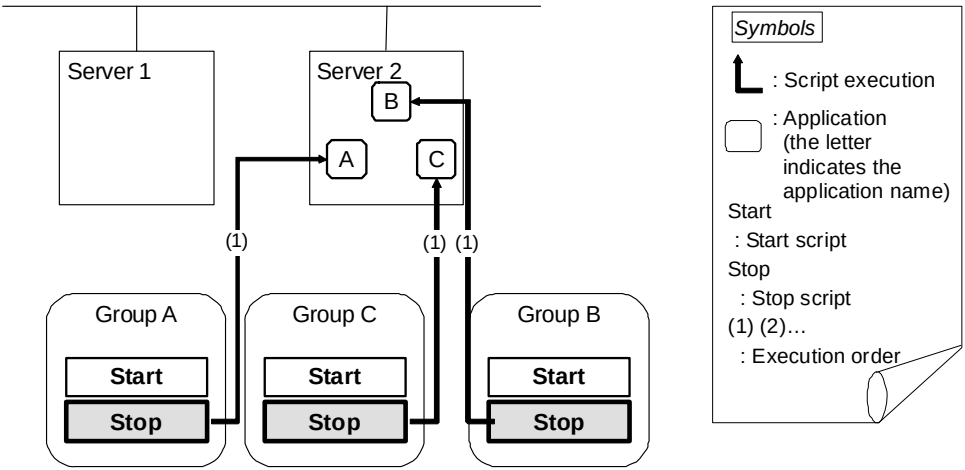


Environment variables for Start

| 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).

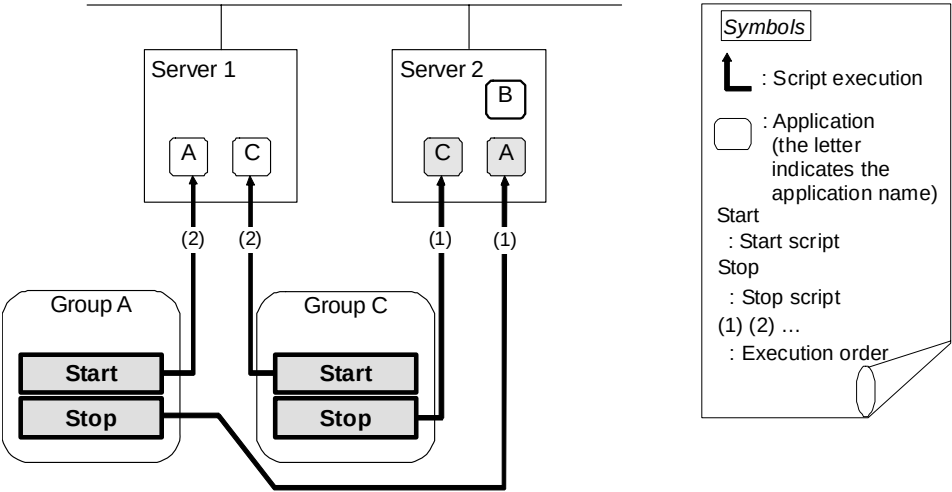


Environment variables for Stop

| 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                 |

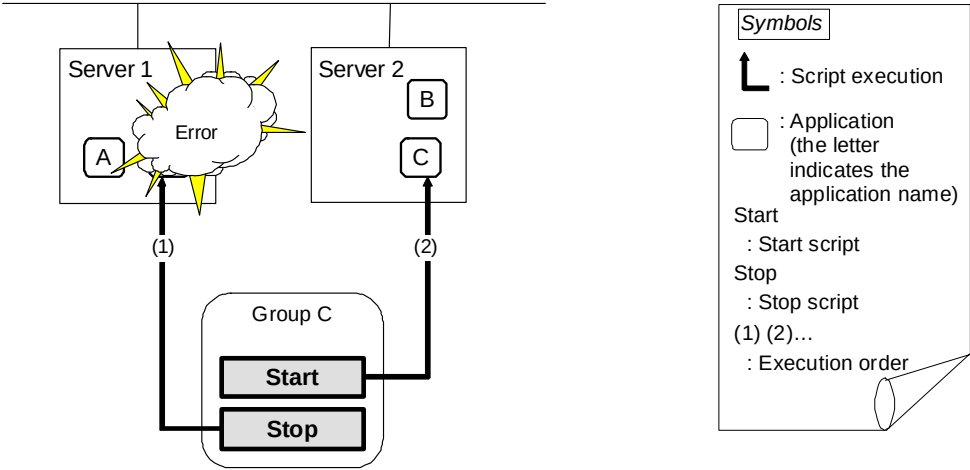
Environment variables for Start

| 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

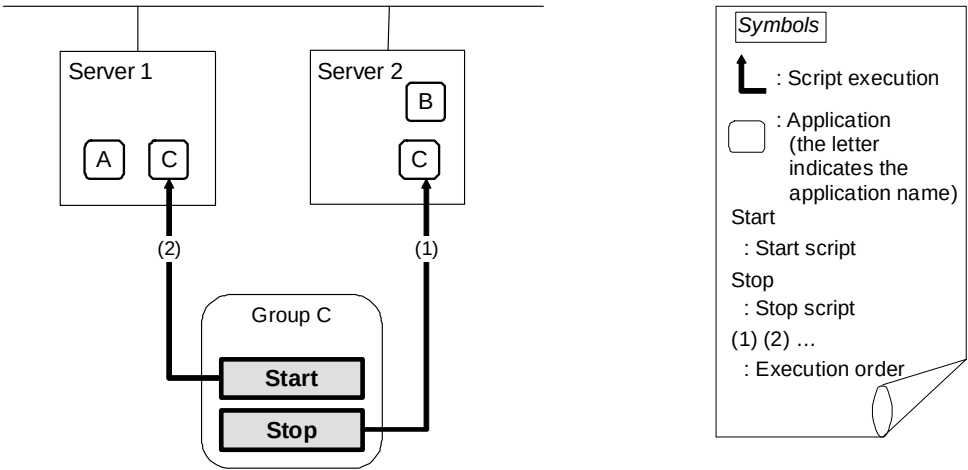
| Group | Environment variable | Value |
|-------|----------------------|-------|
| C     | CLP_EVENT            | START |
|       | CLP_SERVER           | HOME  |

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))

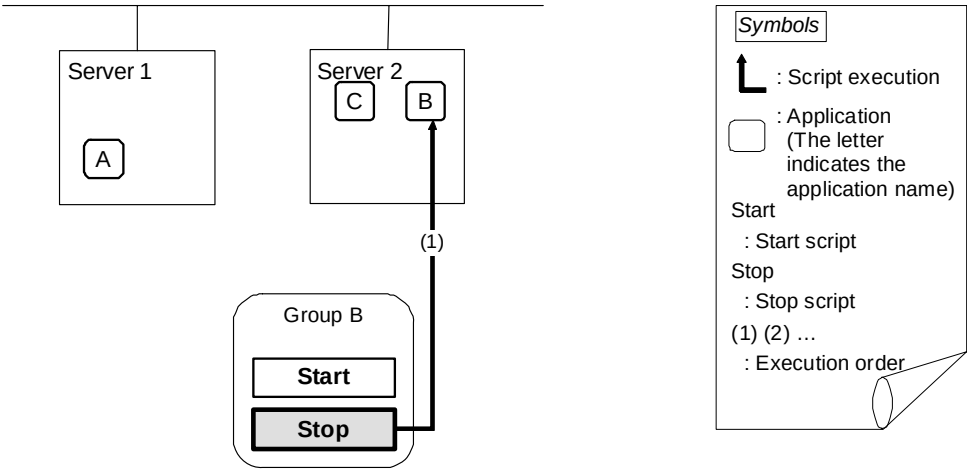
| Group | Environment variable | Value    |
|-------|----------------------|----------|
| C     | CLP_EVENT            | FAILOVER |
|       | CLP_SERVER           | OTHER    |

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.

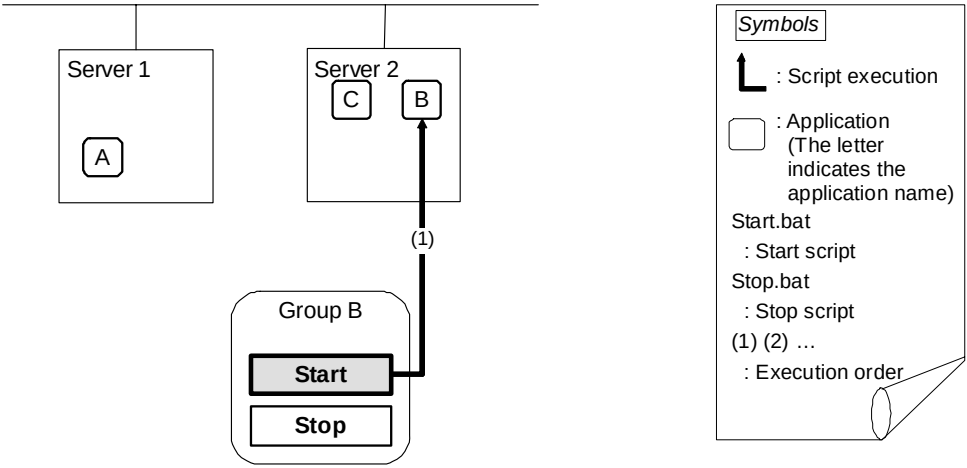


Stop

| Group | Environment variable | Value |
|-------|----------------------|-------|
| B     | CLP_EVENT            | START |
|       | CLP_SERVER           | HOME  |

(9) Starting up Group B

The start script of Group B is run on server2.

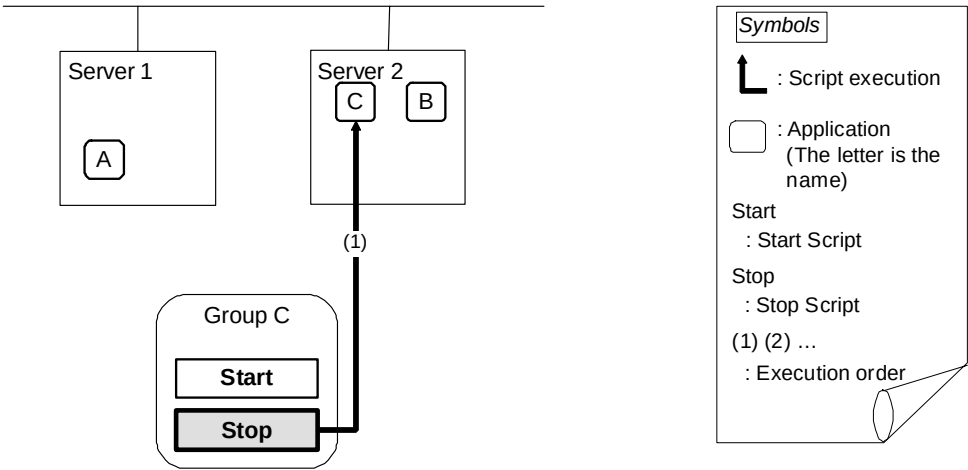


Start

| 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.

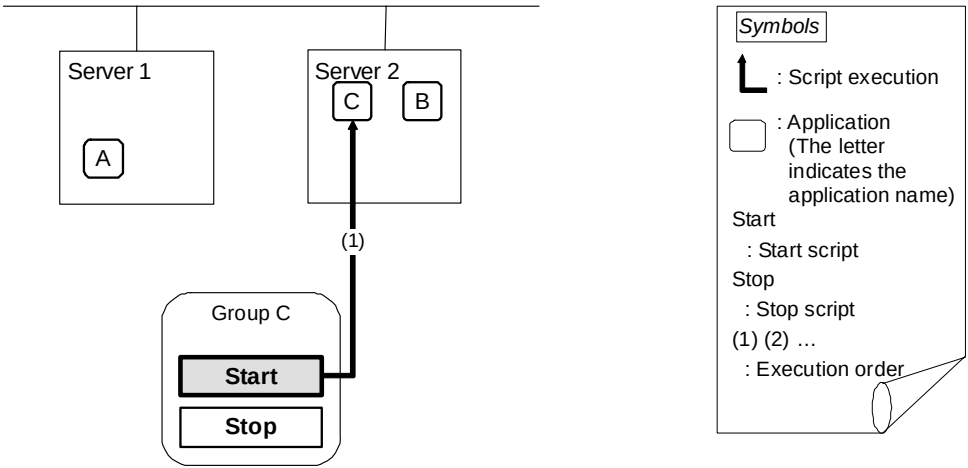


Stop

| 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.



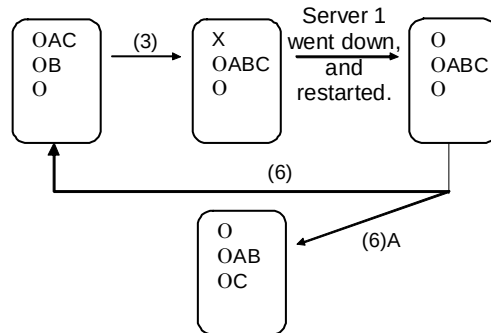
Start

| Group | Environment variable | Value |
|-------|----------------------|-------|
| C     | CLP_EVENT            | START |
|       | CLP_SERVER           | OTHER |



### Supplementary information 1

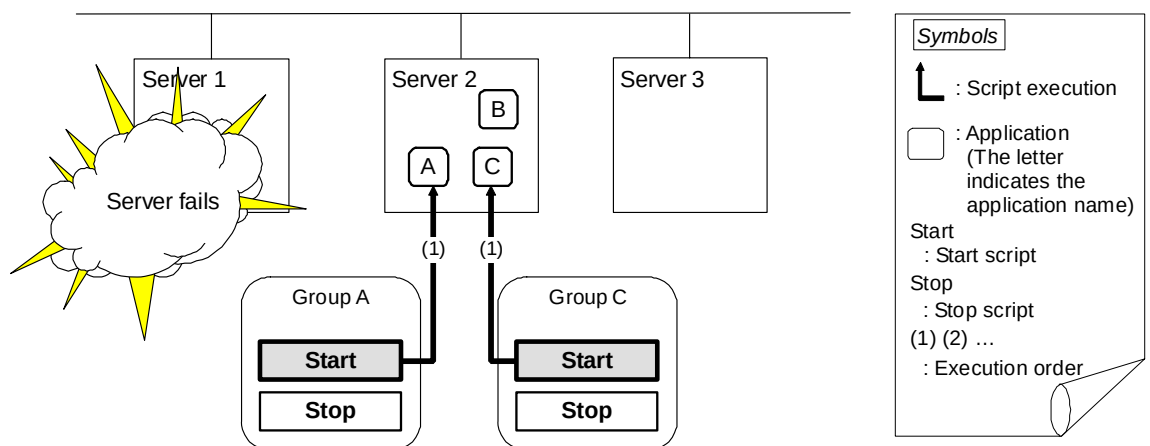
For a group that has three or more servers specified in the failover policy to behave differently on servers other than the primary server, use CLP\_PRIORITY instead of CLP\_SERVER(HOME/OTHER).



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.

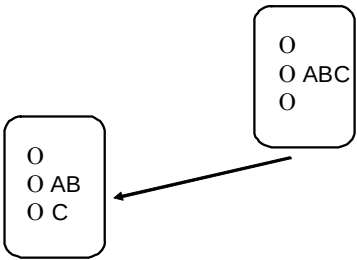
For a process to be performed only on the server that has the second highest priority failover policy, it is necessary to write CLP\_PRIORITY(=2) as the branching condition.



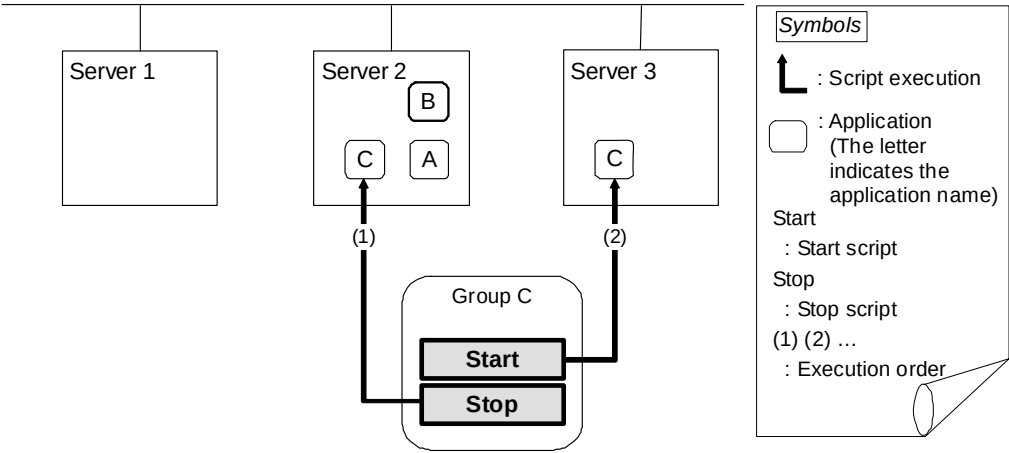
Environment variables for Start

| 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        |

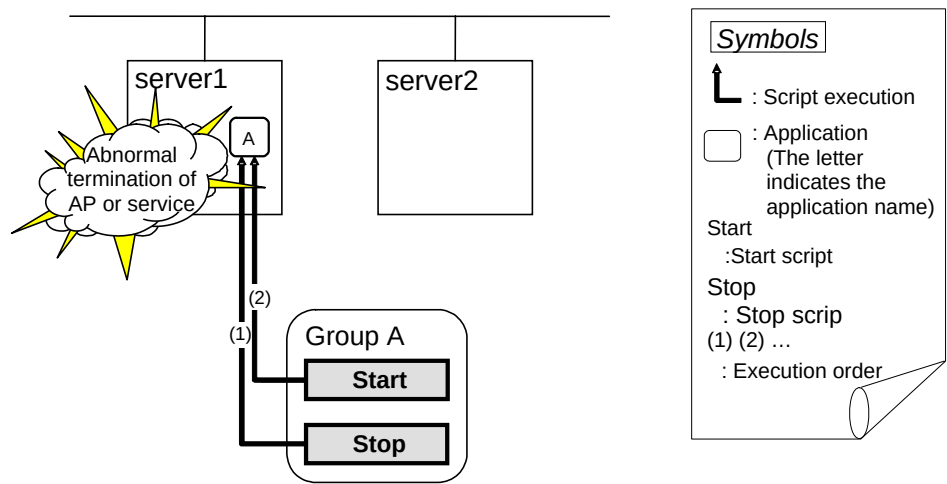
Environment variables for Start

| 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.

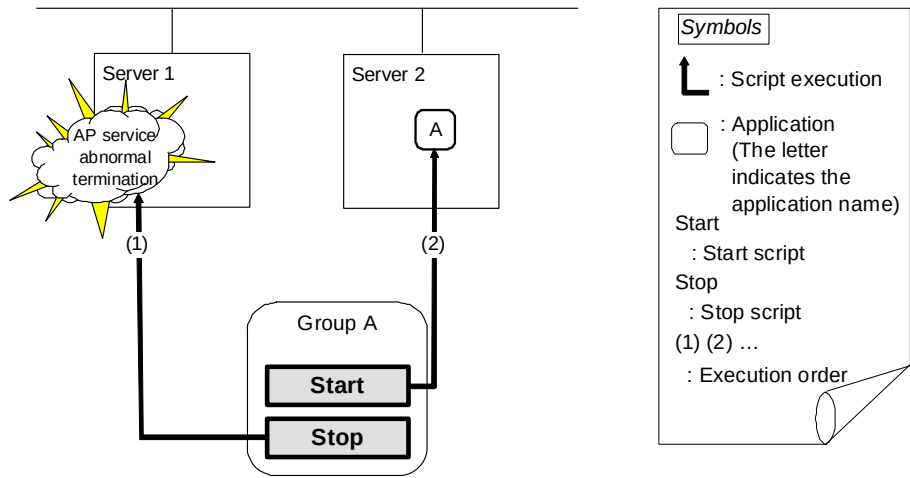
Environment variable for Stop

| 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 331.

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
```

```
if ["$CLP_DISK" = "SUCCESS"]
then
```

Refer to the DISK connection  
information environment variable and  
handle the error.

*Overview of processing:*  
Application's normal startup process  
*When to start this process:*  
(3) Failover at Server 1 down

```
if ["$CLP_SERVER" = "HOME"]
then
```

Refer to the environment variable of  
script executing factor and  
divide the processes.

*Overview of processing:*  
A process to be executed only when the application is started on the primary server  
after failover.  
*When to start this process:*

```
else
```

*Overview of processing:*  
A process to be executed only when the application is started on the non-primary  
server after failover.  
*When to start this process:*  
(3) Failover at Server 1 down

```
fi
```

```
else
```

Disk-related error handling

```
fi
```

```
else
```

```
#NO_CLP
```

ExpressCluster is not running.

```
fi
```

```
#EXIT
```

```
exit 0
```

## Group A stop script: A sample of **stop.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:*

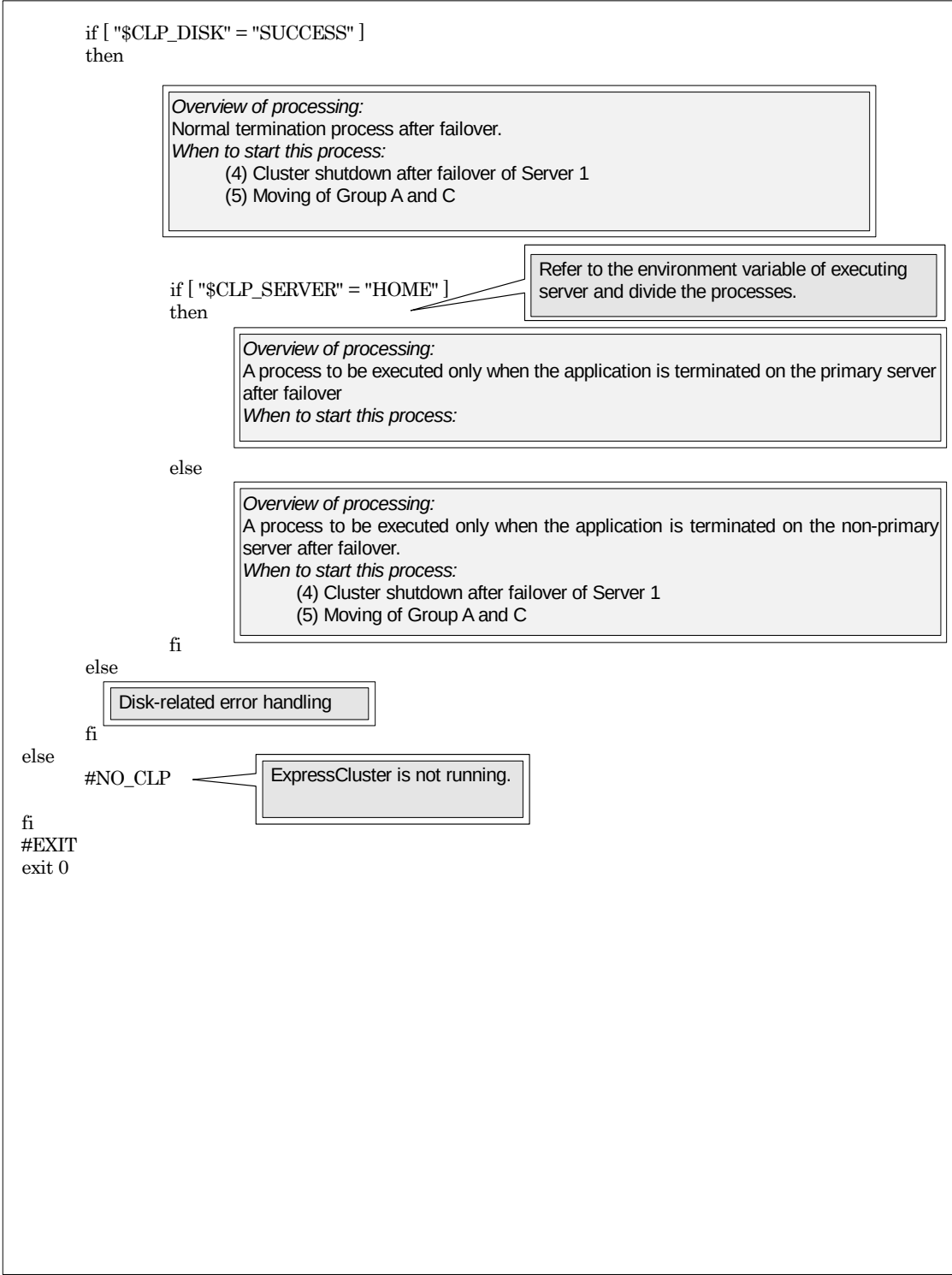
```
 fi
```

```
else
```

Disk-related error handling

```
fi
```

```
elif ["$CLP_EVENT" = "FAILOVER"]
then
```





## Tips for creating EXEC resource script

Note the following points when 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 356. 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 3, “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**  
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

#* *
#* *

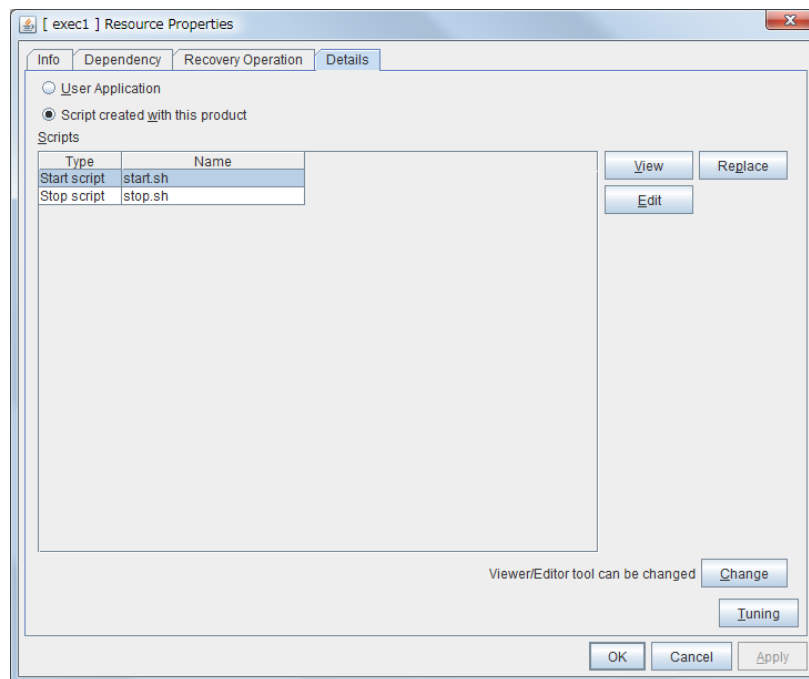
ulimit -s unlimited # Change stack size (unlimited)

" 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.

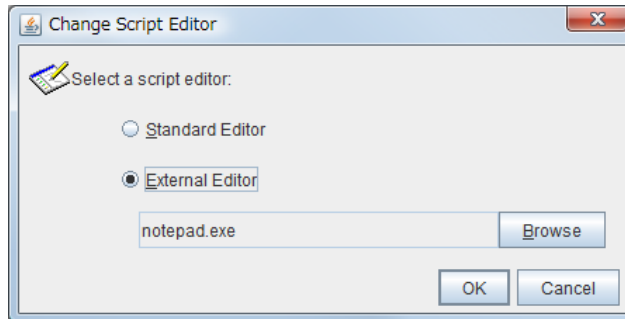
The executable files will not be distributed to each server. They should be placed on each server in advance. The cluster configuration data created by the Builder does not contain these files. You cannot edit the script files using the Builder.

### 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.

- 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.

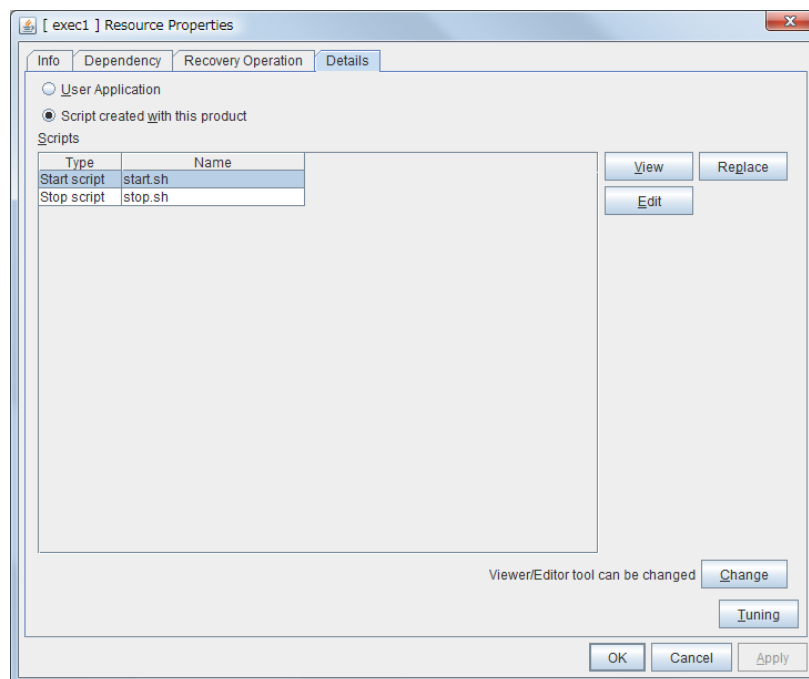
## Tuning

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. Changes made and saved by the editor are not applied.

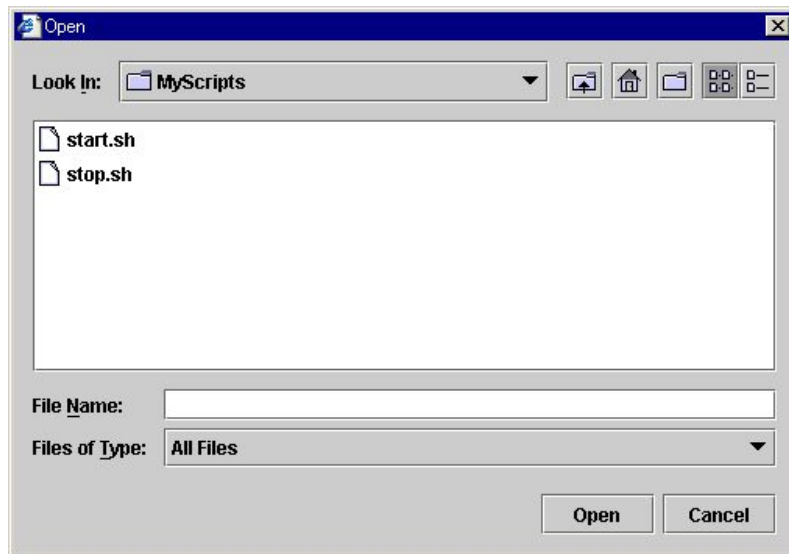
If the selected script file is being viewed or edited, you cannot see it.

### Edit

You can edit the selected script file on the script editor. To apply changes, overwrite the file. If the selected script file is being viewed or edited, you cannot edit it. You cannot rename the script file

## Replace

Opens the **Open** dialog box.

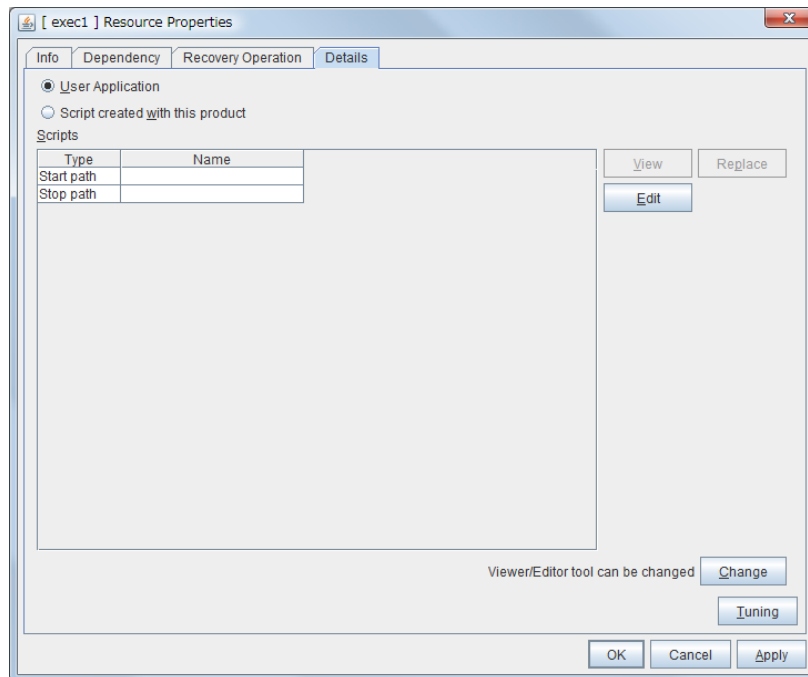


The contents of the script file selected in the **Resource Property** are replaced with the one selected in the **Open** dialog box. If the selected script file is being viewed or edited, you cannot replace it. Select a script file, not a binary file such as an application program.

## Displaying and changing EXEC resource script using a user application

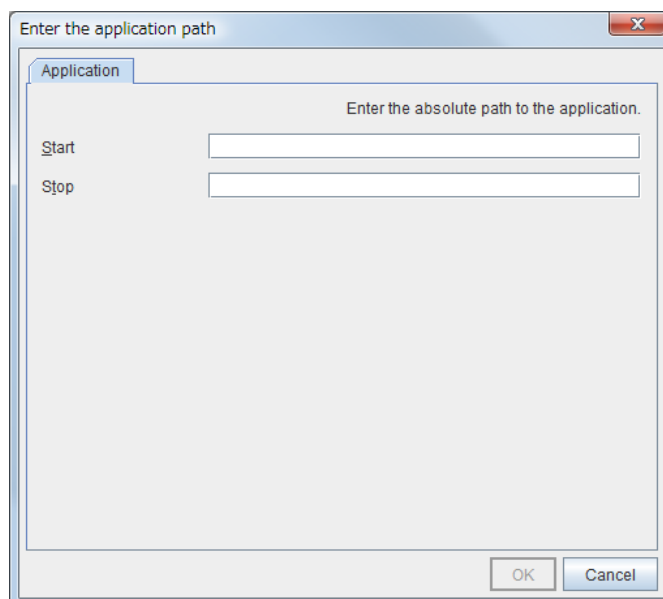
1. From the tree view displayed in the left pane of the Builder, click the icon of the group to which the EXEC resource whose detail information you want to display and change belongs.
2. Group resource list is displayed on the table view in the right pane of the window. Right-click the EXEC resource 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.



## Edit

Specify an exec resource executable file name. The **Enter the application path** dialog box is displayed.



**Start** Up to 1023 bytes

Enter an executable file name to be run when the exec resource starts. The name should begin with “/.”

**Stop** Up to 1023 bytes

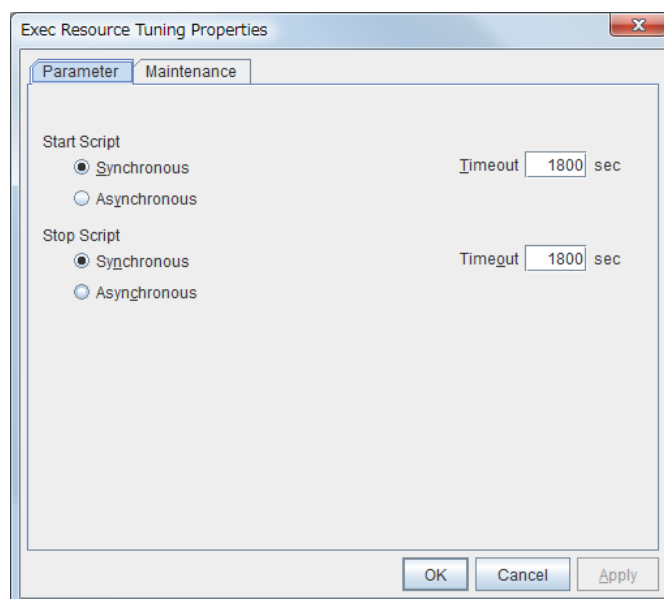
Enter an executable file name to be run when the exec resource exits. The name should begin with “/.” The stop script is optional.

For the executable file name, specify a full path name starting with “/” to a file on your cluster server. Arguments can also be specified.

## 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

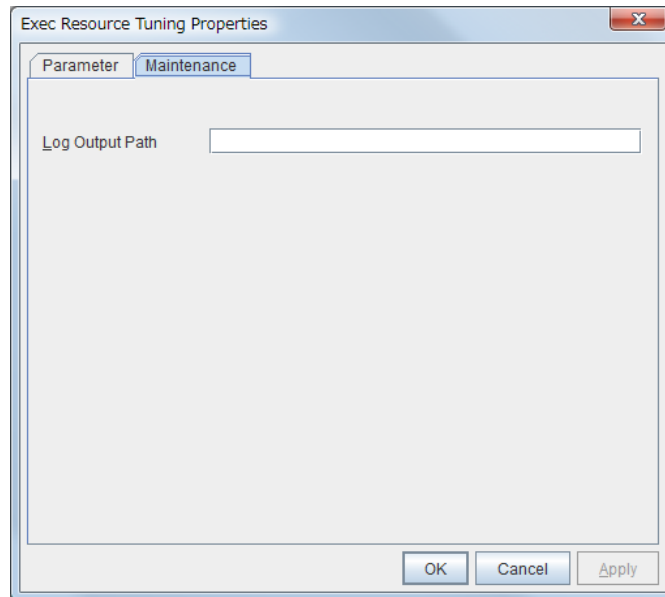
Does not wait for the script to end when it is run. Select this for resident executable files. The script can be monitored by PID monitor resource if **Asynchronous** is selected.

#### 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** Up to 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    |         |
| Comment                |          |         |
| Start Script Path      | start.sh |         |
| Stop Script Path       | stop.sh  |         |
| Status                 | Online   |         |
| Started Server         | server1  |         |

|                    |                          |
|--------------------|--------------------------|
| Comment:           | Comment                  |
| Start Script Path: | Path of the start script |
| Stop Script Path:  | Path of the stop script  |
| Status:            | Resource status          |
| Started Server :   | Server name              |

If you click the **Details** button, the following information is displayed in the pop-up dialog.

| EXEC Detailed Properties (exec1)     |                                           | X |
|--------------------------------------|-------------------------------------------|---|
| Common server1 server2               |                                           |   |
| Properties                           | Value                                     |   |
| Name                                 | exec1                                     |   |
| 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                   | fip1,disk1_md1                            |   |
| Start Type                           | Synchronous                               |   |
| Stop Type                            | Synchronous                               |   |
| Start Script Timeout (sec)           | 1800                                      |   |
| Stop Script Timeout (sec)            | 1800                                      |   |
| Log Output Path                      |                                           |   |

|                                       |                                                                               |
|---------------------------------------|-------------------------------------------------------------------------------|
| Name:                                 | Resource name                                                                 |
| 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.

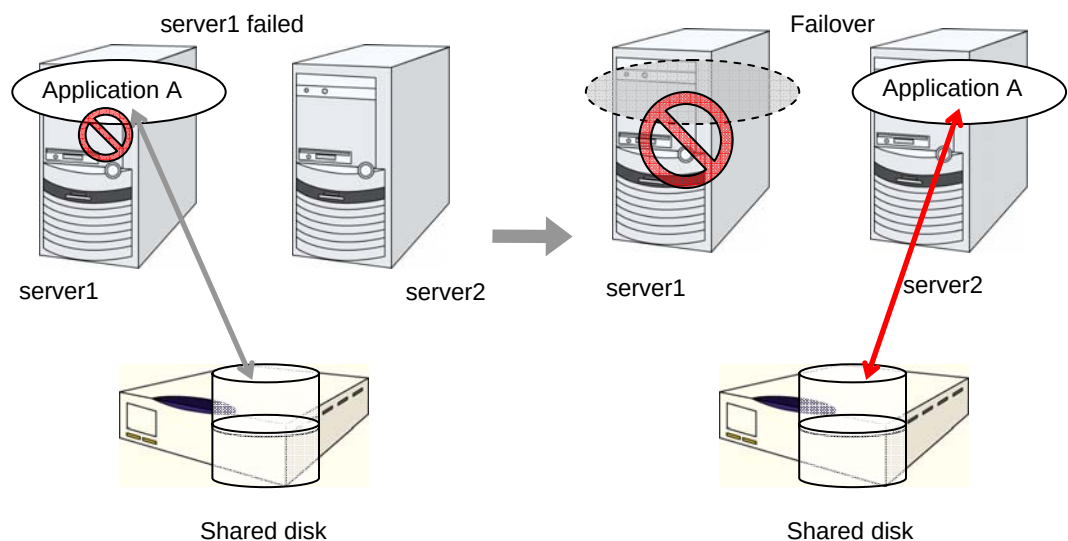
| Group Resource Type     |
|-------------------------|
| Dynamic DNS resource    |
| Floating IP resource    |
| Virtual IP resource     |
| Volume Manager resource |

## 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.



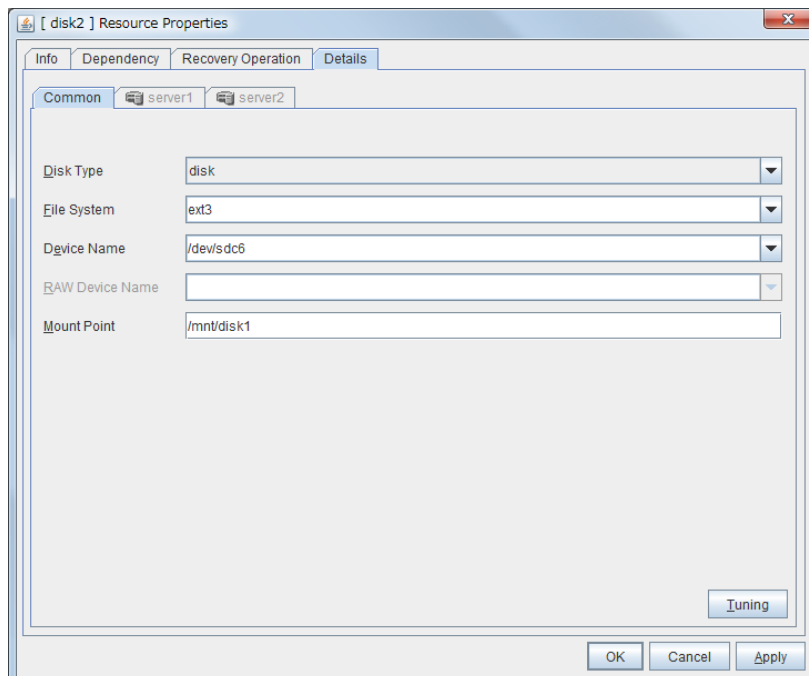
## Notes on disk resources

- ◆ For shared disks, functions such as stripe set, volume set, mirroring, stripe set with parity by md are not supported.
- ◆ ExpressCluster controls accesses to the file system (mount/umount). Thus, do not configure the settings about mount/umount on the OS.
- ◆ 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.
- ◆ If **Mount/Umount Exclusion** is selected on the **Exclusion** tab of the **Cluster Properties**, it may take some time to activate or deactivate a disk resource because mount or unmount of disk resource, and NAS resource is performed exclusively in the same server.

## 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



**Disk Type** **Server Individual Setup**

Select a disk type. You can only choose [disk].

**File System** **Server Individual Setup**

Select a file system type created on the disk device. Choose one from the types described below. You may also directly enter the type.

- ◆ ufs
- ◆ zfs

**Device Name** Up to 1023 bytes **Server Individual Setup**

Enter the disk device name to be used for disk resources. The name should begin with “/.”

When **zfs**pool is selected for the file system, a string of characters is set by combination of search path and pool name with the delimiter “/”.

Example: [/dev/dsk/tank] (search path is [/dev/dsk], pool name is [tank])

**Raw Device Name** (within 1,023 bytes) (This can be individually specified for each server.)

Enter the raw disk device name to be used for disk resources.

**Mount Point** Up to 1023 bytes **Server Individual Setup**

Enter the directory to mount the disk device. The name should begin with “/.”

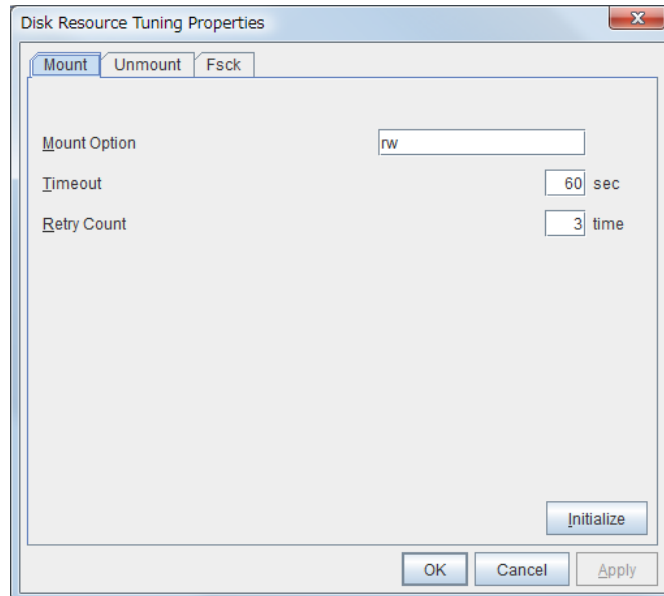
**Tuning**

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/import 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/dsk/c2t0d0s5 |
| Mount point  | /mnt/disk5        |
| File system  | ufs               |
| Mount option | rw                |

The mount command to be run with the above settings is:

