

ExpressCluster[®] X 3.1 *for Solaris*

Reference Guide

10/11/2011
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 five 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.

ExpressCluster X WebManager Mobile Administrator's Guide

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

Conventions

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

Note:

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

Important:

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

Related Information:

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

The following conventions are used in this guide.

Convention	Usage	Example
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># clpcl -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># clpcl -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.com/global/prod/expresscluster/>

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	53
• Checking alerts on the WebManager.....	59
• Manually setting WebManager to stop and start	63
• Changing the settings without using the WebManager	64
• Setting usage limitations.....	65
• Operating a cluster by using the WebManager.....	69
• Limitations of the WebManager.....	70
• Error messages on the WebManager	71

Window of the WebManager

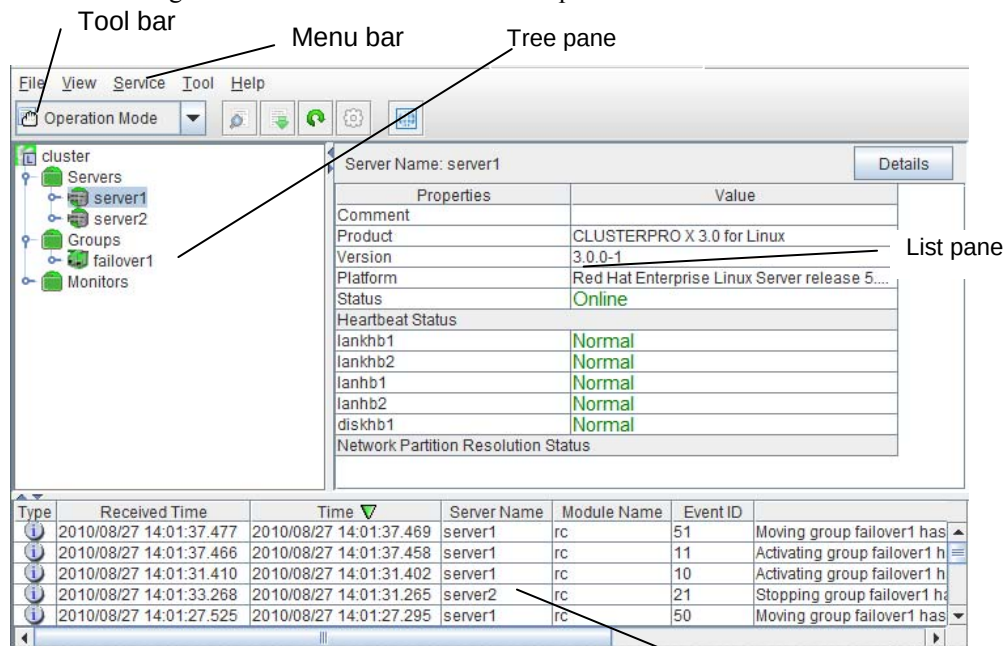
This chapter provides information about the WebManager window.

Note:

For the language representation on the screen, see “Cluster properties Info tab” in Chapter 2, “Functions of the Builder” in this guide.

Main pane of the WebManager

The WebManager window consists of 2 bars and 3 panes.



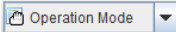
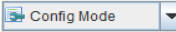
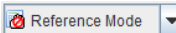
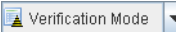
Menu bar

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)
	Switches to WebManager verification mode. This is the same as clicking View on the menu bar and then selecting Verification 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 25)
	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 31)

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

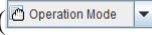
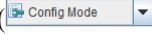
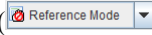
Provides information on each cluster resource selected in the tree view in the top section and lists each server and group resource, whether each monitor resource is started or stopped, and comments in the bottom section. If you click **Details** located on the upper right of the view, further information will be displayed in a dialog. For more information, see “Checking the cluster status on the WebManager list view” on page 53.

Alert view

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

Switching the operation modes of the WebManager

The WebManager has the following four 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.
- ◆ **Verification mode**
This mode allows the user to enable or disable dummy failure of monitor resource.
Select **Verification Mode** on the **View** menu or click **Verification Mode** in the combo box () on the toolbar to switch to verification 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 verification mode.
If you switch from the verification mode to another mode, a dialog box asks if you want to cancel the enabled dummy failure of all the monitor resources. Select **Yes** to place all the monitor resources in the enabled dummy failure back in the normal monitored status. Select **No** to switch to another mode while keeping the monitor resources in the enabled dummy failure.

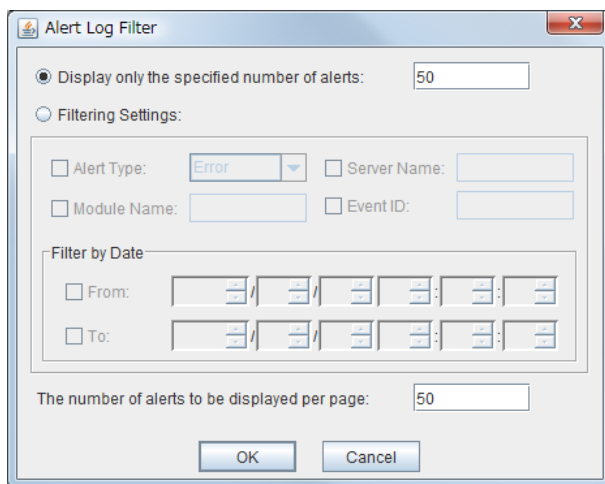
Searching for an alert by using the WebManager

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 59.

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 the 'Alert Log Filter' dialog box. It has a title bar with a close button. Inside, there are two radio buttons: 'Display only the specified number of alerts:' (selected) and 'Filtering Settings:'. The first option has a text box with '50'. The 'Filtering Settings' section contains four checkboxes: '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:' checkboxes and date pickers. At the bottom, there is a text box for 'The number of alerts to be displayed per page:' with '50' and 'OK' and 'Cancel' buttons.

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
mgmtagt	SNMP coordination related

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

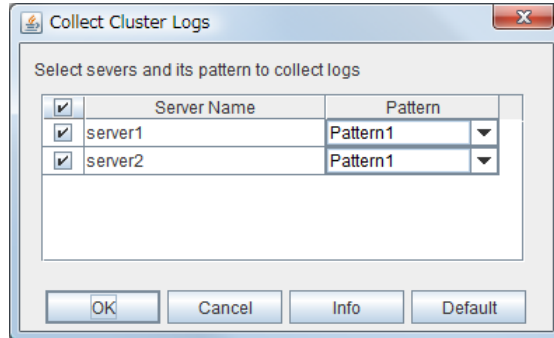
Event ID: Type in an event ID whose alerts you want to see.

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**.

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 “Collecting logs (clplogcc command)” in Chapter 3, “ExpressCluster command reference” in this guide.

OK

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

Cancel

Closes this dialog box.

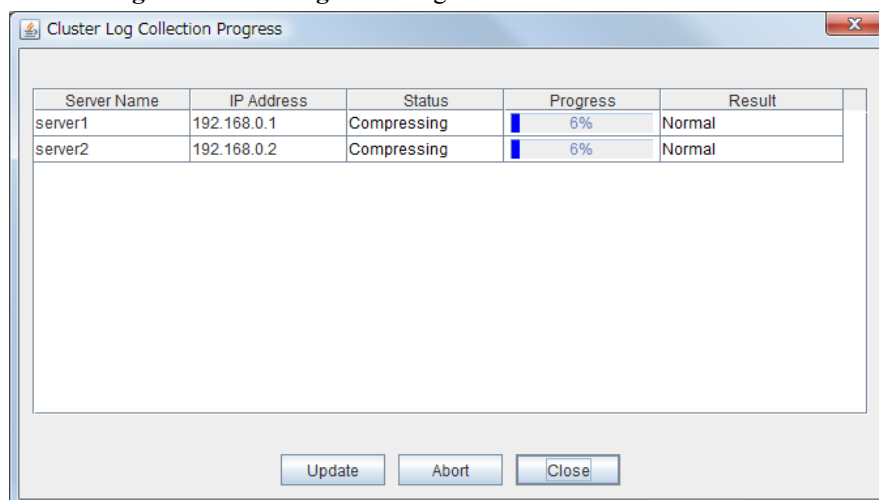
Info

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

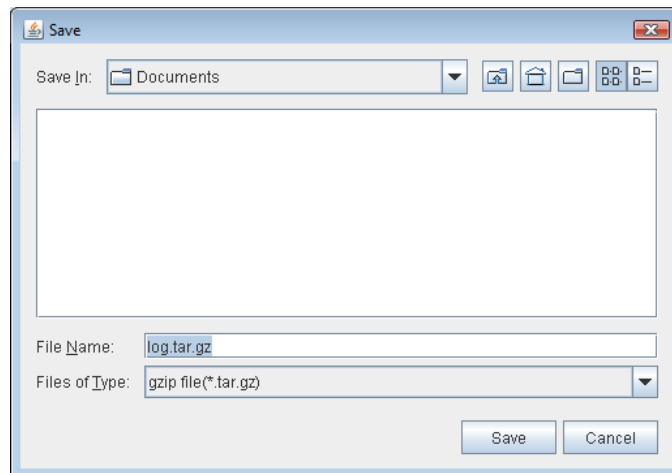
Closes the dialog box of the **Cluster** log collection progress. **Cluster** Log collection is continued.

At this time, the display of **Collect Cluster Logs** has changed to **Progress**. Click **Progress** 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 **Save** dialog box that asks where you want to save the logs. Download the logs to any location.



Note:

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

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.

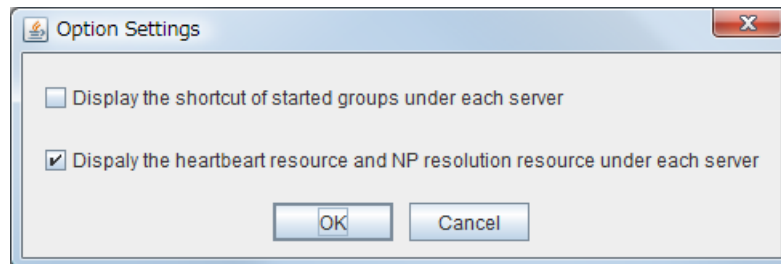
The split bars divide the views in the WebManager.



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.

No.	Icon		Status	Description
			Error	The resource is not working normally.
			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.

No.	Icon		Status	Description
			Error	The NAS resource has an error.
			Offline or Unknown	The NAS resource is stopped, or no information is acquired.
(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.
			Normal (Dummy Failure)	In the normal status, dummy failure enabled.
			Warning (Dummy Failure)	In the warning status, dummy failure enabled.
			Error (Dummy Failure)	In the error status, dummy failure enabled.
			Normal (Recovery Action Disabled)	In the normal status, the recovery action disabled.
			Warning (Recovery Action Disabled)	In the warning status, the recovery action disabled.
			Error (Recovery Action Disabled)	In the error status, the recovery action disabled.
			Normal (Dummy Failure and Recovery Action Disabled)	In the normal status, the recovery action disabled and dummy failure enabled.

No.	Icon		Status	Description
			Warning (Dummy Failure and Recovery Action Disabled)	In the warning status, the recovery action disabled and dummy failure enabled.
			Error (Dummy Failure and Recovery Action Disabled)	In the error status, the recovery action disabled and dummy failure enabled.
			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.
			Dummy Failure	Dummy failure is enabled.
			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.
			Error	No servers can communicate with the IP address of the target.
			Dummy Failure	Dummy failure is enabled.
			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.
			Dummy Failure	Dummy failure is enabled.
			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.
			Dummy Failure	Dummy failure is enabled.
			Unknown	No information is acquired.

No.	Icon		Status	Description
(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.
			Dummy Failure	Dummy failure is enabled.
			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	-
			Error	Custom monitor resource has an error.
			Dummy Failure	Dummy failure is enabled.
			Unknown	No information is acquired.
(27)	VM resource		Normal	The VM resource is running normally.
			Warning	There is a virtual machine error, or monitoring has been suspended on a server.
			Error	VM has an error.
			Dummy Failure	Dummy failure is enabled.
			Unknown	No information has been acquired.

No.	Icon	Status	Description
(28)		Normal	No error message has been received.
		Warning	A server has received an error message, or monitoring is suspended on a server.
		Error	An error message has been received.
		Unknown	No information has been acquired.
(29)		Normal	The Dynamic DNS monitor resource is running normally.
		Warning	-
		Error	The Dynamic DNS monitor resource has an error.
		Unknown	No information has been acquired.
(30)		Normal	Oracle is running normally.
		Warning	Oracle monitor resource is suspended.
		Error	Oracle has an error.
		Dummy Failure	Dummy failure is enabled.
		Unknown	No information is acquired.
(31)		Normal	PostgreSQL is running normally.
		Warning	PostgreSQL monitor resource is suspended.
		Error	PostgreSQL has an error.
		Dummy Failure	Dummy failure is enabled.
		Unknown	No information is acquired.
(32)		Normal	MySQL is running normally.
		Warning	MySQL monitor resource is suspended.
		Error	MySQL has an error.
		Dummy Failure	Dummy failure is enabled.
		Unknown	No information is acquired.
(33)		Normal	Samba is running normally.
		Warning	The Samba is not working in one or more servers, or monitoring is suspended on a server.

No.	Icon		Status	Description
			Error	Samba has an error.
			Dummy Failure	Dummy failure is enabled.
			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.
			Dummy Failure	Dummy failure is enabled.
			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.
			Dummy Failure	Dummy failure is enabled.
			Unknown	Information cannot be acquired.
(36)	Process name monitor resource		Normal	Process is running normally.
			Warning	There are one or more servers on which monitoring is suspended.
			Error	Process is not working normally.
			Dummy Failure	Dummy failure is enabled.
			Unknown	No information is acquired.

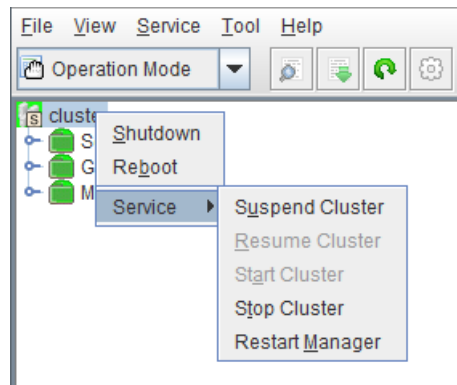
Operations from the WebManager

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:

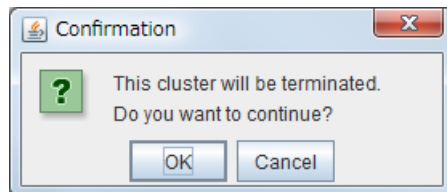
Objects of the cluster

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



◆ Shutdown

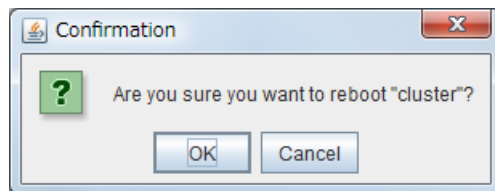
Shuts down all running servers. When you select **Shutdown**, the following dialog box is displayed for confirmation.



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.

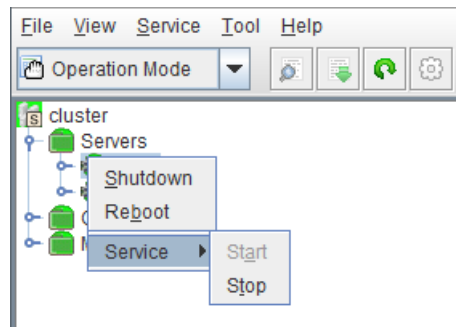


◆ Service

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

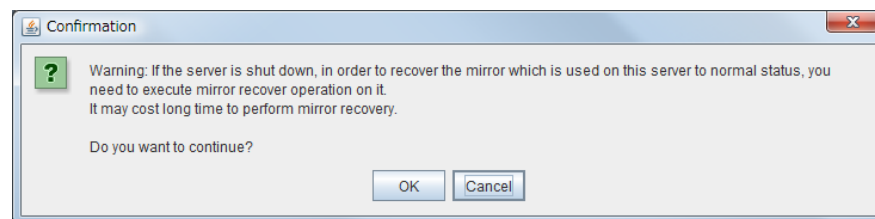
Individual server objects

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



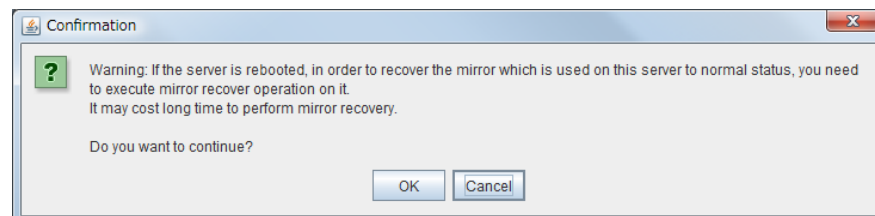
◆ Shut down

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



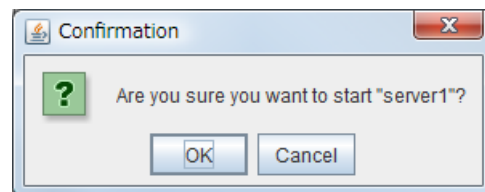
◆ Reboot

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

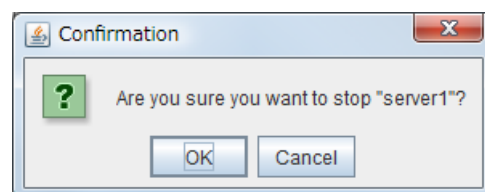


◆ Service

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

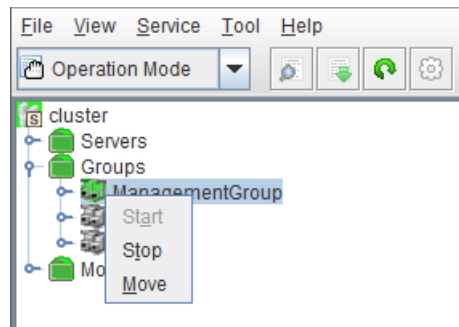


When you click **Stop** on **Service**, the selected server is stopped. When you select this operation, the following dialog box is displayed for confirmation.



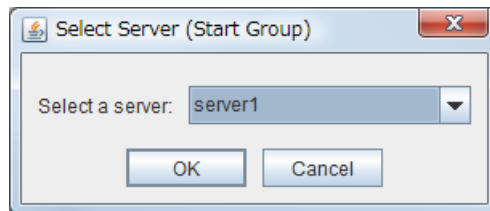
Individual group objects

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



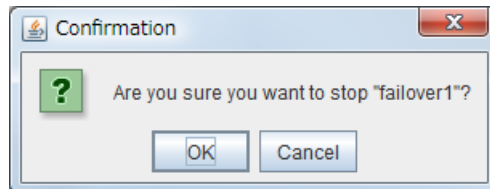
- ◆ Start (enabled only when the group is stopped)

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



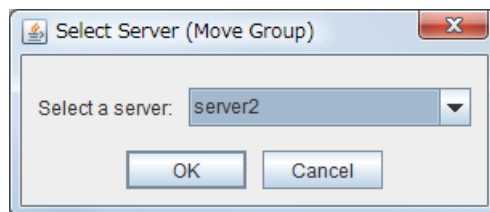
- ◆ Stop (enabled only when the group has been started up or when it has an error)

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



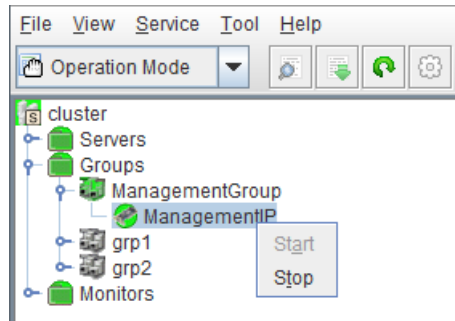
- ◆ Move (enabled only when the group has been started up)

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.



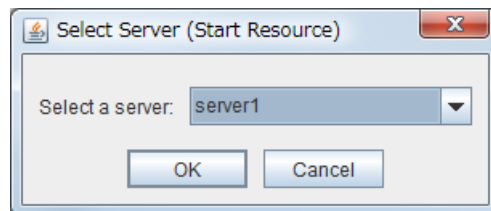
Individual group resource objects

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



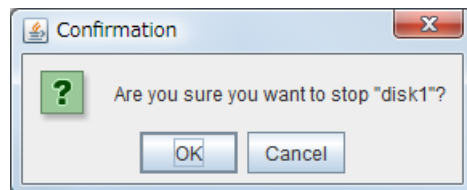
- ◆ Start (enabled only when the group is stopped)

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



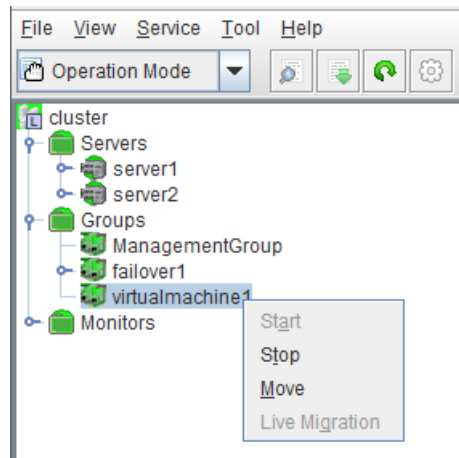
- ◆ Stop (enabled only when the group is running or it has an error)

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



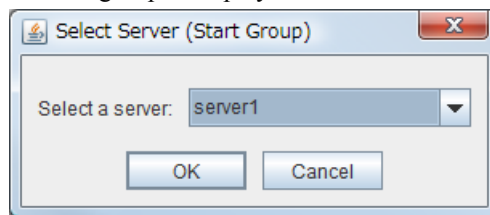
When Virtual Machine is selected for Type:**Objects of the VM resource**

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



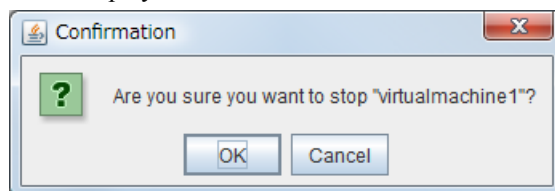
- ◆ **Start (enabled only when the group is stopped)**

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



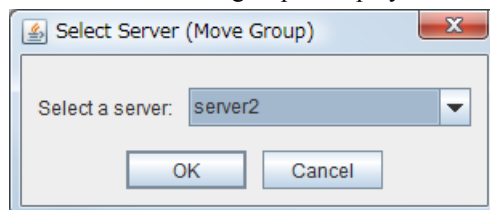
- ◆ **Stop (enabled only when the group is running or has an error)**

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



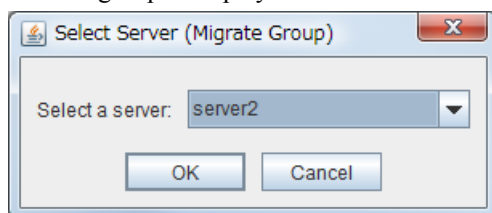
- ◆ **Move (enabled only when the group has been started up)**

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.

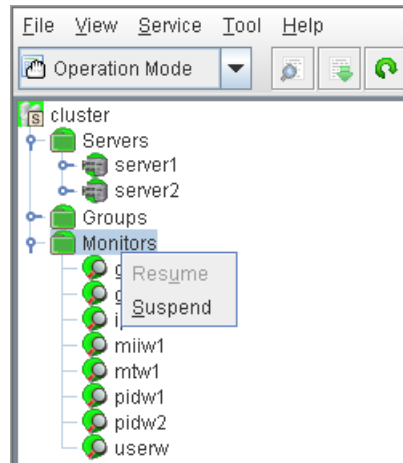


On the server selection screen, servers where groups can be started can be selected as the destination (except the current server and offline servers).

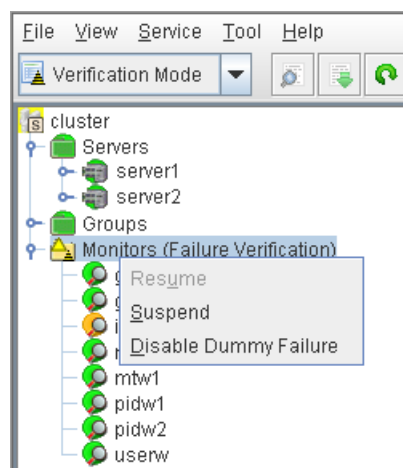
Monitors object

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

When the operation mode is selected

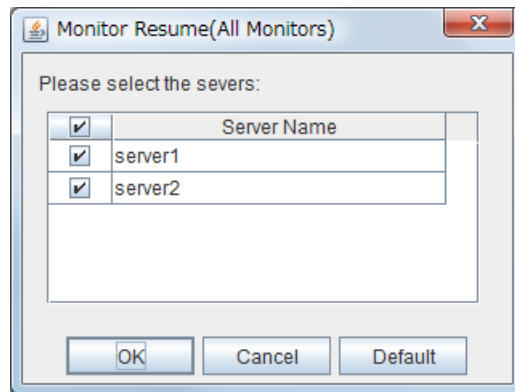


When the simulate mode is selected



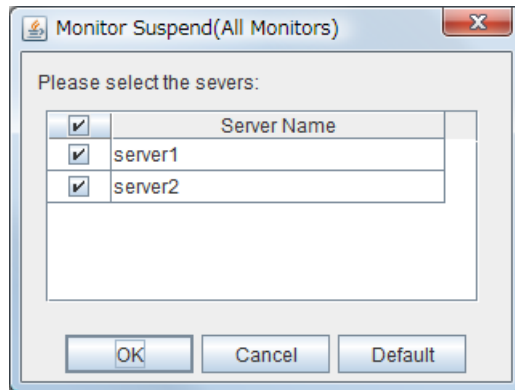
- ◆ Resume (enabled only when the monitor is suspended)

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.



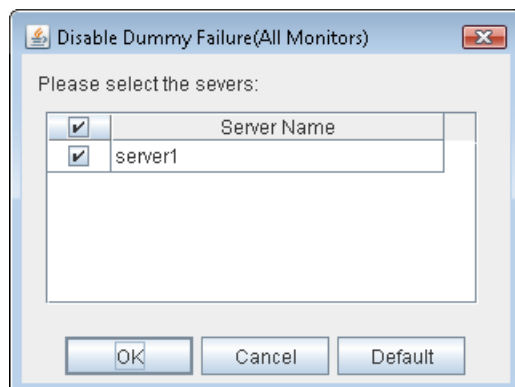
- ◆ Suspend (enabled only when the monitor is running)

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.



- ◆ Disable Dummy Failure (available only when dummy failure enabled)

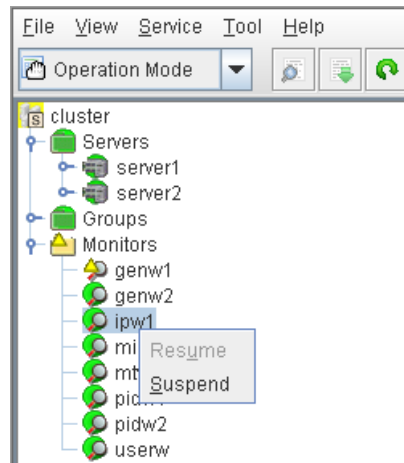
Disable dummy failure for all monitor resources. Select the server on which dummy failure for monitor resources is to be cleared from the dialog box shown below.



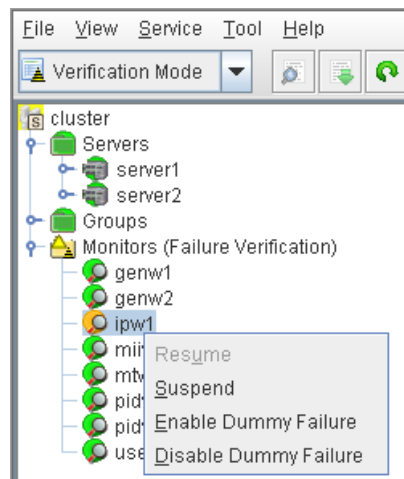
Individual monitor resource objects

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

When the operation mode is selected

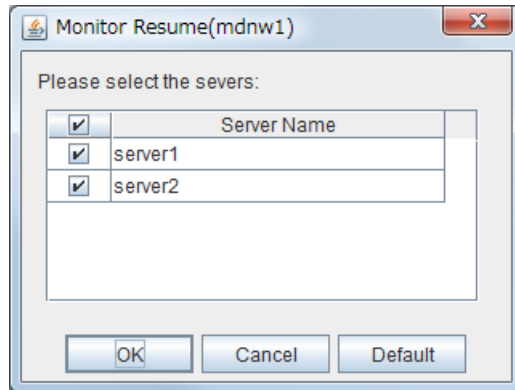


When verification mode is selected



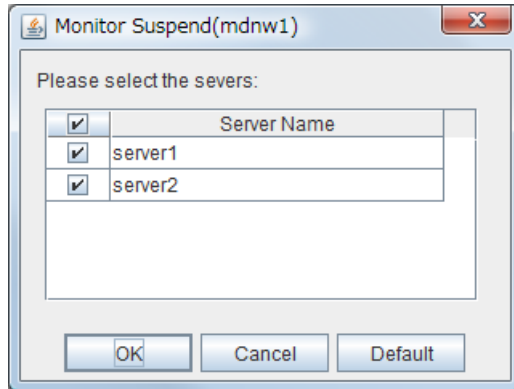
◆ Resume (enabled only when the monitor is suspended)

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.



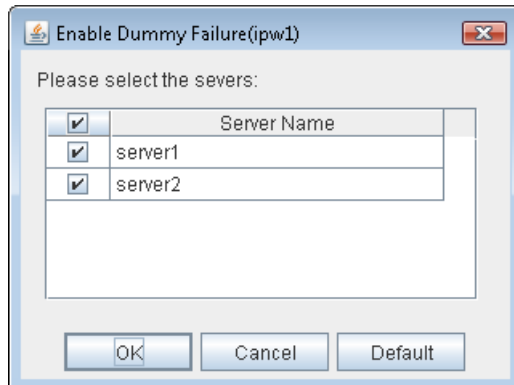
◆ Enable Dummy Failure (available only in verification mode)

Enable dummy failure for a selected monitor resource. Dummy failure can be enabled only on a server on which **Resource Status on Each Server** of the relevant monitor resource indicates a status other than **Error** or Dummy Failure.

Note, however, that the following monitor resources cannot be selected:

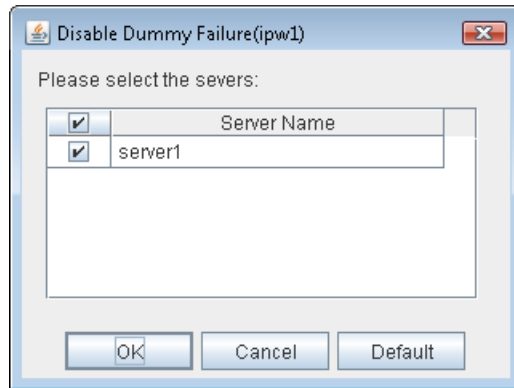
- User space monitor resource
- Virtual IP monitor resource
- Message Receive monitor resource
- Dynamic DNS monitor resource
- VM monitor resource

Select the server on which to enable dummy failure for the selected monitor resource from the following dialog box.



- ◆ Disable Dummy Failure (available only in verification mode)

Dummy failure is disabled for the selected monitor resource. Select the server on which the dummy failure is to be disabled for the selected monitor resource from the dialog box shown below.

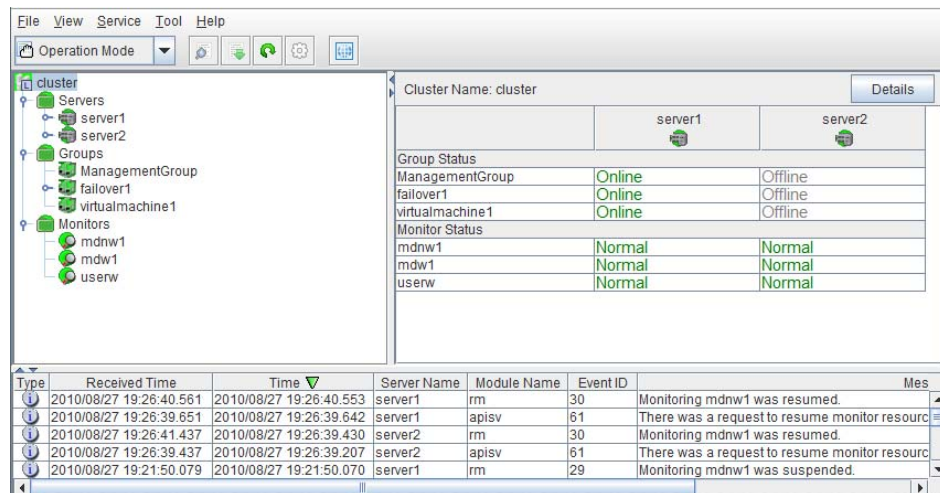


Checking the cluster status on the WebManager list view

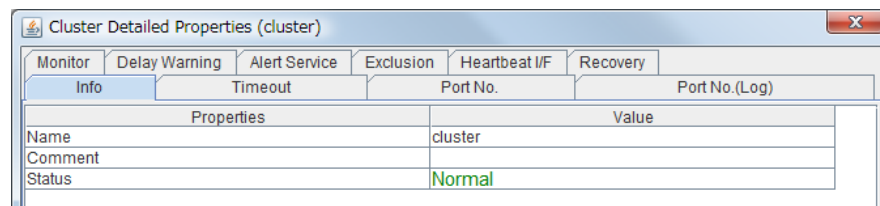
The detailed information on the selected object in the tree view of WebManager can be displayed.

To display information on the whole cluster

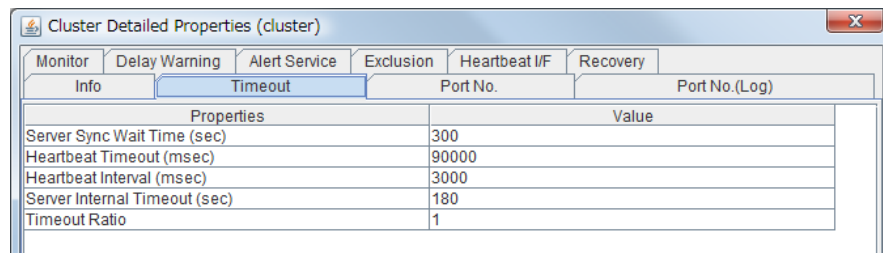
1. Start the WebManager.
2. In this tree view, click the object icon  for the cluster. In the list view in the right pane of the window, the **group status** and **monitor resource status** of each server are displayed.



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



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



The screenshot shows the 'Cluster Detailed Properties (cluster)' window with the 'Timeout' tab selected. The 'Port No.' and 'Port No.(Log)' sub-tabs are also visible. The main table lists the following properties and values:

Properties	Value
Server Sync Wait Time (sec)	300
Heartbeat Timeout (msec)	90000
Heartbeat Interval (msec)	3000
Server Internal Timeout (sec)	180
Timeout Ratio	1

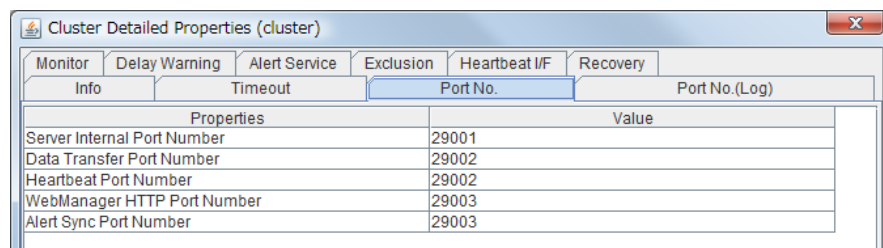
Server Sync Wait Time (sec): Time to wait for the other servers to start up (in seconds)

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

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

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

Timeout Ratio: Current time-out ratio



The screenshot shows the 'Cluster Detailed Properties (cluster)' window with the 'Port No.' tab selected. The main table lists the following properties and values:

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

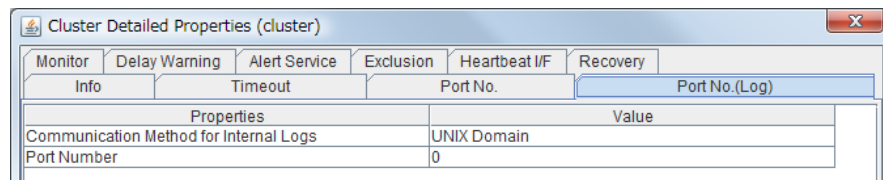
Server Internal Port Number: Port number for internal communication

Data Transfer Port Number: Port number for data transfer

Heartbeat Port Number: Port number for heartbeat

WebManager HTTP Port Number: Port number for WebManager

Alert Sync Port Number: Port number for alert synchronization



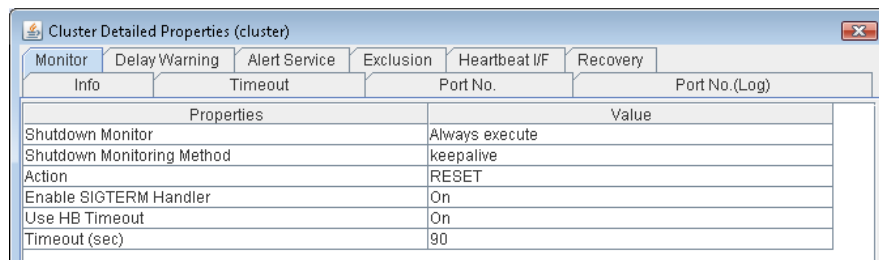
The screenshot shows the 'Cluster Detailed Properties (cluster)' window with the 'Port No.(Log)' tab selected. The main table lists the following properties and values:

Properties	Value
Communication Method for Internal Logs	UNIX Domain
Port Number	0

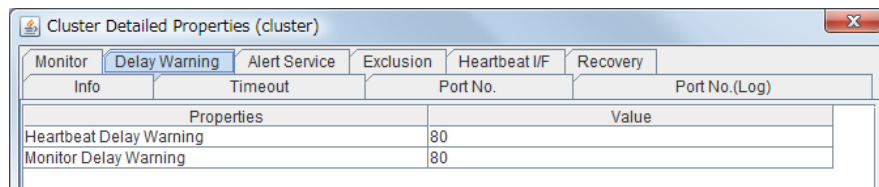
Communication method for Internal Logs:

Communication method used for logs

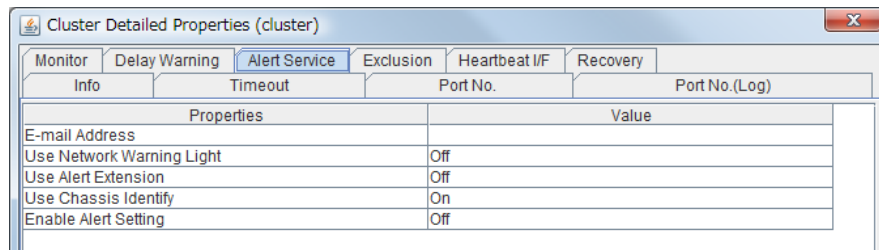
Port Number: Port number used for logs



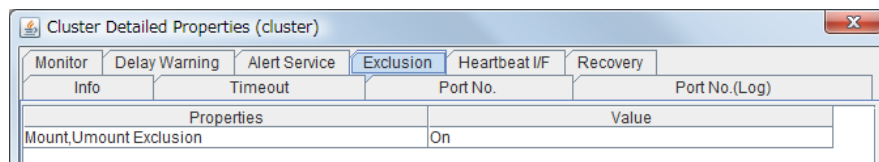
Shutdown Monitor: Whether or not to monitor shutdown
 Shutdown Monitoring Method: Method for monitoring shutdown
 Action: Operation at time-out
 Enable SIGTERM Handler: Whether or not to enable SIGTERM
 Use HB Timeout: Whether or not to use HB time-out
 Timeout (sec): Timeout (in seconds)



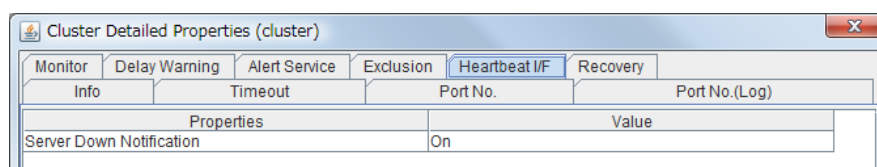
Heartbeat Delay Warning: Heartbeat delay warning (%)
 Monitor Delay Warning: Monitor delay warning (%)



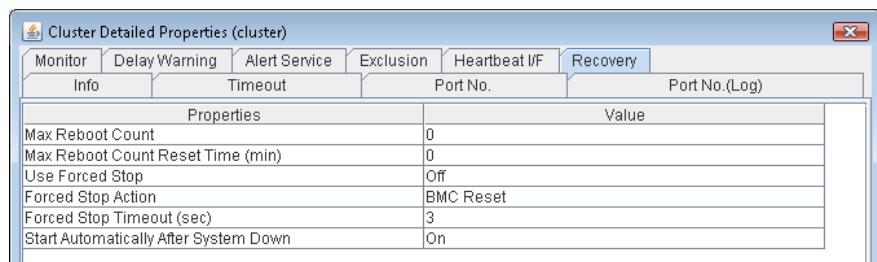
E-mail Address: Destination e-mail address for sending alerts
 Use Network Warning Light: Whether or not to use a network warning light
 Use Alert Extension: Whether or not to use an alert extension function
 Use Chassis Identify: Whether or not to use a chassis identify function
 Enable Alert Setting: Whether or not to use the alert setting



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



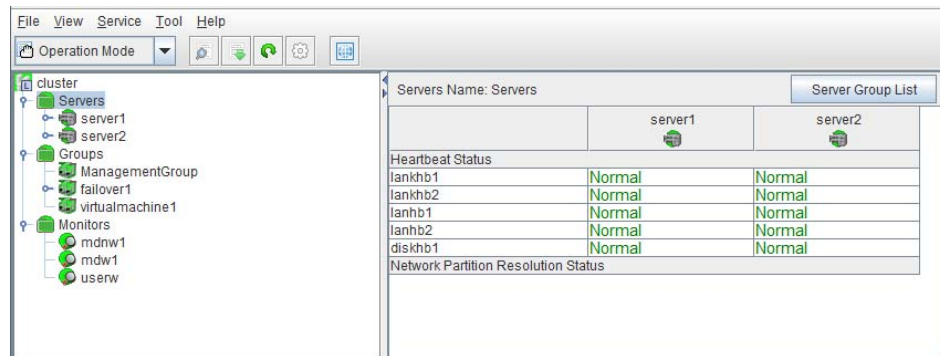
Server Down Notification Server down notification



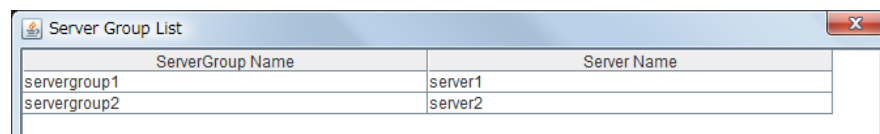
Max Reboot Count:	Maximum reboot count
Max Reboot Count Reset Time (min):	Maximum reboot count reset time (in minutes)
Use forced stop	Whether or not to use a forced stop function
Max Reboot Count:	Maximum reboot count
Forced stop timeout	Wait time till the activation of failover group is started after a forced stop function is performed (in seconds)
Action When the Cluster Service Process Is Abnormal	Action to be taken if an error occurs in the cluster service process
Recovery Action for HA Agents	Action to be taken if an error occurs in the HA process
Retry Count for the HA Process	Retry count for the action to be taken if an error occurs in the HA process
Cluster service's not stop normal, prohibit automatic startup	Whether or not to prohibit automatic startup of the cluster service when it is stopped abnormally

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** to display the information of the server group on the pop up dialog.



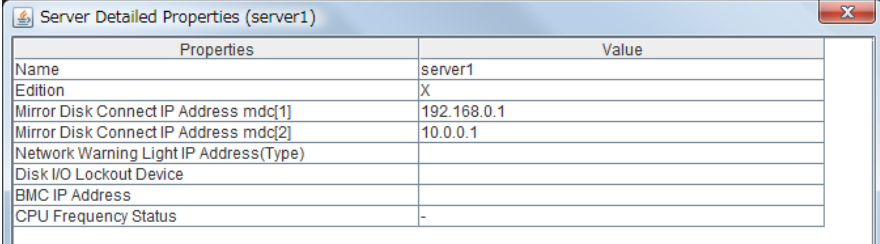
Checking the status of individual server in the WebManager list view

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:	Comment for the server
Product:	Product name
Version:	Version (identical to the RPM version value)
Platform	Platform
Status:	Status of the server

When you click **Details**, 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
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
(1)	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 11:11:01.680	2005/09/14 11:10:58.917	server1	nm	3	Resource lankb1 of server server2 up.
	2005/09/14 11:11:01.607	2005/09/14 11:10:58.917	server1	nm	3	Resource lankb2 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 pidw2 start.

For meanings of alert messages, see Chapter 11, “Error messages” in this guide. For information about searching alert messages, see “Searching for an alert by using the WebManager” on page 25.

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 a list of module name types, see “Searching for an alert by using the WebManager” on page 25 in this chapter.

(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 21:10:10.733		43:30.704	server4
2008/09/22 21:16:10.637	42:38.972		server4
2008/09/22 21:16:10.569	42:37.653		server4
2008/09/22 21:15:55.830	42:15.595		server4
2008/09/22 21:15:55.725	42:15.586		server4
2008/09/22 21:15:55.614	42:12.644		server4
2008/09/22 21:15:55.555	42:12.633		server4
2008/09/22 20:42:09.602	42:09.494		server1
2008/09/22 20:41:44.408	41:44.088		server1
2008/09/22 20:41:44.310	41:44.074		server1
2008/09/22 20:41:43.571	2008/09/22 20:41:43.440		server1

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

Alert Log Detail Information

Detail Information

Type: Info ▲

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

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

Server Name: server1

Module Name: rm

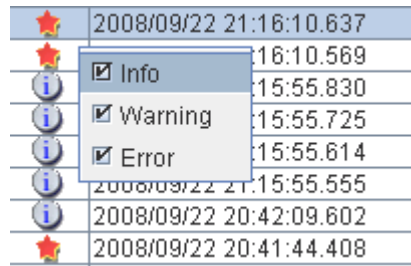
Event ID: 50

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 “Cluster properties WebManager tab” in Chapter 2, “Functions of the Builder” in this guide.

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

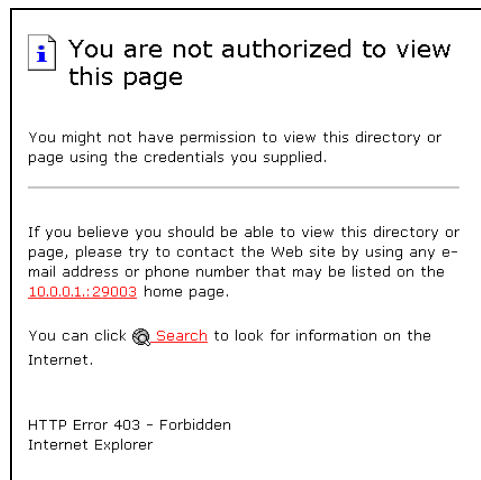
Limiting the access by using client IP addresses

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

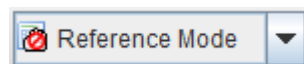
Add IP addresses to **IP Addresses of the Accessible Clients** on the **WebManager** tab in the **Cluster Properties** of the Builder.

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.

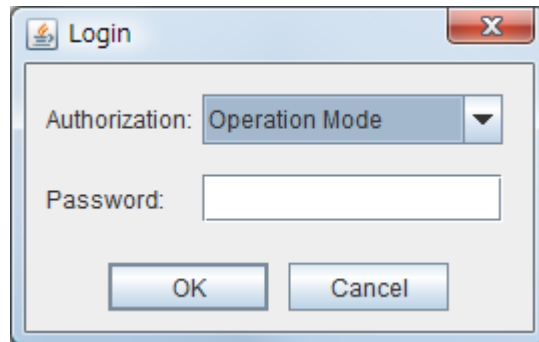
- ◆ Shutdown and shutdown reboot of a cluster
- ◆ Shutdown and shutdown reboot of servers
- ◆ Starting, stopping, and moving each group
- ◆ Change to operation mode
- ◆ Change to config mode
- ◆ Change to verification mode

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**.

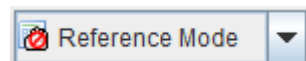
Once password limitation of the WebManager is set, the following authorization dialog box is displayed when trying to access the WebManager by setting a password.



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

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

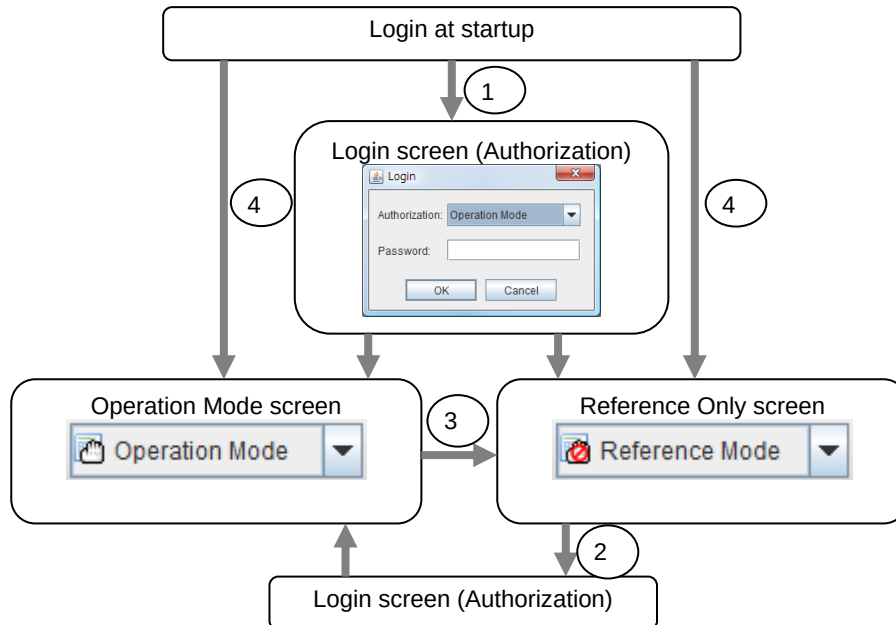
* Authorization cannot be selected.

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 how to perform cluster shutdown and cluster shutdown reboot from the WebManager, see “Objects of the cluster” on page 40.

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” on page 41.

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” on page 42.

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” on page 43.

Suspending and resuming a monitor resource

For the information on how to suspend and resume a monitor resource from the WebManager, see “Monitors object” on page 46.

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” on page 49.

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.

Level	Message	Cause	Solution
Error	Invalid configuration data.	Failed to acquire the cluster configuration data.	Check the information on the cluster configuration.
Error	Invalid group name.	An internal error of the WebManager occurred.	Perform reloading. If the error occurs even after reloading, restart the WebManager daemon.
Error	Invalid group name or server name.	An internal error of the WebManager occurred.	
Error	Invalid parameter.	An internal error of the WebManager occurred.	
Error	Invalid server name.	An internal error of the WebManager occurred.	
Error	An error occurred in server or group operation.	Some operations failed.	Run a command to check the server status. If there is no problem, you can continue your operations.
Error	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.

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

Level	Message	Cause	Solution
Error	There are groups that failed to stop.	There is a server that may have failed to shut down the cluster.	Check if the server has failed. If it has not failed, make sure that ExpressCluster is running.
Error	The value in "From" is incorrect. Enter the correct value.	The time set for the start of alert log search is invalid.	Set a correct time.
Error	The value set in "From" is later than the value in "To".	The time set for the start of alert log search is later than the time set for the end.	Set a correct time.
Info	The total number of pages has been changed. The server alert log will be updated.	The total number of pages of alert log search 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 by using the WebManager" on page 27)
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.

Level	Message	Cause	Solution
Error	Authorization failed. (Internal error.)	An internal error occurred when accessing to the WebManager.	Try logging on to WebManager again. Reboot the WebManager daemon if the error still occurs.
Error	Failed to connect to the server.	Failed to access to the WebManager.	Check if the WebManager is running on the server. Check if the WebManager can be connected to the server successfully.
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.	-

Level	Message	Cause	Solution
Confirmation	Are you sure you want to start "{0}"?	The confirmation message for starting a cluster daemon of some of the servers in the cluster. {0} is where the name of the server is described.	-
Confirmation	Are you sure you want to stop "{0}"?	The confirmation message for stopping a cluster daemon of some of the servers in the cluster. {0} is where the name of the cluster is described.	-
Confirmation	Are you sure you want to start "{0}"?	The confirmation message for starting some of the resources in the fail over group. {0} is where the name of the resource is described.	Note that the resources in dependency are also started.
Confirmation	Are you sure you want to stop "{0}"?	The confirmation message for stopping some of the resources in the fail over group. {0} is where the name of the resource is described.	Note that the resources in dependency are also stopped.
Error	Specified server name was not found.	The specified server is not found.	Click Reload 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 Reload, 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 Reload to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
Error	Failed to stop the cluster "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to suspend the cluster "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to resume the cluster "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to restart the manager service. Click Reload, 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 Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to stop the server "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
Error	Failed to suspend the monitor "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to resume the monitor "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to suspend the monitor. Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to resume the monitor. Click Reload, 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 Reload 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 Reload, 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 Reload to display the latest status of a cluster, and try again.

Level	Message	Cause	Solution
Error	Failed to stop the resource "{0}". Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to suspend any monitor. Click Reload, 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 Reload to display the latest status of a cluster, and try again.
Error	Failed to resume any monitor. Click Reload, 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 Reload 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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• Details on the Builder screen	84
• Pop-up menu.....	92
• Using a tool bar of the Builder	93
• Using the menu bar of the Builder.....	94
• File menu	94
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• Server properties.....	143
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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 3.1 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 130 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

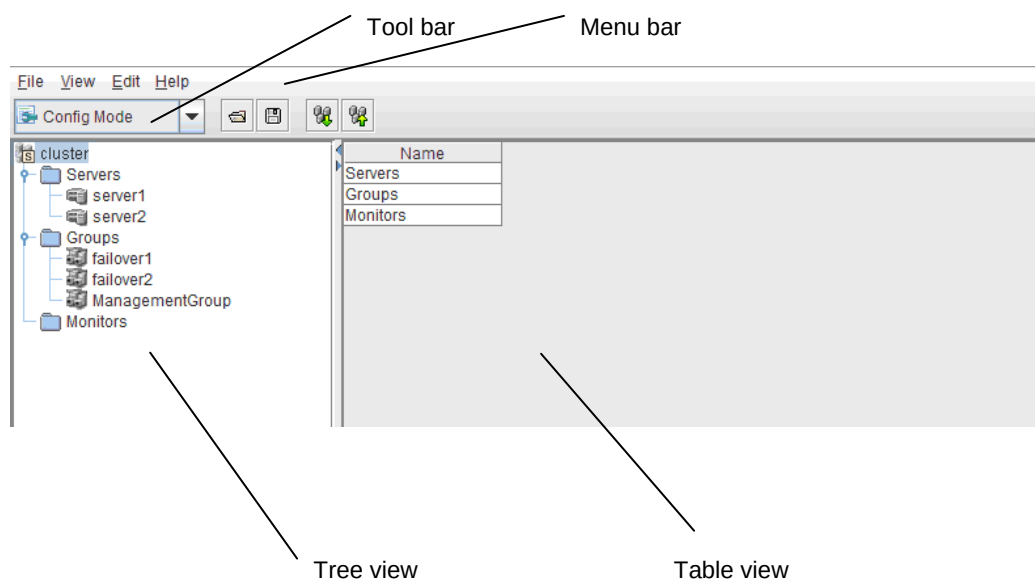
- ◆ If you change the screen resolution while the Builder is running, the Java VM stack trace (example: `NullPointerException`) may be logged on the Java console. The Builder can keep running.
- ◆ If you press **Esc** while a pull-down menu of your browser is displayed, the Java VM stack trace (example: `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 136), 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 Internet Explorer is used, disable **Protected Mode** on the security setting of Internet Explorer.
- ◆ 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	server1 server2	Represents each server	Displays server names.
2	Groups	Represents a set of groups in the clusters	Displays groups.
3	failover1 failover2 ManagementGroup	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.