```
mount -F ufs -o rw /dev/dsk/c2t0d0s5 /mnt/disk5
```

### Timeout 1 to 999

Enter how many seconds you want to wait for the 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.

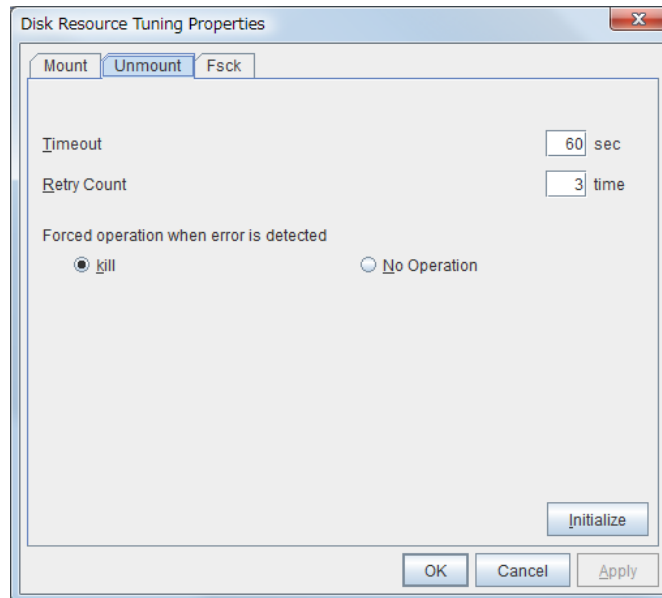
If you set this to zero (0), mount will not be retried.

### 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.

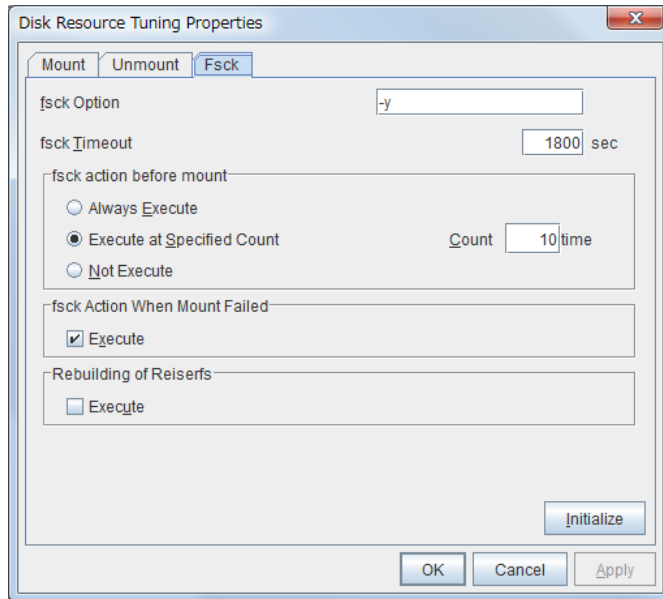
### Initialize

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.

This tab is ignored when specifying [zfs] for the file system.



#### **fsck Option** Up to 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.

#### **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 not selected:  
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 cannot fail over when there is an error that can be recovered by fsck in the switchable partition.

---

### **Initialize**

Clicking **Initialize** resets the values of all items to the default values.

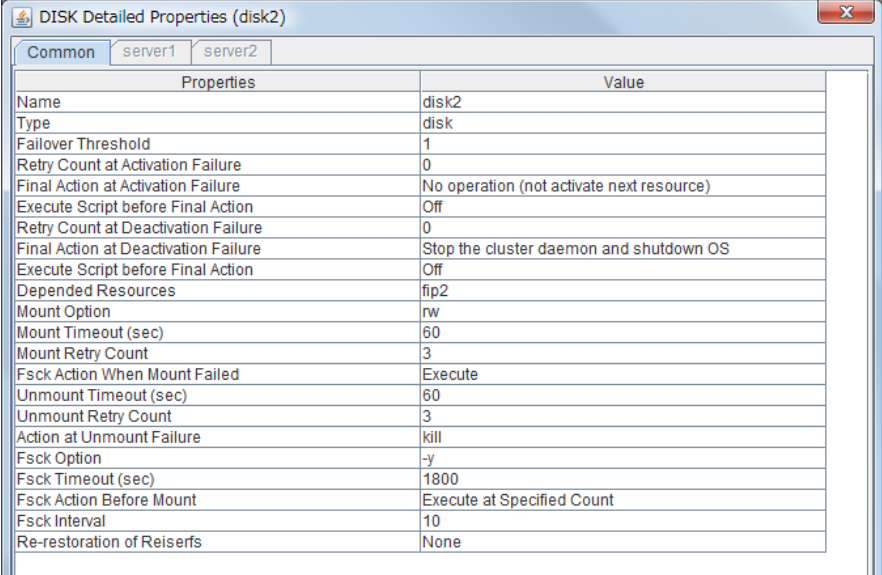
## Displaying the disk resource properties with the WebManager

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: disk2 |            | Details |
|------------------|------------|---------|
| Common           | server1    | server2 |
| Properties       | Value      |         |
| Comment          |            |         |
| Disk Type        | disk       |         |
| File System      | ext3       |         |
| Device Name      | /dev/sdc6  |         |
| Raw Device Name  |            |         |
| Mount Point      | /mnt/disk2 |         |
| Status           | Online     |         |
| Started Server   | server2    |         |

|                  |                                                    |
|------------------|----------------------------------------------------|
| Comment:         | Comment                                            |
| Disk Type:       | Type of the disk device                            |
| File System:     | Type of the file system created on the disk device |
| Device Name:     | Name of the disk device used as disk resource      |
| Raw Device Name: | Name of the disk device used as raw disk resource  |
| Mount Point:     | Directory where the disk device is mounted         |
| Status:          | Disk resource status                               |
| Started Server:  | Server name                                        |

If you click the **Details** button, the following information is displayed in the pop-up dialog.



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | disk2                                     |
| 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                   | fip2                                      |
| 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                                        |
| Re-restoration of Reiserfs           | None                                      |

|                                       |                                                                                                                                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name:                                 | Disk resource name                                                                                                                                                                   |
| 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                                                                                                                                                                   |
| 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 <ul style="list-style-type: none"> <li>0 No action</li> <li>1 Perform fsck</li> </ul>                                                            |
| 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 <ul style="list-style-type: none"> <li>kill Force termination</li> <li>No Operation No action</li> </ul>                                      |
| 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 <ul style="list-style-type: none"> <li>+0 Do not perform fsck</li> <li>+1 Always perform fsck</li> <li>+2 Perform fsck at fsck interval</li> </ul> |
| Fsck Interval:                        | fsck interval                                                                                                                                                                        |
| Follow-up recovery of reiserfs        | Action to be taken at reiserfsck failure <ul style="list-style-type: none"> <li>0 No action</li> <li>1 Perform recovery</li> </ul>                                                   |

# Understanding floating IP resource

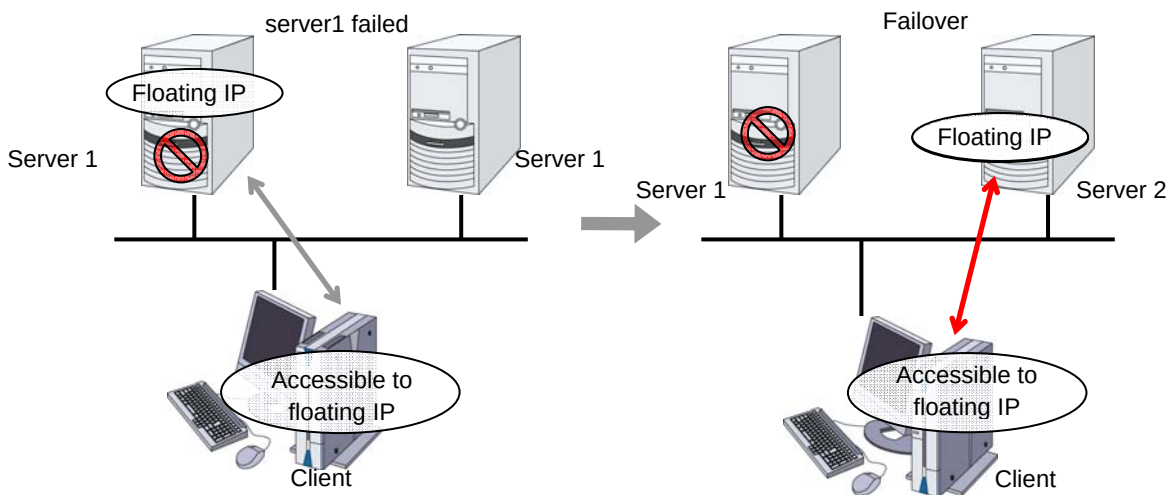
## Dependencies of floating IP resource

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.

## **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.

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:

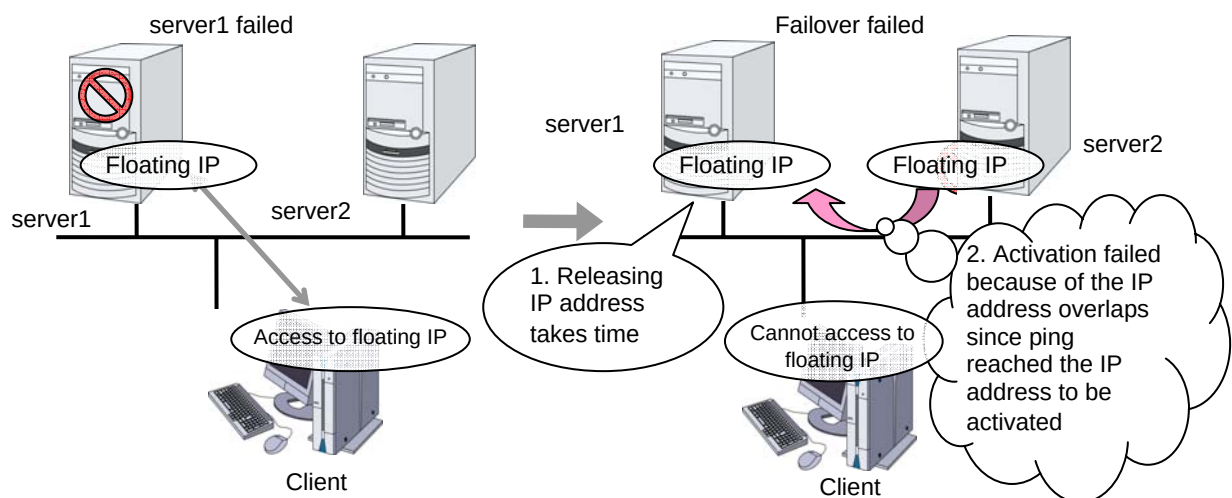
- When a value smaller than the default is set to **Retry Count at Activation Failure**.
- When **Ping Retry Count** and **Ping Interval** are not set.

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.

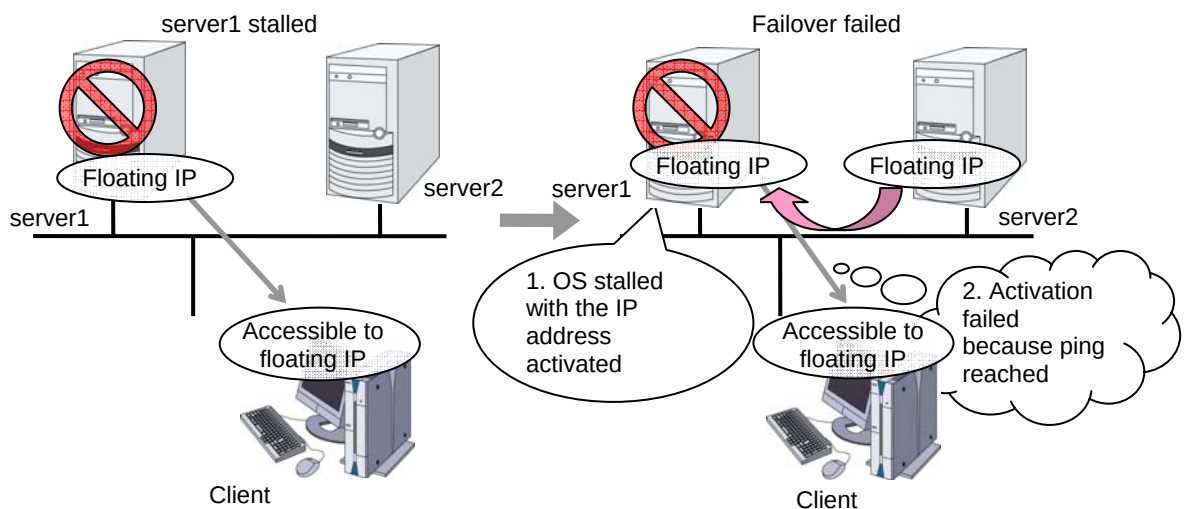
This problem occurs due to the following causes:

- 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.

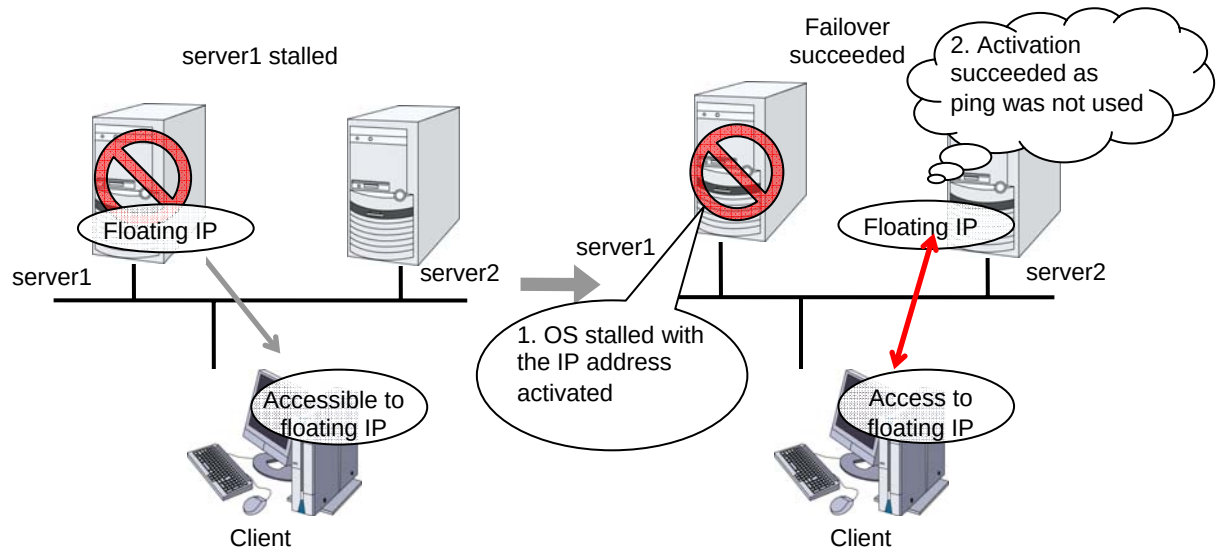
In the machine environment where this problem often occurs, this can be prevented by the settings below. However, both groups may be activated depending on the status of a stall, and server shutdown may occur depending on the timing of the activation of both groups. For details, refer to Chapter 9, “The 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.

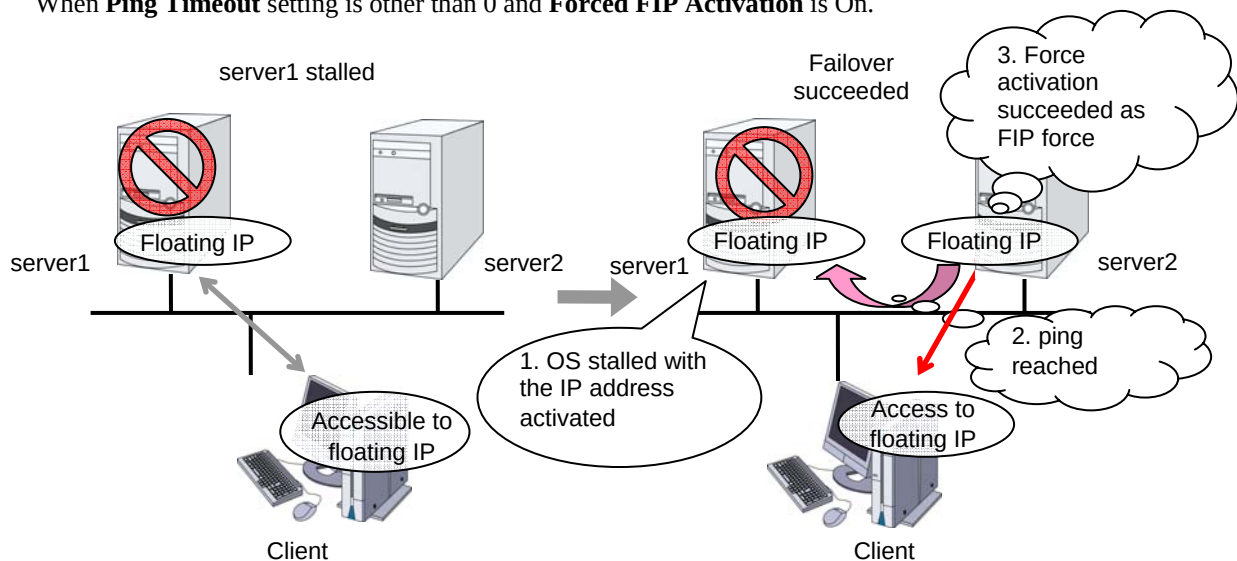
When **Ping timeout** setting is other than 0 and **Forced FIP Activation** is Off.



When **Ping timeout** setting is 0



When **Ping Timeout** setting is other than 0 and **Forced FIP Activation** is On.



- ◆ MAC address of virtual NIC to which floating IP is allocated.

When the floating IP resource fails over, the corresponding MAC address is changed because the MAC address of virtual NIC to which the floating IP is allocated is the MAC address of real NIC.

- ◆ Source address of IP communication from the running server when the resource activation.

The source address from the server is basically the real IP of the server even though the floating IP resource has activated. When you want to change the source address to the floating IP, the settings are necessary on the application.



## Waiting process for floating IP resource deactivation

The following process takes place after deactivating floating IP address with the `ifconfig` command.

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 deactivated.
  - 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 deactivated.
  - 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:

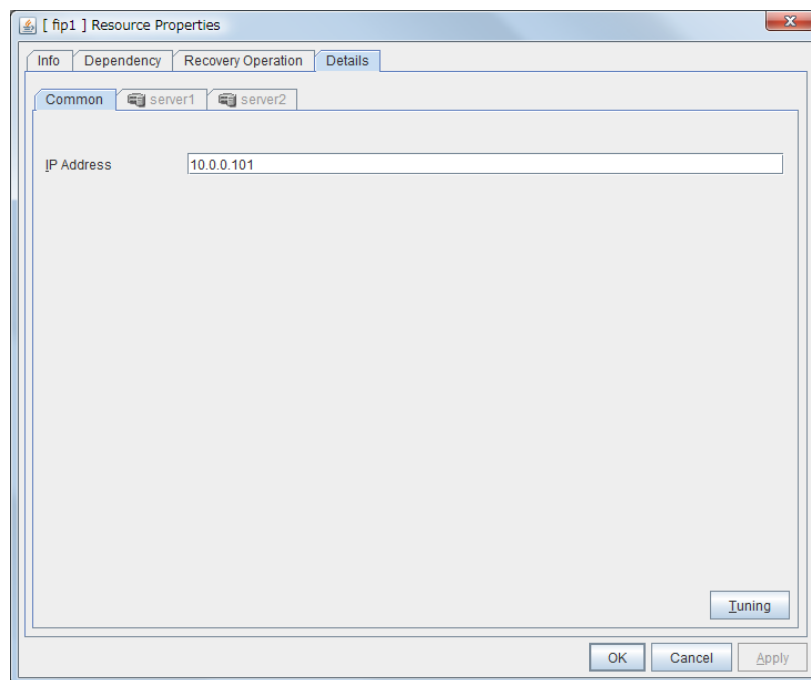
Acquisition of the list of IP addresses and floating address activation/deactivation using the `ifconfig` command timeout in 60 seconds (this is the default value). This timeout value can be changed by the Builder. For details, see the **Parameter** tab of the **Floating IP Resource Tuning Properties**.

---

## 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 NIC interface to activate, specify the interface name by using “%” to separate.

◆ Example: 10.0.0.12% e1000g0

#### Tuning

Opens the **Floating IP Resource Tuning Properties** dialog box where the detailed settings for the floating IP resource can be configured.

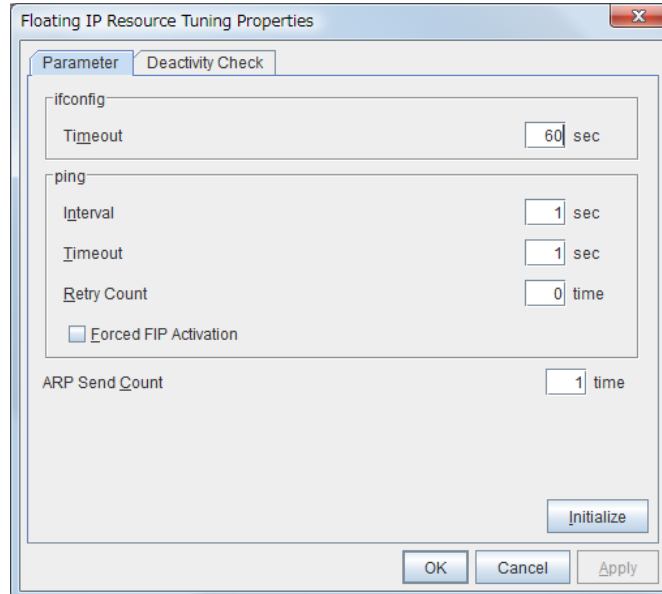
#### Server Individual Setup

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.

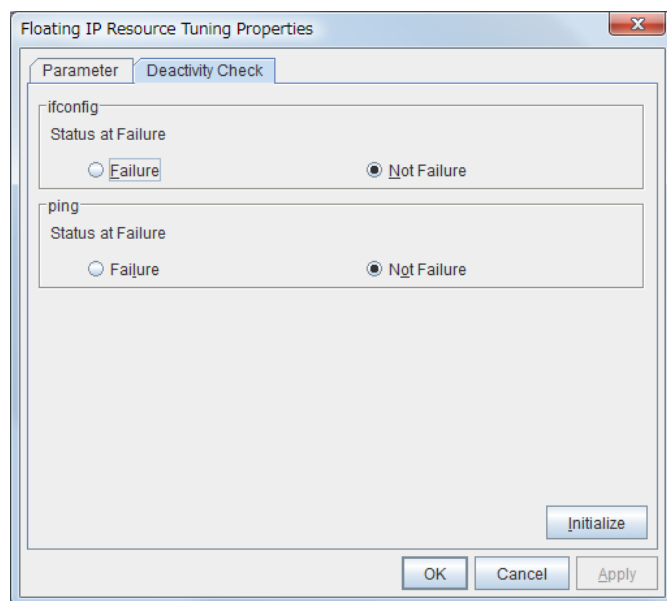
- ◆ **Interval** 0 to 999  
Set the interval to issue the ping command.
- ◆ **Timeout** 0 to 999  
Set timeout of the ping command.  
If zero is set, the ping command is not run.
- ◆ **Retry count** 0 to 999  
Set retry count of the ping command.
- ◆ **Forced FIP Activation**  
Specify whether to forcibly activate floating IP address when an overlapped IP address is detected by command check.
  - When selected  
Forced activation is performed.
  - When not selected  
Forced activation is not performed.

## 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      |         |
| Comment        |            |         |
| IP Address     | 10.0.0.101 |         |
| Status         | Online     |         |
| Started Server | server1    |         |

Comment:

IP Address:

Status:

Started Server:

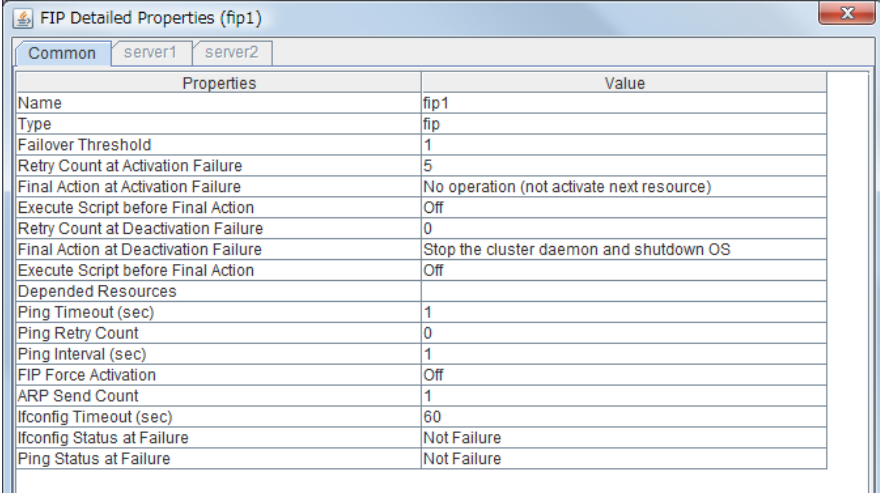
Comment

IP address used by floating IP resource

Status of floating IP resource

Server name

If you click the **Details** button, the following information is displayed in the pop-up dialog.



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | fip1                                      |
| 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                               |

|                                       |                                                             |
|---------------------------------------|-------------------------------------------------------------|
| Name:                                 | Floating IP resource name                                   |
| 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                     |

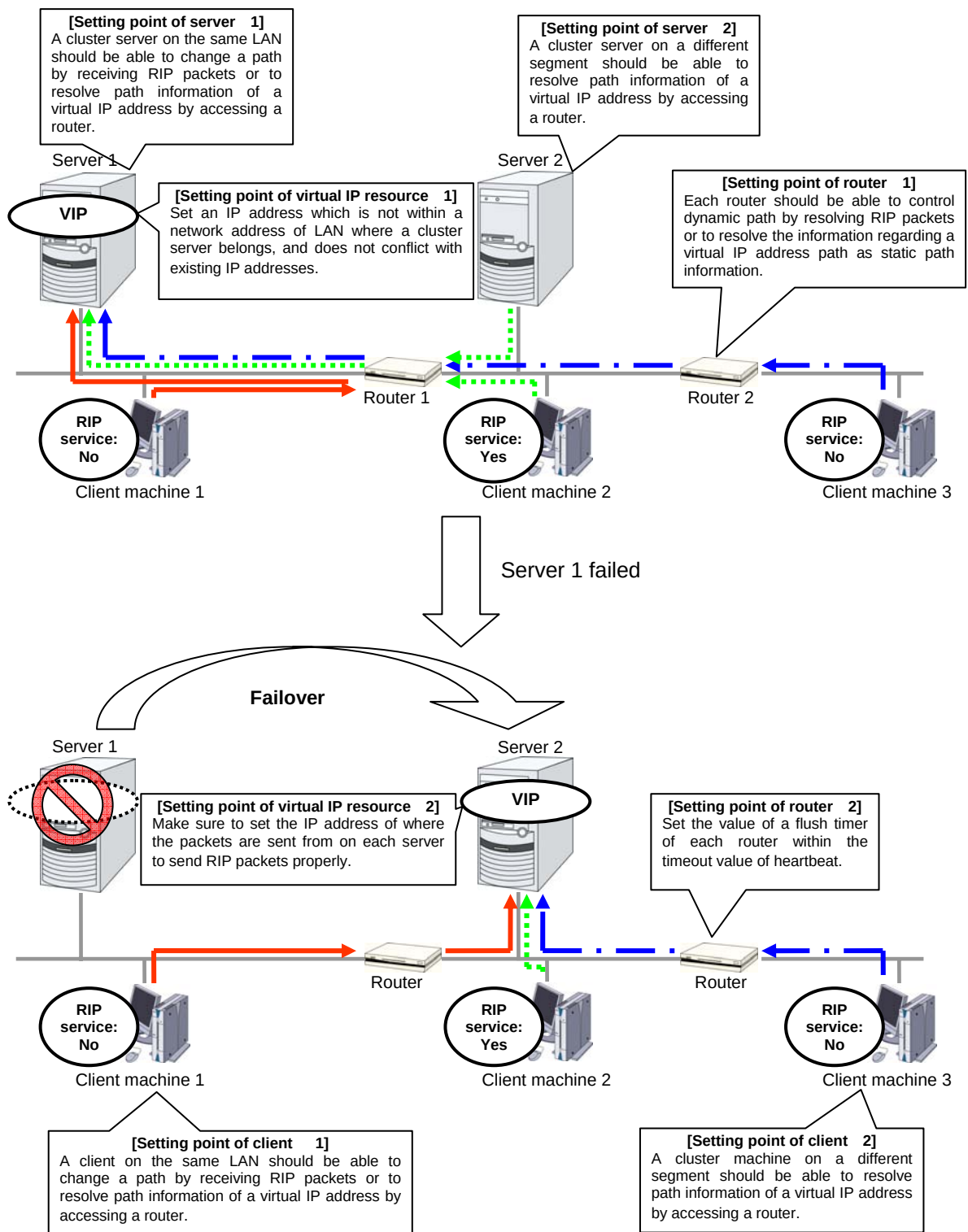
# Understanding virtual IP resources

## 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.
  - 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 conflicts with other address.

## 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 rules apply 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 2 “Functions of the Builder.”

- ◆ MAC address of virtual NIC to which virtual IP is allocated.

When the virtual IP resource fails over, the corresponding MAC address is changed because the MAC address of virtual NIC to which the virtual IP is allocated is the MAC address of real NIC.

- ◆ Source address of IP communication from the running server when the resource activation.

The source address from the server is basically the real IP of the server even though the virtual IP resource has activated. When you want to change the source address to the virtual IP, the settings are necessary on the application.

## 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

The screenshot shows the 'vip1 Resource Properties' dialog box with the 'Details' tab selected. The 'Common' sub-tab is active, showing fields for IP Address (10.0.1.11/24), NIC Alias Name (eth1), Destination IP Address (10.0.1.255), Source IP Address (10.0.0.1), and Send Interval (10 sec). Below these fields is a table for 'Use Routing Protocol' with columns 'Use' and 'Routing Protocol'. The 'Use' column has checkboxes, and the 'Routing Protocol' column lists RIPngver1, RIPngver2, RIPngver3, RIPver1, and RIPver2. The 'Use' checkbox for RIPver2 is checked. At the bottom right, there are 'OK', 'Cancel', 'Apply', and 'Tuning' buttons.

#### IP Address **Server Individual Setup**

Enter the virtual IP address to be used.

#### 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.

The screenshot shows a dialog box titled "Virtual IP Resource Tuning Properties" with a close button (X) in the top right corner. The "Parameter" tab is selected, showing settings for "ifconfig", "ping", and "ARP Send Count". The "ifconfig" section has a "Timeout" field set to "60 sec". The "ping" section has "Interval" set to "1 sec", "Timeout" set to "1 sec", and "Retry Count" set to "0 time". There is a checkbox for "Forced V/IP Activation" which is currently unchecked. The "ARP Send Count" field is set to "1 time". At the bottom right of the dialog is an "Initialize" button. At the very bottom are "OK", "Cancel", and "Apply" buttons.

**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  
Specify 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.

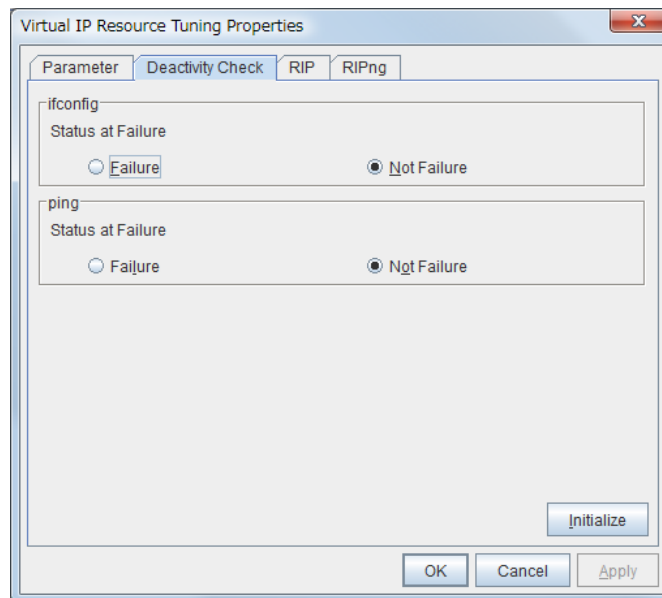
- ◆ Interval 0 to 999  
Specify the interval to issue the ping command in seconds.
- ◆ Timeout 1 to 999  
Specify the timeout for the ping command in seconds.  
When 0 is specified, the ping command is not run.
- ◆ Retry Count 0 to 999  
Specify how many retries of issuing the ping command are attempted.
- ◆ 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 not selected  
Do not forcefully activate the virtual IP address.

## Initialize

Clicking **Initialize** button 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 1

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)

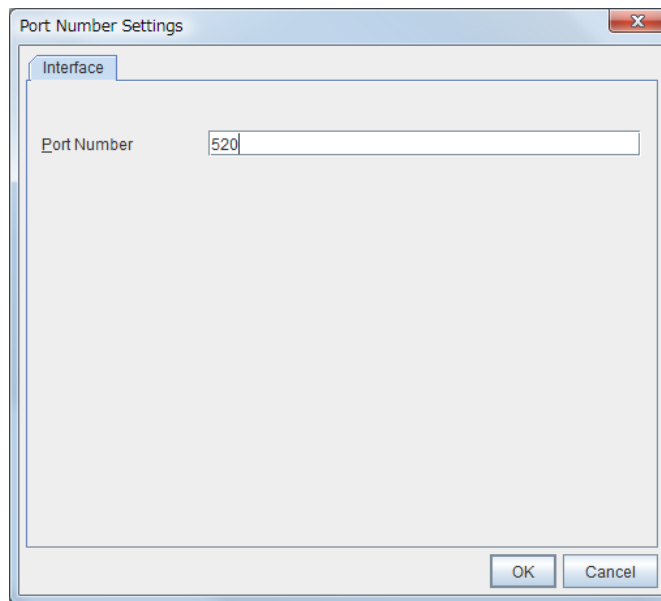
Enter a metric value of RIP. A metric is a hop count to reach the destination address.

#### 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**.

### Edit

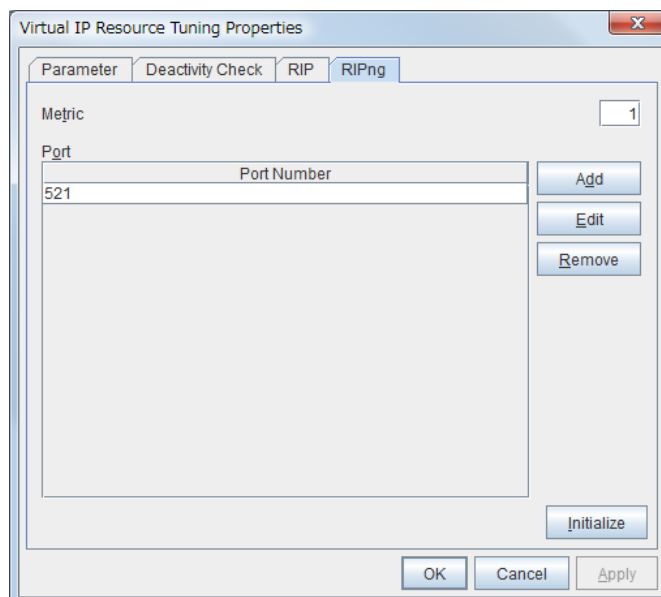
A dialog box to enter a port number is displayed. The port selected in the **Port Number** is displayed. Edit it and click **OK**.

### Delete

Click **Delete** to delete the selected port on the **Port Number**.

### RIPng tab

Detailed settings on RIPng of virtual IP resource are displayed.



**Metric (1 to 15)**

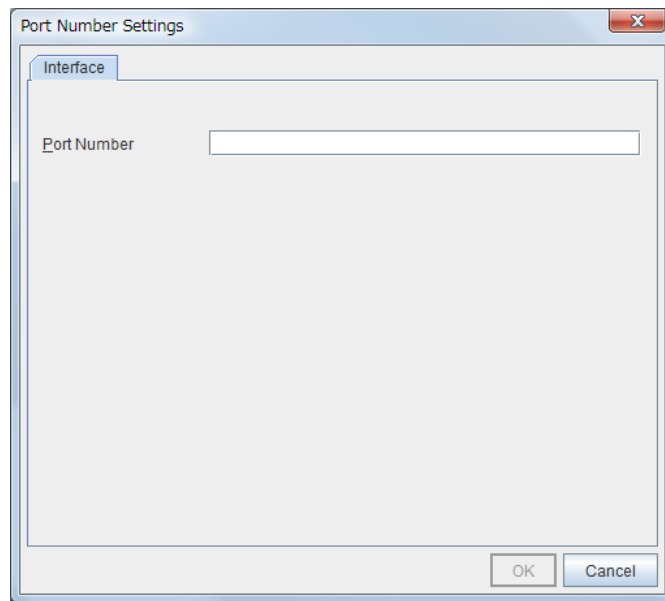
Enter a metric value of RIPng. A metric is a hop count to reach the destination address.

**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**.

**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**.

**Delete**

Click **Delete** to delete the selected port on the **Port Number**.



## 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        |                 |
| Comment                |              |                 |
| IP Address             | 10.0.1.11/24 |                 |
| NIC Alias Name         | eth1         |                 |
| Destination IP Address | 10.0.1.255   |                 |
| Source IP Address      | 10.0.0.1     |                 |
| Send Interval          | 10           |                 |
| Routing Protocol       | RIPver2      |                 |
| Status                 | Online       |                 |
| Started Server         | server1      |                 |

|                         |                                                       |
|-------------------------|-------------------------------------------------------|
| 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                     |
| Started Server:         | Server name                                           |

If you click the **Details** button, the following information is displayed in the pop-up dialog.

| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | vip1                                      |
| Type                                 | vip                                       |
| Failover Threshold                   | 1                                         |
| Retry Count at Activation Failure    | 1                                         |
| Final Action at Activation Failure   | No operation (not activate next resource) |
| Execute Script before Final Action   | Off                                       |
| Retry Count at Deactivation Failure  | 1                                         |
| 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                                         |
| 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                                       |

|                                       |                                                                                   |
|---------------------------------------|-----------------------------------------------------------------------------------|
| Name:                                 | Virtual IP resource name                                                          |
| 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 NAS resource

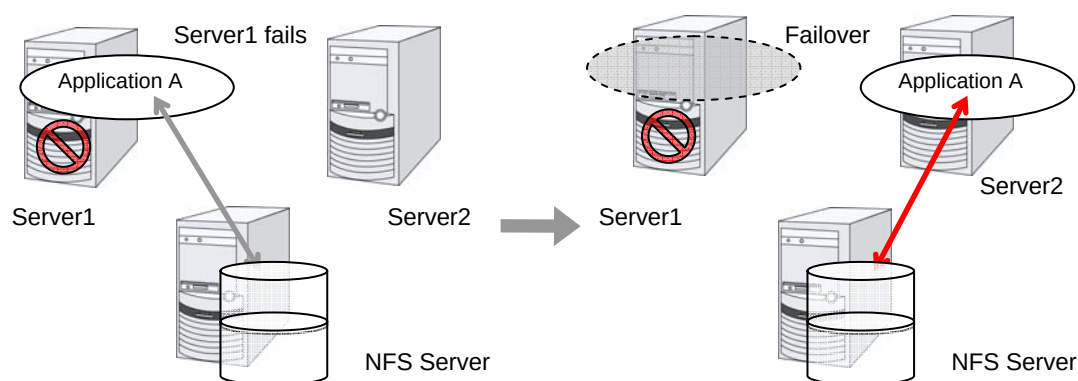
## Dependencies of the NAS resource

By default, this function depends on the following group resource type:

| Group resource type  |
|----------------------|
| Dynamic DNS resource |
| 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.



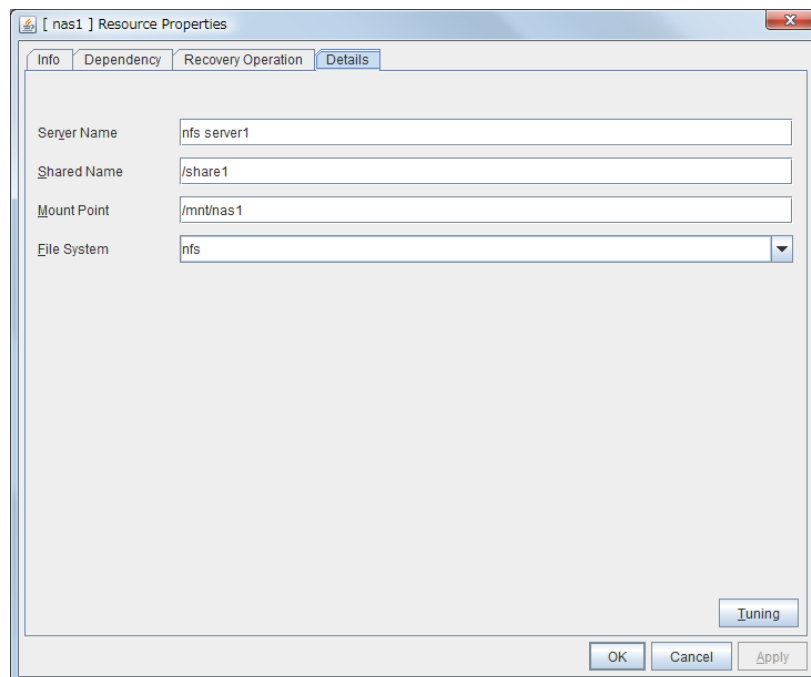
## Notes on NAS resource

- ◆ 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.
- ◆ On the NFS server, it is necessary to configure the settings that allow servers in the cluster for access to NFS resources.
- ◆ On the ExpressCluster X, configure the settings that start the RPC service.
- ◆ If the host name is specified as the NAS server name, make the settings for name resolving.
- ◆ If **Mount/Unmount Exclusion** is selected on the Exclusion tab of the Cluster Properties, it may take some time to activate or deactivate the resources because the mount or unmount of the disk resource, and NAS resource are performed exclusively in the same server.

## 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



**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

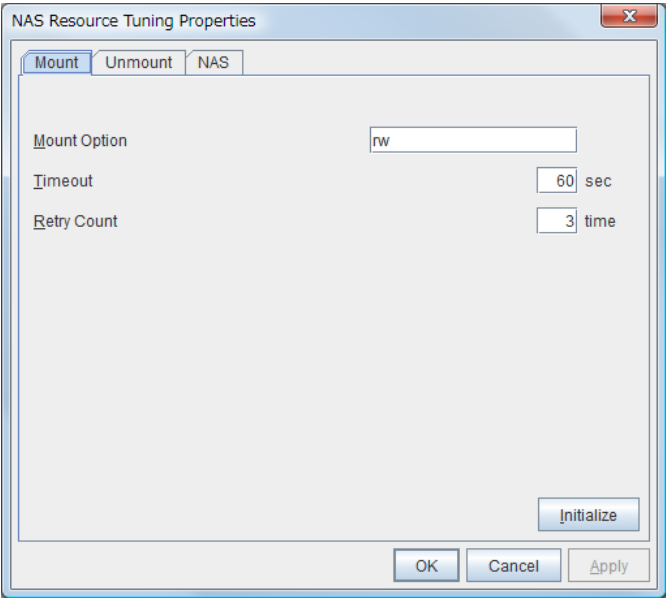
**Tuning**

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.



**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,vers=3     |

The mount command that is run when the option shown above is set:  
`mount -F nfs -o rw,vers=3 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 the 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

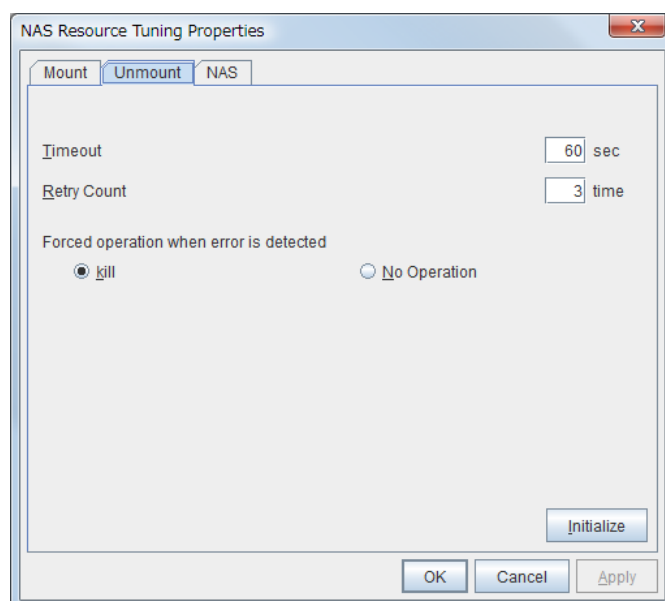
Set the number of mount retries when mounting the file system fails. When zero is set, mounting is not retried.

### 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

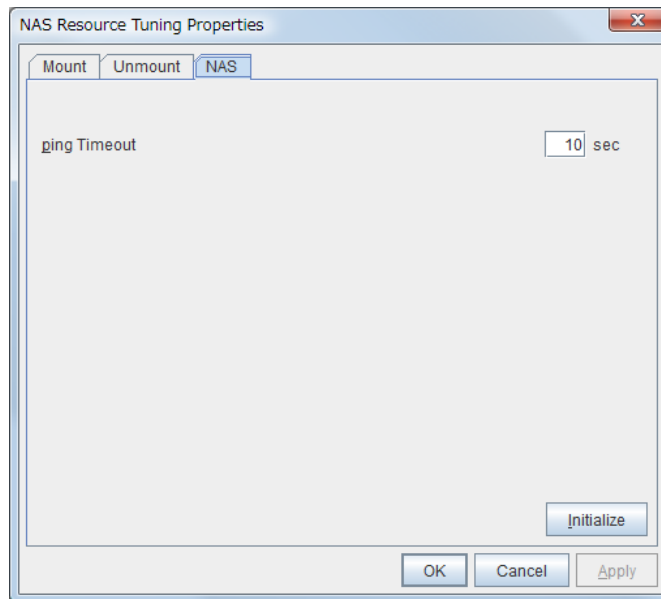
Set the number of unmount retries to be made when unmounting the file system fails. When zero is set, unmounting is not retried.

### 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

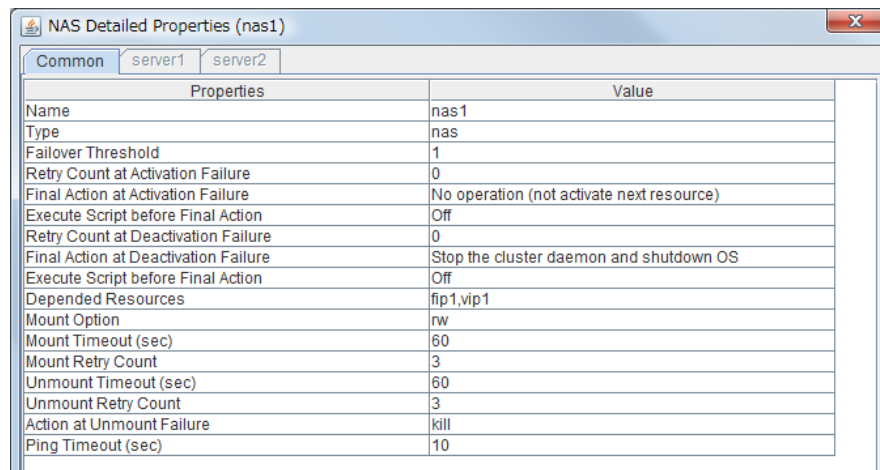
1. Start the WebManager.
2. When you click an object for the NAS resource  in the tree view, the following information is displayed in the list view.

| NAS Name: nas1 |             | Details |
|----------------|-------------|---------|
| Common         | server1     | server2 |
| Properties     | Value       |         |
| Comment        |             |         |
| Server Name    | nfs server1 |         |
| Shared Name    | /share1     |         |
| File System    | nfs         |         |
| Mount Point    | /mnt/nas1   |         |
| Status         | Online      |         |
| Started Server | server1     |         |

|                |                        |
|----------------|------------------------|
| 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    |
| Started Server | Server name            |



When you select **Details**, the following information is displayed in the pop-up dialog.



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | nas1                                      |
| Type                                 | nas                                       |
| 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.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                                        |

|                                       |                                                                                            |
|---------------------------------------|--------------------------------------------------------------------------------------------|
| Name:                                 | NAS resource name                                                                          |
| 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 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                        |
| Ping Timeout (sec):                   | Timeout of ping which checks for redundancy (in seconds)                                   |

# Understanding Volume Manager resource

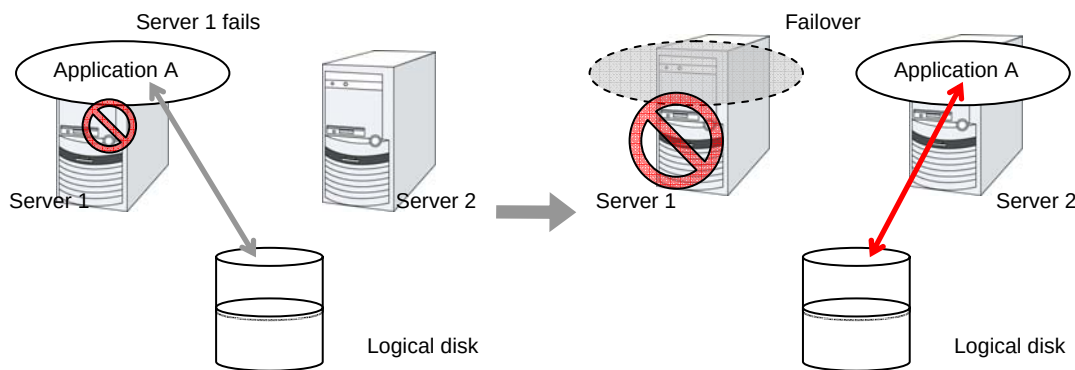
## Dependencies of the Volume Manager resource

By default, this function depends on the following group resource

| Group resource type  |
|----------------------|
| Dynamic DNS resource |
| Floating IP resource |
| Virtual IP resource  |

## Volume Manager resource

- ◆ Volume Manager is a disk management software that handles multiple storages or disks as one logical disk.
- ◆ Volume Manager resource controls the logical disk that is managed by Volume Manager.
- ◆ By storing the data that is necessary for business operations in the logical disk, it is automatically taken over when the failover group is moving during failover.



## Notes on Volume Manager resource

- ◆ ExpressCluster will control the access (import/export) to the logical disk. Thus, do not configure the settings for the OS to import or export.
- ◆ On the internal version 2.1.0-1, ZFS storage pool is the only Volume Manager that is supported by volume manager resource.
- ◆ Exporting and other processes for ZFS may be delayed dramatically if iSCSI connection is disconnected when using ZFS storage pool under iSCSI environment.(OS restriction)  
The ZFS operations at the time of iSCSI disconnection is regulated in ZFS property value **failmode**. However, **failmode=panic** is recommended in ExpressCluster. When it is **failmode=panic**, it operates as OS panics independently in a given time after iSCSI disconnection.

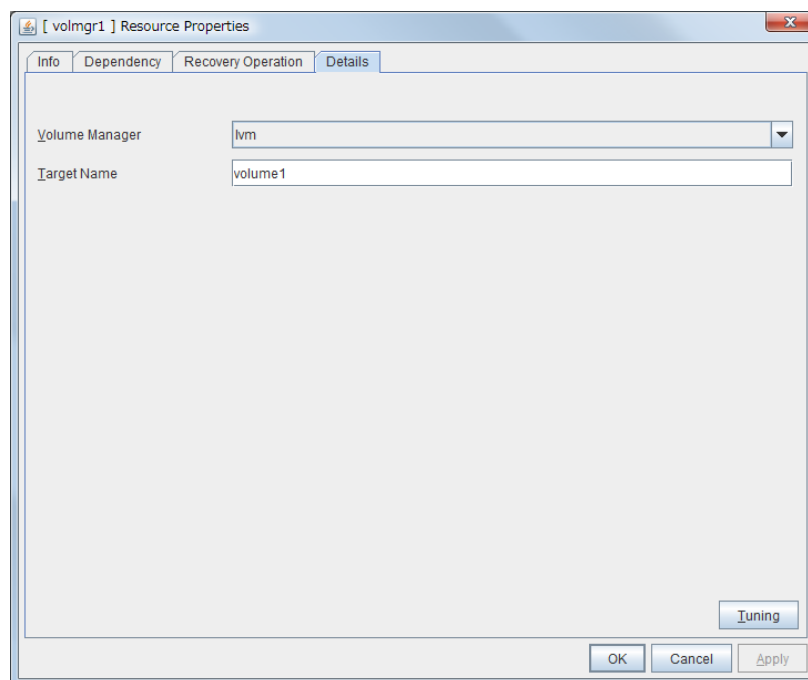
## Notes on ZFS storage pool

- ◆ On the data set that the mount point property is configured in legacy, the file system will not be mounted by just importing the storage pool. In this case, it is necessary to mount or unmount ZFS file system by using the disk resource in addition to Volume Manager resource.

## Displaying and changing the details of Volume Manager resource

1. From the tree view displayed in the left pane of Builder window, click the icon of the group to which the Volume Manager resource whose detailed information and setting 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 Volume Manager 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

### Volume Manager resource: Detail tab



#### Volume Manager

Specify the type of Volume Manager. The following Volume Manager type is selectable.

- ◆ zfspool (ZFS storage pool)

#### Target name(Up to 255 byte)

Set the volume name.

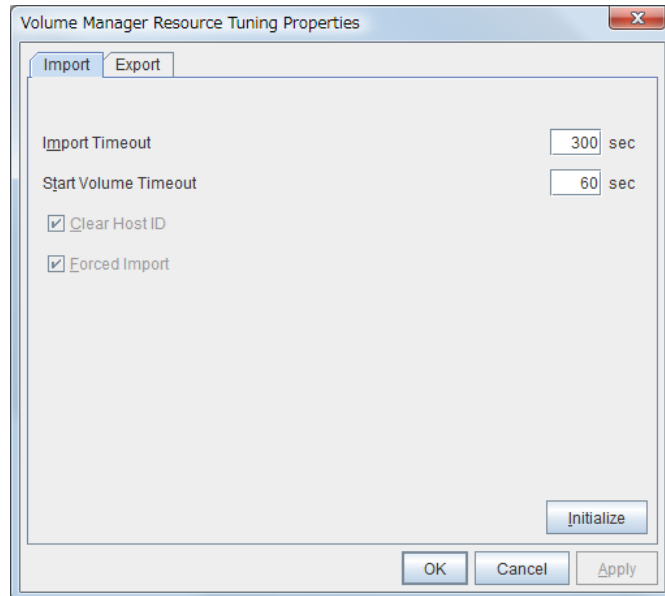
#### Tuning

Displays the **Volume Manager resource tuning properties** dialog box. Configure the Volume Manager resource detailed settings.

## Volume Manager resource Tuning Properties

Import tab

The detailed import settings are displayed.



### Import Timeout (1 to 999)

Specify how long the system waits for completion of the volume import command before it times out.

### Volume Startup Timeout (1 to 9999)

Specify the startup command timeout.

### Clear host ID

When normal importing fails, the clear host ID flag is set and importing is retried. The host ID is cleared when the check box is selected.

This option can be used when the volume manager is **vxvm**.

### Force Option at Import

Specify whether to forcibly import data when importing fails. Data is forcibly imported if the check box is selected.

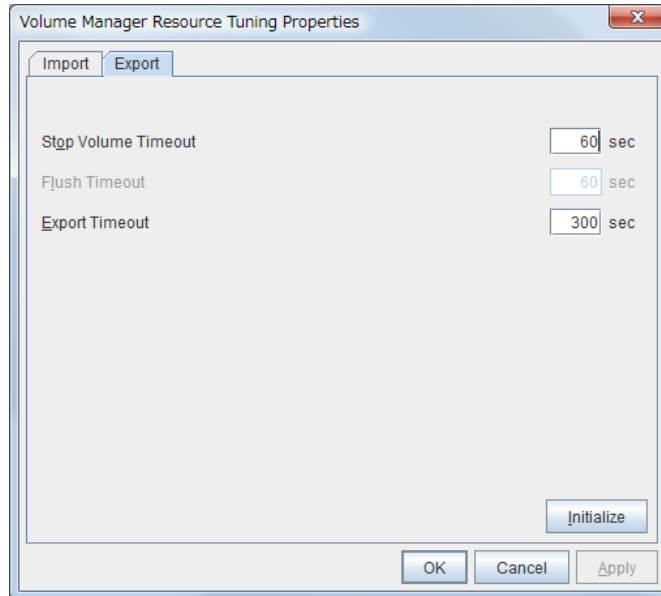
This option can be used when the volume manager is **vxvm**.

### Initialize

Clicking the **Initialize** button resets the values of all items to the defaults.

### Export tab

The detailed export settings are displayed.



### Stop Volume Timeout (1 to 9999)

Specify the volume deactivation command timeout.

### Flush Timeout (1 to 9999)

Specify the flush command timeout.

This option can be used when the volume manager is **vxvm**.

### Export Timeout (1 to 9999)

Specify the export/deport command timeout.

### Initialize

Clicking the **Initialize** button resets the values of all items to the defaults.

## Displaying the properties of a volume manager resource by using the WebManager

1. Start the WebManager
2. When you click an object for the Volume Manager resource  in the tree view, the following information is displayed in the list view

| Volume Manager Name: volmgr1 |         | Details |
|------------------------------|---------|---------|
| Common                       | server1 | server2 |
| Properties                   | Value   |         |
| Comment                      |         |         |
| Volume Manager               | lvm     |         |
| Target                       | volume1 |         |
| Status                       | Online  |         |
| Started Server               | server1 |         |

Comment:

Volume Manager:

Target Name:

Status:

Started Server:

Comment on the volume manager resource

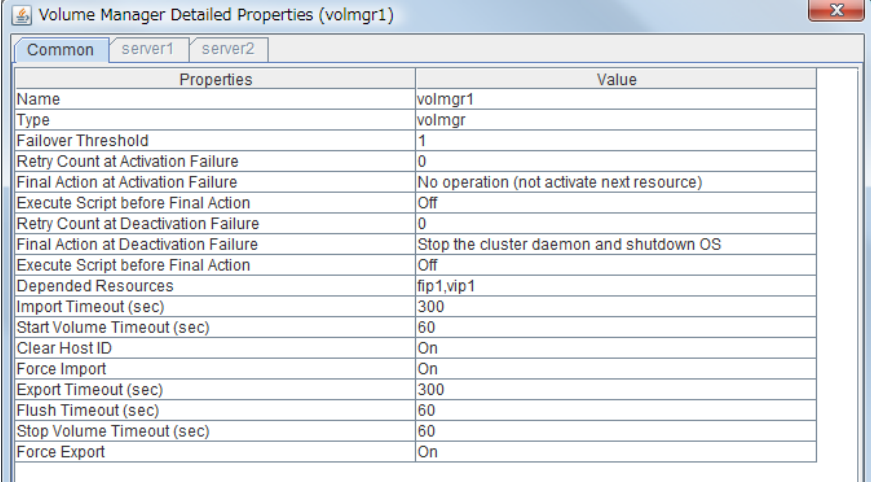
Type of volume manager

Target name

Status of the volume manager resource

Name of the server

When you select Details, the following information is displayed in the pop-up dialog.



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | volmgr1                                   |
| Type                                 | volmgr                                    |
| 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,vip1                                 |
| Import Timeout (sec)                 | 300                                       |
| Start Volume Timeout (sec)           | 60                                        |
| Clear Host ID                        | On                                        |
| Force Import                         | On                                        |
| Export Timeout (sec)                 | 300                                       |
| Flush Timeout (sec)                  | 60                                        |
| Stop Volume Timeout (sec)            | 60                                        |
| Force Export                         | On                                        |

|                                      |                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------|
| Name:                                | Volume manager resource name                                                                     |
| Type:                                | Resource type                                                                                    |
| Failover:                            | Threshold Maximum number of times failing over is performed when an activation error is detected |
| Retry Count at Activation Failure:   | Maximum number of times activation is retried when an activation error is detected               |
| Final Action at Activation:          | Final action when an activation error occurs                                                     |
| Execute Script before Final Action:  | Whether to execute scripts when an error is detected                                             |
| Retry Count at Deactivation Failure: | Maximum number of times deactivation is retried when a deactivation error is detected            |
| Final Action at Deactivation:        | Final action when a deactivation error occurs                                                    |
| Execute Script before Final Action:  | Whether to execute scripts when an error is detected                                             |
| Depended Resources:                  | Dependent resource                                                                               |
| Import Timeout (in seconds):         | How long to wait for the import command to finish before timing out (in seconds)                 |
| Start Volume Timeout (in seconds):   | Start command timeout (in seconds)                                                               |
| Clear host ID:                       | Import execution setting for clearing the host ID when importing fails                           |
| Force Option at Import:              | Forced import execution setting for when importing fails                                         |
| Export Timeout (in seconds):         | How long to wait for the export command to finish                                                |
| Flush Timeout (in seconds):          | Flush command timeout (in seconds)                                                               |
| Stop Volume Timeout (in seconds):    | Volume deactivation command timeout (in seconds)                                                 |
| Force Option at Export:              | Forced export execution setting for when exporting fails                                         |

# Understanding VM resources

## Dependencies of VM resources

The volume manager resources depend on the following group resource types by default.

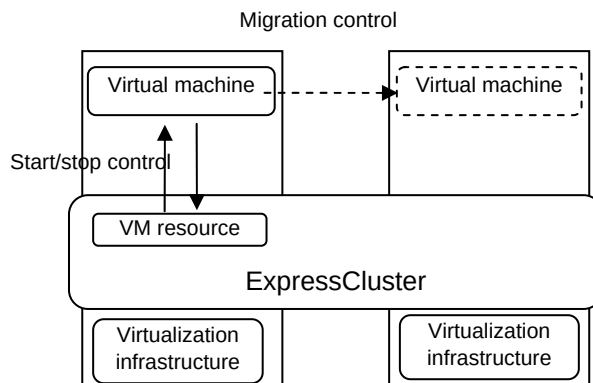
| Group resource type |
|---------------------|
|---------------------|

|               |
|---------------|
| Disk resource |
|---------------|

## What is a VM resource?

VM resources are used to control virtual machines.

VM resources start or stop virtual machines.



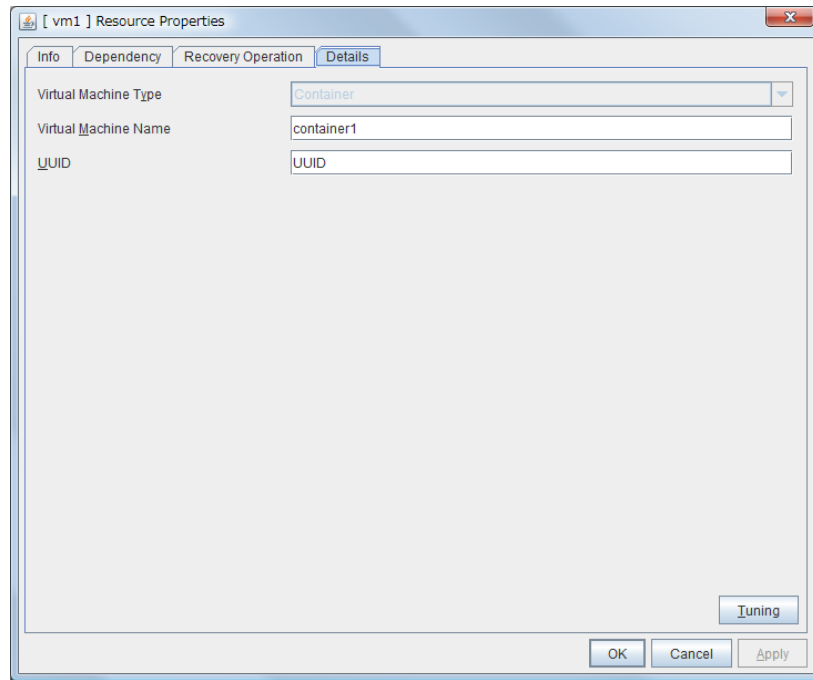
## Notes on VM resources

- ◆ VM resources are enabled only when ExpressCluster is installed in the host OS in the virtualization infrastructure (Solaris Container).
- ◆ A VM resource can be registered with a group for which the group type is virtual machine
- ◆ Only one VM resource can be registered per group.
- ◆ It is not possible to perform migration by using the WebManager [and](#) clpgrp command.



## Displaying and changing the details of the VM resources

1. In the tree view displayed in the left pane of the Builder, click the icon of the group to which the VM resource whose details you want to display, specify, or change belong.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the target VM resource name, and then click the **Details** tab in **Property**.
3. Display or change the detailed settings on the **Details** tab as described below.



### Virtual Machine Type (within 255 bytes)

Specify the virtualization infrastructure type.

### Virtual Machine Name (within 255 bytes)

Enter the virtual machine name. This setting is not required if the UUID is entered. Specify the UUID if the virtual machine name might be changed in the virtualization infrastructure.

### UUID

Specify the UUID (Universally Unique Identifier) for identifying the virtual machine.

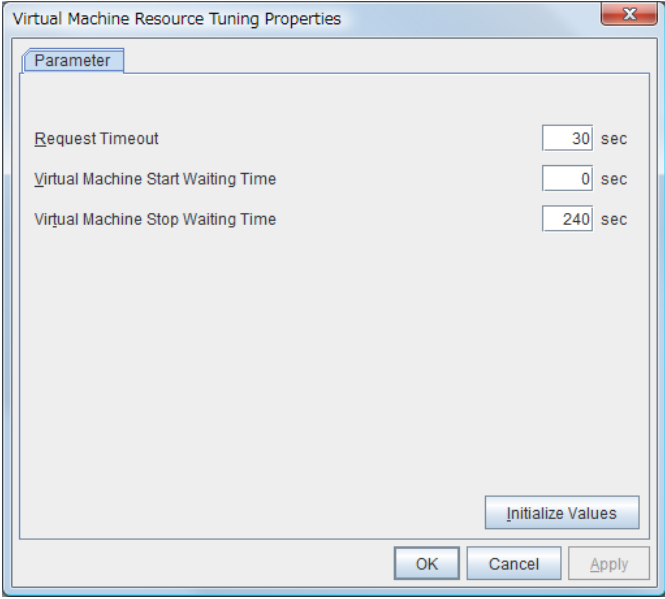
### Tuning

This displays the **VM Resource Tuning Properties** dialog box. Specify detailed settings for the VM resource.

## Adjusting the VM resource

1. Click **Tuning** on the **VM Resource tab**.
2. Display the **VM Resource Tuning Properties** screen. Display or change the detailed settings as described below.

### VM Resource Tuning Properties



The screenshot shows a Windows-style dialog box titled "Virtual Machine Resource Tuning Properties". It has a tab labeled "Parameter". Inside the dialog, there are three settings, each with a text label and a numeric input field followed by "sec":

- Request Timeout**: The input field contains the value "30".
- Virtual Machine Start Waiting Time**: The input field contains the value "0".
- Virtual Machine Stop Waiting Time**: The input field contains the value "240".

At the bottom right of the parameter list is a button labeled "Initialize Values". At the very bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

#### Request Timeout

Specify how long the system waits for completion of a request such as to start or stop a virtual machine.

If the request is not completed within this time, a timeout occurs and resource activation or deactivation fails.

#### Virtual Machine Start Waiting Time

The system definitely waits this time after requesting the virtual machine to startup.

#### Virtual Machine Stop Waiting Time

The maximum time to wait for the stop of the virtual machine. Deactivation completes at the timing the stop of the virtual machine.

## Displaying the properties of a VM resource by using the WebManager

1. Start the WebManager.
2. In the tree view, click the vm object icon for a virtual IP resource. The following information is displayed in the list view:

| virtual machine resource Name: vm1 |            | Details         |
|------------------------------------|------------|-----------------|
| Common                             |            | server1 server2 |
| Properties                         | Value      |                 |
| Comment                            |            |                 |
| VM Type                            | Container  |                 |
| VM Name                            | container1 |                 |
| UUID                               | UUID       |                 |
| Status                             | Online     |                 |
| Started Server                     |            |                 |

Comment:

Virtual Machine Type:

Virtual Machine Name:

UUID:

Virtual Machine Path:

Comment on the VM resource

Virtualization infrastructure type

Virtual machine name

UUID for identifying the virtual machine

Path of the virtual machine configuration information

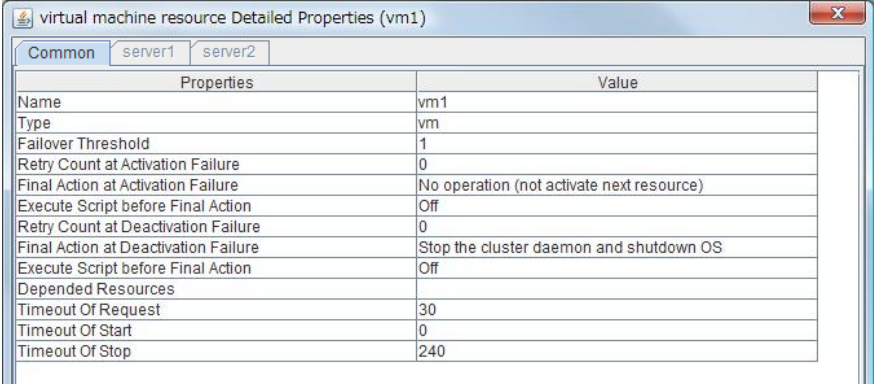
Status:

Status of VM resources

Started Server:

Started Server name

If you click the **Details** button, the following information is displayed in a pop-up dialog box:



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | vm1                                       |
| Type                                 | vm                                        |
| 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                   |                                           |
| Timeout Of Request                   | 30                                        |
| Timeout Of Start                     | 0                                         |
| Timeout Of Stop                      | 240                                       |

|                                       |                                                                                        |
|---------------------------------------|----------------------------------------------------------------------------------------|
| Name:                                 | VM resource name                                                                       |
| Type:                                 | Resource type                                                                          |
| Failover Threshold:                   | Maximum number of times failing over is performed when an activation error is detected |
| Retry Count at Activation Failure:    | Maximum number of times activation is retried when an activation error is detected     |
| Final Action at Activation Failure:   | Final action when an activation error occurs                                           |
| Execute Script before Final Action:   | Whether to execute scripts when an error is detected                                   |
| Retry Count at Deactivation Failure:  | Maximum number of times deactivation is retried when a deactivation error is detected  |
| Final Action at Deactivation Failure: | Final action when a deactivation error occurs                                          |
| Execute Script before Final Action:   | Whether to execute scripts when an error is detected                                   |
| Depended Resource:                    | Dependent resource                                                                     |
| Timeout Of Request:                   | Wait time for the completion of the request to start or stop the virtual machine.      |
| Timeout Of Start                      | Wait time for the virtual machine to start                                             |
| Timeout Of Stop                       | Wait time for the virtual machine to stop                                              |

# Understanding Dynamic DNS resources

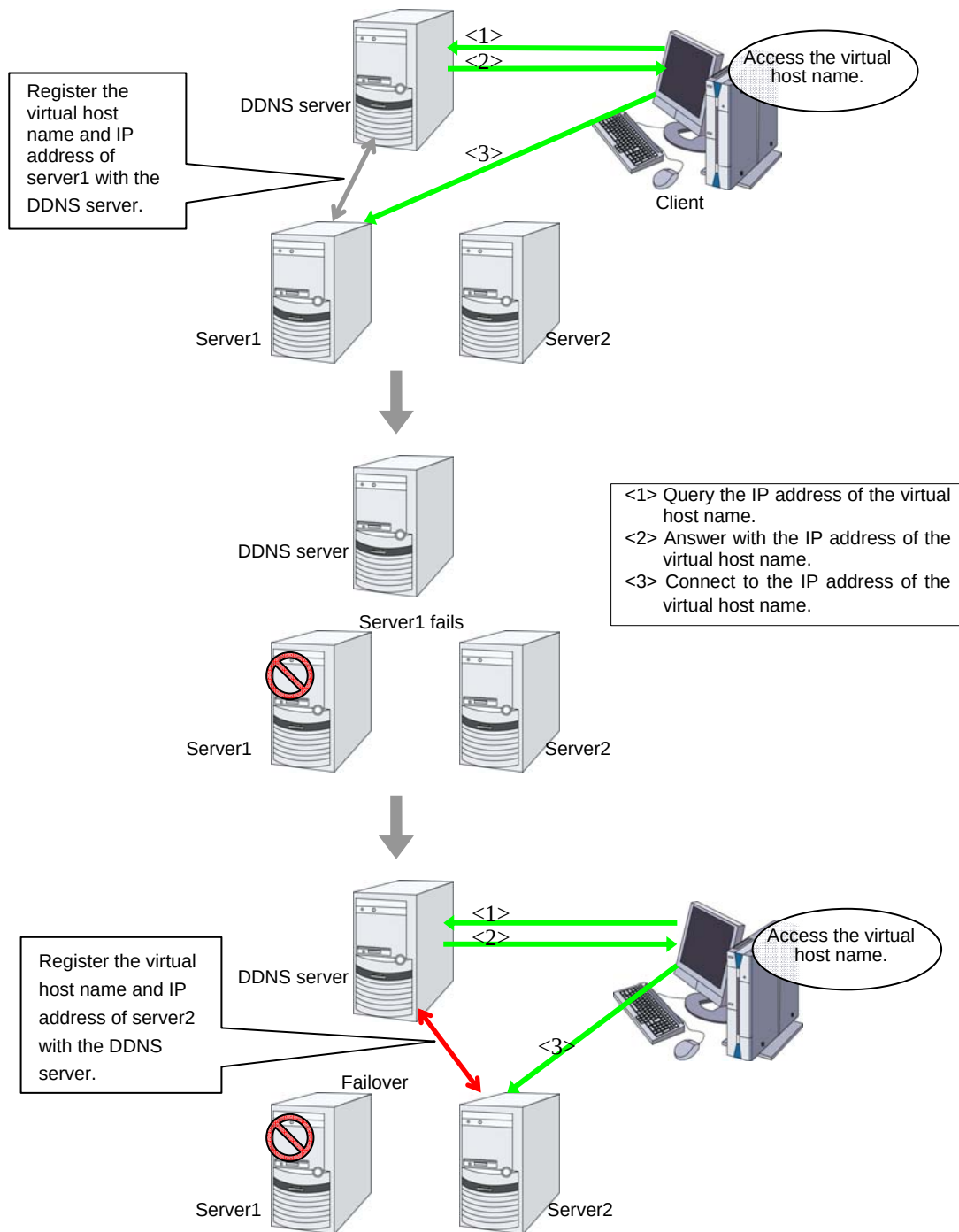
## Dependencies of Dynamic DNS resources

The Dynamic DNS resources depend on the following group resource types by default.

| Group resource type  |
|----------------------|
| Virtual IP resource  |
| Floating IP resource |

## What is a Dynamic DNS resource?

- ◆ A Dynamic DNS resource registers the virtual host name and IP address of the active server with the dynamic DNS server. A client application can use the virtual host name to connect to a server in the cluster. When the virtual host name is used, the client does not have to be aware of whether the connection destination server is switched when a failover occurs or a group is moved.



## Preparing to use Dynamic DNS resources

### Set up the DDNS server before using Dynamic DNS resources.

The description below assumes the use of BIND9.

One of the two types of /etc/named.conf settings below is used depending on the Dynamic DNS resource use mode when the DDNS server is set up. Specify /etc/named.conf on the DDNS server in the desired mode.

◆ When using Dynamic DNS resources with authentication

Create a shared key on the BIND9 server by using the dnssec-keygen command. Add the shared key to /etc/named.conf and allow the zone file to be updated.

When adding a Dynamic DNS resource, enter the shared key name in **Authentication Key Name** and the shared key value in **Authentication Key Value**.

---

**Note:** For details about setting up the DDNS server, using the dnssec-keygen command, and specifying setting other than allow-update, see the BIND manual.

---

Example:

1. Generate a shared key.

```
#dnssec-keygen -a HMAC-MD5 -b 256 -n HOST example
```

example is the shared key name.

When the dnssec-keygen command is executed, the two files below are generated. The same shared key is used for these files.

Kexample.+157+09088.key

Kexample.+157+09088.private

While the shared key is extracted from Kexample.+157+09088.key when using the named.conf setting below, using Kexample.+157+09088.private leads to the same result.

The shared key value for Kexample.+157+09088.key is underlined below.

```
cat Kexample.+157+09088.key
```

```
example. IN KEY 512 3 157 iuBgSUEIBjQUKNJ36NocAgaB
```

2. Add the shared key information to /etc/named.conf.

```
key " example " {
 algorithm hmac-md5;
 secret " iuBgSUEIBjQUKNJ36NocAgaB";
};
```

3. Add the shared key information to the zone statement in /etc/named.conf.

```
zone "example.jp" {
 :
 allow-update{
 key example;
 };
 :
};
```

4. When adding a Dynamic DNS resource by using the Builder, enter the shared key name (**example**) in **Authentication Key Name** and the shared key value (**iuBgSUEIBjQUKNJ36NocAgaB**) in **Authentication Key Value**.

◆ When using Dynamic DNS resources without authentication

Be sure to specify the IP addresses of all servers in the cluster as the IP address range in which the zone file can be updated (allow-update {xxx.xxx.xxx.xxx}) in /etc/named.conf.

Example:

IP address for server 1 in the cluster: 192.168.10.110

IP address for server 2 in the cluster: 192.168.10.111

1. Add the IP address range in which updates are allowed to the zone statement in /etc/named.conf.

```
zone "example.jp" {
 :
 //IP address range in which updates are allowed
 allow-update {
 192.168.10.0/24;
 };
 :
};
```

or

```
zone "example.jp" {
 :
 //IP address range in which updates are allowed
 allow-update {
 192.168.10.110;
 192.168.10.111;
 };
 :
};
```

2. When adding a Dynamic DNS resource, do not enter any values in **Authentication Key Name** or **Authentication Key Value**.

## Notes on Dynamic DNS resources

- ◆ When using Dynamic DNS resources, the bind-utils package is necessary on each server.
- ◆ Configuring Dynamic DNS server settings to be used is necessary to /etc/resolve.conf on each server.
- ◆ When IP address of each server exists in different segments, FIP address cannot be set as IP address of Dynamic DNS resources.
- ◆ To register each server IP address with the DDNS server, specify the addresses in the settings for each server.
- ◆ In case of connecting from clients using virtual host name, when the fail over of the group which has Dynamic DNS resources occurs, reconnection may be necessary (restart browsers, etc.).
- ◆ This method, which authenticates resources, applies only to a DDNS server set up using BIND9. **To use the method without authentication, do not enter any values in Authentication Key Name or Authentication Key Value.**
- ◆ The behavior when the WebManager is connected depends on the Dynamic DNS resource settings.
  - When the IP address of each server is specified for Dynamic DNS resources on a server basis  
If the WebManager is connected by using the virtual host name from the client, this connection is not automatically switched if a failover occurs for a group containing



Dynamic DNS resources. To switch the connection, restart the browser, and then connect to the WebManager again.

- When the FIP address is specified for the Dynamic DNS resource  
If the WebManager is connected by using the virtual host name from the client, this connection is automatically switched if a failover occurs for a group containing Dynamic DNS resources.
- ◆ If Dynamic DNS resources are used with the method with authentication, the difference between the time of every server in the cluster and that of the DDNS server must be less than five minutes.  
If the time difference is five minutes or more, the virtual host name cannot be registered with the DDNS server.

## Displaying and changing the details of the Dynamic DNS resources

1. In the tree view displayed in the left pane of the Builder, click the icon of the group to which the Dynamic DNS resource whose details you want to display, specify, or change belongs.
2. The group resource list is displayed in the table view in the right pane of the window. Right-click the target Dynamic DNS resource name, and then click the **Details** tab in **Property**.
3. Display or change the detailed settings on the **Details** tab as described below.

### Dynamic DNS Resource Details Tab

The screenshot shows a window titled "[ ddns1 ] Resource Properties" with a tabbed interface. The "Details" tab is selected. Inside the tab, there are sub-tabs for "Common", "server1", and "server2". The "Common" sub-tab is active, showing a list of configuration fields:

|                          |             |
|--------------------------|-------------|
| Virtual Host Name        | virtualhost |
| IP Address               | 10.0.0.1    |
| DDNS Server              | ddnsserver  |
| Port No.                 | 53          |
| Authentication Key Name  | key         |
| Authentication Key Value | value       |

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

#### Virtual Host Name

Enter the virtual host name to register with the DDNS service.

#### IP Address **This can be individually specified for each server.**

Enter the IP address for the virtual host name.

When also using FIP resources, enter the IP address of the resources on the **Common** tab. When using an IP address for each server, enter the IP address on each server tab.

**DDNS server**

Enter the IP address of the DDNS server.

**Port Number**

Enter the port number of the DDNS server. The default value is 53.

**Authentication Key Name**

Enter the shared key name if a shared key was generated using the dnssec-keygen command.

**Authentication Key Value**

Enter the value of the shared key generated using the dnssec-keygen command.

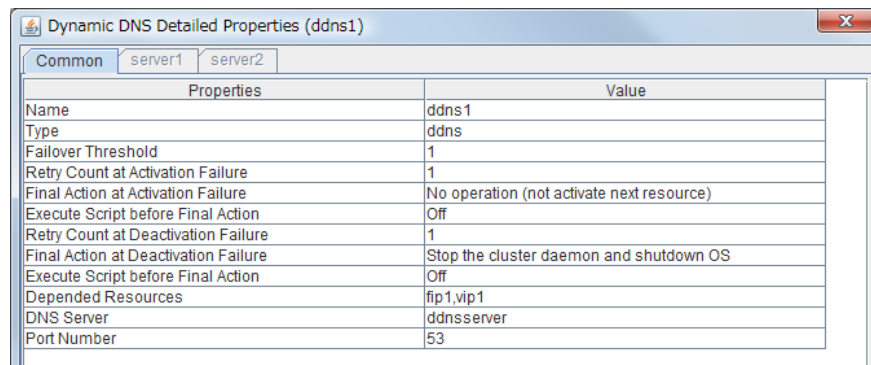
**Displaying the properties of a Dynamic DNS resource by using the WebManager**

- 4. Start the WebManager.
- 5. In the tree view, click the object icon  for a Dynamic DNS resource. The following information is displayed in the list view:

| Dynamic DNS Name: ddns1 |                       | Details           |
|-------------------------|-----------------------|-------------------|
| Common                  |                       | server1   server2 |
| Properties              | Value                 |                   |
| Comment                 |                       |                   |
| Virtual Host Name       | virtualhost           |                   |
| IP Address              | Refer to server's tab |                   |
| Status                  | Online                |                   |
| Started Server          | server1               |                   |

- |                    |                                                     |
|--------------------|-----------------------------------------------------|
| Comment:           | Comment on the Dynamic DNS resource                 |
| Virtual Host Name: | Virtual host name used for the Dynamic DNS resource |
| IP Address:        | IP address used for the Dynamic DNS resource        |
| Status:            | Status of the Dynamic DNS resource                  |
| Started Server:    | Name of the server                                  |

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



| Properties                           | Value                                     |
|--------------------------------------|-------------------------------------------|
| Name                                 | ddns1                                     |
| Type                                 | ddns                                      |
| Failover Threshold                   | 1                                         |
| Retry Count at Activation Failure    | 1                                         |
| Final Action at Activation Failure   | No operation (not activate next resource) |
| Execute Script before Final Action   | Off                                       |
| Retry Count at Deactivation Failure  | 1                                         |
| Final Action at Deactivation Failure | Stop the cluster daemon and shutdown OS   |
| Execute Script before Final Action   | Off                                       |
| Depended Resources                   | fip1.vip1                                 |
| DNS Server                           | ddnsserver                                |
| Port Number                          | 53                                        |

|                                      |                                                                                        |
|--------------------------------------|----------------------------------------------------------------------------------------|
| Name:                                | Dynamic DNS resource name                                                              |
| Type:                                | Resource type                                                                          |
| Failover Threshold:                  | Maximum number of times failing over is performed when an activation error is detected |
| Retry Count at Activation Failure:   | Maximum number of times activation is retried when an activation error is detected     |
| Final Action at Activation Failure:  | Final action when an activation error occurs                                           |
| Execute Script before Final Action:  | Whether to execute scripts when an error is detected                                   |
| Retry Count at Deactivation Failure: | Maximum number of times deactivation is retried when a deactivation error is detected  |
| Final Action at Deactivation:        | Final action when a deactivation error occurs                                          |
| Execute Script before Final Action:  | Whether to execute scripts when an error is detected                                   |
| Depended Resource:                   | Dependent resource                                                                     |
| DDNS Server:                         | IP address of the DDNS server                                                          |
| Port Number:                         | Port number of the DDNS server                                                         |



# Chapter 5      Monitor resource details

This chapter provides detailed information on monitor resources. Monitor resource is a unit to perform monitoring.

This chapter covers:

|                                                          |     |
|----------------------------------------------------------|-----|
| • Monitor resource .....                                 | 418 |
| • Understanding the disk monitor resources .....         | 472 |
| • Understanding IP monitor resources .....               | 478 |
| • Understanding NIC link up/down monitor resources ..... | 483 |
| • Understanding PID monitor resources .....              | 488 |
| • Understanding user-mode monitor resources .....        | 490 |
| • Understanding multi target monitor resources .....     | 496 |
| • Understanding virtual IP monitor resources .....       | 502 |
| • Understanding custom monitor resources .....           | 504 |
| • Understanding volume manager .....                     | 509 |
| • Understanding message receive monitor resources .....  | 513 |
| • Understanding VM monitor resources .....               | 518 |
| • Understanding Dynamic DNS monitor resources .....      | 522 |
| • Understanding MySQL monitor resources .....            | 524 |
| • Understanding NFS monitor resources .....              | 529 |
| • Understanding Oracle monitor resources .....           | 533 |
| • Understanding PostgreSQL monitor resources .....       | 539 |
| • Understanding Samba monitor resources .....            | 544 |

## 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 472.        | 3.0.0-1~          |
| IP Monitor Resource                      | ipw          | See "Understanding IP monitor resources" on page 478.              | 3.0.0-1~          |
| NIC Link Up/Down Monitor Resource        | miiw         | See "Understanding NIC link up/down monitor resource on page 483.  | 3.0.0-1~          |
| PID Monitor Resource                     | pidw         | See "Understanding PID monitor resource" on page 488.              | 3.0.0-1~          |
| User-Mode Monitor Resource               | userw        | See "Understanding user-mode monitor resources" on page 489.       | 3.0.0-1~          |
| Multi Target Monitor Resource            | mtw          | See "Understanding multi target monitor resource on page 496.      | 3.0.0-1~          |
| Virtual IP Monitor Resource              | vipw         | See "Understanding virtual IP monitor resources on page 502.       | 3.0.0-1~          |
| Custom monitor Resource                  | genw         | See "Understanding custom monitor resources" on page 504.          | 3.0.0-1~          |
| Volume Manager Monitor resource          | volmgrw      | See "Understanding Volume Manager resource" on page 557.           | 3.0.0-1~          |
| Message receive monitor resource         | mrw          | See "Understanding message receive monitor resources" on page 513. | 3.0.0-1~          |
| VM monitor resource                      | vmw          | See "Understanding VM monitor resources" on page 518.              | 3.0.0-1~          |
| Dynamic DNS monitor resource             | ddns         | See "Understanding Dynamic DNS monitor resources" on page 522.     | 3.0.0-1~          |
| MySQL Monitor Resource <sup>1</sup>      | mysqlw       | See "Understanding MySQL monitor resources" on page 524.           | 3.0.0-1~          |
| NFS Monitor Resource <sup>1</sup>        | nfs          | See "Understanding NFS monitor resources" on page 529.             | 3.0.0-1~          |
| Oracle Monitor Resource <sup>1</sup>     | oraclew      | See "Understanding Oracle monitor resources" on page 533.          | 3.0.0-1~          |
| PostgreSQL Monitor Resource <sup>1</sup> | psqlw        | See "Understanding PostgreSQL monitor resource on page 539.        | 3.0.0-1~          |
| Samba Monitor Resource <sup>1</sup>      | sambaw       | See "Understanding Samba monitor resources on page 544.            | 3.0.0-1~          |

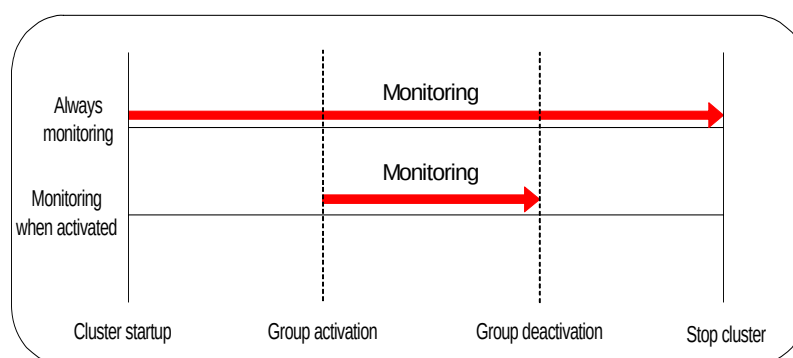
<sup>1</sup> It is required to register the license to use the monitor resources. See the *Installation and Configuration Guide* for details about registering the license.

## 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)            | -               |
| NIC Link Up/Down Monitor resource | Always or when activated  | All             |
| PID Monitor resource              | Fixed to while activating | exec            |
| Multi Target Monitor Resource     | Always or when activated  | All             |
| Virtual IP Monitor Resource       | When activated (Fixed)    | vip             |
| Custom monitor resources          | Always or when activated  | All             |
| Volume Manager Monitor Resource   | Always or when activated  | All             |
| MySQL Monitor Resource            | When activated (Fixed)    | exec            |
| NFS Monitor Resource              | Always or when activated  | exec            |
| Oracle Monitor Resource           | When activated (Fixed)    | exec            |
| PostgreSQL Monitor Resource       | When activated (Fixed)    | exec            |
| Samba Monitor Resource            | Always or when activated  | exec            |
| VM monitor resource               | Always (fixed)            | vm              |
| Message receive monitor resource  | Always or when activated  | mrw             |
| Dynamic DNS Monitor Resource      | Always (Fixed)            | ddns            |

## 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   |
| NIC Link Up/Down Monitor Resource | Possible   |
| PID Monitor Resource              | Possible   |
| Multi Target Monitor Resource     | Possible   |
| Virtual IP Monitor Resource       | Impossible |
| Custom Monitor Resource           | Possible   |
| Volume Manager Monitor Resource   | Possible   |
| MySQL Monitor Resource            | Possible   |
| NFS Monitor Resource              | Possible   |
| Oracle Monitor Resource           | Possible   |
| PostgreSQL Monitor Resource       | Possible   |
| Samba Monitor Resource            | Possible   |
| VM monitor resource               | Possible   |
| Message receive monitor resource  | Possible   |
| Dynamic DNS Monitor Resource      | Impossible |

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 controlling is not performed.



## Monitoring interval for monitor resource

All monitor resources except the user-mode monitor resource monitors their targets at every monitor interval.

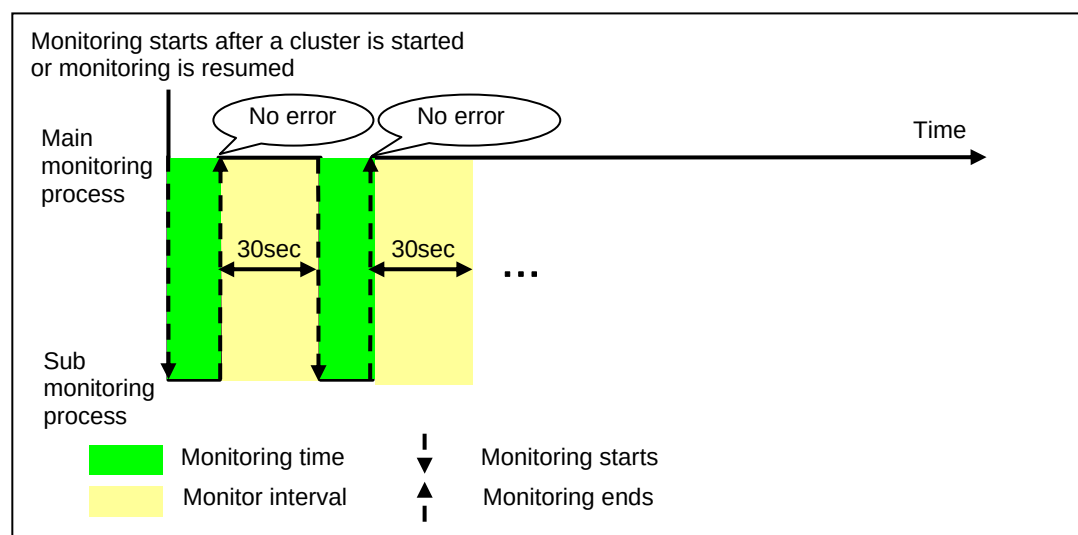
The following illustrates the timeline of how a monitor resource monitors its target and finds error/no error with the configuration below:

### When no error is detected

Examples of behavior when the following values are set.

<Monitor>

|                     |        |
|---------------------|--------|
| Monitor Interval    | 30 sec |
| Monitor Timeout     | 60 sec |
| Monitor Retry Count | 0 time |



**When an error is detected (without monitor retry setting)**

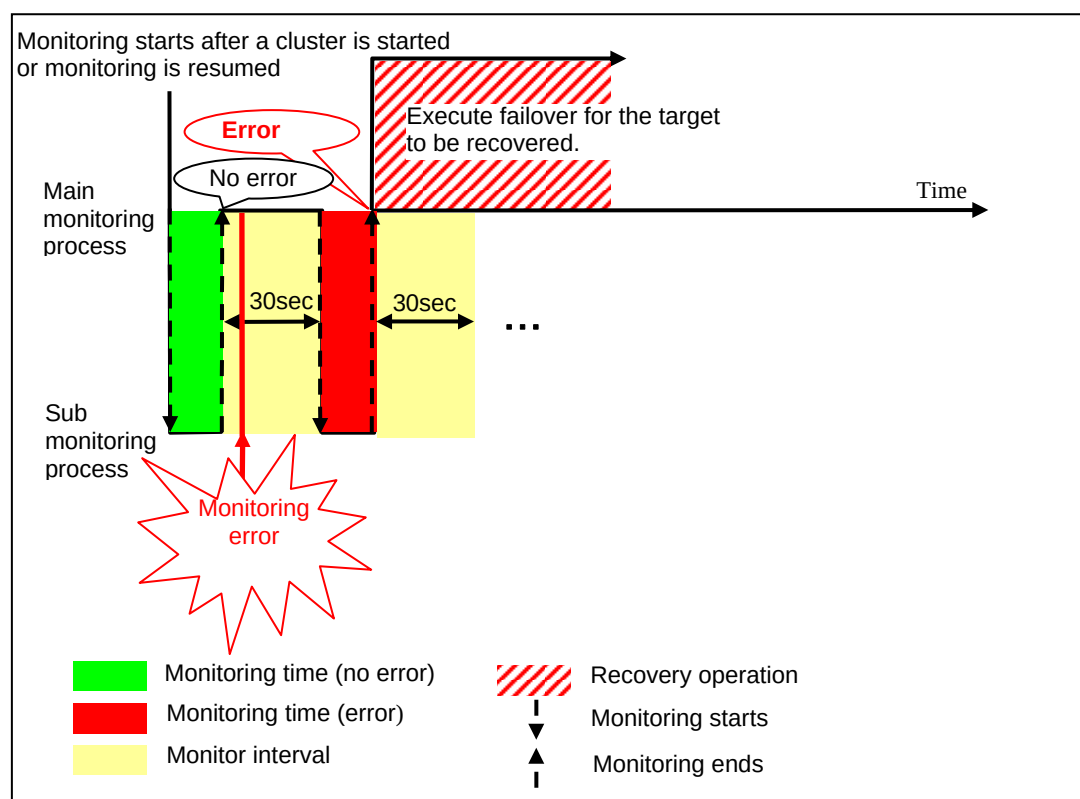
Examples of behavior when the following values are set.

## &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   |



After an error occurs, it is detected at the next monitoring and the failover for the recovery target starts.

**When an error is detected (with monitor retry settings)**

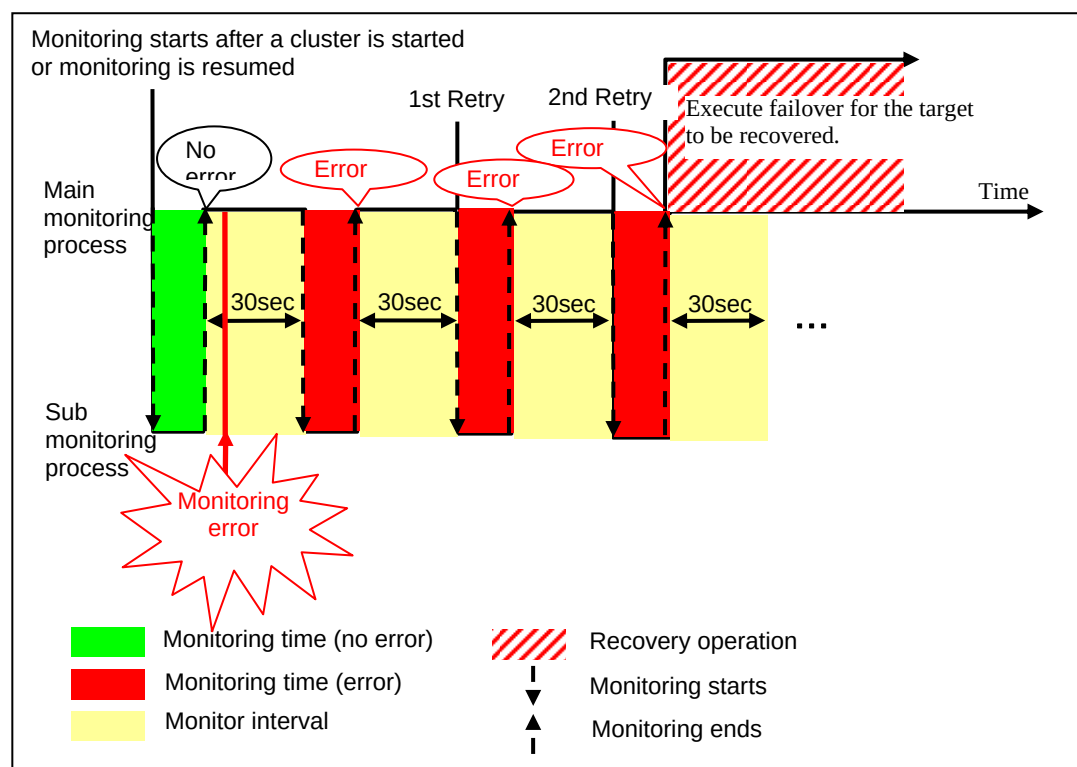
Examples of behavior when the following values are set.

## &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)**

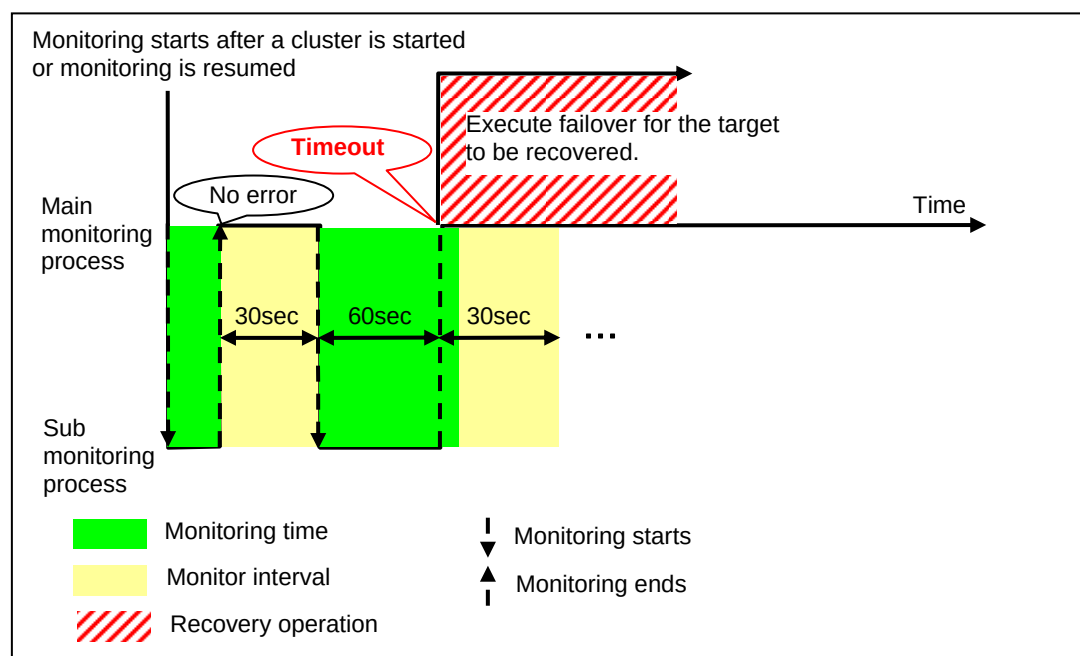
Examples of behavior when the following values are set.

## &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)**

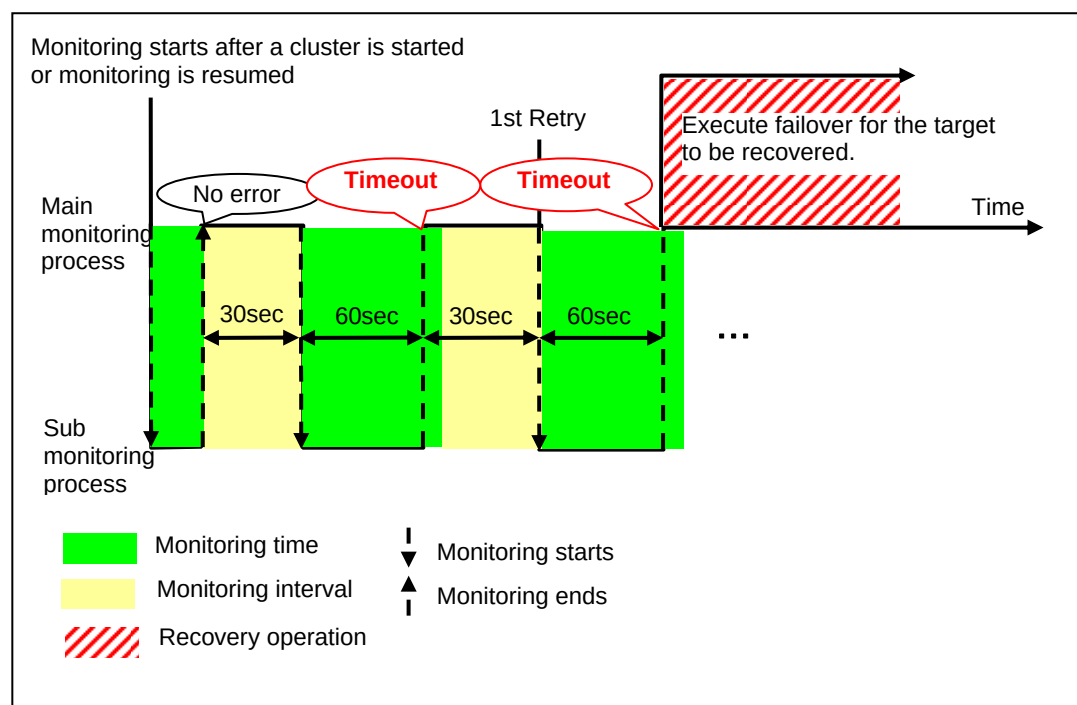
Examples of behavior when the following values are set.

## &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 as following:

| Recovery target                   | Status                  | Reactivation <sup>2</sup> | Failover <sup>3</sup> | Final action <sup>4</sup> |
|-----------------------------------|-------------------------|---------------------------|-----------------------|---------------------------|
| Group resource/<br>Failover group | Already stopped         | No                        | No                    | No                        |
|                                   | Being activated/stopped | No                        | No                    | No                        |
|                                   | Already activated       | Yes                       | Yes                   | Yes                       |
|                                   | Error                   | Yes                       | Yes                   | Yes                       |
| Nothing                           | -                       | -                         | -                     | 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>2</sup> Effective only when the value for the reactivation threshold is set to 1 (one) or greater.

<sup>3</sup> Effective only when the value for the failover threshold is set to 1 (one) or greater.

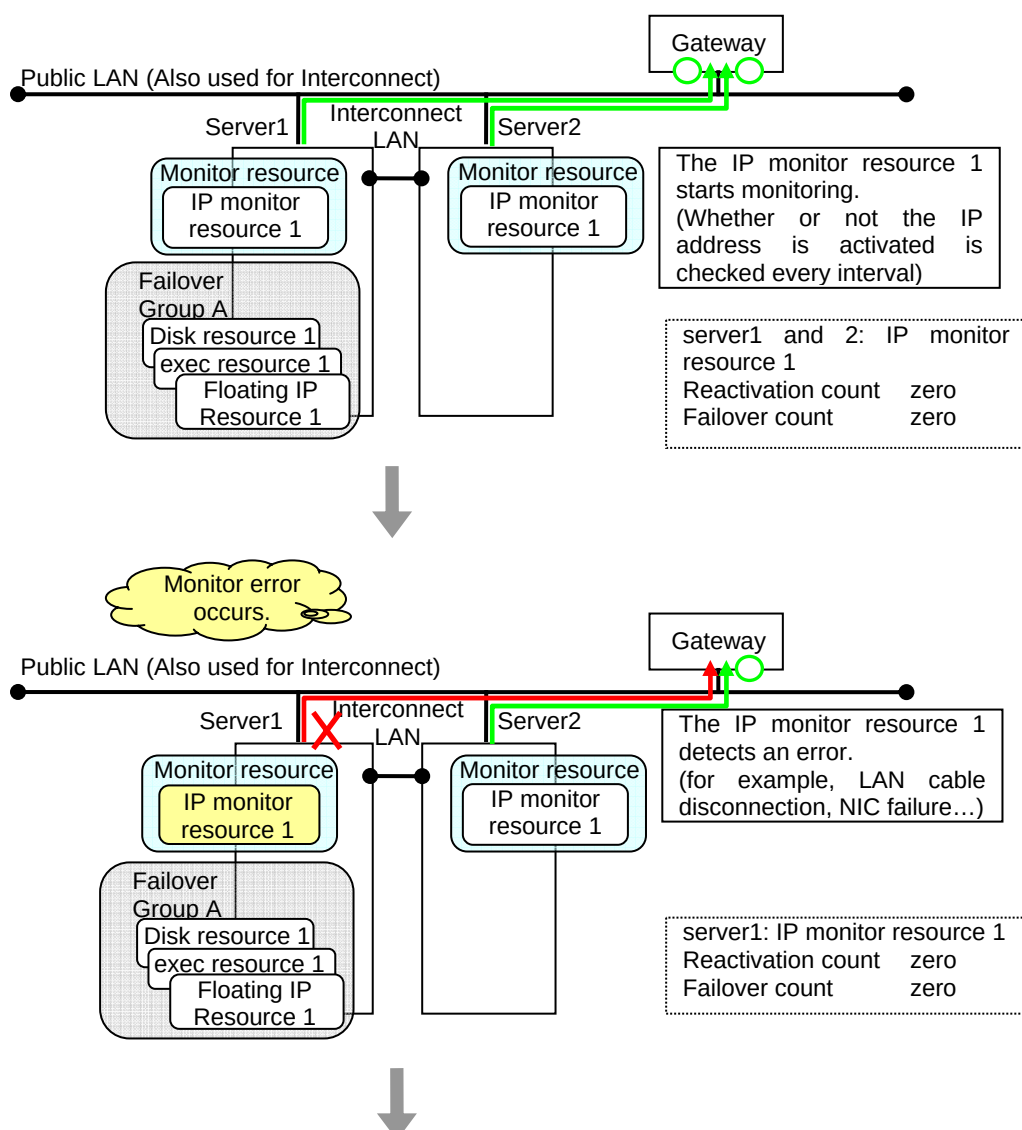
<sup>4</sup> Effective only when an option other than **No Operation** is selected.

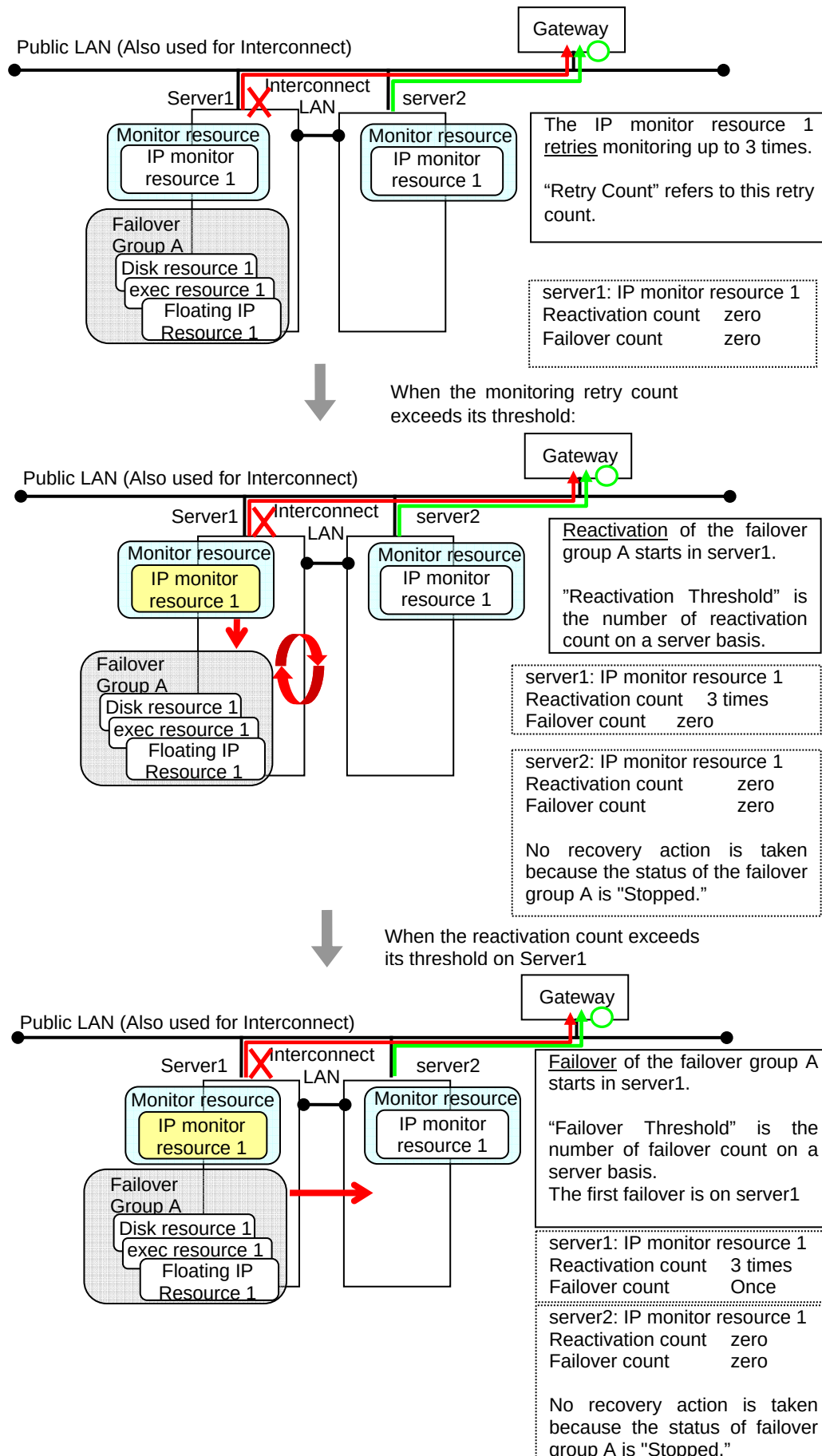
The following is an example of the progress when only one server detects an error while the gateway is specified as an IP resource of the IP monitor resource:

Examples of behavior when the following values are set.

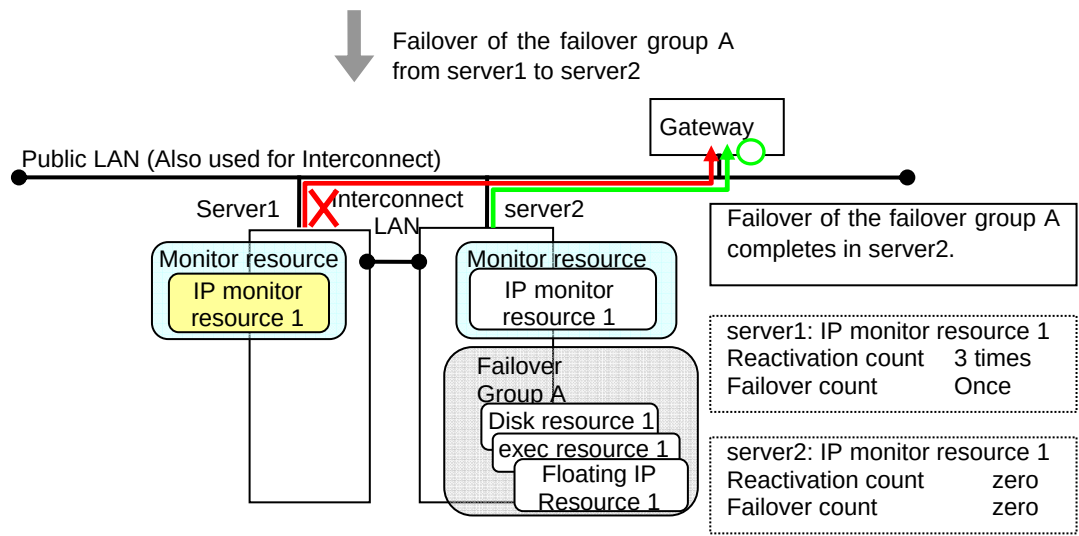
```
<Monitor>
Interval 30 sec
Timeout 30 sec
Retry Count 3 times

<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.

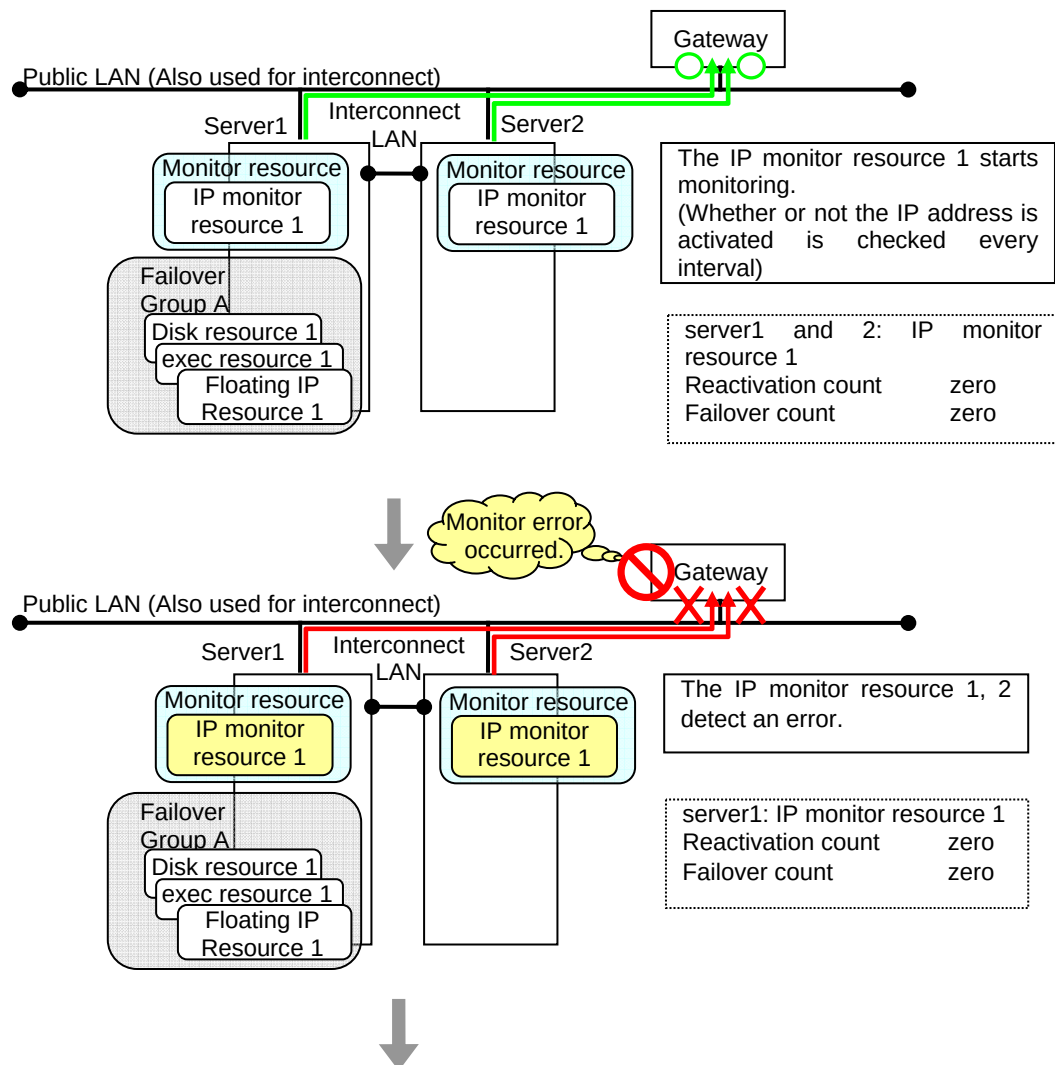
Examples of behavior when the following values are set.