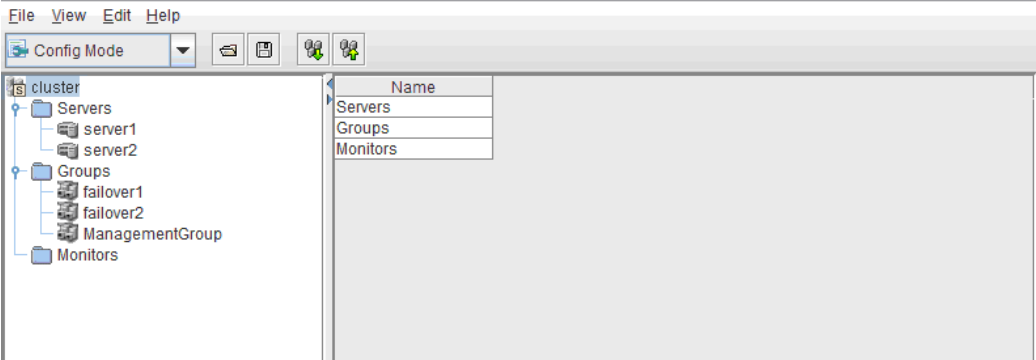
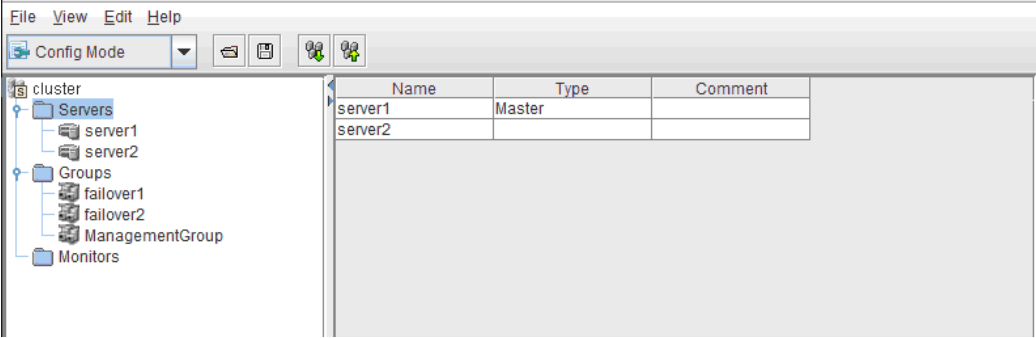


Table for server selection

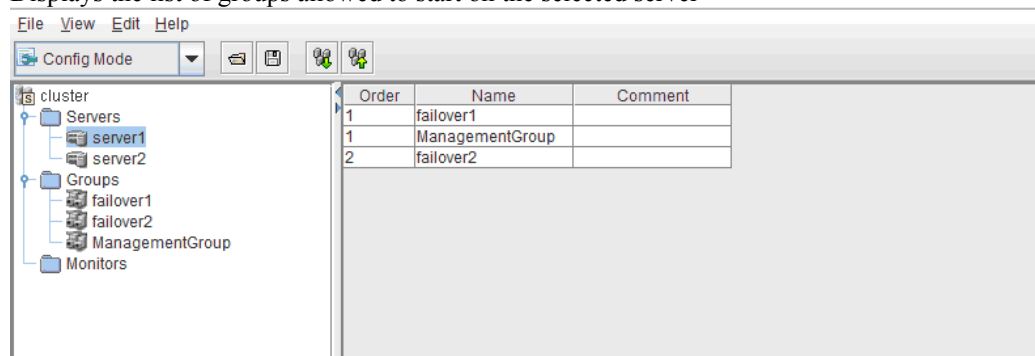
Displays the failover priorities of the groups.



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

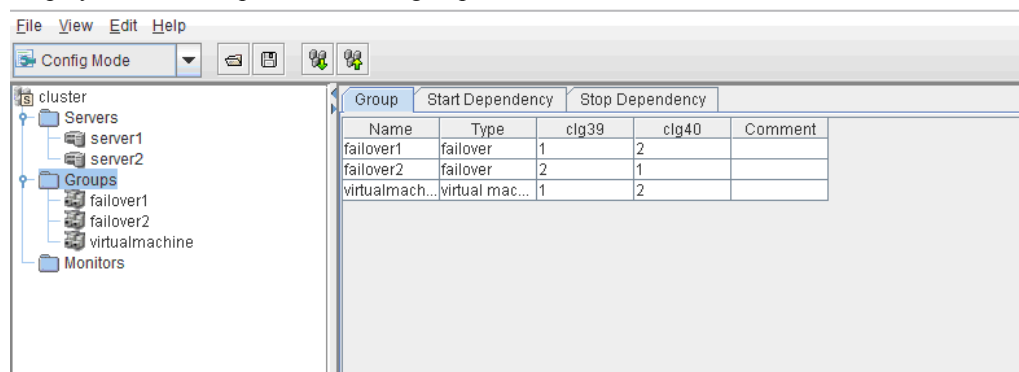


Column name	Overview
Order	Displays the server priority. The groups in the name cells start on servers in this order. "1" is displayed for the top priority. This list is displayed in the descending order of priority.
Name	Displays the group name.
Comment	Displays comments specified for the group.

Table for group selection

Group list

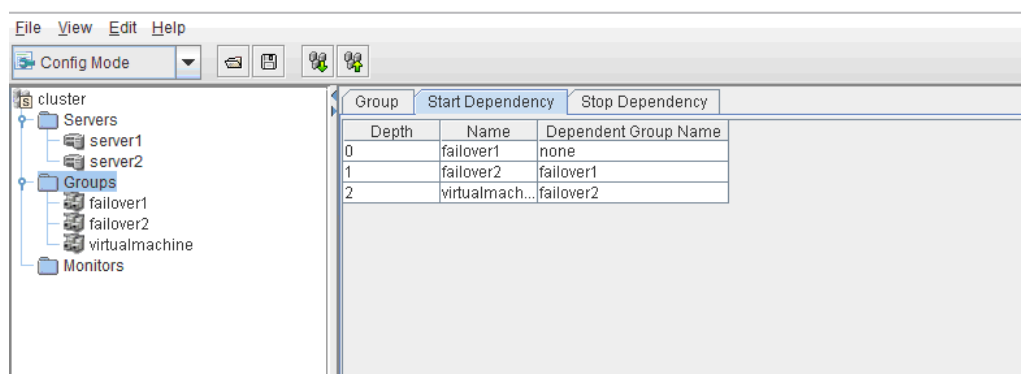
Displays the failover priorities of the groups.



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.

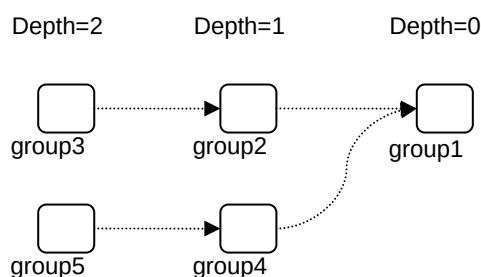
Start dependence

The dependencies included in the group start dependence are listed.



Column name	Overview
Depth	Represents the target start order of groups in the name cells. If start dependence is not applied to any group, "0" is displayed. Groups are displayed in the depth order.
Name	Displays group names.
Dependent Group Name	Displays the group start dependence names in the name cells. If start dependence is not applied to any group, "none" is displayed. If there are multiple start dependence groups, they are displayed on separate rows.

The levels of depth are illustrated below. Arrows (->) in the figure represent group start dependence targets.

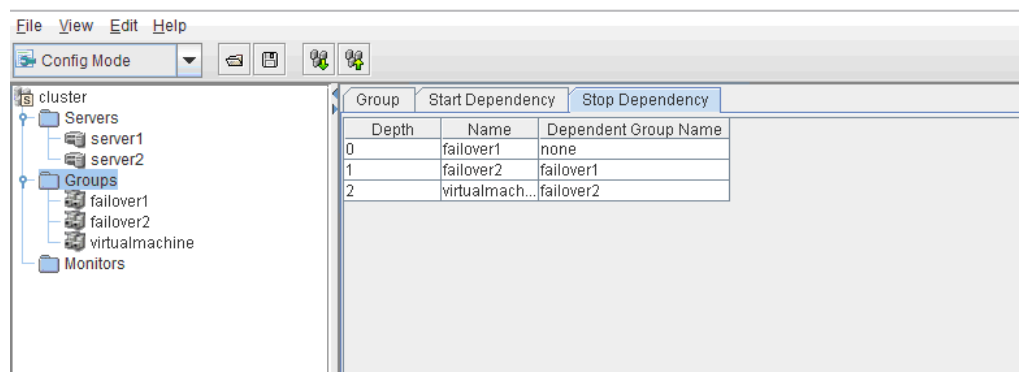


The dependencies represented by this figure are listed below.

Depth	Name	Start dependence group name
0	group1	none
1	group2	group1
1	group4	group1
2	group3	group2
2	group5	group4

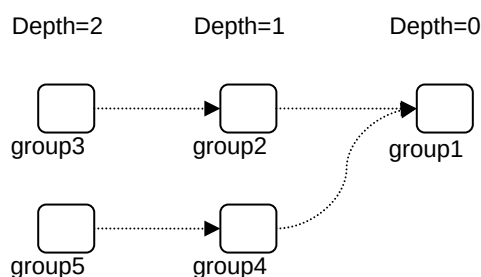
Stop dependence

The dependencies included in the group stop dependence are listed.



Column name	Overview
Depth	Represents the target stop order of groups in the name cells. If stop dependence is not applied to any group, "0" is displayed. Groups are displayed in the depth order.
Name	Displays group names.
Dependent Group Name	Displays the group stop dependence names in the name cells. If stop dependence is not applied to any group, "none" is displayed. If there are multiple stop dependence groups, they are displayed on separate rows.

The levels of depth are illustrated below. Arrows (->) in the figure represent group stop dependence targets.



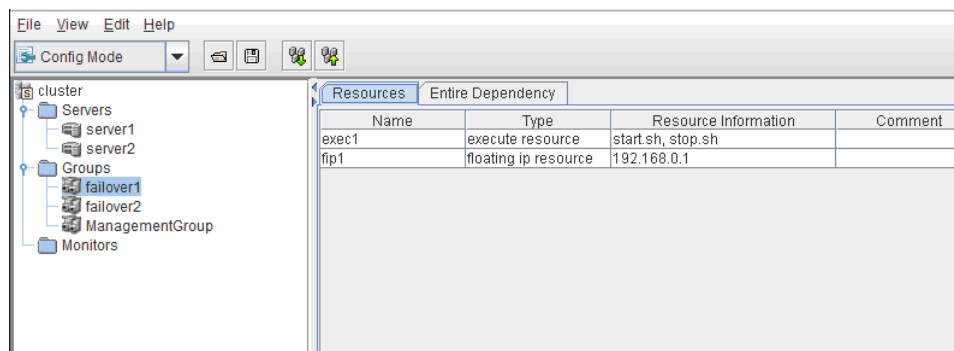
The dependencies represented by this figure are listed below.

Depth	Name	Stop dependence group name
0	group1	none
1	group2	group1
1	group4	group1
2	group3	group2
2	group5	group4

Table for group name selection

Resources

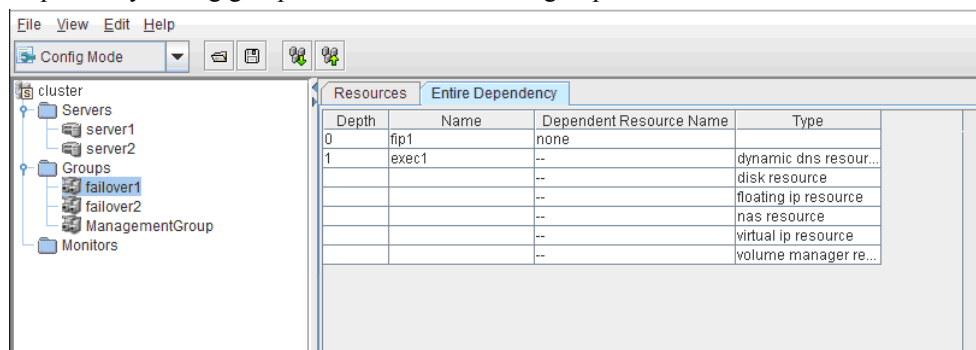
Group resources in the selected group are listed.



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.

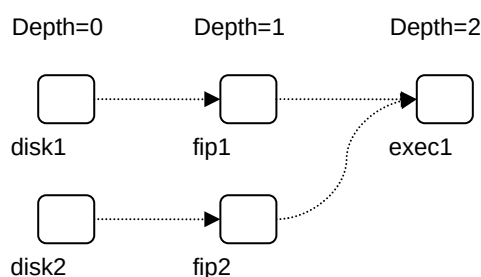
Dependency List

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.

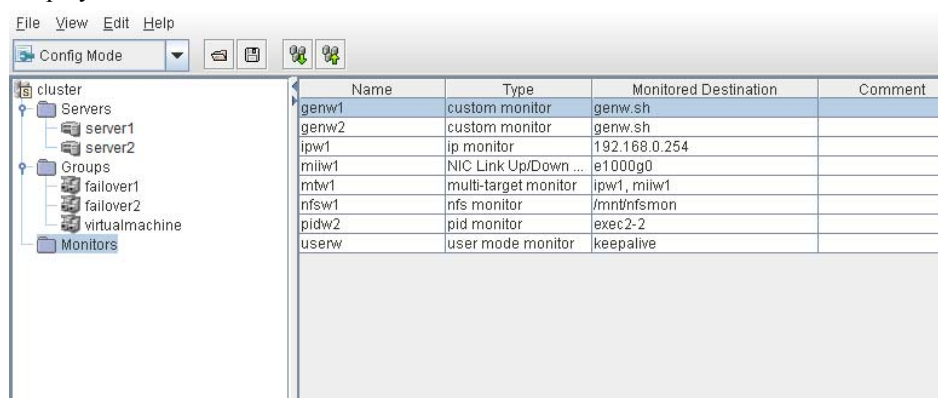


The dependencies in this figure are listed below. These are not the default dependencies, but specified with resource names.

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.



The screenshot shows the 'Config Mode' window of the ExpressCluster Builder. On the left is a tree view with 'cluster' expanded, showing 'Servers' (server1, server2), 'Groups' (failover1, failover2, virtualmachine), and 'Monitors'. The main pane displays a table with the following data:

Name	Type	Monitored Destination	Comment
genw1	custom monitor	genw.sh	
genw2	custom monitor	genw.sh	
lpw1	ip monitor	192.168.0.254	
mliw1	NIC Link Up/Down ...	e1000g0	
mtw1	multi-target monitor	lpw1, mliw1	
nfsw1	nfs monitor	/mnt/nfsmon	
pidw2	pid monitor	exec2-2	
userw	user mode monitor	keepalive	

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 96)
 <i>cluster_name</i>	Remove Cluster	Removing an object (on page 105)
	Rename Cluster	Renaming an object (on page 106)
	Properties	Properties (on page 106)
 Servers	Server Definition	Definition (on page 104)
	Properties	Properties (on page 106)
 <i>server_name</i>	Remove Server	Removing an object (on page 105)
	Rename Server	Renaming an object (on page 106)
	Properties	Properties (on page 106)
 Monitor Resources	Add monitor resource	Adding an object (on page 104)
 Groups	Add Group	Adding an object (on page 104)
	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 104)
	Remove Group	Removing an object (on page 105)
	Rename Group	Renaming an object (on page 106)
	Properties	Properties (on page 106)
<i>group_resource_name</i>	Remove Resource	Removing an object (on page 105)
	Rename Resource	Renaming an object (on page 106)
	Properties	Properties (on page 106)
<i>monitor_resource_name</i>	Remove Monitor Resource	Removing an object (on page 105)
	Rename Monitor Resource	Renaming an object (on page 106)
	Properties	Properties (on page 106)

Using a tool bar of the Builder

The Builder provides a toolbar:



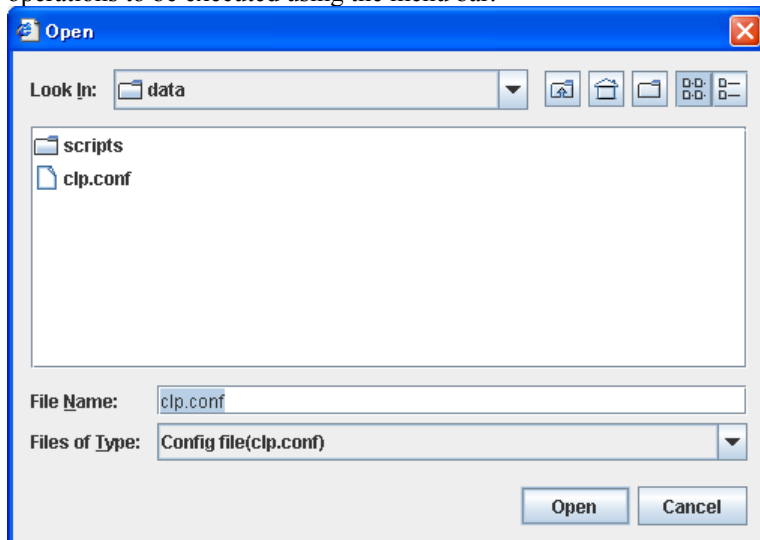
For details about the icons used to switch to the operation mode, the config mode, or the reference mode, which are common to the WebManager, see “Window of the WebManager Main pane of WebManager Toolbar” in Chapter 1, “Functions of the WebManager” in this guide.

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 96)
	Saves a file. This is the same as clicking File on the menu bar and then selecting Save .	“Saving the configuration file” (on page 97)
	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 97)
	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 98)

Using the menu bar of the Builder

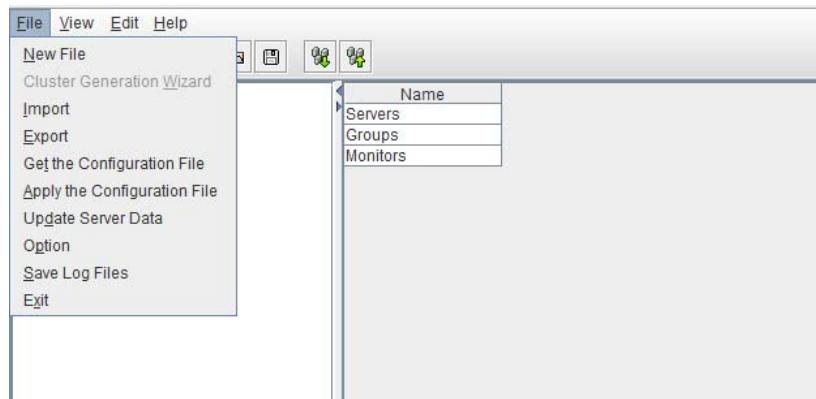
You can perform various operations by using the menu bar of the Builder. This topic explains the operations to be executed using the menu bar.



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 97.
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*.

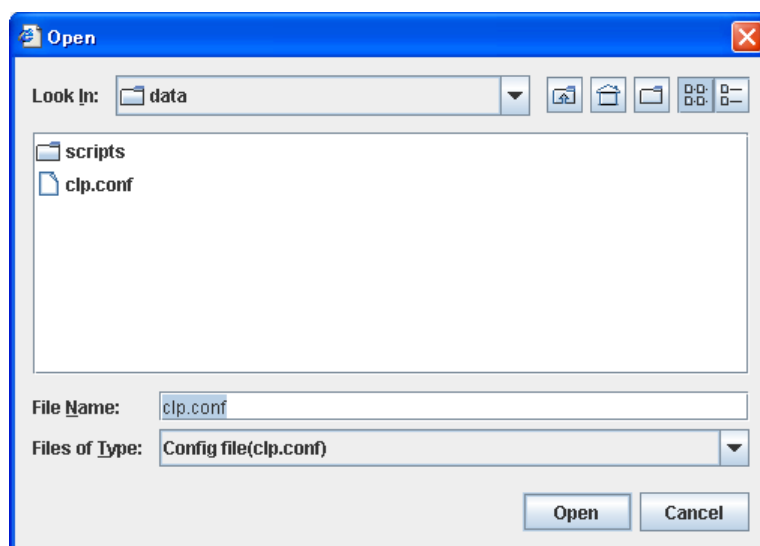
Opening the configuration file

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

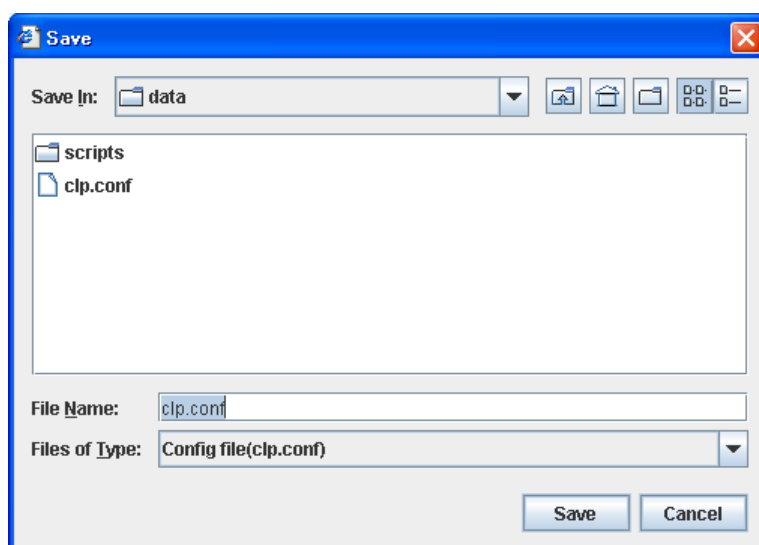
Click **Export** to save the cluster configuration data you are editing. This menu becomes available if you have created a cluster configuration data. Save the file as “clp.conf.”

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 97.

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 details, see “Creating a cluster and backing up configuration data (clpcfctrl command)” in Chapter 3 “ExpressCluster command reference” in this guide.

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 ore more servers that cannot be connected to. To apply cluster configuration information forcibly, run the clpcfctrl command on the server.	Since there is a server that cannot be connected to exist in the cluster, uploading the cluster configuration data has been cancelled. Make sure that all the servers in the cluster have been started, and then upload the cluster configuration data. If you want to upload the cluster configuration data forcibly even though there is a server that cannot be connected in the cluster, see “Creating a cluster and backing up configuration data (clpcfctrl command)” in Chapter 3 “ExpressCluster command reference” in this guide.
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.

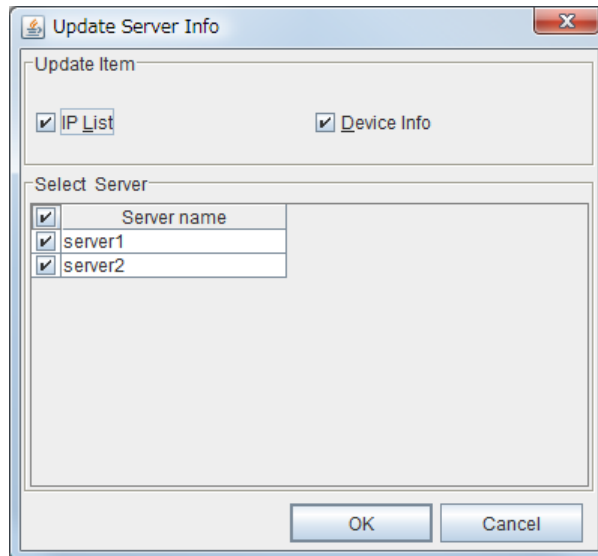
```
clpcfctrl --push -x "Directory where the cluster configuration data
has been saved" --force
```

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

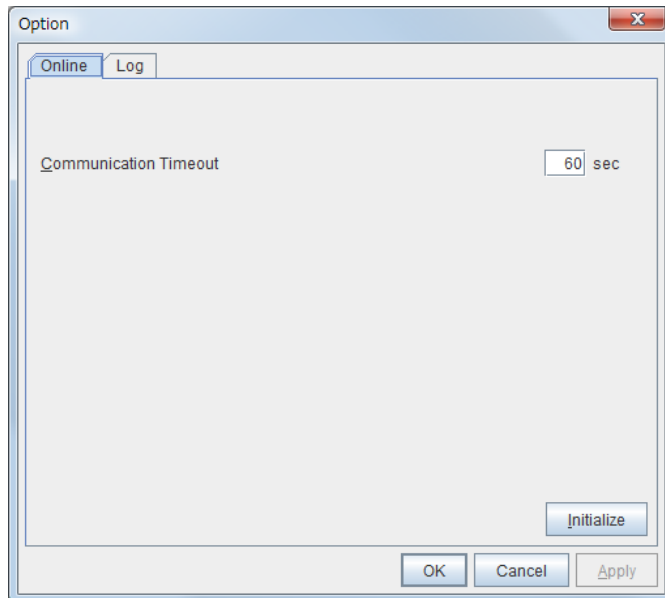
- ◆ IP List
Get the IP address list.
- ◆ Device Info
Get the device information of disk and COM.

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.

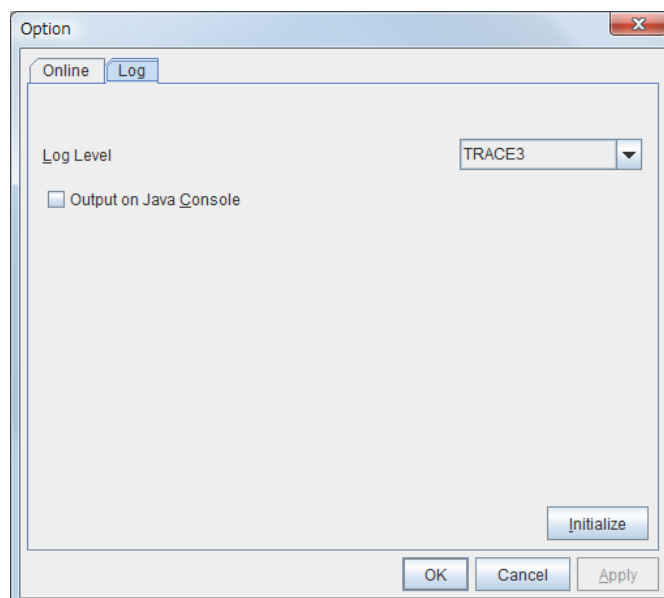


Communication Timeout (0 to 999)

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.

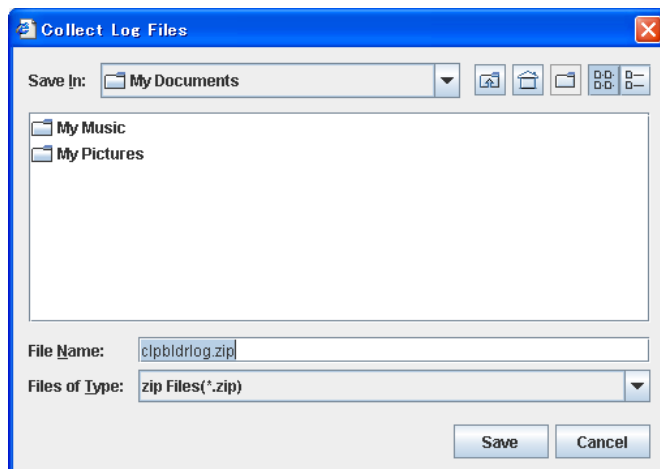
- **ERROR**
Select this to read only error-level logs.
- **WARNING**
Select this to read warning-level and error-level logs.
- **INFORMATION**
Select this to read information-level, warning-level, and error-level logs.
- **TRACE1,2,3**
Select this to read logs of internal trace, and those from the information, 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 97.

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

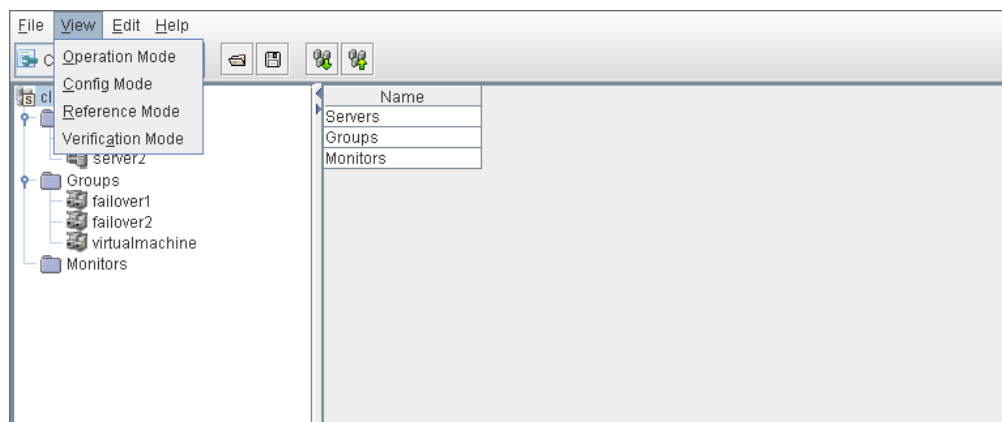
Exit from the Builder discarding the changes you made in the cluster configuration data.

View menu

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

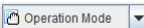
View menu is not displayed on offline version.

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



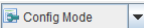
Operation Mode

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.

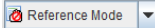
Configuration Mode

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.

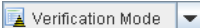
Reference Mode

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

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

Verification Mode

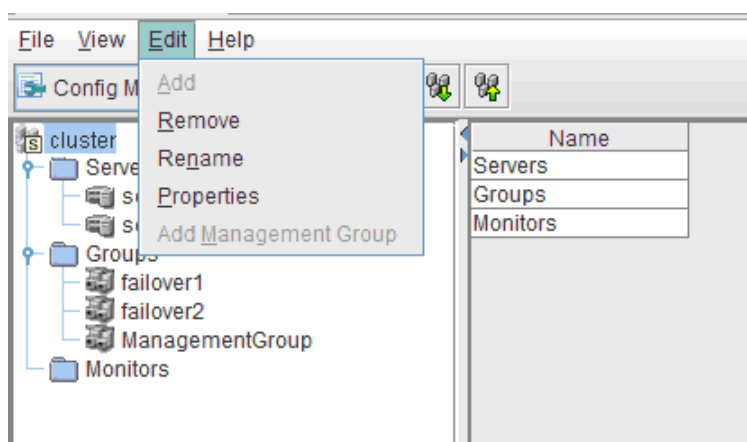
Switches from the currently displayed mode to the WebManager verification mode.

This is the same as clicking 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
<i>group_name</i>	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” on page 96.

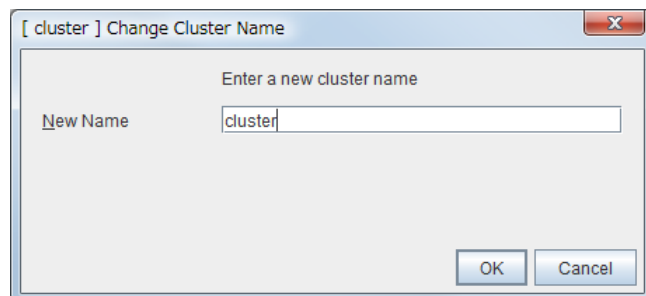
You cannot remove an object if any of the following conditions is met:

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 for changing the server name, see Chapter 9, "The system maintenance information" in this 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 107.

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**.

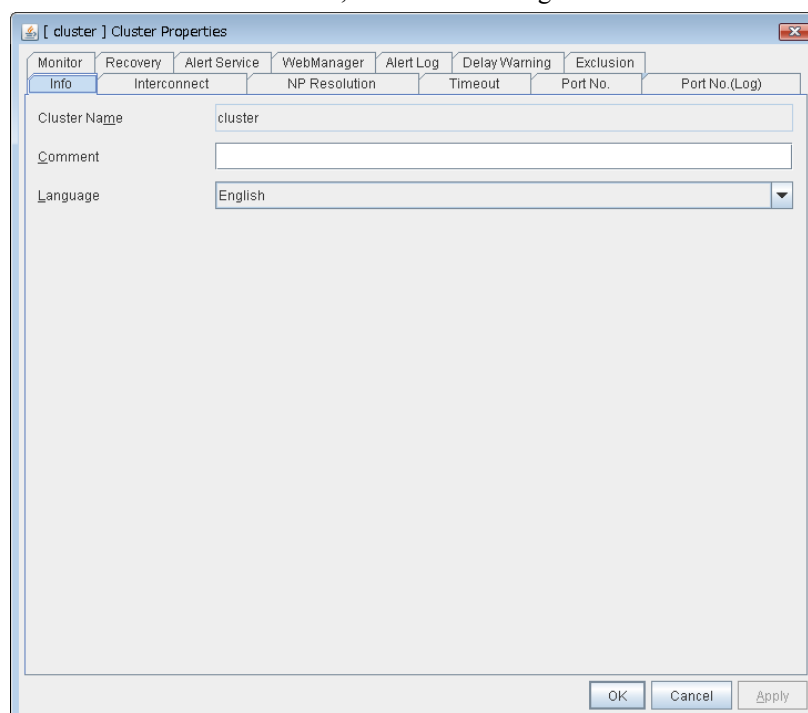
Parameter details

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

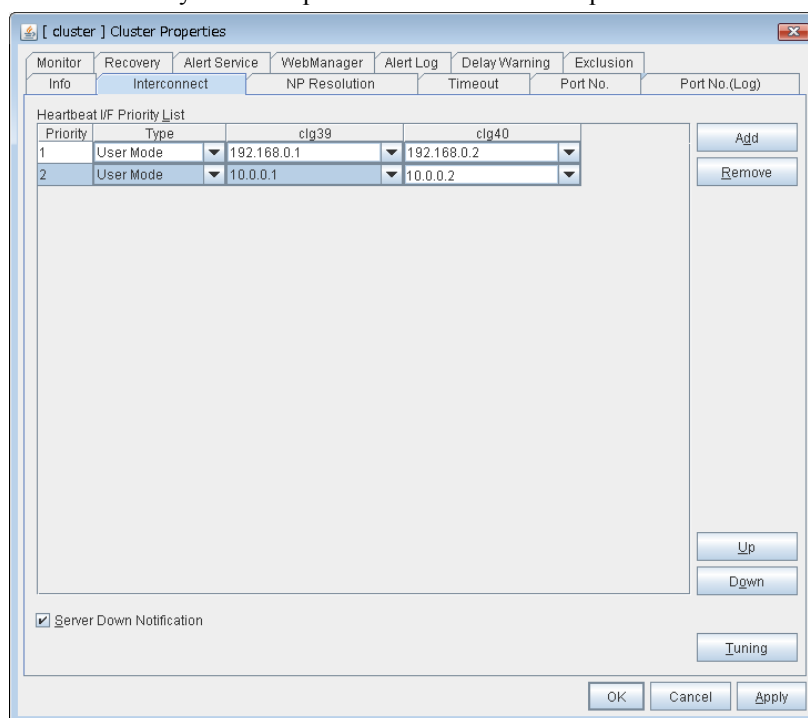
WebManager and the results of clpstat command are displayed in the language set in the **Language** settings on the cluster properties.

* 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.

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.

◆ User Mode

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.

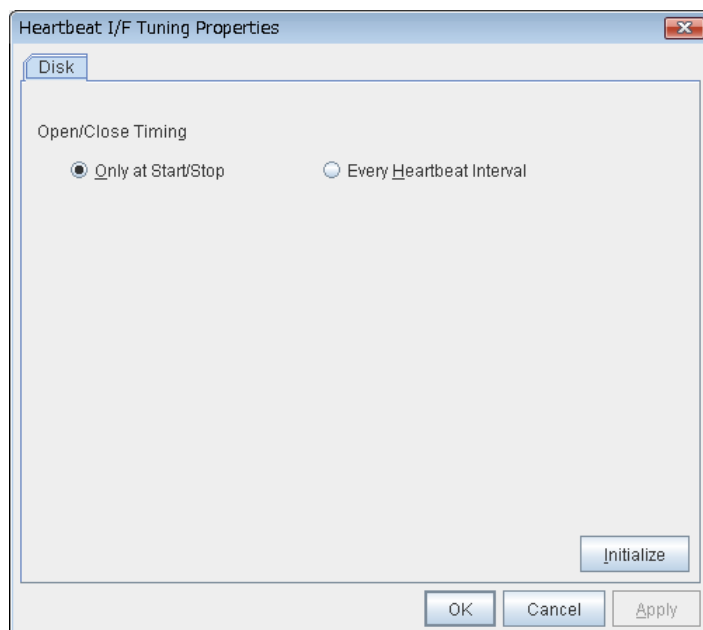
When there is a failure to deactivate groups when a server stops (including a shutdown or reboot), or when other abnormalities occur, other servers are not notified of the server that went down regardless of the server down notification settings.

◆ 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.

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

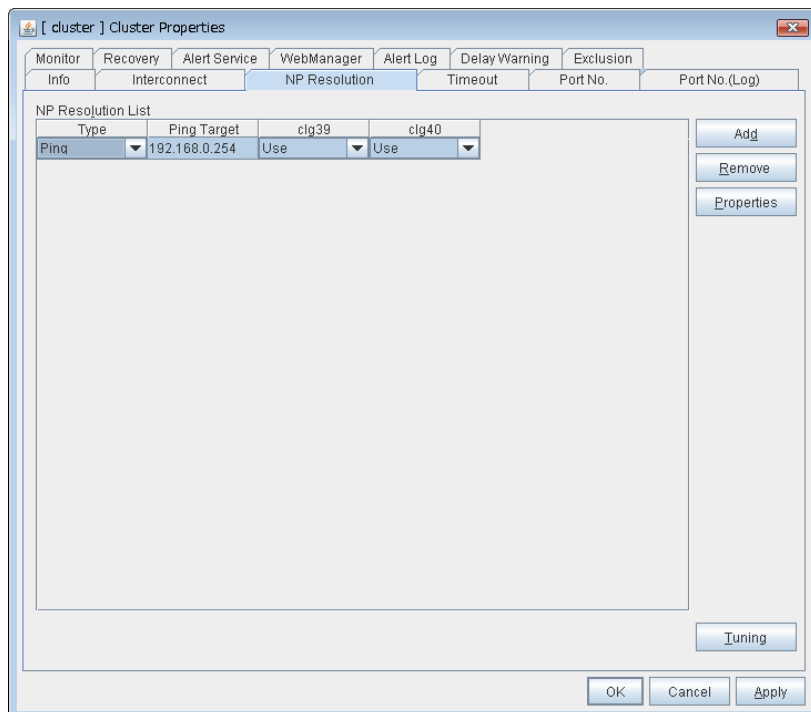
- (1). Only at Start/Stop
Opens raw device when a cluster starts and close it when a cluster stops. Performs only reads and writes of raw device at each heartbeat interval.
- (2). Every Heartbeat Interval
Opens raw device when a cluster starts, and closes it when a cluster stops. Performs open, reads,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

◆ Initialize

Set the open/close timing to the default values.

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

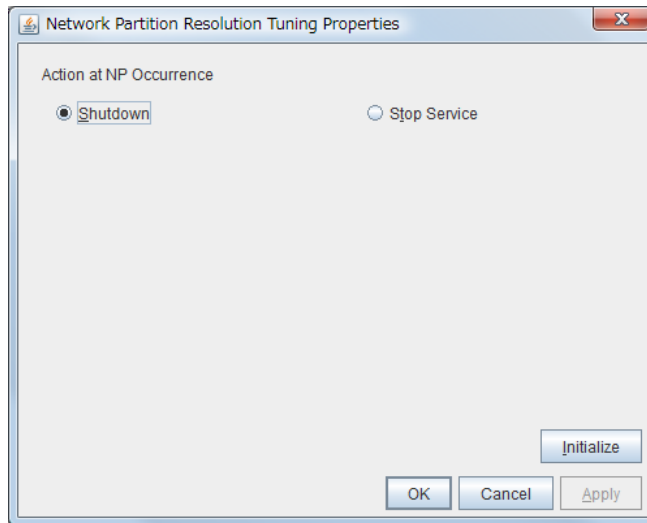
The screenshot shows the 'Ping NP Properties' dialog box. It is divided into three main sections:

- Interface:** Contains a table with two columns: 'No' and 'IP Address'. The first row has '1' and '192.168.0.254'. To the right of the table are 'Add' and 'Remove' buttons.
- IP Address:** Contains a table with one column: 'IP Address'. The first row has '192.168.0.254'. To the right of the table are 'Add', 'Remove', and 'Edit' buttons.
- Detailed Settings:** Contains three input fields: 'Interval' (set to 5 sec), 'Timeout' (set to 3 sec), and 'Retry Count' (set to 3 time). Below these fields is an 'Initialize' button.

At the bottom of the dialog 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.

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 116), this timeout should be longer than the time it takes to shut down applications and the operating system.

Server Internal Timeout (1 to 9999)

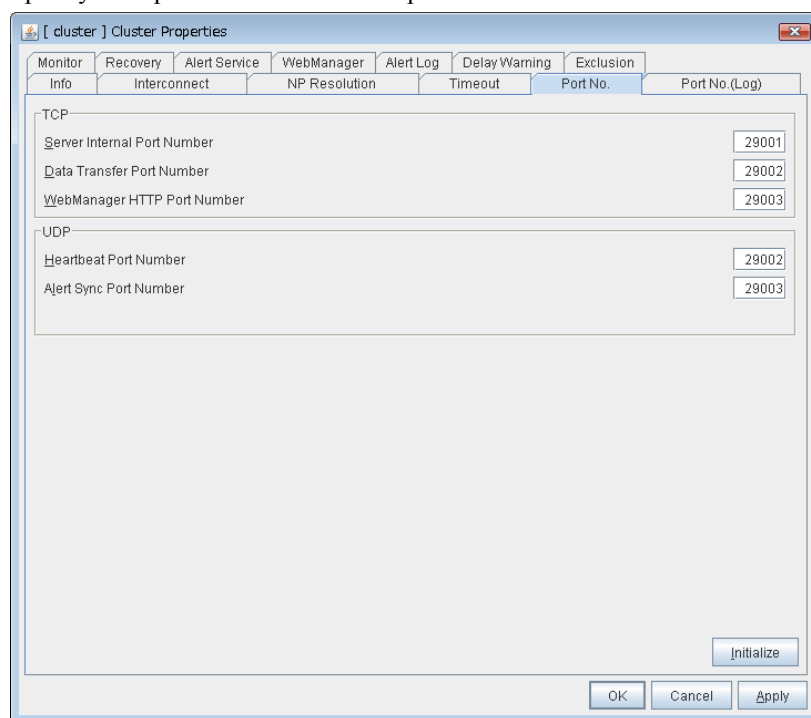
The timeout to be used in the ExpressCluster Server internal communications.

Initialize

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

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.

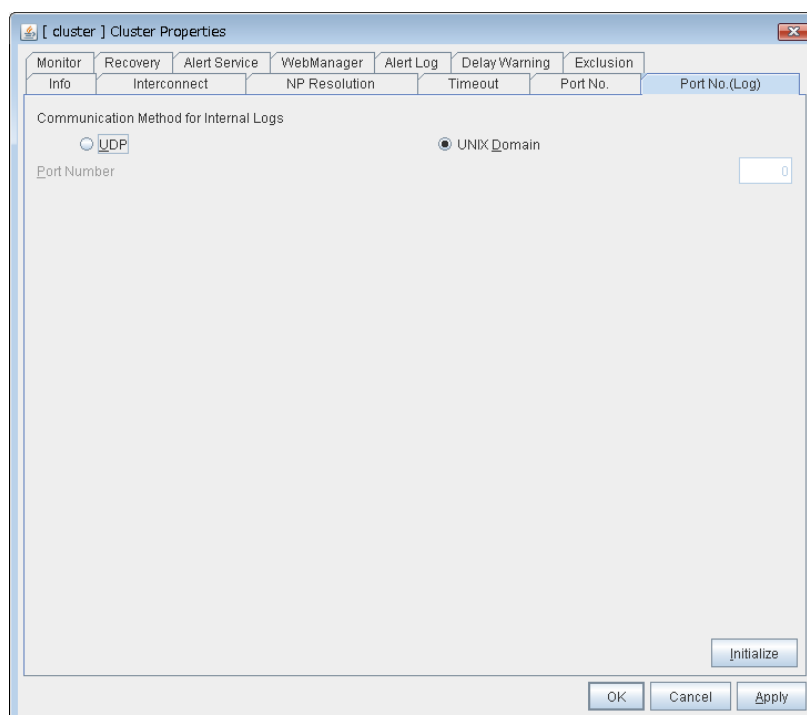
Initialize

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

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 Number³(1 to 65535)

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

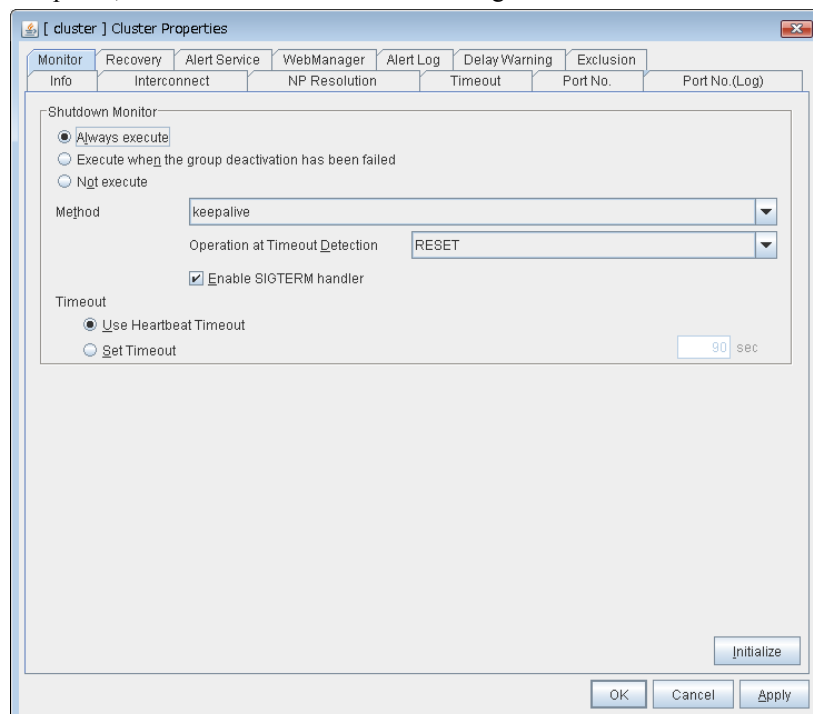
Initialize

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

³ It is strongly recommended not to use well-known ports, especially reserved ports from 1 to 1023.
Section I Detailed reference of ExpressCluster functions

Monitor tab

Configure the settings for monitoring. For details on the shutdown monitor and reboot limit, see Chapter 5, “Monitor resource details” in this guide.



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.

◆ Always execute:

If selected, the shutdown monitor is performed. For the heartbeat time-out, specify a longer time than the time required to shut down every application and the operating system (see “Timeout tab” on page 115). If you use shared disks, it is recommended to select **Always execute**.

◆ Execute when the group deactivation has been failed:

The shutdown monitor is applied only when a group cannot be deactivated. For the heartbeat time-out, specify a longer time than the time required to shut down every application and the operating system (see “Timeout tab” on page 115).

◆ **Not execute:**

If selected, the shutdown monitor is not performed.

- **Method**

Select the shutdown monitor method from:

- **keepalive**

For details on the shutdown monitoring method, see “Shutdown monitoring Shutdown monitoring method” in Chapter 8, “Information on other monitoring settings” in this guide.

- **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 the SIGTERM settings, see “Shutdown monitoring Setting of SIGTERM” in Chapter 8, “Information on other monitoring settings” in this guide.

- **Use Heartbeat Timeout**

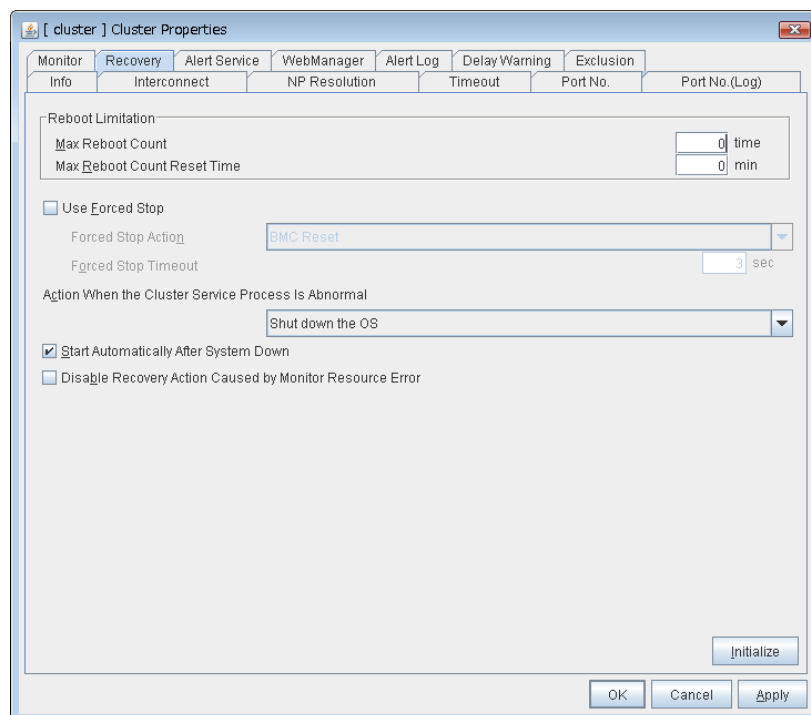
Select this for heartbeat timeout to work in conjunction with shutdown monitoring timeout.

- **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

Action When the Cluster Service Process Is Abnormal

Specify the action when a cluster service process error occurs.

- OS shutdown
Shut down the OS.
- OS reboot
Reboot the OS.

Start Automatically After System Down

Set whether to prohibit automatic startup of the cluster service at the next OS startup when the server has been stopped by a means other than cluster shutdown or cluster stop, or when cluster shutdown or stop does not terminate normally.

Disable Recovery Action Caused by Monitor Resource Error

- When the checkbox is selected
The recovery action is disabled when the monitor resource is error.
- When the checkbox is cleared
The recovery action is enabled when the monitor resource is error.

Alert Service tab

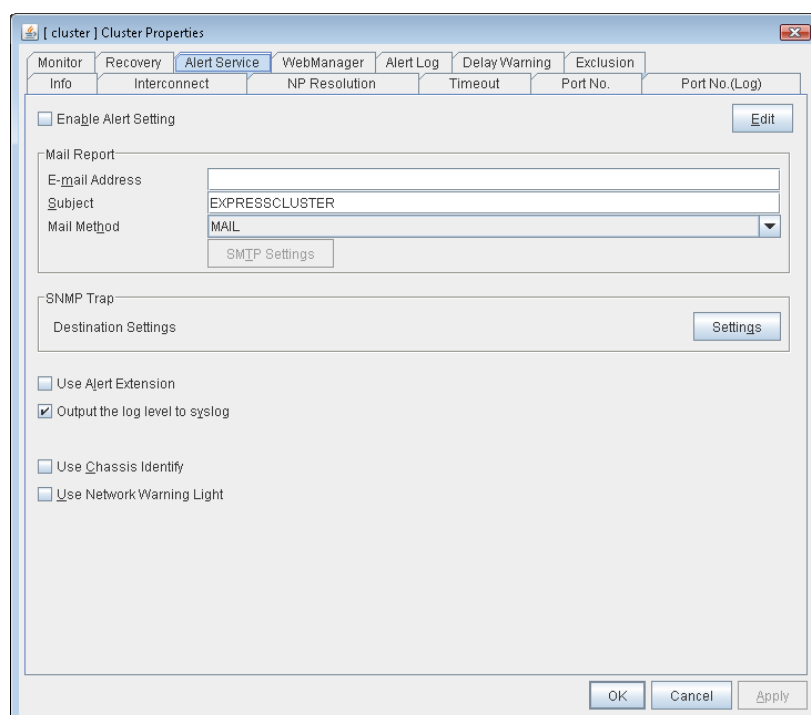
Configure the settings for the mail report function, the network warning light, alert report destination, and SNMP trap transmission.

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 3.1 for Solaris.



Enable Alert Setting

Configure whether to modify the alert destination from the default value. To modify the alert report destination, click **Edit** to configure the address.

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

For details on the default alert destination, see “Messages reported by syslog, alert and mail” in Chapter 11, “Error messages”.

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.

Destination Settings

Configure the SNMP trap transmission function. Click **Setting** to configure the SNMP trap transmission destination.

Use Alert Extension

Configure whether or not to execute an optional command when ExpressCluster sends an alert. To use the Alert Extension function, select the **Enable Alert Setting** checkbox 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

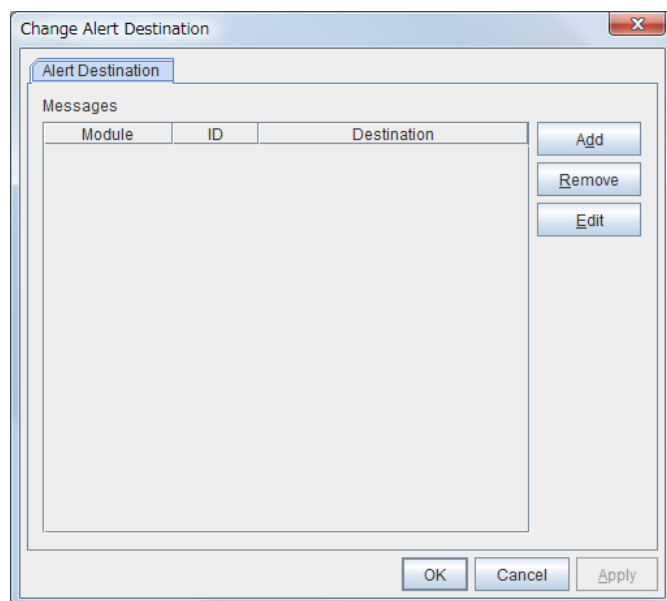
Configure whether or not to enable **Use Chassis Identify**.

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.

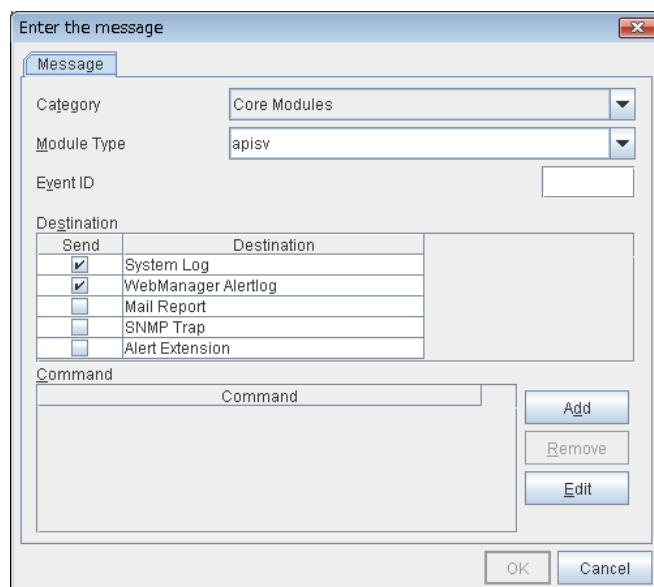
Change Alert Destination

Click **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 details on the event ID, see “Messages reported by syslog, alert, and mail” in Chapter 11, “Error messages” in this guide.

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

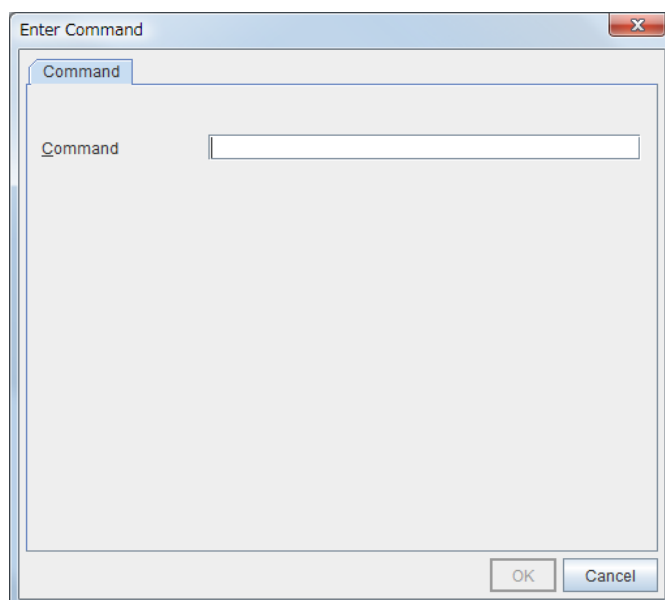
This sends message by the Alert Extension function. Modify the extension settings using **Add** and **Edit**.

◆ SNMP Trap

Uses the SNMP trap transmission function to send messages.

Add

Add a command of the alert extension function. Click **Add** to display the **Enter Command** dialog box. 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

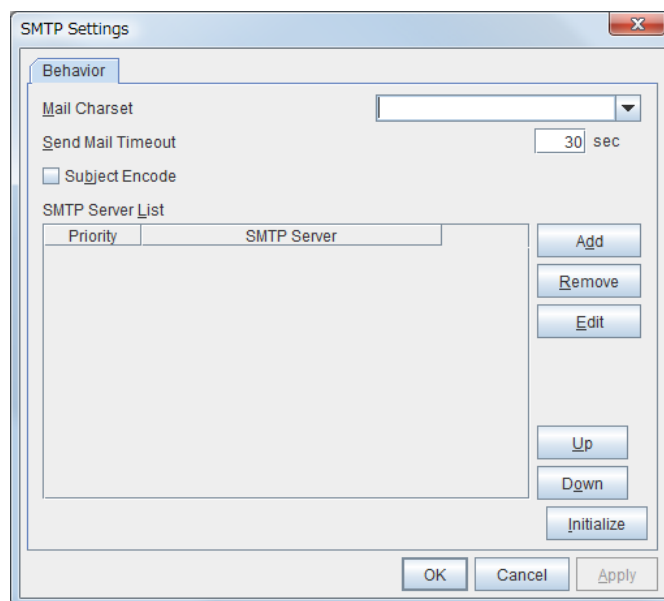
Click this to remove a command of alert extension function. Select the command and click **Remove**.

Edit

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

SMTP Settings

Click **SMTP Settings** 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

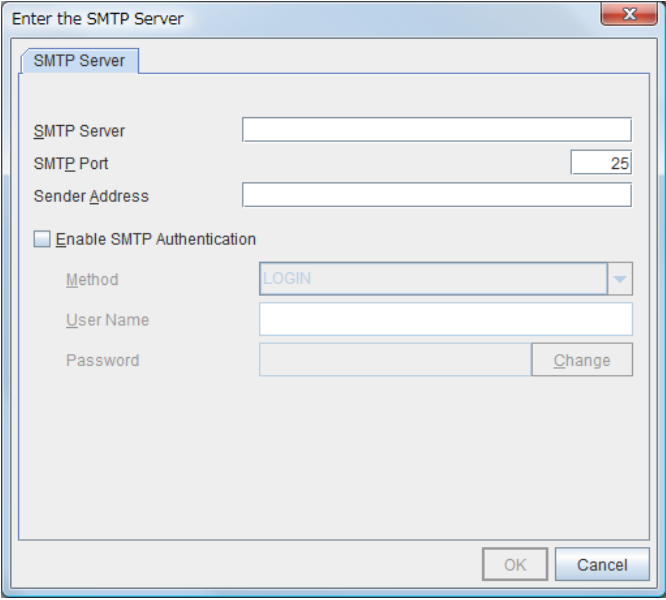
Use this button to add a SMTP server. Click **Add** to display the **Enter the SMTP Server** dialog box.

Remove.

Use **Remove** to remove the SMTP server settings.