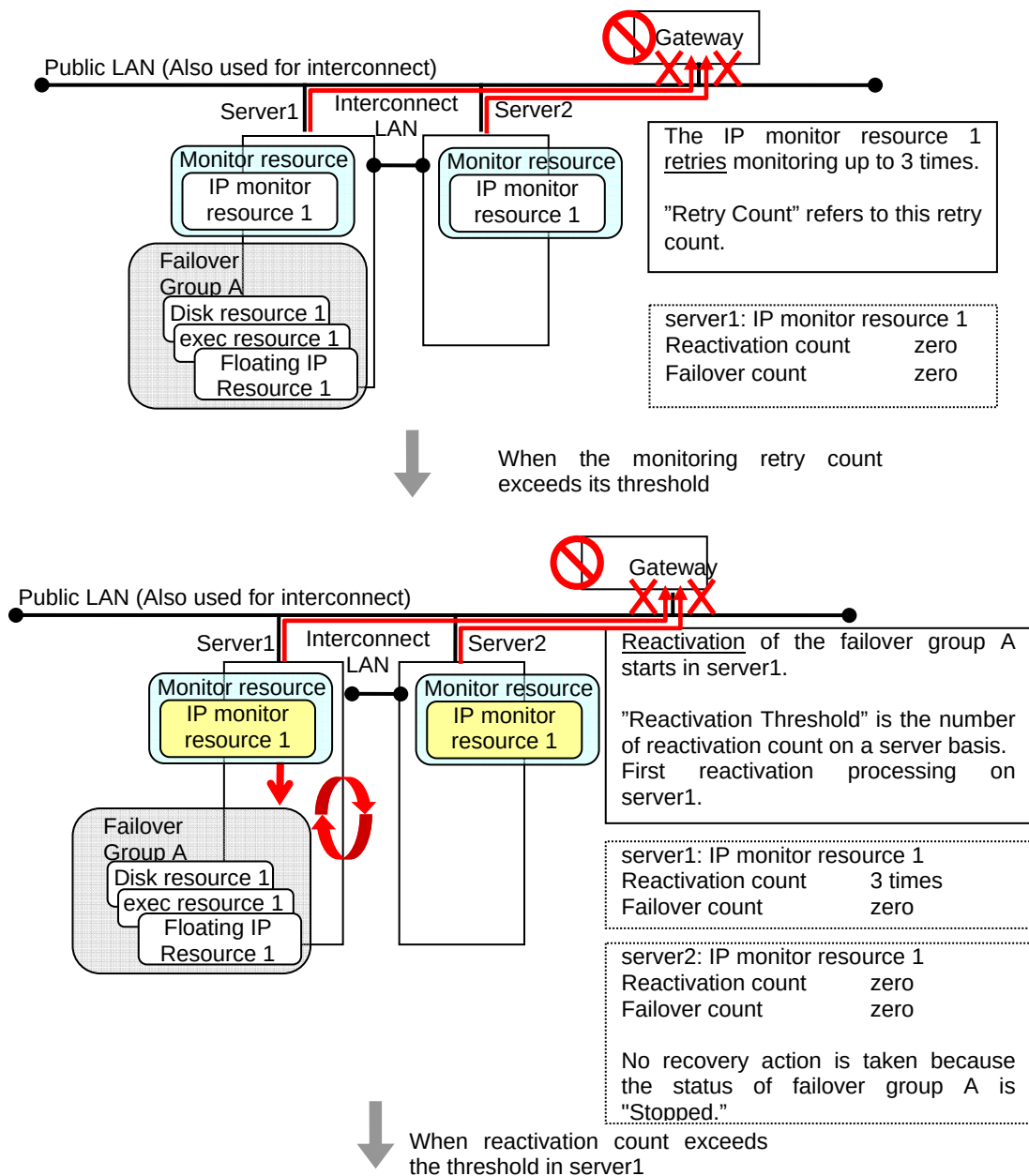
<Monitor>

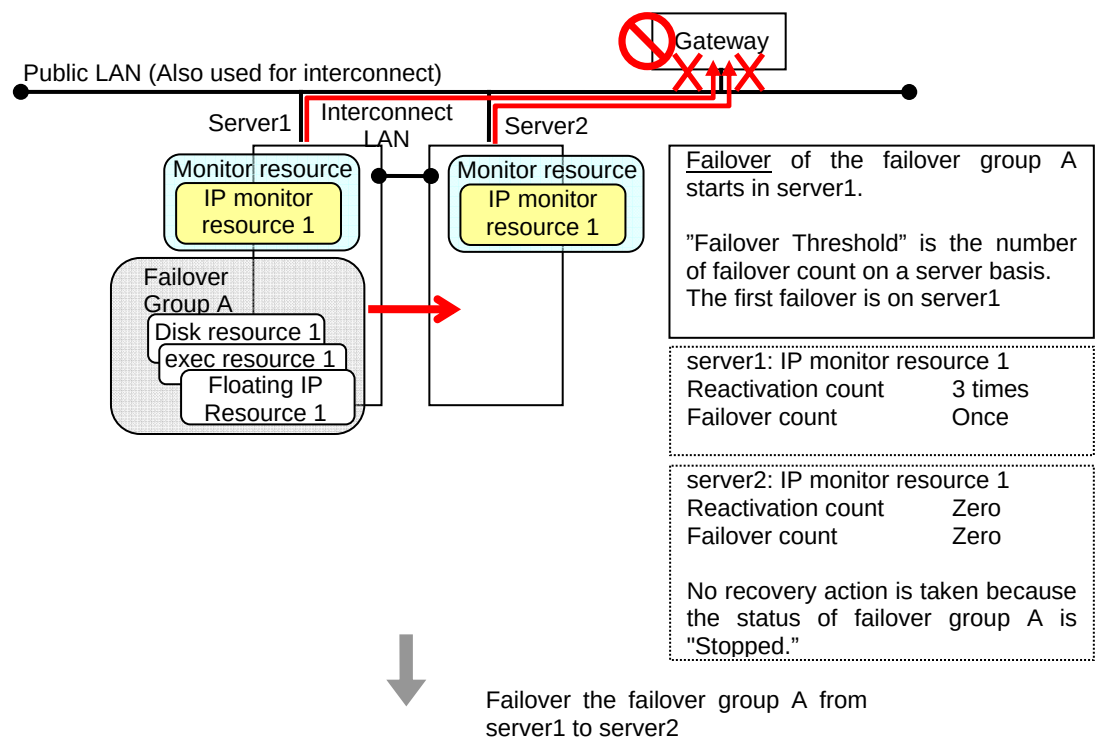
|             |         |
|-------------|---------|
| Interval    | 30 sec  |
| Timeout     | 30 sec  |
| Retry Count | 3 times |

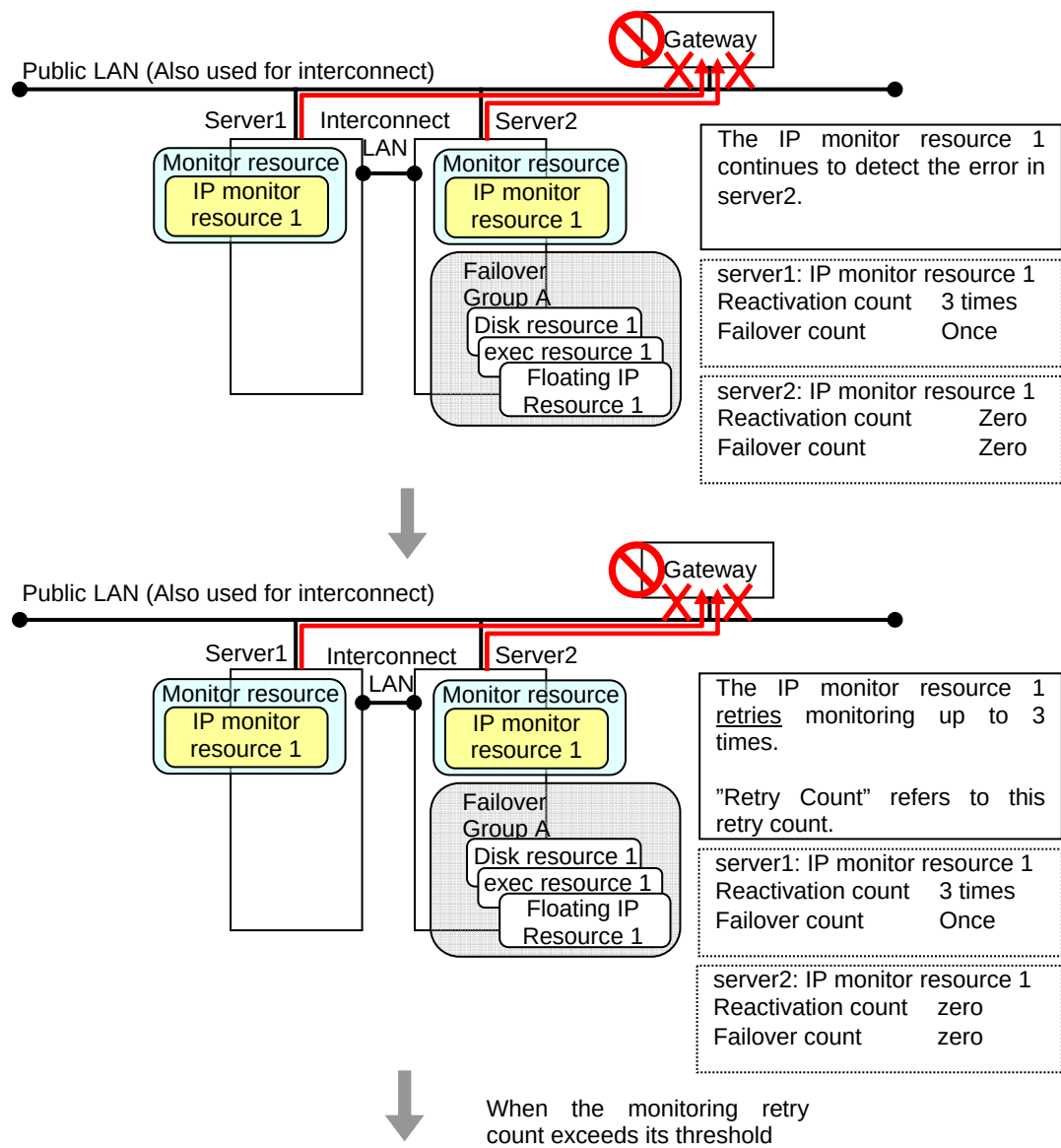
<Error detection>

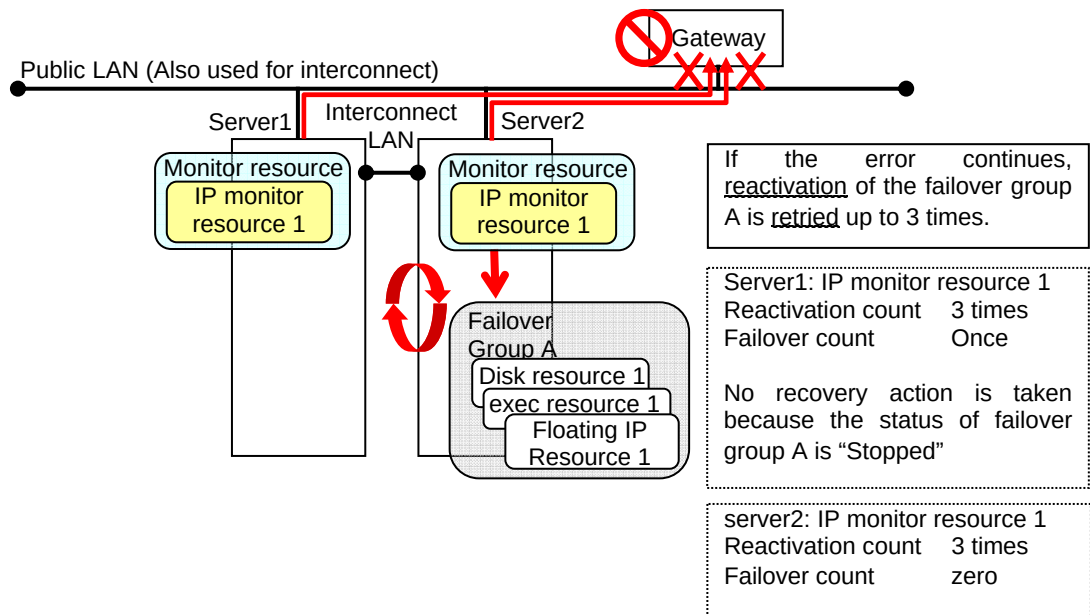
|                        |                  |
|------------------------|------------------|
| Recovery Target        | Failover Group A |
| Reactivation threshold | 3 times          |
| Failover Threshold     | 1                |
| Final Action           | No Operation     |



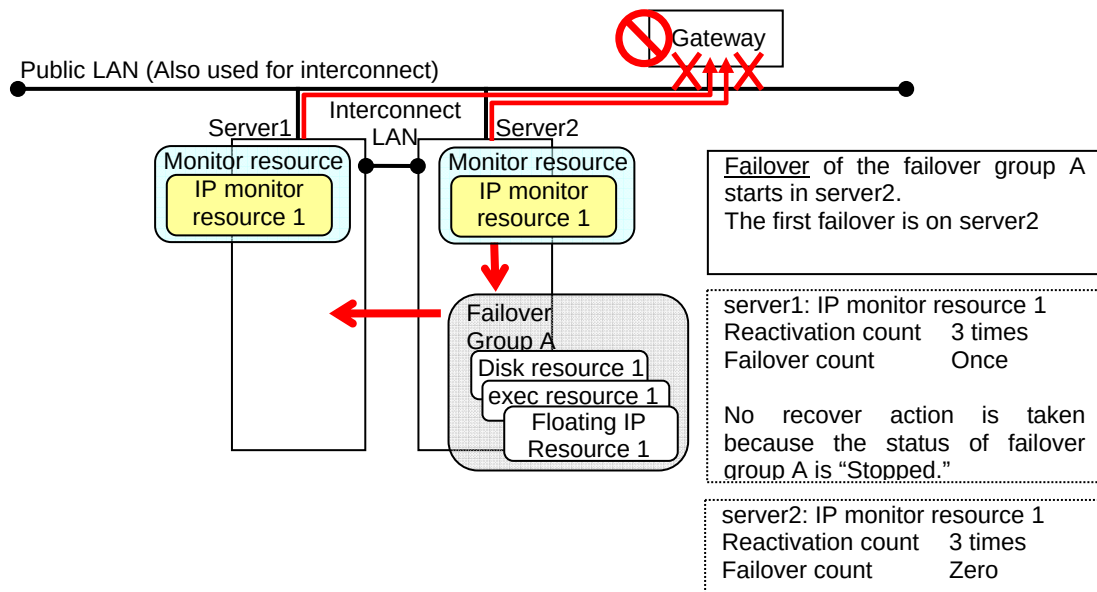




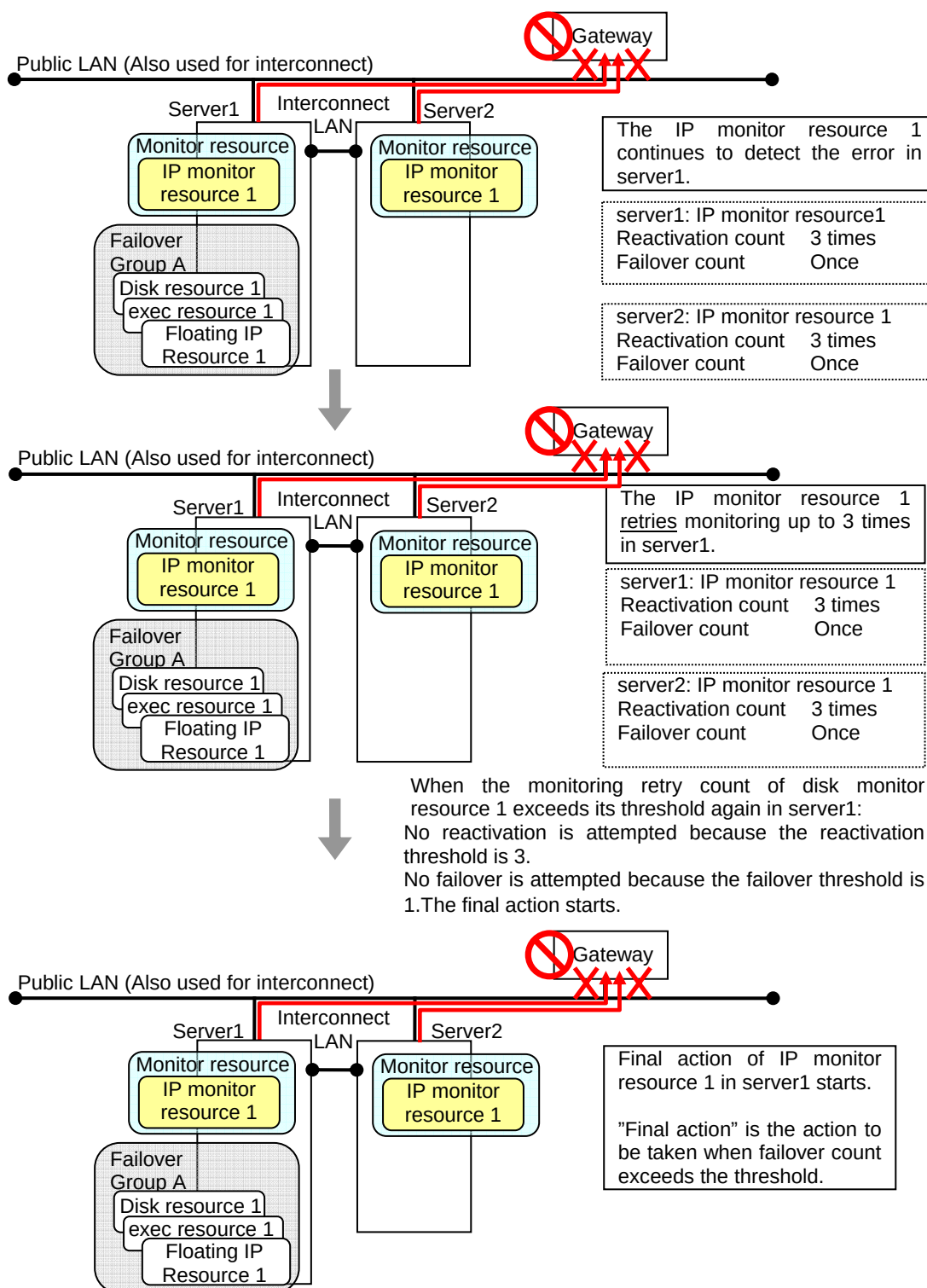




When reactivation count also exceeds its threshold in server2



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 this section 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 be able to failover 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

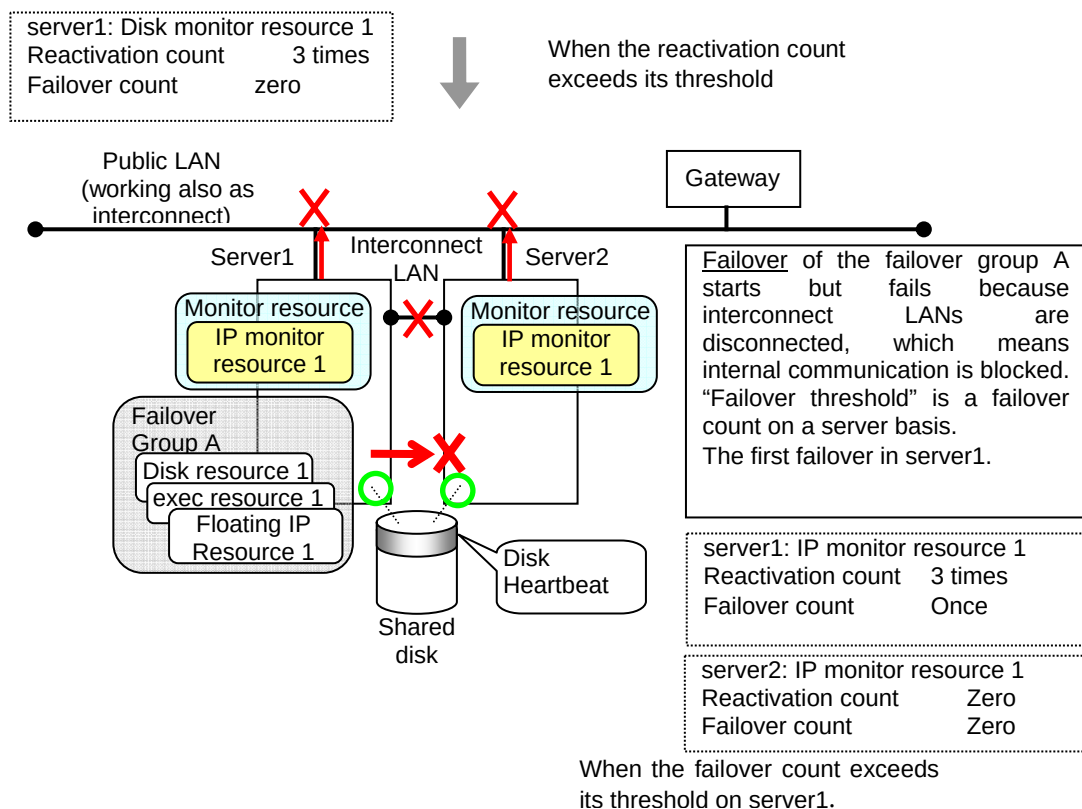
##### <Monitor>

|             |            |
|-------------|------------|
| Interval    | 30 seconds |
| Timeout     | 30 seconds |
| Retry Count | 3 times    |

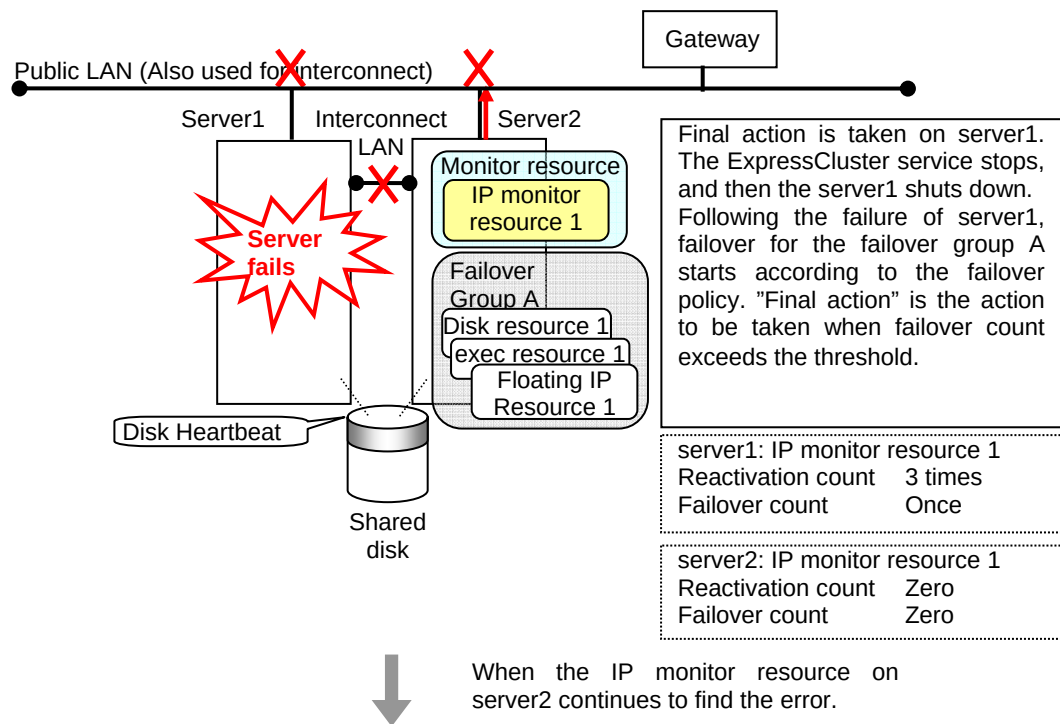
##### <Error detection>

|                        |                                      |
|------------------------|--------------------------------------|
| Recovery Object        | Failover Group A                     |
| Reactivation Threshold | 3 times                              |
| Failover Threshold     | 1 time                               |
| Final Action           | Stop cluster service 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.



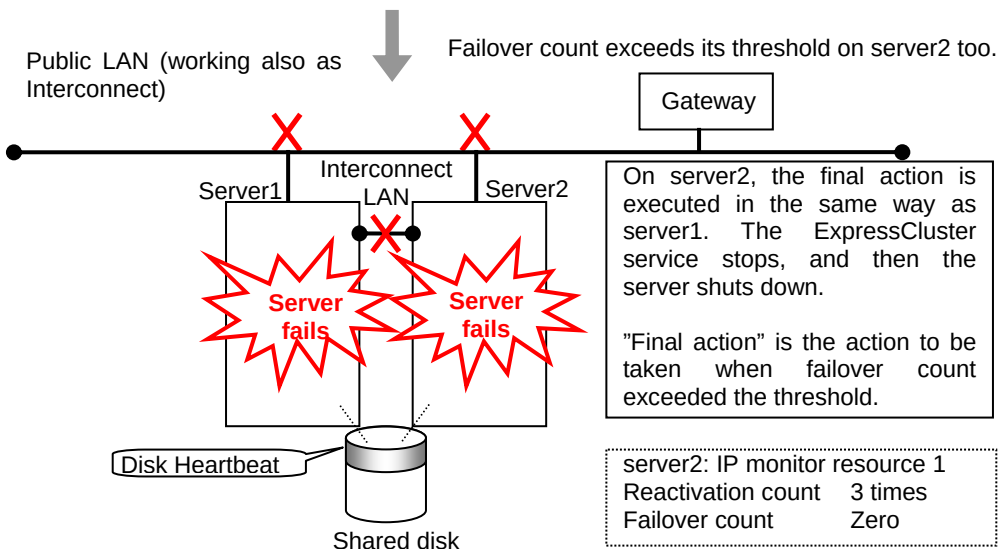




Reactivation of the Failover Group A is executed on server2 in the same way as server1.

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 426 is executed and another monitoring error occurs after monitoring returns to normal.

Examples of behavior when the following values are set.

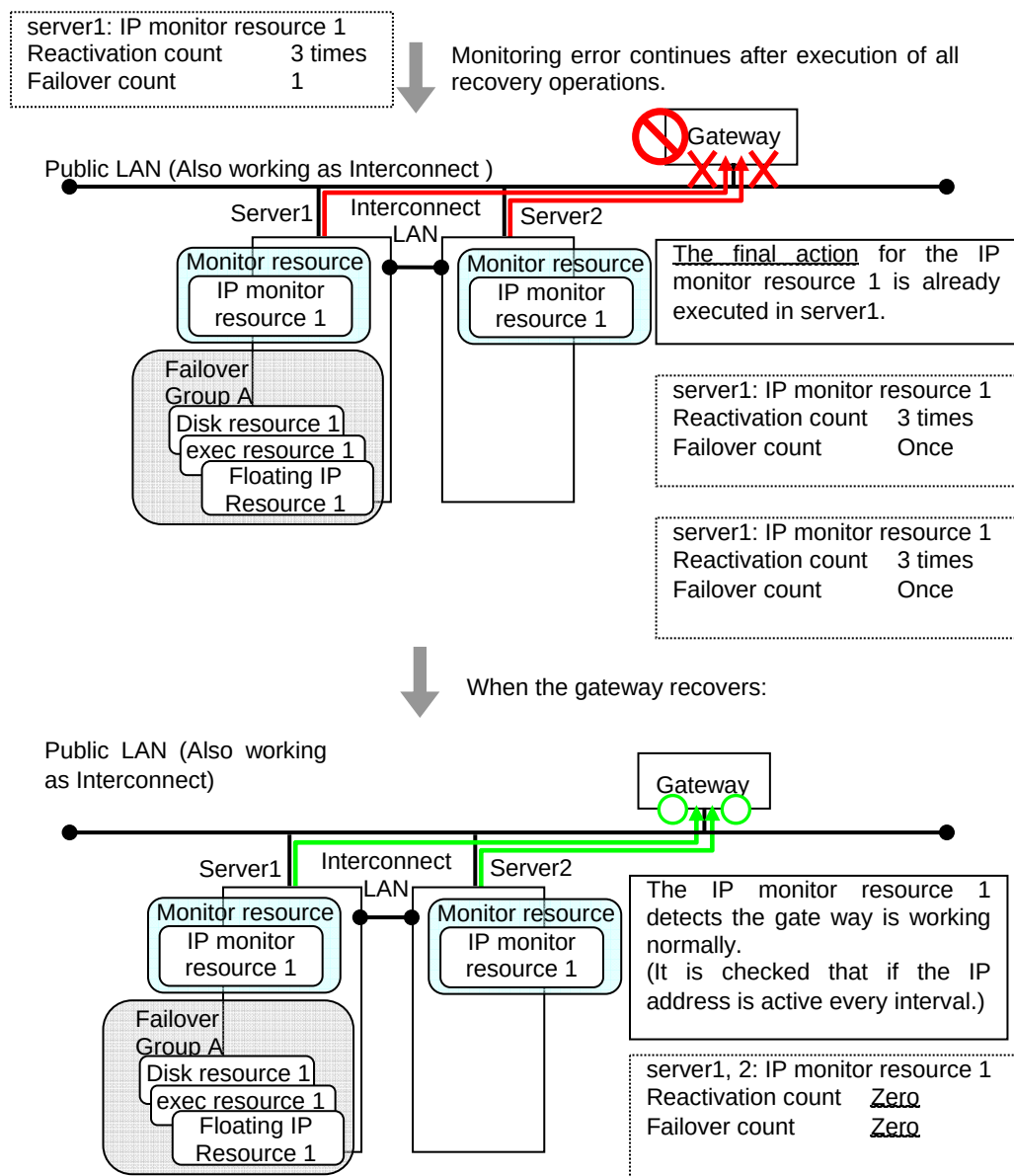
### Configuration

#### <Monitor>

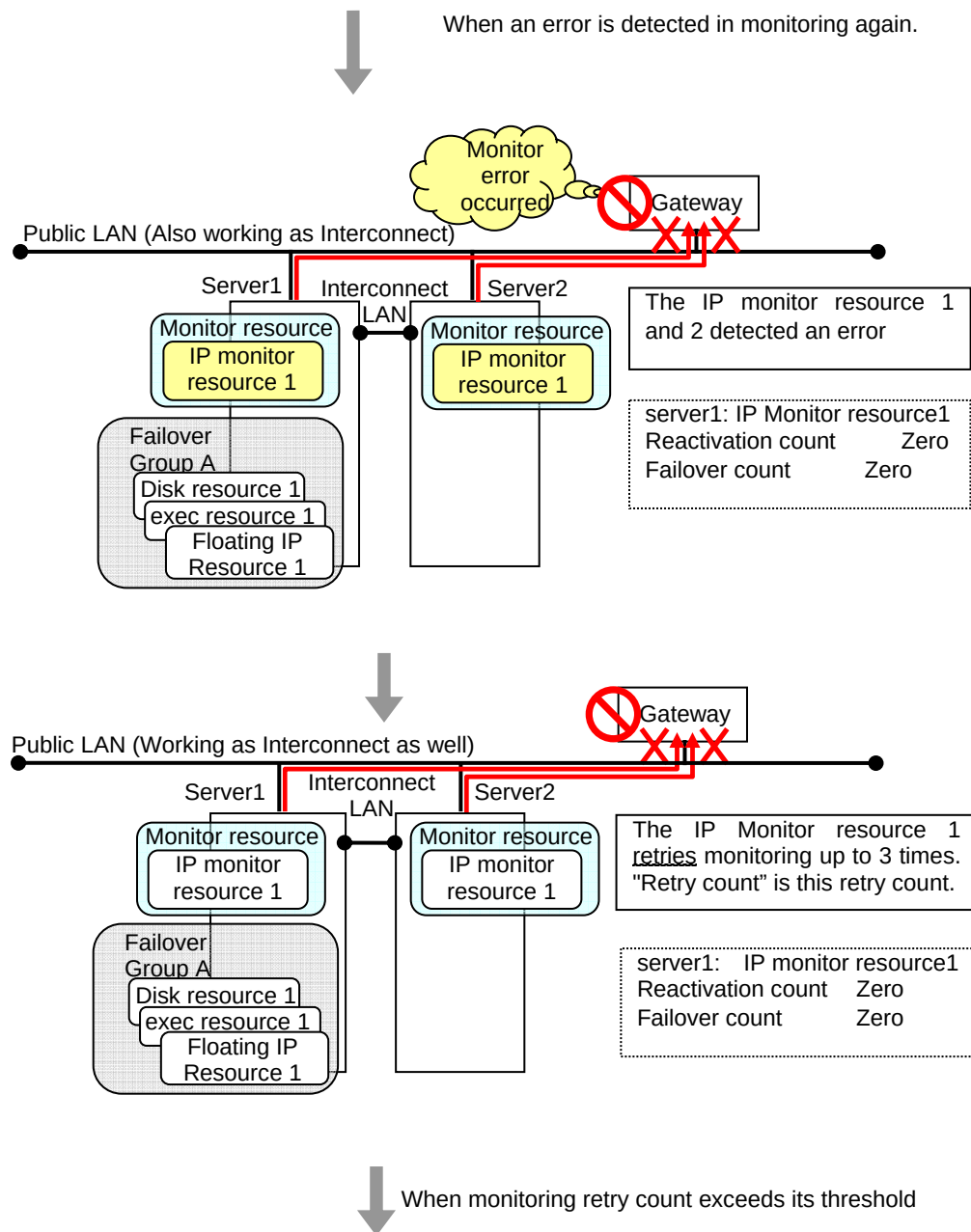
|             |         |
|-------------|---------|
| Interval    | 30 sec  |
| Timeout     | 30 sec  |
| Retry Count | 3 times |

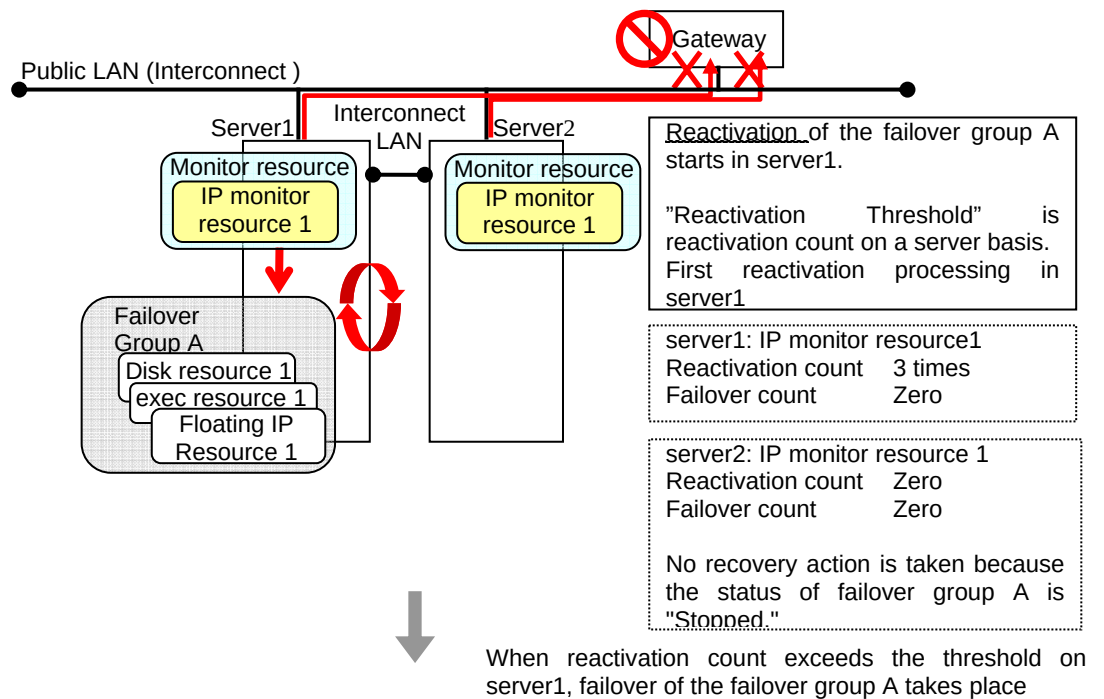
#### <Error detection>

|                        |                  |
|------------------------|------------------|
| Recovery Target        | Failover Group A |
| Reactivation Threshold | 3 times          |
| Failover Threshold     | 1                |
| Final Action           | Stop 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 Group       |

<Parameter>

|        |     |
|--------|-----|
| Method | TUR |
|--------|-----|

Configuration of the failover group A: disk resource

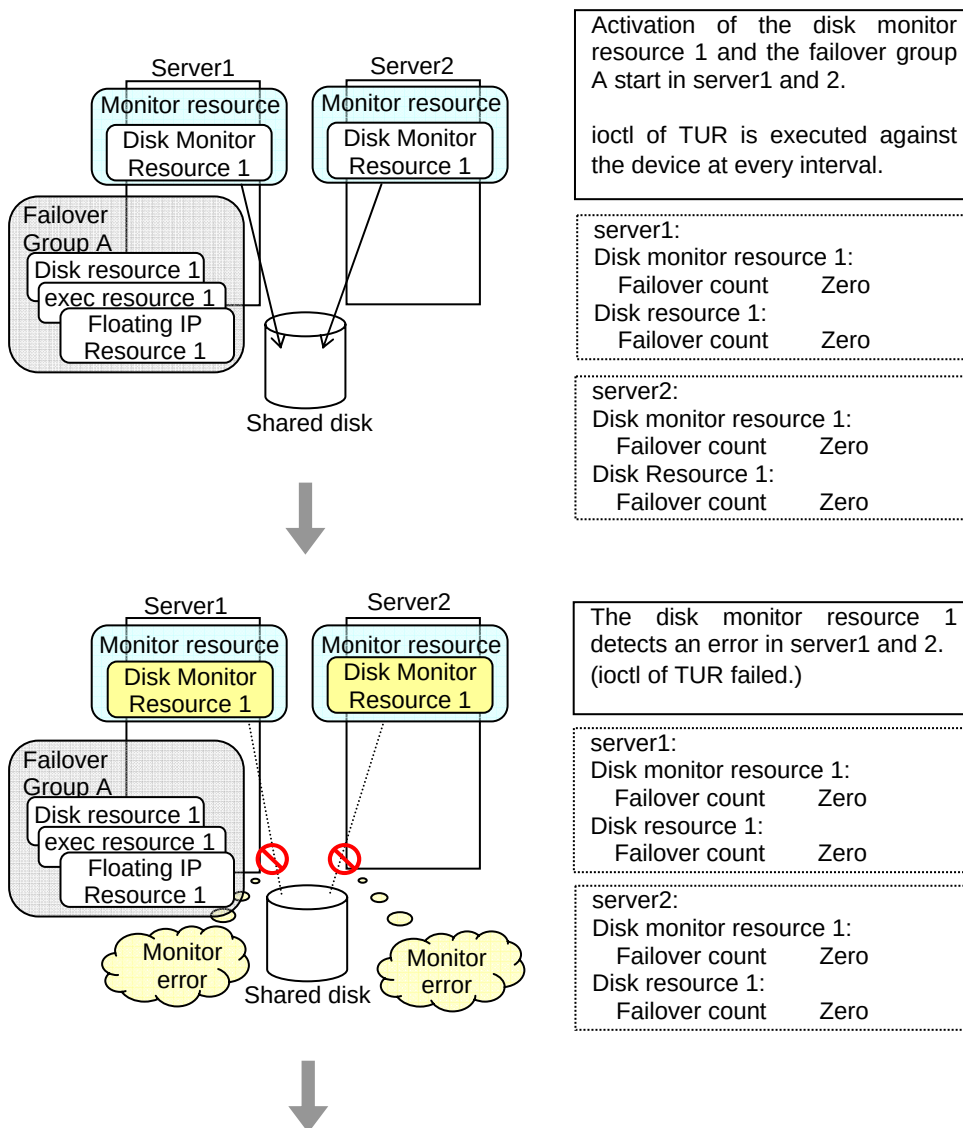
<Activation error>

|                            |                                                 |
|----------------------------|-------------------------------------------------|
| Activation retry Threshold | 0 time                                          |
| Failover Threshold         | 1 time                                          |
| Final Action               | No Operation (Next resources are not activated) |

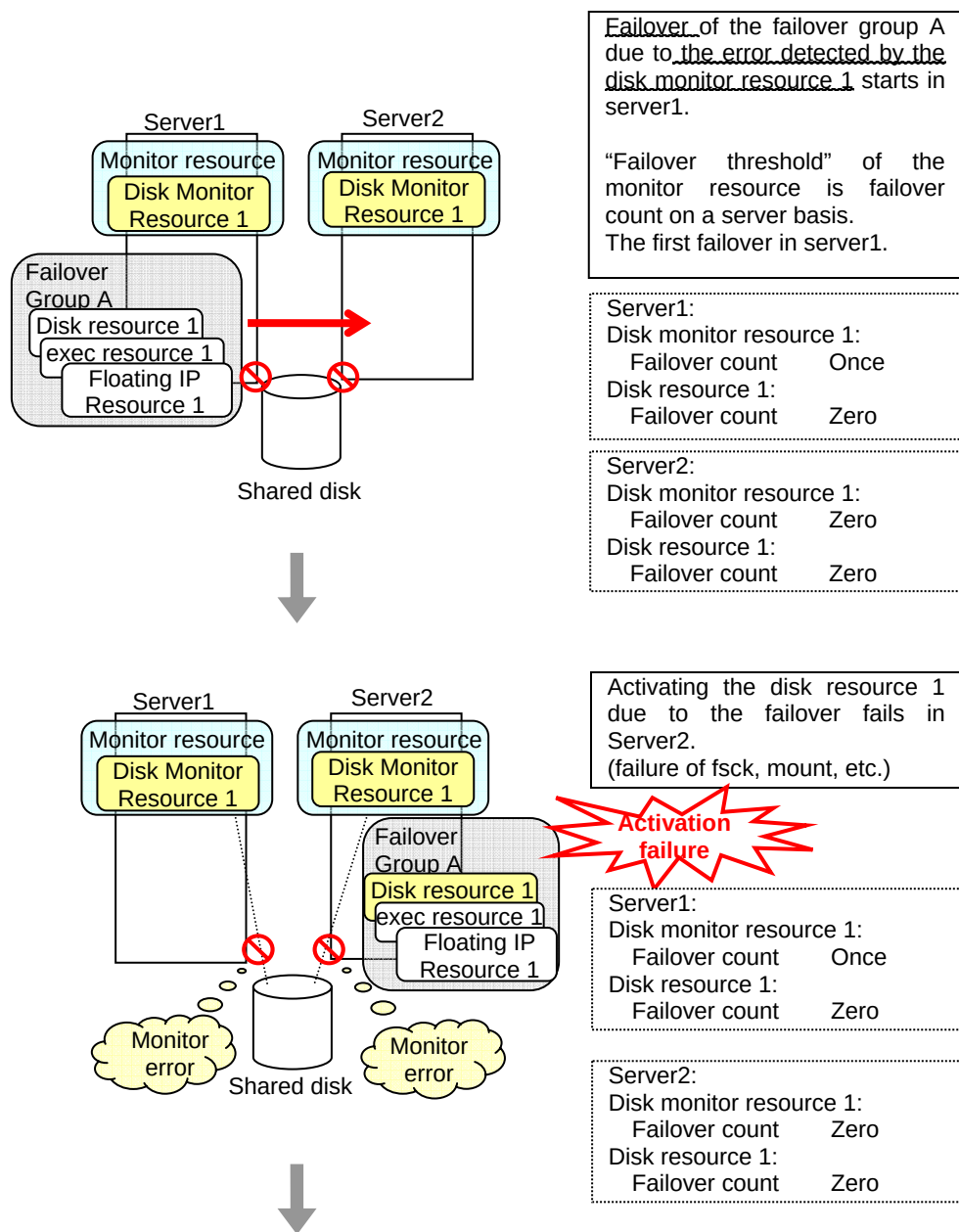
<Deactivation abnormality>

|                              |                                      |
|------------------------------|--------------------------------------|
| Deactivation Retry Threshold | 0 time                               |
| Final Action                 | Stop cluster service 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).

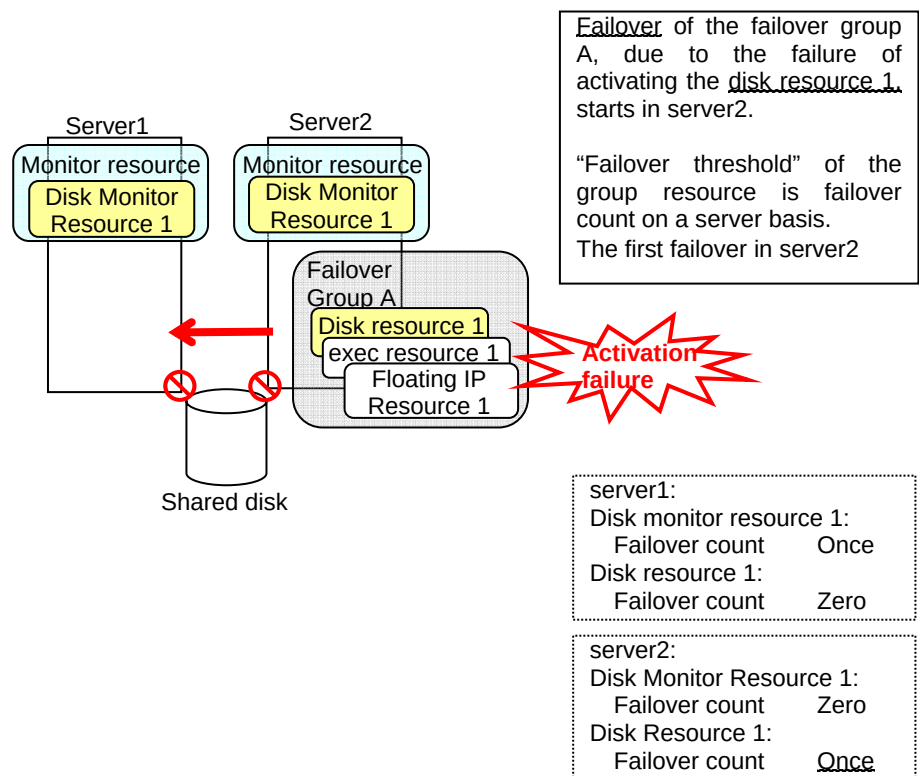


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

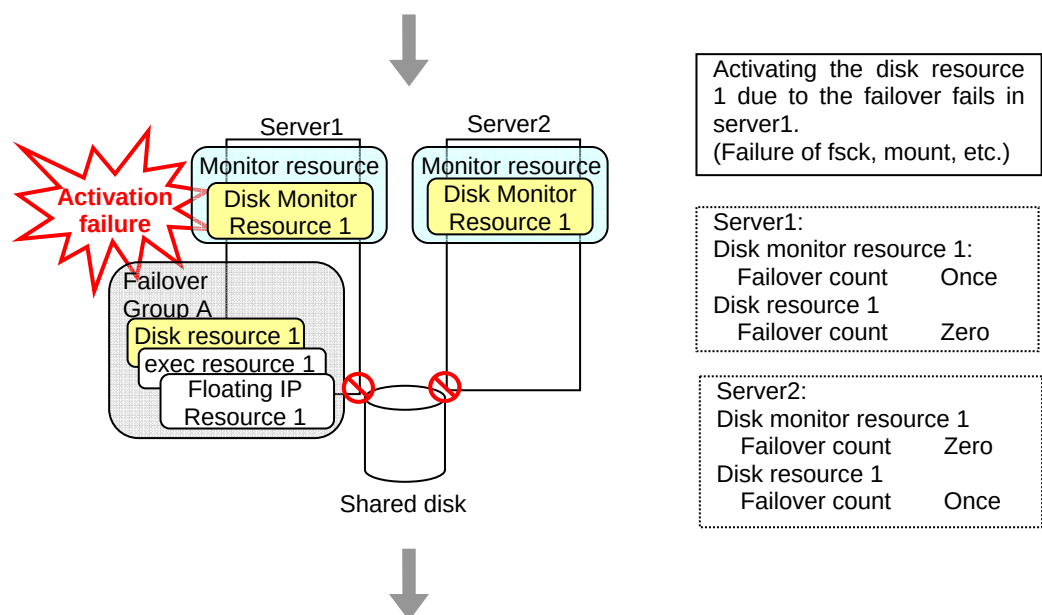


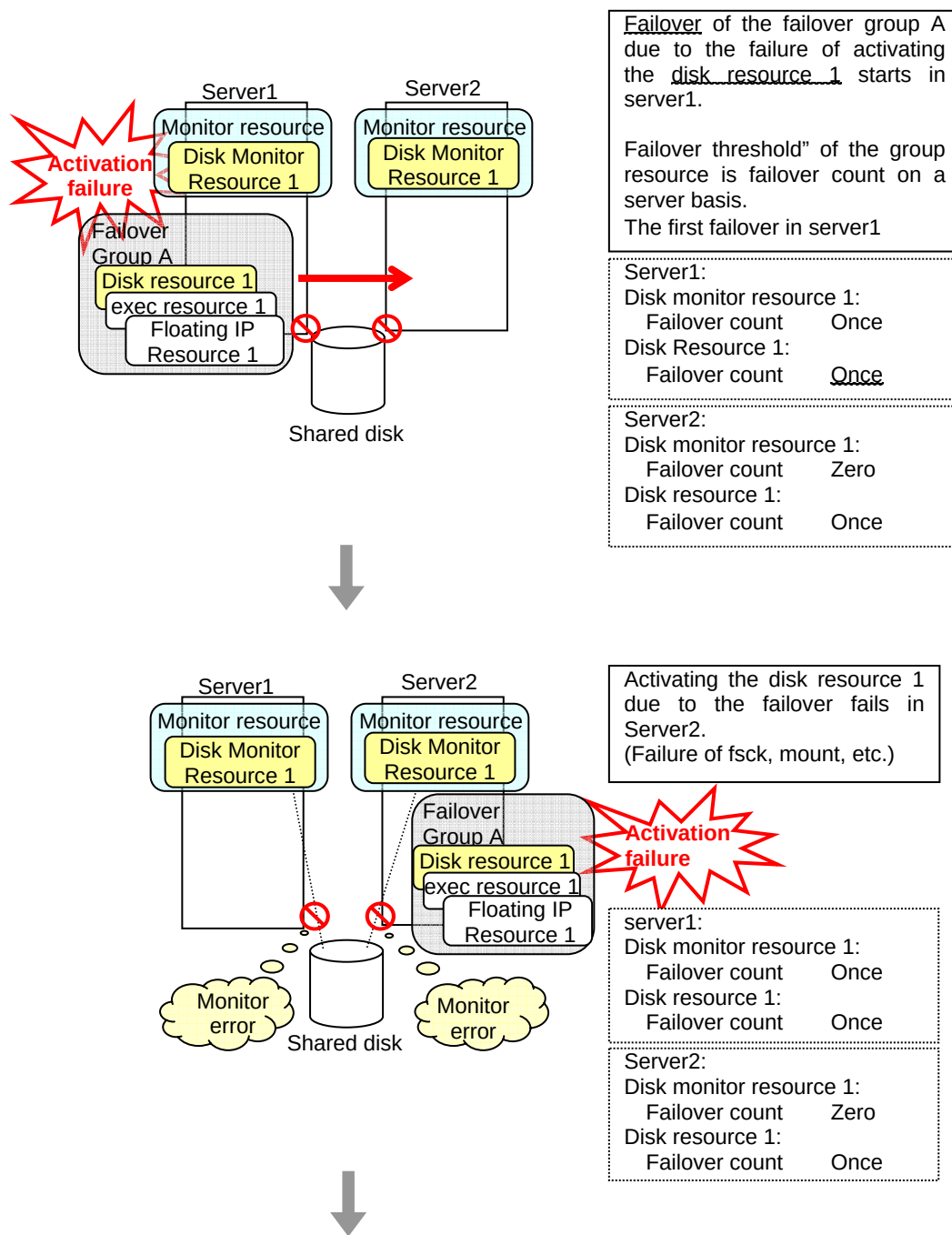


The disk monitor resource 1 detects an error in server2 as is the case in server1. However, no recovery action is taken because the failover group A, the recovery target, is activated.

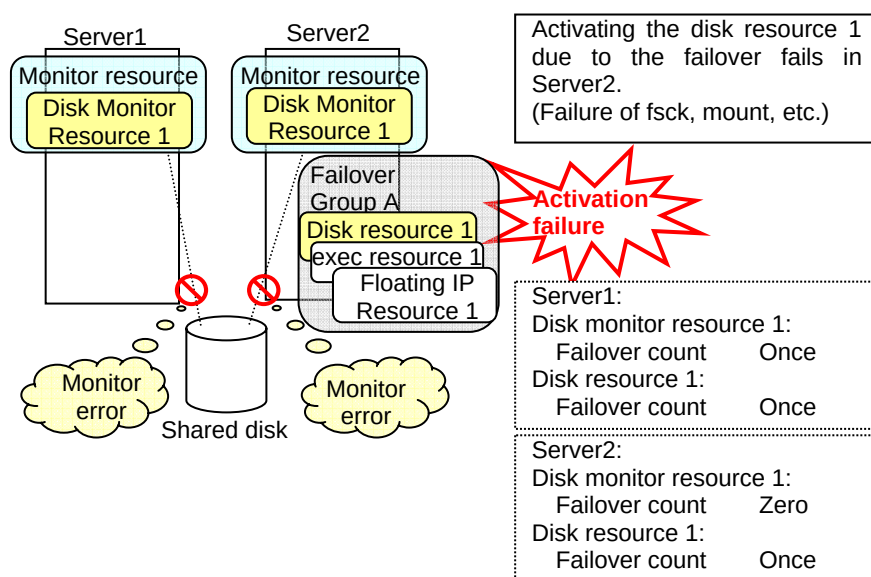
For more information on recovery executed by monitor resources against their recovery targets, see “Action when an error is detected by monitor resource” on page 426.

An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



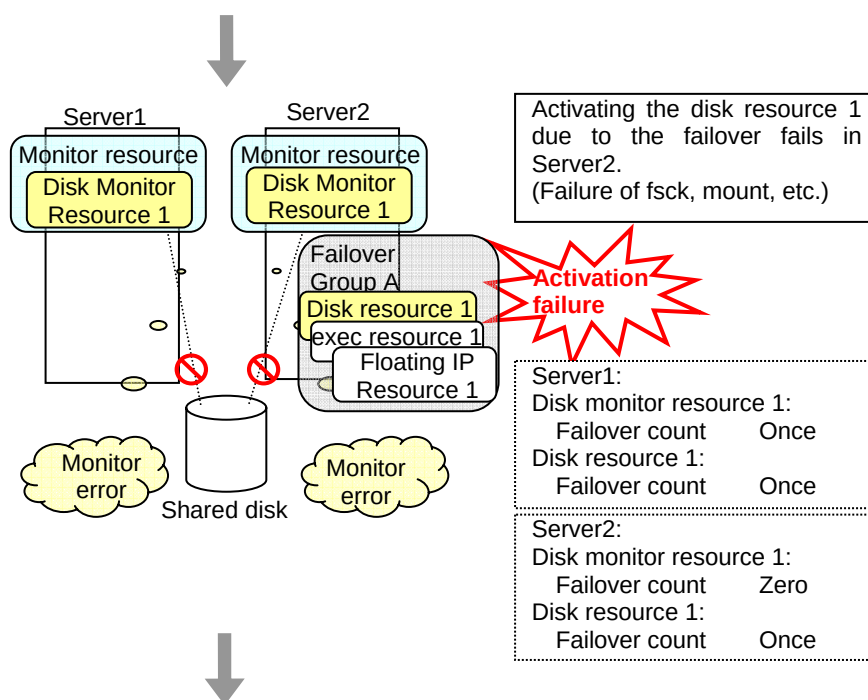


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

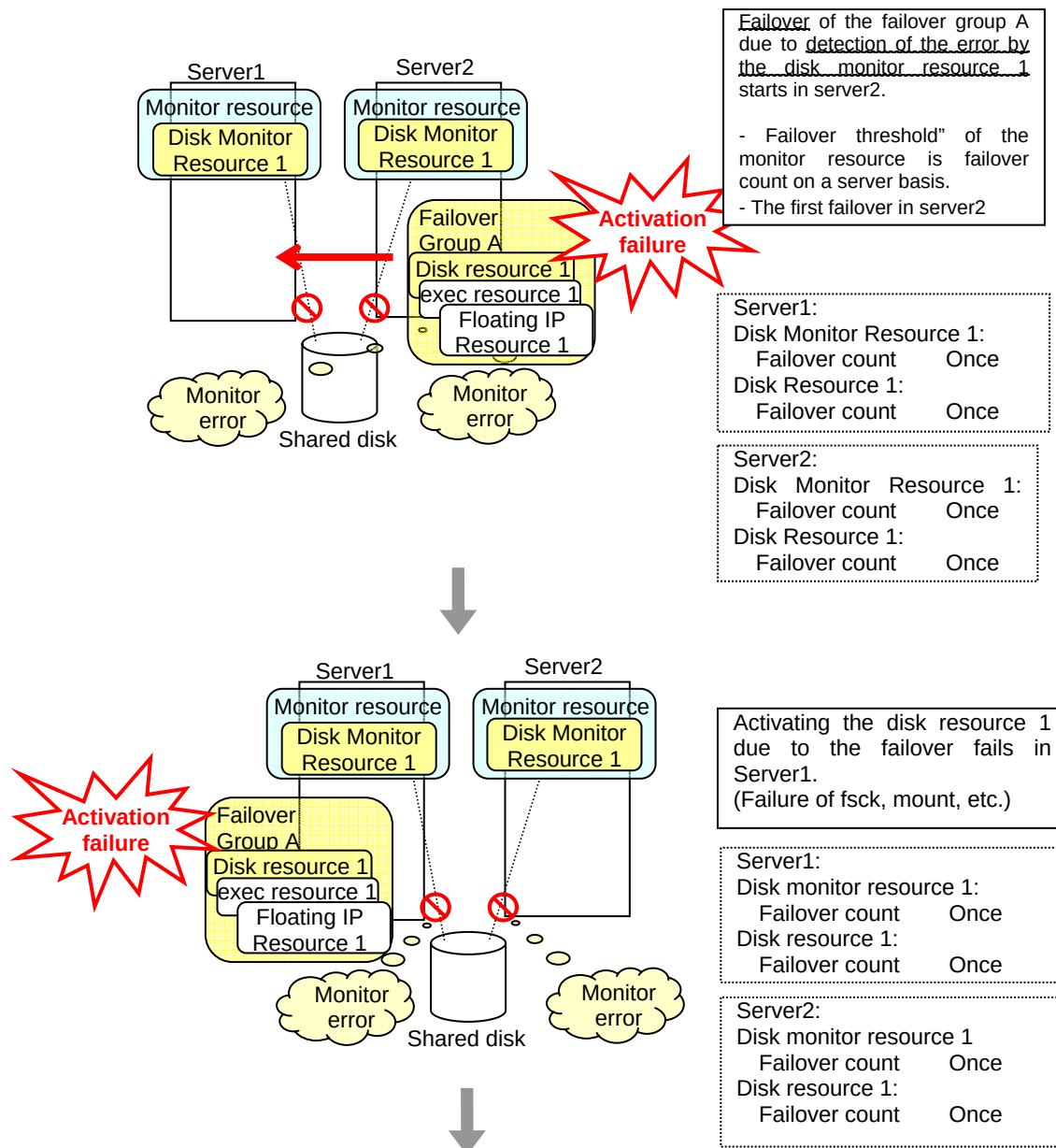


The final action is executed in server2 because the number of failovers due to failure of disk resource activation has exceeded its threshold.

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.



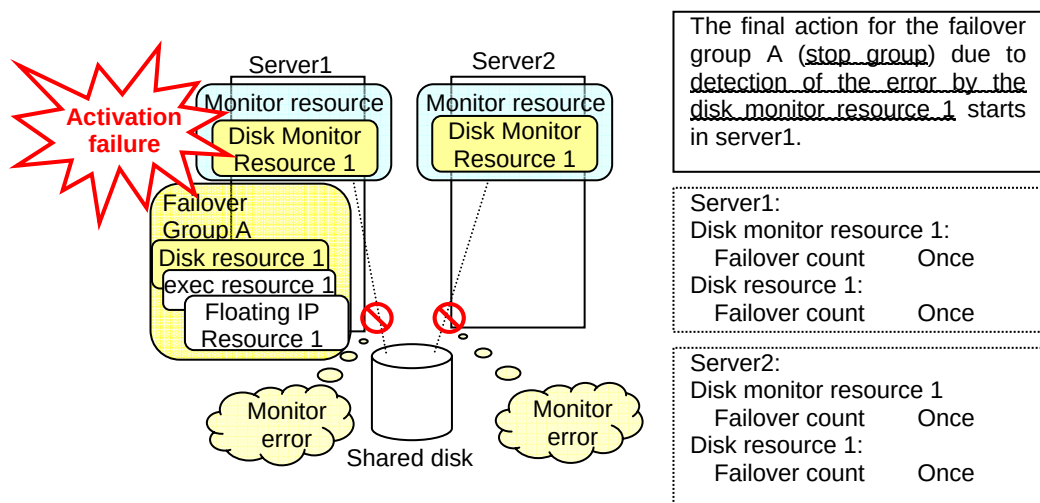
An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



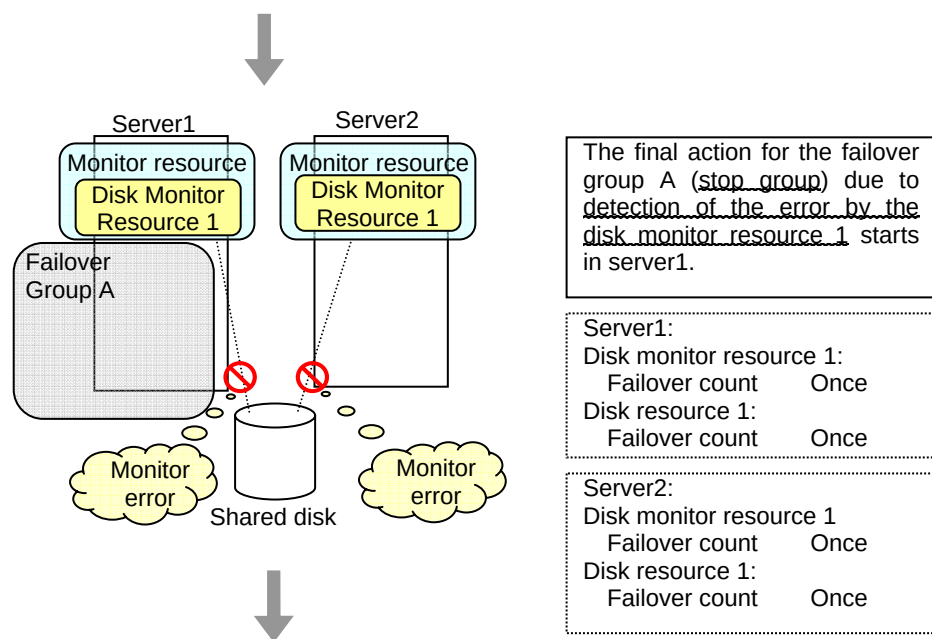
The final action is executed in server1 as is the case in server2 because the number of failovers due to failure of activating the disk resource 1 has exceeded the threshold.

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 on server 1 because the number of failovers due to failing to activate disk monitor resource 1 has exceeded the threshold.



However, note that activation ends abnormally without activating the rest of the group resources in Failover Group A because “No operation (Next resources are not activated)” is selected as the final action.