Edit

Use **Edit** to modify the SMTP server settings.

A screenshot of a Windows-style dialog box titled "Enter the SMTP Server". The dialog has a tab labeled "SMTP Server". Inside, there are several input fields: "SMTP Server" (a text box), "SMTP Port" (a text box with "25" entered), "Sender Address" (a text box), "Enable SMTP Authentication" (a checkbox), "Method" (a dropdown menu showing "LOGIN"), "User Name" (a text box), and "Password" (a text box with a "Change" button next to it). At the bottom right, there are "OK" and "Cancel" buttons.**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)

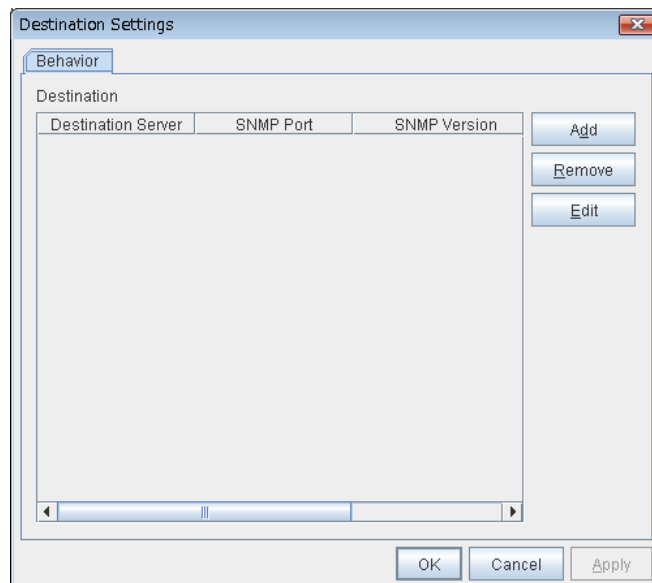
Configure the password used for SMTP authentication.

Remove

Select this to remove the SMTP server.

Edit

Use this button to modify the settings of SMTP server.



Destination

Displays the set SNMP trap transmission destinations. With this version, up to 255 SNMP trap transmission destinations can be set.

Add

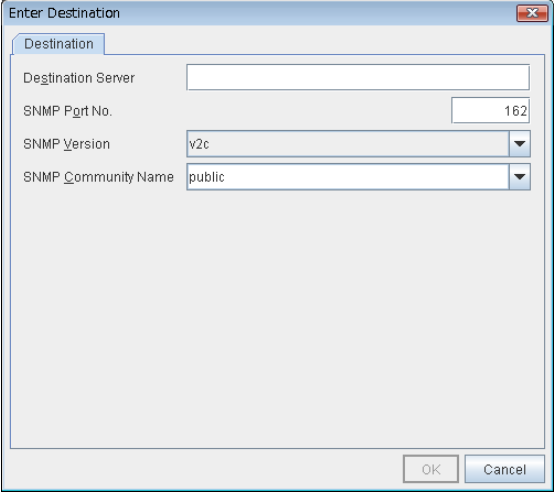
Adds an SNMP trap transmission destination. Click **Add** to display the **Change SNMP Destination** dialog box.

Remove

Use **Remove** to remove the SNMP trap transmission destination settings.

Edit

Use Edit to modify the SNMP trap transmission destination settings.

A screenshot of a Windows-style dialog box titled "Enter Destination". It has a tab labeled "Destination". Inside the dialog, there are four fields: "Destination Server" (a text box), "SNMP Port No." (a text box containing "162"), "SNMP Version" (a dropdown menu showing "v2c"), and "SNMP Community Name" (a dropdown menu showing "public"). At the bottom right of the dialog are "OK" and "Cancel" buttons.

Destination Server (up to 255 bytes)

Configure the name of the SNMP trap transmission destination server.

SNMP Port No. (1-65535)

Configure the port number of the SNMP trap transmission destination.

SNMP Version

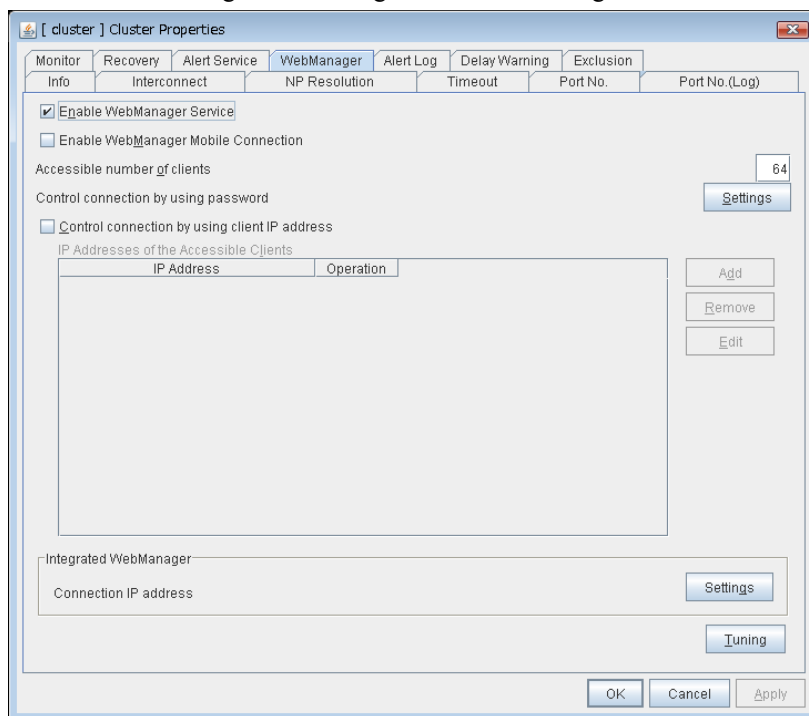
Configure the SNMP version of the SNMP trap transmission destination.

SNMP Community Name (up to 255 bytes)

Configure the SNMP community name of the SNMP trap transmission destination.

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.

Enable WebManager Mobile Connection

Enables the WebManager Mobile Connection.

◆ When selected:

The WebManager Mobile is enabled.

◆ When cleared:

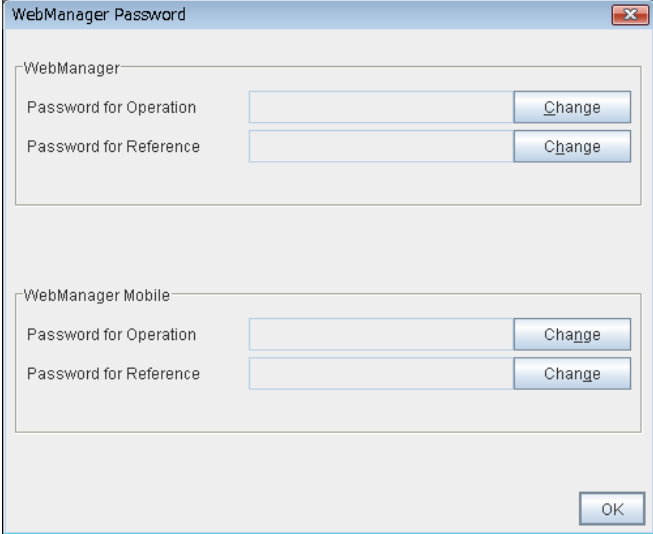
The WebManager Mobile is disabled.

Accessible number of clients (1 to 999)

Specify the number of client machines that can be connected.

Control connection by using password

Click **Settings** to display the **WebManager Password** dialog box.



The **WebManager Password** dialog box contains two sections: **WebManager** and **WebManager Mobile**. Each section has two text input fields: **Password for Operation** and **Password for Reference**. To the right of each field is a **Change** button. At the bottom right of the dialog is an **OK** button.

WebManager

◆ Password for Operation

Set a password that must be entered to enable connection to the WebManager in operation mode, config mode, or simulate mode.

Click **Change** to display the **Change Password** dialog box.

◆ Password for Reference

Set a password that must be entered to enable connection to the WebManager in reference mode. Click **Change** to display the **Change Password** dialog box.

WebManager Mobile

◆ Password for Operation

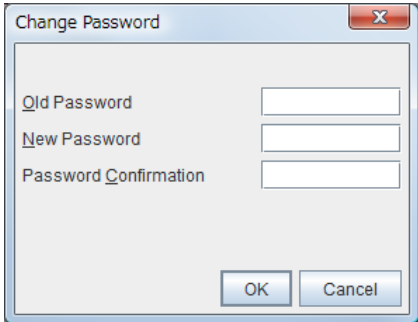
Set a password that must be entered to enable connection to the WebManager Mobile in operation mode.

Click **Change** to display the **Change Password** dialog box.

◆ Password for Reference

Set a password that must be entered to enable connection to the WebManager Mobile in reference mode. Click **Change** to display the **Change Password** dialog box.

Click **Change** to display the **Change Password** dialog box.



The **Change Password** dialog box contains three text input fields: **Old Password**, **New Password**, and **Password Confirmation**. At the bottom of the dialog are **OK** and **Cancel** buttons.

- **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**.

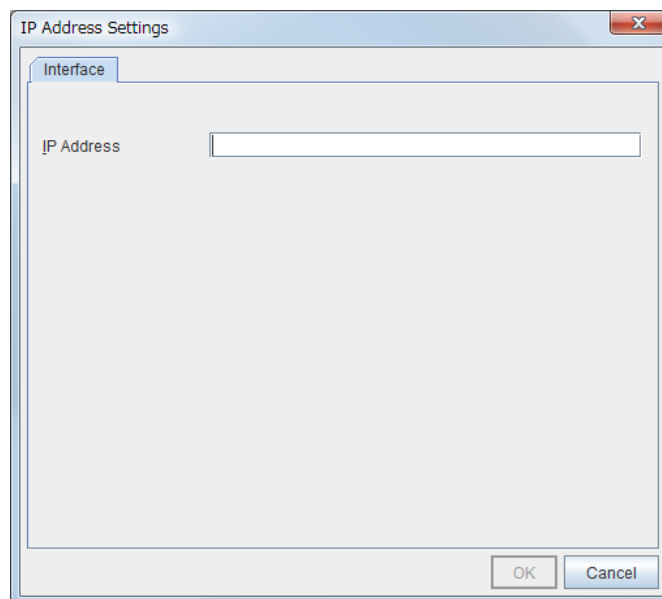
Control connection by using client IP address

If selected, accesses are controlled by client IP addresses.

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

Add

Use **Add** to add an IP address in **IP Addresses of the Accessible Clients**. Click **Add** to display the **IP Address Settings** dialog box. 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 the IP address you want to remove from **IP Addresses of the Accessible Clients** and click **Remove**.

Edit

Use **Edit** to edit an IP address. Select the IP address you want to edit from **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`.

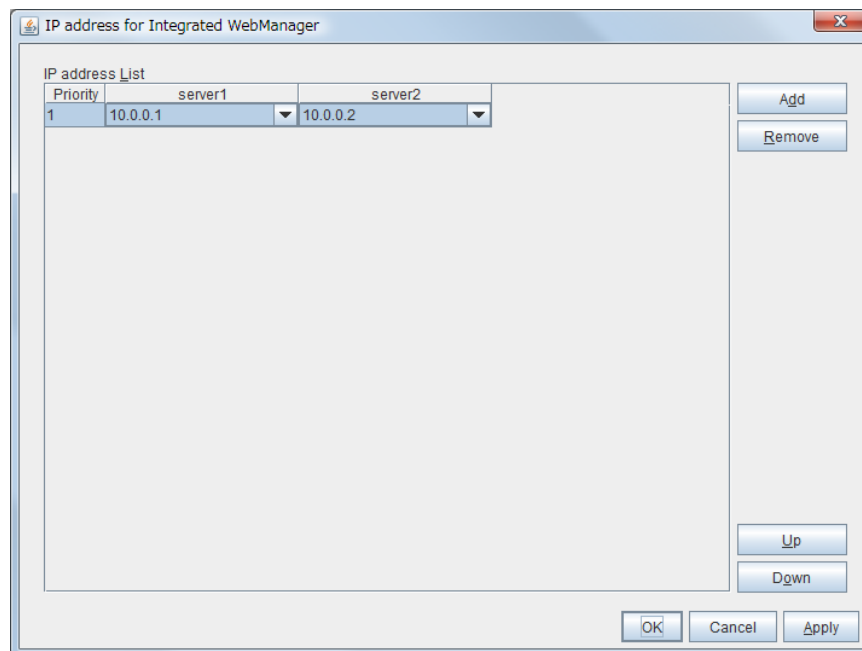
Control connection by using client IP address

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

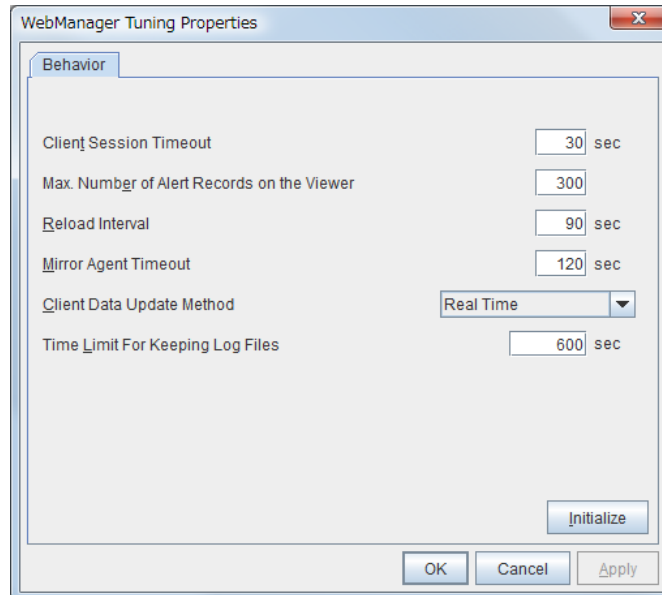
Click the **Settings** button to open the IP address dialog box for the Integrated WebManager.



- ◆ 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

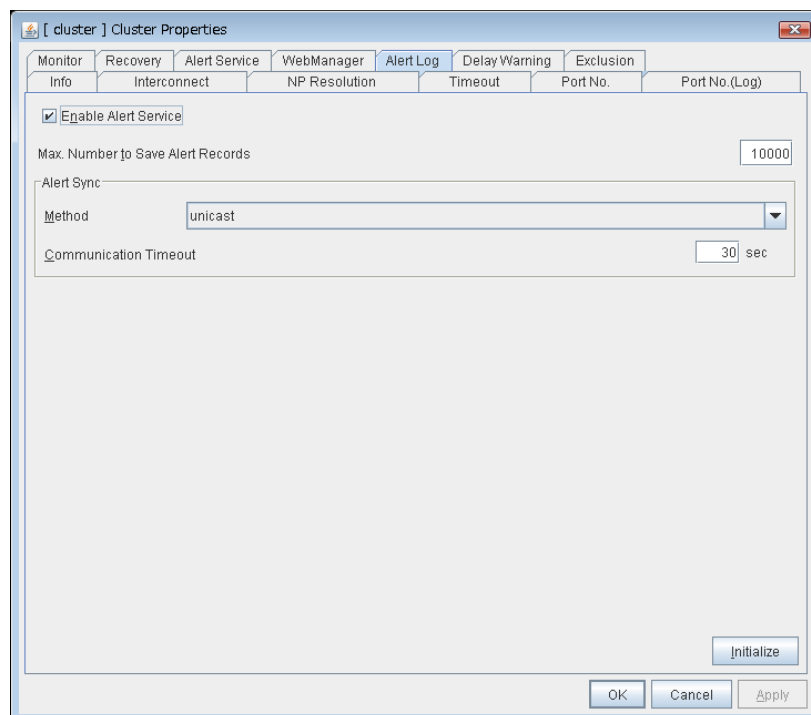
Use **Tuning** to tune the WebManager. Clicking **Tuning** displays the **WebManager Tuning Properties** dialog box.



- ◆ **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. Click **Initialize** to set all the items to their default values.

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)

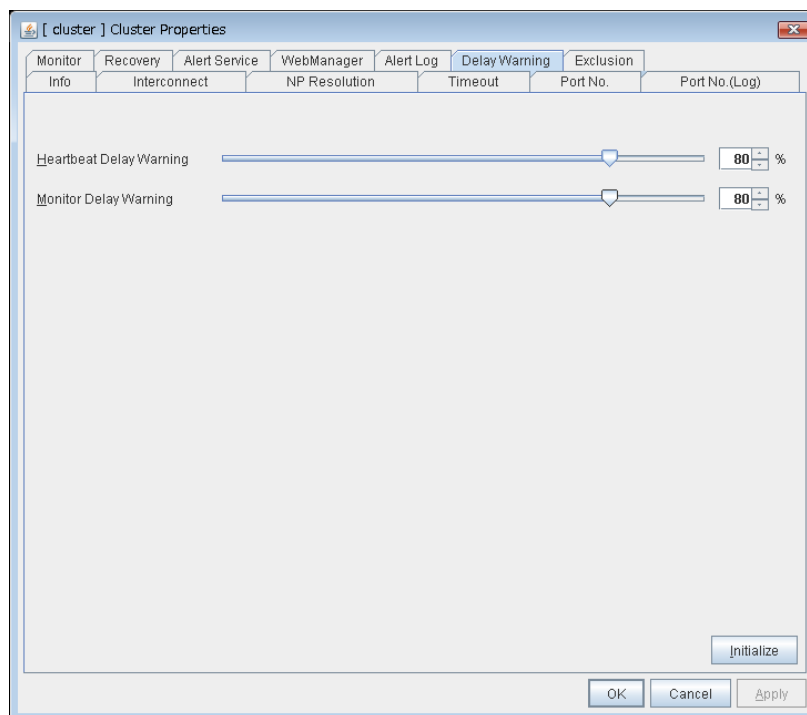
Specify a communication timeout. A communication timeout is determined if the time specified here elapses after the last communication between Alert service and servers.

Initialize

Click **Initialize** to reset all settings on this tab to default. Click **Initialize** to set all the items to their default values.

Delay Warning tab

Configure the settings for Delay Warning on this tab. For details on delay warning, see “Monitor resource Delay warning of monitor resources” in Chapter 5, “Monitor resource details” in this guide.



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.

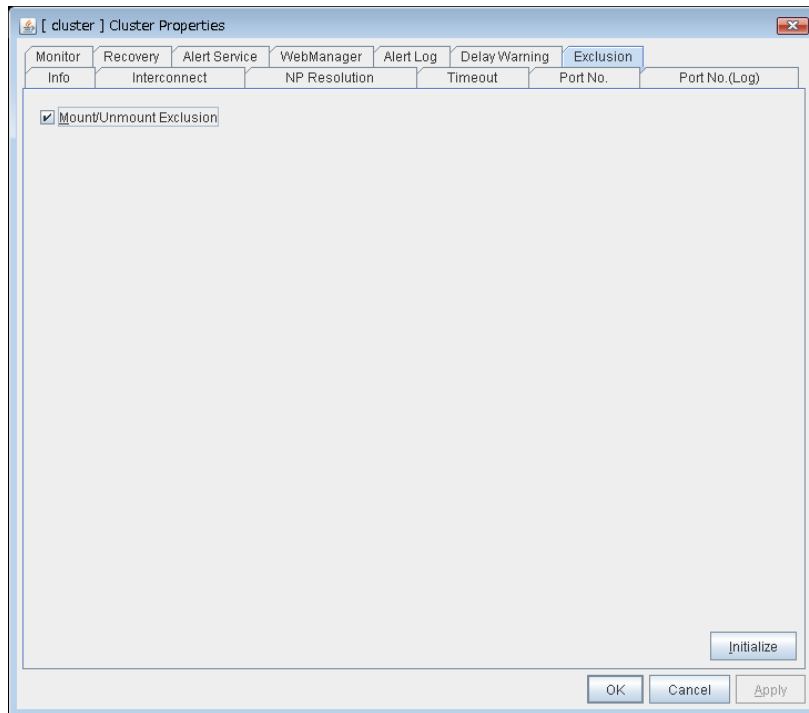
Monitor Delay Warning (0 to 100)

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

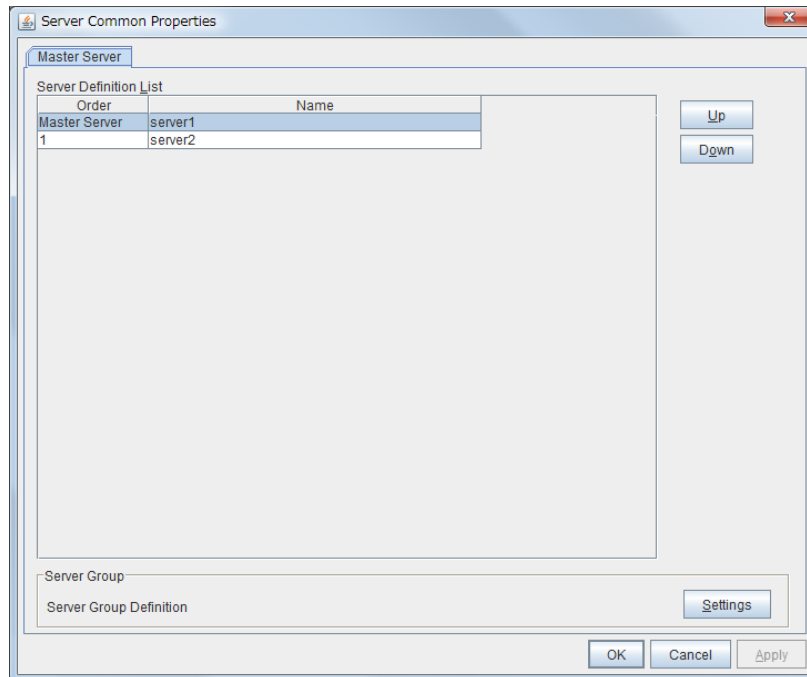
Use **Initialize** to reset the values to the default value. Click **Initialize** to set all the items to their default values.

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.

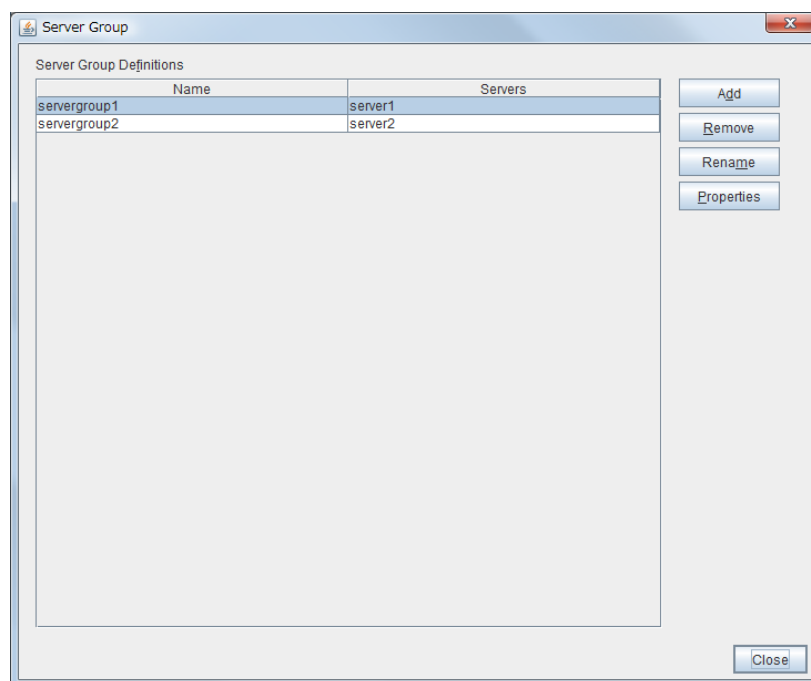


Up, Down

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 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

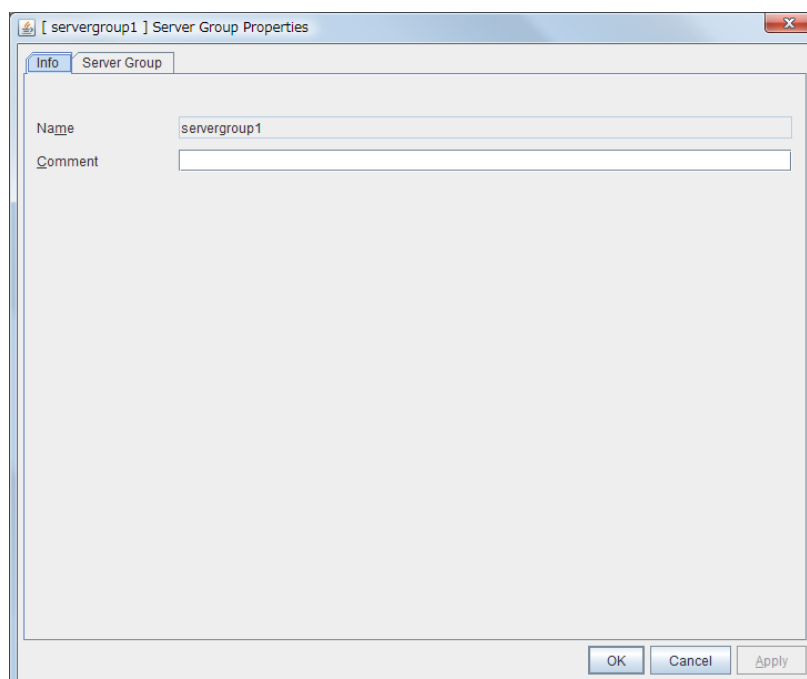
Display the server group name.

◆ 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

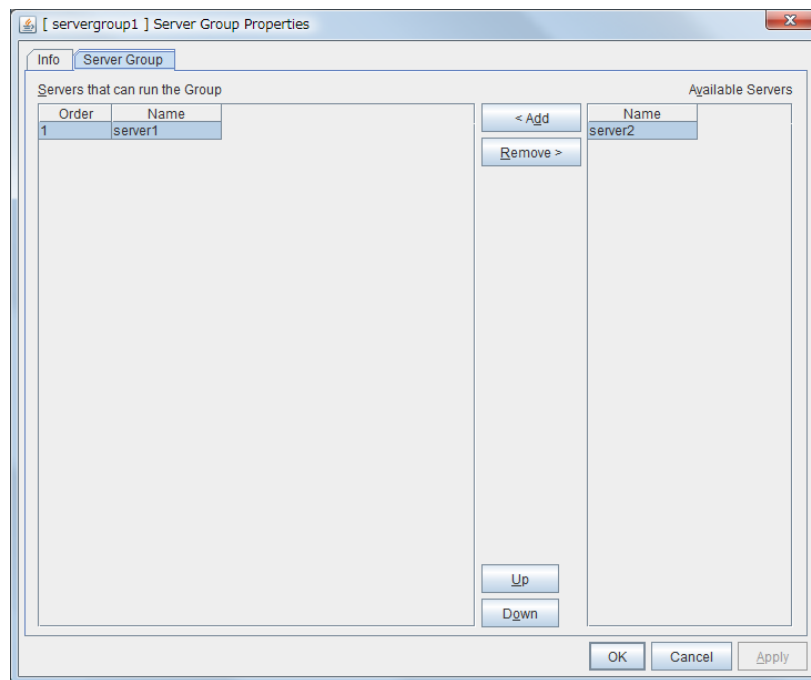
The selected server name is displayed. You cannot change the name here.

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

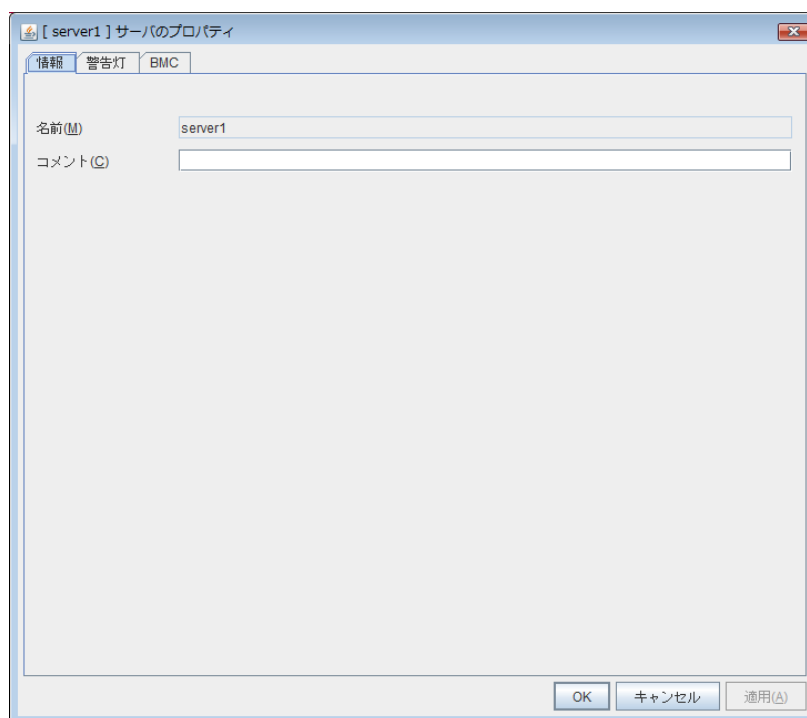
Used when changing the priority order of the server. Select the server to be changed from **Servers that can run the Group** and click **Up** or **Down**. The selected row moves.

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

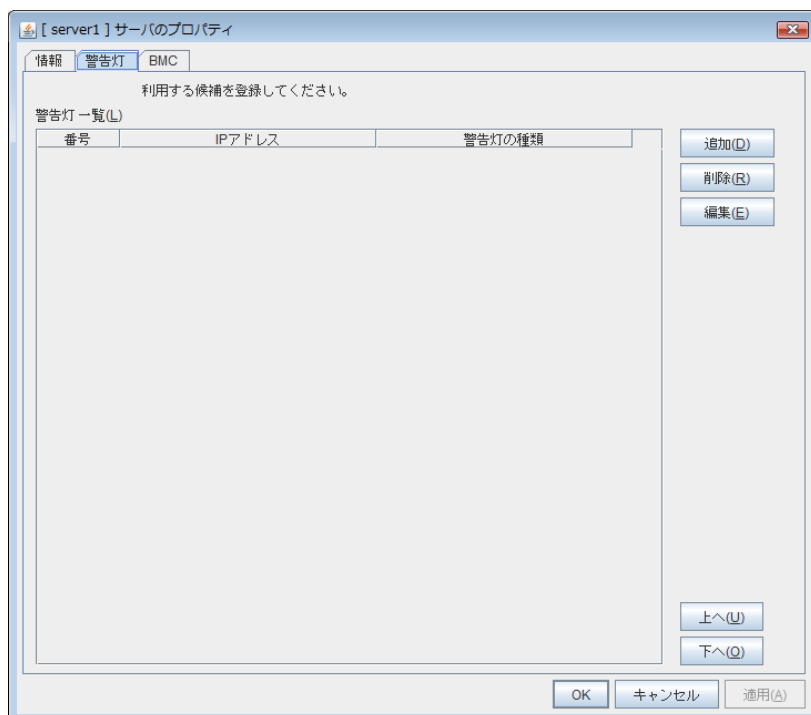
The selected server name is displayed. You cannot change the name here.

Comment (up to 127 bytes)

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

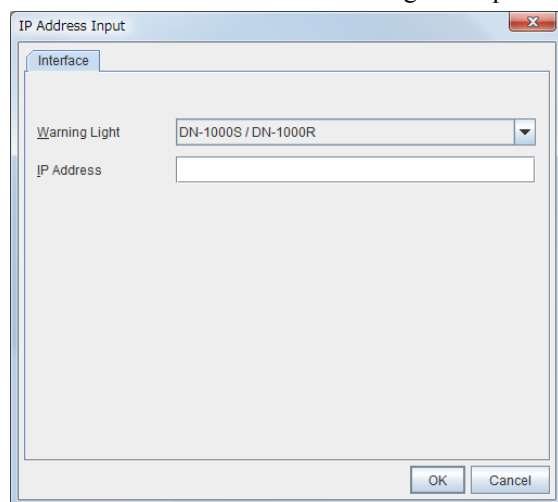
Warning Light tab

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.

◆ Warning Light

Select the product number of the warning light you use. The products corresponding to each number are as follows.

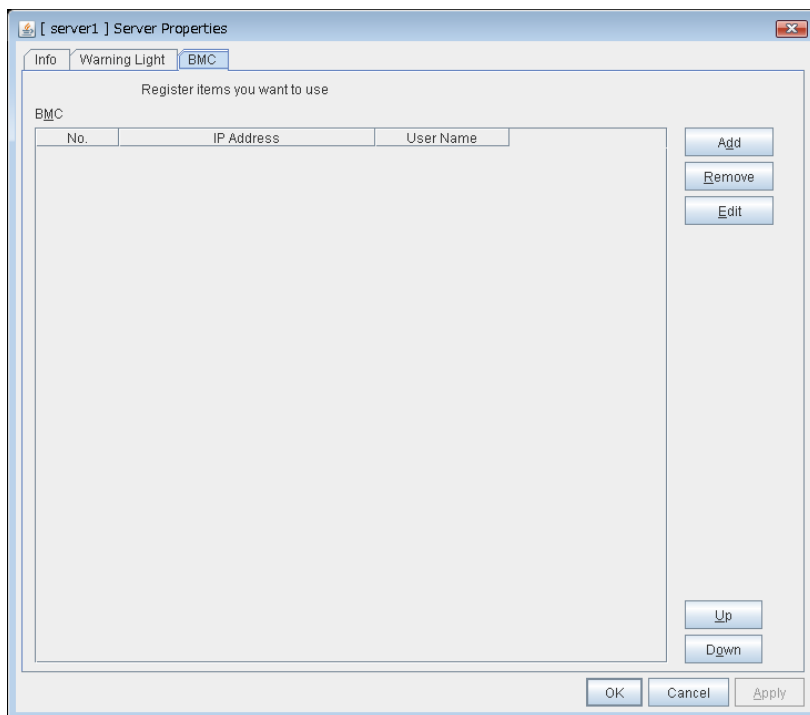
Product Number	Product Name
DN-1000S/DN-1000R	DN-1000S/DN-1000R
NHE-3FB/ NHM-3FB/ NHC-3FB	Single Tower MHE/MHM/NHC

Edit

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

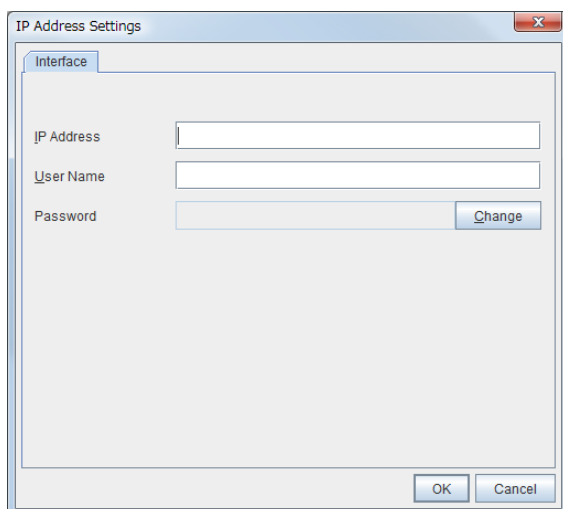
BMC tab

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.

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
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	Always execute					O
Method	keepalive					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
Max Restart Count	3 times				O	
Recovery Action over Max Restart Count	No operation				O	
Cluster service's not stop normal, prohibit automatic startup	Off				O	
Disable recovery action caused by monitor resource error	Off					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

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	-									

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			
Perform a Forced Failover	Off						0			
Prioritize failover policy in the server group	Off						0			
Perform a Smart Failover	Off						0			
Enable only manual failover among the server groups	Off						0			
Failback Attribute	Manual Failback						0			
Failover Exclusive Attribute	Off						0			
Start Dependency Tab										
Dependent Group (Add)	-						0			
Dependent Group (Delete)	-						0			
Property										
Wait Only when on the Same Server	Off						0			
Stop Dependency Tab										
Dependent Group (Add)	-						0			
Dependent Group (Delete)	-						0			

Group Resource (Common)

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Add Group Resource	-				0		0			
Remove Group Resource	-					0	0			
Group Resource Common Properties										
Info Tab										

Name	Each resource default value				0		0				
Comment	-										0
Recovery Operation											
Edit Script											
Select User Application	-										0
Enter application path (Edit)											
Select Script created with this product	-										0
Script content (Edit)											
Timeout	5(sec)										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
Stop Script Timeout	1800 seconds						0			
Normal Return Value	0									0
Maintenance Tab										
Log Output Path	Blank (/dev/null)					0				
Rotate Log	Off					0				
Rotation Size	1000000					0				

Disk resource

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)						O			
Dependent Resources (Add, Remove)	-						O			
Recovery Operation Tab										
Retry Count at Activation Failure	1 time						O			
Maximum Failover Count	1 time						O			
Final Action at Activation Failure	No Operation (Next resources are not activated).						O			
Execute Script before Final Action	Off									O
Retry Count at Deactivation Failure	1 time						O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.						O			
Execute Script before Final Action	Off									O
Details Tab										
IP Address	-					O				
NIC Alias Name	-					O				
Destination IP Address	-					O				
Source IP Address	-					O				
Send Interval	10 seconds					O				
User Routing Protocol	-					O				
Virtual IP Resource Tuning Properties										
Parameter Tab										
ifconfig Timeout	60 seconds						O			
Ping Interval	1 second						O			
Ping Timeout	1 second						O			
Ping Retry Count	Zero						O			
Ping Forced VIP Activation	Off									O
ARP Send Count	1 time						O			
Deactivity Check Tab										
ifconfig Status at Failure	Not Failure									O
ping Status at Failure	Not Failure									O
RIP Tab										
Next Hop IP Address	-					O				
Metric	1					O				
Port Number	520					O				
RIPng Tab										
Metric	1					O				
Port Number	521					O				

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	zfspool					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 - 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
Details Tab										
Virtual Machine Type	-					0				
Virtual Machine Name	-					0				
UUID	-					0				
VM Resource Tuning Properties										
Parameter Tab										
Request Timeout	30 seconds						0			
Wait Time To Start Virtual Machine	0 seconds						0			
Wait Time To Stop Virtual Machine	240 seconds						0			

Dynamic DNS resource

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						O			
Dependent Resources (Add, Remove)	-						O			
Recovery Operation Tab										
Activation Retry Threshold	One time						O			
Maximum Failover Count	One time						O			
Final Action at Activation Failure	No operation (Do not activate the next resource.)						O			
Execute Script before Final Action	Off									O
Retry Count at Deactivation Failure	One time						O			
Final Action at Deactivation Failure	Stop the cluster service and shut down the OS						O			
Execute Script before Final Action	Off									O
Details Tab										
Virtual Host Name	-					O				
IP Address	-					O				
DDNS Server	-					O				
Port Number	53					O				
Authentication Key Name	-					O				
Authentication Key Value	-					O				

Monitor resource (common)

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

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 seconds						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										
Method	READ									0
Monitor Target	-									0
Monitor Target Raw Device Name	-									0
I/O size	2000000 bytes									0
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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			

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 seconds						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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 seconds						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			
Recovery Script Execution Count	zero						0			

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

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 seconds						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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	zero						0			
Execute Script before Failover	Off									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 seconds						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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	3 times (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 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										
Monitor Script Path Type	Script created with this product							0		
Monitor Script Type	Synchronous							0		
Log Output Path	Blank (/dev/null)							0		
Rotate Log	Off							0		
Rotation Size	1000000							0		
Normal Return Value of Monitor Script	0							0		
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	3 (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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	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 seconds						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										
Volume Manager	zfspool							0		
Target Name	-									0
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	0 times (if the recovery target is not a cluster)						0			
Execute Script before Failover	Off									0
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time (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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Three times						0			
Execute Script before Failover	Off									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						☐			
Timeout	30 seconds						☐			
Collect the dump file of the monitor process at timeout occurrence	Off						☐			
Retry Count	0 times						☐			
Wait Time to Start Monitoring	0 seconds						☐			
Monitor Timing	Always (fixed)						☐			
Target Resource	-						☐			
Nice Value	19						☐			
Error Detection Server										
Error Detection Server	All servers						☐			
Servers that can run the Group (Add, Remove)	-						☐			
Monitor(special) Tab										
Category	-						☐			
Keyword	-						☐			
Recovery Action Tab										
Recovery Action	Run failover for recovery target						☐			
Recovery Target	-						☐			
Execute migration before failing over	Off						☐			
Execute Failover to outside the Server Group	Off						☐			
Execute Script before Recovery Action	Off									☐
Final Action	No action is taken.						☐			

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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Three times						0			
Execute Script before Failover	Off									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			

Process monitor resource

Parameters	Default	How to change								
		1	2	3	4	5	6	7	8	9
Virtual Machine 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			
Recovery Action Tab										
Wait Time When External Migration Occurs	15 seconds							0		
Error Detection Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0

Maximum Reactivation Count	3 times						0			
Execute Script before Failover	Off									0
Execute migration before failing over	Off						0			
Maximum Failover Count	1 time						0			
Execute Script before Final Action	On									0
Final Action	No Operation						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 seconds						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 Level	Level 3 (Create and Drop Table in Monitoring)							0		
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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 seconds						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			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 seconds						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			
Monitor Level	Level 3 (Create and Drop Table in Monitoring)									
Connect Command	-									0
User Name	sys									0
Password	change_on_install									0
Authority	SYSDBA									
Create and Drop Table in Monitoring	On						0			
Table	orawatch									0
ORACLE_HOME	-									
Character Set	JAPANESE_JAPAN.JA16EUC									0
Library Path	/opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1									
Collect Details at the Time of Error	Off						0			
Collection Timeout	600 seconds						0	0		
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 seconds						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 Level	Level 3 (Create and Drop Table in Monitoring)									
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									
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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 seconds						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	-									0
IP Address	127.0.0.1									0
Port	139									0
User Name	-									0
Password	-									0
Recovery Action Tab										
Recovery Target	-						0			
Recovery Script Execution Count	zero						0			
Execute Script before Reactivation	Off									0
Maximum Reactivation Count	Zero (if the recovery target is other than clusters)						0			
Execute Script before Failover	Off									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			

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	3.1.0-1 or later	128
Group resource (Per group)	3.1.0-1 or later	256
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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• Operating the cluster (clpcl command).....	235
• Shutting down a specified server (clpdown command).....	240
• Shutting down the entire cluster (clpstdn command)	241
• Operating groups (clpgrp command).....	242
• Collecting logs (clplogcc command)	247
• Creating a cluster and backing up configuration data (clpcfctrl command)	254
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• Modifying the log level and size (clplogcf command)	265
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• Controlling monitor resources (clpmonctrl command).....	279
• Controlling group resources (clprsc command).....	287
• Controlling reboot count (clpregctrl command)	291
• Turning off warning light (clplamp command)	294
• Controlling chassis identify lamp (clpledctrl command).....	295
• Processing inter-cluster linkage (clptrnreq command)	297
• Requesting processing to cluster servers (clprexec command).....	299
• Controlling cluster activation synchronization wait processing (clpbwctrl command).....	303

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.	254
clplcncs	Registers and refers to the product or test version license of this product.	271
Commands for displaying status		
Command	Description	Page
clpstat	Displays the cluster status and configuration information.	183
Commands for cluster operation		
Command	Description	Page
clpcl	Starts, stops, suspends, or resumes the ExpressCluster daemon.	235
clpdown	Stops the ExpressCluster daemon and shuts down the server.	240
clpstdn	Stops the ExpressCluster daemon across the whole cluster and shuts down all servers.	241
clpgrp	Starts, stops, or moves groups. This command also migrates groups.	242
clptoratio	Extends or displays the various timeout values of all servers in the cluster.	262
clpmonctrl	The clpmonctrl command controls monitor resources.	279
clpregctrl	Displays or initializes the reboot count on a single server.	291
clprsc	Stops or resumes group resources	287
clpledctrl	The clpledctrl command controls the chassis identify function.	295
clptrnreq	The clptrnreq command requests a server to execute a process.	297
clprexec	The clprexec command requests that an ExpressCluster server execute a process from external monitoring.	297
clpbwctrl	The clpbwctrl command controls the cluster activation synchronization wait processing.	303
Log-related commands		
Command	Description	Page
clplogcc	Collects logs and OS information.	247
clplogcf	Modifies and displays a configuration of log level and the file size of log output.	265
Script-related commands		
Command	Description	Page
clplogcmd	Writes texts in the exec resource script to create a desired message to the output destination	276

Other commands		
Command	Description	Page
clplamp	Lights off the warning light of the specified server.	294

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	Displays a cluster status.
	No option	
	-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.

<code>--grp [group_name]</code>	Displays group configuration information. By specifying the name of a group, you can display only the information on the specified group resource.
<code>--rsc [resource_name]</code>	Displays group resource configuration information. By specifying the name of a group resource, you can display only the information on the specified group resource.
<code>--mon [monitor_name]</code>	Displays monitor resource configuration information. By specifying the name of a monitor resource, you can display only the information on the specified resource.
<code>--detail</code>	Displays more detailed information on the setting.
<code>-h hostname</code>	Acquires information from the server specified with <i>hostname</i> . Acquires information from the command running server (local server) when the <code>-h</code> option is omitted.

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 <code>-h</code> option, the server should be in the cluster. For the language used for command output, see "Cluster properties Info tab" in Chapter 2 "Functions of the Builder" in this guide. When you run the <code>clpstat</code> command with the <code>-s</code> 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> ->See (8)
  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

If a Dummy Failure occurred in the monitor resource, “(Dummy Failure)” is added after Status.

- (8) The following descriptions might appear after “<monitor>”.

When the monitor resource is abnormal, and if the recovery action is controlled, "Recovery Action Disable" is added.

If a Dummy Failure occurred in the monitor resource, “Failure Verification” is added.

Information on each status is provided in “Status Descriptions” on page 233.

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 233.

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.

If a Dummy Failure occurred in the monitor resource, “(Dummy Failure)” is added after Monitor n.
- (4) server n [*server_status*] : status
Displays the status of each monitor resource per server.

If a Dummy Failure occurred in the monitor resource, “(Dummy Failure)” is added after the server n.

Information on each status is provided in “Status Descriptions” on page 233.

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 233.

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 233.

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 "Cluster properties" in Chapter 2, "Functions of the Builder" 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)
  WebManager HTTP Port Number      : 29003          -> see (11)
  Alert Sync Port Number           : 29003          -> see (12)
<Port No. (Log)>
  Communication Method for Internal Logs
                                     : UNIX Domain   -> see (13)
  Port Number                       : 0              -> see (14)
<Monitor>
  Shutdown Monitor                  : always         -> see (15)
  Shutdown Monitoring Method        : keepalive     -> see (16)
  Enable SIGTERM Handler            : On            -> see (17)
  Use HB Timeout                    : On             -> see (18)
  Timeout (sec)                     : 90             -> see (19)
<Delay Warning>
  Heartbeat Delay Warning           : 80           -> see (20)
  Monitor Delay Warning             : 80           -> see (21)
<Alert Service>
  E-mail Address                    :               -> see (22)
  Use Network Warning Light         : Off          -> see (23)
  Use Alert Extension               : Off          -> see (24)
  Use Chassis Identify              : Off          -> see (25)
  Enable Alert Setting              : Off          -> see (26)

<Exclusion>
  Mount,Umount Exclusion            : On           -> see (27)
<Heartbeat I/F>
  Server Down Notification          : On           -> see (28)
<Recovery>
  Max Reboot Count                  : 1            -> see (29)
  Max Reboot Count Reset Time (min) : 0            -> see (30)
  Use Forced Stop                   : On           -> see (31)
  Forced Stop Action                 : BMC Power Off -> see (32)
  Forced Stop Timeout (sec)         : 30           -> see (33)
=====

```


◆ The lines enclosed by the red dotted line 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) WebManager HTTP Port Number	: WebManager HTTP port number
(12) Alert Sync Port Number	: Alert synchronous port number
<Port No. (Log)>	
(13) Communication Method for Internal Logs	: Log communication method
(14) Port Number	: Port number
<Monitoring>	
(15) Shutdown Monitor	: Shutdown monitor
(16) Shutdown Monitoring Method	: Shutdown monitor method
(17) Enable SIGTERM Handler	: Enable SIGTERM
(18) Use HB Timeout	: Use HB timeout
(19) Timeout (sec)	: Timeout (in seconds)
<Delay Warning>	
(20) Heartbeat Delay Warning	: Delay warning of heartbeat resource (%)
(21) Monitor Delay Warning	: Delay warning of monitor resource (%)
<Alert Service>	
(22) E-mail Address	: Address to which notice mails are sent
(23) Use Network Warning Light	: Network warning light
(24) Use Alert Extension	: Alert extension function
(25) Use Chassies Identify	: Chassies Identify
(26) Enable Alert Setting	: Alert report configuration
<Exclusion>	
(27) Mount, Umount Exclusion	: Mount, unmount command exclusion

<Heartbeat I/F>

(28) Server Down Notification : Server down notification

<Recovery>

(29) Max Reboot Count : Maximum reboot count

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

(31) Use Forced Stop : Forced stop

(32) Forced Stop Action : Forced stop action

(33) 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 lines enclosed by the red dotted line are displayed when the --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 enclosed by the red dotted line 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 lines enclosed by the red dotted line 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)
Fsck Option : -y (23)
Fsck Timeout (sec) : 1800 (24)
Fsck Action Before Mount : Execute at Specified Count (25)
Fsck Interval : 3 (26)
=====
```

- ◆ 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) Fck 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) Fck Option : fsck option

(24) Fck Timeout : fsck time-out (in seconds)

(25) Fck Action Before Mount : fsck action before mounting

0 : Does not execute fsck

1 : Always executes fsck

2 : Executes fsck once the specified count is reached

(26) Fck Interval : fsck interval

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)
  Ifconfig Timeout (sec)                : 60                 -> see (6)
  Ifconfig Status at Failure            : Failure            -> see (7)
  Ping Status at Failure                : Failure            -> see (8)
=====
```

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) Ifconfig Timeout (sec) : Ifconfig timeout (in seconds)
- (7) Ifconfig Status at Failure : Operation at Ifconfig failure

Failure

Operates as an activation failure

Not Failure

Does not operate as an activation failure

- (8) 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 : /tmp/log/test.txt -> see (7)
Script Log Rotate : off -> see (8)
Script Log Rotate Size (byte) : 1000000 -> see (9)
Script Log Rotate Generation : 2 -> see (10)
=====
```

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 : Output destination of script log
- (8) Script Log Rotate : Rotate script log
 - On : Rotate script log
 - Off : Do not rotate script log
- (9) Script Log Rotate Size (byte) : Size of script log
- (10) Script Log Rotate Generation : Script log generation

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)
  Clear Host ID                       : On (4)
  Force Import                        : On (5)
  Export Timeout (sec)                : 300 (6)
  Force Export                        : On (7)
=====
```

Explanation of each item

(1) Volume Manager	: Volume Manager
(2) Target	: Target name
(3) Import Timeout (sec)	: Import timeout
(4) Clear Host ID	: Clear host ID
(5) Force Import	: Force Import
(6) Export Timeout (sec)	: Export Timeout
(7) 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-gos1 (2)
  UUID                 : 6b3e3895-db9b-
                        6b82-ec94-2240c232e271 (3)
  Timeout Of Request   : 30 (4)
  Timeout Of Start     : 0 (5)
  Timeout Of Stop      : 240 (6)
=====
```

Explanation of each item

(1) VM Type	: Type of virtual machine
(2) VM Name	: Name of virtual machine
(3) UUID	: UUID(Universally Unique Identifier)
(4) Timeout Of Request	: Request timeout
(5) Timeout Of Start	: Wait time to start virtual machine
(6) 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 Reactivation: Off (10)
Execute Script before Failover : Off (11)
Execute Script before Final Action: Off (12)
Recovery Target     : disk1 (13)
Recovery Target Type : Resource (14)
Recovery script Threshold : 0 (15)
Reactivation Threshold : 3 (16)
Failover Threshold  : 1 (17)
Wait Time to Start Monitoring (sec): 0 (18)
Nice Value          : 0 (19)
Monitor Suspend Possibility : Possible (20)
Gather Dump When Timeout : Off (21)
Execute Migration Before Failover: Off (22)
Dummy Failure Possibility : Off (23)
Method              : READ (24)
Monitor Target      : /dev/sdb5 (25)
I/O Size (byte)     : 2000000 (26)
=====
```

- ◆ 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 Reactivation : Execute script before reactivation
 - (11) Execute Script before Failover : Execute script before failover
 - (12) Execute Script before Final Action : Execute script before final action
 - (13) Recovery Target : Target to be recovered when an error is detected
 - (14) Recovery Target Type : Type of a target to be recovered when an error is detected
 - (15) Recovery script Threshold : Recovery script execution count
 - (16) Reactivation Threshold : Restart count
 - (17) Failover Threshold : Failover count
 - (18) Wait Time to Start Monitoring (sec) : Time to wait for the start of monitoring (in seconds)
 - (19) Nice Value : Nice value
 - (20) Monitor Suspend Possibility : Possibility of suspending monitoring
 - Possible : Suspending monitoring is possible
 - Impossible : Suspending monitoring is not possible
 - (21) Gather Dump When Timeout : Gather dump when timeout occurs
 - On : Gather
 - Off : Do not gather
 - (22) Excute Migration Before Failover : Execute migration before failover
 - On : Execute
 - Off : Do not execute

(23) Dummy Failure Possibility : Possibility of Dummy Failure

Possible : Dummy failure is possible

Impossible : Dummy failure is impossible

Explanation of each item

(24) Method : Monitor method

TUR

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

READ

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

READ(raw)

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

WRITE(FILE)

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

(25) Monitor Target : Monitor target

(26) I/O size (byte) : Monitoring I/O size (in bytes)

* Monitoring I/O size is effective when the monitoring method is “READ.”

Example of a command entry (For IP monitor resource)

```
# clpstat --mon ipw1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor2 : ipw1]
  Type                : ipw
  Comment             : ip monitor1
  Monitor Timing      : Always
  Target Resource     :
  Interval(sec)       : 30
  Timeout (sec)       : 10
  Retry Count         : 0
  Final Action        : No Operation
  Execute Script before Reactivation: Off
  Execute Script before Failover  : Off
  Execute Script before Final Action: Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Recovery script Threshold : 0
  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
  Dummy Failure Possibility : Possible
  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 Reactivation: Off
Execute Script before Failover    : Off
Execute Script before Final Action: Off
Recovery Target                    : execl
Recovery Target Type               : Resource
Recovery script Threshold          : 0
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
Dummy Failure Possibility           : Possible
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 Reactivation: Off
  Execute Script before Failover  : Off
  Execute Script before Final Action: Off
  Recovery Target           : cluster
  Recovery Target Type      : Itself
  Recovery script Threshold  : 0
  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
  Dummy Failure Possibility  : Impossible
  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 Reactivation: Off
Execute Script before Failover   : Off
Execute Script before Final Action: Off
Recovery Target                   : cluster
Recovery Target Type              : Itself
Recovery script Threshold         : 0
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
Dummy Failure Possibility         : Possible
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 Reactivation: Off
  Execute Script before Failover  : Off
  Execute Script before Final Action: Off
  Recovery Target     : cluster
  Recovery Target Type : Itself
  Recovery script Threshold : 0
  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
  Dummy Failure Possibility : Possible
  Monitor Resources      : diskw1          (1)
                        : ipw3
                        : raww1
```

Explanation of each item

(1) Monitor Resources : Monitor resource list

Example of a command entry (For virtual IP monitor resource)

```
# clpstat --mon vipw1 --detail
```

Example of the display after running the command:

```
===== CLUSTER INFORMATION =====
[Monitor11 : 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 Reactivation: Off
Execute Script before Failover   : Off
Execute Script before Final Action: Off
Recovery Target                   : cluster
Recovery Target Type              : Itself
Recovery script Threshold         : 0
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
Dummy Failure Possibility         : Impossible
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 Reactivation: Off
  Execute Script before Failover      : Off
  Execute Script before Final Action: Off
  Recovery Target                     : exec
  Recovery Target Type                 : Resource
  Recovery script Threshold            : 0
  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
  Dummy Failure Possibility           : Possible
  Monitor Path                        : genw.sh (1)
  Monitor Type                        : Synchronous (2)
  Log Output Path                     : /tmp/log/test.txt (3)
  Script Log Rotate                   : off (4)
  Script Log Rotate Size (byte)       : 1000000 (5)
  Script Log Rotate Generation        : 2 (6)
=====
```

Explanation of each item

(1) Monitor Path	: Target monitor resource
(2) Monitor Type	: Monitor type
(3) Log Output Path	: Output destination of script log
(4) Script Log Rotate	: Rotate script log
On	: Rotate script log
Off	: Do not rotate script log
(5) Script Log Rotate Size (byte)	: Size of script log
(6) Script Log Rotate Generation	: Script log generation

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 Reactivation: Off
  Execute Script before Failover    : Off
  Execute Script before Final Action: Off
  Recovery Target                    : exec
  Recovery Target Type               : Resource
  Recovery script Threshold          : 0
  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
  Dummy Failure Possibility          : Possible
  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 Reactivation: Off
  Execute Script before Failover      : Off
  Execute Script before Final Action: Off
  Recovery Target                     : exec
  Recovery Target Type                 : Resource
  Recovery script Threshold            : 0
  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
  Dummy Failure Possibility            : Impossible
  Execute Failover to outside the Server Group: Off      (1)
  Category                            : NIC                (2)
  Keyword                             :                    (3)
=====
```

Explanation of each item

(1) Execute Failover to outside the Server Group : Failover to outside the server group

On : Execute failover

Off : Do not execute failover

(2) Category : Category

(3) 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 Reactivation: Off
  Execute Script before Failover: Off
  Execute Script before Final Action: Off
  Recovery Target      : vml
  Recovery Target Type : Resource
  Recovery script Threshold : 0
  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
  Dummy Failure Possibility : Impossible
  virtual machine resource name : vml                                     (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 Reactivation: Off
  Execute Script before Failover  : Off
  Execute Script before Final Action: Off
  Recovery Target           : ddns1
  Recovery Target Type      : Resource
  Recovery script Threshold  : 0
  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
  Dummy Failure Possibility  : Impossible
  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 Reactivation: Off
Execute Script before Failover   : Off
Execute Script before Final Action: Off
Recovery Target                  : execl
Recovery Target Type             : Resource
Recovery script Threshold        : 0
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
Dummy Failure Possibility        : Possible
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)
Monitor Action                   : Level 3 (create/drop table each time) (7)
=====
```

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
(7) Monitor Action	: Monitor level

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 Reactivation: Off
Execute Script before Failover    : Off
Execute Script before Final Action: Off
Recovery Target                   : execl
Recovery Target Type              : Resource
Recovery script Threshold         : 0
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
Dummy Failure Possibility         : Possible
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                    :
                                   Level 3 (create/drop table each time) (7)
ORACLE_HOME                      : /opt/oracle/product/1.0.0.1/ (8)
=====
```

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 : Monitor level
- (8) ORACLE_HOME : ORACLE_HOME path

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 Reactivation: Off
  Execute Script before Failover   : Off
  Execute Script before Final Action: Off
  Recovery Target              : exec1
  Recovery Target Type         : Resource
  Recovery script Threshold    : 0
  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
  Dummy Failure Possibility    : Possible
  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)
  Monitor Action : Level 3 (create/drop table each time) (6)
=====
```

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
(6) Monitor Action	: Monitor level

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 Reactivation: Off
  Execute Script before Failover   : Off
  Execute Script before Final Action: Off
  Recovery Target                : execl
  Recovery Target Type           : Resource
  Recovery script Threshold      : 0
  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
  Dummy Failure Possibility      : Possible
  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
- clpstn
- 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	
	# clpdown	
	Example 2: Shutting down and rebooting server1 from server0	
	# clpdown -r -h server1	
Error Message	See “Operating the cluster (clpcl command)” on page 235.	

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 <pre># clpstdn</pre> Example 2: Performing the cluster shutdown reboot <pre># clpstdn -r</pre>	
Error Message	See “Operating the cluster (clpcl command)” on page 235.	

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.

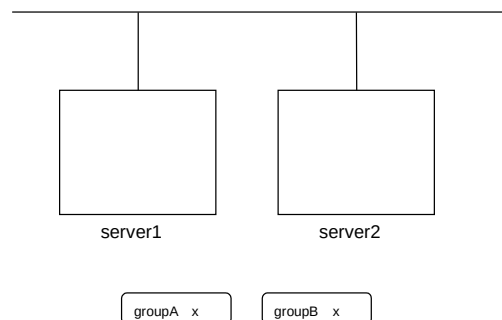
Example: The cluster has two servers and two groups.

Failover policy of group

groupA server1 -> server2

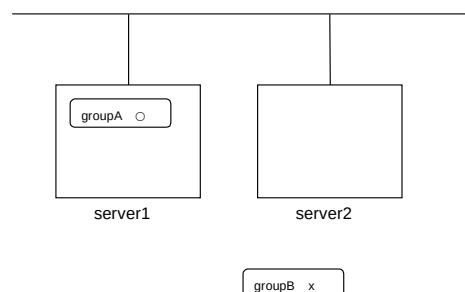
groupB server2 -> server1

1. Both groups are stopped.



2. Run the following command on server1.

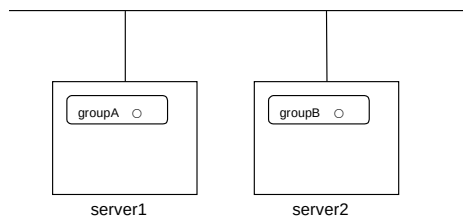
```
# clpgrp -s groupA
```



GroupA starts in server1.

3. Run the following command in server2.

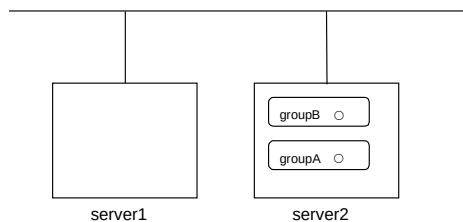
```
# clpgrp -s
```



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

4. Run the following command in server1

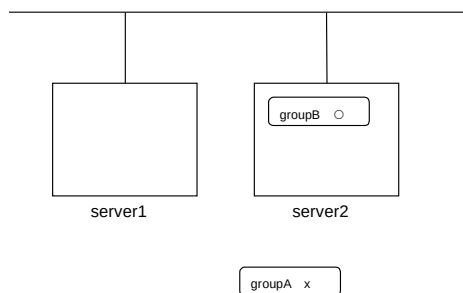
```
# clpgrp -m groupA
```



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.

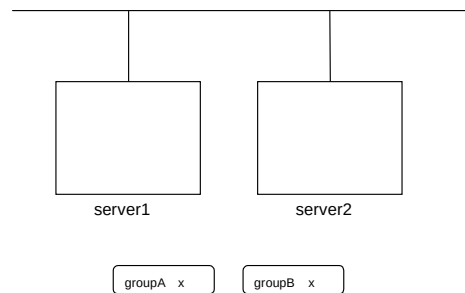
```
# clpgrp -t
```

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 253.)

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:

 altyyyymmdd_x.tar

The WebManager related:

 wmyyyymmdd_x.tar

ExpressCluster core related:

 clsyyymmdd_x.tar

 yyyyymmdd 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.

```
# clplogcc -n Server1 -n Server3
```

- ◆ Specify a server in the same cluster.
- ◆ The number of servers you can specify is within the maximum number of servers in the cluster configuration.

Collecting information when a failure occurs

When the following failure occurs, the information for analyzing the failure is collected.

When a cluster daemon configuring the cluster abnormally terminates due to interruption by a signal (core dump) or internal status error etc.

When a group resource activation error or deactivation error occurs

When monitoring error occurs in a monitor resource

Information to be collected is as follows:

- ◆ Cluster information
 - Some module logs in ExpressCluster servers
 - Dump files in the shared memory used by ExpressCluster
 - Cluster configuration information files
 - Core files of ExpressCluster module
- ◆ 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.
	-x <i>directory</i>	In general, it is not necessary to specify this option. 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.	

Message	Cause/Solution
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.
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.	

Message	Cause/Solution
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.
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.

Message	Cause/Solution
The upload is completed successfully. To apply the changes you made, restart the Alert Sync. To apply the changes you made, restart the WebManager.	The upload is completed successfully. To apply the changes you made, restart the Alert Sync. To apply the changes you made, restart the WebManager service.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
The upload is completed successfully.	The upload is successfully completed.
The upload was stopped. Failed to deliver the configuration data. Check if the other server is active and run the command again.	The upload was stopped. Failed to deliver the configuration data. Check if the other server is active and run the command again.
The upload was stopped. There is one or more servers that cannot be connected to. To apply cluster configuration information forcibly, run the command again with "--force" option.	The upload was stopped. The server that cannot connect exists. To forcibly upload the cluster configuration information, run the command again with the -force option.

Backing up the Cluster configuration data

clpcfctrl --pull The clpcfctrl --pull command backups cluster configuration data.

Command line

```
clpcfctrl --pull -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.	

Message	Cause/Solution
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 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 <pre># clpstat --cl --detail</pre> Monitor resource timeout <pre># clpstat --mon monitor resource name --detail</pre>
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 <pre># clptoratio -r 2 -t 3d</pre> Example 2: Setting back the timeout ratio to original <pre># clptoratio -i</pre> Example 3: Referring to the current timeout ratio <pre># clptoratio -s</pre> 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*

Description	This command modifies the log level and log output file size, or displays the values currently configured.	
Option	-t	Specifies a module type whose settings will be changed. If both -l and -s are omitted, the information set to the specified module will be displayed. See the list of “Types that can be specified for the -t option” on page 266 for types which can be specified.
	-l	Specifies a log level. You can specify one of the following for a log level. 1, 2, 4, 8, 16, 32 You can see more detailed information as the log level increases. See the list of “Default log levels and log file sizes” on page 269 for default values of each module type.
	-s	Specifies the size of a file for log output. The unit is byte.
	None	Displays the entire configuration information currently set.
Return Value	0	Success
	Other than 0	Failure
Remarks	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.	
Notes	This command must be executed by a user with the root privilege. 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 ExpressCluster Server
apicl	libclpapi.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	libclpcfmggr.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

Type	Module	Description	The ExpressCluster Server
rsc	clprsc	Group resource startup and stop command	y
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
mgmtagt	libclpsnmpmgmtagt.so.1.0	SNMP coordination library	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
scrpc	clpscrpc	Script log rotation command	y
stat	clpstat	Status display command	y
stdn	clpstdn	Cluster shutdown command	y
toratio	clptoratio	Timeout ratio modification command	y
trap	clptrap	SNMP trap 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

Type	Module	Description	The ExpressCluster Server
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
ipw	clpipw	IP monitor resource	y
miw	clpmiw	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
lcnscl	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	5000000
rc_ex	4	5000000
reg	4	1000000
regctrl	4	1000000
rm	4	5000000
relpath	4	1000000
scrpc	4	1000000
stat	4	1000000
stdn	4	1000000
toratio	4	1000000
trap	4	1000000
trncl	4	2000000
trnreq	4	1000000
rexec	4	1000000
trnsv	4	2000000
alert	4	4000000
webmgr	4	1000000
webalert	4	1000000

Type	Level	Size (byte)
disk	4	1000000
disk_ex	4	2000000
exec	4	1000000
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
miiw	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 (clplcnsnc command)

clplcnsnc The clplcnsnc command manages licenses.

Command line:

```
clplcnsnc -i [licensefile] -p productid
clplcnsnc -l -p productid
clplcnsnc -d -p productid
clplcnsnc -d -p productid -t
clplcnsnc -v
```

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

Option	-i [licensefile] Registers the license with the specified product ID. 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 References the license with the specified product ID. -d Deletes the license with the specified product ID. -t Deletes the license of the trial version with the specified product ID. Specify it together with the -d option. -v Displays a list of all registered licenses. -p productid Specifies the product ID of a licensed product.

Cluster product	
Product ID	License product name
BASE31	ExpressCluster X 3.1 for Solaris
BASE31	ExpressCluster X 3.1 for Solaris VM
DBAG31	ExpressCluster X Database Agent 3.1 for Solaris
FSAG31	ExpressCluster X File Server Agent 3.1 for Solaris
ALRT31	ExpressCluster X Alert Service 3.1 for Solaris

Return Value	0	Normal termination
	1	Normal termination (with licenses not synchronized) *This means that license synchronization failed in the cluster at the time of license registration. For actions to be taken, see “Troubleshooting for licensing” in “Appendix A. Troubleshooting” in the <i>Installation and Configuration Guide</i> .
	2	Initialization error
	4	Invalid option
	7	Other internal error

Example of a command entry:

Registering the license interactively

```
# clplcnsd -i -p BASE31
```

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 BASE31
```

for referring
to the license

```
# clplcns -l -p BASE31
```

1. Product version

```
< Cluster CPU License EXPRESSCLUSTER X 3.1 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 3.1 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

for referring
to the
license

```
# clplcns -d-p BASE31  
Command succeeded.
```

for referring
to the

```
# clplcns -d-p BASE31 -t  
Command succeeded.
```

license**for referring
to the
license**

```
# clplcnsd -v
< Cluster CPU License ExpressCluster X 3.1 for Solaris <TRIAL> >
< Cluster CPU License ExpressCluster X 3.1 for Solaris <PRODUCT> >
```

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 multiple license information items on the product ID have been specified for deletion, all of the license information including that for the trial version of the product ID will be deleted.

Error Messages

Message	Cause/Solution
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.
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, reports the text by mail, or sends it as an SNMP trap.

Command line:

```
clplogcmd -m message [--syslog] [--alert] [--mail] [--trap] [-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.

Description	Write this command in the exec resource script and output messages you want to send to the destination.	
Options	-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. You may use alphabets, numbers, and symbols. See below (*) for notes on them.
	--syslog	Specify the output destination from syslog, alert, mail, and trap. (Multiple destinations can be specified.) This parameter can be omitted. The syslog and alert will be the output destinations when the parameter is omitted. For more information on output destinations, see “Directory structure of ExpressCluster” in Chapter 9 “The system maintenance information” in this guide.
	--alert	
	--mail	
	--trap	
	-i <i>eventID</i>	Specify event ID. The maximum value of event ID is 10000. This parameter can be omitted. The default value 1 is set when the parameter is omitted.
	-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. This parameter can be omitted. The default value INFO is set when the parameter is omitted. For more information, see “Checking alerts on the WebManager” in Chapter 1 “Functions of the WebManager” in this guide.
Return Value	0	Success
	Other than 0	Failure

Notes	This command must be executed by a user with the root privilege.
	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 “Cluster properties Alert Service tab” in Chapter 2, “Functions of the Builder” in this guide 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
```

Example 3: When specifying a message, output destination, event ID, and level (output destination is trap):

When the following is written in the exec resource script, the text is sent to the SNMP trap destination set in **Cluster Properties** of the Builder. See “Cluster properties Alert Service tab” in Chapter 2, “Functions of the Builder” in this guide for more information on the SNMP trap destination settings.

```
clplogcmd -m test3 --trap -i 200 -l ERR
```

The following information is sent to the SNMP trap destination:

```
Trap OID:      clusterEventError
Attached data 1: clusterEventMessage = test3
Attached data 2: clusterEventID = 200
Attached data 3: clusterEventDateTime = 2011/08/01 09:00:00
Attached data 4: clusterEventServerName = server1
Attached data 5: clusterEventModuleName = logcmd
```

*** 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 ...]
clpmonctrl -e -m resource_name
clpmonctrl -n [-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.

Description	This command suspends and/or resumes the monitor resources on a single server, displays and/or resets the times counter of the recovery action, and enable and/or disable Dummy Failure.	
Option	-s	Suspends monitoring
	-r	Resumes monitoring
	-c	Resets the times counter of the recovery action.
	-v	Displays the times counter of the recovery action.
	-e	Enables the Dummy Failure. Be sure to specify a monitor resource name with the -m option.
	-n	Disables the Dummy Failure. When a monitor resource name is specified with the -m option, the function is disabled only for the resource. When the -m option is omitted, the function is disabled for all monitor resources.
	-m resource_name	Specifies one or more monitor resources to be controlled.
	...	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.

Return Value	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 [miiw1: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 [miiw1: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 [miw1: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.

Remarks If you suspend a monitor resource that is already suspended or resume that is already resumed, this command terminates successfully without changing the status of the monitor resource.

Notes Run this command as root user.

Check the status of monitor resource by using the status display clpstat command or WebManager.

Before you run this command, use the clpstat command or WebManager to verify that the status of monitor resources is in either “Online” or “Suspend.”

If the recovery action for the monitor resource is set as follows, “Final Action Count”, which displayed by the -v option, means the number of times “Execute Script before Final Action” is executed.

- Execute Script before Final Action: Enable
- final action: No Operation

Error Messages

Message	Causes/Solution
Command succeeded.	The command ran successfully.
Log in as root.	You are not authorized to run this command. Log on as 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. Check the cluster configuration data by using the Builder.
The cluster has been stopped. Check the active status of the cluster daemon by using the command such as ps command.	The cluster has been stopped. Check the activation status of the cluster daemon by using a command such as ps command.
The cluster has been suspended. The cluster daemon has been suspended. Check activation status of the cluster daemon by using a command such as the ps command.	The cluster daemon has been suspended. Check the activation status of the cluster daemon by using a command such as ps command.
Waiting for synchronization of the cluster. The cluster is waiting for synchronization. Wait for a while and try again.	Synchronization of the cluster is awaited. Try again after cluster synchronization is completed.
Monitor %1 was unregistered, ignored. The specified monitor resources %1 is not registered, but continue processing. Check the cluster configuration data by using the Builder.	There is an unregistered monitor resource in the specified monitor resources but it is ignored and the process is continued Check the cluster configuration data by using the Builder. %1: Monitor resource name

Message	Causes/Solution
Monitor %1 denied control permission, ignored. but continue processing.	The specified monitor resources contain the monitor resource which cannot be controlled, but it does not affect the process. %1: Monitor resource name
This command is already run.	The command is already running. Check the running status by using a command such as ps command.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

Monitor resource types that can be specified for the -m option

Type	Suspending/resuming monitoring	Resetting the times counter of the recovery action	Enabling/disabling Dummy Failure
diskw	y	y	y
ipw	y	y	y
miiw	y	y	y
mtw	y	y	y
pidw	y	y	y
volmgrw	y	y	y
userw	y	y	n
vipw	n	y	n
vmw	y	y	n
ddnsw	n	y	n
mrw	y	y	n
genw	y	y	y
oraclew	y	y	y
psqlw	y	y	y
mysqlw	y	y	y
sambaw	y	y	y
nfs	y	y	y
jraw	y	y	y

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.

Option	-s	Starts group resources.
	-t	Stops group resources.
	-h	Requests processing to the server specified by the hostname. When this option is skipped, request for processing is made to the following servers. • When the group is offline, the command execution server (local server). • When the group is online, the server where group is activated.
	-f	When the group resource is online, all group resources that the specified group resource depends starts up. When the group resource is offline, all group resources that the specified group resource depends stop.

Return Value	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. 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. 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.

Description	This command displays and/or initializes reboot count on a single server	
Option	-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> .
Return Value	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

For information on the reboot count limit, see "Attributes common to group resources Reboot count limit" in Chapter 4 "Group resource details" in this guide.

Notes

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

Error Messages

Message	Causes/Solution
Command succeeded.	The command ran successfully.
Log in as root.	You are not authorized to run this command. Log on as a root user.
The command is already executed. Check the execution state by using the "ps" command or some other command.	The command is already running. Check the running status by using a command such as ps command.
Invalid option.	Specify a valid option.
Internal error. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.

Turning off warning light (clplamp command)

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

Command line:

clplamp -h *hostname*

Description Turns the warning light of the specified server off.

Option -h *hostname* Specify a server whose warning light you want to turn off.

Return Value 0 Normal termination
Other than 0 Abnormal termination

Notes 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.

Option	-d	Disables the chassis identify function.
	-i	Enables the chassis identify function.
	-h <i>hostname</i>	Specifies the name of the server which enables/disables the chassis identify function. Specify -a to omit this.
	-a	All servers in the cluster are the targets. The -a option can be omitted. If so, specify <i>hostname</i> .
	-w <i>timeout</i>	Specifies the timeout value of the command by the second. If the -w option is not specified, it waits for 30 seconds.

Return Value	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. Check if the server has started up.	Check if the server has started up.
Could not connect to all data transfer servers. Check if the servers have started up.	Check the all servers in the cluster have started up.
Command timeout.	The cause may be heavy load on OS and so on. Check this.
Chassis identify is not setting or active at all servers.	Chassis identify is disabled or not used.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Specify a valid server name in the cluster.
All servers are busy. Check if this command is already run.	This command may be run already. Check it.
Internal error. Check if memory or OS resource is sufficient.	Check if the memory or OS resource is sufficient.

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.

Option	-t <i>request_code</i>	Specifies the request code of the process to be executed. The following request codes can be specified: GRP_FAILOVER Group failover EXEC_SCRIPT Execute script
	-h <i>IP</i>	Specifies the server to issue the request to execute the process with IP address. You can specify more than one server by separating by commas. When you specify group failover for request code, specify the IP addresses of all the servers in the cluster.
	-r <i>resource_name</i>	Specifies the resource name which belongs to the target group for the request for process when GRP_FAILOVER is specified for request code. If GRP_FAILOVER is specified, -r cannot be omitted.
	-s <i>script_file</i>	Specifies the file name of the script to be executed (e.g. batch file or executable file) when EXEC_SCRIPT is specified for request code. The script needs to be created in the work\trnreq folder in the folder where ExpressCluster is installed in each server specified with -h. If EXEC_SCRIPT is specified, -s cannot be omitted.
	-w <i>timeout</i>	Specifies the timeout value of the command by the second. If the -w option is not specified, the command waits for 30 seconds.

Return Value	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. Check if the server has started up.	Check if the server has started up.
Could not connect to all data transfer servers. Check if the servers have started up.	Check if all the servers in the cluster have started up.
Command timeout.	The cause may be heavy load on OS and so on. Check this.
All servers are busy. Check if this command is already run.	This command may be run already. Check it.
GRP_FAILOVER %s : Group that specified resource(%s) belongs to is offline.	Failover process is not performed because the group to which the specified resource belongs is not started.
EXEC_SCRIPT %s : Specified script(%s) does not exist.	The specified script does not exist. Check it.
EXEC_SCRIPT %s : Specified script(%s) is not executable.	The specified script could not be executed. Check that execution is permitted.
%s %s : This server is not permitted to execute clptrnreq.	The server that executed the command does not have permission. Check that the server is registered to the connection restriction IP list of WebManager.
GRP_FAILOVER %s : Specified resource(%s) does not exist.	The specified resource does not exist. Check it.
Internal error. Check if memory or OS resource is sufficient.	Check if the memory or OS resource is sufficient.

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.

Option	--failover	Requests group failover. Specify a group name for <i>group_name</i> . When not specifying the group name, specify the name of a resource that belongs to the group by using the -r option.
	--script script_name	Requests script execution. For <i>script_name</i> , specify the file name of the script to execute (such as a shell script or executable file). 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.
	--notice	Sends an error message to the ExpressCluster server. Specify a message receive monitor resource name for <i>mrw_name</i> . When not specifying the monitor resource name, specify the category and keyword of the message receive monitor resource by using the -k option.
	--clear	Requests changing the status of the message receive monitor resource from "Abnormal" to "Normal." Specify a message receive monitor resource name for <i>mrw_name</i> . 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	Specify the IP addresses of ExpressCluster servers that receive the processing request. Up to 32 IP addresses can be specified by separating them with commas. * If this option is omitted, the processing request is issued to the local server.
-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	For <i>mon_type</i>, specify the category specified for the message receive monitor when the --notice or --clear option is specified. To specify the keyword of the message receive monitor resource, specify them by separating them with dot after <i>category</i>.
-p port_number	Specify the port number. For <i>port_number</i>, specify the data transfer port number specified for the server that receives the processing request. The default value, 29002, is used if this option is omitted.
-o logfile_path	For <i>logfile_path</i>, specify the file path along which the detailed log of this command is output. The file contains the log of one command execution. * If this option is not specified on a server where ExpressCluster is not installed, the log is always output to the standard output.
-w timeout	Specify the command timeout time. The default, 30 seconds, is used if this option is not specified. A value from 5 to MAXINT can be specified.
Return Value	
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:

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• Attributes common to group resources	309
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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 353)	2.1.0-1~
Disk resource	disk	See “Understanding disk resource.” (Page 389)	2.1.0-1~
Floating IP resource	fip	See “Understanding floating IP resource.” (Page 397)	2.1.0-1~
Virtual IP resource	vip	See “Understanding virtual IP resources” (Page 408)	2.1.0-1~
NAS resource	nas	See “Understanding NAS resource.” (Page 421)	2.1.0-1~
Volume manager resource	volmgr	See “Understanding Volume Manager resource” (Page 428)	2.1.0-1~
VM Resource	vm	See “Understanding VM resources” (on page 432)	3.0.0-1~
Dynamic DNS resource	ddns	See “Understanding Dynamic DNS resources” (on page 437)	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” in this guide. For details about the clpgrp command, see “Operating groups (clpgrp command)” in Chapter 3, “ExpressCluster command reference” in this guide.

- 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 failover policy in the server group** or **Enable only manual failover among the server groups**.

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
Status of critical monitor resource	Error (all servers)		When there is no failover destination, proceed to the processing for determining a forced failover judgment .
	Normal (single server)		A normal server is used as the failover destination.
	Normal (multiple servers)		Proceed to the process that compares error levels.
Perform a forced failover	Set		Proceed to the process that ignores the status of the critical monitor resource and which compares error levels for all the activated servers.
	Not set		Failover is not performed.
Number of servers with 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.
Prioritize failover policy in the server group	Set	Within the same server group as the failover source, there is a server that can perform failover.	The server in the same server group is used as the failover destination.
		Within the same server group as the failover source, there is no server that can perform failover.	Proceed to the running level judgment process.
	Not set		Proceed to the running level judgment process.
Number of servers with the lowest running level	1		The server with the lowest running 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:

Critical monitor resource

Exclude the server that detected an error in a monitor resource of a specific type from the failover destination.

In 3.1.0-1, the following monitor resources are registered in the blacklist.

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

The critical monitor resource type cannot be changed.

Error level

Number of monitor resources that detected errors

Smart failover

A function that assigns a server with the smallest system load calculated by System Resource Agent as the failover destination. This function is invalid in Solaris versions.

Running level

Number of started failover groups or number of failover groups that are being started

- Prioritize failover policy 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.

Note:

If **Execute Failover to outside the Server Group** is set in message receive monitor resource setting, dynamic failover setting and failover setting between server groups are invalid. A failover is applied to the server that is in a server group other than the server group to which the failover source server belongs and which has the highest priority.

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)
X	Stopped (cluster is stopped)

3-node configuration:

Group	Priority order of servers		
	1 st priority server	2 nd priority server	3 rd priority server
A	server1	server3	server2
B	server2	server3	server1

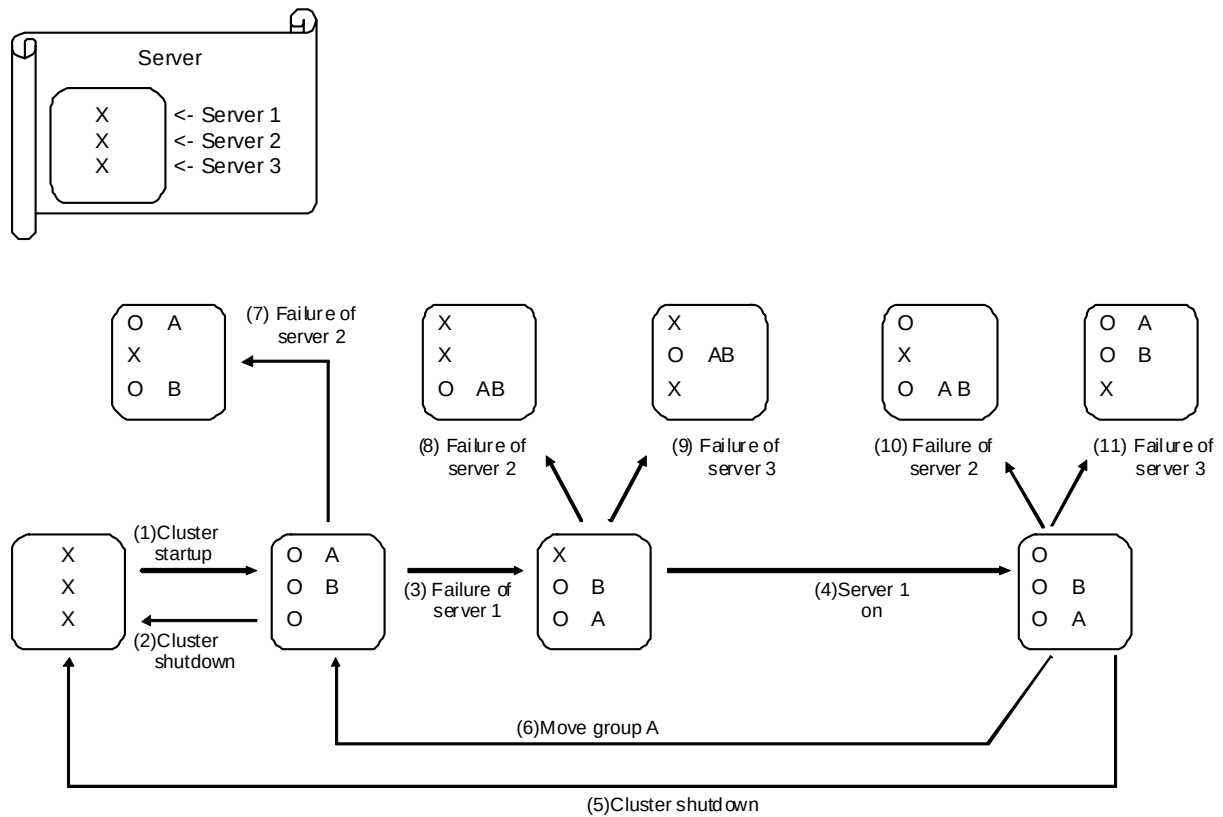
2-node configuration:

Group	Priority order of servers	
	1 st priority server	2 nd priority server
A	server1	server2
B	server2	server1

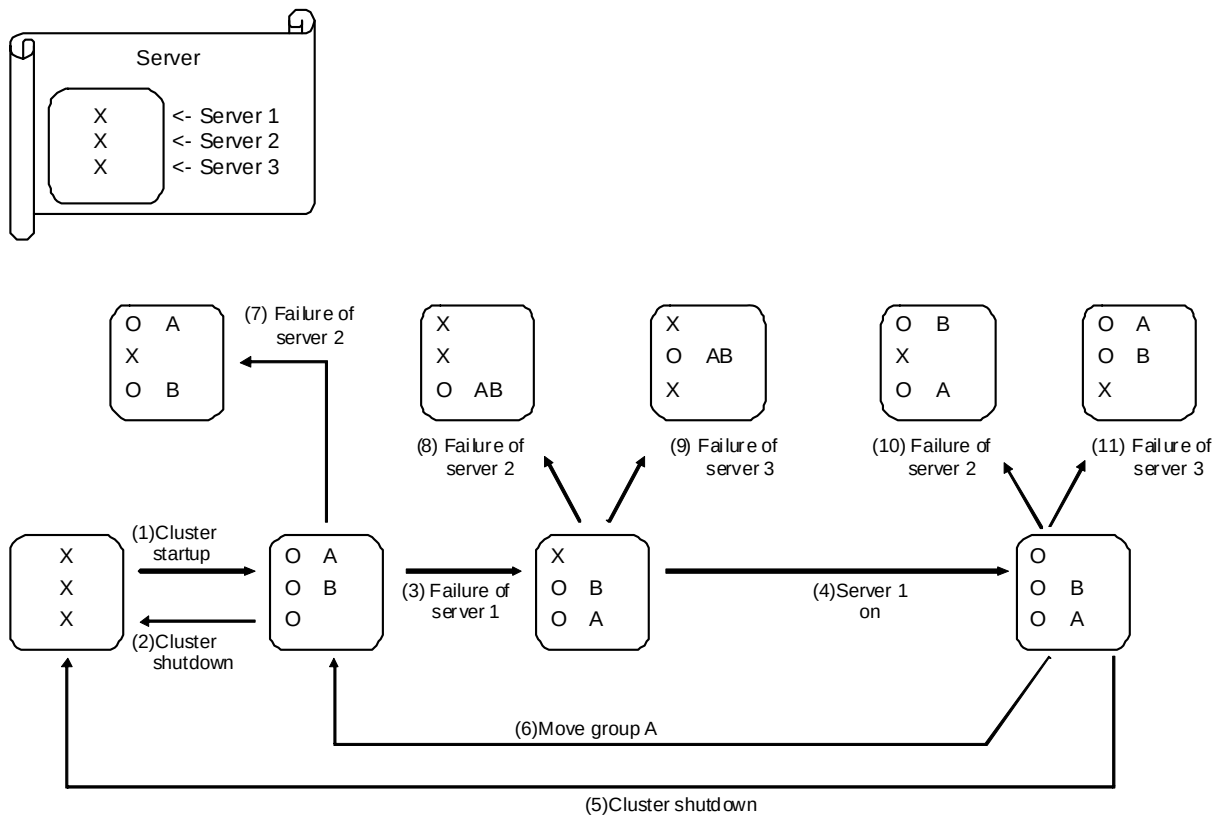
It is assumed that the group startup attribute is set to auto startup and the failback attribute is set to manual failback for both Group A and B.

- ◆ 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:

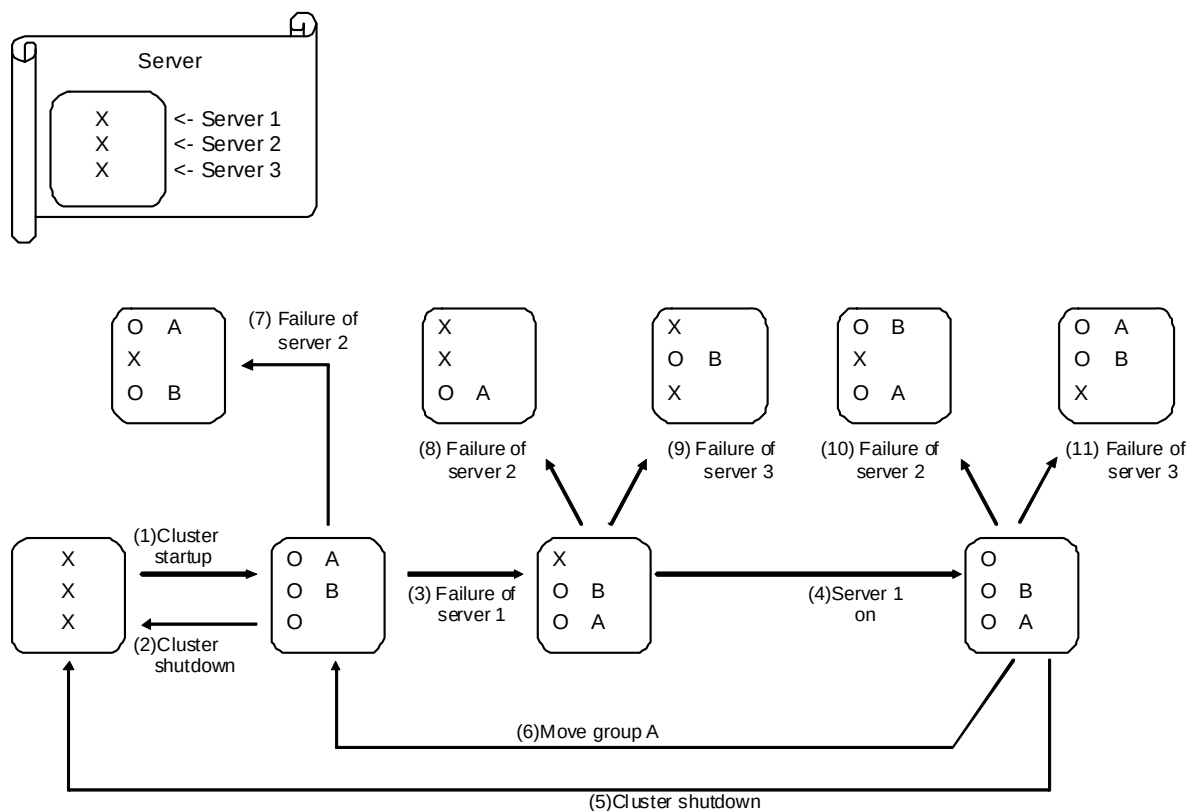


- (1)** Cluster startup
- (2)** Cluster shutdown
- (3)** Failure of server1 Fails over to the next priority server.
- (4)** Server1 power on
- (5)** Cluster shutdown
- (6)** Move group A
- (7)** Failure of server2: Fails over to the next priority server.
- (8)** Failure of server2: Fails over to the 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.

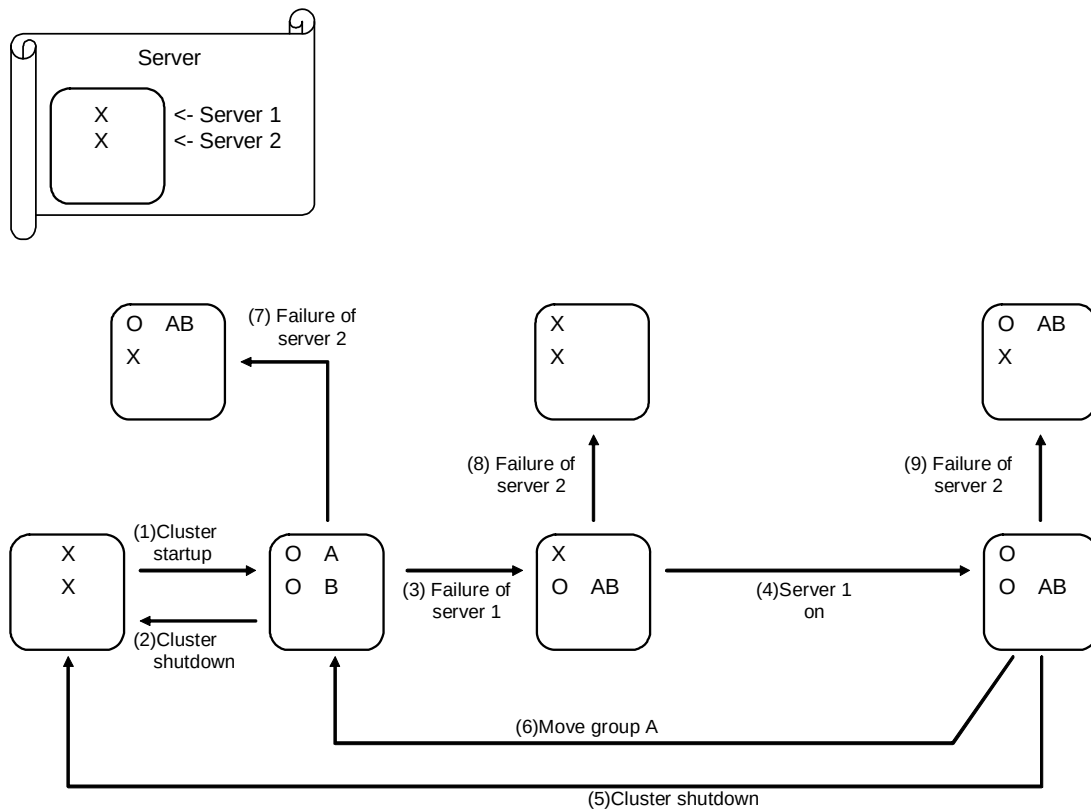
When the failover exclusive attribute for Group A and B is set to Normal:

- (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: 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.
- (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.

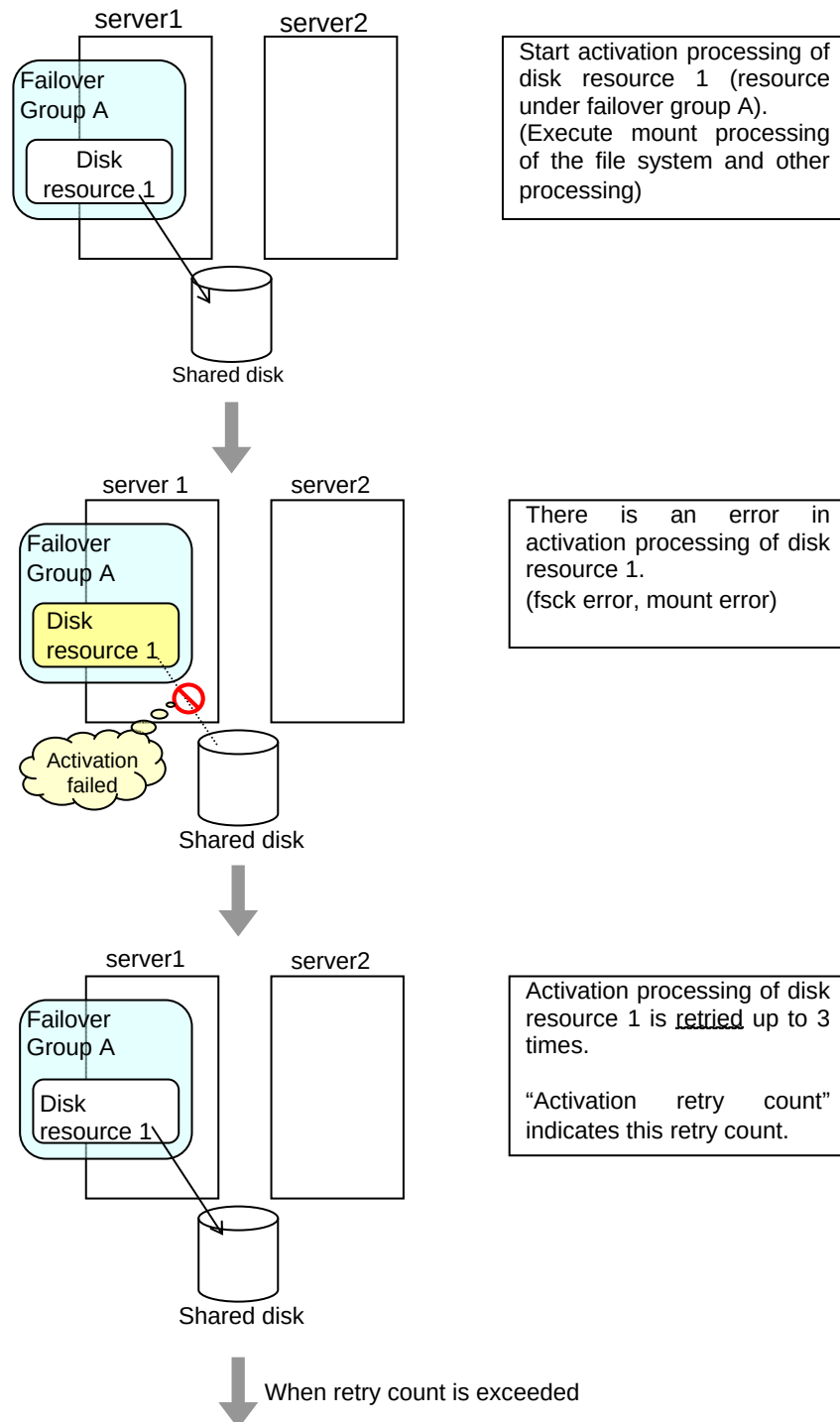
The activation retries count and failover count is reset in a server where the group activation is successful.

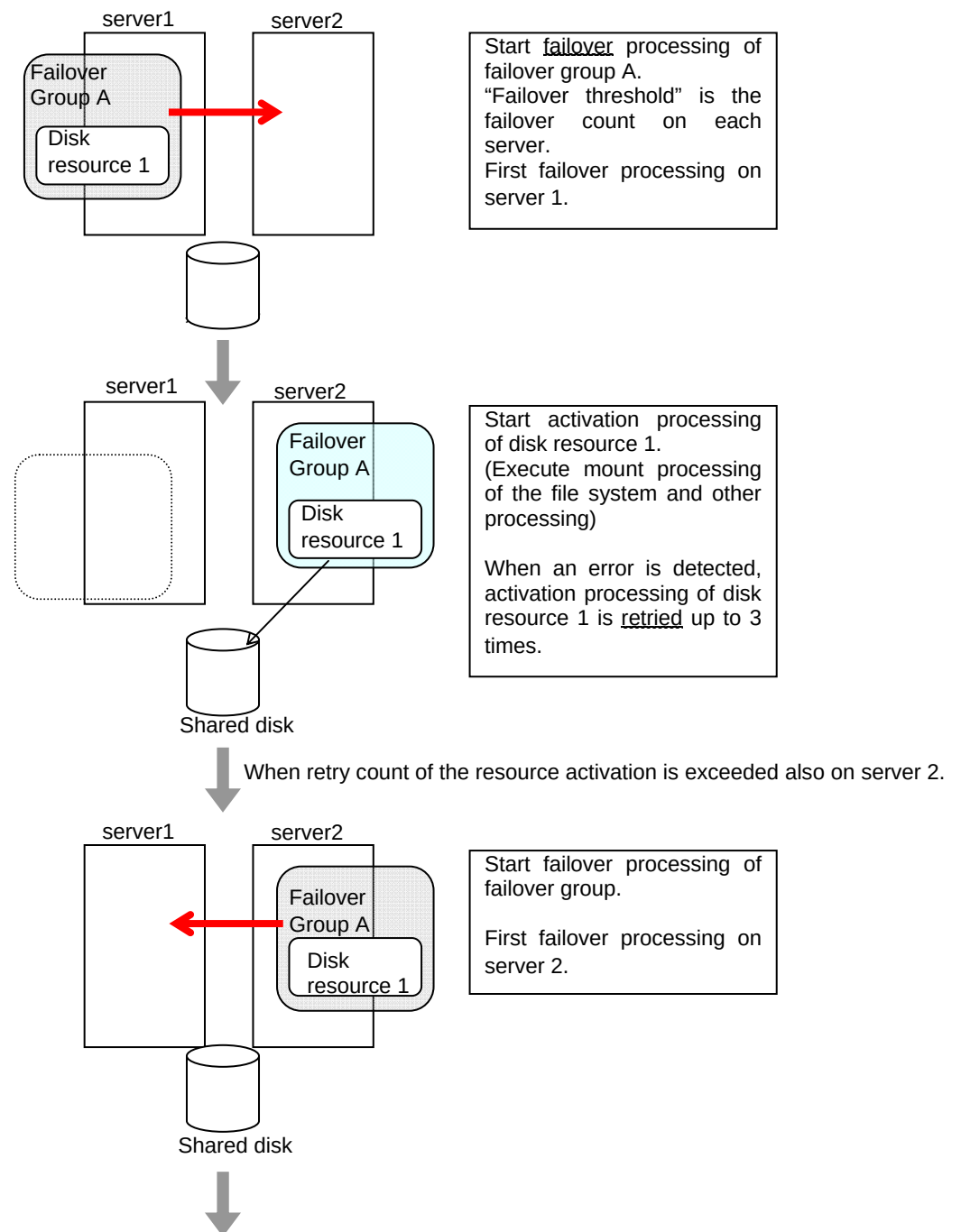
Note that a failed recovery action is also counted as one for the activation retries count or failover count.

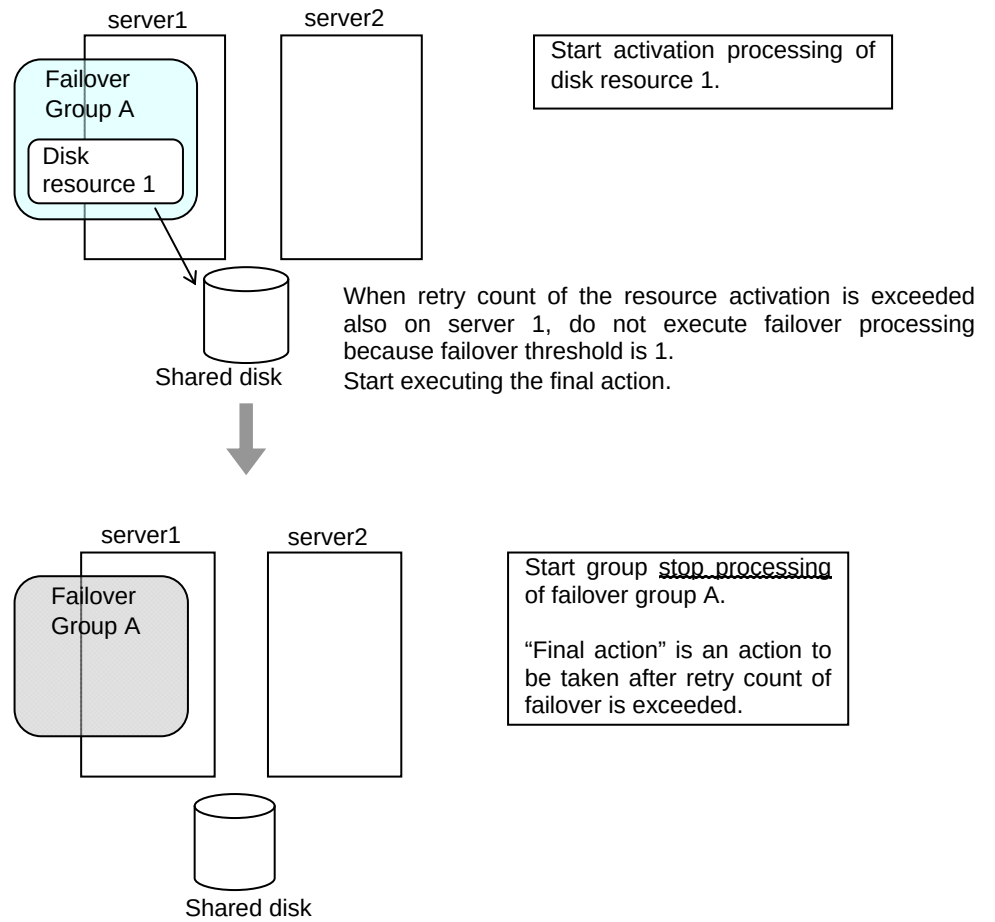
The following describes how an error in activation of a group resource is detected.

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 `clpregctl` command to reset this number. For details on the `clpregctl` command, see “Controlling reboot count (`clpregctl` command)” in Chapter 3, “ExpressCluster command reference” in this guide.

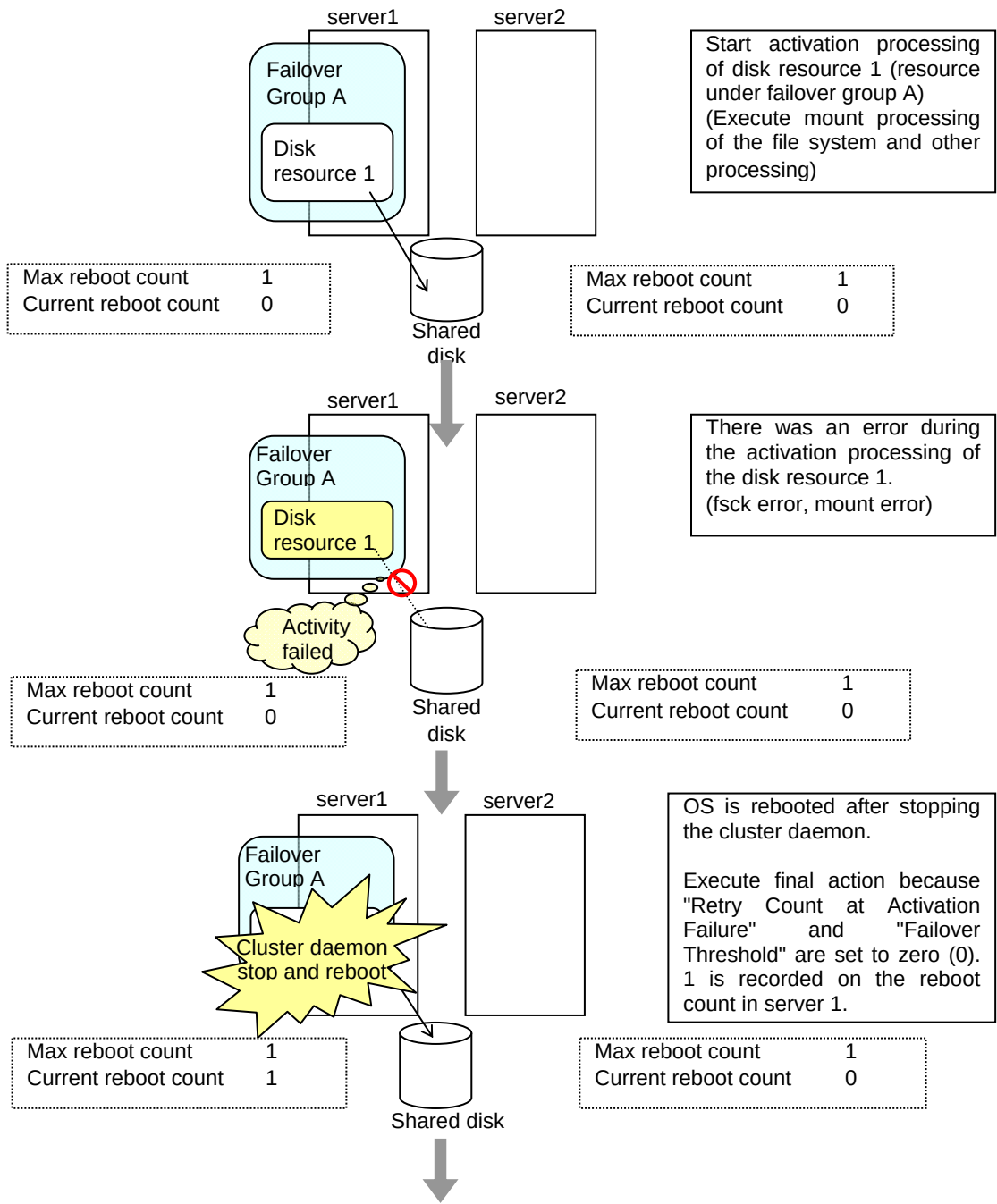
The following describes the flow of operations when the limitation of reboot count is set as shown below:

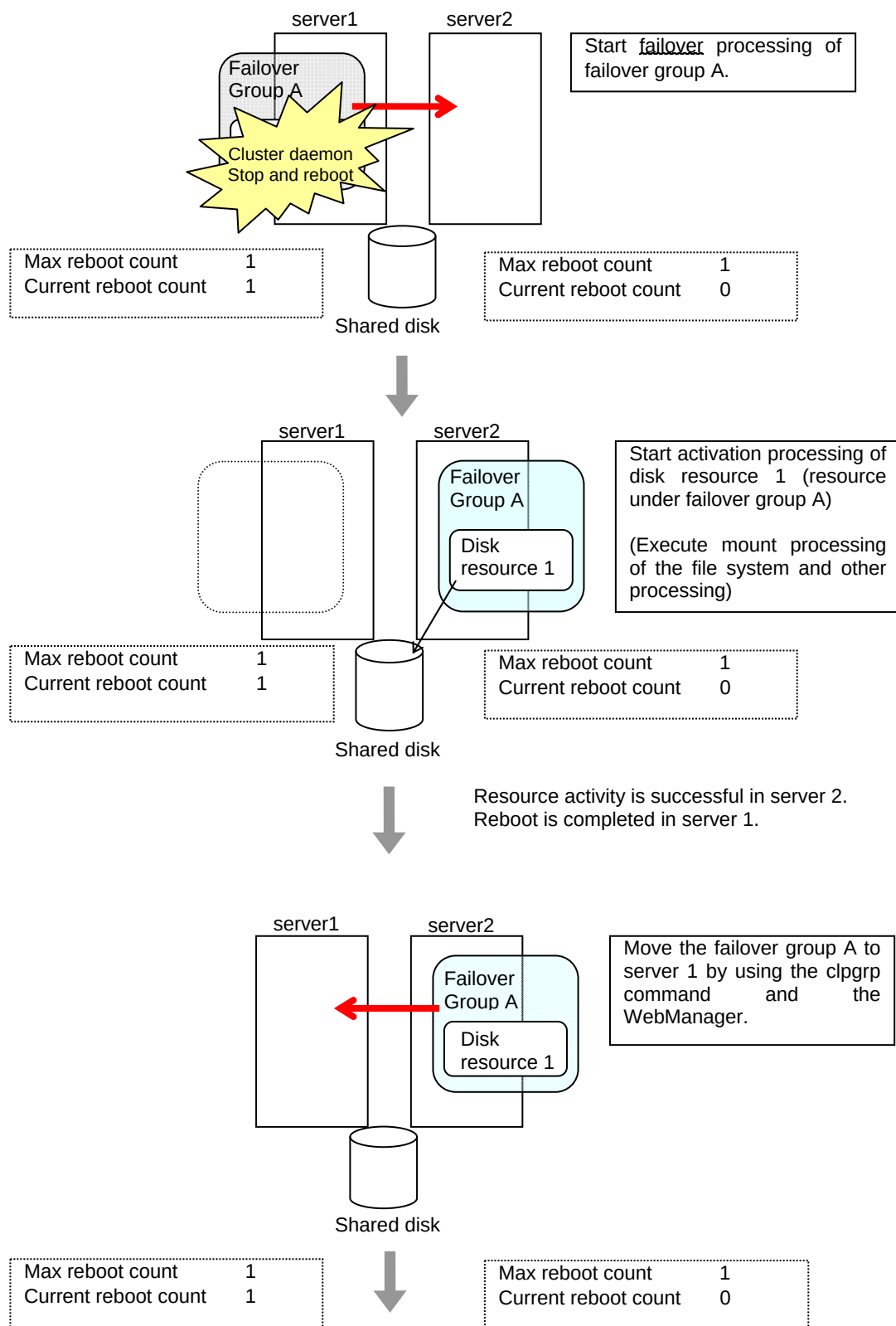
As a final action, **Stop cluster daemon and reboot OS** is executed once because the maximum reboot count is set to one (1).

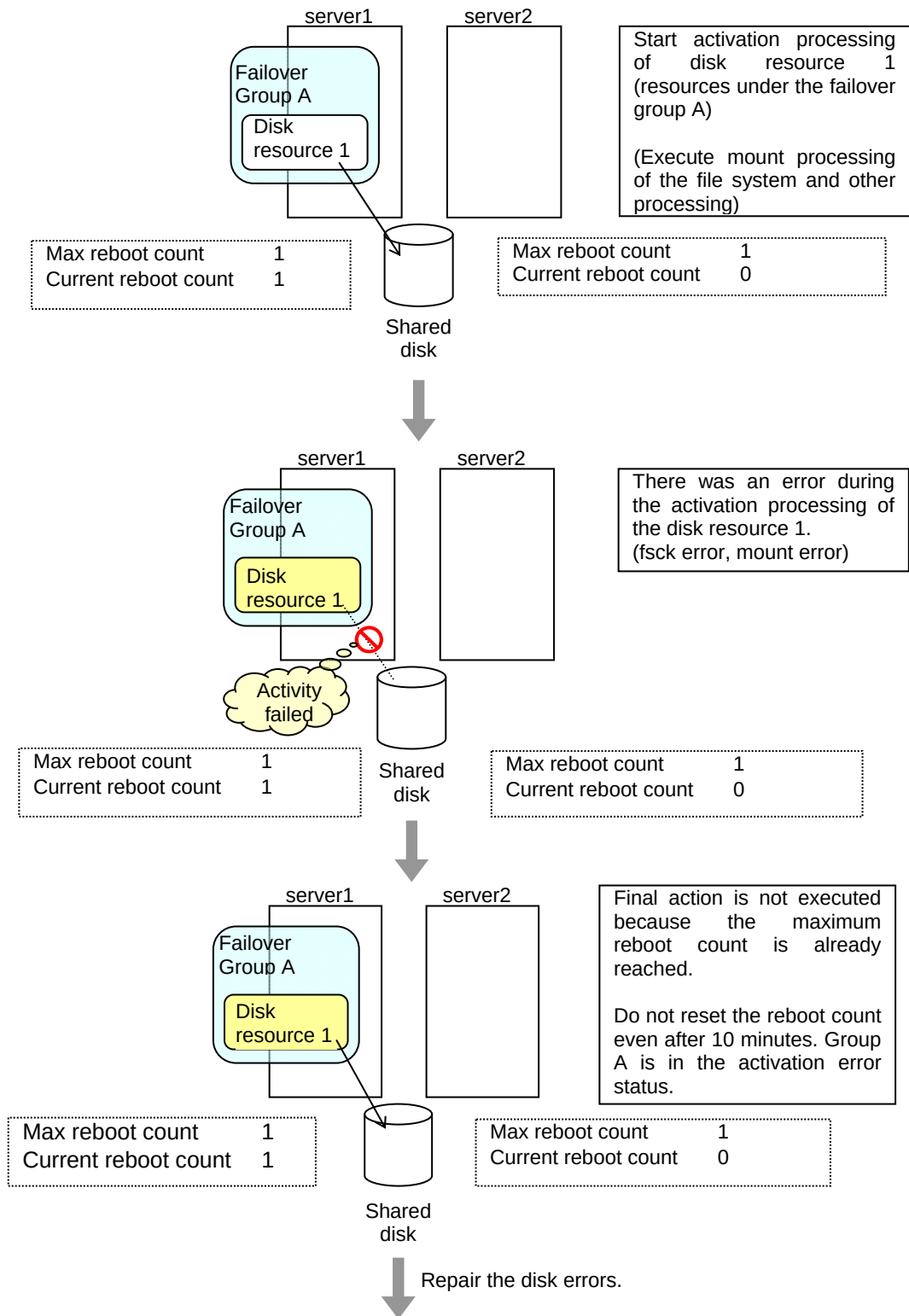
If group activation is successful at a reboot following the cluster shutdown, the reboot count is reset after 10 minutes because the time to reset maximum reboot count is set to 10 minutes.