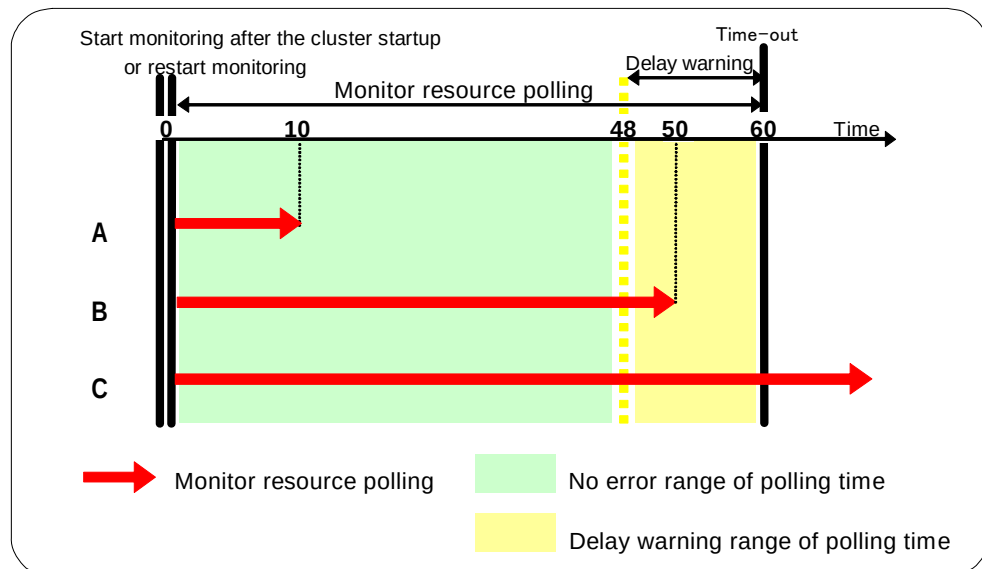
However, on server2, because the final action for disk monitor resource 1 has not been executed, this final action is executed if Failover Group A was manually activated.

## 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 timeout. 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 timeout is detected.

The following figure shows timeline until a delay warning of the monitor resource is used.

In this example, the monitoring timeout 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 timeout 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

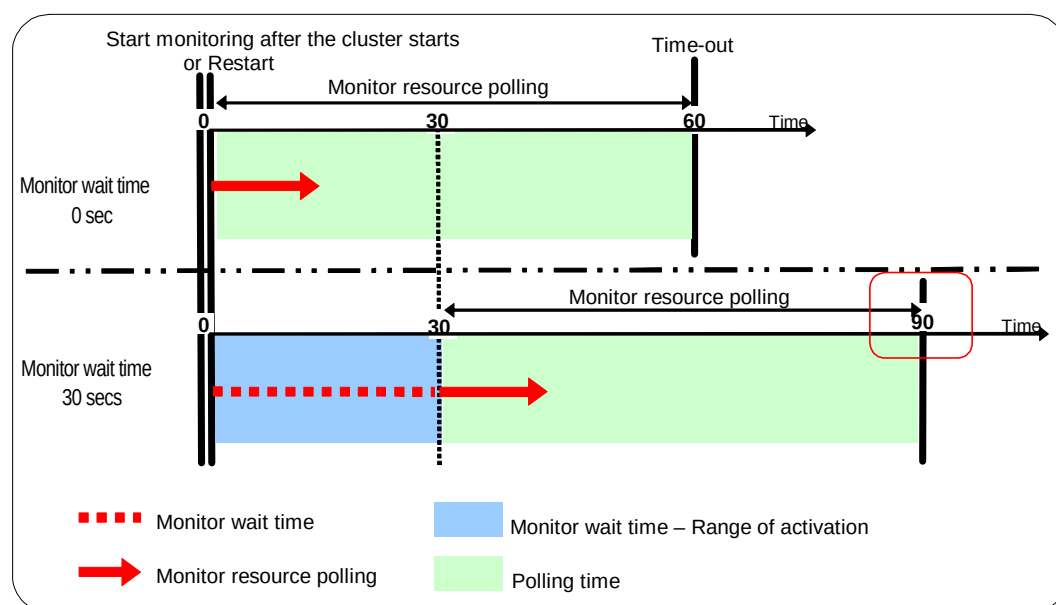
“Wait Time to Start Monitoring” refers to start monitoring after the time period specified as the waiting time elapses.

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:

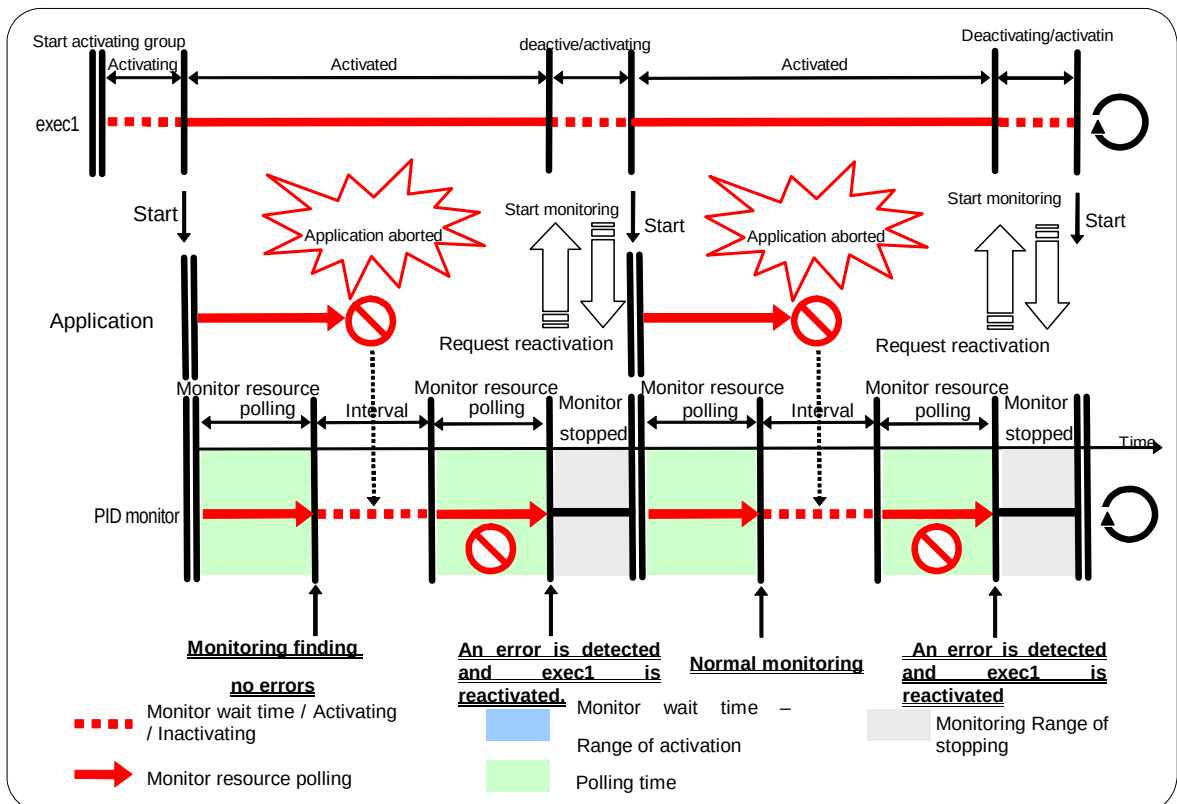
Configuration of PID Monitor resource

<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.

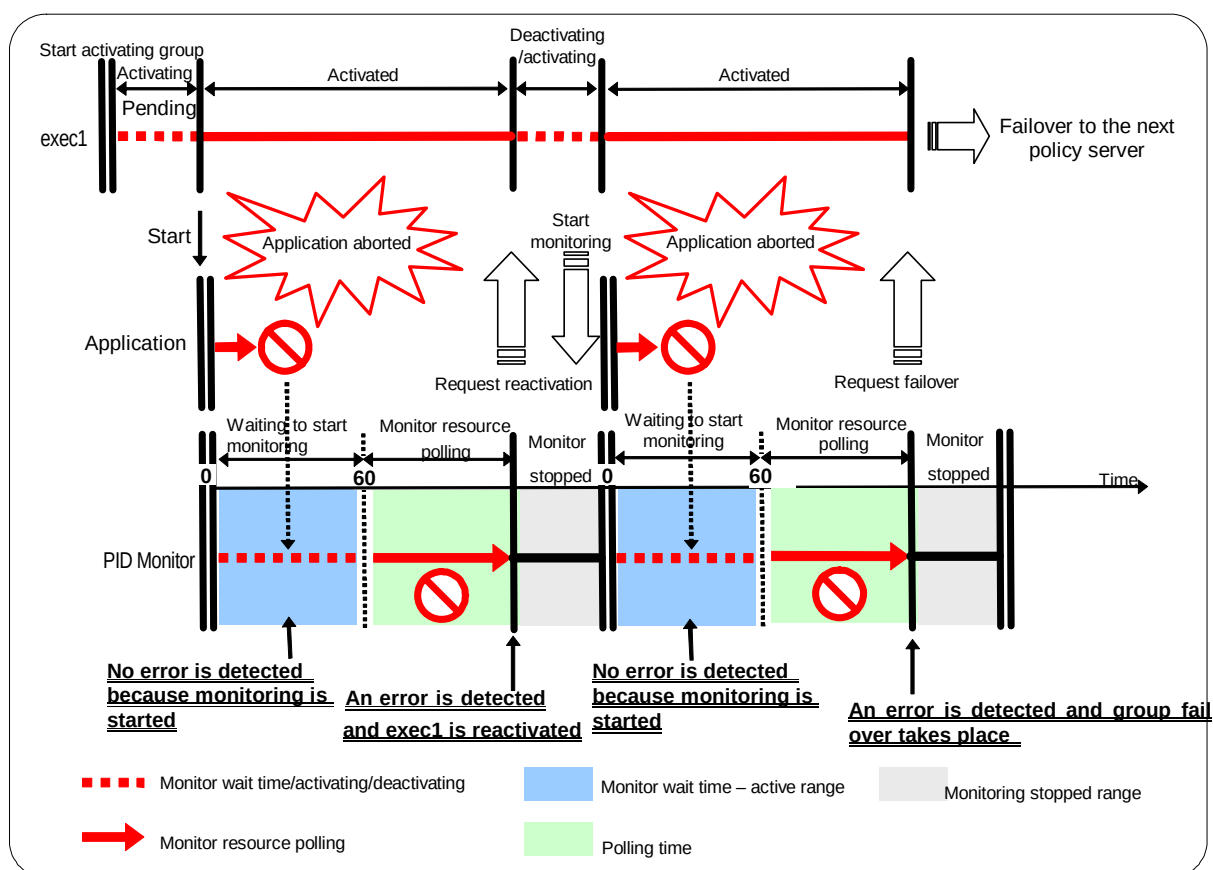
You can prevent this problem by setting the wait time to start monitoring. By default, 60 seconds is set as the wait time from the application startup to the end.

#### 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 service and shutdown OS**, **Stop cluster service and reboot OS**, **keepalive reset**, **keepalive panic**, **BMC reset**, **BMC power off**, **BMC power cycle** or **BMC NMI** are 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>

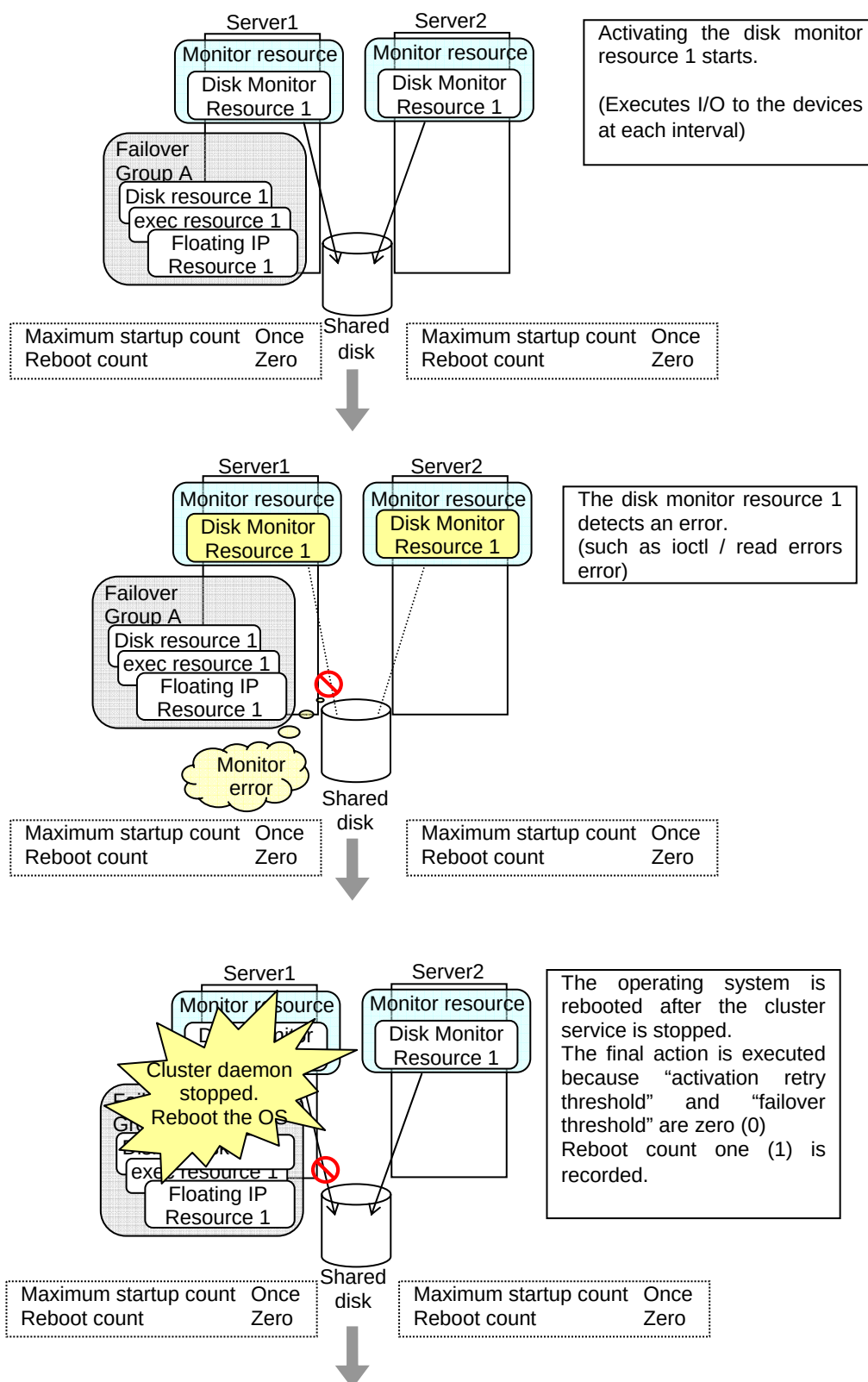
|             |         |
|-------------|---------|
| Interval    | 60 sec  |
| Timeout     | 120 sec |
| Retry Count | 3 times |

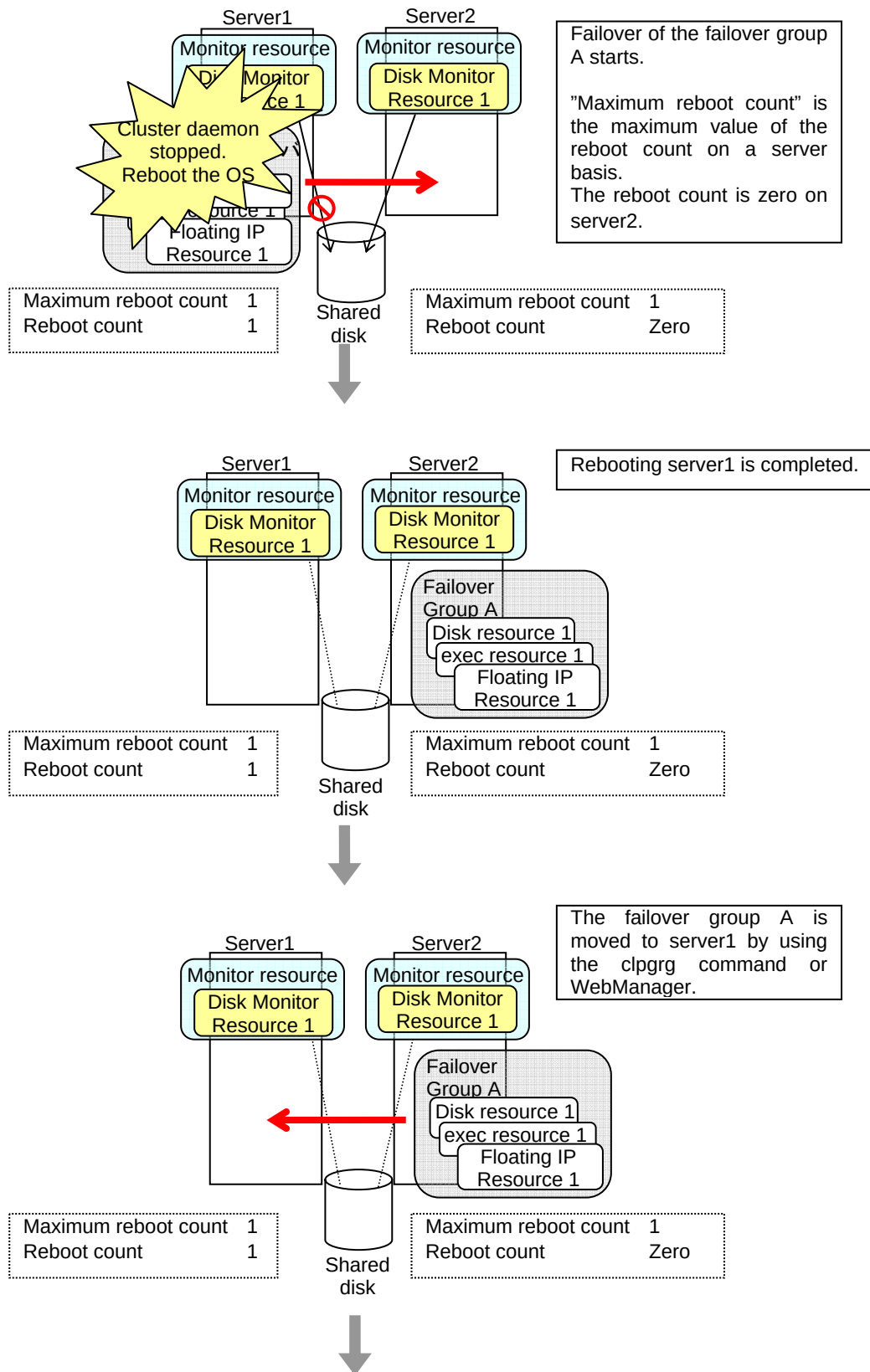
#### <Error detection>

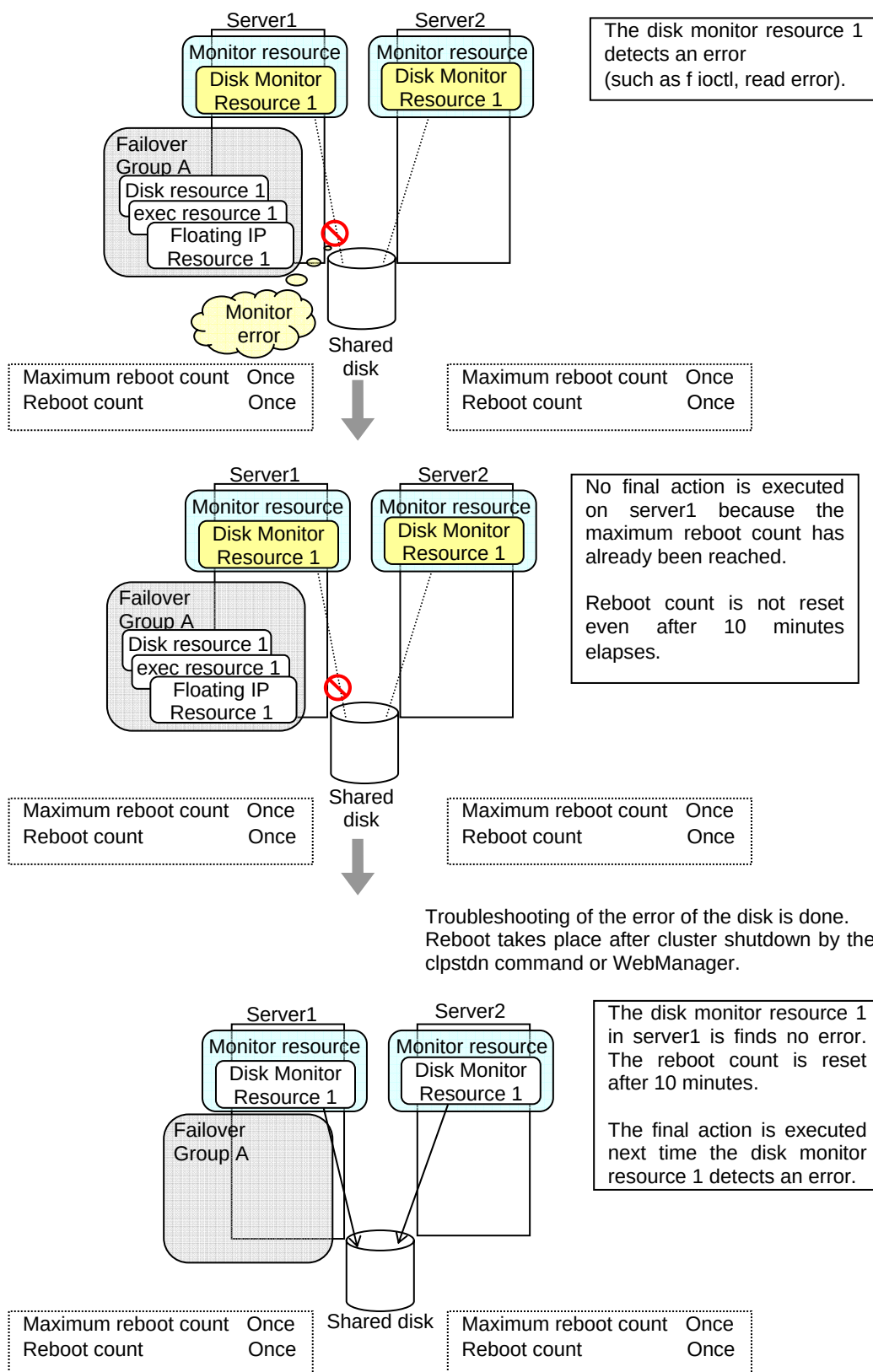
|                        |                                    |
|------------------------|------------------------------------|
| Recovery Target        | Failover Group A                   |
| Reactivation Threshold | 0 time                             |
| Failover Threshold     | 0 time                             |
| Final Action           | Stop cluster service 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 timeout 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).

---

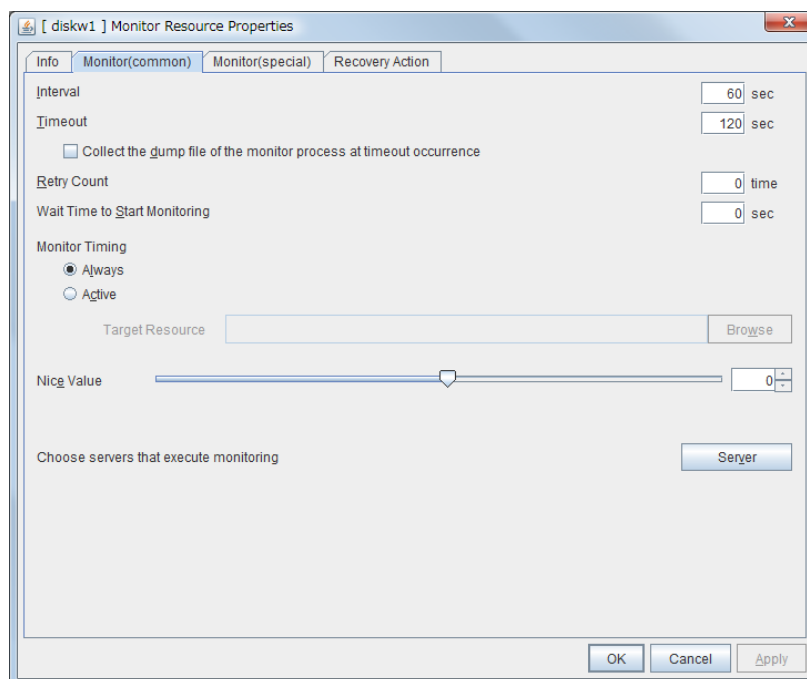
**Note:**

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(common)** tab.
3. On the **Monitor(common)** 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

When the normal status cannot be detected within the time specified here, the status is determined to be error.

**Collect the dump file of the monitor process at timeout occurrence**

In case that this function is enabled, the dump information of the timed out monitor resource is collected when the monitor resource time out. Dump information is collected up to 5 times.

**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:

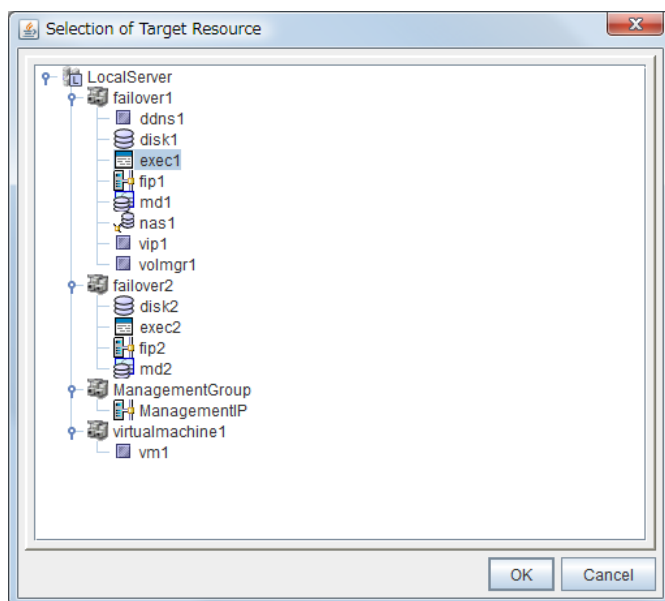
- ◆ **Always:**  
Monitoring is performed all the time.
- ◆ **Active:**  
Monitoring is not started until the specified resource is activated.

**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 group names and resource names that are registered in the LocalServer and cluster are shown in a tree view. Select the target resource and click **OK**.

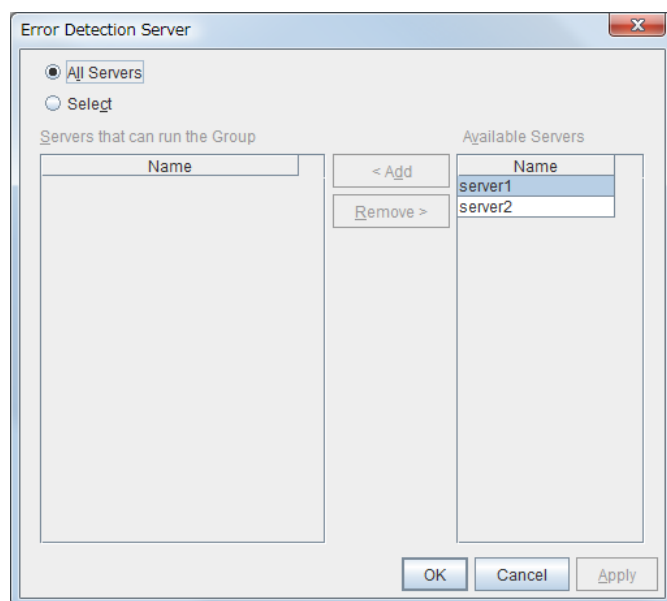


### Nice Value

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.



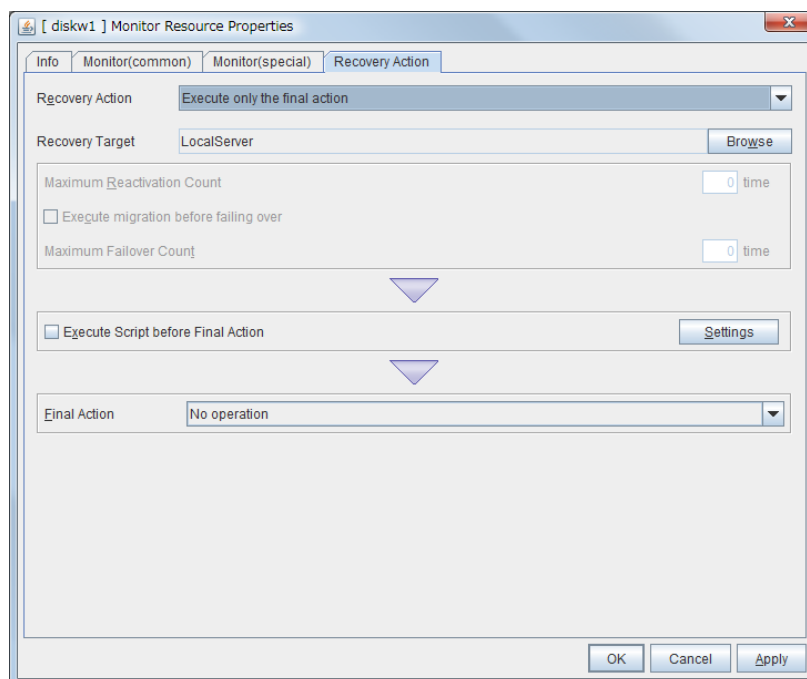
◆ **Remove**

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 **Recovery Action** tab.
3. On the **Recovery Action** 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 Action

Select a recovery action when detecting an error.

### Executing failover the recovery target

When detecting a monitor error, execute failover to the group to which the groups or group resources selected as the recovery target belong.

### Restart the recovery target, and if there is no effect with restart, the failover

Reactivate groups or group resources selected as the recovery target. If the reactivation fails, or the same error is detected after the reactivation, then execute failover.

### Restart the recovery target

Reactivate the selected group or group resource as the recovery target. When reactivation fails or the same error is detected after reactivation, execute the selected action as the final action.

### Execute only the final action

Execute the selected action as the final action.

### Custom setting

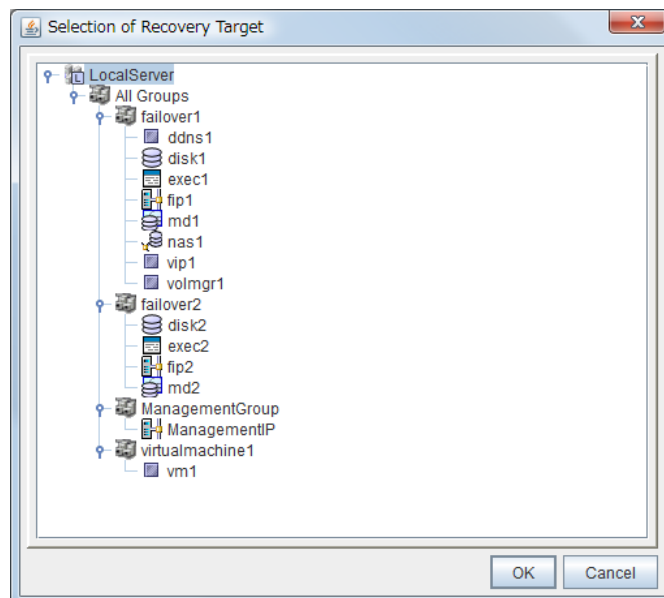
Reactivate the selected group or group resource as the recovery target until the maximum reactivation count. When reactivation fails or the same error is detected after reactivation, and the count reaches to the maximum count, execute the selected action as the final action.

### 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 LocalServer, All Groups and , group names and resource names that are registered in the cluster are shown in a tree view. Select the target resource and click **OK**.



#### Maximum Reactivation Count 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.

#### Execute migration before failing over

Select this check box, execute migration before executing failing over

#### Maximum Failover Count 0 to 99

Specify how many times you allow failover after reactivation fails for the number of times set in **Maximum Reactivation Count** when an error is detected. If this is set to zero (0), no failover is executed. This can be settable when selecting "All Groups", a group or a group resource as the recovery target. When "All Groups" is selected, execute failover of all groups running on the server of which the monitor resource has detected errors.

### Execute Script before Final Action

Select whether script is run or not before executing final action.

◆ When selected:

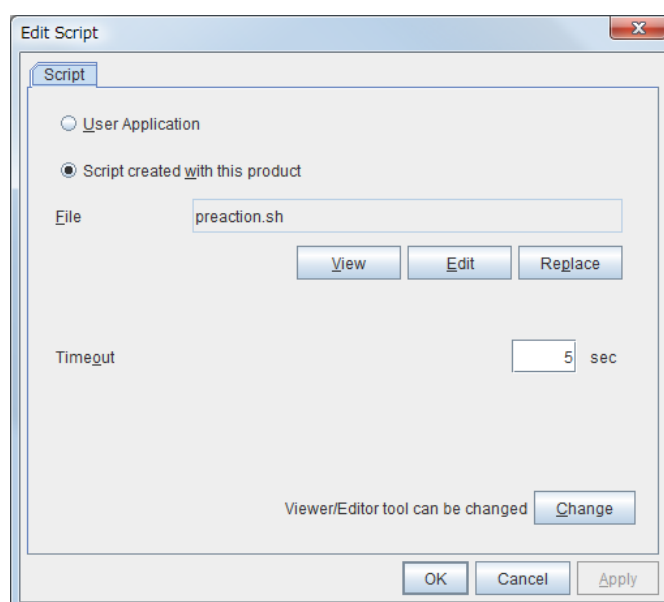
A script/command is run before executing final action. To configure the script/command setting, click **Settings**.

◆ 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 applied. 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 apply 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**

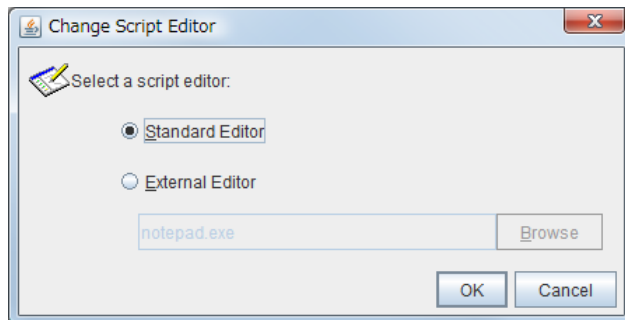
Click here to replace the contents of a script file with the contents of the script file which you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not 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.

- 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.

### Final Action

Select a final action to be taken after reactivation fails for the number of times set in **Maximum Reactivation Count**, and failover fails for the number of times set in **Maximum Failover Count** 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. When "All Groups" is selected, stop all the groups running on the server of which the monitor resource has detected errors. This option is disabled when a cluster is selected as a recovery target.

◆ Stop cluster service

Stops the cluster service of the server that detected an error.

◆ Stop cluster service and shutdown OS

Stops the cluster service of the server that detected an error, and then shuts down the OS.

◆ Stop cluster service and reboot OS

Stops the cluster service of the server that detected an error, and then reboots the OS.

◆ Keepalive Reset

Resets the OS with using the clpka driver.

---

**Note:**

If resetting keepalive fails, the OS is shut down.

---

◆ Keepalive Panic

Performs the OS panic with using the clpka driver.

---

**Note:**

If performing the keepalive panic fails, the OS is shut down.

---

◆ 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 is not installed, or the ipmitool 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 is not installed, or the `ipmitool` 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 is not installed, or `ipmitool` 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 is not installed, or `ipmitool` command does not run.

---

**Collect Dump at Timeout**

Select whether to enable this function.

Length: within 4 bytes

Default value: 0 (disabled)

## IPMI command

Final actions such as **BMC Reset**, **BMC Power Off**, **BMC Power Cycle** use the following commands.

| 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         |

### Notes for the final action by ipmi

- ◆ Final Action by IPMI is achieved by associating ExpressCluster and the ipmitool command .
- ◆ ipmitool is not attached with ExpressCluster.

Chassis identify uses the ipmitool command

When the ipmitool command does not exist, this function cannot be used.

| Command  | Option                      | Overview                                                                                 |
|----------|-----------------------------|------------------------------------------------------------------------------------------|
| ipmitool | chassis identify <interval> | Chassis identify lamp blink on and off for the period(in seconds) specified by interval. |

### Notes for chassis identify by ipmi

- ◆ Chassis identify by ipmi is actualized by combining ExpressCluster and the ipmitool command .
- ◆ ipmitool(OpenIPMI-tools) is not shipped with ExpressCluster.

### Notes for ipmi

- ◆ Users are responsible for making decisions and assuming responsibilities. NEC does not support or assume any responsibilities for:
  - Inquires about ipmitool itself.
  - Tested operation of ipmitool.
  - Malfunction of ipmitool or error caused by such malfunction.
  - Inquiries if ipmitool is supported by servers.

## Setting monitor resources on individual servers

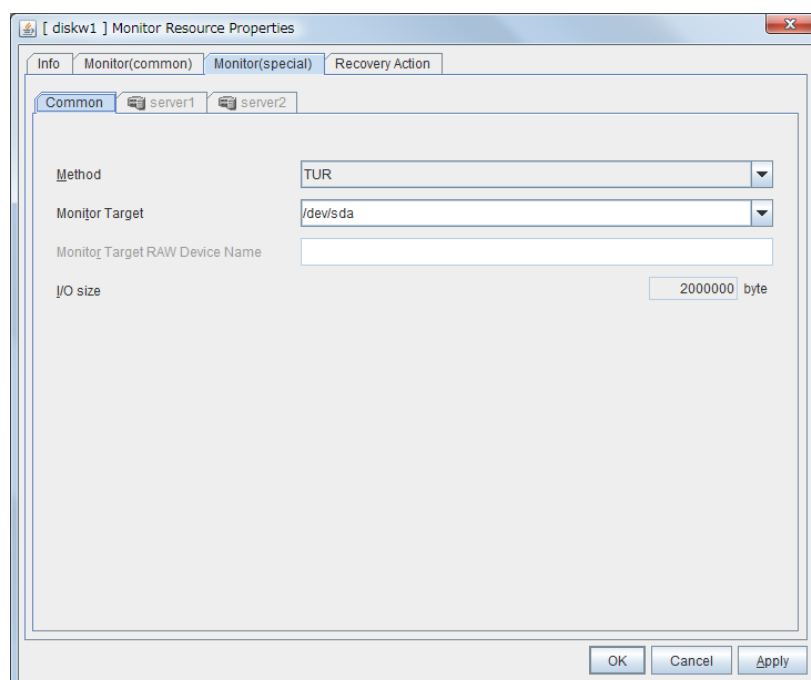
Some setting values of monitor resources can be set for individual servers. For the resources which can be configured on a server basis, the tabs of servers are displayed on the **Monitor(special)** tab.

The following monitor resources can be configured for individual servers.

| Monitor Resource Name             | Supported Version |
|-----------------------------------|-------------------|
| Disk monitor resource             | 3.0.0-1 or later  |
| IP monitor resource               | 3.0.0-1 or later  |
| NIC Link Up/Down monitor resource | 3.0.0-1 or later  |
| Message receive monitor resource  | 3.0.0-1 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.

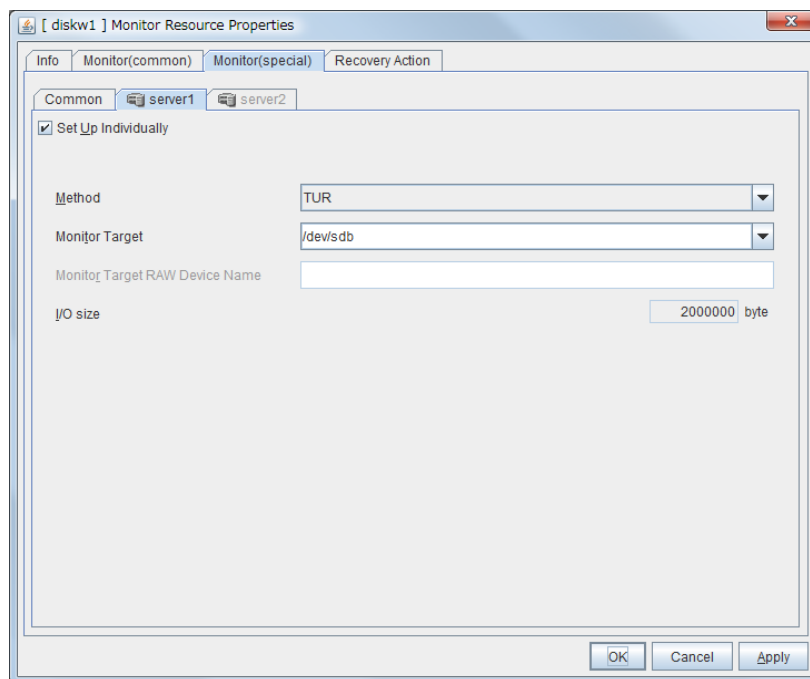
In the example below, configuring settings for each server on the disk monitor resource is described.





### 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, MySQL 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 MySQL 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” 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 MySQL monitor resource for starting target monitoring application

Add the MySQL monitor resource for monitoring the target monitoring application. Select **Active** for **Monitor Timing** and specify **exec1** for **Target Resource** on the **Monitor(common)** 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 each monitor resource for mysqlw, oraclew, psqlw and sambaw, the 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.

### 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 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.
  - 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
  - Test Unit Ready (TUR) of SCSI is used, and the status of the device is determined by the result of the command.

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 473 to configure the read size.

The following is the READ (RAW) monitoring:

- ◆ READ (RAW)
  - Judges by the results of reading (the size that was read) the specified device (disk device or partition device) by 512 bytes without using cache (raw mode).
  - Whether reading was successful is checked. The validity of read data is not checked.

The following is the WRITE (FILE) monitoring:

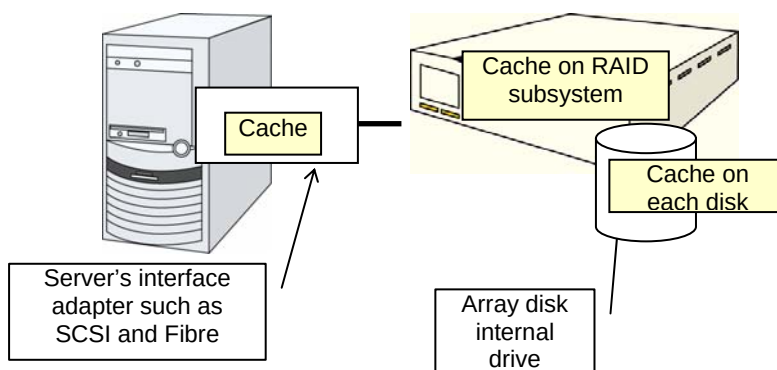
- ◆ WRITE (FILE)
  - The file of the specified path is created, written, and deleted to be judged.
  - Validity of the written data is not judged.

## 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.

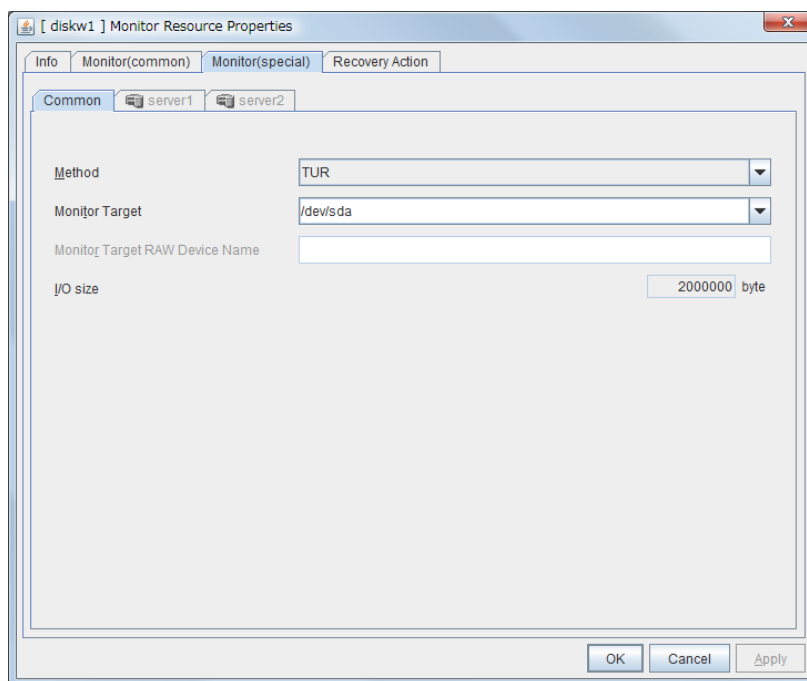
When you specify a READ I/O size, verify that READ can detect I/O errors on the disk with that size by intentionally creating I/O errors.



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 monitor 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 **Monitor(special)** tab.
3. On the **Monitor(special)** tab, you can see and/or change the monitor settings by following the description below.



### Monitoring method **Server Individual Setup**

Select the method used to monitor the disk device from the following:

- ◆ TUR
- ◆ READ
- ◆ WRITE (FILE)
- ◆ READ (RAW)

### Monitor Target Name (Within 1023 bytes) **Server Individual Setup**

- ◆ 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.
- ◆ When the monitoring method is other than the above  
Specify the name of the disk device to monitor. The name must begin with a forward slash (/). If a disk resource exists, the device name specified for the disk resource can be selected.  
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.

**I/O Size** 1 to 99999999 **Server Individual Setup**

Specify the size of I/O for reading or reading/writing of monitoring.

\* When READ( RAW) is specified, the **I/O size** text box is dim.

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/dsk/c3t0d0s2 by READ method, and to reboot the OS when an error is detected:

| Option             | Value                              | Remarks                          |
|--------------------|------------------------------------|----------------------------------|
| Target Device Name | /dev/dsk/c3t0d0s2                  | SCSI disk in the second machine. |
| Method             | READ                               | READ method.                     |
| Recovery Target    | Cluster                            | -                                |
| Final Action       | Stop cluster service and reboot OS | Reboot the OS.                   |

- ◆ Example of settings to monitor the local disk /dev/dsk/c3t0d0s2 by TUR 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/dsk/c3t0d0s2 | SCSI disk in the second machine. |
| Method             | TUR(generic)      | TUR 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

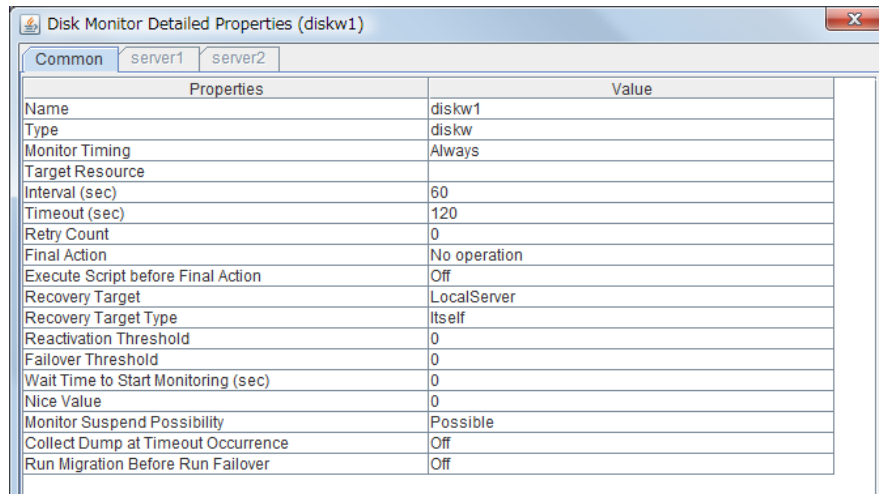
Commonserver1server2

| Properties                     | Value    |
|--------------------------------|----------|
| Comment                        |          |
| Method                         | TUR      |
| Monitor Target                 | /dev/sda |
| Target RAW Device Name         |          |
| I/O Size (byte)                | 2000000  |
| Status                         | Normal   |
| Resource Status on Each Server |          |
| Server Name                    | Status   |
| server1                        | Normal   |
| server2                        | Normal   |

|                                |                                                                   |
|--------------------------------|-------------------------------------------------------------------|
| Comment:                       | Comment on the disk monitor resource                              |
| Monitor method:                | Monitoring method using disk monitor resources                    |
| Monitor Target:                | The target to be monitored                                        |
| Monitor target raw device name | The name of the raw device monitored using disk monitor resources |
| I/O Size(byte):                | I/O size used by monitoring                                       |
| 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.



|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | Disk monitor resource name                                                                                           |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |

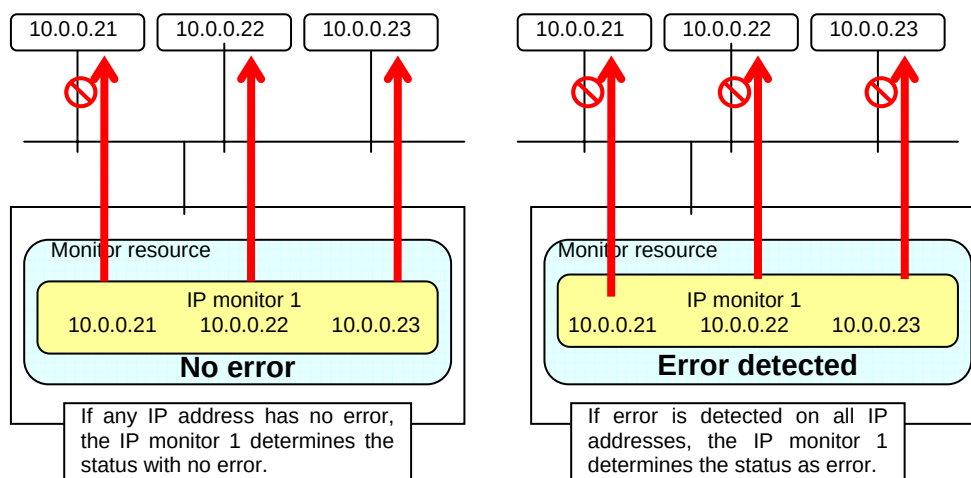
## Understanding IP monitor resources

IP monitor resource monitors IP addresses using the ping command.

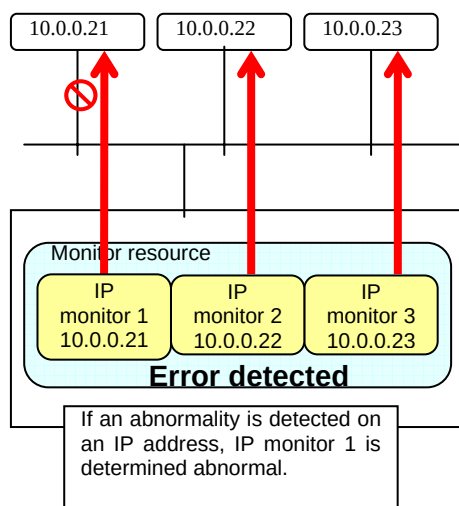
### Monitoring by IP monitor resources

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.



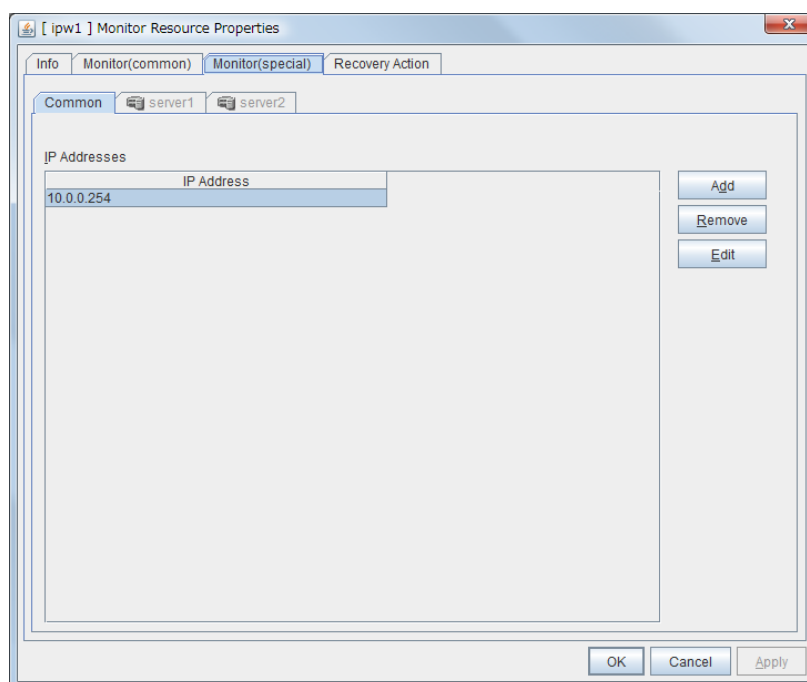
- ◆ If you want to establish error when any one of IP addresses has an error, create one IP monitor resource for each IP address.



## 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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** tab, you can see and/or change the detailed settings by following the description below.

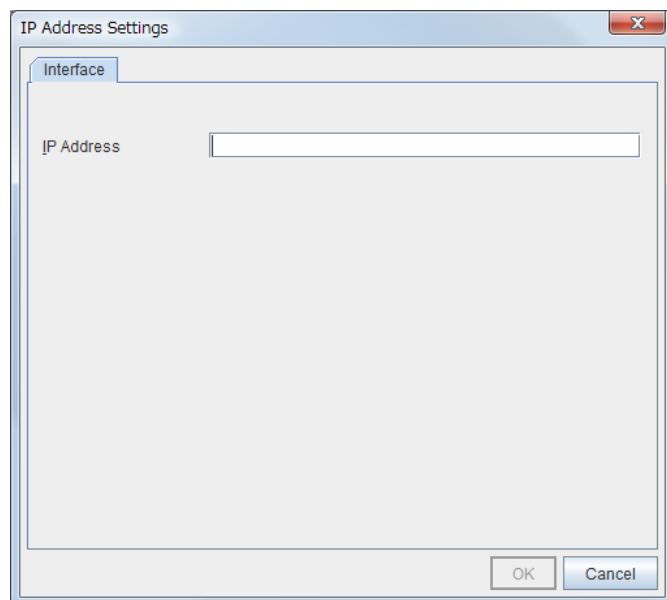
IP addresses to be monitored are listed in **IP Addresses**.



**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** Up to 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**.

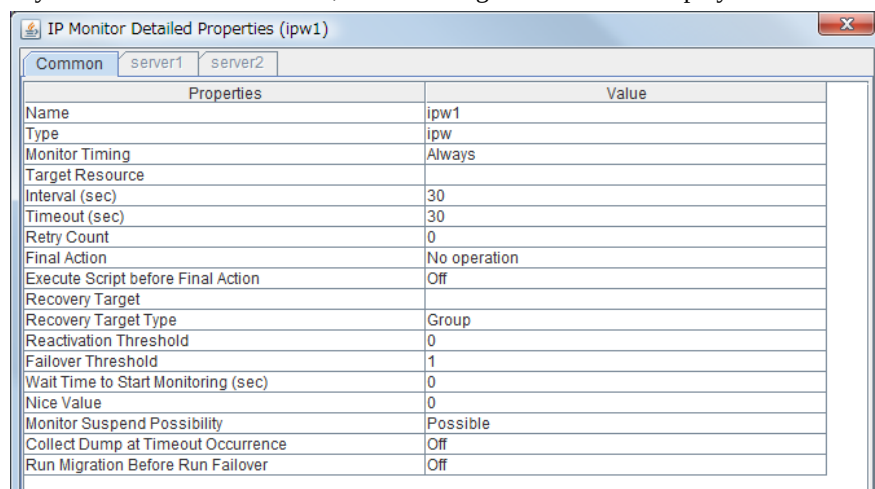
## Displaying the IP monitor resource property with the WebManager

- 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      |
| Comment                        |         |            |
| IP Addresses                   |         | 10.0.0.254 |
| Status                         |         | Normal     |
| Resource Status on Each Server |         |            |
| Server Name                    |         | Status     |
| server1                        |         | Normal     |
| server2                        |         | Normal     |

|               |                                              |
|---------------|----------------------------------------------|
| 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.



|                                      |                                                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Name:                                | IP monitor resource name                                                                                          |
| 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                                                                              |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                           |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                           |

# 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

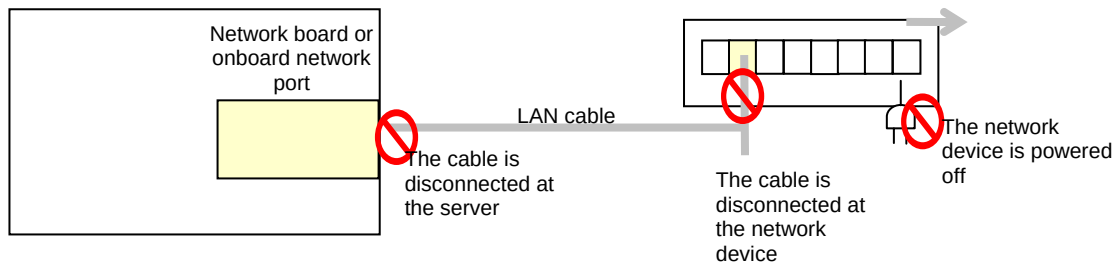
NIC Link UP/Down monitor resource has been tested to work in the following network interfaces.

| 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<br>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          |

When you check if NIC Link Up/Down monitor resource can be used with the use of ExpressCluster on an 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



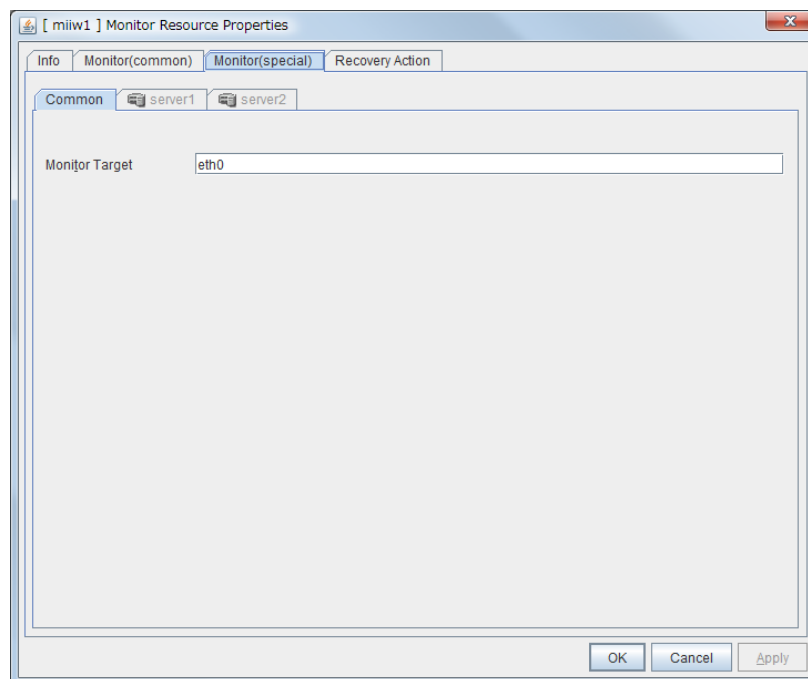
- ◆ The `ioctl()` to the NIC driver is used to find how the server is linked to the network. (For the IP monitoring, the status is judged by the ping response from the specified IP address.)
- ◆ You can monitor an NIC dedicated to interconnect. If you do this in the environment where two nodes are directly 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 service and reboot OS** is selected, other servers will continue to restart the OS endlessly.