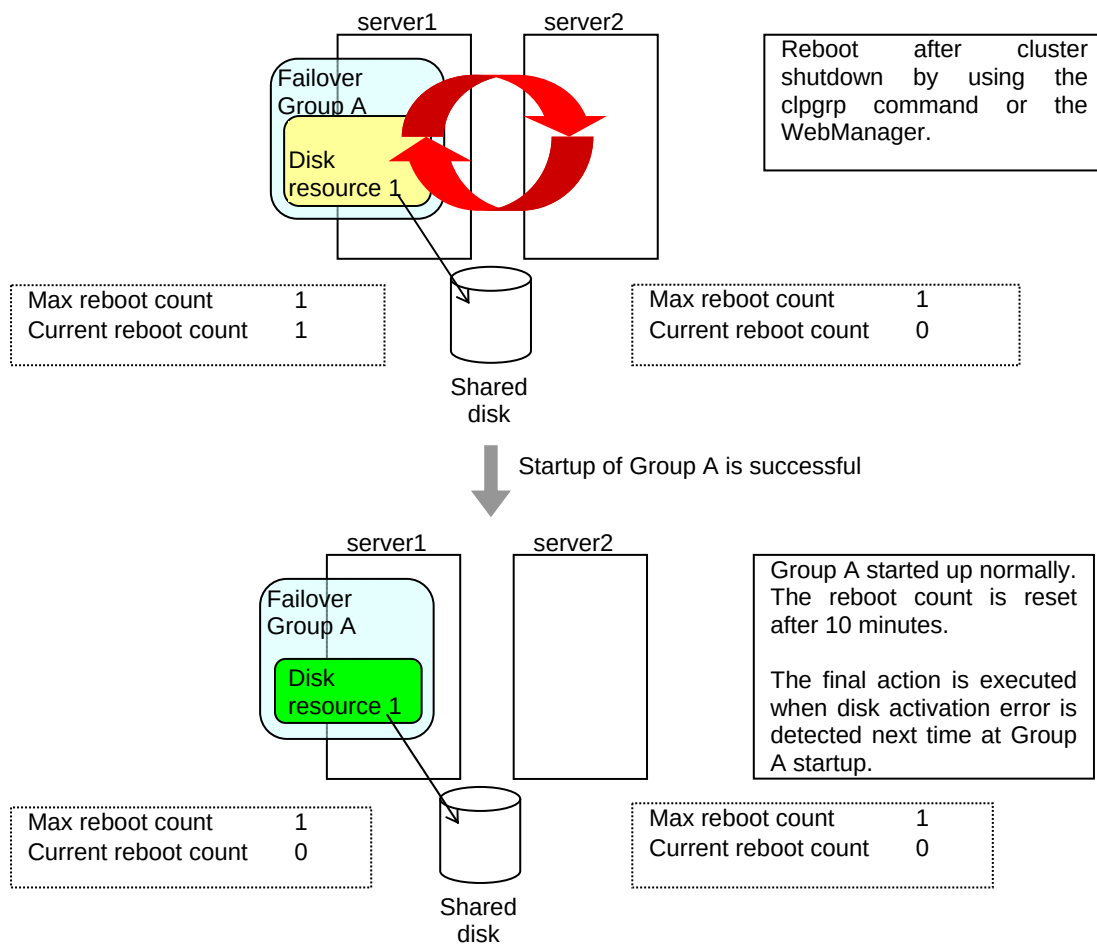
Setting example

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 “Controlling reboot count (`clpregctl` command)” in Chapter 3, “ExpressCluster command reference” in this guide.

Group start dependence and group stop dependence

You can control the group start order by setting the group to which you want to apply start dependence and that to which you want to apply stop dependence.

The group stop dependence is enabled only when performing a cluster stop or cluster shutdown.

The following explains group start execution using examples of simple status transition.

When two servers have three groups

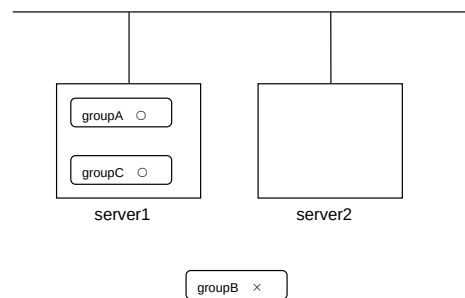
Group failover policy

```
groupA  server1
groupB  server2
groupC  server1 → server2
```

Group start dependence setting

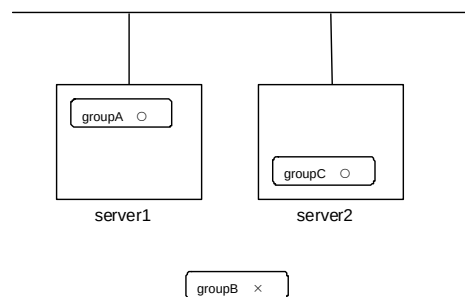
```
groupA  Start dependence is not set.
groupB  Start dependence is not set.
groupC  groupA start dependence is set.
groupC  Start dependence is set when groupC is started by the server of groupB.
```

1. When server1 starts groupA and groupC



server1 starts groupC after groupA has been started normally.

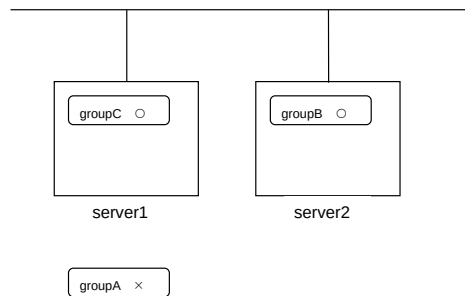
2. When server1 starts groupA and server2 starts groupC



server2 starts groupC after server1 has started groupA normally.

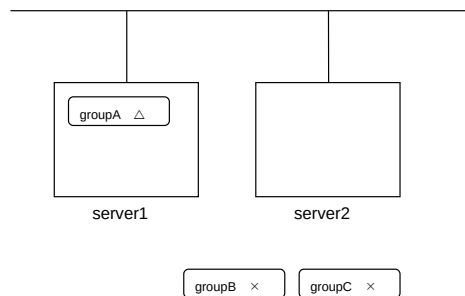
Wait Only when on the Same Server is not set, so groupA start dependence by another server is applied.

3. When server1 starts groupC and server2 starts groupB



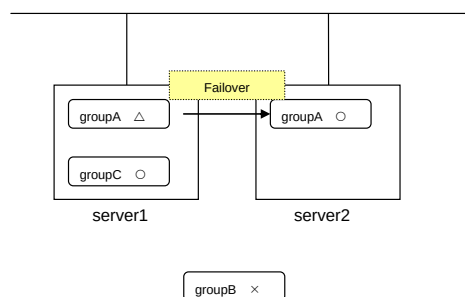
server1 starts groupC without waiting for normal start of groupB. groupC is set to wait for groupB start only when it is started by the same server. However, start dependence is not applied to groupC because groupB is set such that it is not started by server1.

4. When server1 starts groupA and groupC



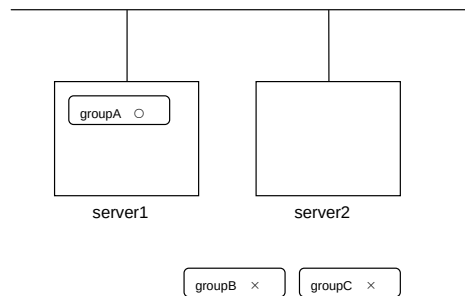
If server1 fails in groupA start, groupC is not started.

5. When server1 starts groupA and groupC



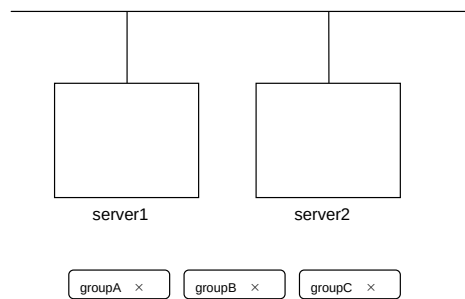
If server1 fails in groupA start and a failover occurs in server2 due to groupA resource recovery, server2 starts groupA and then server1 starts groupC.

6. When server1 starts groupA and groupC



If a groupA start dependence timeout occurs in server1, groupC is not started.

7. When server1 starts only groupC



server1 has not started groupA, so a start dependence timeout occurs. If this timeout occurs, groupC is not started.

Notes:

- ◆ When a group is started, there is no function to automatically start the group for which start dependence is set.
 - ◆ The group is not started if a timeout occurs in the group for which start dependence is set.
 - ◆ The group is not started if the group for which start dependence is set fails to start.
 - ◆ If the group for which start dependence is set contains a normally started and a normally stopped resource, the group is judged to have started normally.
 - ◆ When a group is stopped, there is no function to automatically stop the group for which stop dependence is set.
 - ◆ The group stop processing continues if a timeout occurs in the group for which stop dependence is set.
 - ◆ The group stop processing continues if the group for which stop dependence is set fails to stop.
 - ◆ Stop waiting isn't performed by group stop processing and server stop processing. Stop waiting is performed only by a cluster stop or a cluster shutdown.
 - ◆ If a start waiting timeout occurs at the time of a failover, the failover fails.
-

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)

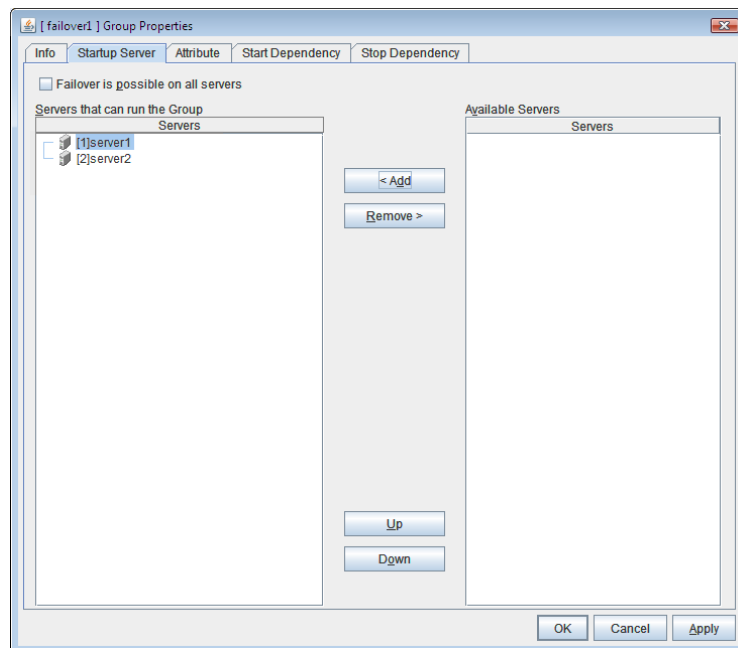
There are two types of settings for the server that starts up the group: starting up the group on all servers or on only the specified servers and server groups that can run the group.

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 “Server properties Master Server tab” in Chapter 2 “Functions of the Builder” in this guide.

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

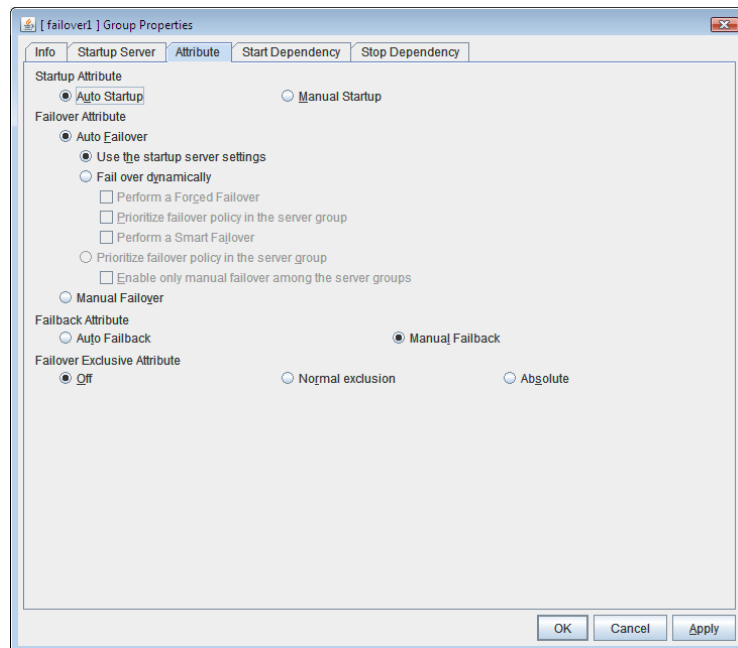
Use this button to remove a server. Select a server that you want to remove from **Servers that can run the Group**, and then click **Remove**. The server is added to **Available Servers**.

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 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.

If dynamic failover is selected, each option can be set. For details, see "Understanding the group properties".
- Prioritize failover policy 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 **Enable only manual failover among the server groups** check box can be selected only when this option button is selected.

If the **Prioritize failover policy 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 failover policy in the server group** option button and **Enable only manual failover among the server groups** 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).

Understanding setting of group start dependence and group stop dependence

You can set the group start and stop order by setting group start dependence and group stop dependence.

- ◆ When group start dependence is set:
 - For group start, start processing of this group is performed after start processing of the group subject to start dependence completes normally.
 - For group start, if a timeout occurs in the group for which start dependence is set, the group does not start.
- ◆ When group stop dependence is set:
 - For group stop, stop processing of this group is performed after stop processing of the group subject to stop dependence completes normally.
 - If a timeout occurs in the group for which stop dependence is set, the group stop processing continues.
 - Stop waiting isn't performed by group stop processing and server stop processing. Stop waiting is performed only by a cluster stop or a cluster shutdown.

To display the settings made for group start dependence and group stop dependence, click the **Groups** icon in the tree view displayed in the left part of Builder and then click the **Start Dependency** tab and the **Stop Dependency** tab in the table view displayed in the right part.

Depths for group start dependence are listed below as an example.

Resources		Entire Dependency	
Depth	Name	Dependent Resource Name	Type
0	fip1	none	
1	disk1	fip1	floating ip resource
2	exec1	disk1	disk resource

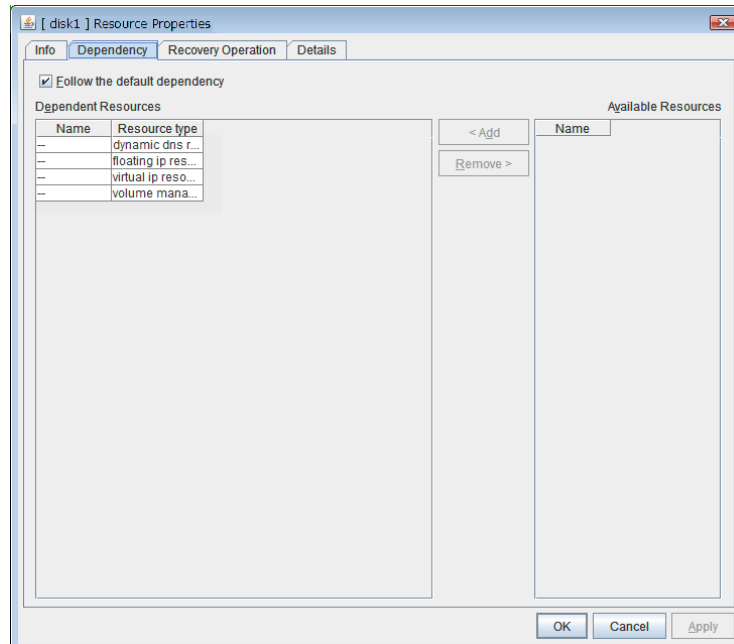
Starting order



Displaying and setting group start dependence and group stop dependence

Set the start dependence and stop dependence for each group.

1. In the tree view displayed in the left part of Builder, click the **Groups** icon.
2. Groups are listed in the table view in the right part. Right-click the group for which you want to display and set dependence and then click the **Start Dependency** tab and the **Stop Dependency** tab of **Properties**.
3. Set the start dependence according to the following description:
 - From **Available Group**, select a start dependence target group.
 - Click **Add**.
 - The added group is added to **Dependent Group**.
 - To change the properties, select a group from **Dependent Group**.
 - Click **Property**.
 - Select the **Wait Only when on the Same Server** check box.
4. Set the stop dependence according to the following description:
 - From **Available Group**, select a stop dependence target group.
 - Click **Add**.
 - The selected group is added to **Dependent Group**.



Add

Clicking **Add** adds the group selected from **Available Group** to **Dependent Group**.

Remove

Clicking **Remove** removes the group selected from **Dependent Group** from **Dependent Group**.

Start Wait Time / Stop Wait Time 0 to 9999

Specify how many seconds you want to wait before a timeout in the target group start process. The default value is 1800 seconds.

Property

Clicking **Property** changes the properties of the group selected from **Dependent Group**.

Wait Only when on the Same Server

Specify whether you wait for start waiting only when the group which starts waiting and the target group start on the same server.

When the server which starts the group that starts waiting isn't included in the Startup Server of a target group, you don't wait.

When a target group fails to start on a server other than the server which starts the group that starts waiting, you don't wait.

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)

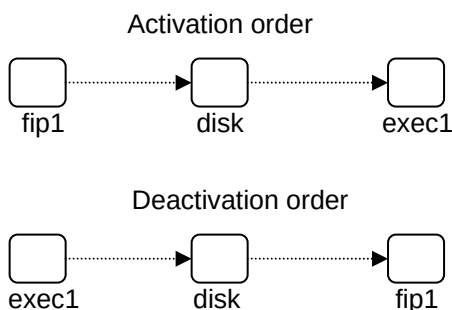
By specifying dependency among group resources, the order of activation can be specified.

- ◆ 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.

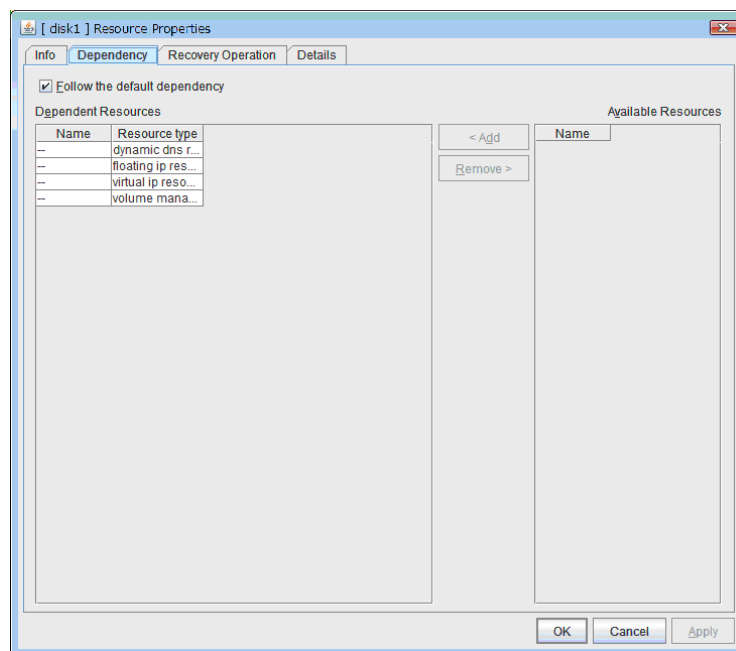
Resources		Entire Dependency	
Depth	Name	Dependent Resource Name	Type
0	fip1	none	
1	disk1	fip1	floating ip resource
2	exec1	disk1	disk resource



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. For the default dependency of each resource, see “Parameters list” in Chapter 2, “Functions of the Builder” in this guide. 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**.

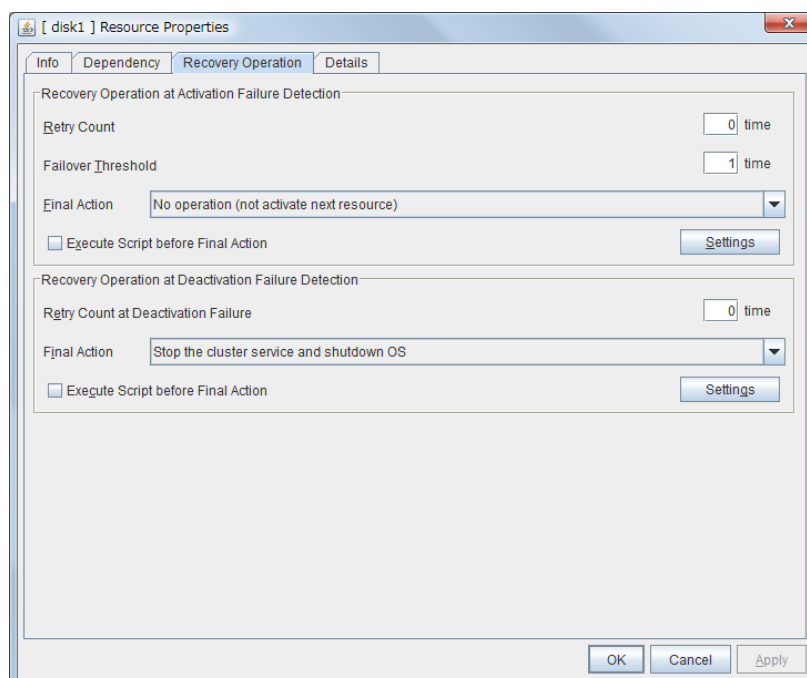
Remove

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

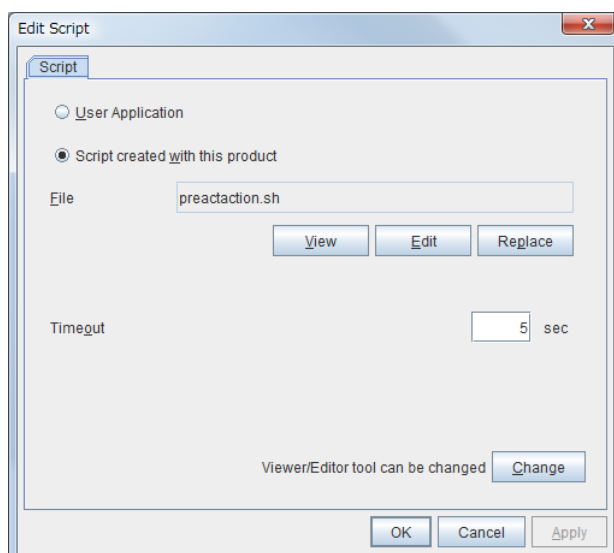
Select whether script is run or not before executing final action when a deactivation failure is detected.

- 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

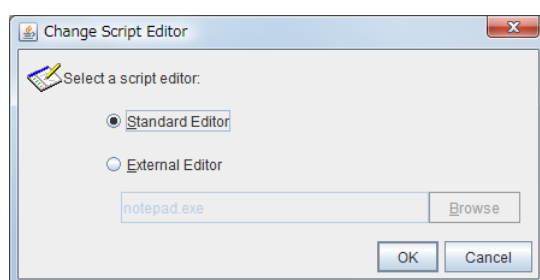
Click here to replace the contents of a script file with the contents of the script file that you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not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

Timeout (1 to 9999)

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 	server2 
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	

Clicking **Details** displays the popup dialog box containing the following contents:

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.

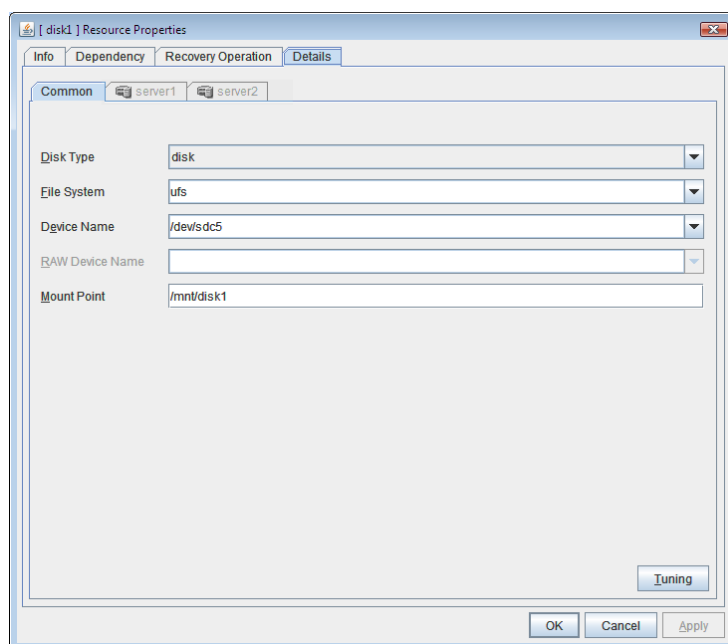
Group resource name	Supported version
Disk resource	2.1.0-1~
Floating IP resource	2.1.0-1~
Virtual IP resource	2.1.0-1~
Dynamic DNS resource	3.0.0-1~
Virtual machine resource	3.0.0-1~

Note:

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

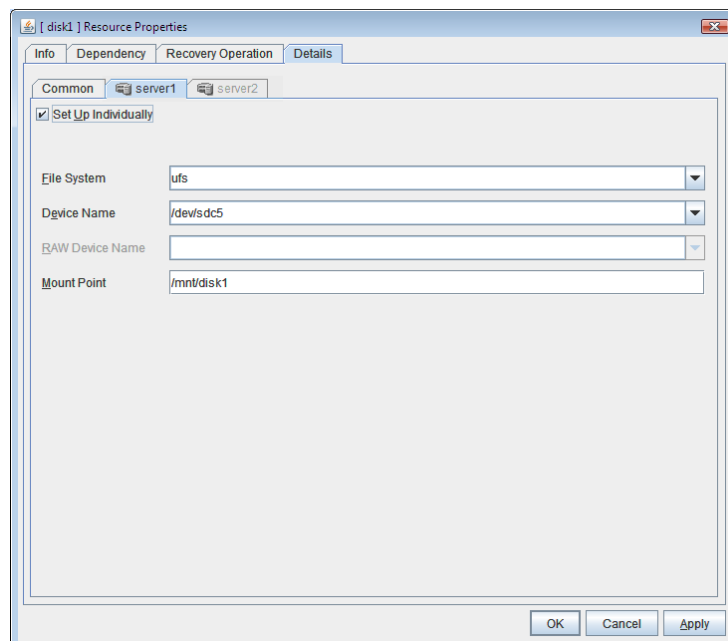
For parameters that can be set for individual servers, see the descriptions of parameters on each group resource. On those parameters, the **Server Individual Setup** icon is displayed.

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 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.

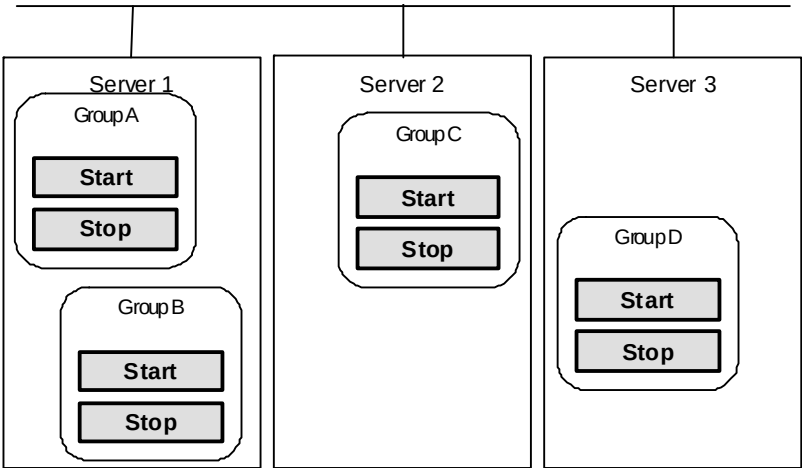
Dependency of EXEC resources

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 ...script starting factor	START	The script was run: - by starting a cluster; - by starting a group; - on the destination server by moving a group; - on the same server by restarting a group due to the detection of a monitor resource error; or - on the same server by restarting a group resource due to the detection of a monitor resource error.
	FAILOVER	The script was run on the failover target server: - by the failure of the server; - due to the detection of a monitor resource error; or - because activation of group resources failed.
CLP_FACTOR ...group stopping factor	CLUSTERSHUTDOWN	The group was stopped by stopping the cluster.
	SERVERSHUTDOWN	The group was stopped by stopping the server.
	GROUPSTOP	The group was stopped by stopping the group.
	GROUPMOVE	The group was moved by moving the group.
	GROUPFAILOVER	The group failed over because an error was detected in monitor resource; or the group failed over because of activation failure in group resources.
	GROUPRESTART	The group was restarted because an error was detected in monitor resource.
	RESOURCESTART	The group resource was restarted because an error was detected in monitor resource.
CLP_LASTACTION ...process after cluster	REBOOT	In case of rebooting OS
	HALT	In case of halting OS

Environment Variable	Value of environment variable	Meaning
shutdown	NONE	No action was taken.
CLP_SERVER ...server where the script was run	HOME	The script was run on the primary server of the group.
	OTHER	The script was run on a server other than the primary server of the group.
CLP_DISK ...partition connection information on shared disks	SUCCESS	There was no partition where connection had failed.
	FAILURE	There was one or more partition where connection had failed.
CLP_PRIORITY ... the order in failover policy of the server where the script is run	1 to the number of servers in the cluster	Represents the priority of the server where the script is run. This number starts from 1 (The smaller the number, the higher the server's priority). If CLP_PRIORITY is 1, it means that the script is run on the primary server.
CLP_GROUPNAME ...Group name	Group name	Represents the group name that the script belongs.
CLP_RESOURCENAME ...Resource name	Resource name	Represents the resource name that the script belongs.
CLP_PID ...Process ID	Process ID	Represents the process ID of start script when the property of start script is set to asynchronous. This environment variable is null when the start script is set to synchronous.
CLP_VERSION_FULL ...ExpressCluster full version	ExpressCluster full version	Represents the ExpressCluster full version. (Example) 3.1.0-1
CLP_VERSION_MAJOR ...ExpressCluster major version	ExpressCluster major version	Represents the ExpressCluster major version. (Example) 3
CLP_PATH ...ExpressCluster install path	ExpressCluster install path	Represents the path where ExpressCluster is installed. (Example) /opt/nec/expresscluster
CLP_OSNAME ...Server OS name	Server OS name	Represents the OS name of the server where the script was executed. (Example) SunOS
CLP_OSVER ...Server OS version	Server OS version	Represents the OS version of the server where the script was executed. (1) When the uname command exists: 5.10 (2) When the uname command does not exist: 0

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.

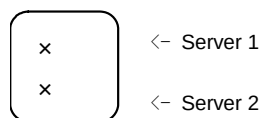
Server	Server status
O	Normal (properly working as a cluster)
X	Stopped (cluster is stopped)

(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:

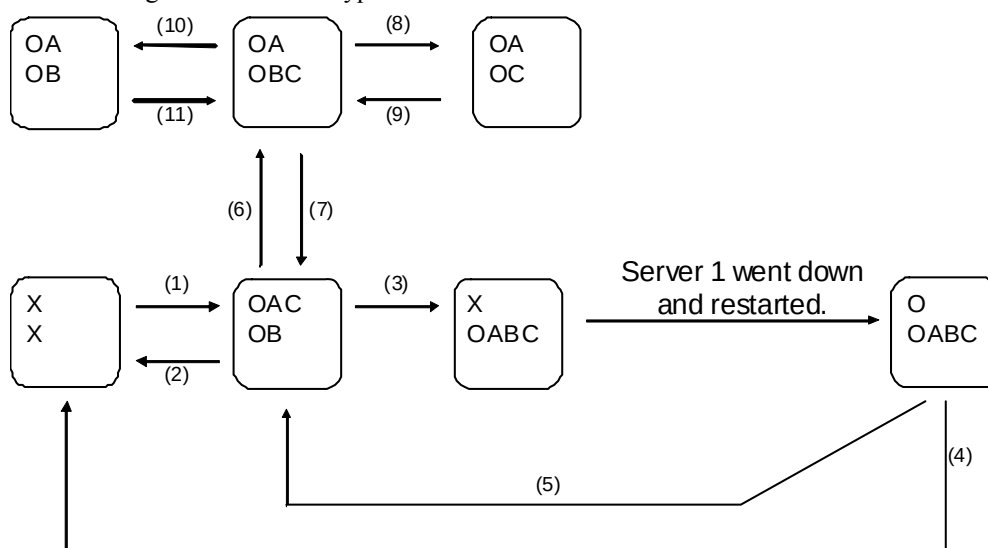
Group	1 st priority server	2 nd priority server
A	server1	server2
B	server2	server1
C	server1	server2

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



<Cluster status transition diagram>

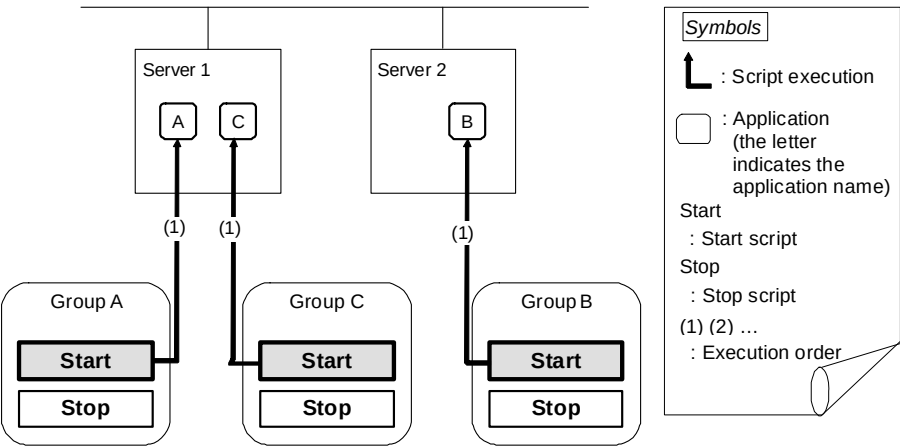
This diagram illustrates a typical status transition of cluster.



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.

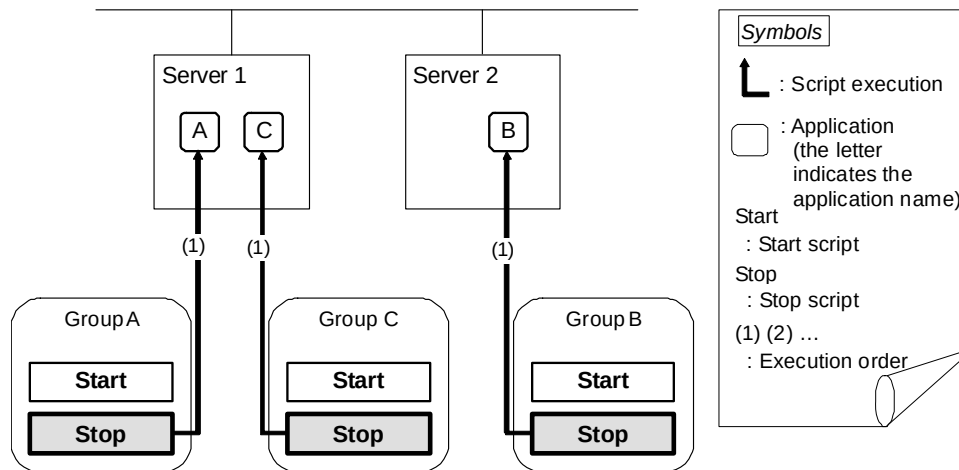


Environment variables for Start

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).



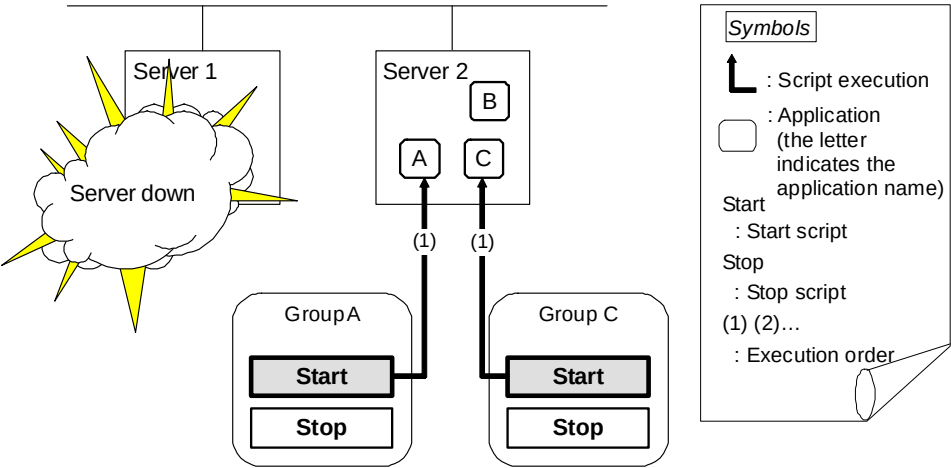
Environment variables for Stop

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.

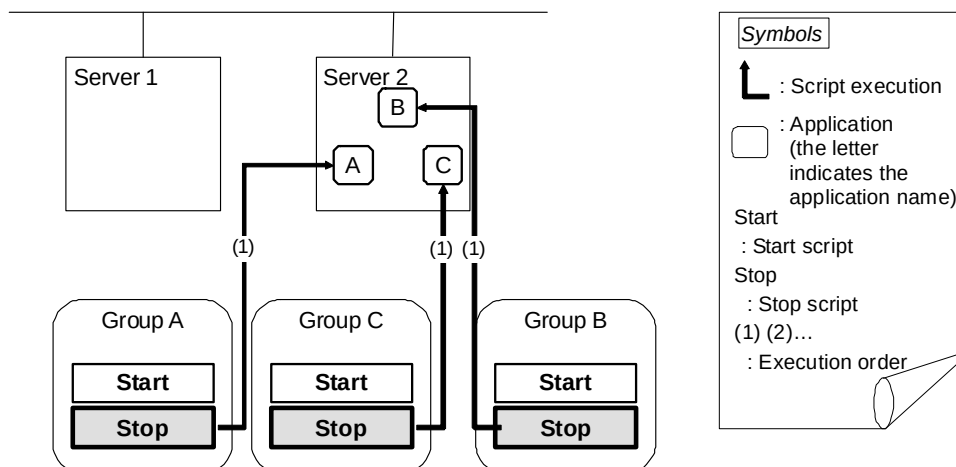


Environment variables for Start

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).

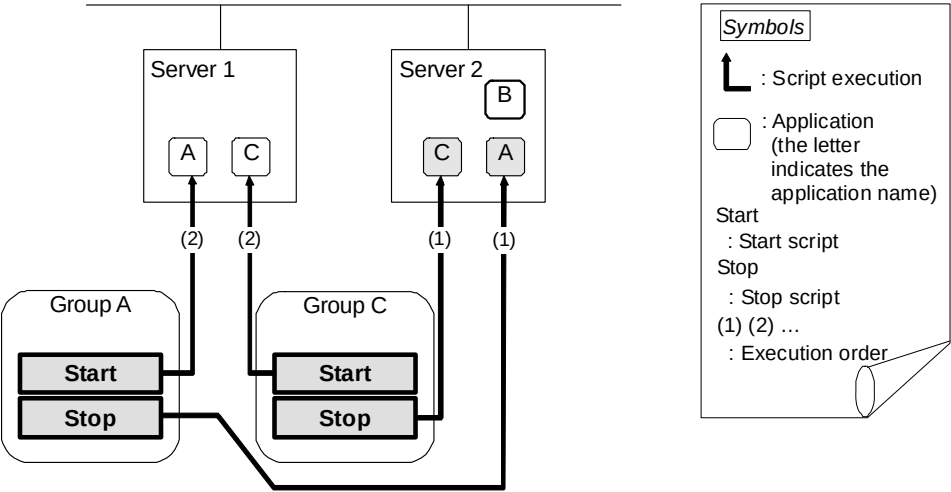


Environment variables for Stop

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 ¹
	CLP_SERVER	OTHER
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

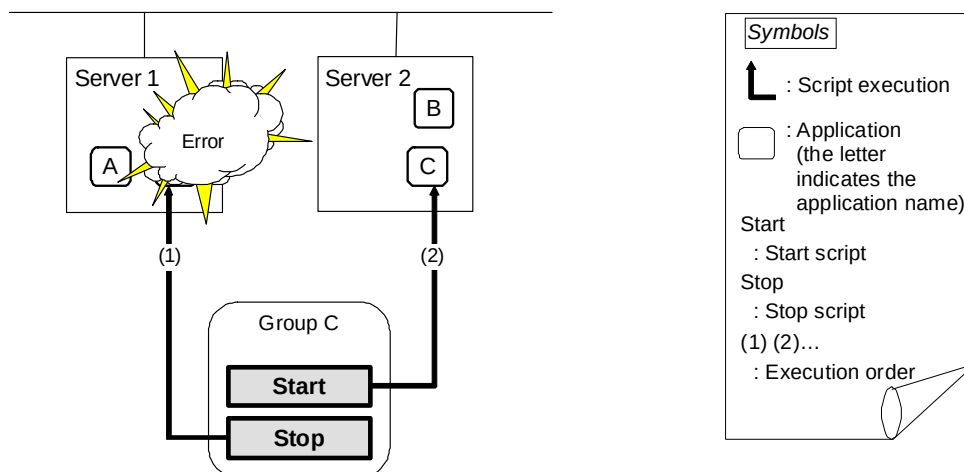
Environment variables for Start

Group	Environment variable	Value
A	CLP_EVENT	START
	CLP_SERVER	HOME
C	CLP_EVENT	START
	CLP_SERVER	HOME

¹ 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

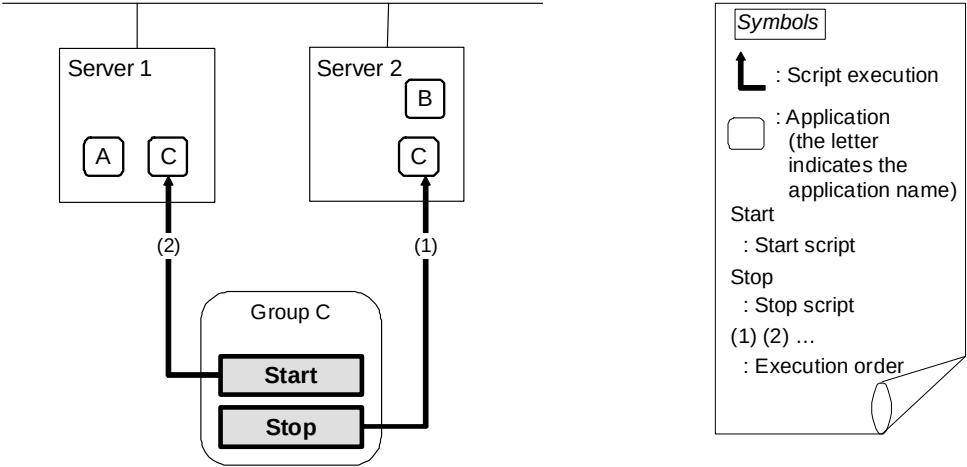
Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	HOME

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))

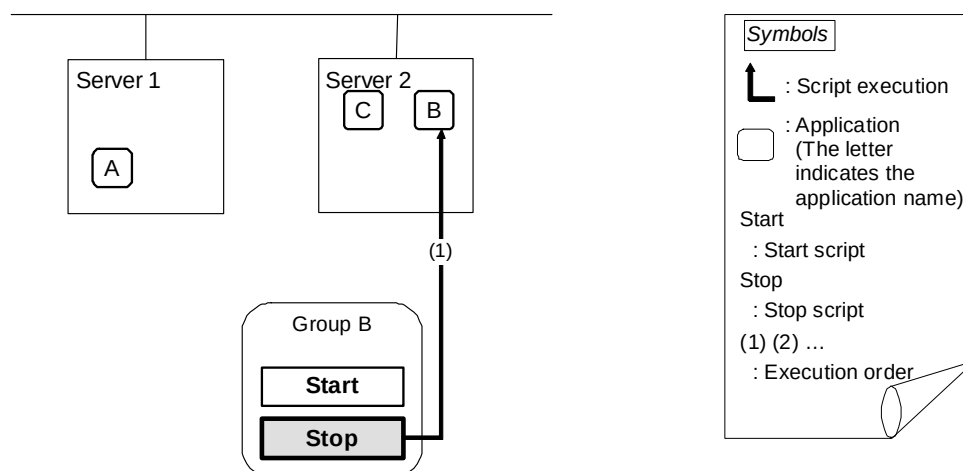
Group	Environment variable	Value
C	CLP_EVENT	FAILOVER
	CLP_SERVER	OTHER

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.

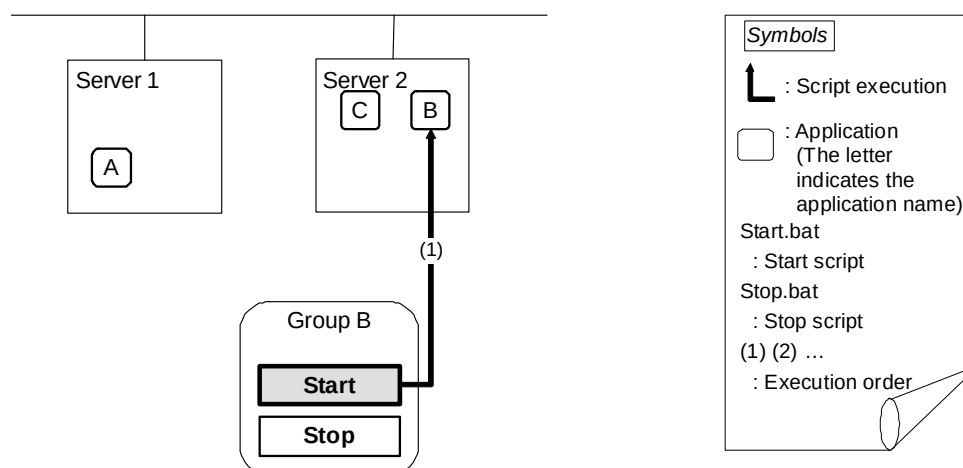


Stop

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.

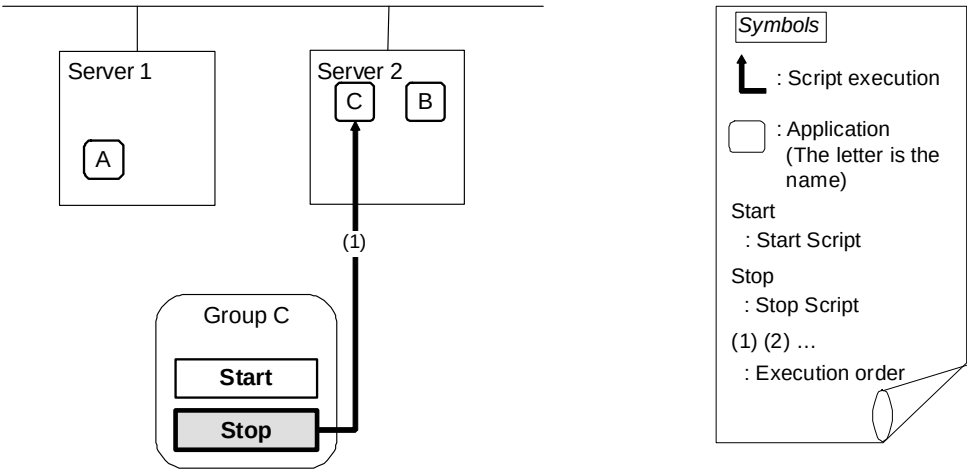


Start

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.

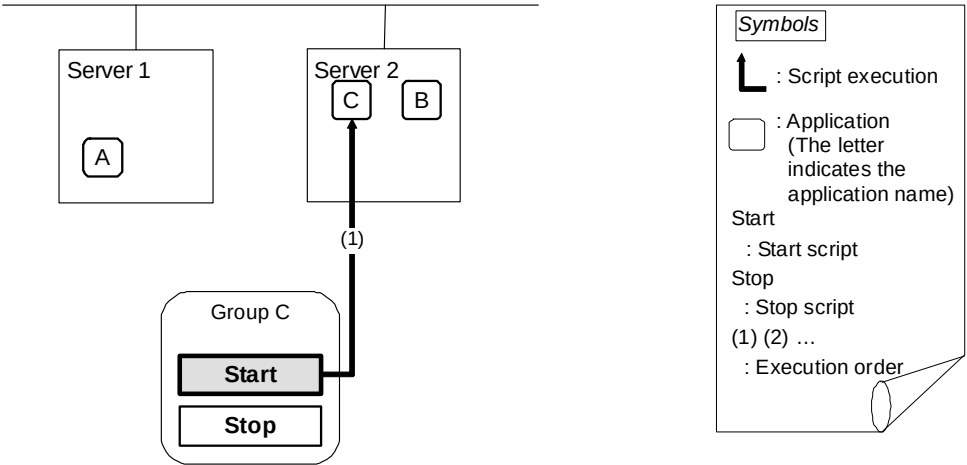


Stop

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.

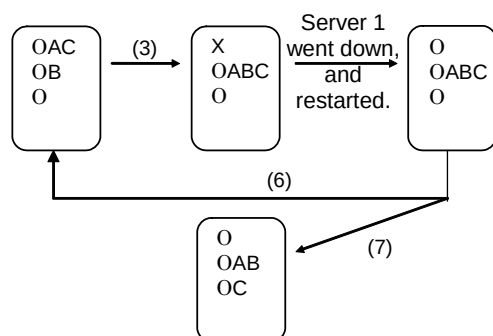


Start

Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	OTHER

Supplementary information 1

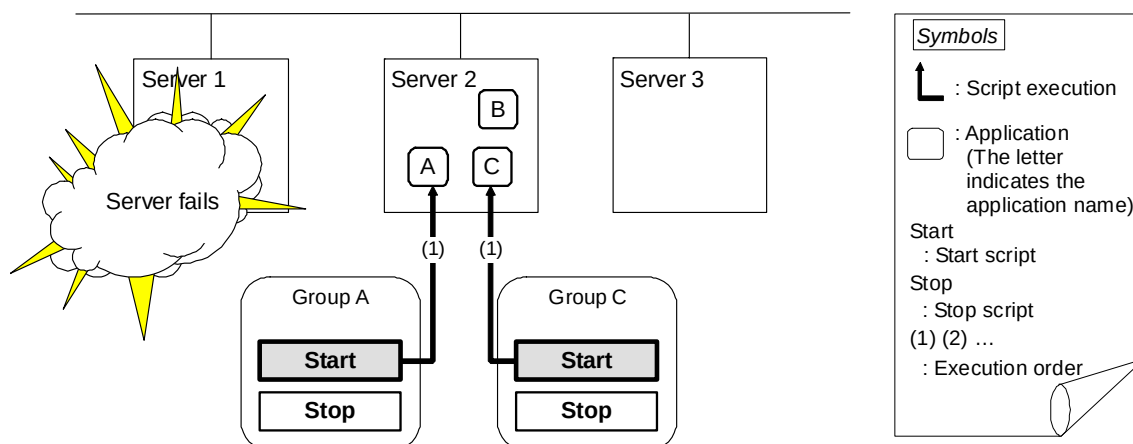
For a group that has three or more servers specified in the failover policy to behave differently on servers other than the primary server, use CLP_PRIORITY instead of CLP_SERVER(HOME/OTHER).



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.

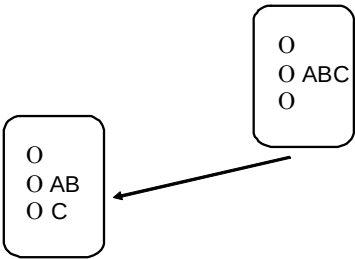
For a process to be performed only on the server that has the second highest priority failover policy, it is necessary to write CLP_PRIORITY(=2) as the branching condition.



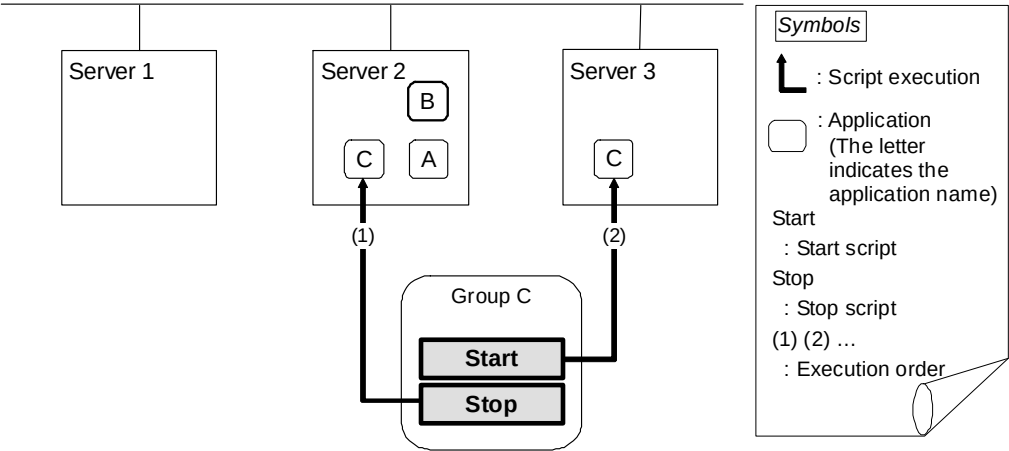
Environment variables for Start

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

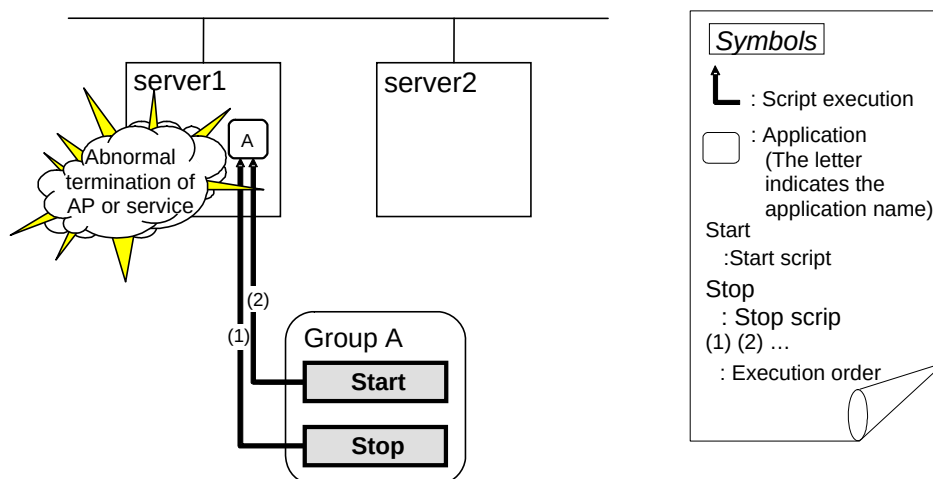
Group	Environment variable	Value
C	CLP_EVENT	START
	CLP_SERVER	OTHER
	CLP_PRIORITY	3

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.



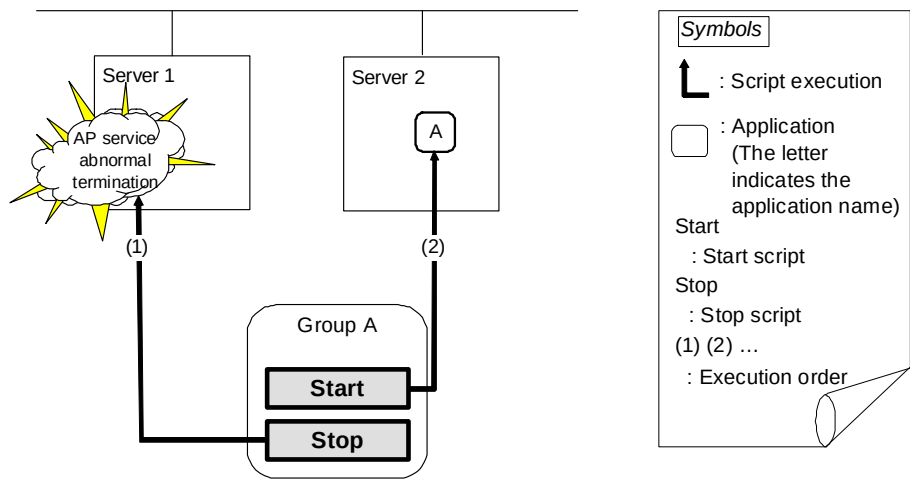
Environment variable for Stop

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 356.

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
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:

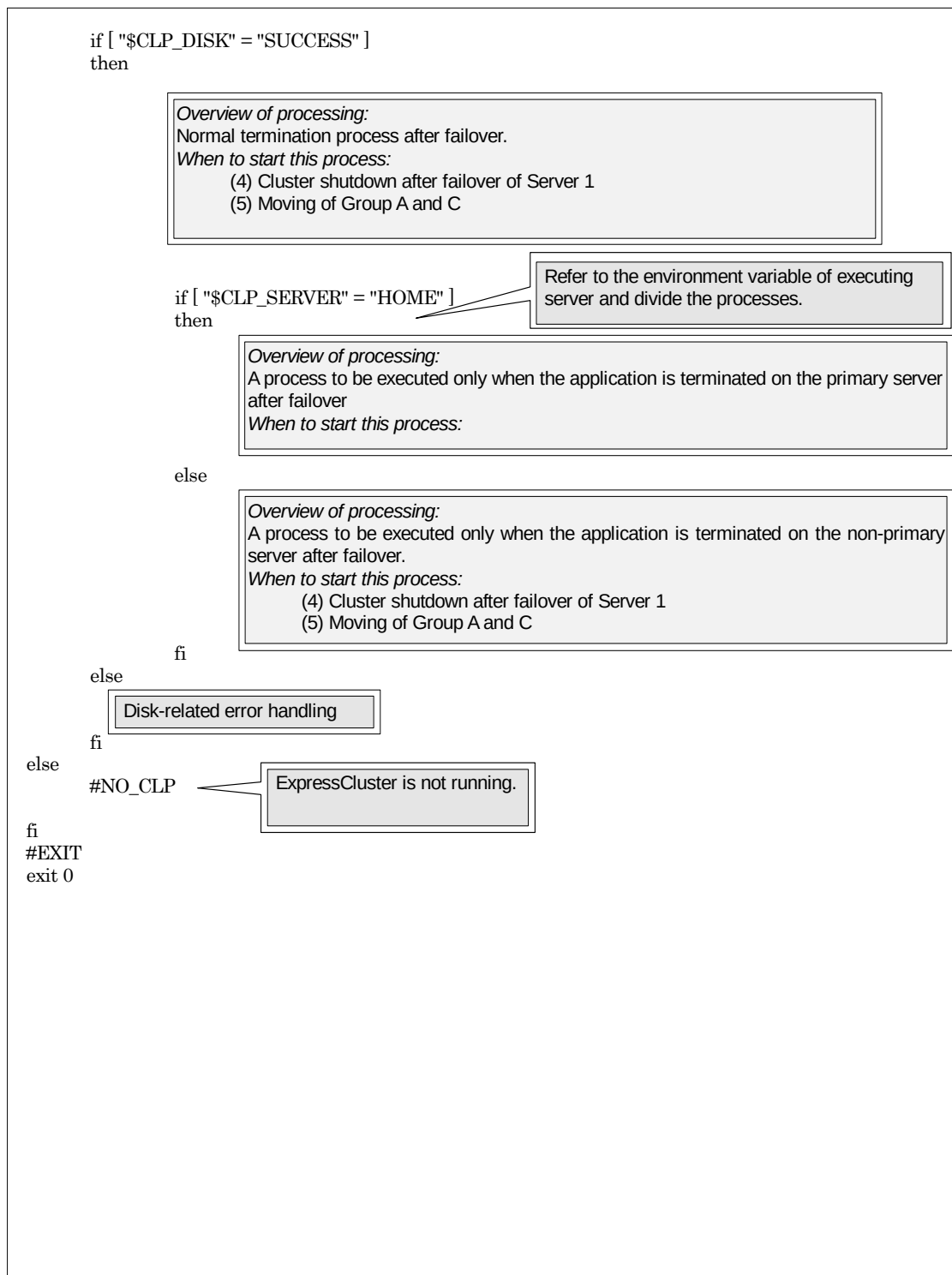
```
    fi
```

```
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 384. 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, see “Outputting messages (clplogcmd command)” in Chapter 3, “ExpressCluster command reference” in this guide.

(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"
-----
```

- ◆ About the rotate log function of the script

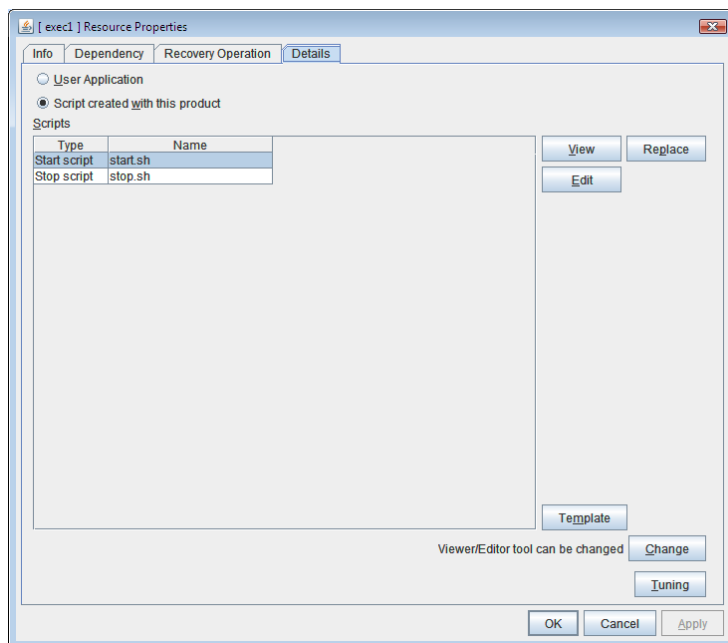
If the rotate log function of the script is enabled, it's written in a specified file when the script finishes. Therefore, if a start script is set to **Asynchronous** you cannot check the log in real time because the script did not finished.

If a start script is set to Asynchronous, it is recommend that you disable the rotate log function.

When the rotate log function of the script is enabled, you must specify a shell script if the name of the file you will use is "start.sh", "stop.sh", "genw.sh".

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.

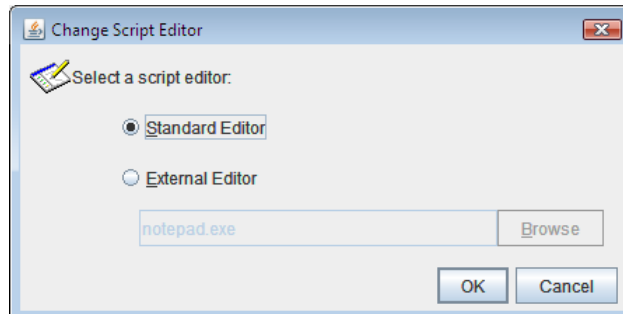
The executable files will not be distributed to each server. They should be placed on each server in advance. The cluster configuration data created by the Builder does not contain these files. You cannot edit the script files using the Builder.

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.

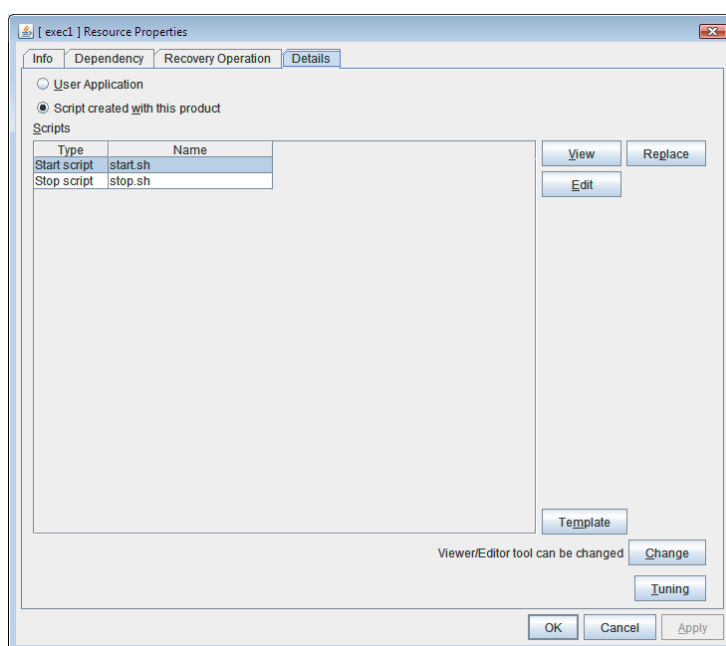
Tuning

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.

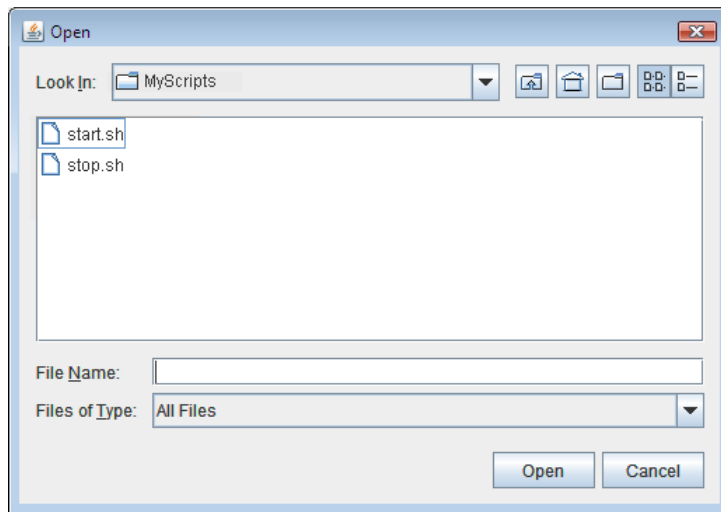
If the selected script file is being viewed or edited, you cannot see it.

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.

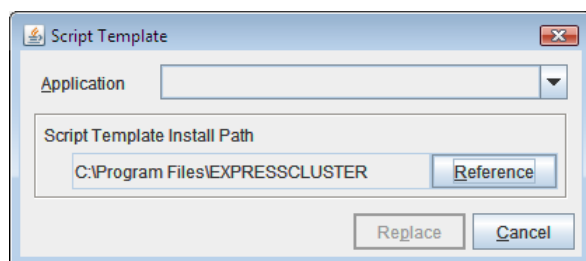
Using the simple selection function of a script template

Selecting an application from the EXEC resource enables you to automatically replace the necessary script template. You can simply create a script by editing the template script.

Note:

To use this function, you must install the script template in advance.

1. From the tree view displayed in the left pane of the Builder, click the icon of the group containing the EXEC resource for which you want to replace the script template.
2. A group resource list is displayed in the table view to the right of the window. Right-click the target EXEC resource name and then click the **Details** tab of **Properties**.
3. On the **Details** tab, click **Script created with this product**.
4. Click **Template**.
5. The **Script Template** dialog box is displayed.

**Application**

Clicking **Application** displays the replaceable script template applications in a list box.

Note:

If the script template is not installed, nothing is displayed in the application list.

Browse

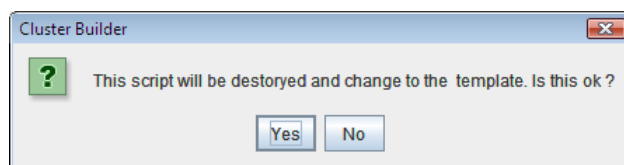
Clicking **Browse** browses to the folder path where the script template is installed.

Note:

If the script template is not installed in the default folder path, a warning message appears. If the script template is installed, specify the correct install path.

Replace

Clicking **Replace** displays the script replacement confirmation dialog box.



Clicking **OK** replaces the script.

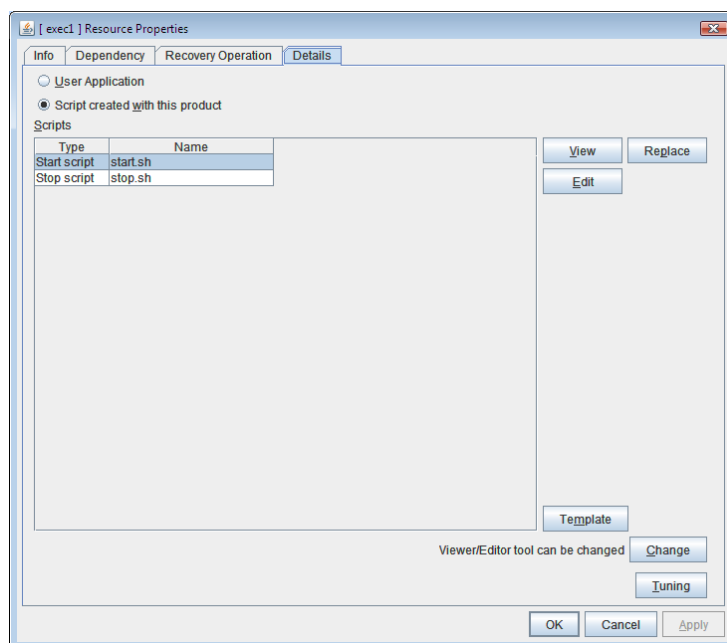
Note:

You must edit the replaced script to suit your environment. For how to edit the script, see “Displaying and changing the EXEC resource script created by the Builder”.

Displaying and changing EXEC resource script using a user application

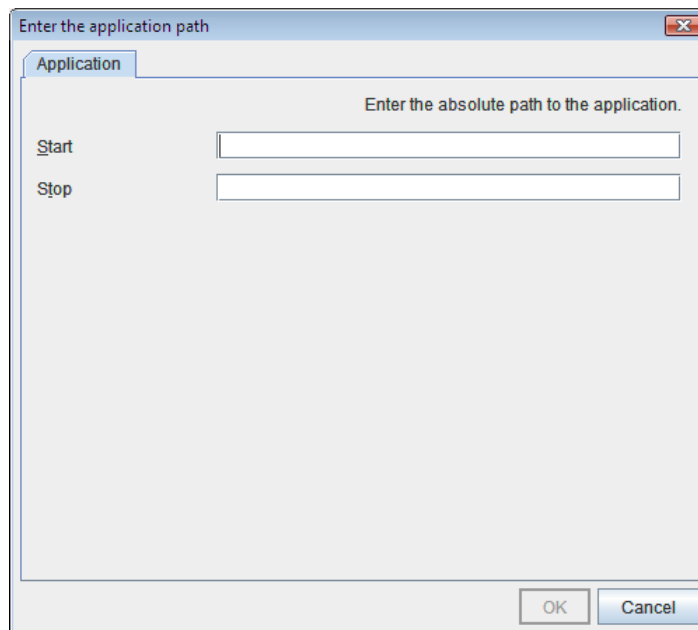
1. From the tree view displayed in the left pane of the Builder, click the icon of the group to which the EXEC resource whose detail information you want to display and change belongs.
2. Group resource list is displayed on the table view in the right pane of the window. Right-click the EXEC resource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

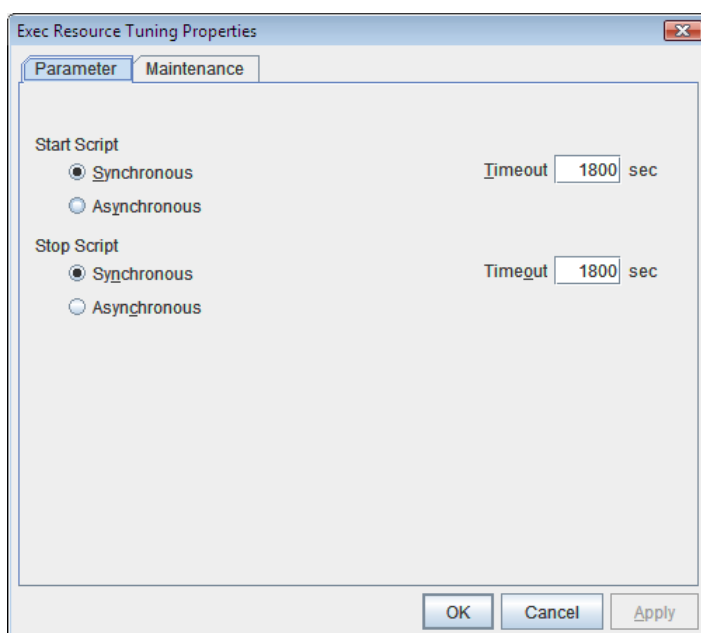
Enter an executable file name to be run when the exec resource exits. The name should begin with “/.” The stop script is optional.

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

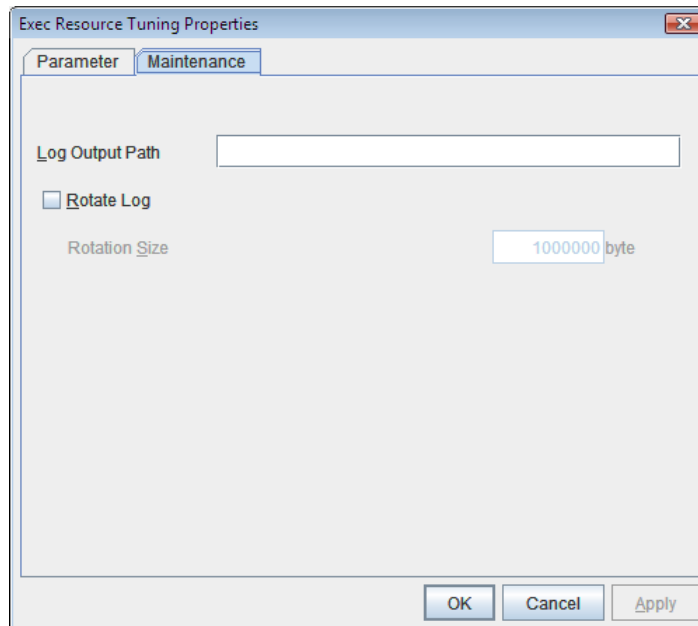
Waits for the script to end when it is run. Select this option for executable files that are not resident (the process is returned immediately after the script completion).

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 1 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 “/.”

If the **Rotate Log** check box is off, note the amount of available disk space in the file system because no limit is imposed on message output.

If the i686 version is used, the files must be periodically removed because EXEC resource activation and deactivation is disabled when the file size exceeds 2GB.

If the **Rotate Log** check box is on, the log file to be output is rotated. Note the following items.

You must specify a log output path within 1009 bytes. If you specify a path of 1010 bytes or more, the log is not output.

You must specify a log file name within 31 bytes. If you specify a file name of 32 bytes or more, the file name is cut off after the 31st byte.

When using multiple custom monitor resources, the rotation size may not be normally recognized if you specify resources with the same file name, even if the paths differ. (ex. /home/foo01/log/genw.log, /home/foo02/log/genw.log)

Rotate Log

Clicking **Rotate Log** when the **Rotate Log** check box is not checked outputs the execution logs of the EXEC resource script and the executable file without imposing any limit on the file size. Clicking **Rotate Log** when the **Rotate Log** check box is selected rotates and outputs messages.

Rotation Size 1 to 999999999

If the **Rotate Log** check box is selected, specify a rotation size.

The structures of the log files to be rotated and output are as follows:

File name	Description
file_name for the Log Output Path specification	Newest log
file_name.pre for the Log Output Path specification	Previously rotated log

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

EXEC Detailed Properties (exec1)		
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 service and shutdown OS	
Execute Script before Final Action	Off	
Depended Resources	fip1_nas1	
Start Type	Synchronous	
Stop Type	Synchronous	
Start Script Timeout (sec)	1800	
Stop Script Timeout (sec)	1800	
Log Output Path		
Script Log Rotate	Off	
Script Log Rotate Size (byte)	1000000	
Script Log Rotate Generation	2	

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:	Script execution log type
Script Log Rotate:	Script log rotation
Script Log Rotate Size (bytes):	Script log rotation size (bytes)
Script Log Rotate Generation:	Script log rotation generation

Understanding disk resource

Dependencies of disk resource

Disk resource is supported by the following versions of ExpressCluster by default.

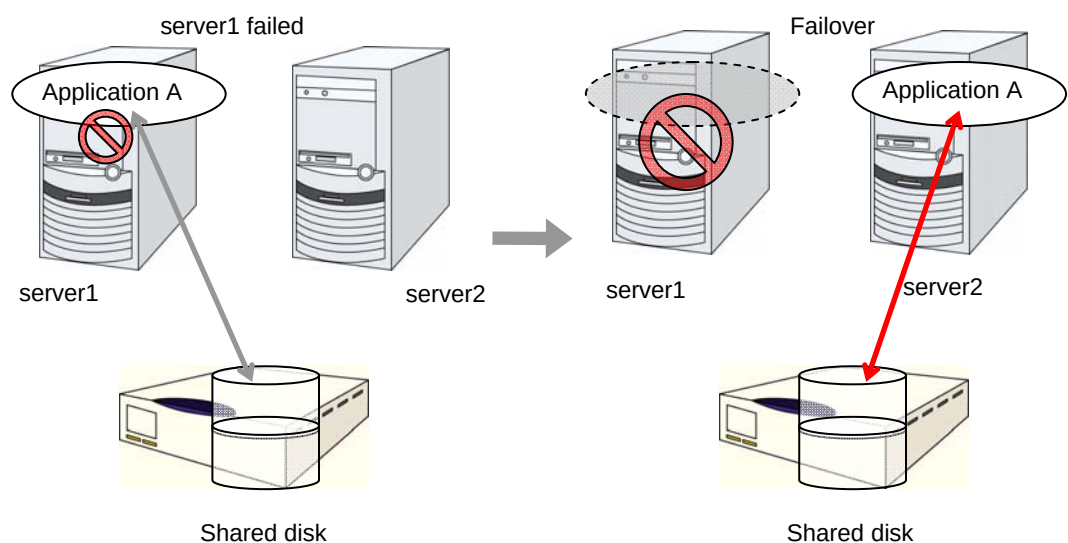
Group Resource Type
Dynamic DNS resource
Floating IP resource
Virtual IP resource
Volume Manager resource

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.



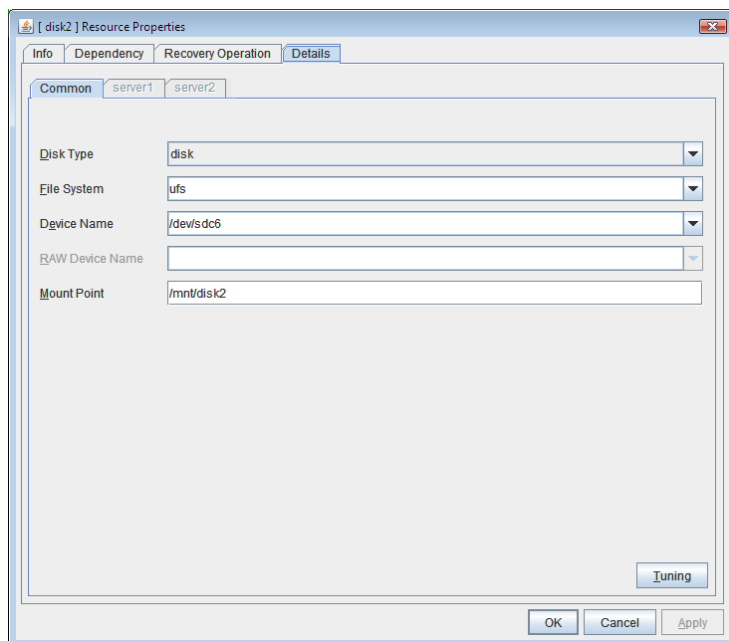
Notes on disk resources

- ◆ 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/Unmount 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**

Set the disk device name to be used for disk resources. When zfs is selected for the file system, specify the ZFS data set name.

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

You do not need to set it.

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

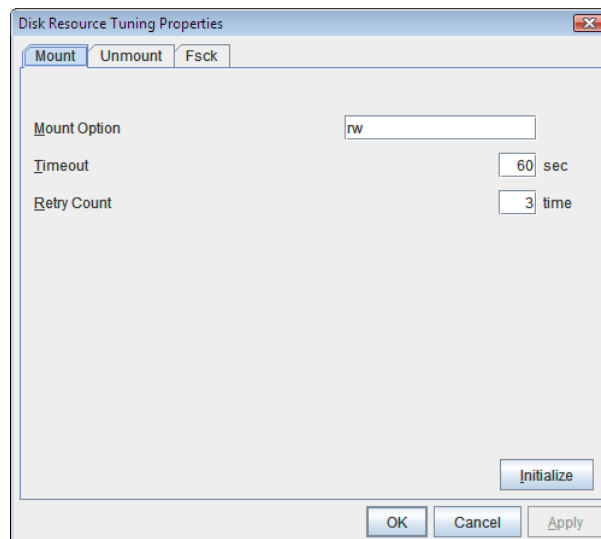
Set the directory to mount the disk device.

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 Up to 1023 bytes

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.

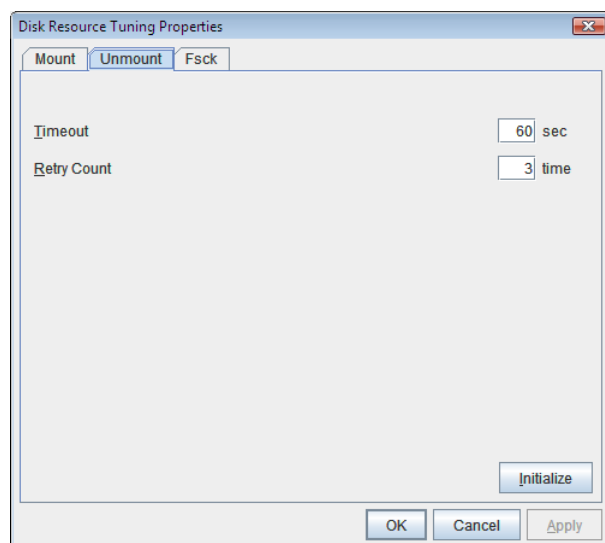
If you set this to zero (0), mount will not be retried.

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.

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.

The screenshot shows the 'Disk Resource Tuning Properties' dialog box with the 'Fsck' tab selected. The 'fsck Option' field contains '-y'. The 'fsck Timeout' is set to '1800' seconds. Under 'fsck Action Before Mount', the 'Execute at Specified Count' radio button is selected, with a 'Count' of '10' and the unit 'time'. Under 'fsck Action When Mount Failed', the 'Execute' checkbox is checked. An 'Initialize' button is located at the bottom right of the dialog. At the very bottom are 'OK', 'Cancel', and 'Apply' buttons.

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.

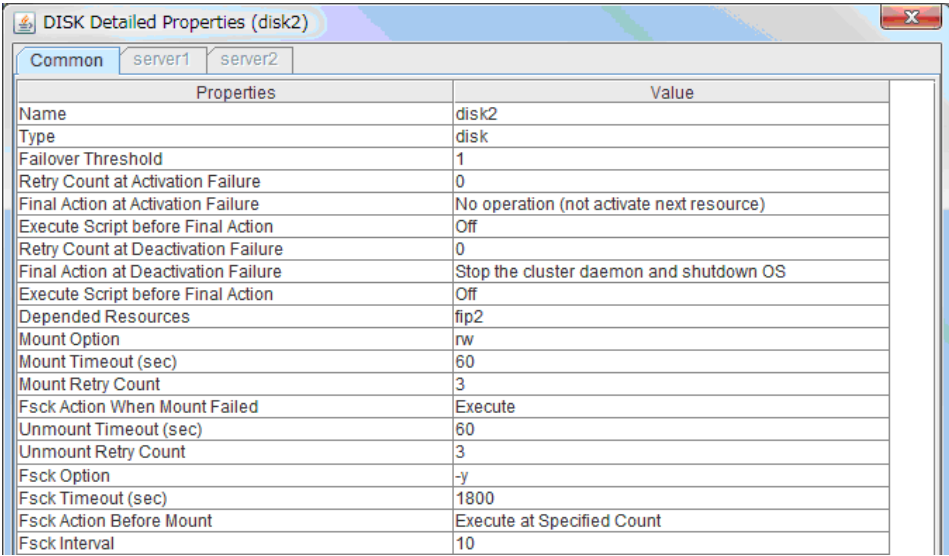
Displaying the disk resource properties with the WebManager

- 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		zfs
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 **Details**, 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
Fsck Option	-y
Fsck Timeout (sec)	1800
Fsck Action Before Mount	Execute at Specified Count
Fsck Interval	10

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 0 No action 1 Perform fsck
Unmount Timeout (sec):	Unmount timeout (in seconds)
Unmount Retry Count:	Unmount retry count
Fsck Option:	Options passed to the fsck command
Fsck Timeout (sec):	Timeout for the fsck command execution (in seconds)
Fsck Action Before Mount	fsck timing when performing mount +0 Do not perform fsck +1 Always perform fsck +2 Perform fsck at fsck interval
Fsck Interval:	fsck interval

Understanding floating IP resource

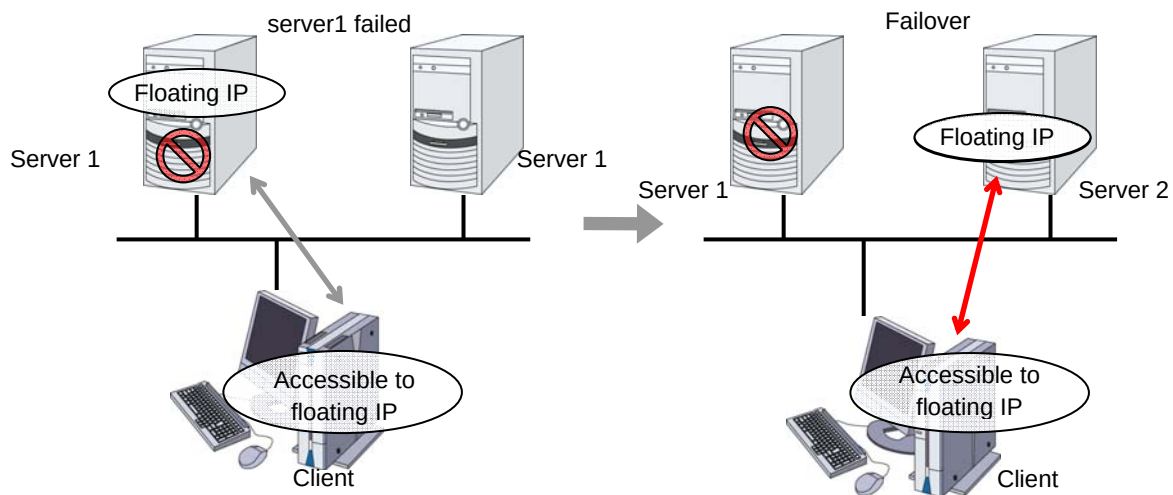
Dependencies of floating IP resource

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:

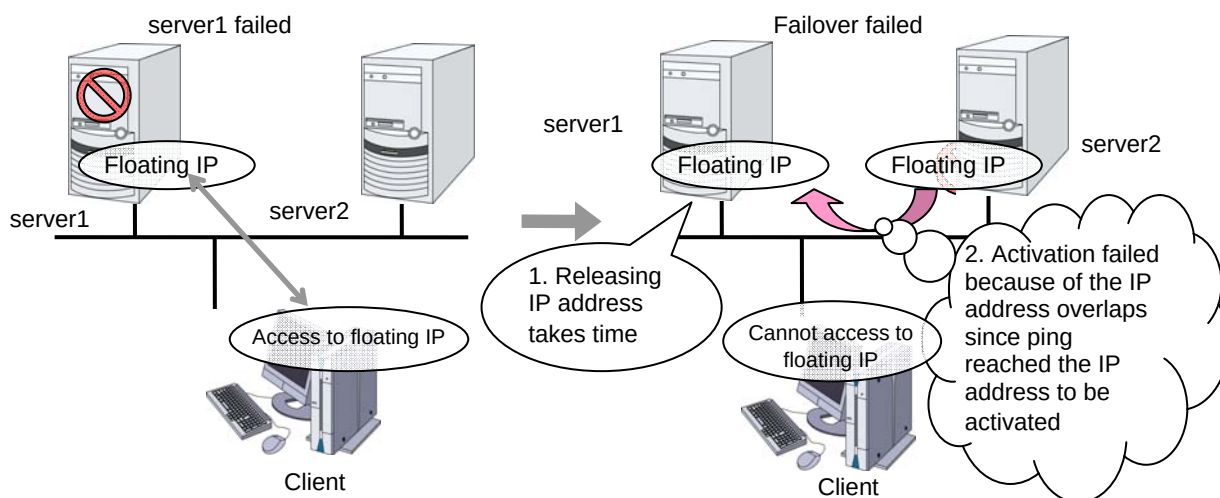
- When a value smaller than the default is set to **Retry Count at Activation Failure**.
- When **Ping Retry Count** and **Ping Interval** are not set.

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.

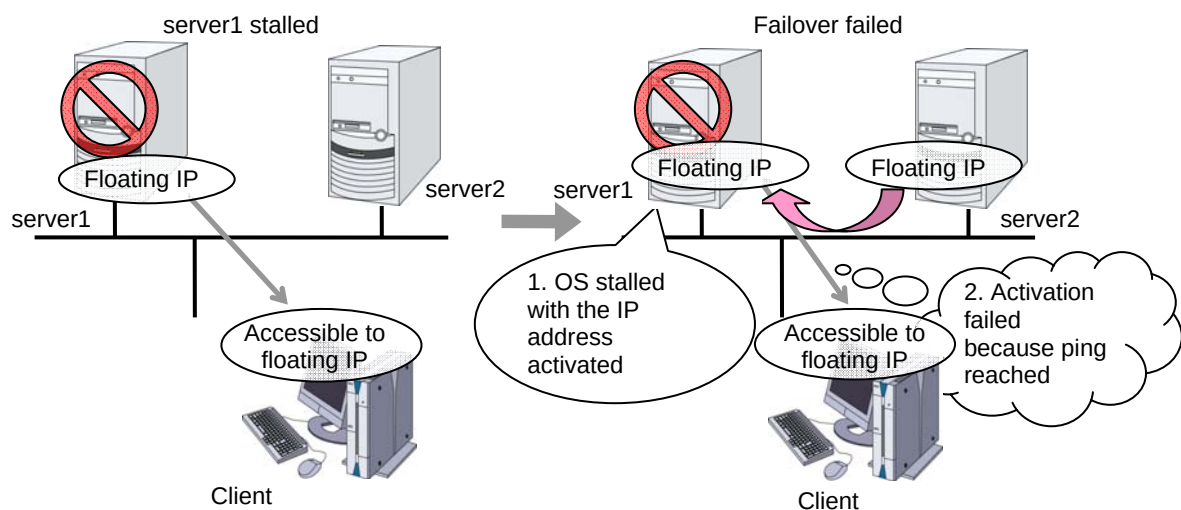
This problem occurs due to the following causes:

- 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.

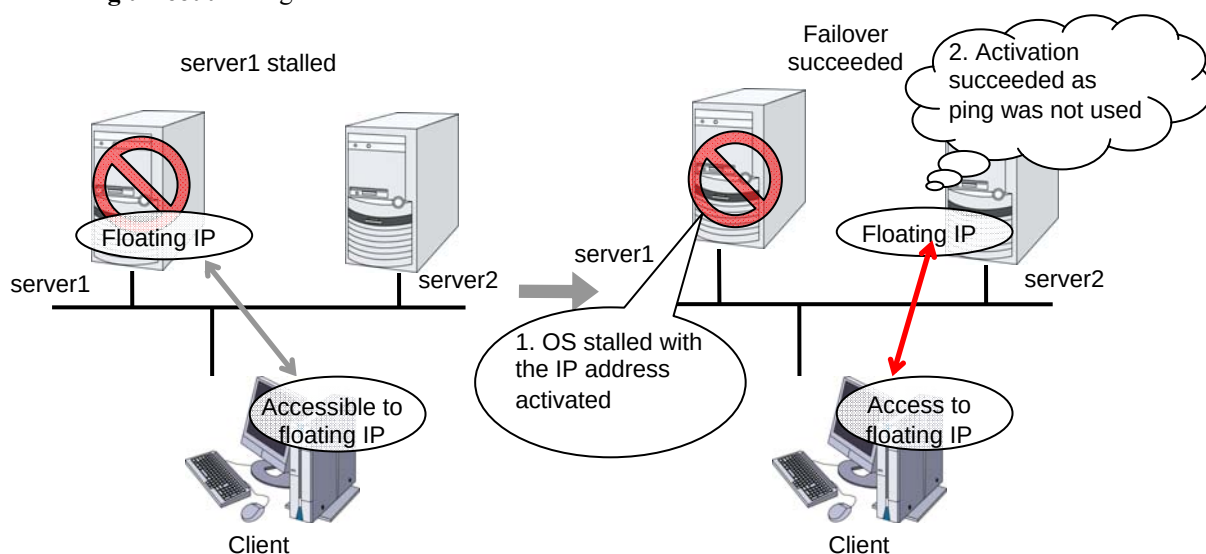
In the machine environment where this problem often occurs, this can be prevented by the settings below. However, both groups may be activated depending on the status of a stall, and server shutdown may occur depending on the timing of the activation of both groups. For details on activation of both groups, see “What causes servers shut down Recovery from network partitioning” in Chapter 9, “The system maintenance information” in this 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.

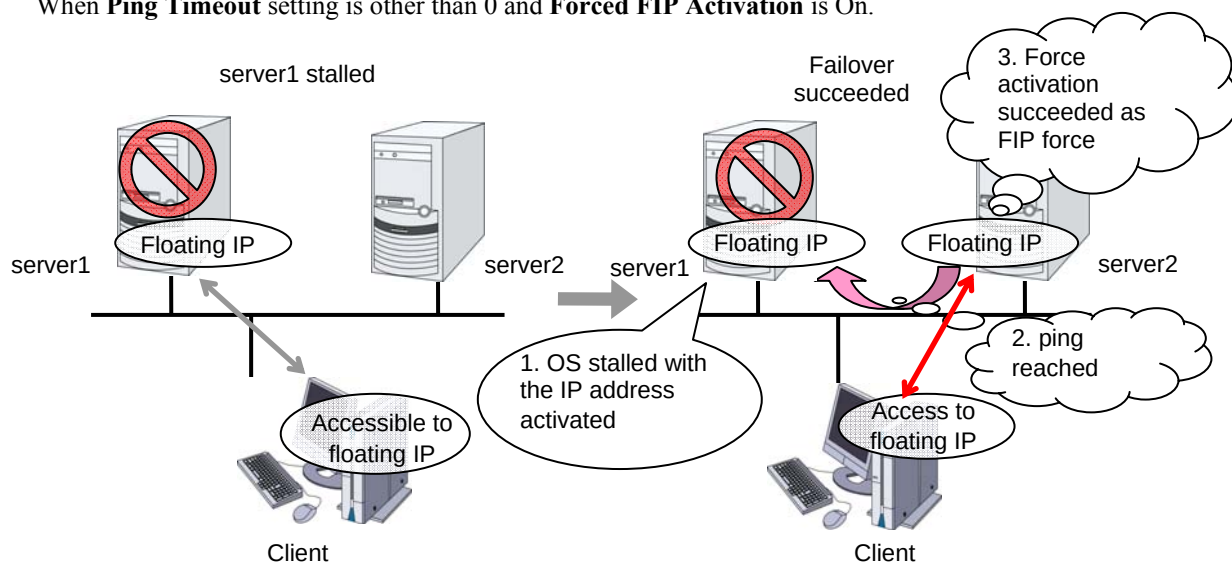
When **Ping timeout** setting is other than 0 and **Forced FIP Activation** is Off.



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.

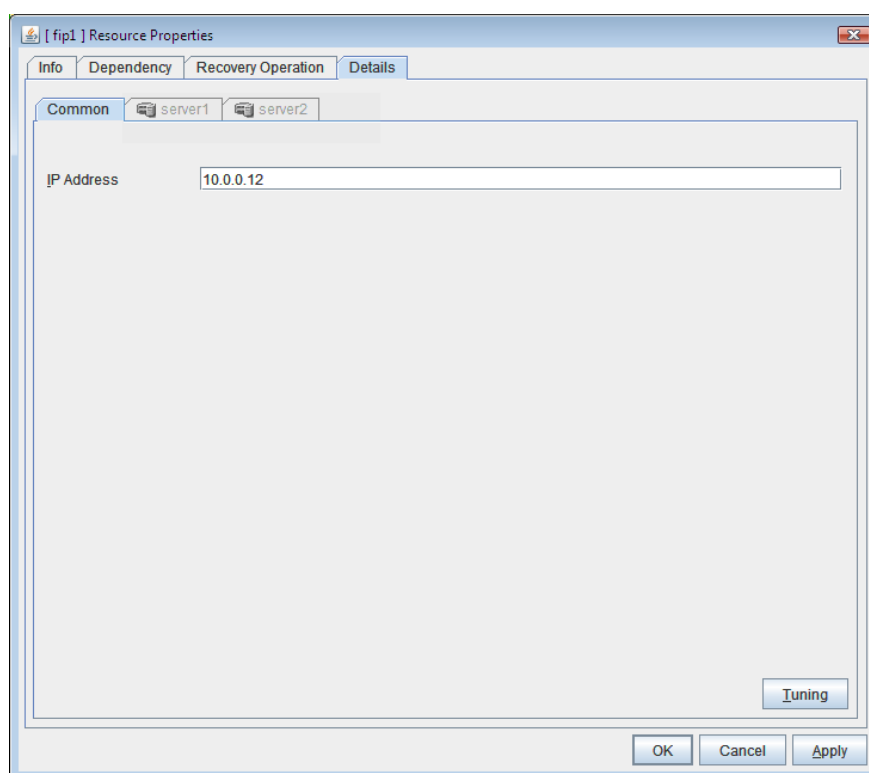
Note:

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.

The screenshot shows a dialog box titled "Floating IP Resource Tuning Properties" with a close button in the top right corner. It has two tabs: "Parameter" (selected) and "Deactivity Check". Under the "Parameter" tab, there are two sections: "ifconfig" and "ping". The "ifconfig" section has a "Timeout" field set to "60 sec". The "ping" section has three fields: "Interval" set to "1 sec", "Timeout" set to "1 sec", and "Retry Count" set to "0 time". There is also a checkbox labeled "Forced FIP Activation" which is currently unchecked. At the bottom right of the dialog is an "Initialize" button. At the very bottom are three buttons: "OK", "Cancel", and "Apply".

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.

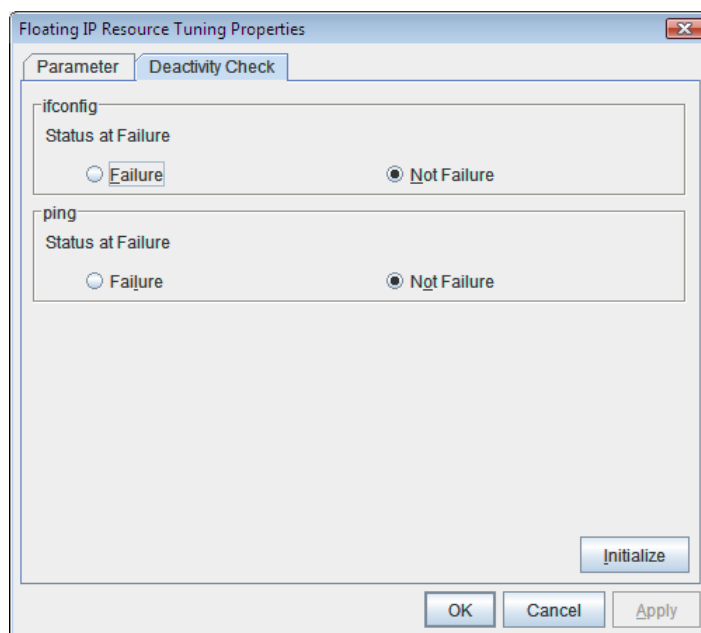
- ◆ **Interval** 0 to 999
Set the interval to issue the ping command.
- ◆ **Timeout** 0 to 999
Set timeout of the ping command.
If zero is set, the ping command is not run.
- ◆ **Retry count** 0 to 999
Set retry count of the ping command.
- ◆ **Forced FIP Activation**
Specify whether to forcibly activate 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	10.0.0.12	
Status	Online	
Started Server	server1	

Comment:

IP Address:

Status:

Started Server:

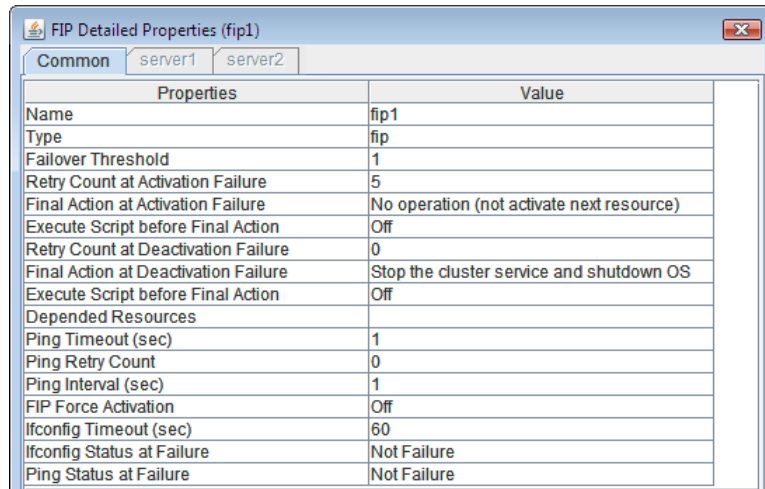
Comment

IP address used by floating IP resource

Status of floating IP resource

Server name

If you click **Details**, 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 service 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
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
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

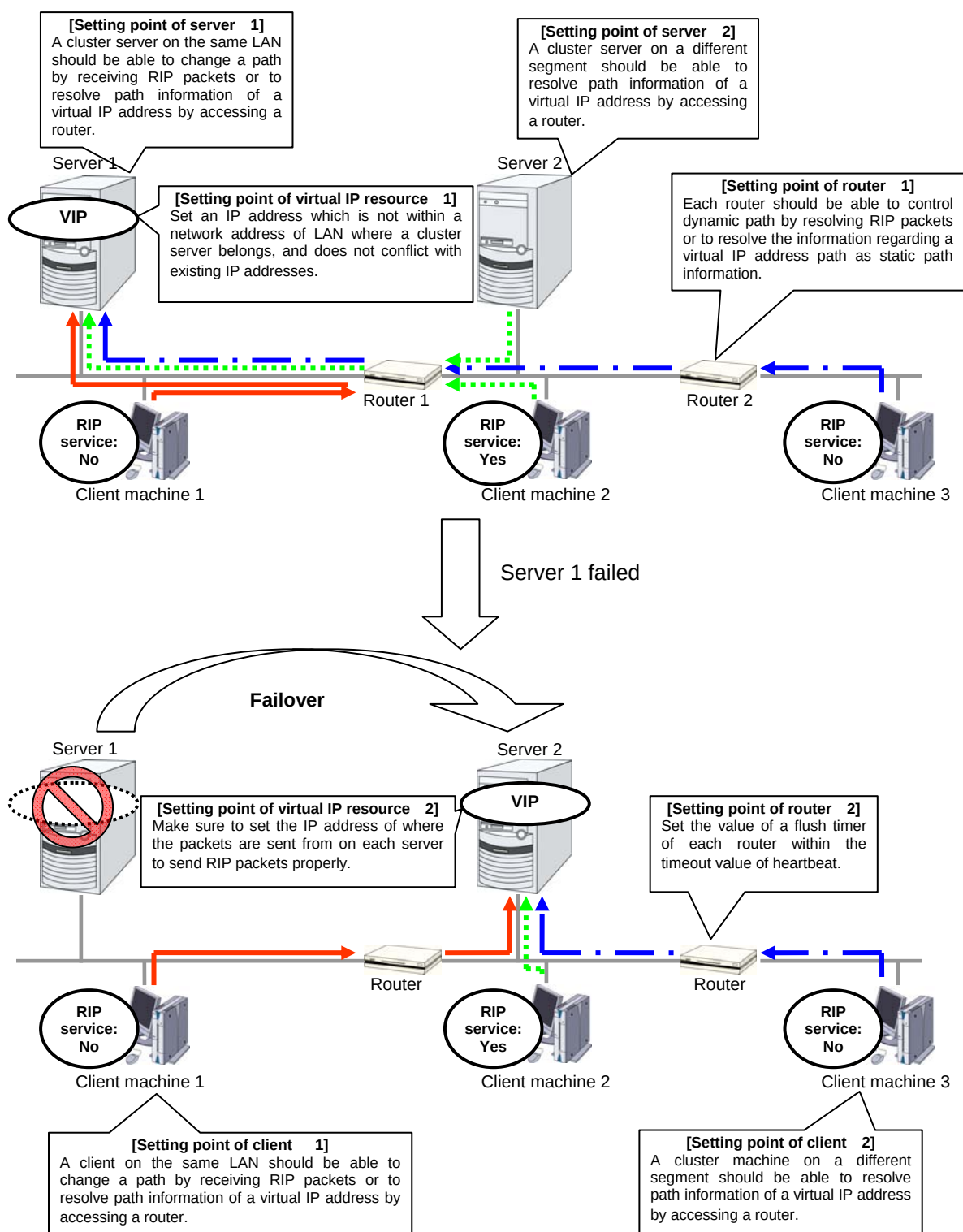
Understanding virtual IP resources

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 “Cluster properties Timeout tab” in Chapter 2 “Functions of the Builder” in this guide.
- ◆ 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

[vip1] Resource Properties

Info Dependency Recovery Operation **Details**

Common server1 server2

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 sec

Use Routing Protocol

Use	Routing Protocol
☐	RIPngver1
☐	RIPngver2
☐	RIPngver3
☐	RIPver1
☒	RIPver2

Tuning

OK Cancel Apply

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**

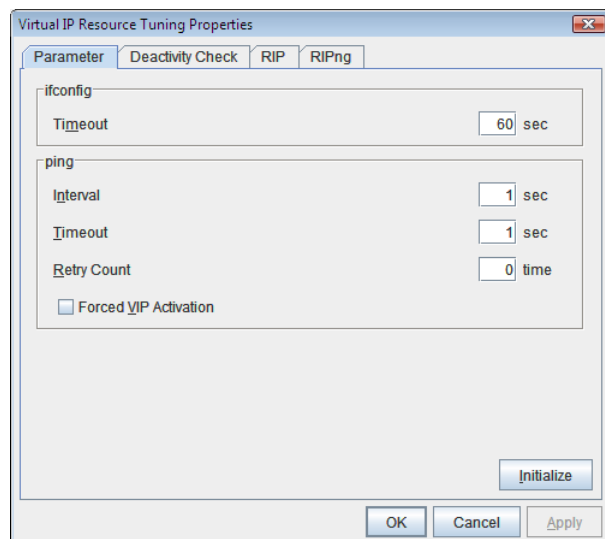
Specify the RIP version to use. For IPv4 environment, select RIPver1 or RIPver2. For IPv6 environment, select RIPngver1 or RIPngver2 or RIPngver3. You can select more than one routing protocols.

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.

**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.

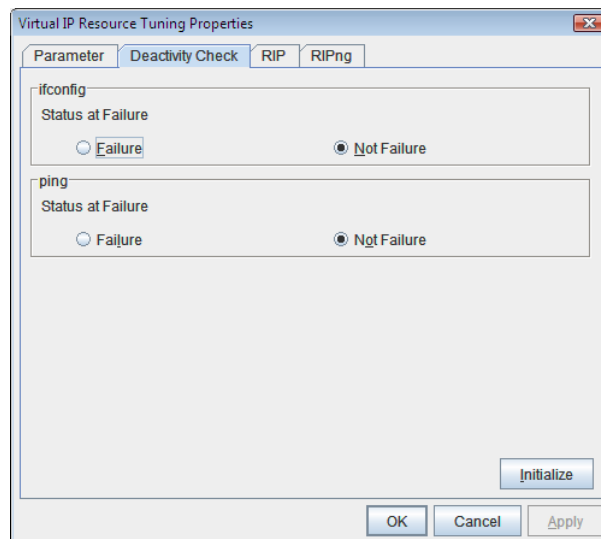
- ◆ Interval 0 to 999
Specify the interval to issue the ping command in seconds.
- ◆ Timeout 0 to 999
Specify the timeout for the ping command in seconds.
When 0 is specified, the ping command is not run.
- ◆ Retry Count 0 to 999
Specify how many retries of issuing the ping command are attempted.
- ◆ 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** 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.

Port Number
520

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)

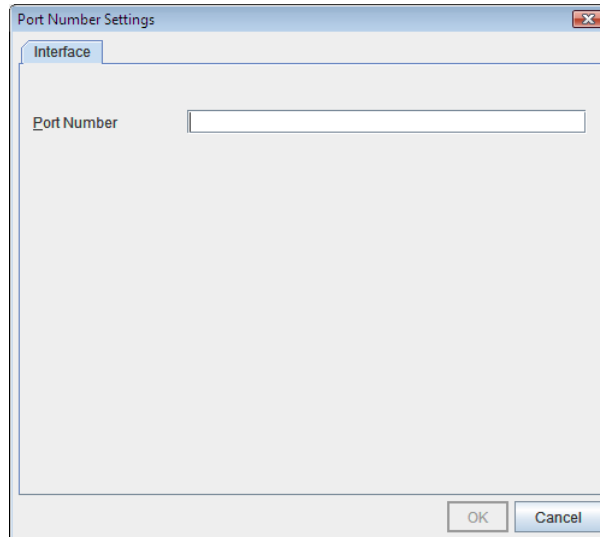
Enter a metric value of RIP. A metric is a hop count to reach the destination address.

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

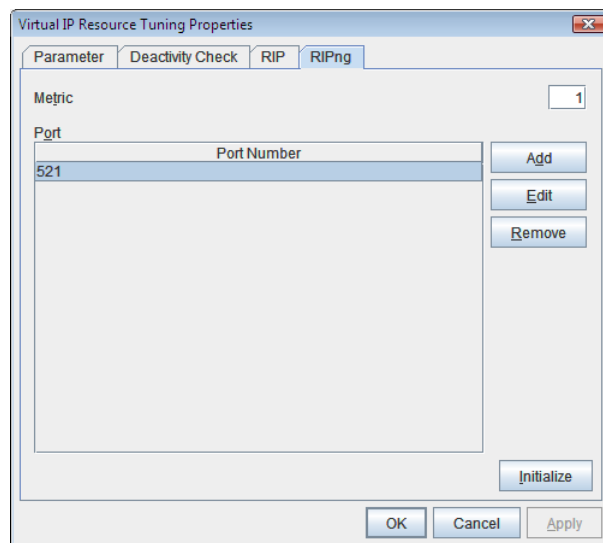
A dialog box to enter a port number is displayed. The port selected in the **Port Number** is displayed. Edit it and click **OK**.

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)

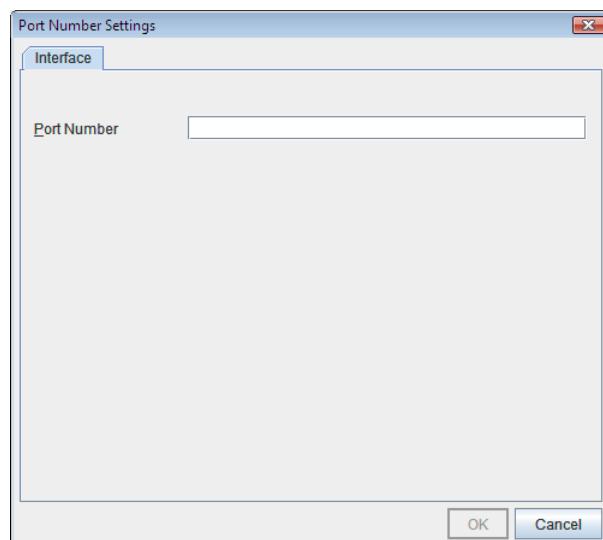
Enter a metric value of RIPng. A metric is a hop count to reach the destination address.

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 **Details**, 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
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

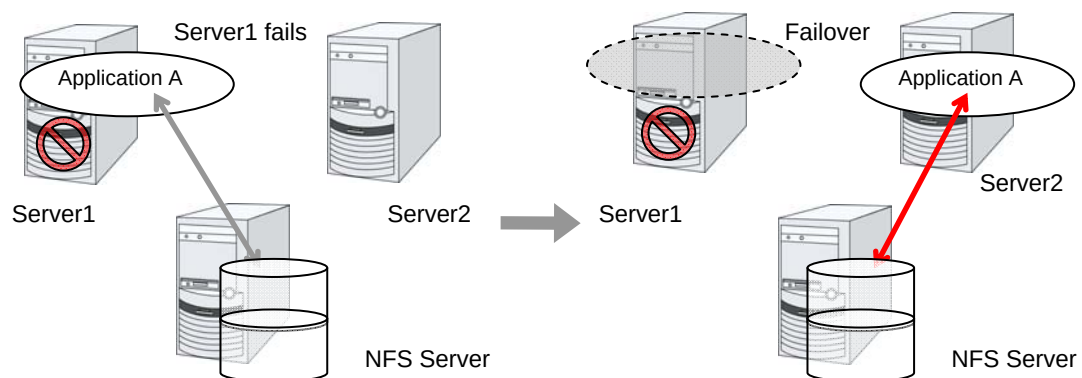
Dependencies of the NAS resource

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/Umount 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 umount 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

The screenshot shows a window titled "[nas1] Resource Properties" with four tabs: Info, Dependency, Recovery Operation, and Details. The Details tab is selected. It contains four input fields: "Server Name" with the value "nfs server1", "Shared Name" with the value "/share1", "Mount Point" with the value "/mnt/nas1", and "File System" with a dropdown menu showing "nfs". At the bottom right of the main area is a "Tuning" button. At the very bottom of the window are "OK", "Cancel", and "Apply" buttons.