## 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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** 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** Up to 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

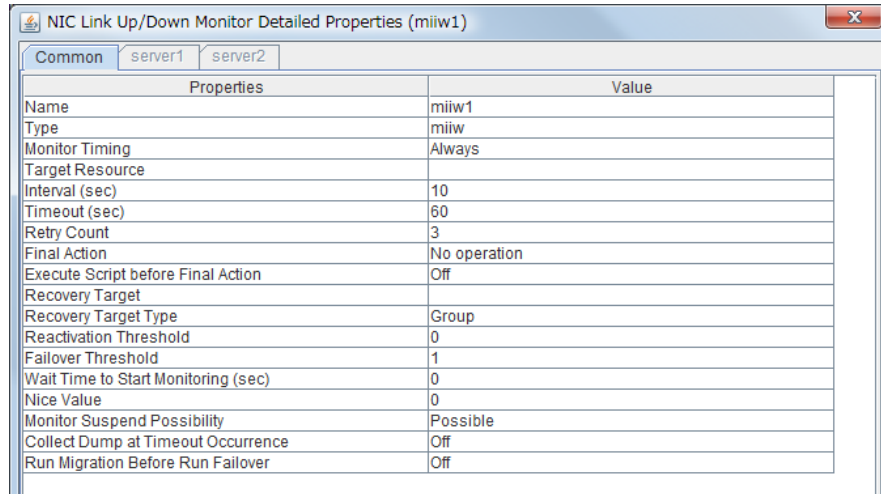
Details

Commonserver1server2

| Properties                     | Value  |
|--------------------------------|--------|
| Comment                        |        |
| Monitor Target                 | eth0   |
| Status                         | Normal |
| Resource Status on Each Server |        |
| Server Name                    | Status |
| server1                        | Normal |
| server2                        | Normal |

|                 |                                                                                    |
|-----------------|------------------------------------------------------------------------------------|
| 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.



|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | NIC Link Up/Down monitor resource name                                                                               |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |

## 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 458.

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 or samba,, 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

Commonserver1server2

| Properties                     | Value   |
|--------------------------------|---------|
| Comment                        |         |
| Target PID                     | 14602   |
| Status                         | Normal  |
| Resource Status on Each Server |         |
| Server Name                    | Status  |
| server1                        | Normal  |
| server2                        | Offline |

Comment:

Target PID:

Status:

Comment of the PID monitor resource

PID of the process monitored by the PID monitor resource

PID monitor resource status

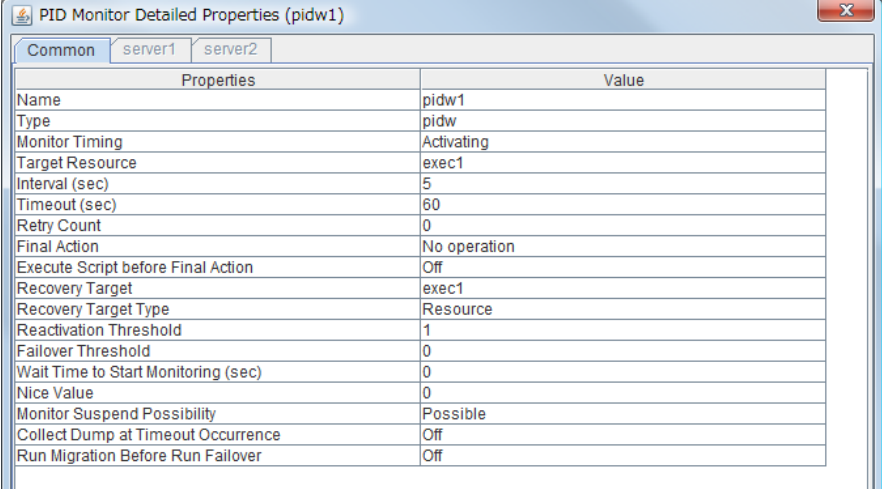
Server Name:

Status:

Server name

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        |
|-------------------------------------|--------------|
| Name                                | pidw1        |
| Type                                | pidw         |
| Monitor Timing                      | Activating   |
| Target Resource                     | exec1        |
| Interval (sec)                      | 5            |
| Timeout (sec)                       | 60           |
| Retry Count                         | 0            |
| Final Action                        | No operation |
| Execute Script before Final Action  | Off          |
| Recovery Target                     | exec1        |
| Recovery Target Type                | Resource     |
| Reactivation Threshold              | 1            |
| Failover Threshold                  | 0            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Possible     |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | PID monitor resource name                                                                                            |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |

## Understanding user-mode monitor resources

### Drivers that user-mode monitor resources depend on

#### **Monitor by: keepalive**

clpka

- ◆ If keepalive is selected as a monitoring method, the clpka driver of the ExpressCluster are required.
- ◆ The clpka driver is provided by ExpressCluster. For information on support, refer to the *Getting Started Guide*.
- ◆ Monitoring can not be started if the clpka driver is unable to use.

### 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: keepalive**

If keepalive is selected as a monitoring method, the clpka drivers are used.

#### **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: keepalive

- ◆ Process overview
  - Following steps below from 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 each setting.
- ◆ 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 or panic is performed by clpka.ko according to the action setting.
- ◆ Disadvantages
  - OS versions that can be operated (which provide drivers ) are restricted,
  - 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.

## Notes on user-mode monitor resources

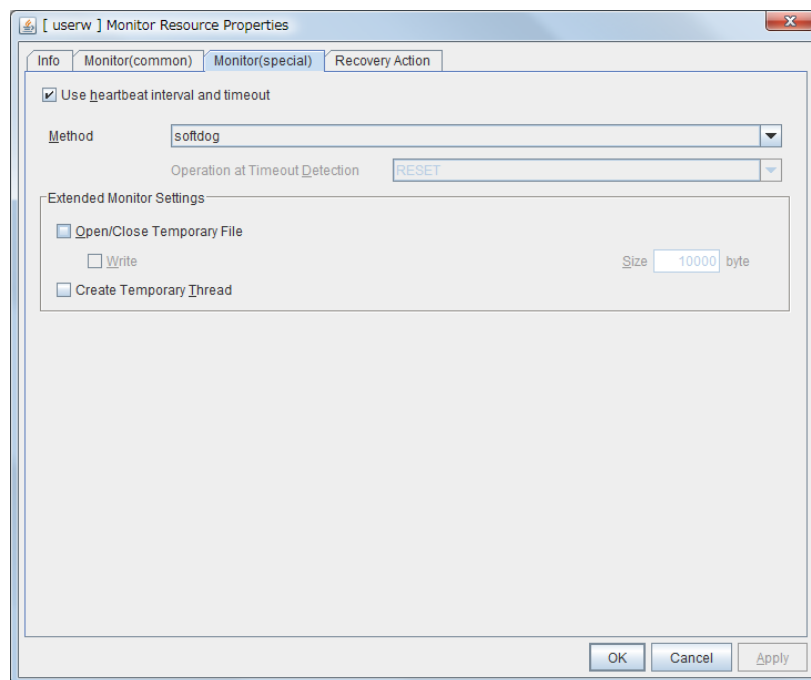
### Common notes on all the monitoring methods:

- ◆ When a cluster is added by the Builder, a user-mode monitor resource of keepalive is automatically created.
- ◆ A user-mode monitor resource of keepalive 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 clpka driver of ExpressCluster does not exist, “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.

## 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 keepalive 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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** 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.



**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.

- ◆ **keepalive:**  
Uses 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   |
|--------------------------------|---------|
| Comment                        |         |
| Method                         | softdog |
| Use HB interval and timeout    | On      |
| Status                         | Normal  |
| Resource Status on Each Server |         |
| Server Name                    | Status  |
| server1                        | Normal  |
| server2                        | Normal  |

Comment:

Comment of the user-mode monitor resource

Method:

Monitoring method

Use HB Interval and Timeout:

Whether or not to use HB interval/timeout value

Status:

Status of the user-mode monitor resource

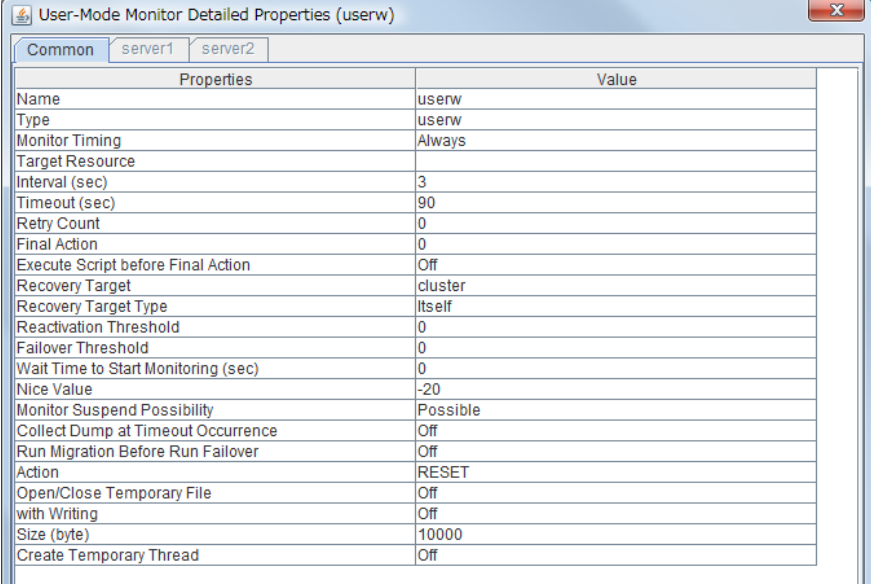
Server Name:

Server name

Status:

Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the pop-up dialog.



| Properties                          | Value    |
|-------------------------------------|----------|
| Name                                | userw    |
| Type                                | userw    |
| Monitor Timing                      | Always   |
| Target Resource                     |          |
| Interval (sec)                      | 3        |
| Timeout (sec)                       | 90       |
| Retry Count                         | 0        |
| Final Action                        | 0        |
| 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 |
| Collect Dump at Timeout Occurrence  | Off      |
| Run Migration Before Run Failover   | Off      |
| Action                              | RESET    |
| Open/Close Temporary File           | Off      |
| With Writing                        | Off      |
| Size (byte)                         | 10000    |
| Create Temporary Thread             | Off      |

|                                      |                                                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Name:                                | User-mode monitor resource name                                                                                   |
| 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                                                                              |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                           |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                           |
| Action:                              | Operation at timeout                                                                                              |
| Open/Close temporary file:           | Whether or not to open/close a dummy file                                                                         |
| With Writing:                        | Whether or not to create a dummy thread                                                                           |
| Size:                                | Size of writing into a temporary file                                                                             |
| Create Temporary Thread:             | Whether or not to create a dummy thread                                                                           |

## Understanding multi target monitor resources

The multi target monitor resource monitors more than one monitor resources.

### Multi target monitor resource status

The status of the multi target monitor resource is determined by the status of registered monitor resources.

The table below describes status of multi target monitor resource when the multi target monitor resource is configured as follows:

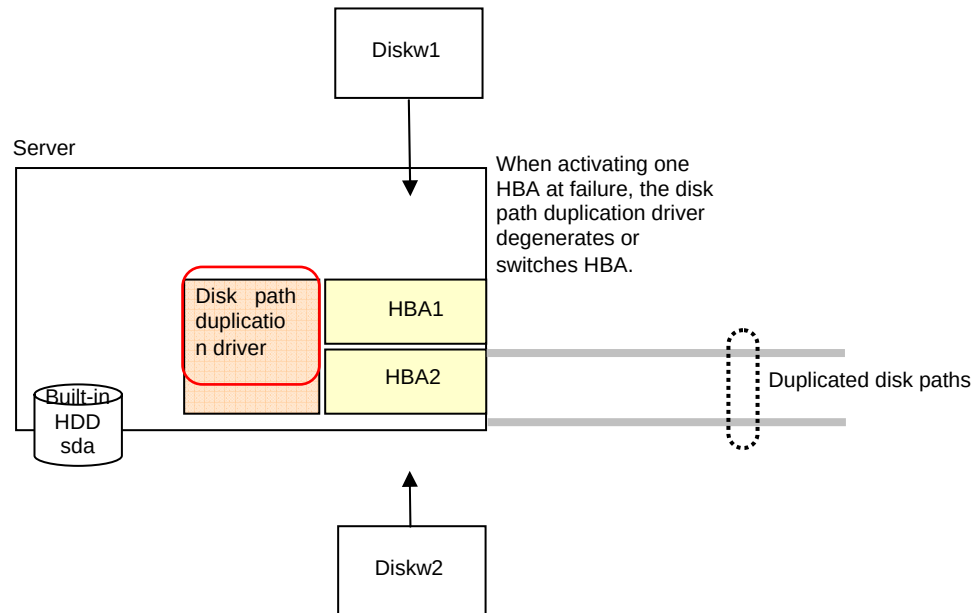
|                                            |   |
|--------------------------------------------|---|
| The number of registered monitor resources | 2 |
| Error Threshold                            | 2 |
| Warning Threshold                          | 1 |

| Multi target monitor resource status |         | Monitor resource1 status |         |         |
|--------------------------------------|---------|--------------------------|---------|---------|
|                                      |         | Normal                   | Error   | Offline |
| Monitor resource2 status             | Normal  | normal                   | caution | caution |
|                                      | Error   | caution                  | error   | error   |
|                                      | Offline | caution                  | error   | normal  |

- ◆ Multi target monitor resource monitors status of registered monitor resources.  
 If the number of the monitor resources with the error status exceeds the error threshold, the status of the multi target monitor resource becomes error.  
 If the number of the monitor resources with the caution status exceeds the caution threshold, the status of the multi target resource becomes caution.  
 If all registered monitor resources are in the status of stopped (offline), the status of multi target monitor resource becomes normal. Unless all the registered monitor resources are stopped (offline), the multi target monitor resource recognizes the stopped (offline) status of a monitor resource as error.
- ◆ If the status of a registered monitor resource becomes error, actions for the error of the monitoring resource are not executed.  
 Actions for error of the multi target monitor resource are executed only when the status of the multi target monitor resource becomes error.

## 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/dsk/c2t0d0s2 and /dev/dsk/c3t0d0s2) 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/dsk/c2t0d0s2
    - Reactivation Threshold: 0
    - Failover Threshold: 0
    - Final Action: No Operation
  - Disk monitor resource (diskw2)
    - Target Device Name: /dev/dsk/c3t0d0s2
    - 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.

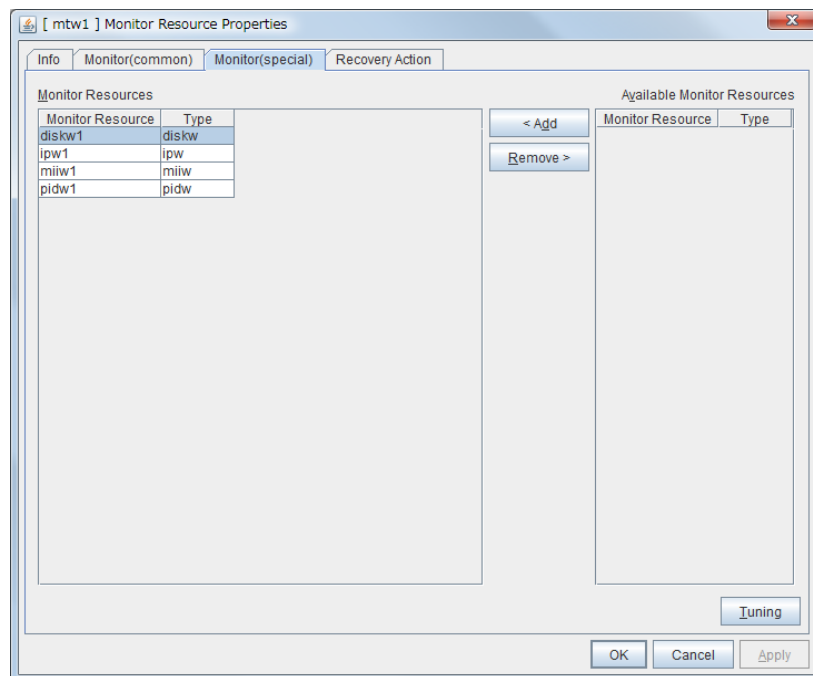
## Displaying and changing the details of the multi target monitor resource

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 **Monitor(special)** tab.
3. On the **Monitor(special)** 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**.

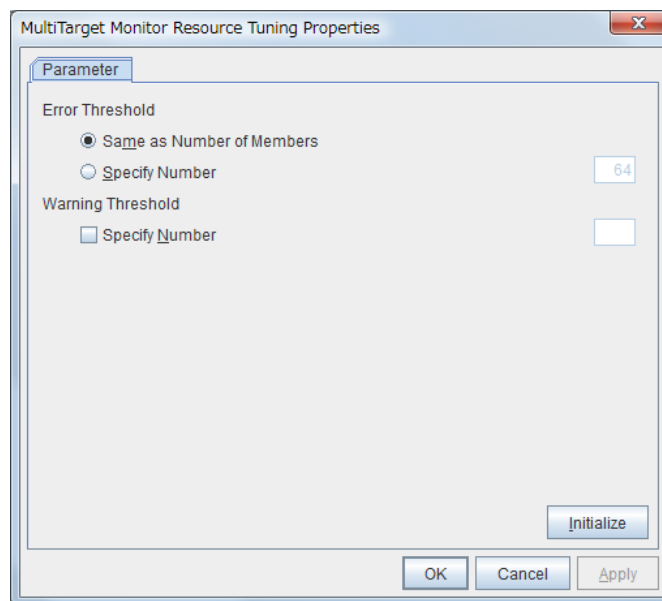
### Remove

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 **Monitor(special)**, and then click **Parameters**.
3. Click **Tuning** on the parameter tab. The **MultiTarget Monitor Resource Tuning Monitor(special)** 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 not selected:

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

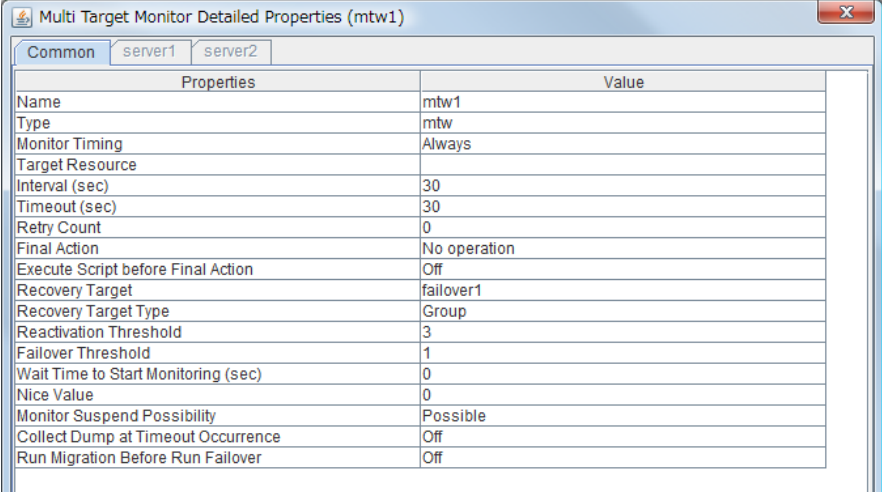
1. Start the WebManager
2. When you click an object for a multi target monitor resource  in the tree view, the following information is displayed in the list view.

| Multi Target Monitor Name: mtw1 |         | Details |
|---------------------------------|---------|---------|
| Common                          | server1 | server2 |
| Properties                      |         | Value   |
| Comment                         |         |         |
| Monitor Resources               |         | diskw1  |
|                                 |         | ipw1    |
|                                 |         | miw1    |
|                                 |         | pidw1   |
| Status                          |         | Normal  |
| Resource Status on Each Server  |         |         |
| Server Name                     |         | Status  |
| server1                         |         | Normal  |
| server2                         |         | Normal  |

|                    |                                              |
|--------------------|----------------------------------------------|
| 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        |
|-------------------------------------|--------------|
| Name                                | mtw1         |
| 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                     | failover1    |
| Recovery Target Type                | Group        |
| Reactivation Threshold              | 3            |
| Failover Threshold                  | 1            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Possible     |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |

|                                      |                                                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Name:                                | Multi target monitor resource name                                                                                |
| 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                                                                              |
| Collect Dump at Timeout Occurrence:  | Whether or not migration is run before running failover                                                           |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                           |

## 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

Common

server1

server2

| Properties                     | Value   |
|--------------------------------|---------|
| Comment                        |         |
| Monitor Target                 | vip1    |
| Status                         | Normal  |
| Resource Status on Each Server |         |
| Server Name                    | Status  |
| server1                        | Normal  |
| server2                        | Offline |

Comment:

Monitor Target:

Status:

Server Name:

Status:

Comment

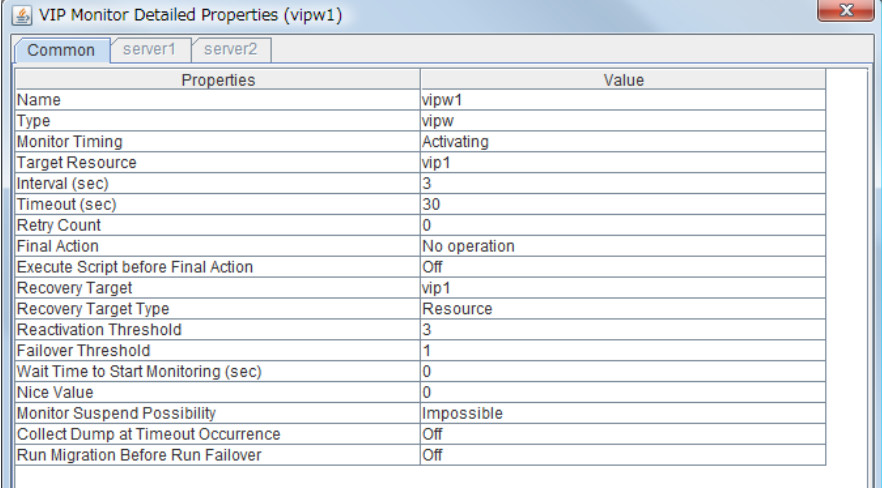
The name of a Virtual IP resource to be monitored

Status of virtual IP monitor resource

Server name

Status of monitor resource of the server

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



| Properties                          | Value        |
|-------------------------------------|--------------|
| Name                                | vipw1        |
| Type                                | vipw         |
| 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                     | vip1         |
| Recovery Target Type                | Resource     |
| Reactivation Threshold              | 3            |
| Failover Threshold                  | 1            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Impossible   |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | Virtual IP monitor resource name                                                                                     |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |

## Understanding custom monitor resources

Custom monitor resources monitor system by executing an arbitrary script.

### Monitoring by custom monitor resources

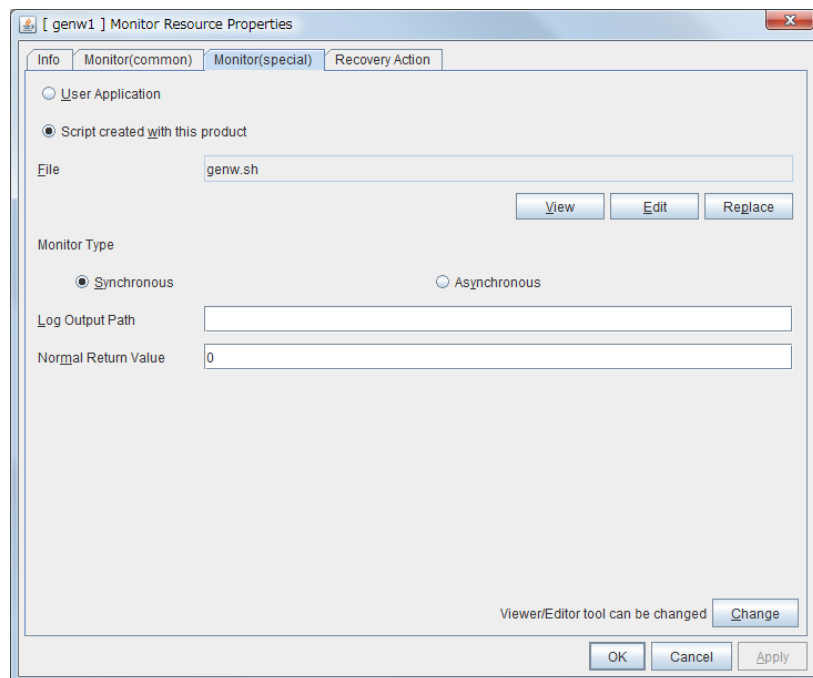
Custom monitor resources monitor system by an arbitrary script.

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 **Monitr(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitr(special)** 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 applied. You cannot display the script file if it is currently displayed or edited.

### Edit

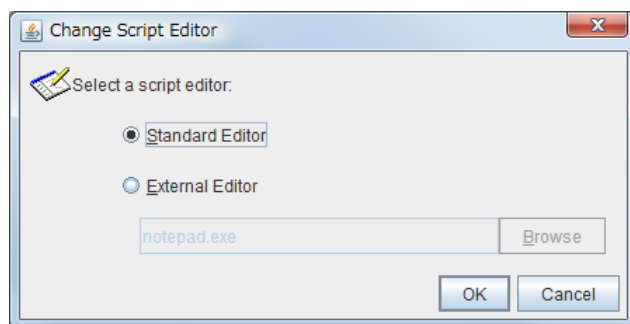
Click here to edit the script file with the editor when you select **Script created with this product**. Overwrite the script file to apply the change. You cannot edit the script file if it is currently displayed or edited. You cannot modify the name of the script file.

### 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.

- 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.

### Monitor Type SuspendResume

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) SuspendResume

Specify log output path for the script of custom monitor resource.

Be careful with the free space of the file system because the log is output without limitation when the file name is specified.

### Normal Return Value (Within 1023 bytes) SuspendResume

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 WebManager

- 1. Start the WebManager  
(*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     |         | Details |
| Common                         | server1 | server2 |
| Properties                     |         | Value   |
| Comment                        |         |         |
| Monitor Path                   |         | genw.sh |
| Status                         |         | Normal  |
| Resource Status on Each Server |         |         |
| Server Name                    |         | Status  |
| server1                        |         | Normal  |
| server2                        |         | Normal  |

- Comment:

Monitor Path:

Status:
- Comment of the custom monitor resource

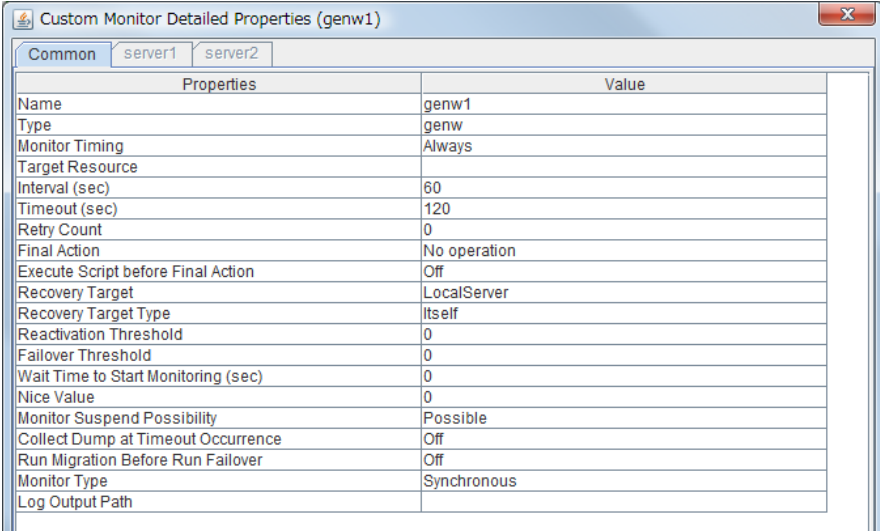
Path to the monitor script

Custom monitor resource status
- Server Name:

Status:
- Server name

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        |
|-------------------------------------|--------------|
| Name                                | genw1        |
| 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                     | LocalServer  |
| Recovery Target Type                | Itself       |
| Reactivation Threshold              | 0            |
| Failover Threshold                  | 0            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Possible     |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |
| Monitor Type                        | Synchronous  |
| Log Output Path                     |              |

|                                     |                                                                                                                   |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Name:                               | Custom monitor resource name                                                                                      |
| Type:                               | Monitor resource type                                                                                             |
| Monitor Timing:                     | Timing for the monitor resource 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 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 Target Server:             | How to specify the failover target                                                                                |
| 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 Suspend Possibility:        | Possibility of suspending monitoring                                                                              |
| Collect Dump at Timeout Occurrence: | Whether or not dump of monitor process is collected when timeout occurs                                           |
| Run Migration Before Run Failover:  | Whether or not migration is run before running failover                                                           |
| Monitor Type:                       | Execution method of monitor type                                                                                  |
| Log Output Path:                    | The output destination of the log                                                                                 |



## Understanding volume manager monitor resource

Volume manager monitor resource monitors a logical disk that is managed by volume manager.

### Monitoring volume manager monitor resource

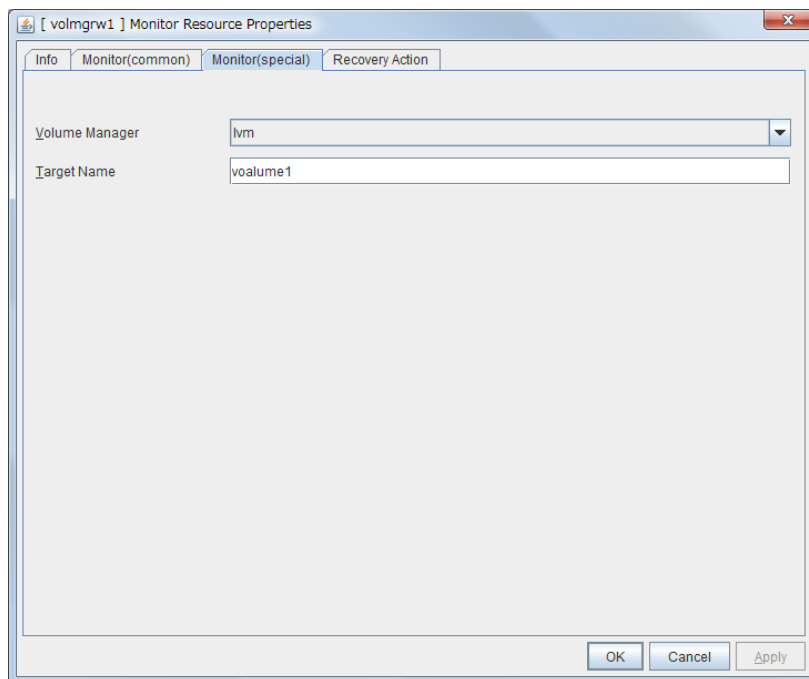
Monitoring method of volume manager monitor resource differs depending on types of volume manger that manages logical disk to be monitored.

The supported volume manager is as follow.

- ◆ zfspool (ZFS storage pool)

## Displaying and changing the details of the volume manager monitor resource

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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** tab, you can display and/or change the detailed settings by following the description below.



### Volume Manager

Specify a volume manager type that manages logical disk to be monitored. The supported volume manager is as follows.

- ◆ zfspool (ZFS storage pool)

### Target Name(within 255 bytes)

Specify the name of the monitor target.

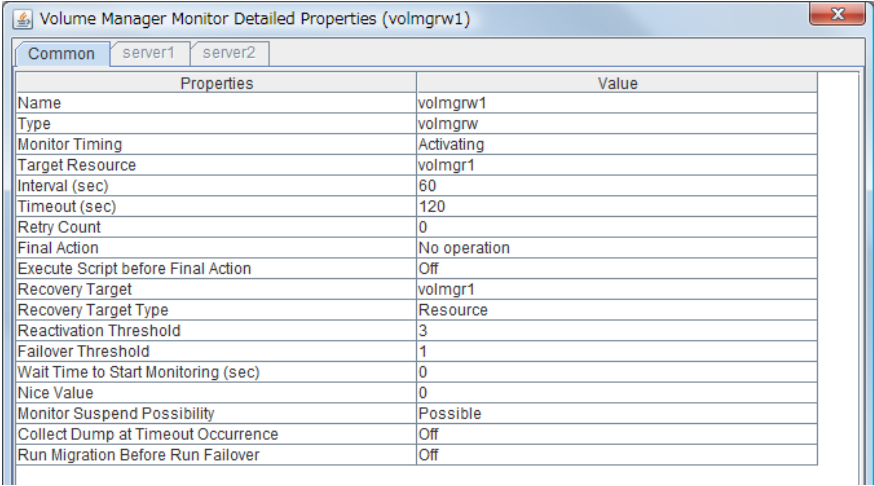
## Displaying the volume manager monitor resource properties with the WebManager

1. Start the Web Manager. (<http://FIP address for WebManager group:port number>(Default value is 29003))
2. Click a custom monitor resources object, , in the tree view. The following information is displayed in the list view.

|                                       |         |         |
|---------------------------------------|---------|---------|
| Volume Manager Monitor Name: volmgrw1 |         | Details |
| Common                                | server1 | server2 |
| Properties                            |         | Value   |
| Comment                               |         |         |
| Volume Manager                        | lvm     |         |
| Target                                | volume1 |         |
| Status                                | Normal  |         |
| Resource Status on Each Server        |         |         |
| Server Name                           |         | Status  |
| server1                               | Normal  |         |
| server2                               | Offline |         |

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| Comment:        | Comment on the volume manager monitor resource                      |
| Volume Manager: | Type of volume manager that manages the monitor target logical disk |
| TargetName:     | Name of the monitor target                                          |
| Server Name:    | Server name                                                         |
| Status:         | Status of the monitor resources on each server                      |

If you click **Details** button, the following information is displayed in the pop-up dialog box:



| Properties                          | Value        |
|-------------------------------------|--------------|
| Name                                | volmgrw1     |
| Type                                | volmgrw      |
| Monitor Timing                      | Activating   |
| Target Resource                     | volmgr1      |
| Interval (sec)                      | 60           |
| Timeout (sec)                       | 120          |
| Retry Count                         | 0            |
| Final Action                        | No operation |
| Execute Script before Final Action  | Off          |
| Recovery Target                     | volmgr1      |
| Recovery Target Type                | Resource     |
| Reactivation Threshold              | 3            |
| Failover Threshold                  | 1            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Possible     |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |

|                                       |                                                                                                                   |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Name:                                 | Volume manager monitor resource name                                                                              |
| Type:                                 | Monitor resource type                                                                                             |
| Monitor Timing:                       | Monitor resource monitoring start time                                                                            |
| Target Resource:                      | Monitor target resource                                                                                           |
| Interval(sec):                        | Interval between monitor target status checks (in seconds)                                                        |
| Timeout l(sec):                       | Timeout used to determine that the monitor resource has 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 Target Server:               | How to specify the failover target                                                                                |
| Failover Threshold:                   | The number of failovers to be made at detection of an error                                                       |
| Wait Time to Start Monitoring l(sec): | Wait time until monitoring starts (in seconds)                                                                    |
| Nice Value:                           | Nice value of the monitor resource                                                                                |
| Monitor Suspend Possibility:          | Possibility of pausing monitor resource monitoring                                                                |
| Collect Dump at Timeout Occurrence:   | Whether or not dump of monitor process is collected when timeout occurs                                           |
| Run Migration Before Run Failover:    | Whether or not migration is run before running failover                                                           |

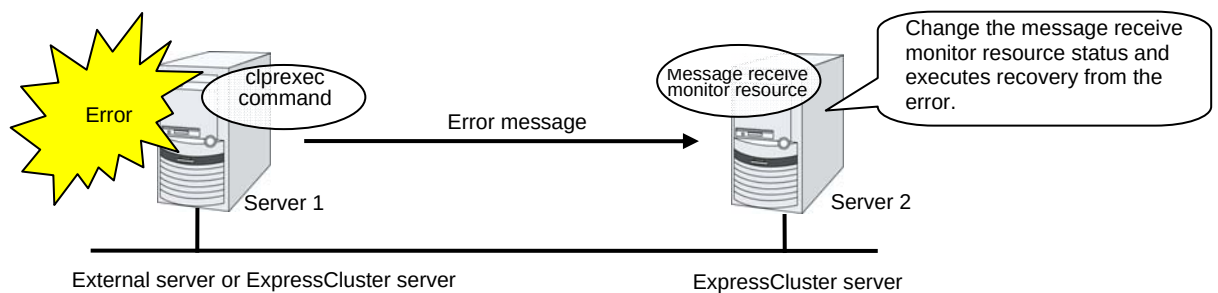
## Understanding message receive monitor resources

Message receive monitor resources are passive monitors. They do not perform monitoring by themselves.

When an error message issued using the `clprexec` command is received from an outside source, the message receive monitor resources change their status and perform recovery from the error.

### Monitoring by message receive monitor resources

- ◆ When an error message is received from an outside source, the resource recovers the message receive monitor resource whose Category and Keyword have been reported. (The Keyword can be omitted.)  
If there are multiple message receive monitor resources whose monitor types and monitor targets have been reported, each monitor resource is recovered.

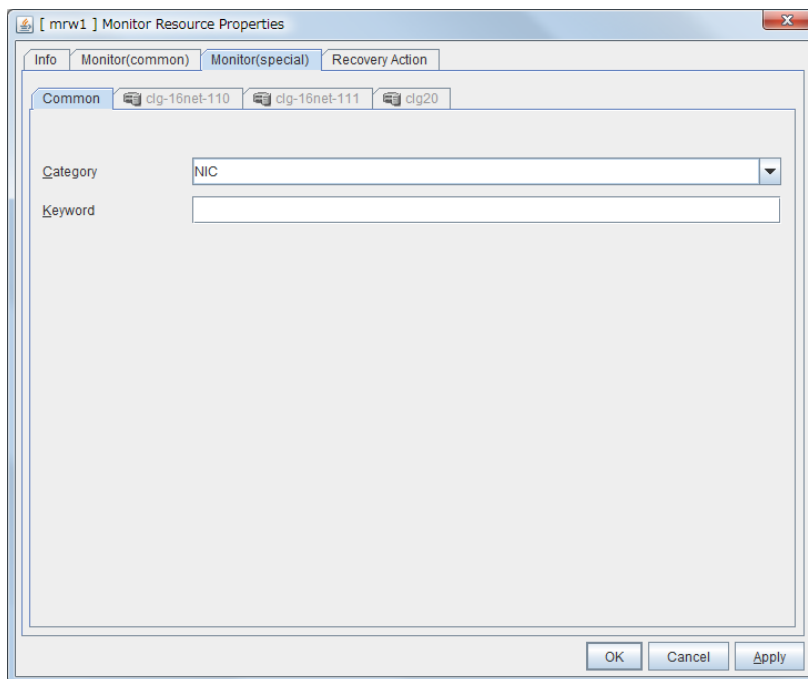


### Notes on message receive monitor resources

- ◆ If a message receive monitor resource is paused when an error message is received from outside, error correction is not performed.
- ◆ If an error message is received from outside, the status of the message receive monitor resource becomes "error". The error status of the message receive monitor resource is not automatically restored to "normal". To restore the status to normal, use the `clprexec` command. For details about this command, see Chapter 3, "ExpressCluster Command Reference."
- ◆ If an error message is received when the message receive monitor resource is already in the error status due to a previous error message from outside, recovery from the error is not performed.

## Displaying and changing the details of the message receive monitor resources

1. Click a monitor resource icon in the tree view on the left side of the Builder window.
2. The list of monitor resources is shown in the table view on the right side of the screen. Right-click the target message receive monitor resource name, and then click the **Monitor(special)** tab in **Property**.
3. On the **Monitor(special)** tab, you can display or change the detailed settings by following the description below.



For **Category** and **Keyword**, specify a keyword passed using the -k parameter of the clprexec command. The keyword can be omitted.

### **Category** (within 32 bytes)

Specify a monitor type.

You can select the default character string from the list box or specify any character string.

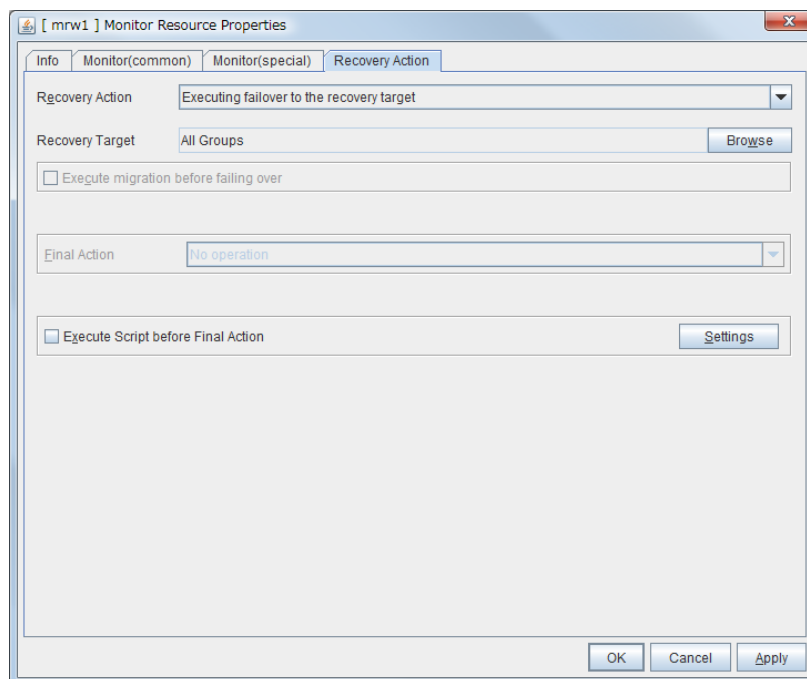
### **Keyword** (within 1,023 bytes)

Specify a keyword passed using the -k parameter of the clprexec command.

## Displaying and changing the error detection settings of the message receive monitor resources

1. Click a monitor resource icon in the tree view on the left side of the Builder window.
2. The list of monitor resources is shown in the table view on the right side of the screen. Right-click the target monitor resource name, and then click the **Recovery Action** tab in **Property**.
3. On the **Recovery Action** tab, you can display or change the monitoring settings by following the description below.

Specify the recovery target and the action upon detecting an error. For message receive monitor resources, select "Restart the recovery target", "Executing failover to the recovery target", or "Execute the final action" as the action to take when an error is detected. However, if the recovery target is inactive, the recovery action is not performed.



### Recovery Action

Select the action to take when a monitor error is detected.

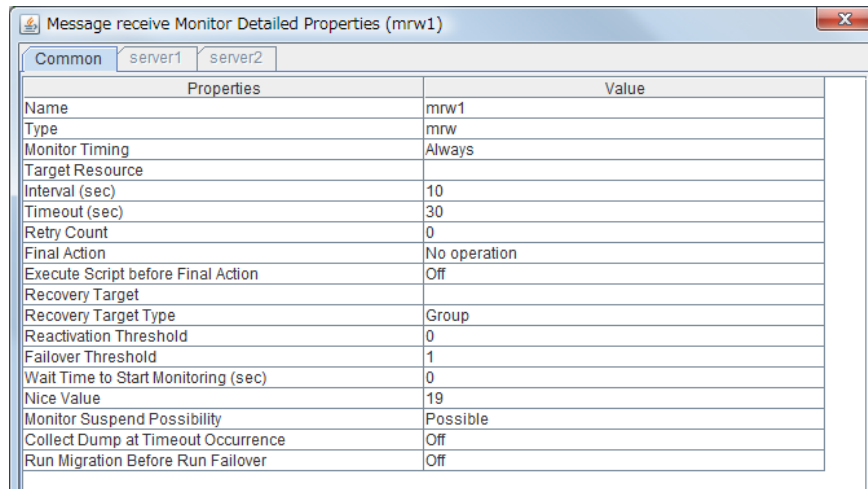
- ◆ Restart the recovery target  
Restart the group or group resource selected as the recovery target when a monitor error is detected.
- ◆ Executing failover to the recovery target  
Perform a failover for the group selected as the recovery target or the group to which the group resource selected as the recovery target belongs when a monitor error is detected.
- ◆ Execute the final action  
Execute the selected final action when a monitor error is detected.

\* For details about the settings other than the above, see “Displaying and changing the settings of the time when an error is detected by a monitor resource (Common to monitor resources)” in Chapter 6, “Monitor resource details.”





If you click the **Details** button, the following information is displayed in a pop-up dialog box:



|                                     |                                                                                                                      |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                               | Message receive monitor resource name                                                                                |
| Type:                               | Monitor resource type                                                                                                |
| Monitor Timing:                     | Monitor resource monitoring start time                                                                               |
| Target Resource:                    | Monitor target resource                                                                                              |
| Interval(sec):                      | Interval between monitor target status checks (in seconds)                                                           |
| Timeout(sec):                       | Timeout used to determine that the monitor resource has an error after detecting a monitor target error (in seconds) |
| Retry Count:                        | Retry count used to determine that the monitor resource has an error after detecting a monitor target error          |
| Final Action:                       | Final action when an error is detected                                                                               |
| Execute Script before Final Action: | Whether to execute scripts when an error is detected                                                                 |
| Recovery Target:                    | Recovery target when an error is detected                                                                            |
| Recovery Target Type:               | Recovery target type when an error is detected                                                                       |
| Reactivation Threshold:             | Reactivation count when an error is detected                                                                         |
| Failover Threshold:                 | Failover count when an error is detected                                                                             |
| Wait Time to Start Monitoring(sec): | Wait time until monitoring starts (in seconds)                                                                       |
| Nice Value:                         | Nice value of the monitor resource                                                                                   |
| Monitor Suspend Possibility:        | Possibility of pausing monitor resource monitoring                                                                   |
| Collect Dump at Timeout Occurrence: | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:  | Whether or not migration is run before running failover                                                              |

## Understanding VM monitor resources

VM monitor resources check whether the virtual machine is alive.

### Notes on VM monitor resources

For the supported virtual infrastructure versions, see the *Getting Started Guide*.

- ◆ The times counter of the recovery action kept by the monitor resource is not reset even though the virtual machine monitor resource recovery is detected while recovery action is in transit, or after all the recovery action have completed. Execute either one of the following procedures when you want to reset the times counter of the recovery action.
  - Reset the times counter of the recovery action by the `clpmonctrl` command.
  - Execute cluster stop/start by `clpcl` command or WebManager.

### Monitoring by VM monitor resources

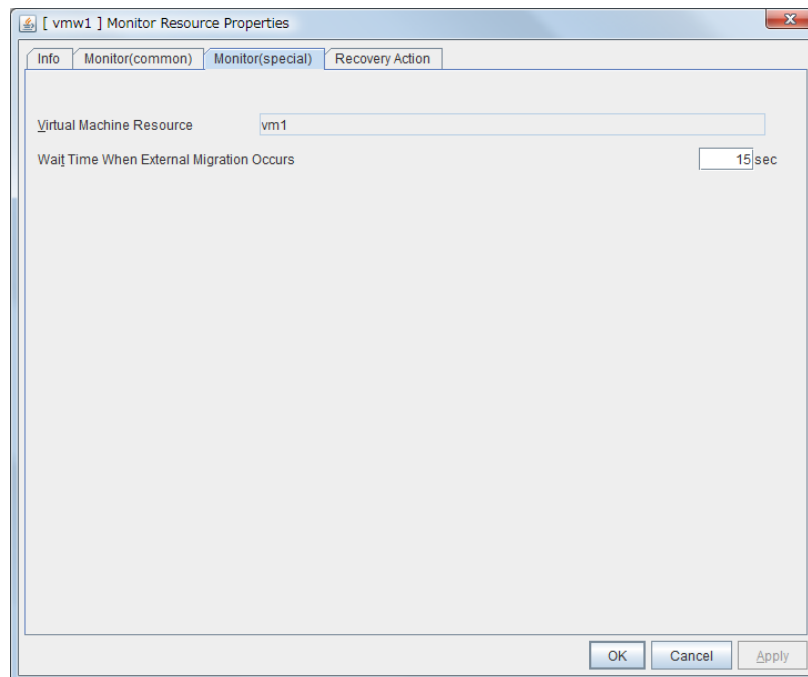
The `zoneadm` command is used to monitor virtual machines.

An error is detected if the monitoring result is one of the following:

- (1) The VM status is POWEROFF, SHUTDOWN, or SUSPENDED.
- (2) Acquiring the VM status failed.

## Displaying and changing the details of the VM monitor resources

1. Click the **Monitor Resource** icon in the tree view on the left side of the Builder window.
2. The list of monitor resources is shown in the table view on the right side of the screen. Right-click the target VM monitor resource name, and then click the **Monitor(special)** tab in **Property**.
3. On the **Monitor(special)** tab, you can display or change detailed settings by following the description below.



### Wait Time for External Migration

Specify the time to wait for the completion of the migration.

## Displaying the properties of a VM monitor resource by using the WebManager

1. Start the WebManager.
2. In the tree view, click the object icon  for a VM monitor resource. The following information is displayed in the list view:

Virtual Machine Monitor Name: vmw1

Details

Commonserver1server2

| Properties                     | Value  |
|--------------------------------|--------|
| Comment                        |        |
| virtual machine resource name  | vm1    |
| Status                         | Normal |
| Resource Status on Each Server |        |
| Server Name                    | Status |
| server1                        | Normal |
| server2                        | Normal |

Comment:

Comment on the VM monitor resource

VM Resource Name:

Virtual machine resource name

Status

Status of the VM monitor resource

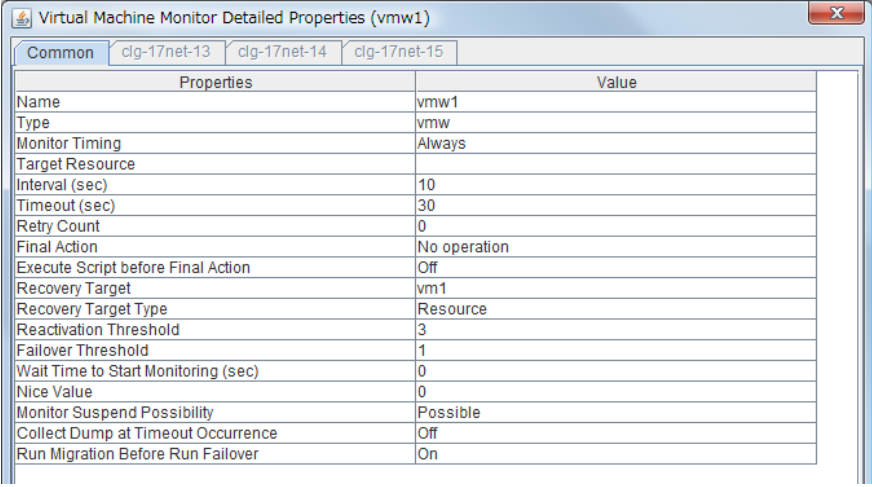
Server Name:

Name of the server

Status:

Status of the monitor resources on each server

If you click the **Details** button, the following information is displayed in a pop-up dialog box:



| Properties                          | Value        |
|-------------------------------------|--------------|
| Name                                | vmw1         |
| Type                                | vmw          |
| Monitor Timing                      | Always       |
| Target Resource                     |              |
| Interval (sec)                      | 10           |
| Timeout (sec)                       | 30           |
| Retry Count                         | 0            |
| Final Action                        | No operation |
| Execute Script before Final Action  | Off          |
| Recovery Target                     | vm1          |
| Recovery Target Type                | Resource     |
| Reactivation Threshold              | 3            |
| Failover Threshold                  | 1            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Possible     |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | On           |

|                                     |                                                                                                                      |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                               | VM monitor resource name                                                                                             |
| Type:                               | Monitor resource type                                                                                                |
| Monitor Timing:                     | Monitor resource monitoring start time                                                                               |
| Target Resource:                    | Monitor target resource                                                                                              |
| Interval(sec):                      | Interval between monitor target status checks (in seconds)                                                           |
| Timeout(sec):                       | Timeout used to determine that the monitor resource has an error after detecting a monitor target error (in seconds) |
| Retry Count:                        | Retry count used to determine that the monitor resource has an error after detecting a monitor target error          |
| Final Action:                       | Final action when an error is detected                                                                               |
| Recovery Target:                    | Recovery target when an error is detected                                                                            |
| Recovery Target Type:               | Recovery target type when an error is detected                                                                       |
| Reactivation Threshold:             | Reactivation count when an error is detected                                                                         |
| Failover Threshold                  | Failover count when an error is detected                                                                             |
| Wait Time to Start Monitoring(sec): | Wait time until monitoring starts (in seconds)                                                                       |
| Nice Value:                         | Nice value of the monitor resource                                                                                   |
| Monitor Suspend Possibility:        | Possibility of pausing monitor resource monitoring                                                                   |
| Collect Dump at Timeout Occurrence: | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:  | Whether or not migration is run before running failover                                                              |

## Understanding Dynamic DNS monitor resources

### Notes on Dynamic DNS monitor resources

There are no detailed settings for Dynamic DNS monitor resources.

These monitor resources are used when using the Dynamic DNS resources in ExpressCluster.

- ◆ A Dynamic DNS monitor resource is automatically created when a Dynamic DNS resource is added. One Dynamic DNS monitor resource is automatically created for each Dynamic DNS resource.
- ◆ Dynamic DNS monitor resources cannot be deleted. They are automatically deleted when the Dynamic DNS resource is deleted.
- ◆ Do not change the recovery target.
- ◆ Monitoring cannot be paused or resumed using the clpmonctrl command or from the WebManager.
- ◆ Dynamic DNS monitor resources periodically register virtual host names with the DDNS server. If the target Dynamic DNS resource is active while the cluster is suspended, the Dynamic DNS monitor resource continues operating.

### Settings for Dynamic DNS monitor resources

Dynamic DNS monitor resources periodically register virtual host names with the DDNS server. There are no detailed settings for Dynamic DNS monitor resources.

### Displaying the properties of a Dynamic DNS monitor resource by using the WebManager

1. Start the WebManager.
2. In the tree view, click the object icon  for a Dynamic DNS monitor resource.. The following information is displayed in the list view:

Dynamic DNS Monitor Name: ddnsw1

Details

Commonserver1server2

| Properties                     | Value   |
|--------------------------------|---------|
| Comment                        |         |
| Monitor Target                 | ddns1   |
| Status                         | Normal  |
| Resource Status on Each Server |         |
| Server Name                    | Status  |
| server1                        | Normal  |
| server2                        | Offline |

Comment:

Monitor Target:

Status

Comment on the Dynamic DNS monitor resource

Monitor target Dynamic DNS resource name

Status of the Dynamic DNS monitor resource

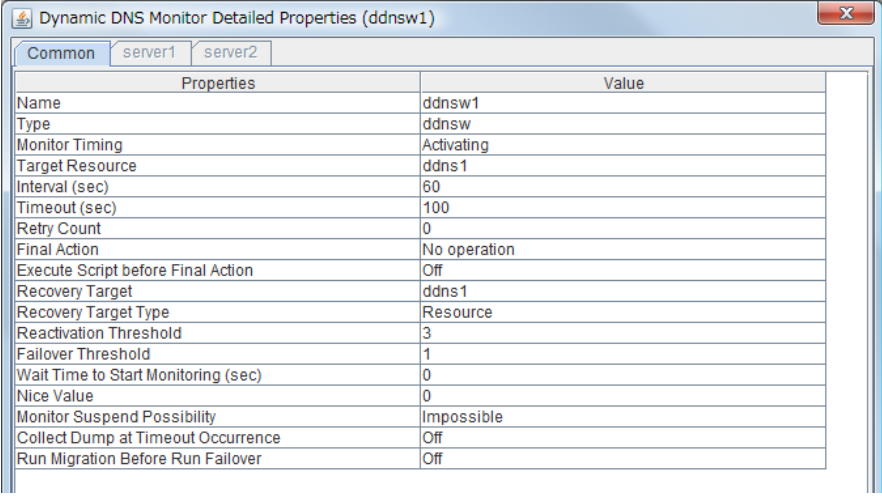
Server Name:

Status:

Name of the server

Status of the monitor resource on each server

If you click the **Details** button, the following information is displayed in a pop-up dialog box:



| Properties                          | Value        |
|-------------------------------------|--------------|
| Name                                | ddnsw1       |
| Type                                | ddnsw        |
| Monitor Timing                      | Activating   |
| Target Resource                     | ddns1        |
| Interval (sec)                      | 60           |
| Timeout (sec)                       | 100          |
| Retry Count                         | 0            |
| Final Action                        | No operation |
| Execute Script before Final Action  | Off          |
| Recovery Target                     | ddns1        |
| Recovery Target Type                | Resource     |
| Reactivation Threshold              | 3            |
| Failover Threshold                  | 1            |
| Wait Time to Start Monitoring (sec) | 0            |
| Nice Value                          | 0            |
| Monitor Suspend Possibility         | Impossible   |
| Collect Dump at Timeout Occurrence  | Off          |
| Run Migration Before Run Failover   | Off          |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | Dynamic DNS monitor resource name                                                                                    |
| Type:                                | Monitor resource type                                                                                                |
| Monitor Timing:                      | Monitor resource monitoring start time                                                                               |
| Target Resource:                     | Name of the monitor target Daynamic DNS resource                                                                     |
| Interval (sec):                      | Interval between monitor target status checks (in seconds)                                                           |
| Timeout (sec):                       | Timeout used to determine that the monitor resource has an error after detecting a monitor target error (in seconds) |
| Retry Count:                         | Retry count used to determine that the monitor resource has an error after detecting a monitor target error          |
| Final Action:                        | Final action when an error is detected                                                                               |
| Execute Script before Final Action:  | Whether to execute scripts when an error is detected                                                                 |
| Recovery Target:                     | Recovery target when an error is detected                                                                            |
| Recovery Target Type:                | Recovery target type when an error is detected                                                                       |
| Reactivation Threshold:              | Reactivation count when an error is detected                                                                         |
| Failover Threshold:                  | Failover count when an error is detected                                                                             |
| Wait Time to Start Monitoring (sec): | Wait time until monitoring starts (in seconds)                                                                       |
| Nice Value:                          | Nice value of the monitor resource                                                                                   |
| Monitor Suspend Possibility:         | Possibility of pausing monitoring                                                                                    |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |

## 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:

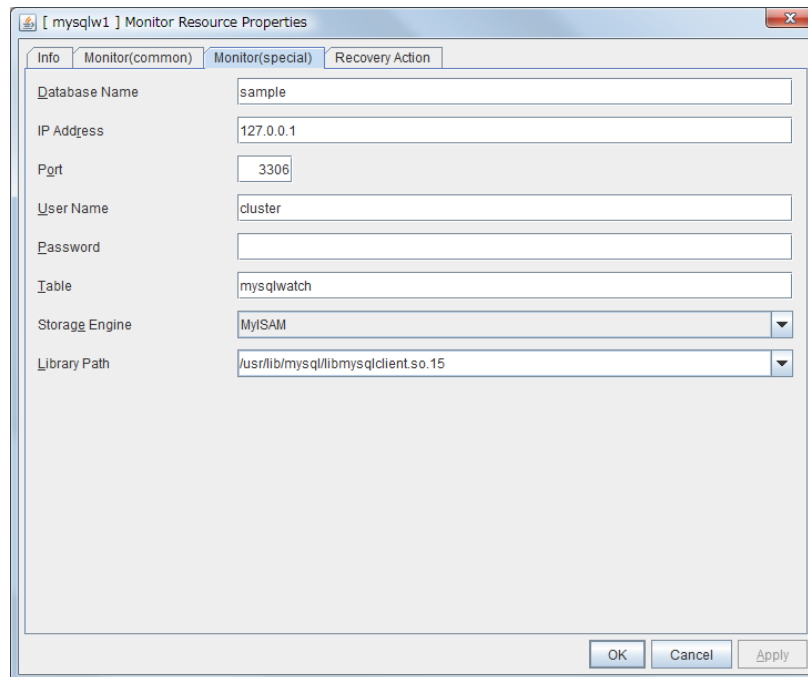
- (1) An error is informed in a response to the database connection or the issued SQL statement
- (2) Written data and read data do not match

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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** tab, you can see and/or change the detailed settings by following the description below.



**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

**Monitoring 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. The path must be specified.

Default value: /usr/lib/mysql/libmysqlclient.so.15

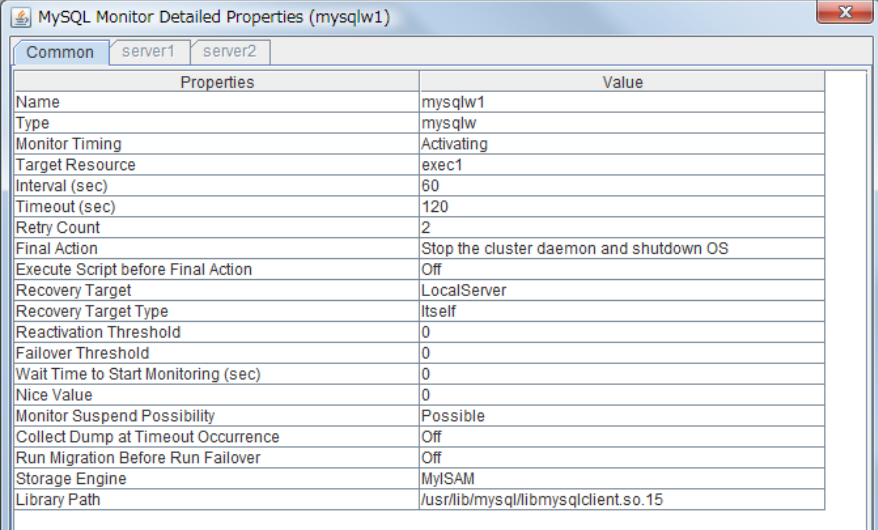
## Displaying the MySQL monitor resource properties with the WebManager

- 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: mysqlw1    |         | Details    |
| Common                         | server1 | server2    |
| Properties                     |         | Value      |
| Comment                        |         |            |
| Database Name                  |         | sample     |
| IP Address                     |         | 127.0.0.1  |
| Port                           |         | 3306       |
| Table                          |         | mysqlwatch |
| Status                         |         | Normal     |
| Resource Status on Each Server |         |            |
| Server Name                    |         | Status     |
| server1                        |         | Normal     |
| server2                        |         | Offline    |

|                |                                                 |
|----------------|-------------------------------------------------|
| 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                                   |
|-------------------------------------|-----------------------------------------|
| Name                                | mysqlw1                                 |
| Type                                | mysqlw                                  |
| Monitor Timing                      | Activating                              |
| Target Resource                     | exec1                                   |
| Interval (sec)                      | 60                                      |
| Timeout (sec)                       | 120                                     |
| Retry Count                         | 2                                       |
| Final Action                        | Stop the cluster daemon and shutdown OS |
| Execute Script before Final Action  | Off                                     |
| Recovery Target                     | LocalServer                             |
| Recovery Target Type                | Itself                                  |
| Reactivation Threshold              | 0                                       |
| Failover Threshold                  | 0                                       |
| Wait Time to Start Monitoring (sec) | 0                                       |
| Nice Value                          | 0                                       |
| Monitor Suspend Possibility         | Possible                                |
| Collect Dump at Timeout Occurrence  | Off                                     |
| Run Migration Before Run Failover   | Off                                     |
| Storage Engine                      | MyISAM                                  |
| Library Path                        | /usr/lib/mysql/libmysqlclient.so.15     |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | MySQL monitor resource name                                                                                          |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |
| 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.

To monitor an NFS file server that runs in the guest OS on a virtual machine controlled by a VM resource, specify the VM resource as the monitor target and specify enough wait time for the NFS file server to become accessible after the VM resource is activated for **Wait Time to Start Monitoring**.

## How NFS monitor resources perform monitoring

NFS monitor resource monitors the following:

Connect to the NFS server and run NFS test command.

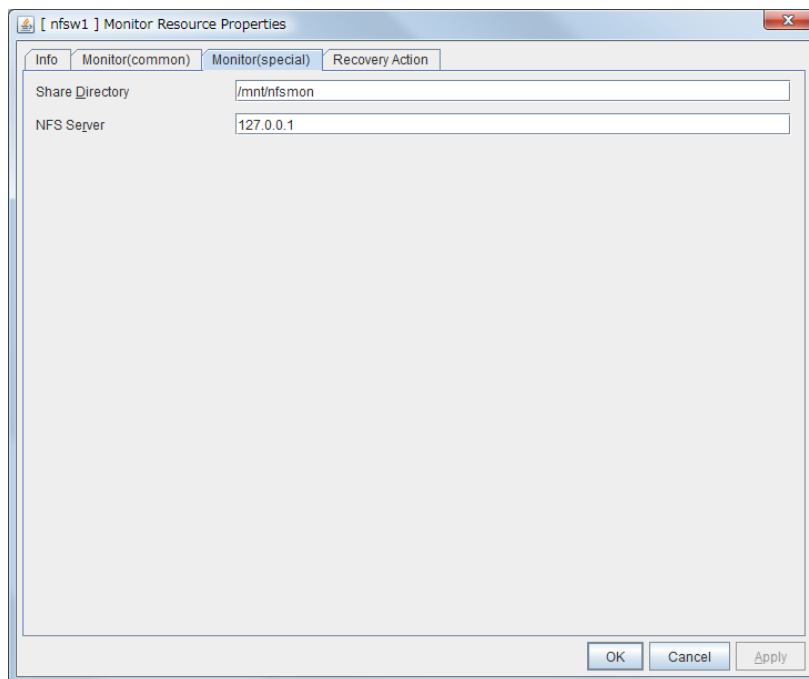
This monitor resource assumes the following result as an error:

(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 **Monitro(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitro(special)** 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

**NFS Server** Within 79 bytes

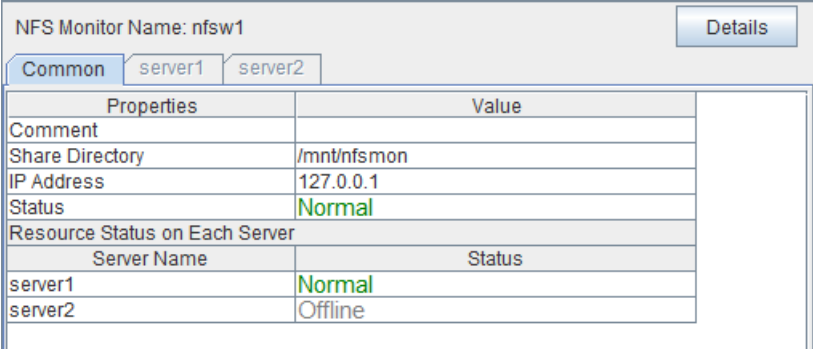
Specify an IP address of the server that monitors NFS. You must specify the IP address.

Usually, specify the loopback address (127.0.0.1) to connect to the NFS file server that runs on the local server. To monitor an NFS file server that runs in the guest OS on a virtual machine controlled by a VM resource, specify the IP address of the virtual machine.

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.

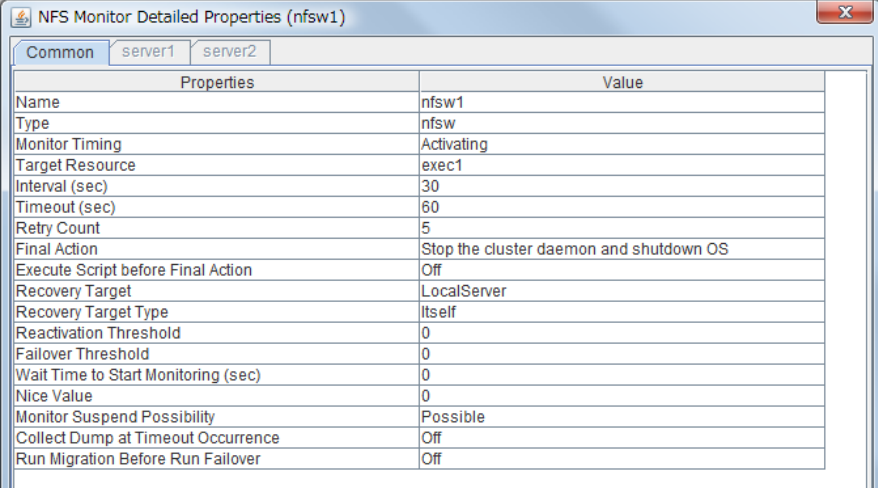


| NFS Monitor Name: nfs1         |             |
|--------------------------------|-------------|
| Details                        |             |
| Common server1 server2         |             |
| Properties                     | Value       |
| Comment                        |             |
| Share Directory                | /mnt/nfsmon |
| IP Address                     | 127.0.0.1   |
| Status                         | Normal      |
| Resource Status on Each Server |             |
| Server Name                    | Status      |
| server1                        | Normal      |
| server2                        | Offline     |

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                                   |
|-------------------------------------|-----------------------------------------|
| Name                                | nfs1                                    |
| Type                                | nfs                                     |
| Monitor Timing                      | Activating                              |
| Target Resource                     | exec1                                   |
| Interval (sec)                      | 30                                      |
| Timeout (sec)                       | 60                                      |
| Retry Count                         | 5                                       |
| Final Action                        | Stop the cluster daemon and shutdown OS |
| Execute Script before Final Action  | Off                                     |
| Recovery Target                     | LocalServer                             |
| Recovery Target Type                | Itself                                  |
| Reactivation Threshold              | 0                                       |
| Failover Threshold                  | 0                                       |
| Wait Time to Start Monitoring (sec) | 0                                       |
| Nice Value                          | 0                                       |
| Monitor Suspend Possibility         | Possible                                |
| Collect Dump at Timeout Occurrence  | Off                                     |
| Run Migration Before Run Failover   | Off                                     |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | NFS monitor resource name                                                                                            |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |



# 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.

To monitor an Oracle database that runs in the guest OS on a virtual machine controlled by a VM resource, specify the VM resource as the monitor target and specify enough wait time for the Oracle database to become accessible after the VM resource is activated for **Wait Time to Start Monitoring**. Also, set up the Oracle client on the host OS side, where monitor resources run, and specify the connection string for connecting to the Oracle database on the virtual machine.

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, ExpressCluster does not create a table. A table needs to be created manually with the following procedure.

### When creating by SQL statements

```
sql> create table orawatch (num number(11,0) primary key);
sql> insert into orawatch values(0);
sql> commit;
```

### When using ExpressCluster commands

```
clp_oraclew --createtable -n <Oracle monitor resource name>
```

When deleting the created monitor table manually, run the following command:

```
clp_oraclew --deletetable -n <Oracle monitor resource name>
```

## 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.

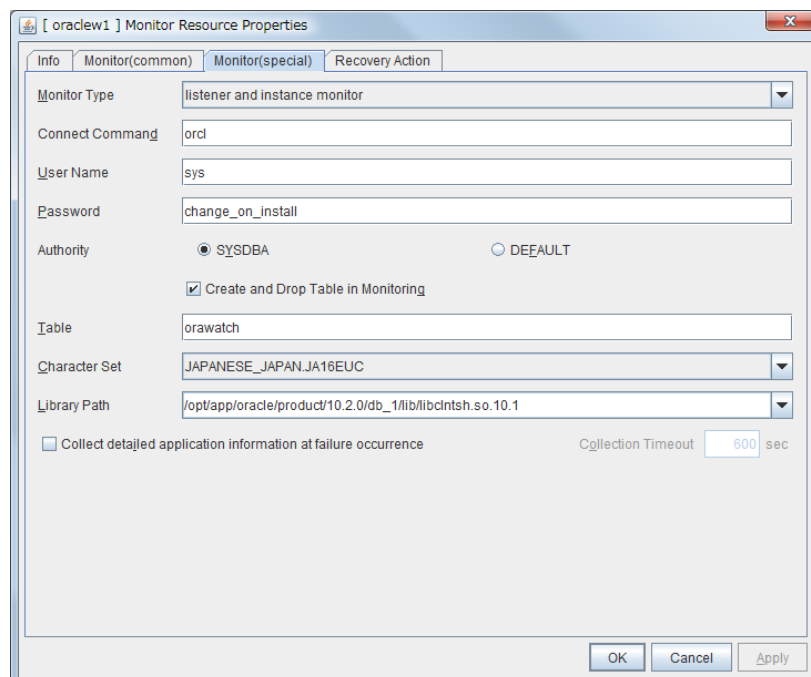
The monitor resource determines the following results as an error:

- (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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** 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**.

**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

**Create and Drop Table in Monitoring**

Specify whether or not creating and dropping table in monitoring is performed.

**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

**Collect detailed application information at failure occurrence**

In case that this function is enabled, when Oracle monitor resource detects errors, the detailed Oracle information is collected. The detailed Oracle information is collected up to 5 times.

---

**Note:** In case of stopping the oracle service while collecting the information due to the cluster stop, correct information may not be collected.

---

Default value: disabled

**Collection Timeout**

Specify the timeout value for collecting detailed information.

Default value: 600

## 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.

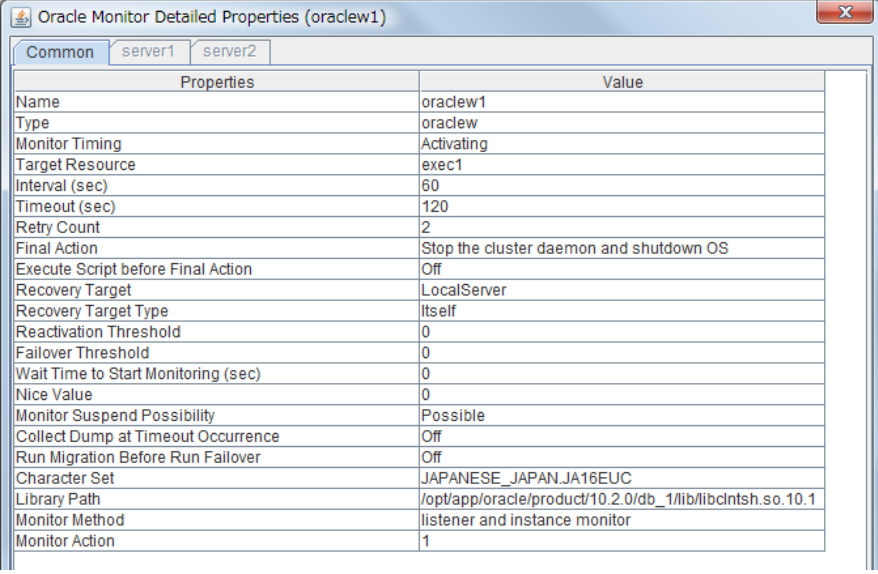
Oracle Monitor Name: oraclew1 Details

Common server1 server2

| Properties                     | Value    |
|--------------------------------|----------|
| Comment                        |          |
| Connect Command                | orcl     |
| Authority                      | SYSDBA   |
| Table                          | orawatch |
| Status                         | Normal   |
| Resource Status on Each Server |          |
| Server Name                    | Status   |
| server1                        | Normal   |
| server2                        | Offline  |

|                  |                                                             |
|------------------|-------------------------------------------------------------|
| 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 in the pop-up dialog.



| Properties                          | Value                                                     |
|-------------------------------------|-----------------------------------------------------------|
| Name                                | oraclew1                                                  |
| Type                                | oraclew                                                   |
| Monitor Timing                      | Activating                                                |
| Target Resource                     | exec1                                                     |
| Interval (sec)                      | 60                                                        |
| Timeout (sec)                       | 120                                                       |
| Retry Count                         | 2                                                         |
| Final Action                        | Stop the cluster daemon and shutdown OS                   |
| Execute Script before Final Action  | Off                                                       |
| Recovery Target                     | LocalServer                                               |
| Recovery Target Type                | Itself                                                    |
| Reactivation Threshold              | 0                                                         |
| Failover Threshold                  | 0                                                         |
| Wait Time to Start Monitoring (sec) | 0                                                         |
| Nice Value                          | 0                                                         |
| Monitor Suspend Possibility         | Possible                                                  |
| Collect Dump at Timeout Occurrence  | Off                                                       |
| Run Migration Before Run Failover   | Off                                                       |
| Character Set                       | JAPANESE_JAPAN.JA16EUC                                    |
| Library Path                        | /opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1 |
| Monitor Method                      | listener and instance monitor                             |
| Monitor Action                      | 1                                                         |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | Oracle monitor resource name                                                                                         |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |
| 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 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.

To monitor a PostgreSQL database that runs in the guest OS on a virtual machine controlled by a VM resource, specify the VM resource as the monitor target and specify enough wait time for the PostgreSQL database to become accessible after the VM resource is activated for **Wait Time to Start Monitoring**.

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.

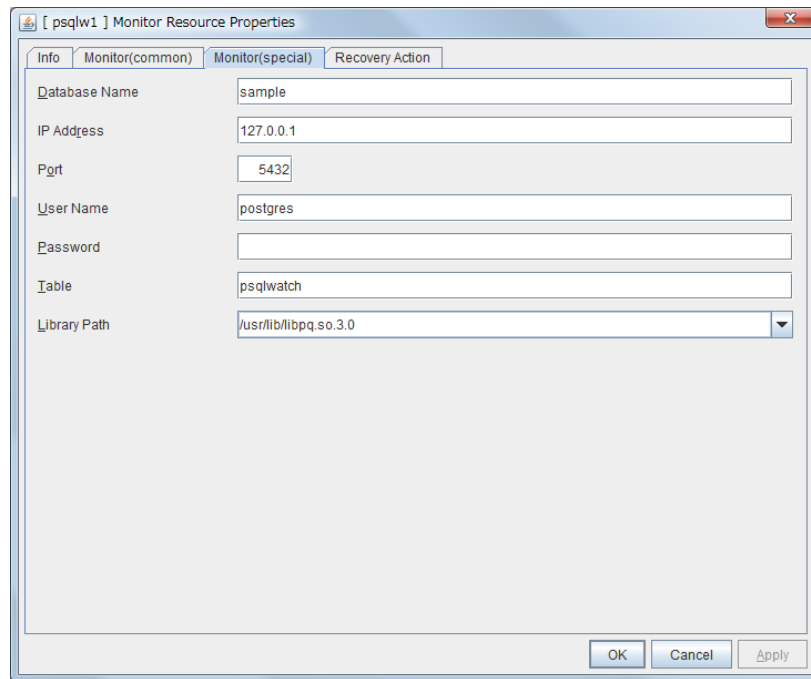
This monitor resource determines the following results as an error:

- (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/drop/insert/update/select.

## 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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** tab, you can see and/or change the detailed settings by following the description below.



**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.

Usually, specify the loopback address (127.0.0.1) to connect to the PostgreSQL server that runs on the local server. To monitor a PostgreSQL database that runs in the guest OS on a virtual machine controlled by a VM resource, specify the IP address of the virtual machine.

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: psqwatch

**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: psqlw1

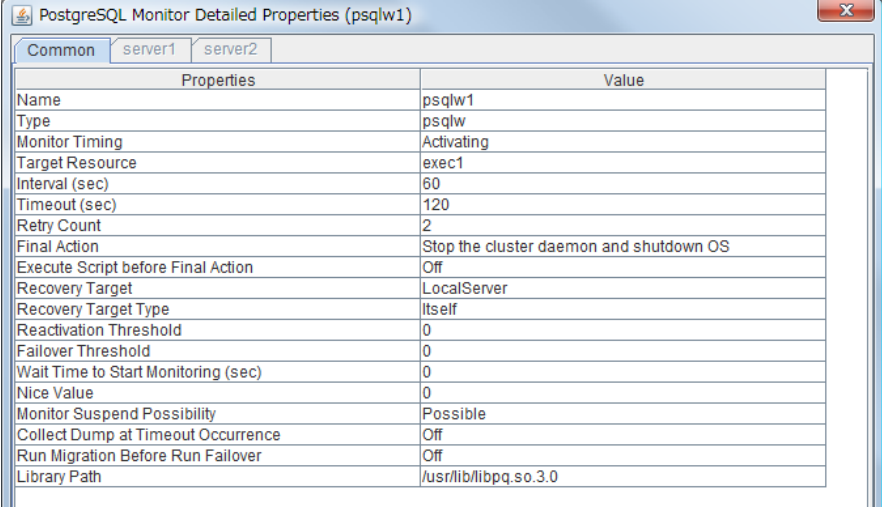
Details

Commonserver1server2

| Properties                     | Value     |
|--------------------------------|-----------|
| Comment                        |           |
| Database Name                  | sample    |
| IP Address                     | 127.0.0.1 |
| Port                           | 5432      |
| Table                          | psqlwatch |
| Status                         | Normal    |
| Resource Status on Each Server |           |
| Server Name                    | Status    |
| server1                        | Normal    |
| server2                        | Offline   |

|                |                                                |
|----------------|------------------------------------------------|
| 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 in the pop-up dialog.



The screenshot shows a window titled "PostgreSQL Monitor Detailed Properties (psqlw1)". It has tabs for "Common", "server1", and "server2", with "Common" selected. The window contains a table with two columns: "Properties" and "Value".

| Properties                          | Value                                   |
|-------------------------------------|-----------------------------------------|
| Name                                | psqlw1                                  |
| Type                                | psqlw                                   |
| Monitor Timing                      | Activating                              |
| Target Resource                     | exec1                                   |
| Interval (sec)                      | 60                                      |
| Timeout (sec)                       | 120                                     |
| Retry Count                         | 2                                       |
| Final Action                        | Stop the cluster daemon and shutdown OS |
| Execute Script before Final Action  | Off                                     |
| Recovery Target                     | LocalServer                             |
| Recovery Target Type                | Itself                                  |
| Reactivation Threshold              | 0                                       |
| Failover Threshold                  | 0                                       |
| Wait Time to Start Monitoring (sec) | 0                                       |
| Nice Value                          | 0                                       |
| Monitor Suspend Possibility         | Possible                                |
| Collect Dump at Timeout Occurrence  | Off                                     |
| Run Migration Before Run Failover   | Off                                     |
| Library Path                        | /usr/lib/libpq.so.3.0                   |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | PostgreSQL monitor resource name                                                                                     |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |
| 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

To monitor a samba file server that runs in the guest OS on a virtual machine controlled by a VM resource, specify the VM resource as the monitor target and specify enough wait time for the samba file server to become accessible after the VM resource is activated for **Wait Time to Start Monitoring**.

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:

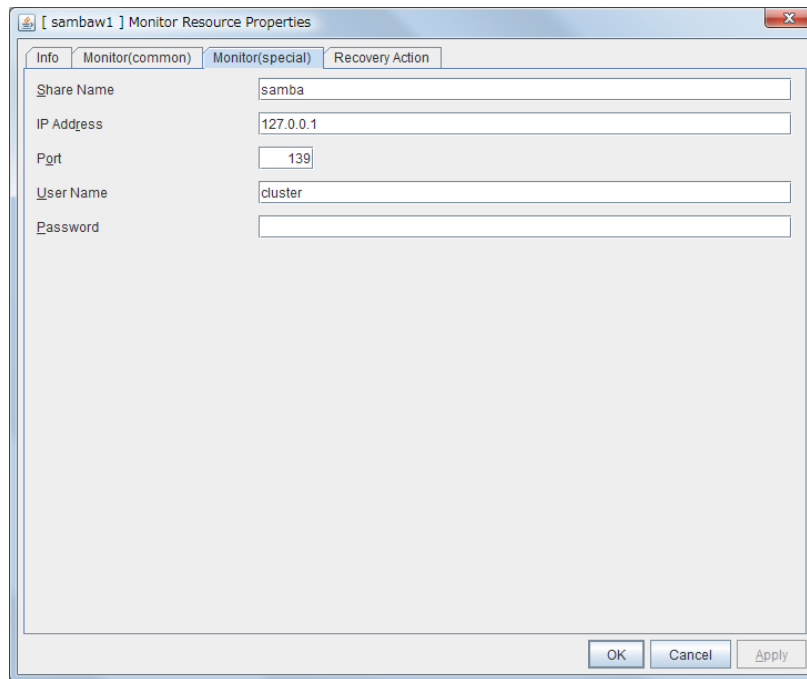
By connecting to samba server and verify establishment of tree connection to resources of the samba server.

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 **Monitor(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitor(special)** tab, you can see and/or change the detailed settings by following the description below.



**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.

Usually, specify the loopback address (127.0.0.1) to connect to the samba file server that runs on the local server. To monitor a samba file server that runs in the guest OS on a virtual machine controlled by a VM resource, specify the IP address of the virtual machine.

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: sambaw1 Details

Common server1 server2

| Properties                     | Value     |
|--------------------------------|-----------|
| Comment                        |           |
| Share Name                     | samba     |
| IP Address                     | 127.0.0.1 |
| Port                           | 139       |
| Status                         | Normal    |
| Resource Status on Each Server |           |
| Server Name                    | Status    |
| server1                        | Normal    |
| server2                        | Offline   |

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

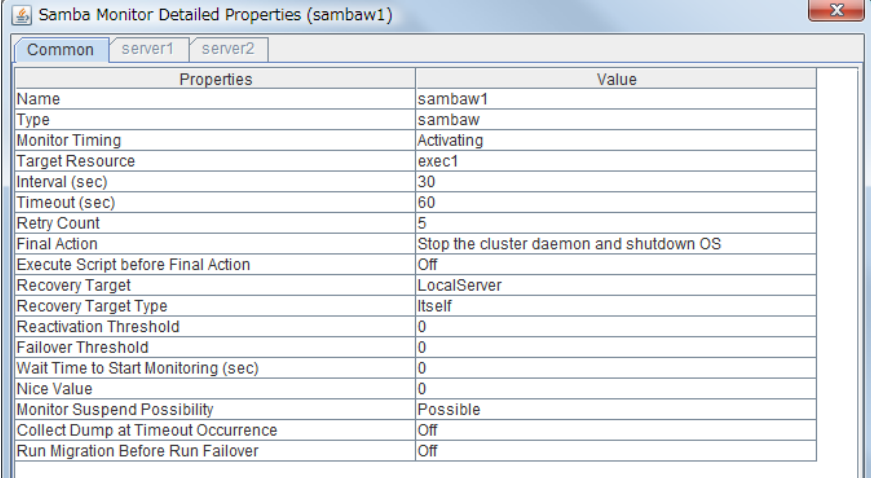
Server Name:

Server name

Status:

Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the pop-up dialog.



| Properties                          | Value                                   |
|-------------------------------------|-----------------------------------------|
| Name                                | sambaw1                                 |
| Type                                | sambaw                                  |
| Monitor Timing                      | Activating                              |
| Target Resource                     | exec1                                   |
| Interval (sec)                      | 30                                      |
| Timeout (sec)                       | 60                                      |
| Retry Count                         | 5                                       |
| Final Action                        | Stop the cluster daemon and shutdown OS |
| Execute Script before Final Action  | Off                                     |
| Recovery Target                     | LocalServer                             |
| Recovery Target Type                | Itself                                  |
| Reactivation Threshold              | 0                                       |
| Failover Threshold                  | 0                                       |
| Wait Time to Start Monitoring (sec) | 0                                       |
| Nice Value                          | 0                                       |
| Monitor Suspend Possibility         | Possible                                |
| Collect Dump at Timeout Occurrence  | Off                                     |
| Run Migration Before Run Failover   | Off                                     |

|                                      |                                                                                                                      |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Name:                                | Samba monitor resource name                                                                                          |
| 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                                                                                 |
| Collect Dump at Timeout Occurrence:  | Whether or not dump of monitor process is collected when timeout occurs                                              |
| Run Migration Before Run Failover:   | Whether or not migration is run before running failover                                                              |





# Chapter 6      Heartbeat resources details

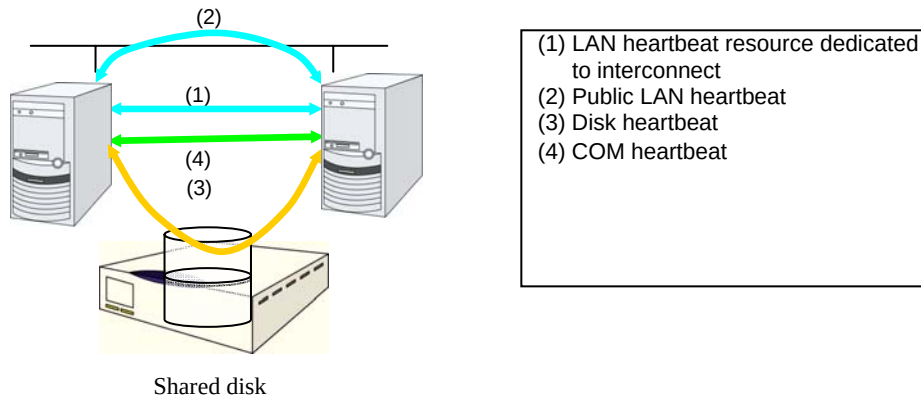
This chapter provides detailed information on heartbeat resources.

This chapter covers:

- What are heartbeat resources? ..... 550
- Understanding LAN heartbeat resources ..... 551
- Understanding disk heartbeat resources ..... 552
- Understanding COM heartbeat resources ..... 556

## 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.<br>Used for communication within the cluster as well. |
| 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.                          |

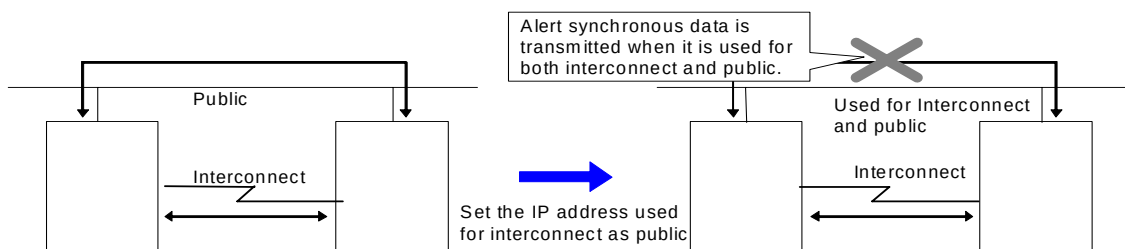
- ◆ You need to set at least one LAN heartbeat resource. It is recommended to set two or more LAN heartbeat resources.
- ◆ When you configure the settings of interfaces for disk heartbeat and COM heartbeat resources, follow the specifications described below

|                                 |                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| When a shared disk is used:     | [Number of servers: up to 2]<br>In principle, COM interface and disk interface<br>[Number of servers: 3 or more]<br>Disk interface |
| When a shared disk is not used: | [Number of servers: up to 2]<br>COM interface                                                                                      |

# Understanding LAN heartbeat resources

## LAN heartbeat resources

- ◆ 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.
- ◆ 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.
- ◆ 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                    | Normal |         |
| server2                    | Normal |         |

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.

| LAN Heartbeat Name: lanhb1 |        | Details |
|----------------------------|--------|---------|
| Server Name                | Status |         |
| server1                    | Normal |         |
| server2                    | Normal |         |

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

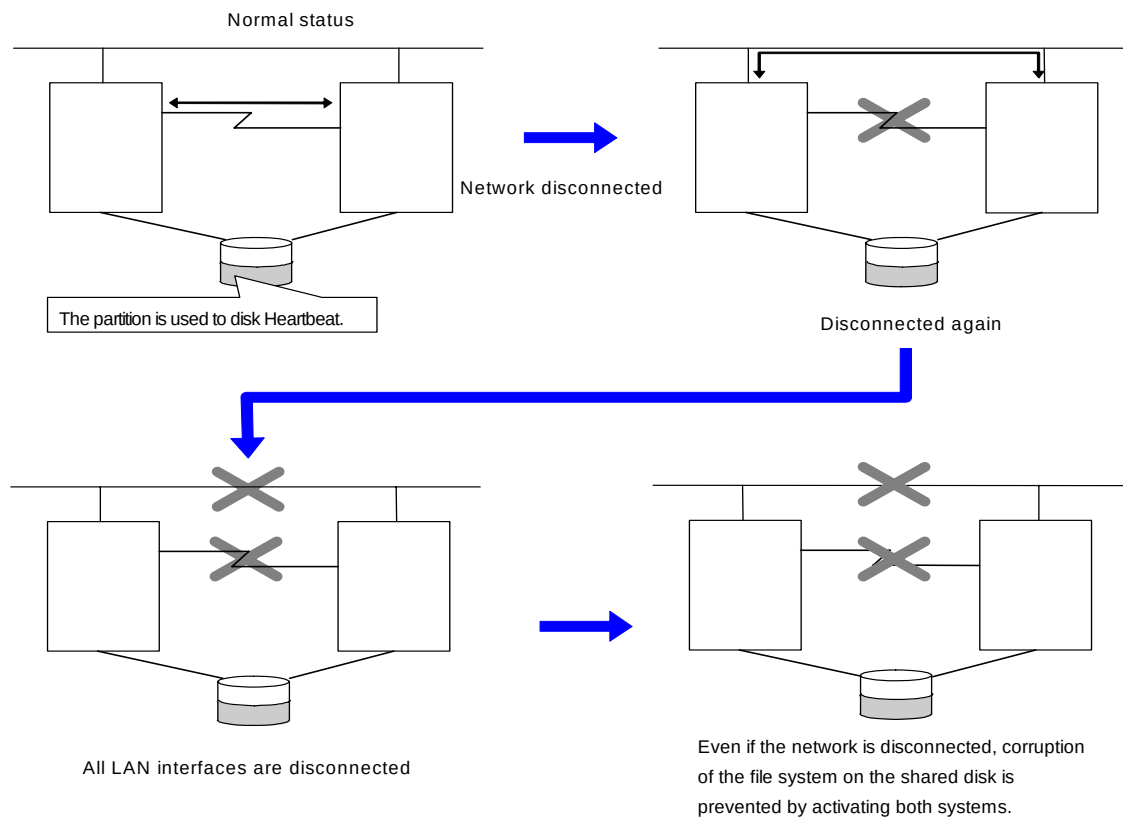
## Understanding disk heartbeat resources

### Setting the disk heartbeat resources

To use a heartbeat resource, you need to have the following settings.

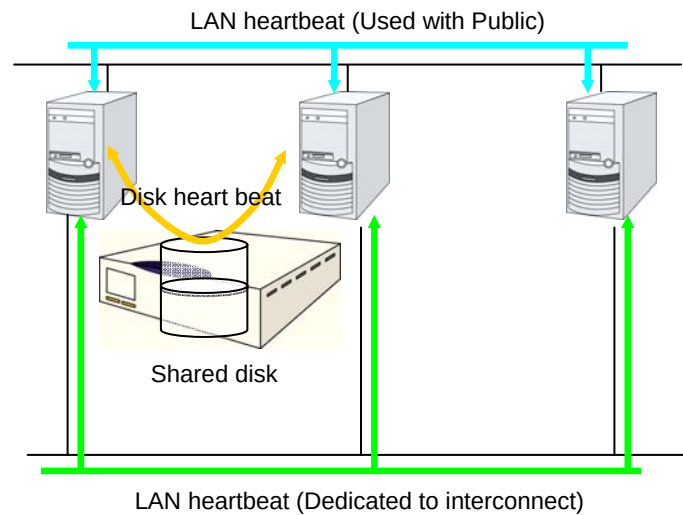
- ◆ Allocate a dedicated partition on the shared disk. (You do not need to create any file system.)
- ◆ Configure settings that allow all servers to access the dedicated partition on the shared disk by the same device name.

When a disk heartbeat resource is being used, it can be checked if other servers are active even if the network is disconnected.



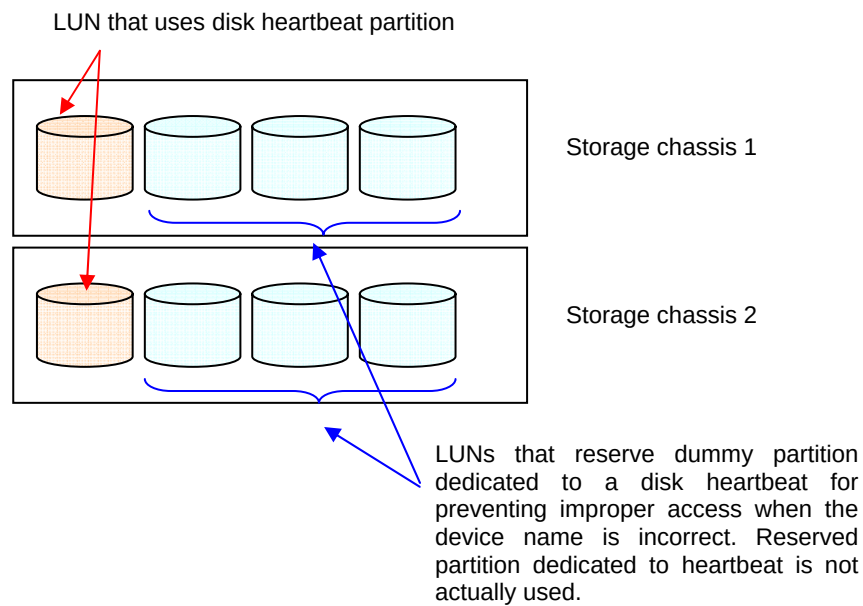
If the cluster consists of three or more servers, you can have a configuration using a disk heartbeat resource as below. You can configure the settings that allow usage of the disk heartbeat resource only among the servers in the cluster using the shared disk.

For more details, see “Disk IF tab” in Chapter 2, “Functions of the Builder.”



## Disk heartbeat resources

- ◆ It is recommended to use both a LAN heartbeat resource and a disk heartbeat resource when you use a shared disk.
- ◆ 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.
- ◆ 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.



- ◆ Specify a slice device for the disk heartbeat partition.
- ◆ Do not register this to the storage pool.

## 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 |         |
| server1                      | Normal |         |
| server2                      | Normal |         |

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.

| Disk Heartbeat Detailed Properties (diskhb1) |                |
|----------------------------------------------|----------------|
| Properties                                   | Value          |
| Name                                         | diskhb1        |
| Type                                         | diskhb         |
| Comment                                      | DISK Heartbeat |
| Status                                       | Normal         |
| Device Name                                  | /dev/sdc1      |
| RAW Device Name                              |                |

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

## 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                    | Unused |         |
| server2                    | Normal |         |

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.

| COM Heartbeat Detailed Properties (comhb1) |               |
|--------------------------------------------|---------------|
| Properties                                 | Value         |
| Name                                       | comhb1        |
| Type                                       | comhb         |
| Comment                                    | COM Heartbeat |
| Status                                     | Normal        |
| Device Name                                | /dev/ttyS0    |

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 7      Network partition resolution resources details

This chapter provides detailed information on network partition resolution resources.

This chapter covers:

- Network partitions .....558
- Understanding the network partition resolution resources .....558
- Understanding network partition resolution by PING method .....559
- Network partition is unsolved.....560

## 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. |

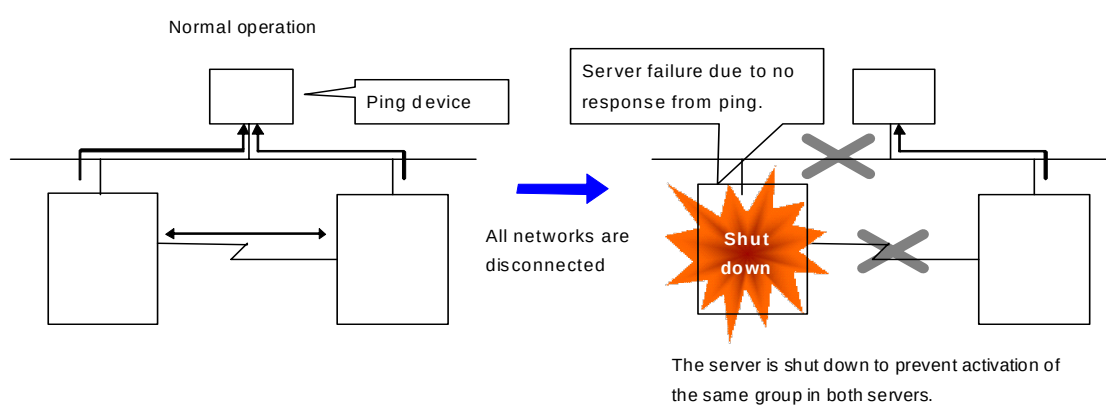
- ◆ If there is only one available LAN on the configuration, set the PING network partition resolution.

# 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,” emergency shutdown takes place, and the ExpressCluster Server service is stopped.



For more information, refers to “**NP Resolution** tab” in Chapter 2, “Function for the Builder.”

## Note on PING network partition resolution resource

When using PING network partition resolution resource, specify addresses which can be sent from and received to through one of the interconnect LANs registered in the configuration information.

In case that response to ping command continues not returning before disconnection of the heartbeat due to ping device failure or other reasons, as network partition cannot be resolved, all the servers fail over when the heartbeat disconnection is detected in this situation. Consequently, in case of the cluster using shared disks, the data may be destructed because the same resource may be accessed from more than one servers in this method.

## 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                                                  | Normal |         |
| server2                                                  | Normal |         |

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.

| PING Network Partition Resolution Resource Detailed Properties (pingnp1) |                 |
|--------------------------------------------------------------------------|-----------------|
| Properties                                                               | Value           |
| Name                                                                     | pingnp1         |
| Type                                                                     | pingnp          |
| Comment                                                                  | ping resolution |
| Status                                                                   | Normal          |
| IP Address List                                                          | 192.168.0.254   |
| 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

## Network partition is unsolved

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 failover.

# Chapter 8      Information on other monitor settings

This chapter provides the information on the other monitor settings.

This chapter covers:

- Shutdown monitoring ..... 562
- IPMP ..... 565
- Forced stop ..... 566
- Chassis Identify ..... 568
- Alert Service ..... 570

## 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 that 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 disk.

- ◆ **Disable**

Shutdown is not monitored.

### Shutdown monitoring method

You can select the shutdown method from the following:

- ◆ **keepalive**

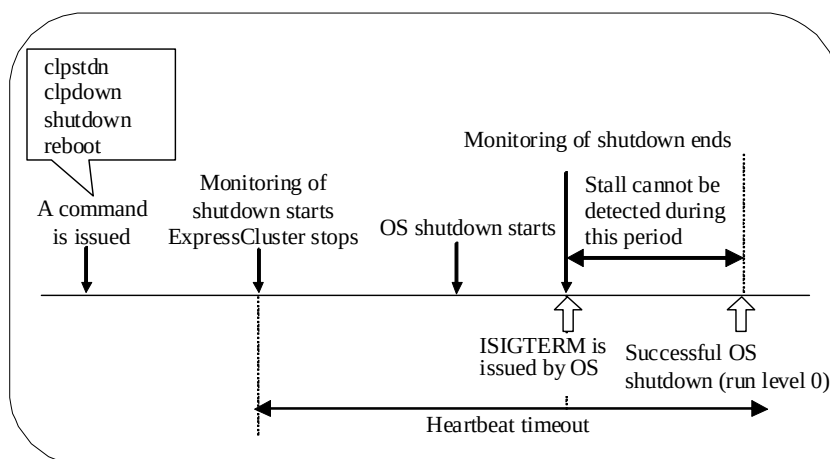
For this method, set the timer with using the clpka drivers of ExpressCluster.

## 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.”

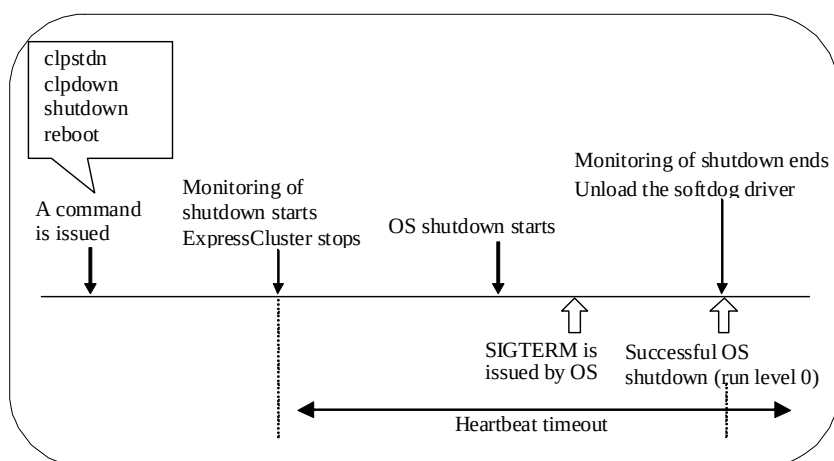
◆ Monitoring method: softdog

- Successful shutdown (when keepalive is selected and SIGTERM is enabled)



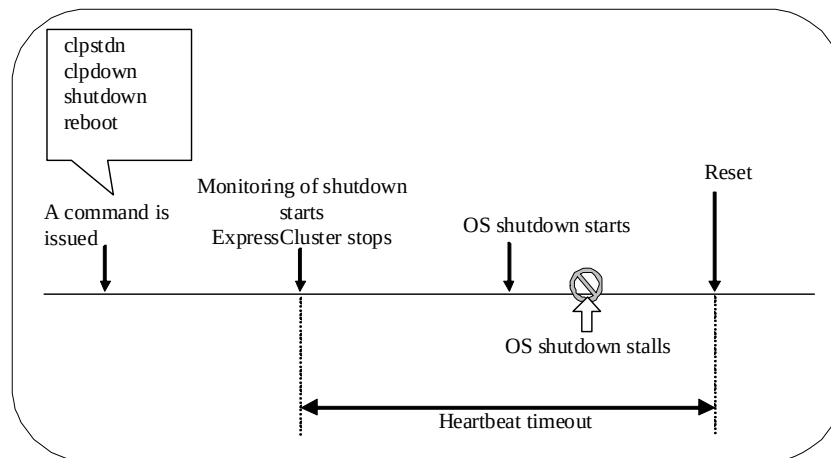
When SIGTERM is enabled, the stalled status cannot be detected because monitoring of the shutdown ends if the OS issues SIGTERM during shutdown.

- Successful shutdown (when keepalive is selected and SIGTERM is disabled)



It is recommended to disable SIGTERM if softdog 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 timeout

Use the timeout value for shutdown monitoring with the heartbeat timeout value.

## Timeout

Specify the timeout value when the heartbeat timeout value is not used as the timeout value for shutdown monitoring.



# IPMP

## Notes on Floating IP resource

- If you specify “Active-Standby” to the mode, the communication may be temporarily lost when switching slave interfaces.
- If you specify floating IP on the NIC that is grouped by IPMP, do not configure the interface.

## Notes on NIC Link Up/Down Monitor resource

- NIC interface that is grouped on IPMP can not be monitored by NIC Link Up/Down monitor resource. Use IP monitor resource.

## Forced stop

### What is forced stop function?

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 is 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

- ◆ Notes on ipmitool  
See “ipmi 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 commands.

| Distribution                       | Versions of ipmiutil or OpenIPMI-tools | Server |
|------------------------------------|----------------------------------------|--------|
| Solaris10 10/08 s10x_u6wos_07b X86 | 1.8.8                                  |        |

## 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 ExpressCluster in the some of the servers in the cluster is disabled by svcadm command
- ◆ 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 is used.

| Options for the ipmitool command | Options for the alarms 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

- ◆ Notes on ipmitool  
See “ipmi 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 ipmi | Server |
|------------------------------------|------------------|--------|
| Solaris10 10/08 s10x_u6wos_07b X86 | 1.8.8            |        |

## 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 reporting method notifies a different purpose.

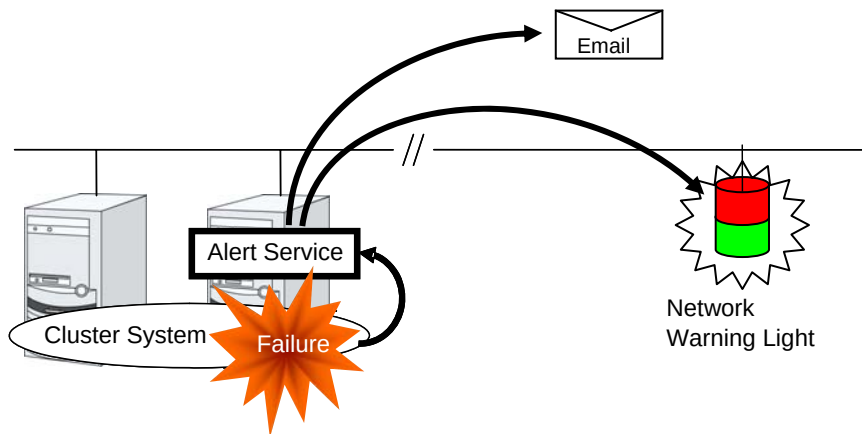
**(1) E-mail report**

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 immediately on failures even if physically being away from 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.

A sample of E-mail report

Subject:

ExpressCluster

Body:

---

Message: Server [down server] has been stopped.

Type: nm

ID: 2

Host: [mail sending source server name]

Date: [send time stamp]

---

## Notes on Alert Service

- ◆ To use this function, ExpressCluster X Alert Service 3.0 for Solaris 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 11, “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 `clplamp` command introduced in the following section to put the light out. For more information on the `clplamp` 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 9 The system maintenance information
- Chapter 10 Troubleshooting
- Chapter 11 Error messages



# Chapter 9      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:

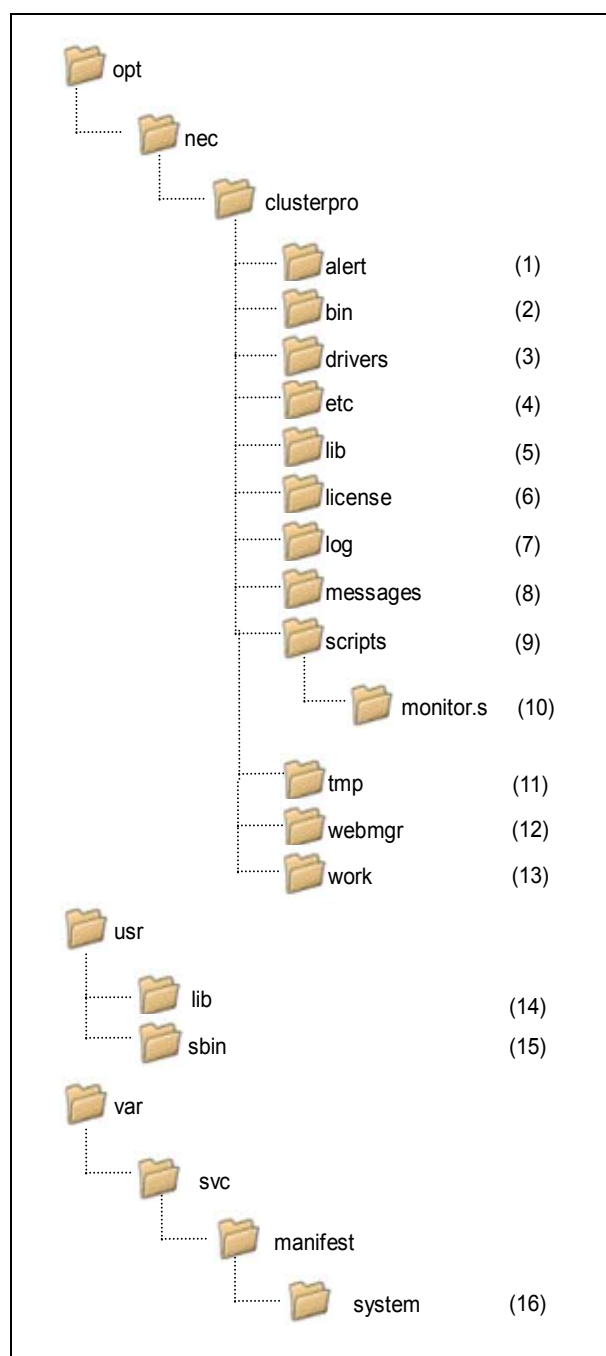
|   |                                                                             |     |
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| • | Directory structure of ExpressCluster.....                                  | 578 |
| • | Communication ports .....                                                   | 580 |
| • | What causes servers to shut down .....                                      | 581 |
| • | Configuring the settings to temporarily prevent execution of failover ..... | 584 |
| • | How to replace a server with a new one ~For a shared disk~ .....            | 585 |
| • | Wait time for synchronized cluster startup .....                            | 586 |
| • | Changing disk resources file system.....                                    | 587 |
| • | Changing the server configuration (add/delete).....                         | 588 |
| • | Changing the server IP address.....                                         | 591 |
| • | Changing the host name .....                                                | 593 |

## Directory structure of ExpressCluster

**Note:**

You will find executable files and script files that are not described in Chapter 3, “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  
Keepalive driver  
This directory stores the executable files of the 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 EXEC resource script of group resources  
This directory stores EXEC resource scripts of group resources.
- (10) Directory for temporary files  
This directory stores archive files created when logs are collected.
- (11) Directory for the script executed before the final action  
This directory stores the script executed by this function if **Execute script before Final Action** is selected when an error is detected in the group resource or monitor resource.
- (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  
This directory stores the symbolic links to the ExpressCluster Server's library.
- (15) /usr/sbin  
This directory stores the symbolic links to the ExpressCluster Server's executable files.
- (16) /var/svc/manifest/system  
This directory stores the ExpressCluster Server's manifesto files.