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

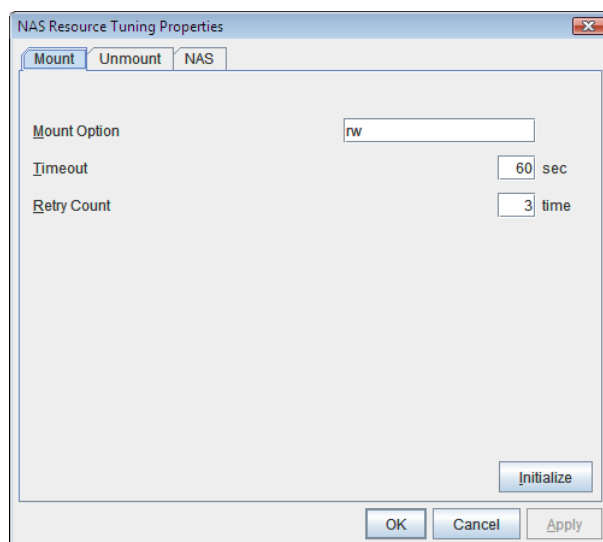
Tuning

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

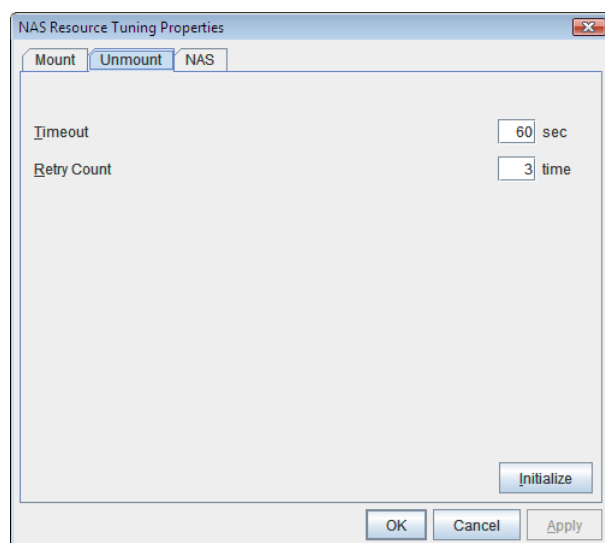
Set the number of mount retries when mounting the file system fails. When zero is set, mounting is not retried.

Initialize

Clicking **Initialize** 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

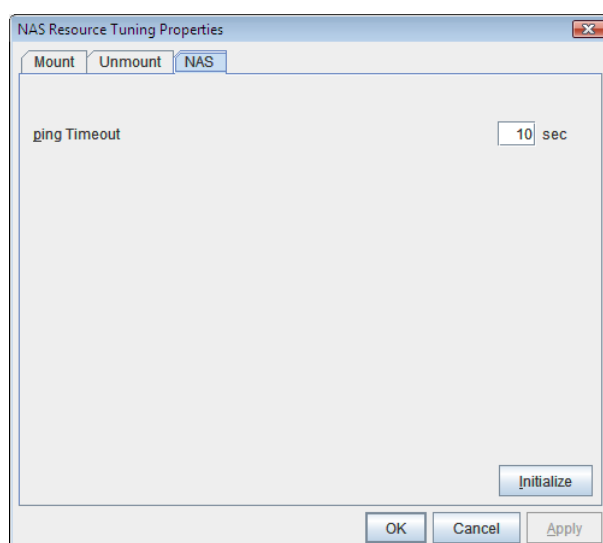
Set the number of unmount retries to be made when unmounting the file system fails. When zero is set, unmounting is not retried.

Initialize

Clicking **Initialize** 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 **Initialize** sets all the items to their default values.

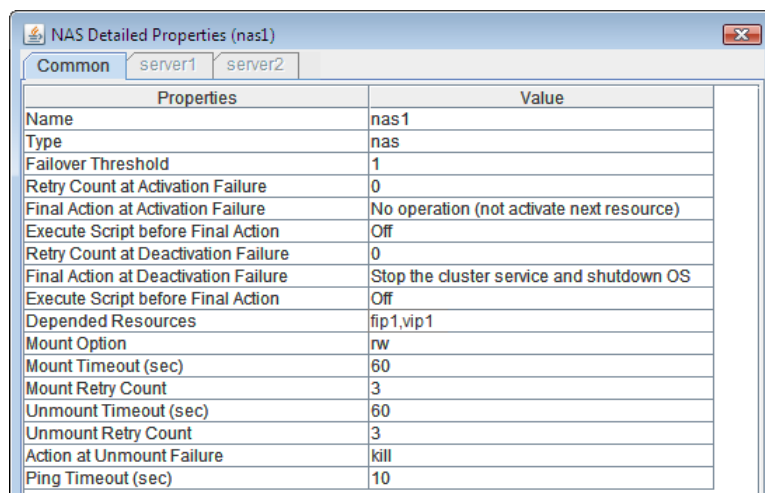
Displaying the property of NAS resource with the WebManager

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

Clicking **Details** displays the popup dialog box containing the following contents:



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 service 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

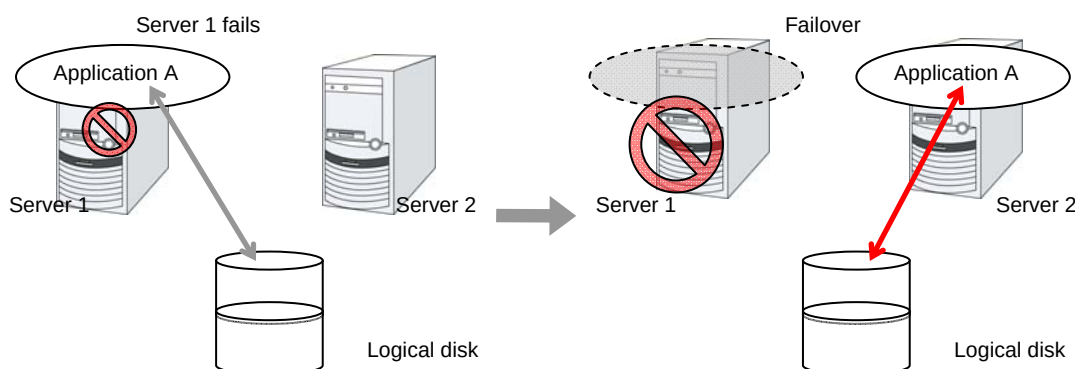
Dependencies of the Volume Manager resource

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.
- ◆ 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.

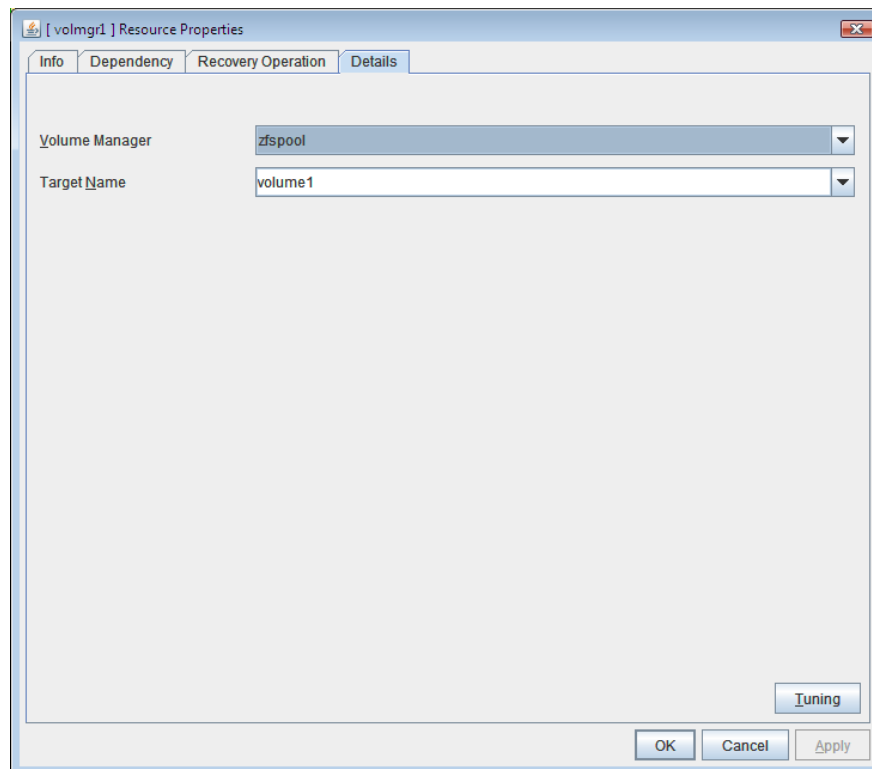
Notes on ZFS storage pool

- ◆ 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.

Combo box options collect volume group information from all the servers and display all the volume groups on one or more servers.

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

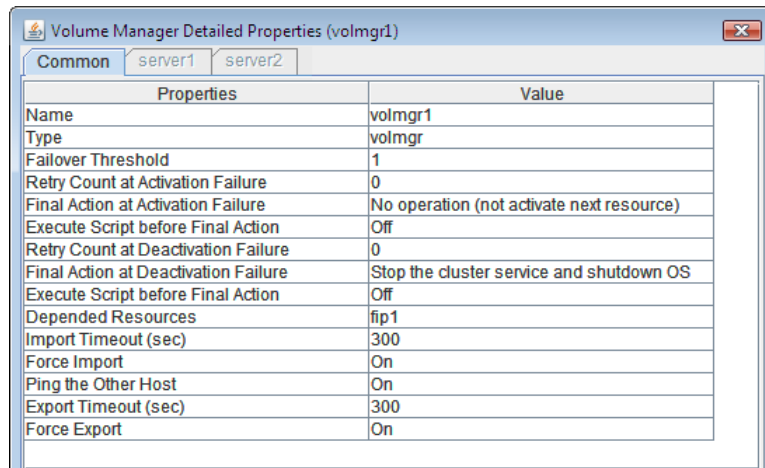
Type of volume manager

Target name

Status of the volume manager resource

Name of the server

Clicking **Details** displays the popup dialog box containing the following contents:



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)
Force Option at Import:	Forced import execution setting for when importing fails
Send Ping to another host:	Whether to check Ping when forced import is executed.
Export Timeout (in seconds):	How long to wait for the export command to finish
Force Option at Export:	Forced export execution setting for when exporting fails

Understanding VM resources

Dependencies of VM resources

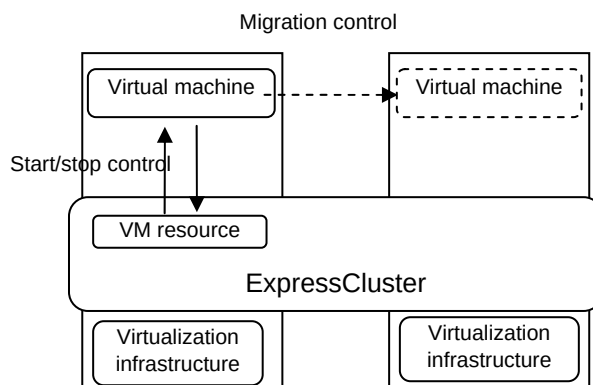
The volume manager resources depend on the following group resource types by default.

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.

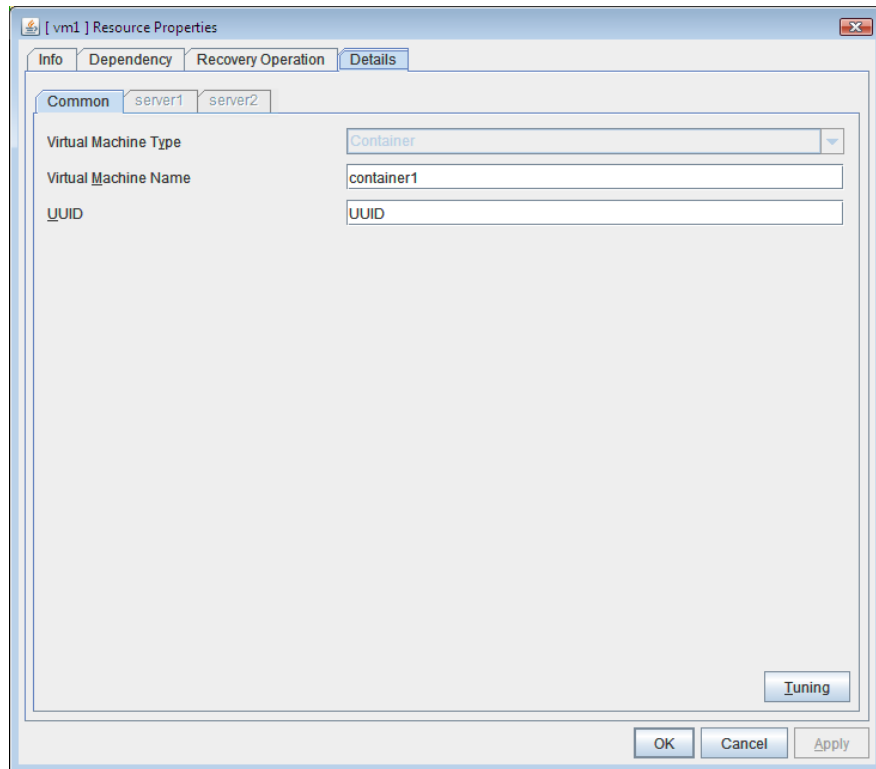


Notes on VM resources

- ◆ 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.

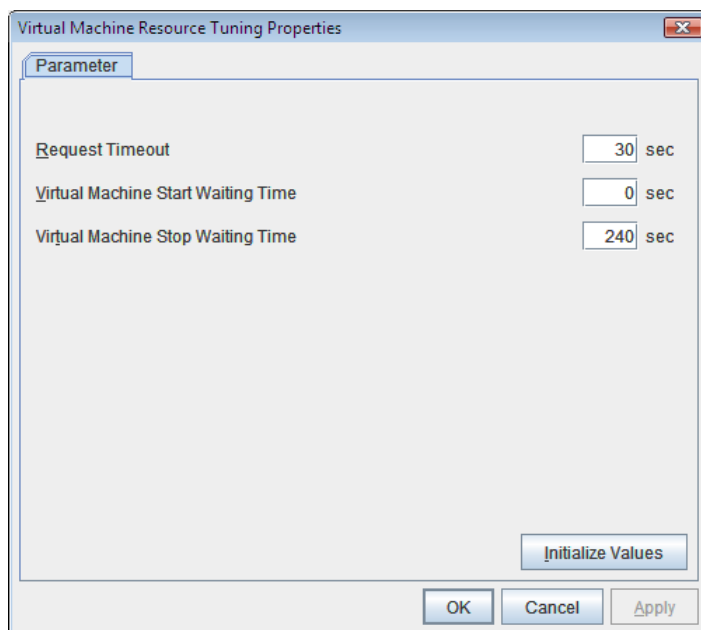
Tuning

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 dialog box titled "Virtual Machine Resource Tuning Properties". It has a tab labeled "Parameter". Inside the dialog, there are three rows of settings, each with a text label and a numeric input field followed by "sec". The first row is "Request Timeout" with the value "30". The second row is "Virtual Machine Start Waiting Time" with the value "0". The third row is "Virtual Machine Stop Waiting Time" with the value "240". At the bottom right of the main content area is a button labeled "Initialize Values". At the bottom of the dialog are three buttons: "OK", "Cancel", and "Apply".

Parameter	Value	Unit
Request Timeout	30	sec
Virtual Machine Start Waiting Time	0	sec
Virtual Machine Stop Waiting Time	240	sec

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.

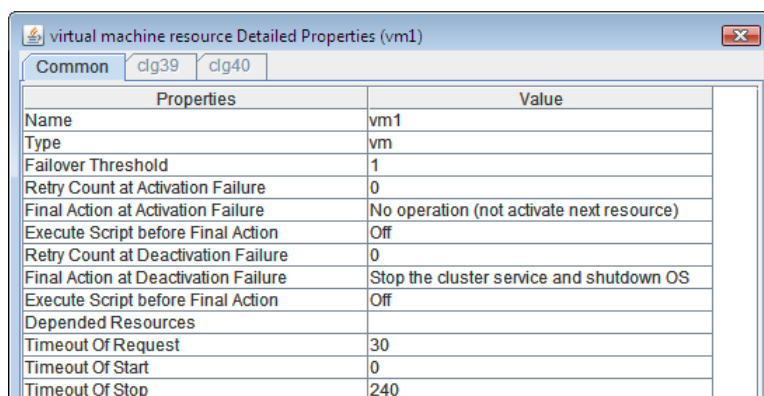
Displaying the properties of a VM resource by using the WebManager

- 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:	Comment on the VM resource
Virtual Machine Type:	Virtualization infrastructure type
Virtual Machine Name:	Virtual machine name
UUID:	UUID for identifying the virtual machine
Virtual Machine Path:	Path of the virtual machine configuration information
Status:	Status of VM resources
Started Server:	Started Server name

Clicking **Details** displays the popup dialog box containing the following contents:



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 service 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

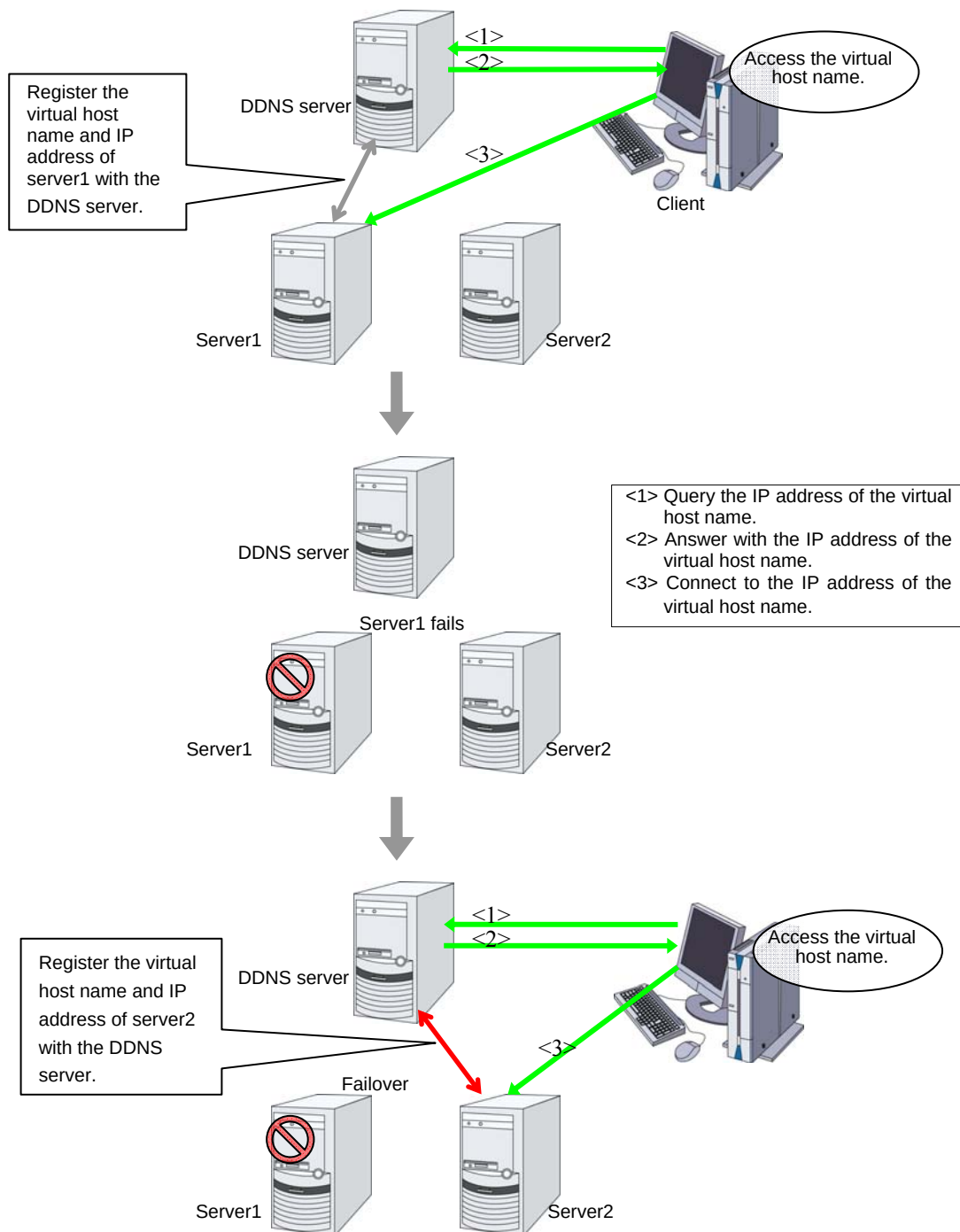
Dependencies of Dynamic DNS resources

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 main tabs are "Info", "Dependency", "Recovery Operation", and "Details". The "Details" tab is active, and within it, the "Common" sub-tab is selected. The "Common" sub-tab contains the following 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 right of the dialog are "OK", "Cancel", and "Apply" buttons.

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

1. Start the WebManager.
2. 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	10.0.0.1	
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 **Details**, the following information is displayed.

Dynamic DNS Detailed Properties (ddns1)		
Common server1 server2		
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 service and shutdown OS	
Execute Script before Final Action	Off	
Depended Resources	fip1,vip1	
DDNS 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	446
• Understanding the disk monitor resources	509
• Understanding IP monitor resources	516
• Understanding NIC link up/down monitor resources	521
• Understanding PID monitor resources	526
• Understanding user-mode monitor resources	528
• Understanding multi target monitor resources	534
• Understanding virtual IP monitor resources	540
• Understanding custom monitor resources	542
• Understanding volume manager monitor resource	549
• Understanding message receive monitor resources	553
• Understanding VM monitor resources	560
• Understanding Dynamic DNS monitor resources	564
• Understanding process name monitor resources	566
• Understanding MySQL monitor resources	570
• Understanding NFS monitor resources	576
• Understanding Oracle monitor resources	580
• Understanding PostgreSQL monitor resources	590
• Understanding Samba monitor resources	596

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 509.	3.0.0-1~
IP Monitor Resource	ipw	See "Understanding IP monitor resources" on page 516.	3.0.0-1~
NIC Link Up/Down Monitor Resource	miiw	See "Understanding NIC link up/down monitor resource on page 521.	3.0.0-1~
PID Monitor Resource	pidw	See "Understanding PID monitor resource" on page 526.	3.0.0-1~
User-Mode Monitor Resource	userw	See "Displaying the user-mode monitor resource property with the WebManager" on page 527.	3.0.0-1~
Multi Target Monitor Resource	mtw	See "Understanding multi target monitor resource on page 534.	3.0.0-1~
Virtual IP Monitor Resource	vipw	See "Understanding virtual IP monitor resources on page 540.	3.0.0-1~
Custom monitor Resource	genw	See "Understanding custom monitor resources" on page 542.	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 553.	3.0.0-1~
VM monitor resource	vmw	See "Understanding VM monitor resources" on page 560.	3.0.0-1~
Dynamic DNS monitor resource	ddns	See "Understanding Dynamic DNS monitor resources" on page 564.	3.0.0-1~
Process name monitor resource	psw	See "Understanding process name monitor resources" on page 566.	3.1.0-1~
MySQL Monitor Resource ¹	mysqlw	See "Understanding MySQL monitor resources" on page 570.	3.0.0-1~
NFS Monitor Resource ¹	nfs	See "Understanding NFS monitor resources" on page 576.	3.0.0-1~
Oracle Monitor Resource ¹	oraclew	See "Understanding Oracle monitor resources" on page 580.	3.0.0-1~
PostgreSQL Monitor Resource ¹	psqlw	See "Understanding PostgreSQL monitor resource on page 590.	3.0.0-1~
Samba Monitor Resource ¹	sambaw	See "Understanding Samba monitor resources on page 596.	3.0.0-1~

¹ It is required to register the license to use the monitor resources. See the *Installation and Configuration Guide* for details about registering the license.

Status of monitor resources after monitoring starts

The status of some monitor resources might be “Caution” if there is a period of time following the start of monitoring in which monitoring of that resource is not yet ready.

Caution status is possible for the following monitor resources.

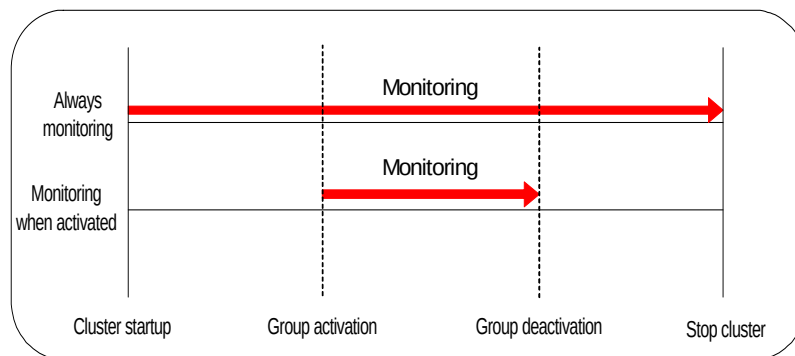
- Dynamic DNS Monitor Resource
- Message Receive Monitor Resource
- Custom Monitor Resource (whose monitor type is **Asynchronous**)
- Virtual IP Monitor Resource
- MySQL Monitor Resource
- Oracle Monitor Resource
- PostgreSQL Monitor Resource
- Process Name Monitor Resource

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 Resource	Monitor	Always or when activated	All
IP Resource	Monitor	Always or when activated	All
User-Mode Resource	Monitor	Always (Fixed)	-
NIC Link Up/Down Monitor resource		Always or when activated	All
PID resource	Monitor	Fixed to while activating	exec
Multi Target Resource	Monitor	Always or when activated	All
Virtual IP Resource	Monitor	When activated (Fixed)	vip
Custom resources	monitor	Always or when activated	All
Volume Manager Monitor Resource		Always or when activated	All
MySQL Resource	Monitor	When activated (Fixed)	exec

NFS Resource Monitor	Always or when activated	exec
Oracle Resource Monitor	When activated (Fixed)	exec
PostgreSQL Monitor Resource	When activated (Fixed)	exec
Samba Resource Monitor	Always or when activated	exec
VM resource monitor	Always (fixed)	vm
Message receive monitor resource	Always or when activated	mrw
Dynamic DNS Monitor Resource	Always (Fixed)	ddns
Process name monitor resource	Always or when activated	psw

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
Process name monitor resource	Possible

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.

Suspending monitoring on a monitor resource is disabled if one of the following operations is performed.

- ◆ Resume operation on WebManager
- ◆ Resume operation by using the clpmonctrl command
- ◆ Stop the cluster
- ◆ Suspend the cluster

Enabling and disabling dummy failure of monitor resources

You can enable and disable dummy failure of monitor resources.

Use one of the following methods to enable or disable dummy failure.

- ◆ Operation on WebManager (verification mode)
On the WebManager(Verification mode), shortcut menus of the monitor resources which cannot control monitoring are disabled.
- ◆ Operation by using the clpmonctrl command
The clpmonctrl command can control only monitor resources on the server where this command is run. When the clpmonctrl command is executed on monitor resource which cannot be controlled, dummy failure is not enabled even though the command succeeds.

Some monitor resources can enable and disable dummy failure and others cannot.

For details, see “Controlling monitor resources (clpmonctrl command)” in Chapter 3.

Dummy failure of a monitor resource is disabled if the following operations are performed.

- ◆ Dummy failure was disabled on WebManager (verification mode)
- ◆ “Yes” was selected from the dialog displayed when the WebManager mode changes from verification mode to a different mode.
- ◆ -n was specified to enable dummy failure by using the clpmonctrl command
- ◆ Stop the cluster
- ◆ Suspend the cluster

Monitoring interval for monitor resource

All monitor resources except the user-mode monitor resource monitors their targets at every monitor interval.

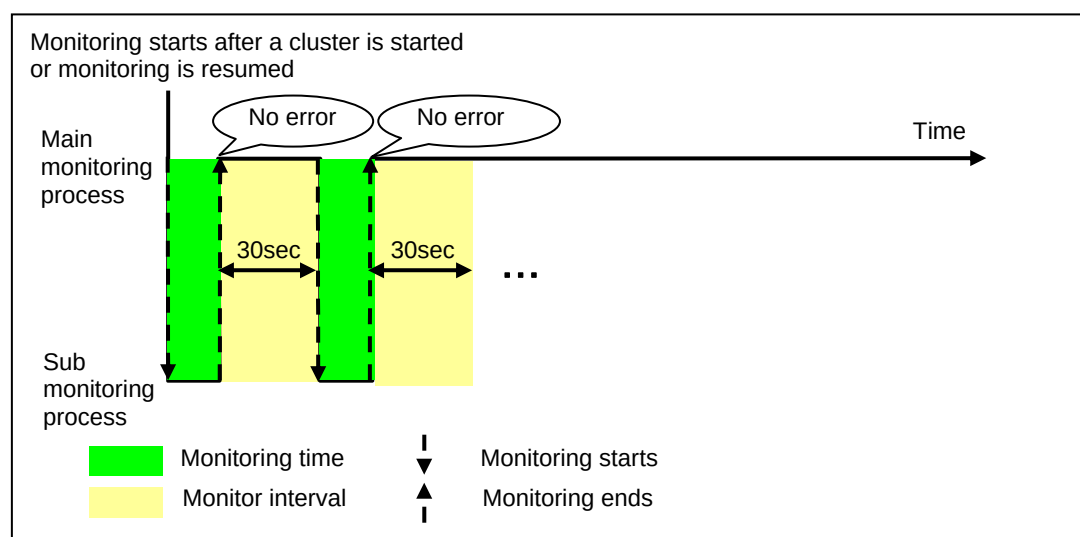
The following illustrates the timeline of how a monitor resource monitors its target and finds error/no error with the configuration below:

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)

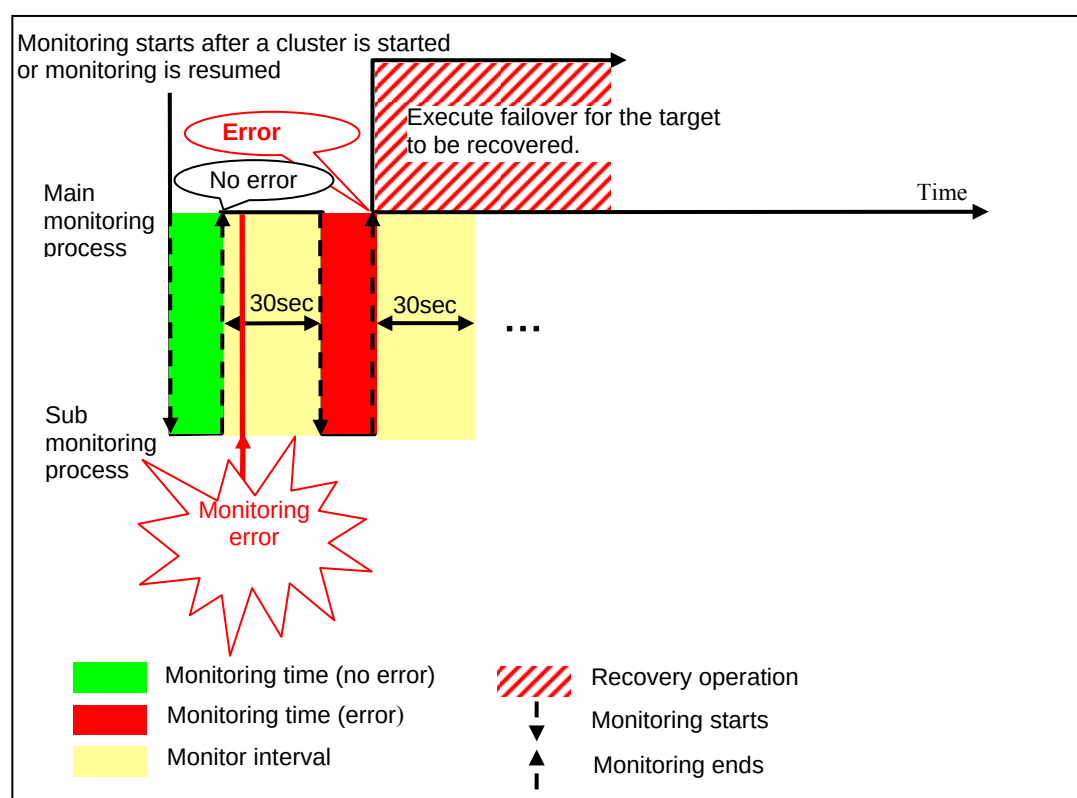
Examples of behavior when the following values are set.

<Monitor>

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	0 time

<Error detection>

Recovery Target	group
Recovery Script Execution Count	0 time
Maximum Reactivation Count	0 time
Maximum Failover Count	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)

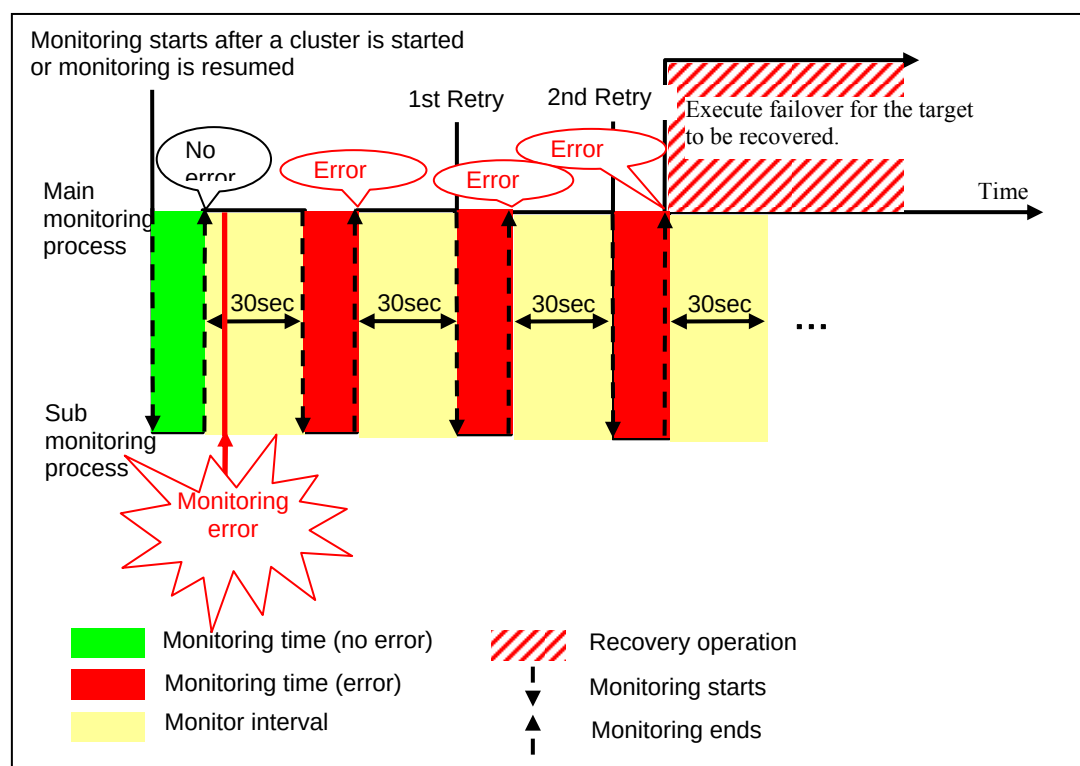
Examples of behavior when the following values are set.

<Monitor>

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	2 times

<Error detection>

Recovery Target	group
Recovery Script Execution Count	0 time
Maximum Reactivation Count	0 time
Maximum Failover Count	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)

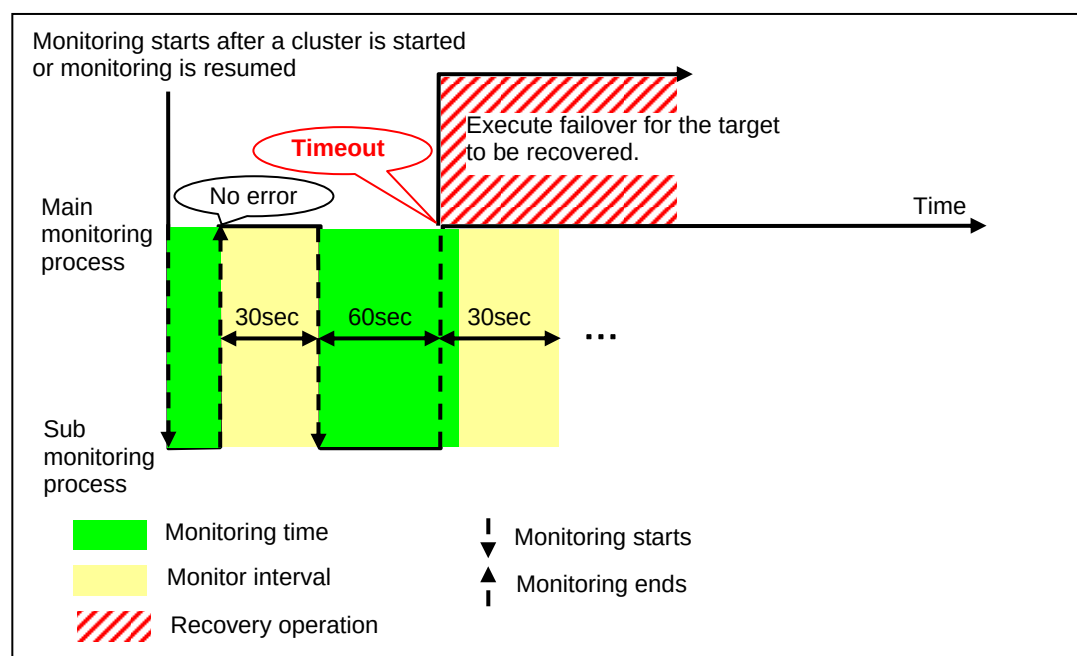
Examples of behavior when the following values are set.

<Monitor>

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	0 time

<Error detection>

Recovery Target	group
Recovery Script Execution Count	0 time
Maximum Reactivation Count	0 time
Maximum Failover Count	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)

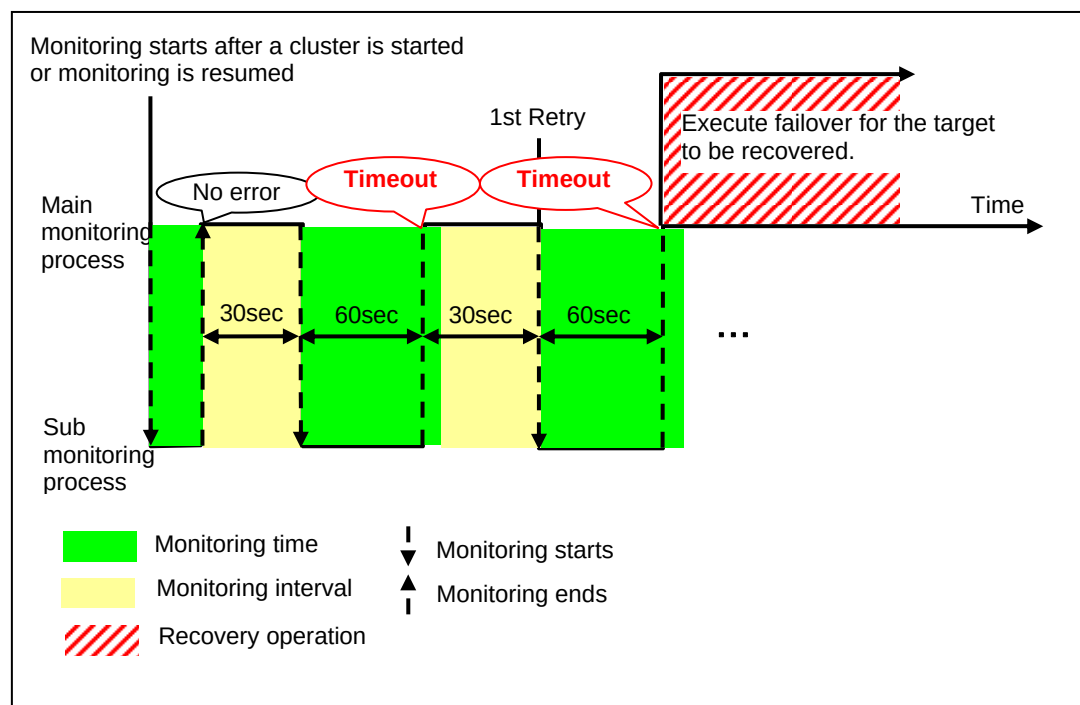
Examples of behavior when the following values are set.

<Monitor>

Monitor Interval	30 sec
Monitor Timeout	60 sec
Monitor Retry Count	1 time

<Error detection>

Recovery Target	group
Recovery Script Execution Count	0 time
Maximum Reactivation Count	0 time
Maximum Failover Count	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:

- ◆ Execution of recovery script: this takes place when an error is detected in a monitor target.
- ◆ Reactivation of the recovery target: this takes place if the recovery script is executed up to the recovery script execution count. When the execution of a pre-reactivation script is specified, reactivation starts after that script has been executed.
- ◆ Failover: this takes place when reactivation fails for the number of times set in the reactivation threshold. When the execution of a pre-failover script is specified, failover starts after that script has been executed.
- ◆ 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. When the execution of a pre-final-action script is specified, the final action starts after that script has been executed.

No recovery action is taken if the status of the recovery target is as following:

Recovery target	Status	Reactivation ²	Failover ³	Final action ⁴
Group resource/ Failover group	Already stopped	No	No	No
	Being activated/stopped	No	No	No
	Already activated	Yes	Yes	Yes
	Error	Yes	Yes	Yes
LocalServer	-	-	-	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.

² Effective only when the value for the reactivation threshold is set to 1 (one) or greater.

³ Effective only when the value for the failover threshold is set to 1 (one) or greater.

⁴ 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:

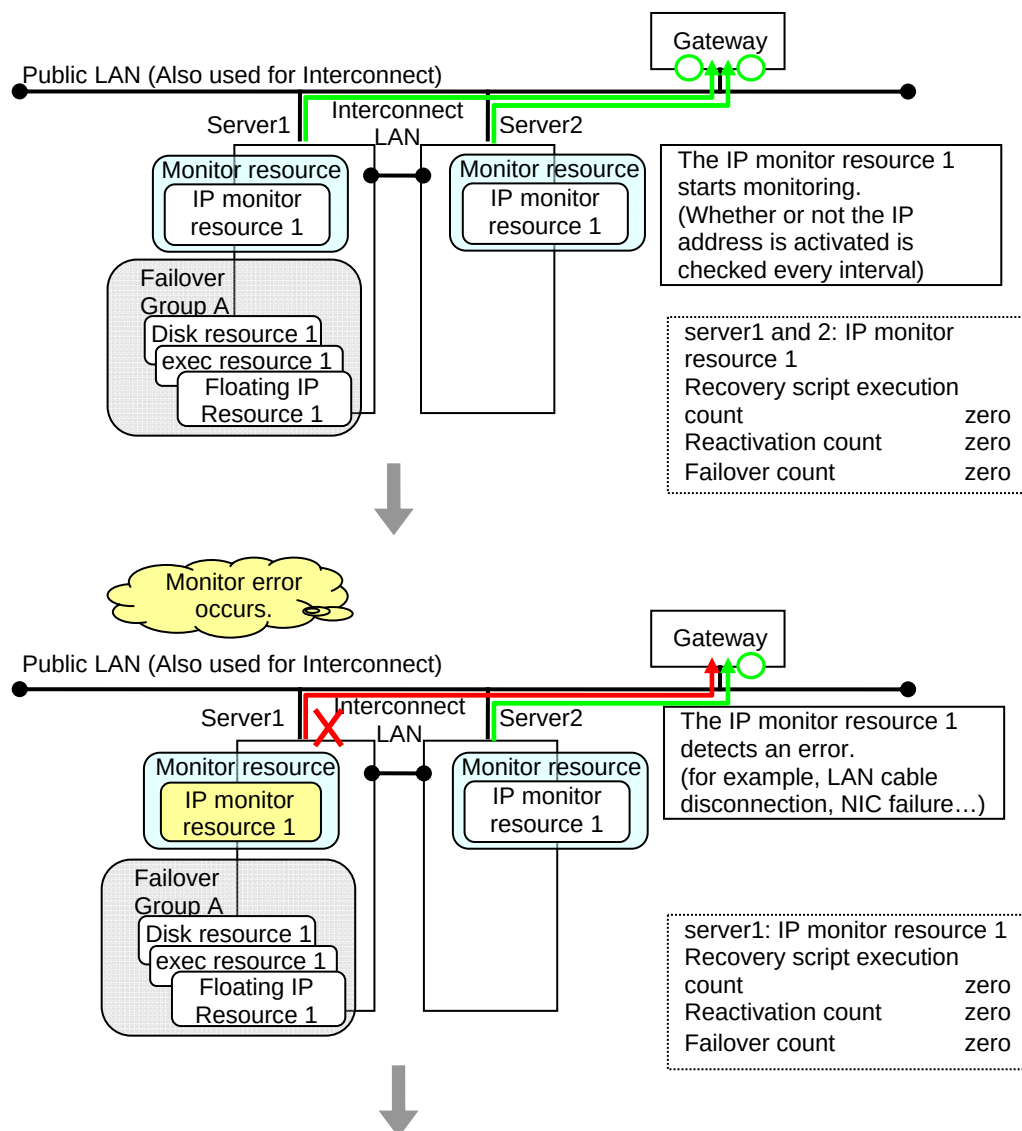
Examples of behavior when the following values are set.

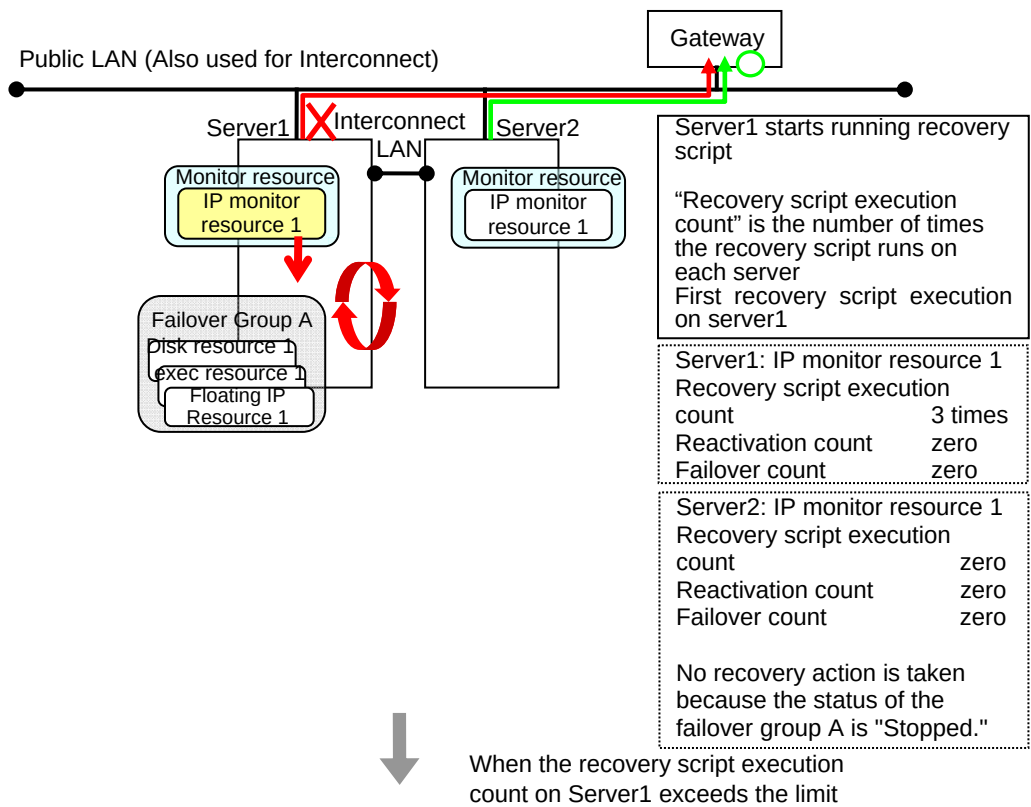
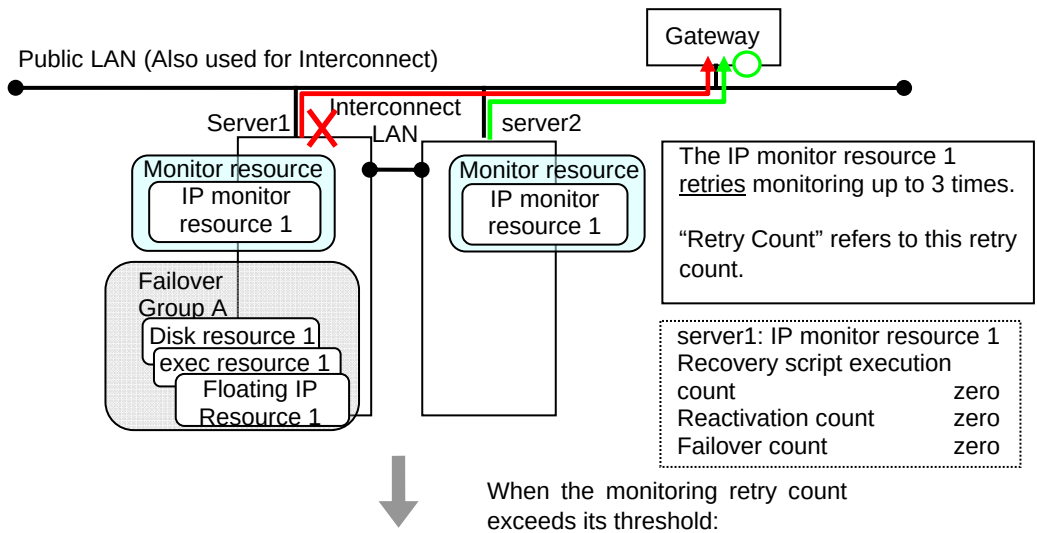
<Monitor>

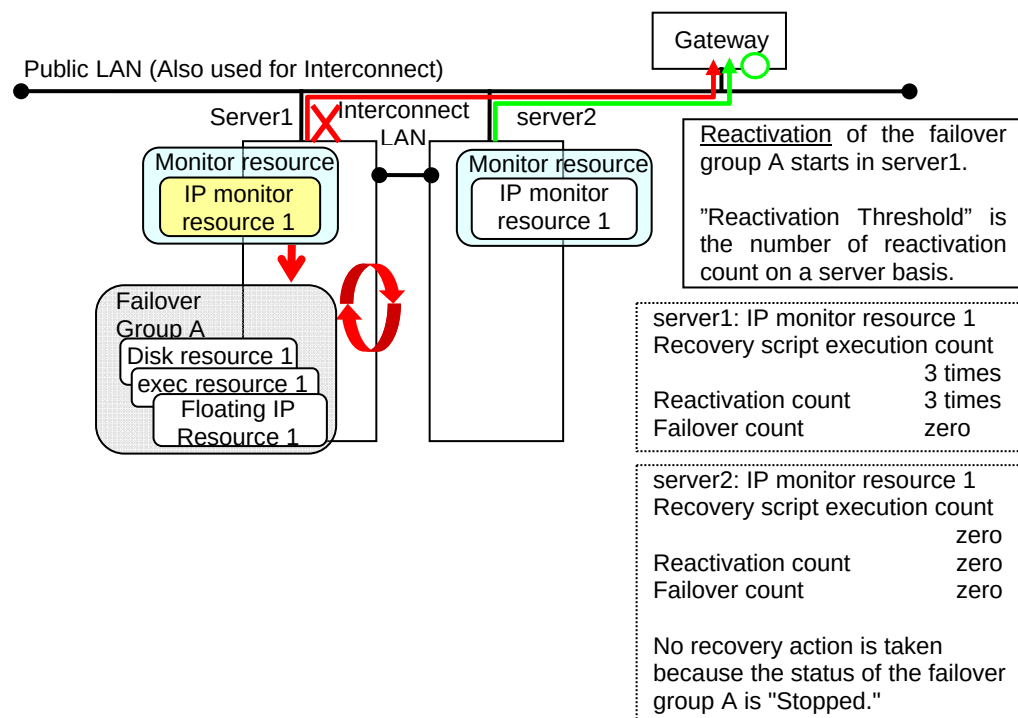
Interval 30 sec
Timeout 30 sec
Retry Count 3 times

<Error detection>

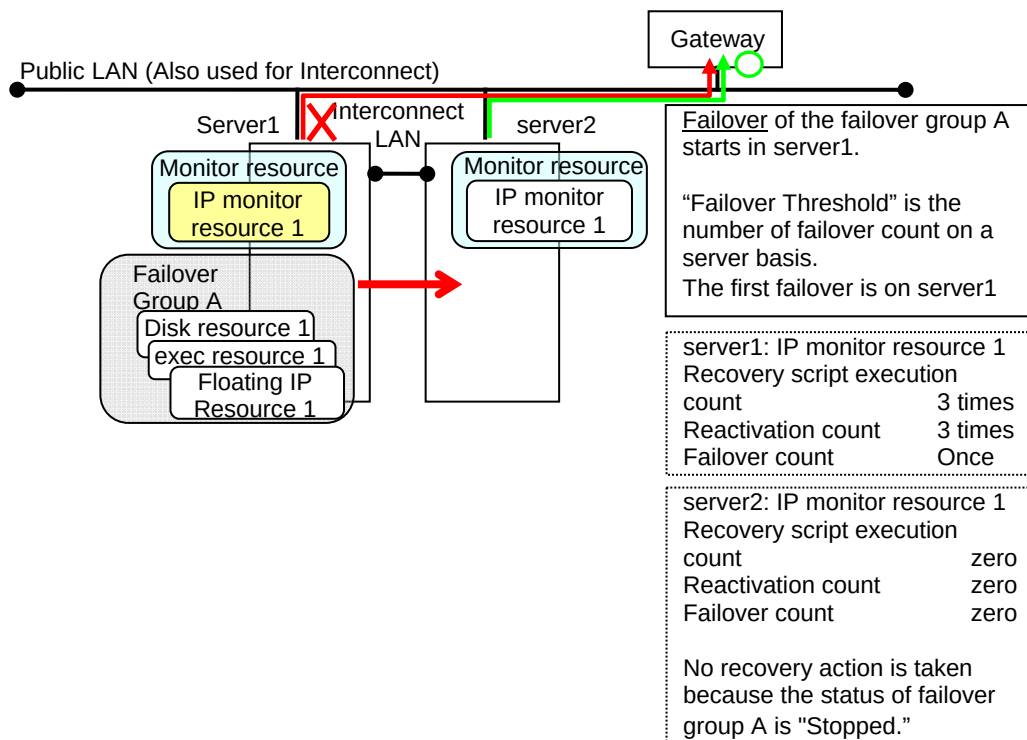
Recovery Target Failover Group A
Recovery Script Execution Count 3 times
Reactivation Threshold 3 times
Failover Threshold 1
Final Action No Operation



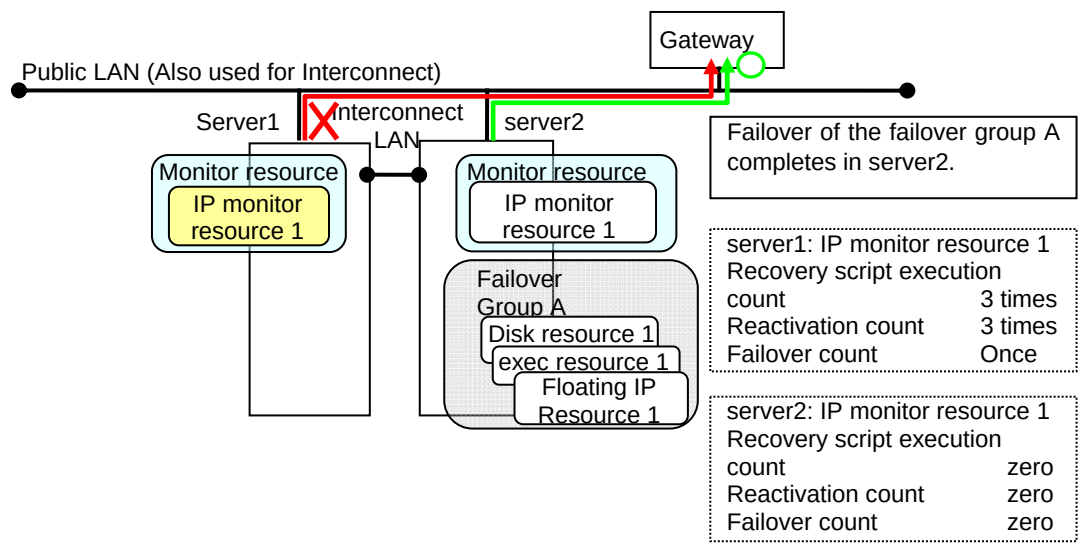




When the reactivation count exceeds its threshold on Server1



Failover of the failover group A from server1 to server2



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.