## 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 (Loopback 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 | icmp                   | Duplication check of FIP/VIP resource |
| Server                                | Automatic allocation              | - | Server | XXXX <sup>2</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 the Integrated WebManager                  | Automatic allocation | - | Server | 29003/TCP | http 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. 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.



## 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 service stops and the OS shuts down. | Causes normal shutdown after the group resources stop.                    |
| The cluster service stops and the OS reboots.    | Causes normal reboot after the group resources stop.                      |
| 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 service and shut down the OS | Causes normal shutdown after the group resources stop.            |
| Stop cluster service and reboot the OS    | Causes normal reboot after the group resources stop.              |
| 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 failover group existed.       |
| BMC power off   | Causes power off in the failing server in which a failover group existed.   |
| BMC power cycle | Causes power cycle in the failing server in which a failover group existed. |
| BMC NMI         | Causes NMI in the failing server in which a failover group 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

## 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 timeout, 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 600.

## 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.

## 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 timeout

By temporarily adjusting timeout, you can prevent a failover caused by a failed server from occurring.

The `clptoratio` command is used to temporarily adjust timeout. Run the `clptoratio` command on one of the servers in the cluster.

(Example) To prevent a failover for an hour when the heartbeat timeout is set to 90 seconds:

```
clptoratio -r 40 -t 1h
```

See Chapter 3, “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 3, “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 timeout

Cancel temporary adjustment of timeout. Run the `clptoratio` command on one of the servers in the cluster.

```
clptoratio -i
```

See Chapter 3, “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 3, “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 that contains the information at the time a cluster was added with you.

If you do not have the data, 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 3, “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. Prepare the configuration data on the server.  
The server on which you installed the ExpressCluster Server should be restarted after the installation.
3. Distribute the configuration data to servers.  
To use the configuration data saved by the Builder on Windows, run the following command.

```
clpcfctrl --push -w <directory path that the configuration data exists>
```

You see the following message if the data has successfully been distributed.

```
Command succeeded.(code:0)
```

For information on troubleshooting `clpcfctrl` problems, see Chapter 3, “ExpressCluster command reference” in this guide.

4. Restart the server on which the ExpressCluster Server was installed.

## 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 2, “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. Create the file system in the partition device.
3. Start the online version Builder on the WebManager you connected to.
4. Change the configuration data of disk resource file system by using the Builder.
5. Upload the cluster configuration data on the Builder.
6. From the **Service** menu on the WebManager, click **Start Cluster**.

The settings applying 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.

```
clpctl -t -a
```

2. Back up the cluster configuration.

To back up data for the Builder working on Windows Web browser, run the following command:

```
clpcfctrl --pull -w <Directory path to save configuration data>
```

3. Create the file system in the partition device.
4. Change the configuration data of disk resource file system by using the Builder.
5. Distribute the configuration data to the server.

If you use the configuration data created by the Builder for Windows, run the following command:

```
clpcfctrl --push -w <Directory path configuration data exists>
```

The settings applying the changes become effective at next ExpressCluster daemon startup.

## 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.  
Install the ExpressCluster Server on a new server. For details, see “Installing the ExpressCluster Package” in the Installation and Configuration Guide.  
Restart the server on which the ExpressCluster Server was installed.
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 latest cluster configuration data.

If you do not have 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.  
Install the ExpressCluster Server on a new server. For details, see “Installing the ExpressCluster Package” in the Installation and Configuration Guide.
2. Change the cluster configuration data 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. Prepare the cluster configuration data to the master server.
5. Distribute the configuration data from the master server.

If the configuration data saved by the Builder on Windows is used, run the following command:



```
clpcfctrl --push -w -nocheck <Directory path configuration data exists>
```

The following message is shown if the data has successfully been distributed.

```
Command succeeded. (code:0)
```

Refer to “ExpressCluster Command Reference” in Chapter 3 for troubleshooting clpcfctrl command.

6. 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. From the **Service** menu in the WebManager, select **Restart Manager** and then **Start Cluster**.
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)

To delete a server from a cluster, first it is required to prepare the latest cluster configuration data.

If you do not have 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 by using the Builder.
5. Run the `clpcfctrl` command on the master server to apply the configuration data to the servers.

If the configuration data saved by the Builder on Windows is used, run the following command.

```
clpcfctrl --push -w -nocheck <Directory path configuration data exists>
```

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 server on which `clpcl -suspend` command was run.
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

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. If you have the configuration data at the cluster creation, use the data.
3. Use the Builder to change the server IP address based on the backed up cluster configuration
4. Stop the cluster using the `clpcl` command or the WebManager.
5. Disable the ExpressCluster daemon startup setting on all servers. See "Disabling the ExpressCluster daemon" in the *Installation and Configuration Guide*.
6. Use the `reboot` command or other means to restart all servers.
7. 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.
8. Verify the changed IP address is valid by running the `ping` command or using other means.
9. Distribute the cluster configuration data to all the servers. Use the `clpcfctrl` command or the offline version Builder to deliver the configuration data.
10. Enable the startup settings of the ExpressCluster daemon in all servers in the cluster.
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. If you have the configuration data at the cluster creation, use the data.
3. Use the Builder to change the server IP address based on the backed up cluster configuration data, and then save it.
4. Stop the cluster using the `clpcl` command or the WebManager.
5. Disable startup settings of the ExpressCluster daemon in all servers in the cluster. See "Disabling the ExpressCluster daemon" in the *Installation and Configuration Guide*.
6. Use the `reboot` command or other means to restart all servers.
7. 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.
8. Verify the changed IP address is valid by running the `ping` command or using other means.
9. Distribute the cluster configuration data to all servers. Use the `clpcfctrl` command or the online version Builder to deliver the configuration data.
10. Enable the startup settings of the ExpressCluster daemon in all 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 . If you have the configuration data at the cluster creation, use the data
3. Use the Builder to change the host name of your target server based on the backed up cluster configuration data, and then save it
4. Stop the cluster using the `clpcl` command or the WebManager.
5. 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*.
6. Use the `reboot` command or other means to restart all the servers.
7. 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.
8. Verify the changed host name is valid by running the `ping` command or using other means.
9. Distribute the cluster configuration data to all the servers. Use the `clpcfctrl` command or the online version Builder to deliver the configuration data.
10. Enable the startup settings of the ExpressCluster daemon in all servers in the cluster.
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 3, “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 10   Troubleshooting

This chapter provides instructions for troubleshooting problems with ExpressCluster.  
This chapter covers:

- Troubleshooting.....596

## 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 5, “Creating the Cluster Configuration Data” 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 3, “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. 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 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 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
```

If a disk heartbeat resource has been added to the heartbeat resources in the cluster configuration data, clpdiskhb is started. If a COM heartbeat resource has been added, clpcomhb can be 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
```

## 5. Loading of the keepalive driver ~For userw user-mode monitor resource (keepalive)~

Run the modinfo command. Check that the run result of modinfo contains the following loadable module.

```
clpka
```

## 6. 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. (BASE21)
```

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.
(BASE21)
```

## 7. 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*.

## 8. Usage of memory or OS resource

Run ps 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 639.

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 640.

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 642.

## 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 644.

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 645.

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 647.

4. 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 648.

## When a heartbeat timeout occurs

Possible causes of heartbeat timeout 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.<br><br>For LAN cables, check that you can send packets with the ping command.                                                                                                                   |
| Heavily loaded user space (resulting in misinterpreted heartbeat timeout) | Run the following command in advance to extend the heartbeat timeout when running an application that can make the OS heavily loaded for a long time.<br><br># clptoratio -r 3 -t 1d<br><br>The above mentioned command triples the heartbeat timeout 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, 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 : diskhb1
HB3 : comhb1
```

```
[on server0 : Online]
```

```
HB 0 1 2 3
```

```

server0 : o o o o
server1 : o o o o
```

```
[on server1 : Online]
```

```
HB 0 1 2 3
```

```

server0 : o o o o
server1 : 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 : diskhb1
 HB3 : comhb1

[on server0 : Online]
 HB 0 1 2 3

 server0 : 0 0 0 0
 server1 : 0 0 0 0

[on server1 : Online]
 HB 0 1 2 3

 server0 : 0 0 0 0
 server1 : 0 0 0 0

=====
```

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 : diskhb1
 HB3 : comhb1

[on server0 : Online]
 HB 0 1 2 3

 server0 : 0 0 0 0
 server1 : x x x x

[on server1 : Offline]
 HB 0 1 2 3

 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 : diskhb1
HB3 : comhb1

[on server0 : Offline]
 HB 0 1 2 3

server0 : - - - -
server1 : - - - -

[on server1 : Online]
 HB 0 1 2 3

server0 : x x x x
server1 : 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. Disk heartbeat resource  
Disk cable status  
Disk device status
3. 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.

## When all interconnection LANs are disconnected

This section describes how to check the status when all interconnections (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.

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 : diskhb1
HB3 : comhb1
```

```
[on server0 : Warning]
```

```
HB 0 1 2 3
```

```

server0 : 0 0 0 0
server1 : x x 0 0
```

```
[on server1 : Warning]
```

```
HB 0 1 2 3
```

```

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 : diskhb1
HB3 : comhb1
```

```
[on server0 : Warning]
```

```
HB 0 1 2 3
```

```

server0 : - - - -
server1 : - - - -

[on server1 : Warning]
 HB 0 1 2 3

server0 : x x o o
server1 : 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

## 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.<br>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                                                               |
| clpcl                             | 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. This command also migrates the virtual machine.                                                                                                                          | 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 timeout values of all servers in the cluster.                 | Timeout ratios of other servers cannot be set.                        |
| clprexec                 | Issues a request to execute the error correction action from the external monitor. | Some error correction actions cannot be executed on the local server. |
| <b>Commands for logs</b> |                                                                                    |                                                                       |
| <b>Command</b>           | <b>Description</b>                                                                 | <b>Remarks</b>                                                        |
| clplogcc                 | Collects logs and OS information.                                                  | Logs of other servers cannot be collected.                            |



# Chapter 11    Error messages

This chapter provides information on error messages you might encounter in operating ExpressCluster.  
This chapter covers:

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| • Messages .....                                                           | 608 |
| • Messages reported by syslog, alert and mail .....                        | 608 |
| • Driver syslog messages .....                                             | 638 |
| • Detailed information in activating and deactivating group resources..... | 639 |
| • Detailed info of monitor resource errors.....                            | 644 |

## Messages

### 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. | •           | •      |      |
| 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                        | The ExpressCluster daemon process was abnormally terminated.                   | Inactivating group resources may have failed. Take                                                             | •           | •      |      |

| Module type | Event type | Event ID | Message                                                         | Description                                                               | Solution                                                                   | Reported to |        |      |
|-------------|------------|----------|-----------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                 |                                                                           |                                                                            | alert       | syslog | mail |
|             |            |          | process terminated abnormally.                                  | The system will be shut down.                                             | 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 596. | •           | •      | •    |
| 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. | -                                                                          | •           | •      |      |
| 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       | 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.                | -                                                                          | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                              | Description                                                                                                                | Solution                                                                                   | Reported to |        |      |
|-------------|------------|----------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                      |                                                                                                                            |                                                                                            | alert       | syslog | mail |
| 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.                                                                | -                                                                                          | •           | •      |      |
| 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.                                                                       | -                                                                                          | •           | •      |      |
| 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.                                  | •           | •      | •    |

| Module type | Event type | Event ID | Message                                                                            | Description                                                                                                    | Solution                                                                                                                                                                                                                                          | Reported to |        |      |
|-------------|------------|----------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                    |                                                                                                                |                                                                                                                                                                                                                                                   | alert       | syslog | mail |
| 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 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                                                    |                                                                                                                | Make sure that an error is not occurring                                                                                                                                                                                                          | •           | •      |      |

| Module type | Event type | Event ID | Message                                                     | Description                                                                          | Solution                                                                                                                                                                                                                                    | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                             |                                                                                      |                                                                                                                                                                                                                                             | alert       | syslog | mail |
|             |            |          | server %2 has an error.                                     |                                                                                      | 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.                                                   | -                                                                                                                                                                                                                                           | •           | •      |      |
| 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          | Info       | 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                                                                                                                                                                                                 | •           | •      | •    |



| Module type | Event type | Event ID | Message                                             | Description                                                   | Solution                                                                                                                              | Reported to |        |      |
|-------------|------------|----------|-----------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                     |                                                               |                                                                                                                                       | alert       | syslog | mail |
|             |            |          |                                                     |                                                               | 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 639.                                                | •           | •      | •    |
| 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.                            | -                                                                                                                                     | •           | •      |      |
| 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       | 55       | Migrating group %1 has started.                     | Migrating the group %1 has started.                           | -                                                                                                                                     | •           | •      |      |
| rc          | Info       | 56       | Migrating group %1 has completed.                   | Migrating the group %1 has completed.                         | -                                                                                                                                     | •           | •      |      |
| rc          | Error      | 57       | Migrating group %1 has failed.                      | Migrating the group %1 has failed.                            | Take appropriate action by following the group resource messages.                                                                     | •           | •      |      |
| rc          | Warning    | 58       | Server %1 is not in a condition to migrate group %2 | The server %1 is not ready for the migration of the group %2. | Check the status of the migration destination server.<br>No server name is output for %1 if there is no migration destination server. | •           | •      |      |
| 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          | Warning    | 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                       | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                                | Description                                                                                                    | Solution                                                                                                                                                                                                                                                                                                   | Reported to |        |      |
|-------------|------------|----------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                        |                                                                                                                |                                                                                                                                                                                                                                                                                                            | alert       | syslog | mail |
|             |            |          |                                                                                                        |                                                                                                                | output in %1.                                                                                                                                                                                                                                                                                              |             |        |      |
| rc          | Info       | 64       | Server %1 has been set as the destination for the group %2 (reason: %3).                               | Server %1 has been set as the destination for the group %2 (reason: %3).                                       |                                                                                                                                                                                                                                                                                                            | •           | •      | rc   |
| rc          | Error      | 65       | There is no appropriate destination for the group %1 (reason: %2).                                     | There is no appropriate destination for the group %1 (reason: %2).                                             | There is no appropriate destination server for failover.<br>The server may have stopped, or the monitor resource error which makes failover impossible may have occurred. Start the server, or correct the cause of the monitor resource error, or stop the monitor resource which has detected the error. | •           | •      |      |
| rc          | Warning    | 66       | Server %1 is not in a condition to start group %2 (reason: %3).                                        | Server %1 is not in a condition to start group %2 (reason: %3).                                                | The monitor resource error which makes startup of the group impossible has occurred.<br>Correct the cause of the monitor resource error, or stop the monitor resource which has detected the error.                                                                                                        | •           | •      |      |
| rc          | Info       | 67       | Server %1 in the same server group (%2) has been set as the destination for the group %3.              | Server %1 in the same server group (%2) has been set as the destination for the group %3.                      |                                                                                                                                                                                                                                                                                                            | •           | •      |      |
| rc          | Info       | 68       | Server %1 not in the same server group (%2) has been set as the destination for the group %3.          | Server %1 not in the same server group (%2) has been set as the destination for the group %3.                  |                                                                                                                                                                                                                                                                                                            | •           | •      |      |
| rc          | Warning    | 69       | Can not failover the group %1 because there is no appropriate destination in the same server group %2. | There is no appropriate destination server for failing over the group %1 to the inside of the server group %2. | Start the group after starting the server in the server group, or start the group on the server inside another server group.                                                                                                                                                                               | •           | •      |      |
| rc          | Info       | 70       | Restarting group %1 has started.                                                                       | Restarting the group %1 has started.                                                                           |                                                                                                                                                                                                                                                                                                            | •           | •      |      |
| rc          | Info       | 71       | Restarting group %1                                                                                    | Restarting the group %1                                                                                        |                                                                                                                                                                                                                                                                                                            | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                        | Description                                                                                 | Solution                                                                                          | Reported to |        |      |
|-------------|------------|----------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                |                                                                                             |                                                                                                   | alert       | syslog | mail |
|             |            |          | has completed.                                                                                 | 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.                                                      | -                                                                                                 | •           | •      |      |
| 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          | Warning    | 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 583. | •           | •      | •    |
| 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       | 160      | Script before final action upon                                                                | -                                                                                           | -                                                                                                 | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                        | Description                                                              | Solution                                                          | Reported to |        |      |
|-------------|------------|----------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                |                                                                          |                                                                   | alert       | syslog | mail |
|             |            |          | 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. |                                                                          |                                                                   | •           | •      |      |
| 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       | 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. | •           | •      |      |
| 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      | 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                                                                               | An attempt to reset system                                                                        | Check if the hwreset                                                     | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                            | Description                                                                                        | Solution                                                                 | Reported to |        |      |
|-------------|------------|----------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                    |                                                                                                    |                                                                          | alert       | syslog | mail |
|             |            |          | system by BMC due to failure of resource(%1) activation failed.                                    | by BMC due to failure of resource(%1) activation failed.                                           | 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.                                | •           | •      |      |
| 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       | 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      | 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.                                | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                     | Description                                                                                 | Solution                                                                                      | Reported to |        |      |
|-------------|------------|----------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                             |                                                                                             |                                                                                               | alert       | syslog | mail |
| 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.                             | •           | •      |      |
| 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.                             | •           | •      |      |
| rc          | Info       | 500      |                                                                                             | The server %2 is specified as the failover destination for the group %1 (reason: %3).       | -                                                                                             | •           | •      | •    |
| rc          | Error      | 501      |                                                                                             | There is no appropriate failover destination for the group %1 (reason: %3).                 | There is no available failover destination server. The server is stopped or an error has been | •           | •      | •    |

| Module type | Event type | Event ID | Message                                                                                | Description                                                                          | Solution                                                                                                                                                                             | Reported to |        |      |
|-------------|------------|----------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                        |                                                                                      |                                                                                                                                                                                      | alert       | syslog | mail |
|             |            |          |                                                                                        |                                                                                      | detected in the monitor resource registered in the black list.<br>Restart the server or resolve the error.                                                                           |             |        |      |
| 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 644.                                                                                                                          | •           | •      |      |
| 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.                                                                                                                            | •           | •      |      |
| 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 644.<br><br>When a monitor timeout is detected, the following message appears in parentheses.<br>(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                      | The recovery target %1 is restarted because a problem was detected in monitoring %2. | -                                                                                                                                                                                    | •           | •      |      |



| Module type | Event type | Event ID | Message                                                                                             | Description                                                                                            | Solution                                                  | Reported to |        |      |
|-------------|------------|----------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                     |                                                                                                        |                                                           | alert       | syslog | mail |
|             |            |          | 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.                            | -                                                         | •           | •      |      |
| 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. | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                               | Description                                                                                           | Solution                                                            | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                       |                                                                                                       |                                                                     | alert       | syslog | mail |
| 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.                                                       | -                                                                   | •           | •      |      |
| 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       | 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       | 47       | NMI send by BMC has been required because an error was detected in monitoring %1.              | NMI of the system by BMC has been required because an error was detected in monitoring %1.     | -                                                                                     | •           | •      |      |
| rm          | Error      | 48       | Attempted to send NMI by BMC due to the error detected in monitoring %1, but failed.           | Attempted to NMI of the system by BMC due to the error detected in monitoring %1, but failed.  | Check if the ipmitool command, the hwreset command or the ireset 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 timeout if the monitoring timeout 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.                       |                                                                                                                                                                                                                                                          |                                                                                        | •           | •      |      |
| rm          | Error      | 83       | Script before final action upon failure in monitor resource %1 failed.                          |                                                                                                                                                                                                                                                          | Check the cause of the script failure and take measures.                               | •           | •      |      |
| rm          | Warning    | 100      | Restart count exceeded the maximum of %1. Final action of monitoring %2 will not be executed.   | The final action of %2 has not been executed because restart count exceeded the maximum value %1.                                                                                                                                                        |                                                                                        | •           | •      |      |
| rm          | Warning    | 120      | The virtual machine (%1) has been migrated by an external operation.                            | The virtual machine managed by the resource %1 has been migrated by an external operation.                                                                                                                                                               |                                                                                        | •           | •      |      |
| rm          | Warning    | 121      | The virtual machine (%1) has been started by an external operation.                             | The virtual machine managed by the resource %1 has been started by an external                                                                                                                                                                           |                                                                                        | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                                                 | Description                                                                                                                               | Solution                                                          | Reported to |        |        |
|-------------|------------|----------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------|--------|--------|
|             |            |          |                                                                                                                         |                                                                                                                                           |                                                                   | alert       | syslog | mail   |
|             |            |          |                                                                                                                         | operation.                                                                                                                                |                                                                   |             |        |        |
| rm          | Info       | 130      | Collecting detailed information was triggered by error detection when monitoring monitor resource \$1.                  | Collecting detailed information was triggered by error detection when monitoring monitor resource \$1. The timeout time is %2 seconds.    | -                                                                 | •           | •      |        |
| rm          | Info       | 131      | The collection of detailed information triggered by error detection when monitoring monitor resource \$1 has completed. | The collection of detailed information triggered by error detection when monitoring monitor resource \$1 has completed.                   | -                                                                 | •           | •      |        |
| rm          | Warning    | 132      | The collection of detailed information triggered by error detection when monitoring monitor resource \$1 has failed.    | The collection of detailed information triggered by error detection when monitoring monitor resource \$1 has failed.                      | -                                                                 | •           | •      |        |
| trnsv       | Error      | 1        | There was a notification from external (IP=%1), but it was denied.                                                      | The notification from %1 was received, but it was denied.                                                                                 | -                                                                 | •           | •      | trns v |
| trnsv       | Info       | 10       | There was a notification (%1) from external (IP=%2).                                                                    | The notification (%1) from %2 was received.                                                                                               | -                                                                 | •           | •      |        |
| trnsv       | Info       | 20       | Recovery action (%1) of monitoring %2 has been executed because a notification arrived from external.                   | Recovery action when an error is detected (%1) of the monitor resource %2 has been executed due to an notification from external arrived. | -                                                                 | •           | •      |        |
| trnsv       | Info       | 21       | Recovery action (%1) of monitoring %2 has been completed.                                                               | Execution of recovery action when an error is detected (%1) of the monitor resource %2 succeeded.                                         | -                                                                 | •           | •      |        |
| trnsv       | Error      | 22       | Attempted to recovery action (%1) of monitoring %2, but it failed.                                                      | Executed recovery action when an error is detected (%1) of the monitor resource %2, but it failed.                                        | Check if recovery action when an error is detected is executable. | •           | •      |        |
| trnsv       | Info       | 30       | Action (%1) has been completed.                                                                                         | Execution of action (%1) succeeded.                                                                                                       | -                                                                 | •           | •      |        |
| trnsv       | Error      | 31       | Attempted to execute action (%1), but it failed.                                                                        | Executed action (%1), but it failed.                                                                                                      | Check if recovery action when an error is detected is executable. | •           | •      |        |
| trnsv       | Info       | 40       | Script before action of monitoring %1 has been executed.                                                                | Script before action when an error is detected of the monitor resource (%1) has been executed.                                            | -                                                                 | •           |        |        |
| trnsv       | Info       | 41       | Script before action of monitoring %1                                                                                   | Execution of script before action when an error is                                                                                        | -                                                                 | •           |        |        |

| Module type | Event type | Event ID | Message                                                                                                           | Description                                                                                                                                                                                                                                                                                          | Solution                                                                                                                                                                                                                                          | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                                   |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                   | alert       | syslog | mail |
|             |            |          | has been completed.                                                                                               | detected of the monitor resource (%1) succeeded.                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                   |             |        |      |
| trnsv       | Error      | 42       | Attempted to execute script before action of monitoring %1, but it failed.                                        | Executed script before action when an error is detected of the monitor resource (%1), but it failed.                                                                                                                                                                                                 | Check if script before action when an error is detected is executable.                                                                                                                                                                            | •           |        |      |
| 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.<br><br>You need to set a longer timeout value to avoid a heartbeat timeout.                                                                                                               | •           | •      |      |
| 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.<br><br>You need to set a longer timeout value if a heartbeat timeout 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.<br><br>You need to set a longer timeout value if a heartbeat timeout occurs.<br><br>You need to set a longer timeout value if a heartbeat timeout 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 character device.                                                             | The device does not exist.                                                                                                                                                                                                                                                                           | Check the cluster configuration data.                                                                                                                                                                                                             | •           | •      |      |
| diskhb      | Info       | 20       | Resource %1 recovered from initialization error.                                                                  | Resource %1 recovered from initialization error.                                                                                                                                                                                                                                                     | -                                                                                                                                                                                                                                                 | •           | •      |      |
| diskhb      | Warning    | 71       | Heartbeats sent                                                                                                   | A delay occurred in                                                                                                                                                                                                                                                                                  | Check how the                                                                                                                                                                                                                                     | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                                           | Description                                                                                                                                                                                                                                                                                                             | Solution                                                                                                                                                             | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                                   |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                      | alert       | syslog | mail |
|             |            |          | from HB resource %1 of server %2 are delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)                 | 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.                                                             | server %2 is loaded, and reduce the load.<br><br>You need to set a longer timeout value if a heartbeat timeout 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.<br><br>You need to set a longer timeout value if a heartbeat timeout 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.<br><br>You need to set a longer timeout value if a heartbeat timeout 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 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.<br><br>You need to set a longer timeout value if a heartbeat timeout occurs.                                 | •           | •      |      |
| comhb       | Warning    | 72       | Heartbeat write of                                                                                                | A delay occurred in writing                                                                                                                                                                                                                                                                                             | Check how the server                                                                                                                                                 |             |        |      |

| Module type | Event type | Event ID | Message                                                                                                    | Description                                                                                                                                                                                                                                                                                   | Solution                                                                                                                                                                                                                                                                                              | Reported to |        |      |
|-------------|------------|----------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                                            |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                       | alert       | syslog | mail |
|             |            |          | HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6).                  | 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.   | against which the delay was warned is loaded, and reduce the load.<br><br>You need to set a longer timeout value if a heartbeat timeout 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.<br><br>You need to set a longer timeout value if a heartbeat timeout 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.<br><br>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.<br>+ webmgr<br>+ 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                                                                                                                                                                                                | -                                                                                                                                                                                                                                                                                                     | •           | •      |      |



| Module type | Event type | Event ID | Message                                                                               | Description                                                                                    | Solution                                                                                       | Reported to |        |      |
|-------------|------------|----------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                                                       |                                                                                                |                                                                                                | alert       | syslog | mail |
| 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. | •           | •      |      |
| 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.                                        | •           | •      |      |
| 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                   | It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the    | Specify the option %3 manually to run the command %1.                                          | •           | •      |      |

| Module type | Event type | Event ID | Message                                                      | Description                                                          | Solution                                                                                | Reported to |        |      |
|-------------|------------|----------|--------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                              |                                                                      |                                                                                         | alert       | syslog | mail |
|             |            |          | manually.                                                    | command manually.                                                    |                                                                                         |             |        |      |
| disk        | Info       | 14       | %1 of %2 with %3 option has started.                         | Command %1 of the device %2 has started by specifying the option %3. | -                                                                                       | •           | •      |      |
| 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.                                                        | •           | •      |      |
| cl          | Error      | 16       | A request to start %1 failed on some servers(%2).            | Failed to start %1 on some servers.                                  | Check the status of %1.                                                                 | •           | •      |      |
| cl          | Error      | 17       | A request to stop %1 failed on some servers(%2).             | Failed to stop %1 on some servers.                                   | Check the status of %1.                                                                 | •           | •      |      |
| cl          | Warning    | 20       | A request to start %1 failed because cluster is running(%2). | Failed to start %1 because the cluster is running.                   | Check the status of the cluster.                                                        | •           | •      |      |
| cl          | Warning    | 21       | A request to stop %1 failed because cluster is running(%2).  | Failed to stop %1 because the cluster is running.                    | 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.                                            | -                                                                                       | •           | •      |      |
| 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 | •           | •      |      |

| Module type | Event type | Event ID | Message                                                                                         | Description                                                                                                                                                                                                                           | Solution     | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|--------|------|
|             |            |          |                                                                                                 |                                                                                                                                                                                                                                       |              | alert       | syslog | mail |
|             |            |          |                                                                                                 |                                                                                                                                                                                                                                       | 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 (%).            | -            | •           | •      |      |
| ddnsw       | Warning    | 1        | Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5) | Monitoring delay was detected when monitoring %1. The current timeout value is %2 (seconds) x %3 (ticks per second). The actual measurement value at delay detection has reached %4 (ticks), exceeding the delay warning rate %5 (%). | -            | •           | •      |      |
| vmw         | Warning    | 1        | Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5) | Monitoring delay was detected when monitoring %1. The current timeout value is %2 (seconds) x %3 (ticks per second). The actual measurement value at delay detection has reached %4 (ticks), exceeding the delay warning rate %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.                                                                                                                                                           | -            | •           | •      |      |
| 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                                                                             | There was a request to                                                                                                                                                                                                                | -            | •           | •      |      |

| Module type | Event type | Event ID | Message                                                     | Description                                                                | Solution | Reported to |        |      |
|-------------|------------|----------|-------------------------------------------------------------|----------------------------------------------------------------------------|----------|-------------|--------|------|
|             |            |          |                                                             |                                                                            |          | alert       | syslog | mail |
|             |            |          | to suspend cluster from the %1(IP=%2).                      | 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       | 13       | There was a request to server panic from the %1(IP=%2).     | There has been a request of server panic from %1.                          | -        | •           | •      |      |
| apisv       | Info       | 14       | There was a request to server reset from the %1(IP=%2).     | There has been a request of server reset from %1.                          | -        | •           | •      |      |
| apisv       | Info       | 15       | There was a request to server sysrq from the %1(IP=%2).     | There has been a request of SYSRQ panic from %1.                           | -        | •           | •      |      |
| apisv       | Info       | 16       | There was a request to KA RESET from the %1(IP=%2).         | There has been a request of keepalive reset from %1.                       | -        | •           | •      |      |
| apisv       | Info       | 17       | There was a request to KA PANIC from the %1(IP=%2).         | There has been a request of keepalive panic from %1.                       | -        | •           | •      |      |
| apisv       | Info       | 18       | There was a request to BMC reset from the %1(IP=%2).        | There has been a request of BMC reset from %1.                             | -        | •           | •      |      |
| apisv       | Info       | 19       | There was a request to BMC PowerOff from the %1(IP=%2).     | There has been a request of BMC power off from %1.                         | -        | •           | •      |      |
| apisv       | Info       | 20       | There was a request to BMC PowerCycle from the %1(IP=%2).   | There has been a request of BMC power cycle from %1.                       | -        | •           | •      |      |
| apisv       | Info       | 21       | There was a request to BMC NMI from the %1(IP=%2).          | There has been a request of BMC NMI from %1.                               | -        | •           | •      |      |
| 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.       | -        | •           | •      |      |

| Module type | Event type | Event ID | Message                                                        | Description                                                                    | Solution | Reported to |        |      |
|-------------|------------|----------|----------------------------------------------------------------|--------------------------------------------------------------------------------|----------|-------------|--------|------|
|             |            |          |                                                                |                                                                                |          | alert       | syslog | mail |
| 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.     | -        | •           | •      |      |
| 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       | 40       | There was a request to migrate group(%s) from the %s(IP=%s).   | A request to migrate the group %1 was received from %2.                        | -        | •           | •      |      |
| apisv       | Info       | 41       | There was a request to migrate all groups from the %1(IP=%2).  | A request to migrate the All groups was received from %2.                      | -        | •           | •      |      |
| apisv       | Info       | 42       | There was a request to failover all groups from the %1(IP=%2). | There has been a request of all group failover from %2.                        | -        | •           | •      |      |
| 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.  | -        | •           | •      |      |

| Module type | Event type | Event ID | Message                                                              | Description                                                                   | Solution                  | Reported to |        |      |
|-------------|------------|----------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------|-------------|--------|------|
|             |            |          |                                                                      |                                                                               |                           | alert       | syslog | mail |
| 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.                     | -                         | •           | •      |      |
| 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.  | •           | •      |      |
| apisv       | Error      | 113      | A request to server panic was failed(0x%08x).                        | The execution of server panic failed.                                         | Check the server status.  | •           | •      |      |
| apisv       | Error      | 114      | A request to server reset was failed(0x%08x).                        | The execution of server reset failed.                                         | Check the server status.  | •           | •      |      |
| apisv       | Error      | 115      | A request to server sysrq was failed(0x%08x).                        | The execution of SYSRQ panic failed.                                          | Check the server status.  | •           | •      |      |

| Module type | Event type | Event ID | Message                                             | Description                              | Solution                                                                                     | Reported to |        |      |
|-------------|------------|----------|-----------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                     |                                          |                                                                                              | alert       | syslog | mail |
| apisv       | Error      | 116      | A request to KA RESET was failed(0x%08x).           | The execution of keepalive reset failed. | Check the server status.                                                                     | •           | •      |      |
| apisv       | Error      | 117      | A request to KA PANIC was failed(0x%08x).           | The execution of keepalive panic failed. | Check the server status.                                                                     | •           | •      |      |
| apisv       | Error      | 118      | A request to BMC RESET was failed(0x%08x).          | The execution of BMC reset failed.       | Check the server status.                                                                     | •           | •      |      |
| apisv       | Error      | 119      | A request to BMC PowerOff was failed(0x%08x).       | The execution of BMC power off failed.   | Check the server status.                                                                     | •           | •      |      |
| apisv       | Error      | 120      | A request to BMC PowerCycle was failed(0x%08x).     | The execution of BMC power cycle failed. | Check the server status.                                                                     | •           | •      |      |
| apisv       | Error      | 121      | A request to BMC NMI was failed(0x%08x).            | The execution of BMC NMI failed.         | Check the server status.                                                                     | •           | •      |      |
| 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      | 134      | A request to restart group(%1) was failed(0x%08x).  | Failed to restart the group (%1).        | Take appropriate action by following the message of group stop failure output by the RC.     | •           | •      |      |
| 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      | 137      | A request to move all groups was failed(0x%08x).    | Failed to move all the groups.           | Same as above.                                                                               | •           | •      |      |
| 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 to fail over all groups.          | Same as above.                                                                               | •           | •      |      |

| Module type | Event type | Event ID | Message                                                   | Description                                    | Solution                                                                                        | Reported to |        |      |
|-------------|------------|----------|-----------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------|--------|------|
|             |            |          |                                                           |                                                |                                                                                                 | alert       | syslog | mail |
|             |            |          | failed(0x%08x).                                           |                                                |                                                                                                 |             |        |      |
| apisv       | Error      | 140      | A request to migrate group(%1) was failed(0x%08x).        | Failed to migrate the group (%1).              | Take appropriate action by following the message of group failover failure output by the RC.    | •           | •      |      |
| apisv       | Error      | 141      | A request to migrate all groups was failed(0x%08x).       | Failed to migrate all the groups.              | Same as above.                                                                                  | •           | •      |      |
| apisv       | Error      | 142      | A request to failover all groups was failed(0x%08x).      | Failed to fail over all the 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.     | •           | •      | –    |
| apisv       | Error      | 153      | A request to stop all resources was failed(0x%08x).       | Failed to stop all the resources.              | Same as above.                                                                                  | •           | •      |      |
| 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. | •           | •      |      |
| lamp        | Error      | 1        | The license is not registered. (%1)                       | The license is not registered.                 | Purchase and register a license.                                                                | •           | •      |      |
| lamp        | Error      | 2        | The trial license has expired in %1. (%2)                 | The trial license has expired.                 | Register a valid license.                                                                       | •           | •      |      |
| lamp        | Error      | 3        | The registered license is invalid. (%1)                   | The registered license is invalid.             | Register a valid license.                                                                       | •           | •      |      |
| lamp        | Error      | 4        | The registered license is unknown. (%1)                   | The registered license is unknown.             | Register a valid license.                                                                       | •           | •      |      |
| lamp        | Info       | 5        | Notice by the network warning                             | Notice by the network warning light succeeded. | -                                                                                               | •           | •      |      |



| Module type | Event type | Event ID | Message                                                 | Description                                             | Solution                                    | Reported to |        |      |
|-------------|------------|----------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------|-------------|--------|------|
|             |            |          |                                                         |                                                         |                                             | alert       | syslog | mail |
|             |            |          | light succeeded.                                        |                                                         |                                             |             |        |      |
| lamp        | 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.        | •           | •      |      |
| lamp        | Error      | 7        | Failed to execute warning light command.(%d)            | Executing the network warning light command failed.     | Memory or OS resources may be insufficient. | •           | •      |      |
| cfmgr       | Info       | 1        | The cluster configuration data has been uploaded by %1. | The cluster configuration data was uploaded.            | -                                           | •           | •      |      |

## Driver syslog messages

### Keepalive driver

| Module Type | Event type | Event ID | Message                                                                                      | Description                                                                                             | Solution                                                                                          |
|-------------|------------|----------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| clpka       | Info       | 3001     | Kernel Keepalive was v1.0 initialized successfully.                                          | The clpka driver was successfully loaded.                                                               | -                                                                                                 |
| clpka       | Info       | 3002     | Kernel Keepalive was released successfully.                                                  | The clpka driver was successfully unloaded.                                                             | -                                                                                                 |
| clpka       | Info       | 3003     | Kernel Keepalive Timer Initialized. process %1[%2], timeout %3 sec, action %4 (nowayout = 0) | The timer is initialized due to the process %1[PID %2]. The time out value is %3, and the action is %4. | -                                                                                                 |
| clpka       | Info       | 3004     | clpka: <reason: %1> <process name: %2> system reboot.                                        | Due to the reason %1, automatic reboot processing was performed by the process %2.                      |                                                                                                   |
| clpka       | Info       | 3005     | clpka: <reason: %s> <process name: %s> system panic.                                         | Due to the reason %1, automatic panic processing was performed by the process %2.                       |                                                                                                   |
| clpka       | Info       | 3006     | clpka: <reason: %1> <process name: %2> system reboot.                                        | Due to the reason %1, manual reboot processing was performed by the process %2.                         |                                                                                                   |
| clpka       | Info       | 3007     | clpka: <reason: %s> <process name: %s> system panic.                                         | Due to the reason %1, manual panic processing was performed by the process %2.                          |                                                                                                   |
| clpka       | Error      | 1001     | Cannot register miscdev on minor=%d (err=%d)                                                 | Device driver registration has failed.                                                                  | The system is unstable, such as because there is not enough physical memory. Restart the system.  |
| clpka       | Error      | 1002     | 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. |
| clpka       | Error      | 1002     | Failed to ka initialize!                                                                     | Initializing the keepalive driver has failed.                                                           | The system is unstable. Restart the system.                                                       |

## 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            | Raw device was already bound. (%1)       | The RAW device has already been bound by another device.                                   | Check if the unique raw device is set in the cluster.                                               |
| 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.                                                                   |

| Module type | Type  | Return value | Message                            | Description                                                  | Solution                                                             |
|-------------|-------|--------------|------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------|
| disk        | Error | 1            | Command timeout. (%1, timeout=%2)  | Detected an internal timeout.                                | The OS may be heavily loaded. Check its status.                      |
| 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.                                           |

| Module Type | Type  | Return value | Message                                | Description                                                                                              | Solution                                                             |
|-------------|-------|--------------|----------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 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 maximum retry count. | Check that the cluster configuration data is correct.                |
| 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.<br><br>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.<br><br>The application may be stalling. Check if the application is working properly.<br><br>You may be able to identify the cause from the logs in both cases. For details about logging settings, see "Parameter details" in Chapter 2, "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.                                                                                                                                                                                                                                                                                    |

| Module Type | Type  | Return value | Message                           | Description                                                  | Solution                                                                               |
|-------------|-------|--------------|-----------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|
|             |       |              |                                   |                                                              | Memory or OS resources may not be 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.                              |

## Volume manager resource

| Module Type | Type  | Return value | Message                         | Description                                               | Solution                                                          |
|-------------|-------|--------------|---------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------|
| volmgr      | Error | 4            | Invalid Config.                 | The cluster configuration information is invalid.         | Check if the cluster configuration information is consistent.     |
| volmgr      | Error | 10           | Already Imported.               | The target has already been imported.                     | Check the target has been exported before startup of the cluster. |
| volmgr      | Error | 11           | Other Host Imported.(host=%1)   | The execution path is invalid.                            | Check the execution path of the command.                          |
| volmgr      | Error | 12<br>14     | Command("%1") Error.(cmdret=%2) | Command %1 failed. The return value of the command is %2. | Analyze the error by the return value of the command.             |
| volmgr      | Error | Others       | Internal Error.(ret=%1)         | Another internal error occurred.                          | Memory or OS resources may not be sufficient. Check them.         |

## VM resource

| Module Type | Type  | Return value | Message                          | Description                                 | Solution                                                   |
|-------------|-------|--------------|----------------------------------|---------------------------------------------|------------------------------------------------------------|
| vm          | Error | 1~6,8        | Initialize error occurred.       | An error was detected while initialization. | Check if the cluster configuration information is correct. |
| vm          | Error | 7            | Parameter is invalid.            | The parameter is invalid.                   | Check if the cluster configuration information is correct. |
| vm          | Error | 9~13         | Failed to %s virtual machine %s. | Failed to control the virtual machine.      | Check the status of the virtual machine.                   |
| vm          | Error | Others       | Internal error occurred.         | Another internal error occurred.            | Memory or OS resources may not be                          |

|  |  |  |  |  |                         |
|--|--|--|--|--|-------------------------|
|  |  |  |  |  | sufficient. Check them. |
|--|--|--|--|--|-------------------------|

## Dynamic DNS resources

| Module Type | Type  | Return value | Message                          | Description                                   | Solution                                                                          |
|-------------|-------|--------------|----------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------|
| ddns        | Error | 1            | Initialize error.                | An error was detected during initialization.  | There might not be enough memory space or OS resources. Check whether this is so. |
| ddns        | Error | 2            | open() failed.(err=%1)           | Opening the internally used file failed.      | There might not be enough memory space or OS resources. Check whether this is so. |
| ddns        | Error | 3            | write() failed.(err=%1)          | Writing to the internally used file failed.   | There might not be enough memory space or OS resources. Check whether this is so. |
| ddns        | Error | 4            | close() failed.(err=%1)          | Closing the internally used file failed.      | There might not be enough memory space or OS resources. Check whether this is so. |
| ddns        | Error | 5            | nsupdate command has failed(%1). | Executing the nsupdate command failed.        | Analyze the error by referring to the command return value.                       |
| ddns        | Error | 90           | Memory allocation error.(err=%1) | An internal memory allocation error occurred. | There might not be enough memory space or OS resources. Check whether this is so. |
| ddns        | Error | 92           | Time out.                        | An internal timeout was detected.             | The OS might be heavily loaded. Check whether this is so.                         |
| ddns        | Error | Other        | Internal error.(status=%d)       | A different internal error occurred.          | There might not be enough memory space or OS resources. Check whether this is so. |

## 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                                                                        |



| Module Type | Type  | Return value | Message                        | Description                                                  | Solution                                                  |
|-------------|-------|--------------|--------------------------------|--------------------------------------------------------------|-----------------------------------------------------------|
|             |       |              |                                |                                                              | not be sufficient. Check them.                            |
| ipw         | Error | 6<br>8~21    | Internal error.<br>(status=%1) | An error other than the errors mentioned above has occurred. | Memory or OS resources may not be sufficient. Check them. |
| ipw         | Error | 7            | Internal error.<br>(status=%1) | Monitoring of the IP monitor resource failed by time out.    | 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.<br>(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.<br><br>The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.                               |
| diskw       | Error | 14           | Open was failed.<br>(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.<br><br>Memory or OS resources may not be sufficient. Check them. |
| diskw       | Error | 15<br>48     | Open was failed by timeout. File=%1     | Opening the file failed due to timeout.   | Check the disk to be monitored is properly connected, powered on, or does not have any problem.<br><br>The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.                               |
| diskw       | Error | 16           | Read was failed.<br>(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.<br><br>Memory or OS resources may not be                                                                                         |

| Module Type | Type  | Return value                                                                           | Message                                                | Description                                                  | Solution                                                                                                                                                                                       |
|-------------|-------|----------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |       |                                                                                        |                                                        |                                                              | 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.<br>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.<br>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.<br>The system may be heavily loaded, memory or OS resources may not be sufficient. Check them. |
| diskw       | Error | 22<br>23<br>24<br>25<br>26<br>27<br>28<br>29<br>30<br>31<br>32<br>34<br>40<br>43<br>44 | Internal error. (status=%1)                            | An error other than the errors mentioned above has occurred. | Memory or OS resources may not be sufficient. Check them.                                                                                                                                      |
| 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.                                                                                                |

| Module Type | Type  | Return value | Message                                               | Description                                                   | Solution                                                                                                     |
|-------------|-------|--------------|-------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| diskw       | Error | 42           | Parameter was invalid.<br>File=%1                     | The specified file name is invalid.                           | Do not specify the file whose name starts with /dev. Specify a normal file.                                  |
| diskw       | Error | 47           | Device was invalid.<br>Device=%1                      | The specified real device is invalid.                         | Check the device name of the disk monitor resource on the Builder.                                           |
| diskw       | Error | 49           | Already bound for other.<br>Rawdevice=%1<br>Device=%2 | The RAW device has already been bound by another real device. | The set RAW device has already been bound by another real device. Change the RAW device name on the Builder. |
| diskw       | Error | 50           | Popen was failed.<br>(err=%1)                         | Popen failed.                                                 | Popen failed. Memory or OS resources may not be sufficient. Check them.                                      |
| diskw       | Error | 51           | Bind was failed.<br>Rawdevice=%1<br>Device=%2         | Bind failed.                                                  | Bind failed. Memory or OS resources may not be sufficient. Check them.                                       |
| diskw       | Error | 52           | Stat was failed. (err=%1)<br>Device=%2                | Stat failed.                                                  | Stat failed. Memory or OS resources may not be sufficient. Check them.                                       |

## 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.<br>(pid=%1) | The process does not exist.                                  | The process to be monitored disappeared for some reason.   |
| pidw        | Error | 1            | Internal error.<br>(status=%1)      | An error other than the errors mentioned above has occurred. | Memory or OS resources may not be sufficient. Check them.  |

## 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 clpka exist. |

## Custom monitor resource

| Module Type | Type | Return value | Message | Description | Solution |
|-------------|------|--------------|---------|-------------|----------|
|-------------|------|--------------|---------|-------------|----------|

|      |       |        |                                               |                                                      |                                                            |
|------|-------|--------|-----------------------------------------------|------------------------------------------------------|------------------------------------------------------------|
| genw | Error | 1      | Initialize error. (status=%d)                 | An error was detected while initialization.          | Memory or OS resources may not be sufficient. Check them.  |
| genw | Error | 2      | Termination code %d was returned.             | An unexpected value was returned.                    | Check if the cluster configuration information is correct. |
| genw | Error | 3      | User was not superuser.                       | User was not root user.                              | Log in as root user.                                       |
| genw | Error | 4      | Getting of config was failed.                 | Failed to get the cluster configuration information. | Check if the cluster configuration information exists.     |
| genw | Error | 5      | Parameter was invalid.                        | The parameter is invalid.                            | Check if the cluster configuration information is correct. |
| genw | Error | 6      | Option was invalid.                           | The parameter is invalid.                            | Check if the cluster configuration information is correct. |
| genw | Error | 7      | Monitor Resource %s was not found.            | The resource was not found.                          | Check if the cluster configuration information is correct. |
| genw | Error | 8      | Create process failed.                        | Create process failed.                               | Memory or OS resources may not be sufficient. Check them.  |
| genw | Error | 9      | Process does not exist. (pid=%d)              | The process did not exist.                           | Check if the process exists.                               |
| genw | Error | 10     | Process aborted. (pid=%d)                     | The process did not exist.                           | Check if the process exists.                               |
| genw | Error | 11     | Asynchronous process does not exist. (pid=%d) | The process did not exist.                           | Check if the process exists.                               |
| genw | Error | 12     | Asynchronous process aborted. (pid=%d)        | The process did not exist.                           | Check if the process exists.                               |
| genw | Error | 13     | Monitor path was invalid.                     | The path is invalid.                                 | Check if the cluster configuration information is correct. |
| genw | Error | others | Internal error. (status=%d)                   | Another internal error occurred.                     | -                                                          |

## Multi target monitor resources

| Module Type | Type  | Return value | Message                     | Description                      | Solution                                                   |
|-------------|-------|--------------|-----------------------------|----------------------------------|------------------------------------------------------------|
| mtw         | Error | 1            | Option was invalid.         | The parameter is invalid.        | Check if the cluster configuration information is correct. |
| mtw         | Error | 2            | User was not superuser.     | User was not root user.          | Log in as root user.                                       |
| mtw         | Error | 3            | Internal error. (status=%d) | Another internal error occurred. | -                                                          |

## NIC link up/down monitor resources

| Module Type | Type | Return value | Message | Description | Solution |
|-------------|------|--------------|---------|-------------|----------|
|-------------|------|--------------|---------|-------------|----------|

| 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.                                                                                                             |
| 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)<br>Device=%2<br>Request=%3 | The control request to the network driver has failed.                       | Check the network driver supports the control request of %3.<br>See Chapter 5, "Monitor resource details" of this guide.                                               |
| miiw        | Error | 13           | MII was not supported or no such device.<br>Device=%1 | Either MII is not supported by NIC or the monitoring target does not exist. | See Chapter 5, "Monitor resource details" of this guide.<br>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.                                          | -                                                                                                                                                                      |

## 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.                                                 |

| Module Type | Type  | Return value | Message                           | Description                                                              | Solution                                                                                                  |
|-------------|-------|--------------|-----------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 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.                                           | -                                                                                                         |

## VM Monitor resource

| Module Type | Type  | Return value | Message                                          | Description                                      | Solution                                                  |
|-------------|-------|--------------|--------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------|
| vmw         | Error | 1            | initialize error occurred.                       | An error was detected while initialization.      | Memory or OS resources may not be sufficient. Check them. |
| vmw         | Error | 11           | monitor success, virtual machine is not running. | Stop of the virtual machine was detected.        | Check the status of the virtual machine.                  |
| vmw         | Error | 12           | failed to get virtual machine status.            | Failed to get the status of the virtual machine. | Check if the virtual machine exists.                      |
| vmw         | Error | 13           | timeout occurred.                                | The monitoring timed out.                        | The OS may be highly loaded. Check it.                    |

## Volume manager monitor resource

| Module Type | Type    | Return value | Message                        | Description                                                                 | Solution                                                           |
|-------------|---------|--------------|--------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------|
| volmgrw     | Warning | 100          | %1 %2 is %3 !                  | The status of the target (%2) of the volume manager (%1) transferred to %3. | Check the status of the volume manager target.                     |
| volmgrw     | Error   | 10           | Command was failed. Command=%1 | %1 command failed.                                                          | The command failed. Check the action status of the volume manager. |
| volmgrw     | Error   | 11           | Option was invalid.            | The option is invalid.                                                      | Check the cluster configuration information on the Builder.        |

|         |       |        |                                |                                  |   |
|---------|-------|--------|--------------------------------|----------------------------------|---|
| volmgrw | Error | Others | Internal error.<br>(status=%1) | Another internal error occurred. | - |
|---------|-------|--------|--------------------------------|----------------------------------|---|

## Dynamic DNS monitor resources

| Module Type | Type  | Return value | Message                                | Description                                            | Solution                                                                          |
|-------------|-------|--------------|----------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|
| ddnsw       | Error | 1            | Initialize error.                      | An error was detected during initialization.           | There might not be enough memory space or OS resources. Check whether this is so. |
| ddnsw       | Error | 2            | open() failed.(err = %1)               | Opening the internally used file failed.               | There might not be enough memory space or OS resources. Check whether this is so. |
| ddnsw       | Error | 3            | write() failed.(err = %1)              | Writing to the internally used file failed.            | There might not be enough memory space or OS resources. Check whether this is so. |
| ddnsw       | Error | 4            | close() failed.(err = %1)              | Closing the internally used file failed.               | There might not be enough memory space or OS resources. Check whether this is so. |
| ddnsw       | Error | 5            | nsupdate command has failed.           | Executing the nsupdate command failed.                 | Analyze the error by referring to the command return value.                       |
| ddnsw       | Error | 6            | Ping can not reach the DNS server(%1). | There was no ping response from the DNS server (%1).   | Check the DNS server status.                                                      |
| ddnsw       | Error | 7            | nslookup command has failed.           | Executing the nslookup command failed.                 | Check the DNS server status.                                                      |
| ddnsw       | Error | 8            | Ping can not reach virtual host(%1).   | There was no ping response from the virtual host (%1). | Check the DNS server status.                                                      |
| ddnsw       | Error | 90           | Memory allocation error.(err=%1)       | An internal memory allocation error occurred.          | There might not be enough memory space or OS resources. Check whether this is so. |
| ddnsw       | Error | 92           | Time out.                              | Monitoring timed out.                                  | The OS might be heavily loaded. Check whether this is so.                         |
| ddnsw       | Error | Other        | Internal error.(status=%d)             | A different internal error occurred.                   | There might not be enough memory space or OS resources. Check whether this is so. |

## Monitoring option monitor resource

Monitor resources of monitoring options use common messages. Module types are different for each monitoring option monitor resource.

| Monitoring option monitor resource | Module type |
|------------------------------------|-------------|
| MySQL monitor resource             | mysqlw      |
| NFS monitor resource               | nfs         |
| Oracle monitor resource            | oraclew     |
| PostgreSQL monitor resource        | psqlw       |
| Samba monitor resource             | sambaw      |

| 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.<br>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.<br>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.<br>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 right.                                                          |
| (see the list above) | Error | 7            | Failed to execute SQL statement (%1). [ret=%2] %3:             | Failed to execute SQL statement (%1).<br>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.<br>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.<br>The actual module type                                 | Check the status of monitor target.                                                                       |



| Module type          | Type  | Return value | Message                                                          | Description                                                                                                        | Solution                                                                                                                          |
|----------------------|-------|--------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                      |       |              |                                                                  | is displayed in %1.                                                                                                |                                                                                                                                   |
| (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           | Cannot 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.<br>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 license has not become effective yet.<br>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.                                                                                    | -                                                                                                                                 |



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# Appendix A Glossary

|                                 |                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interconnect</b>             | A dedicated communication path for server-to-server communication in a cluster.<br>(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.<br>(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>Active server</b>            | A server that is running for an application set.<br>(Related term: Standby server)                                                                                                        |
| <b>Secondary server</b>         | A destination server where a failover group fails over to during normal operations.<br>(Related term: Primary server)                                                                     |
| <b>Standby server</b>           | A server that is not an active server.<br>(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.                                                                                                                  |
| <b>Network partition</b>        | All heartbeat is lost and the network between servers is partitioned.<br>(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.<br>(Related terms: Interconnect, Network partition)                                                |

|                              |                                                                                                                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Public LAN</b>            | A communication channel between clients and servers.<br>(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.<br>(Related terms: Interconnect, Public LAN)                                                                                              |
| <b>Primary (server)</b>      | A server that is the main server for a failover group.<br>(Related term: Secondary server)                                                                                                                          |
| <b>Floating IP address</b>   | Clients can transparently switch one server from another when a failover occurs.<br>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.                                                                                                                |

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