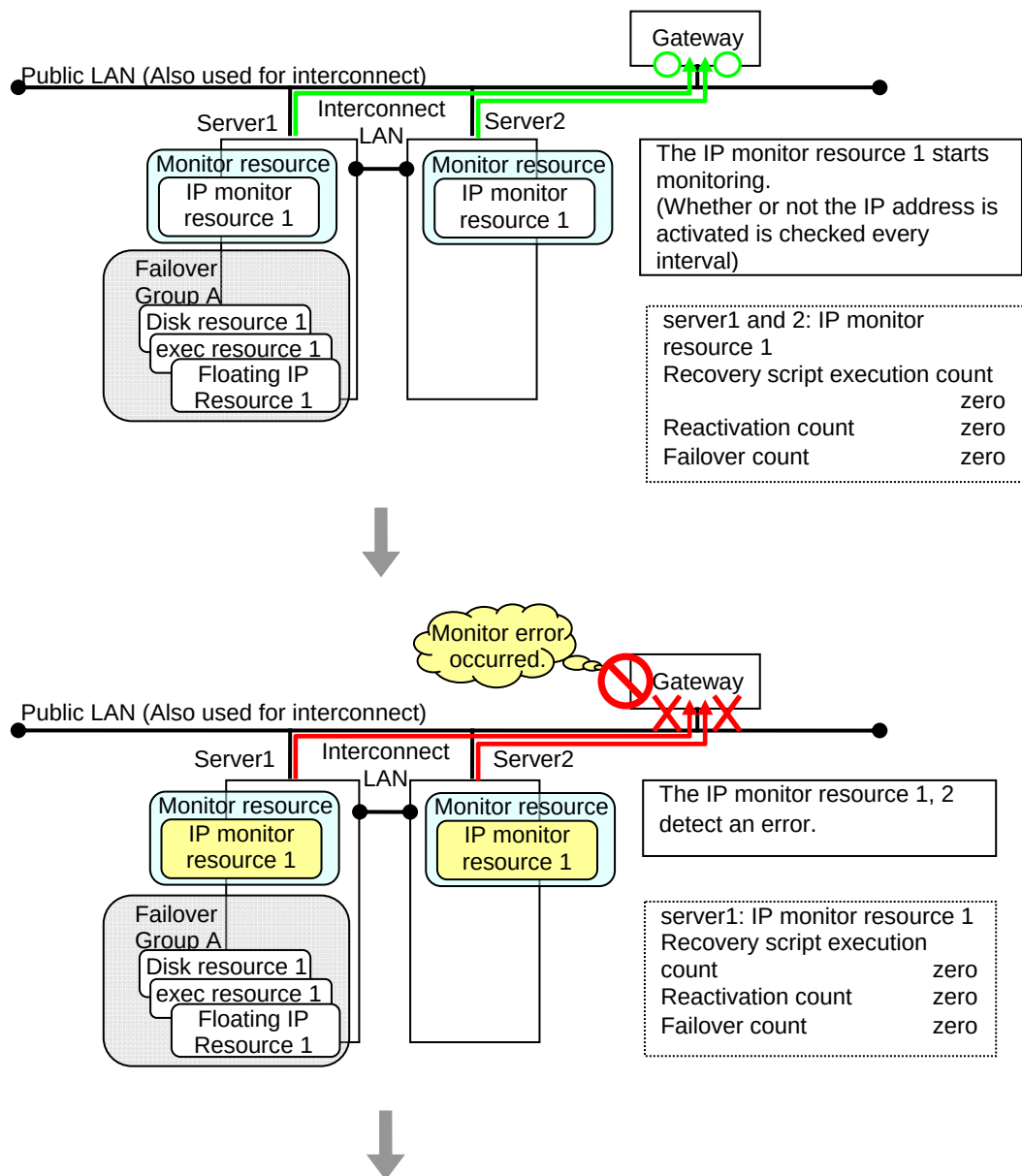
Examples of behavior when the following values are set.

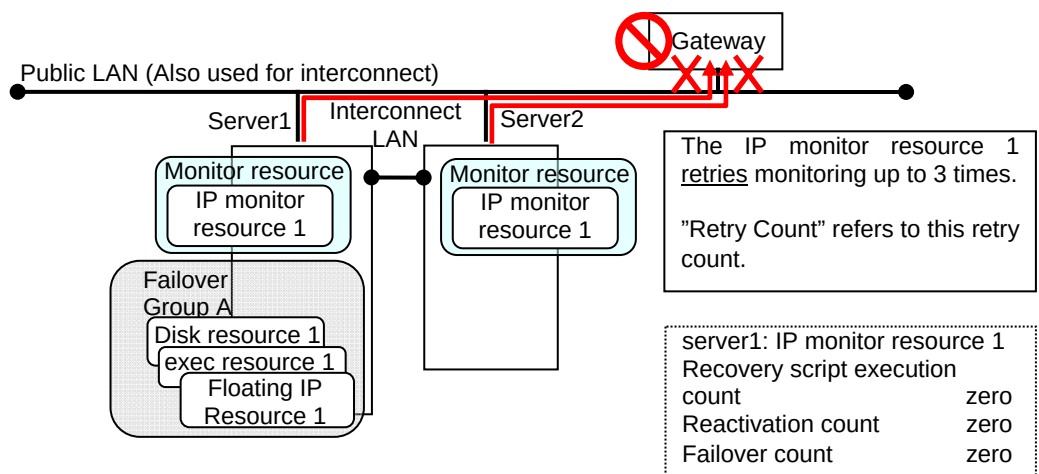
<Monitor>

Interval	30 sec
Timeout	30 sec
Retry Count	3 times

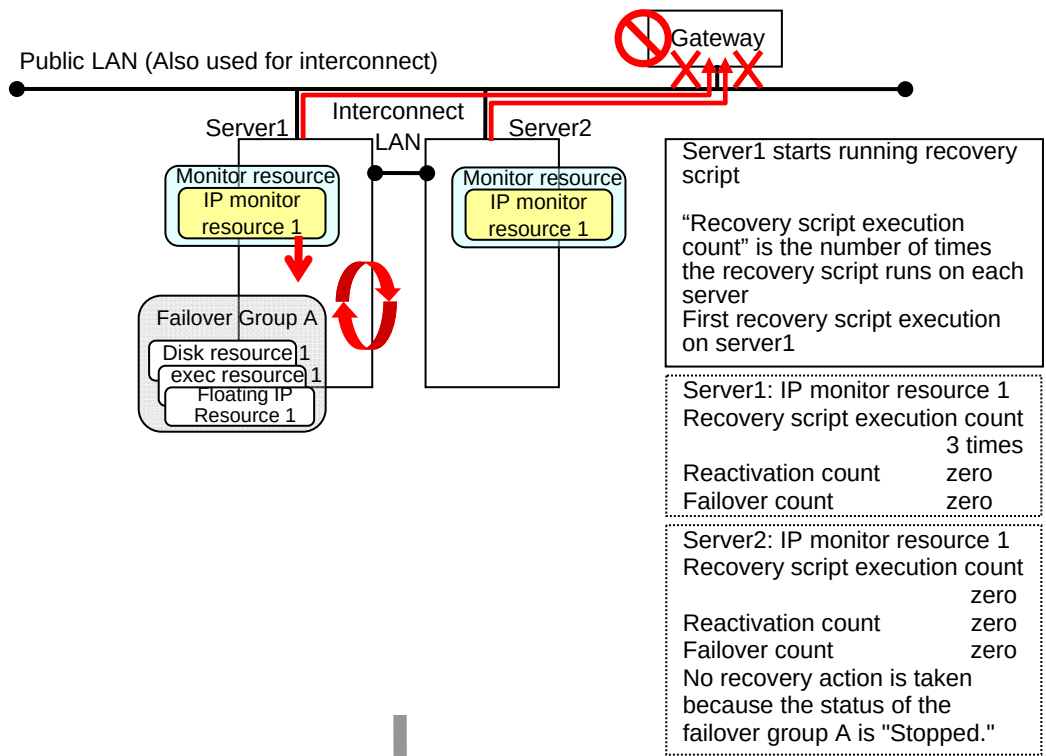
<Error detection>

Recovery Target	Failover Group A
Recovery Script Execution Count	3 times
Reactivation threshold	3 times
Failover Threshold	1
Final Action	No Operation

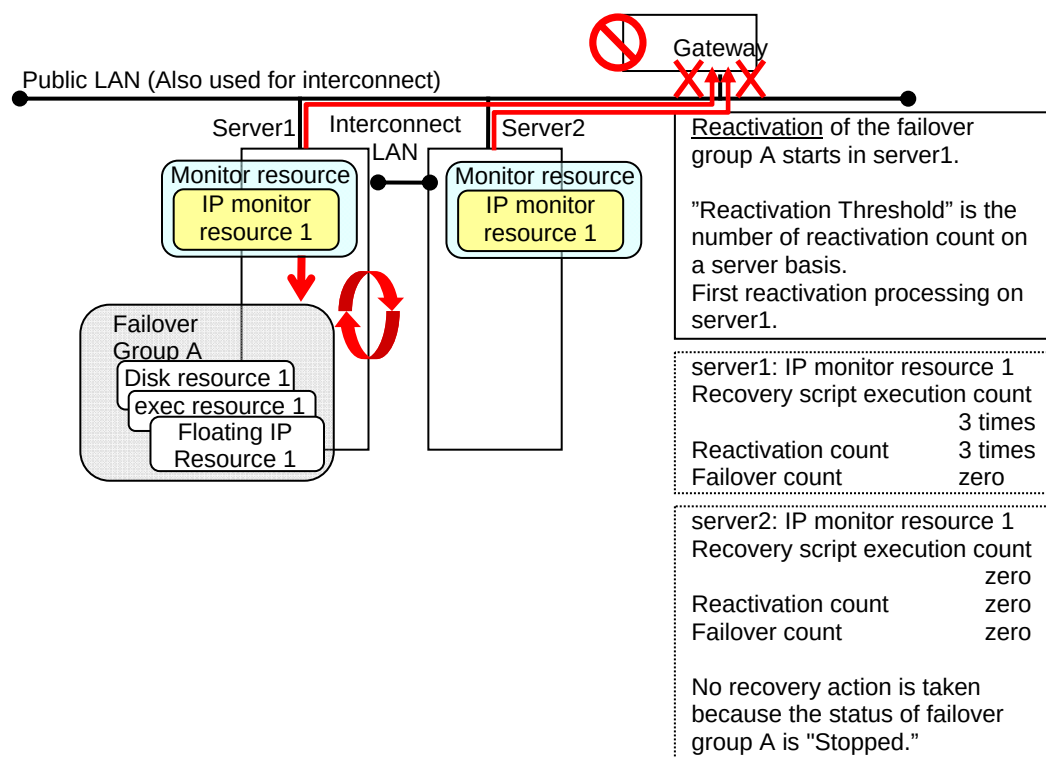




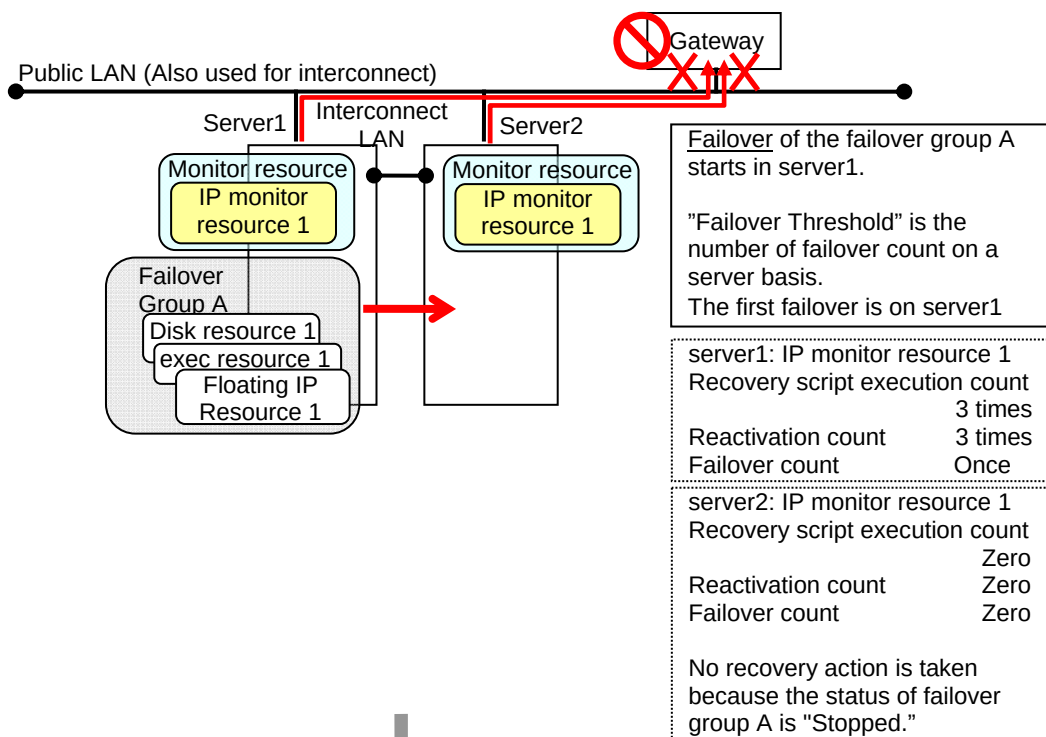
When the monitoring retry count exceeds its threshold



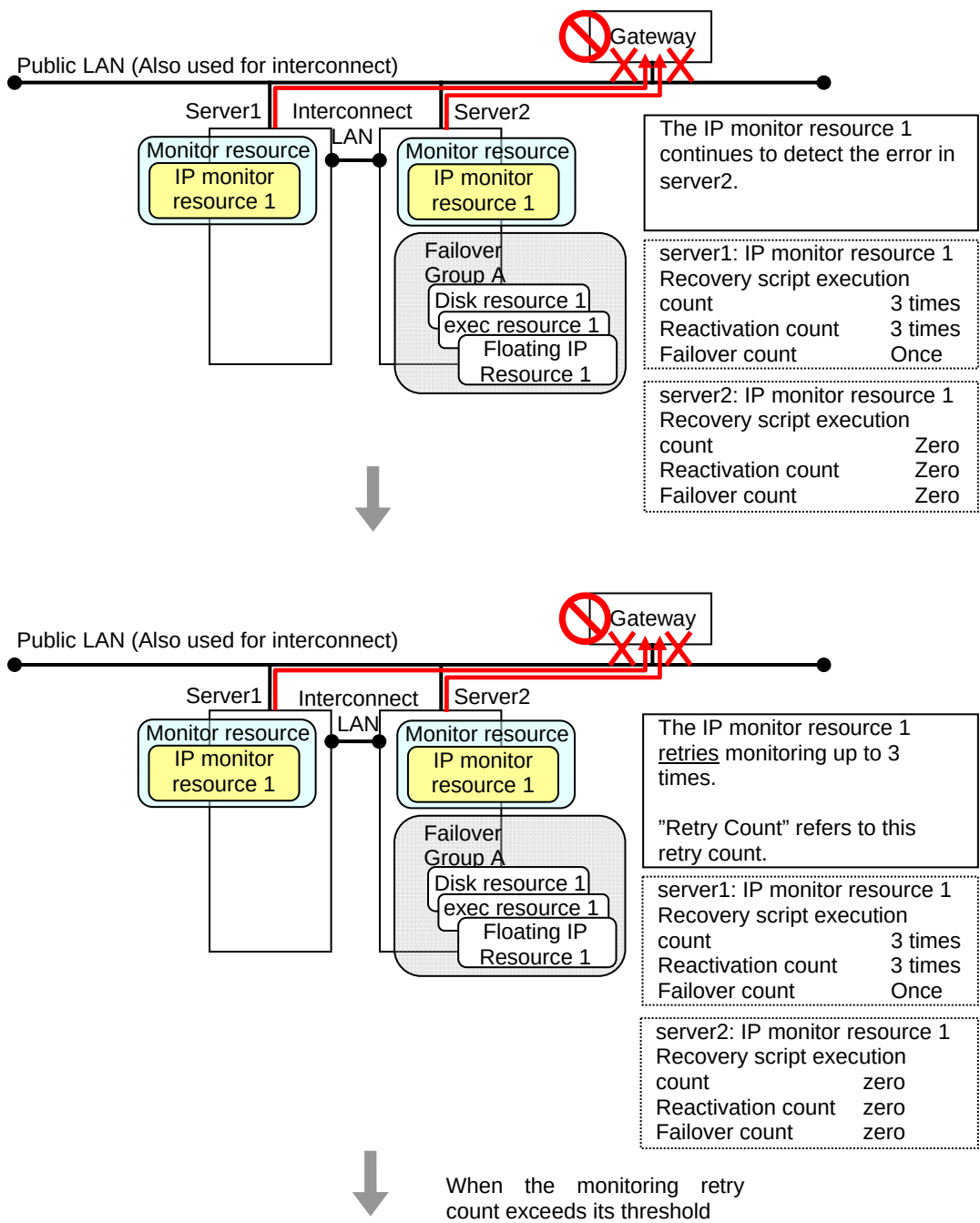
When the recovery script execution count exceeded on Server1

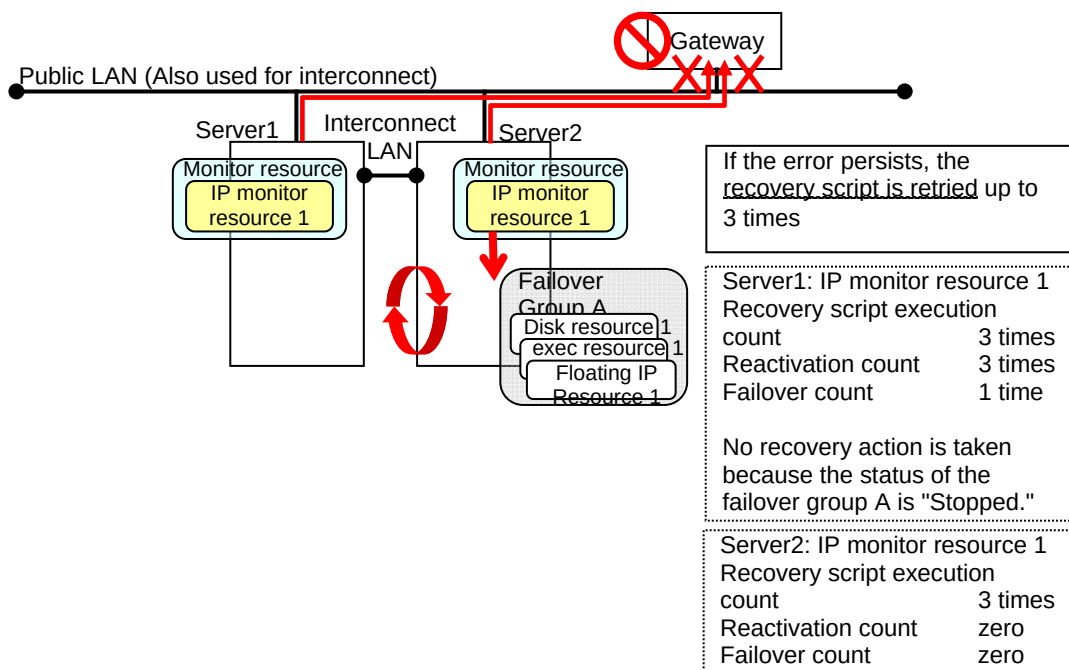


When reactivation count exceeds the threshold in server1

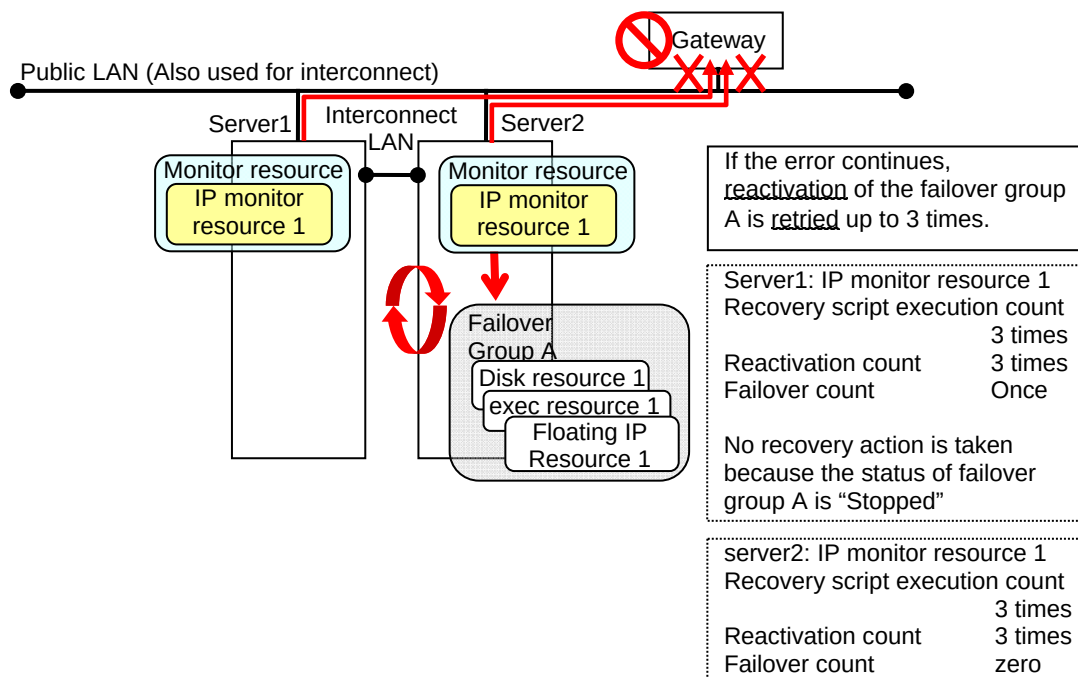


Failover the failover group A from server1 to server2

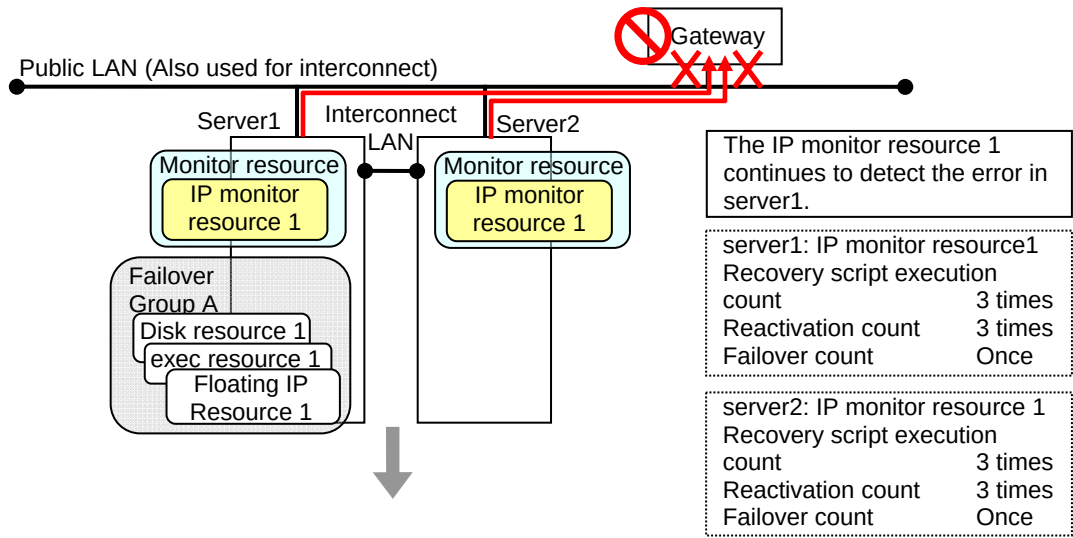
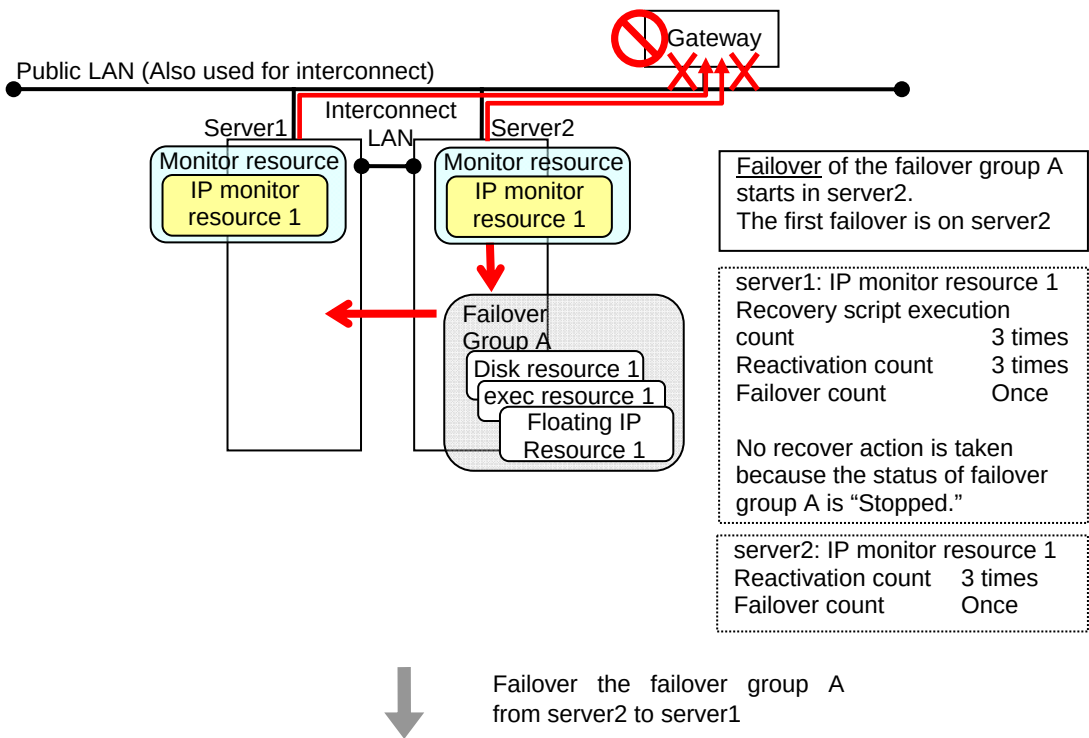


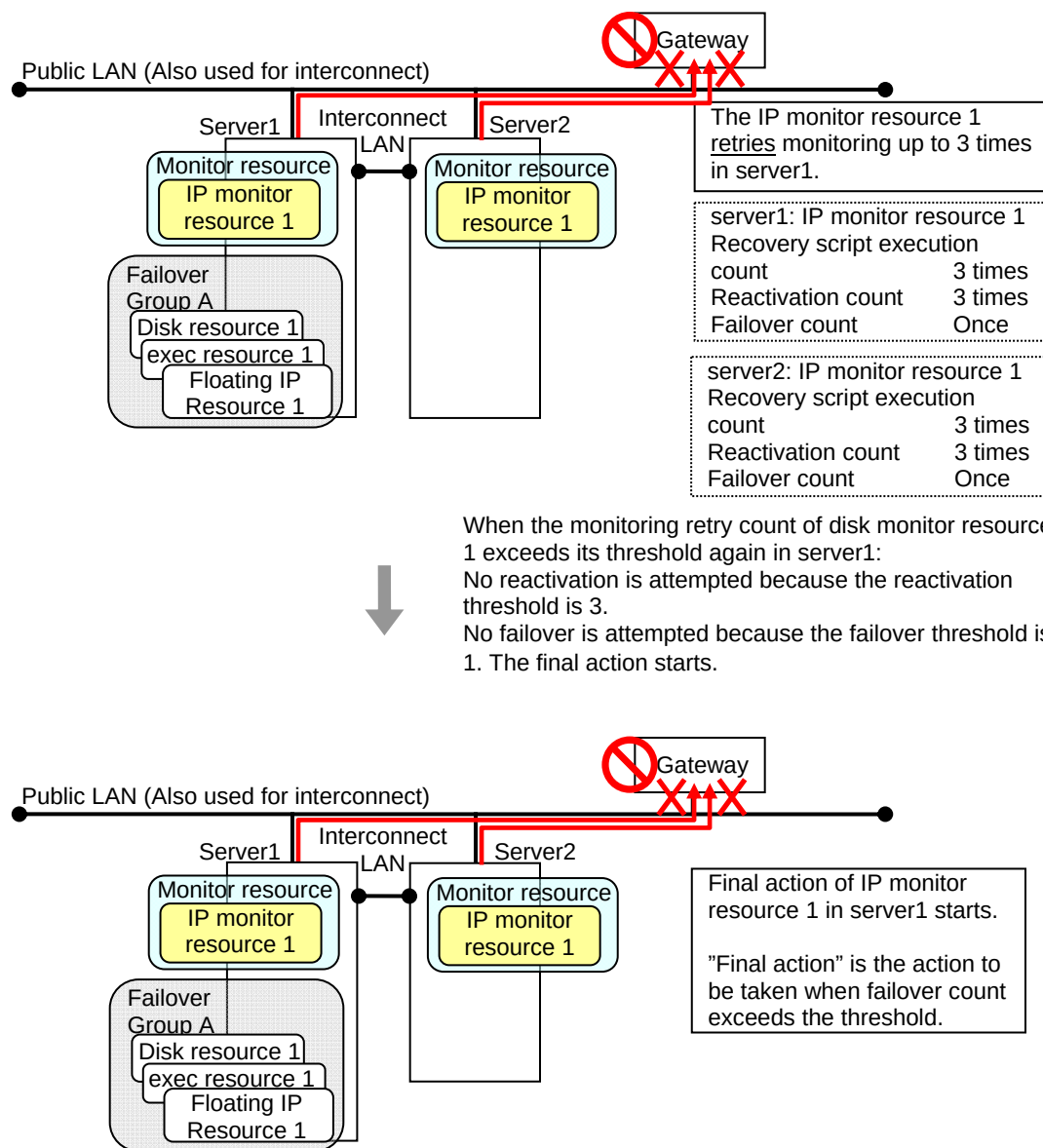


When Server2 also fails to retry running of the recovery script



When reactivation count also exceeds its threshold in server2





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.

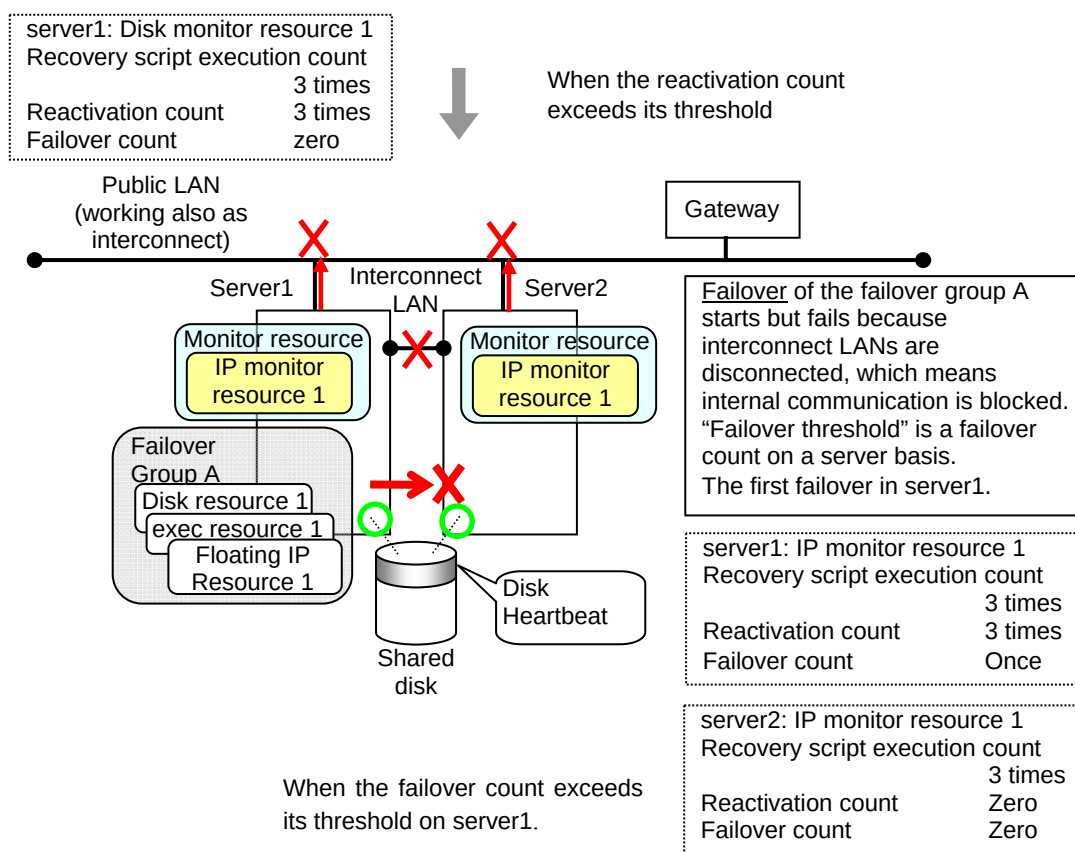
To be able to failover a group when all interconnect LANs are disconnected, you can choose to shut down the server where an error is detected. This will allow other servers to detect the server is shut down and to start failover of the group.

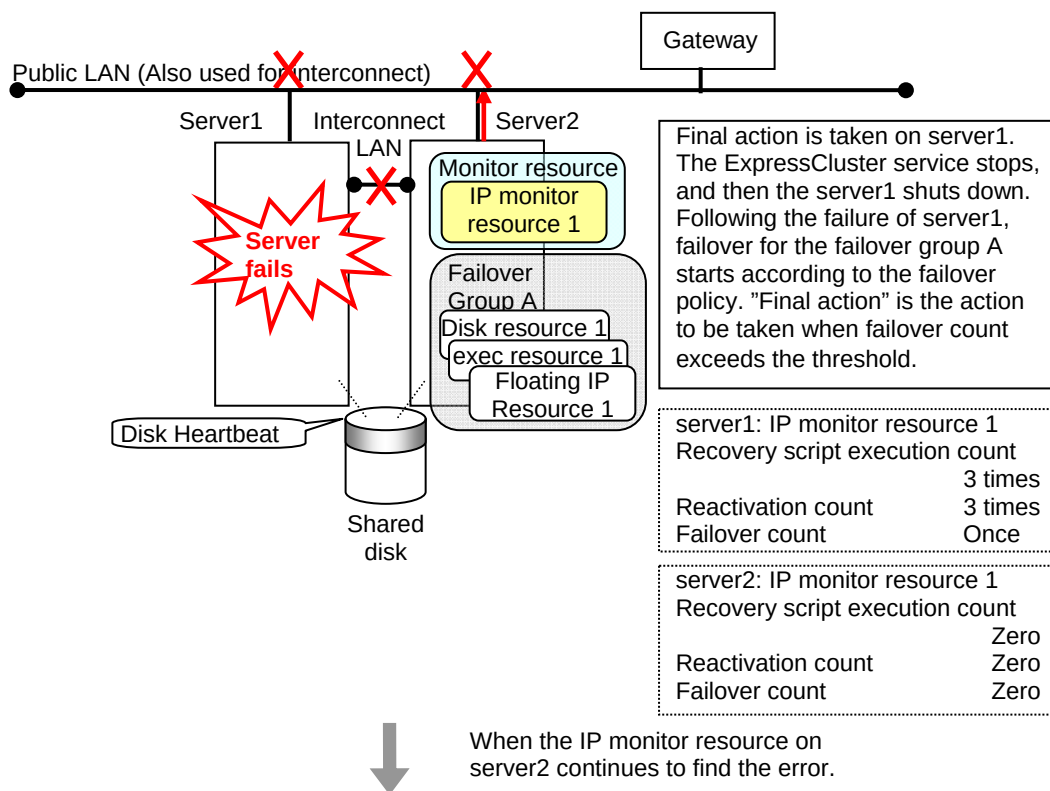
The following is an example of the process when an error is detected while all interconnect LANs are disconnected.

Configuration

<Monitor>	
Interval	30 seconds
Timeout	30 seconds
Retry Count	3 times
<Error detection>	
Recovery Object	Failover Group A
Recovery Script Execution Count	3 times
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.

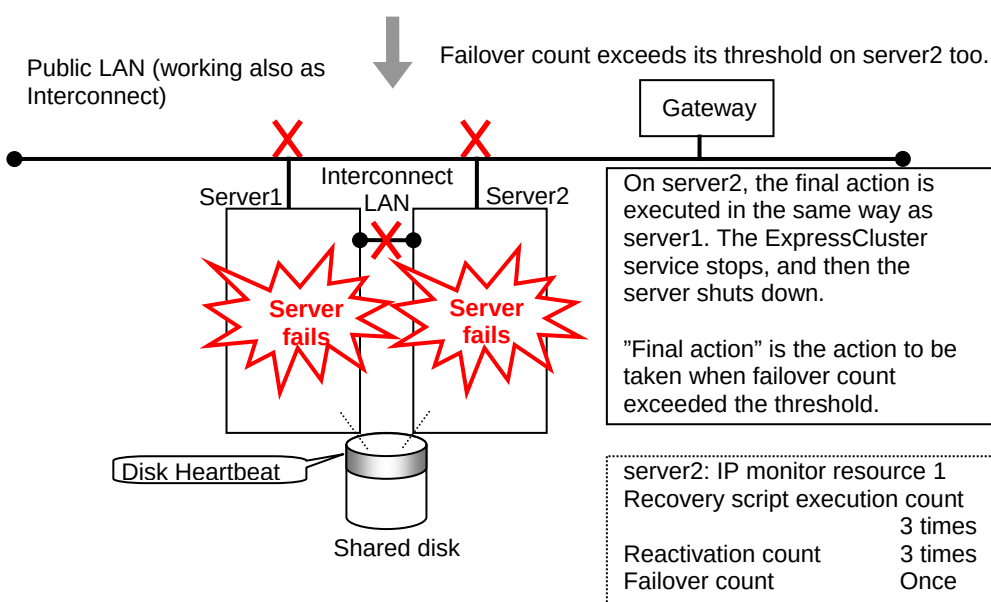




Reactivation of the Failover Group A is executed on server2 in the same way as server1.

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 457 is executed and another monitoring error occurs after monitoring returns to normal.

Examples of behavior when the following values are set.

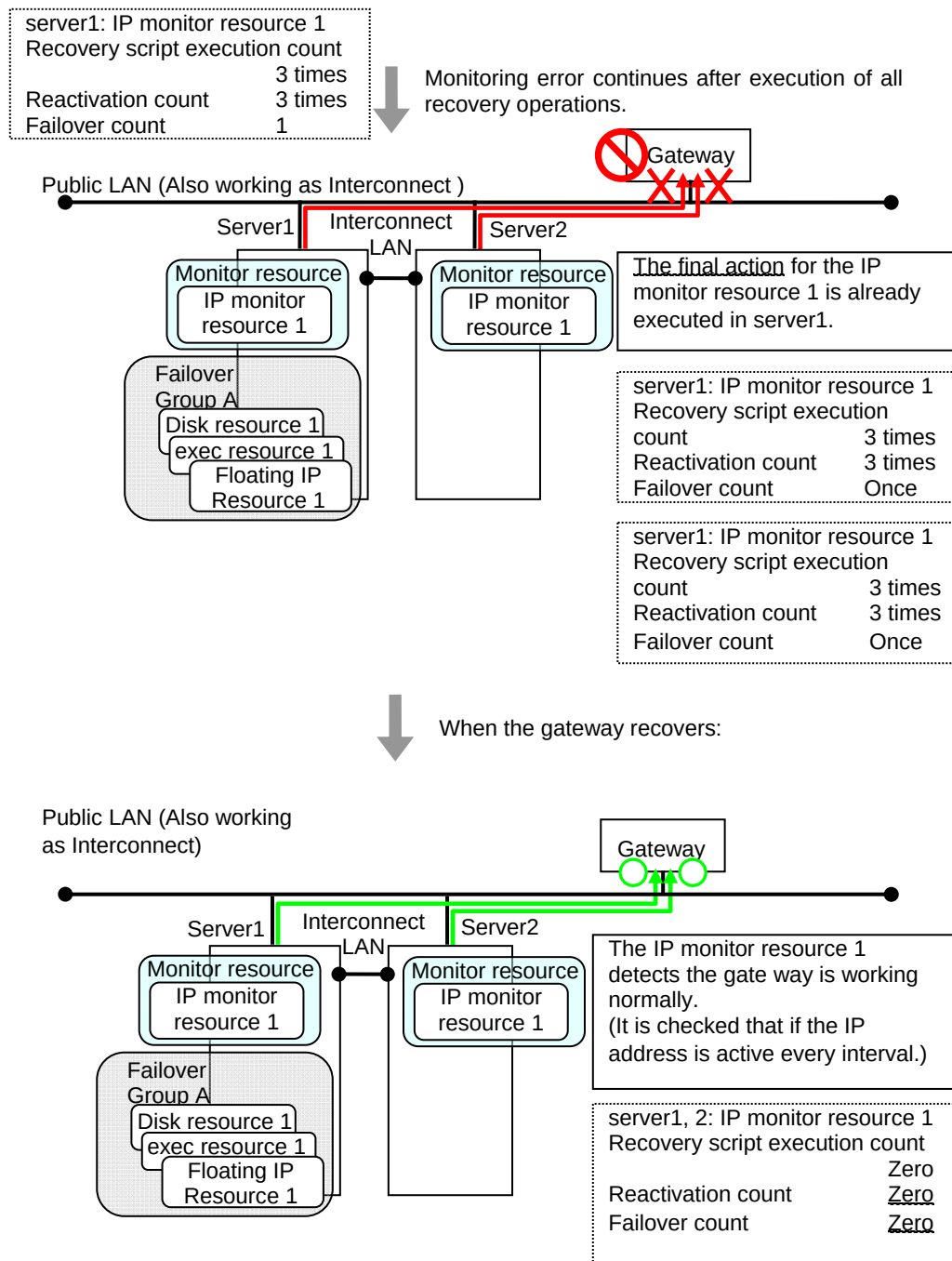
Configuration

<Monitor>

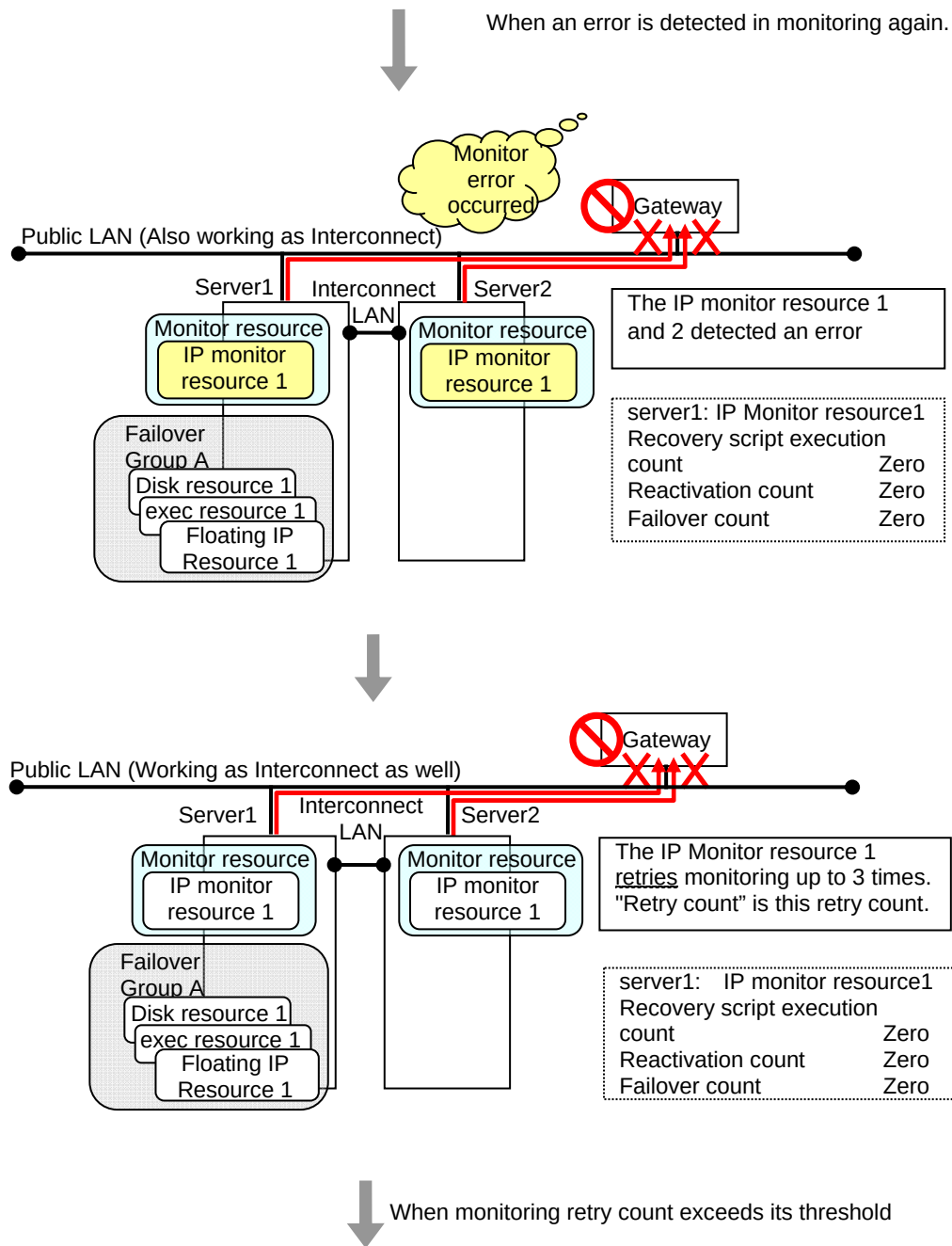
Interval	30 sec
Timeout	30 sec
Retry Count	3 times

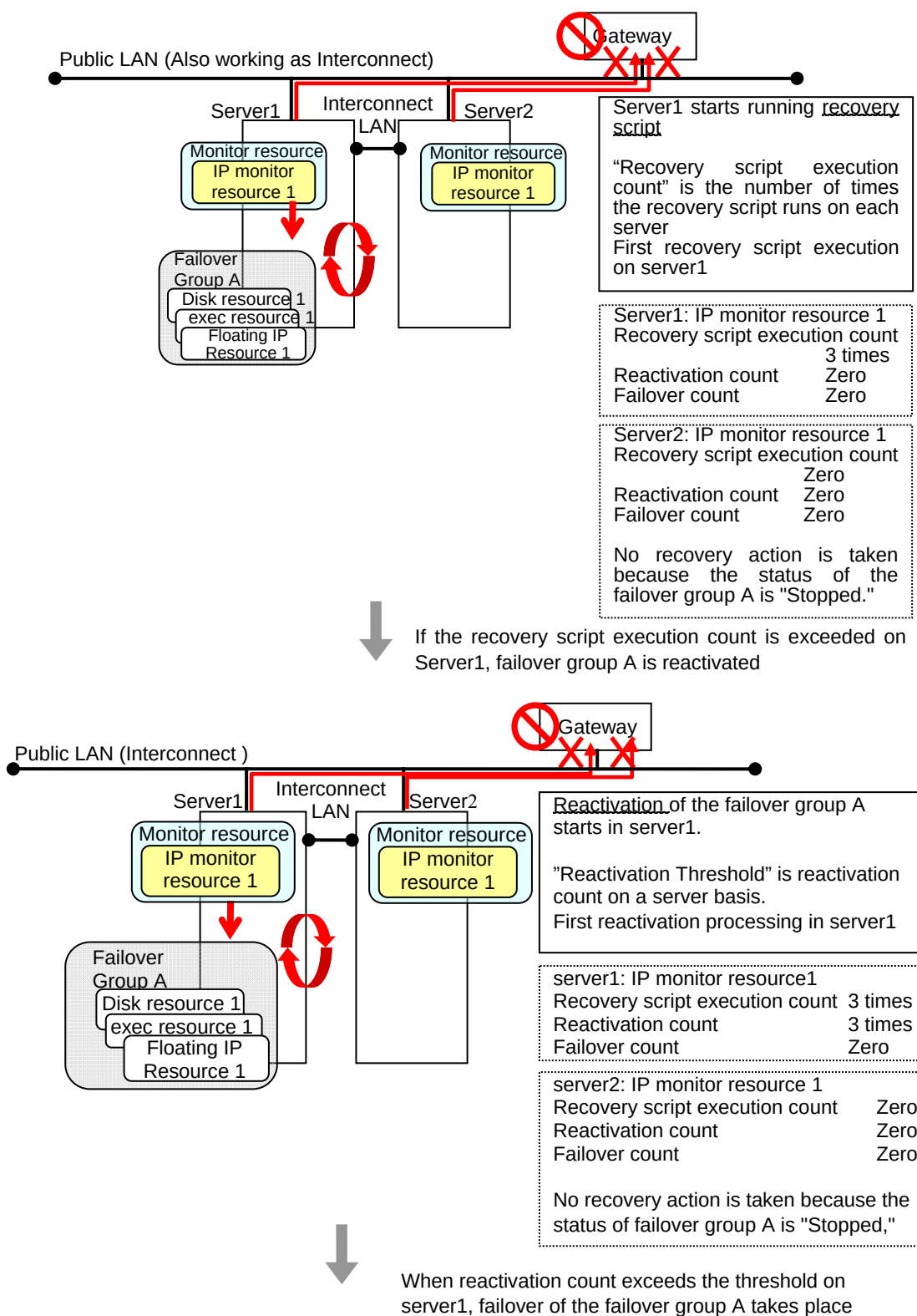
<Error detection>

Recovery Target	Failover Group A
Recovery Script Execution Count	3 times
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
Recovery Script Execution Count	0 time
Maximum Reactivation Count	0 time
Maximum Failover Count	1 time
Final Action	Stop Group

<Parameter>

Method	TUR

Configuration of the failover group A: disk resource

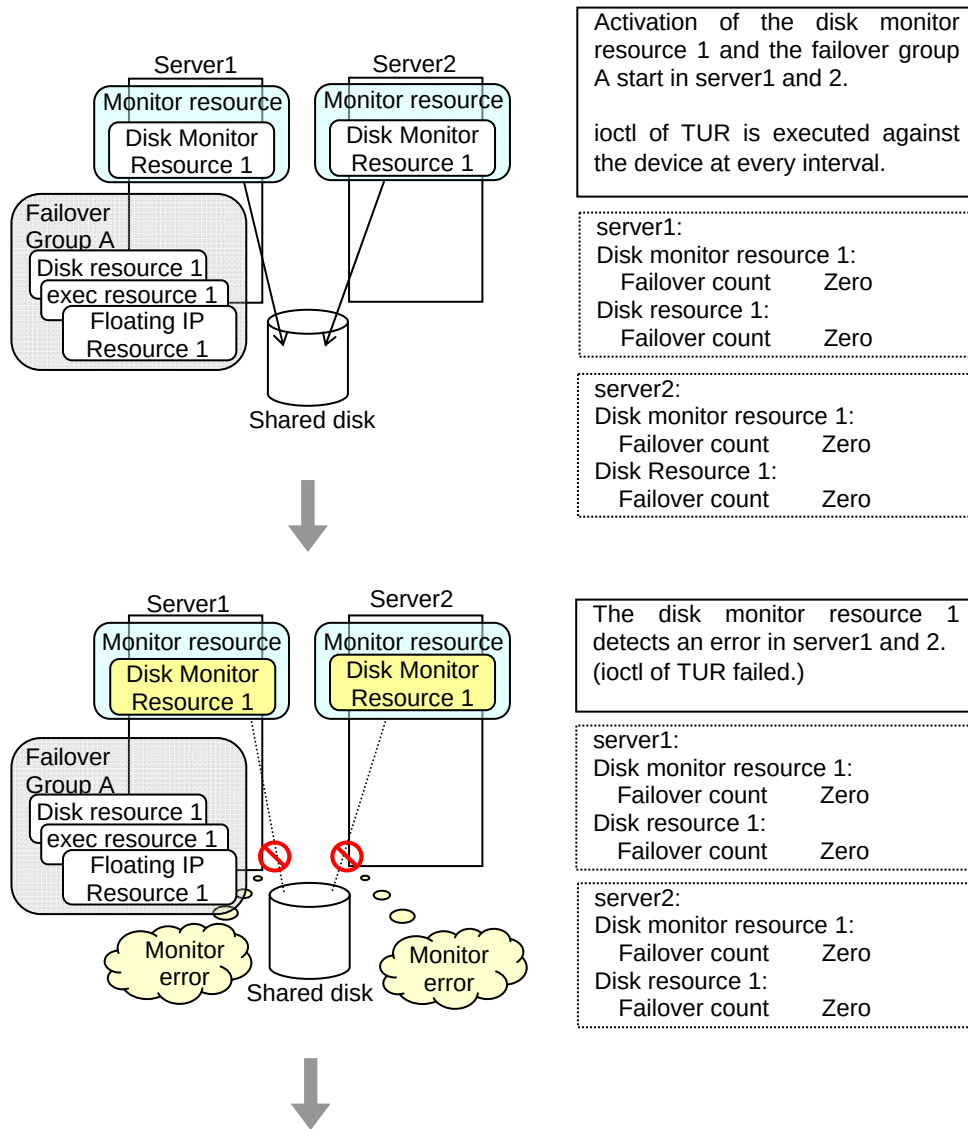
<Activation error>

Activation retry Threshold	0 time
Failover Threshold	1 time
Final Action	No Operation (Next resources are not activated)

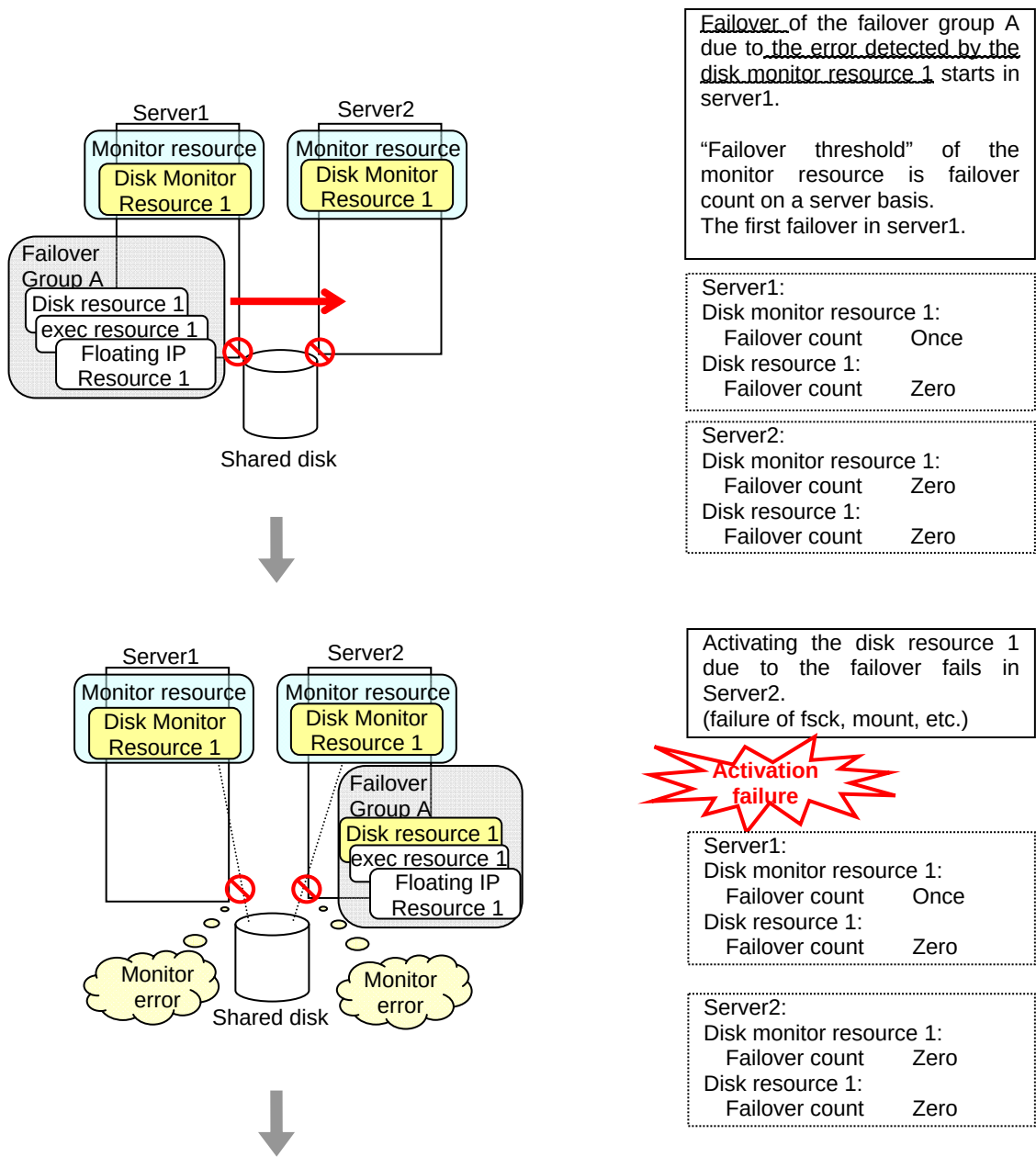
<Deactivation abnormality>

Deactivation Retry Threshold	0 time
Final Action	Stop cluster service and shutdown OS

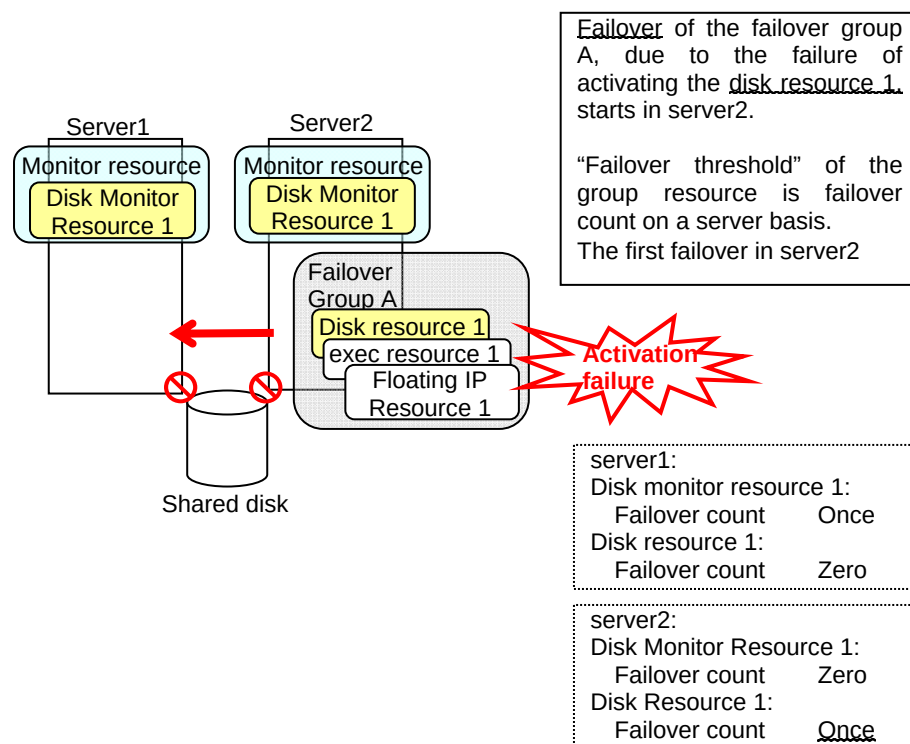
The reactivation threshold of the monitor resource and the activation retry threshold of the group resource are not mentioned in the following diagrams because they are set to zero (0).



An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

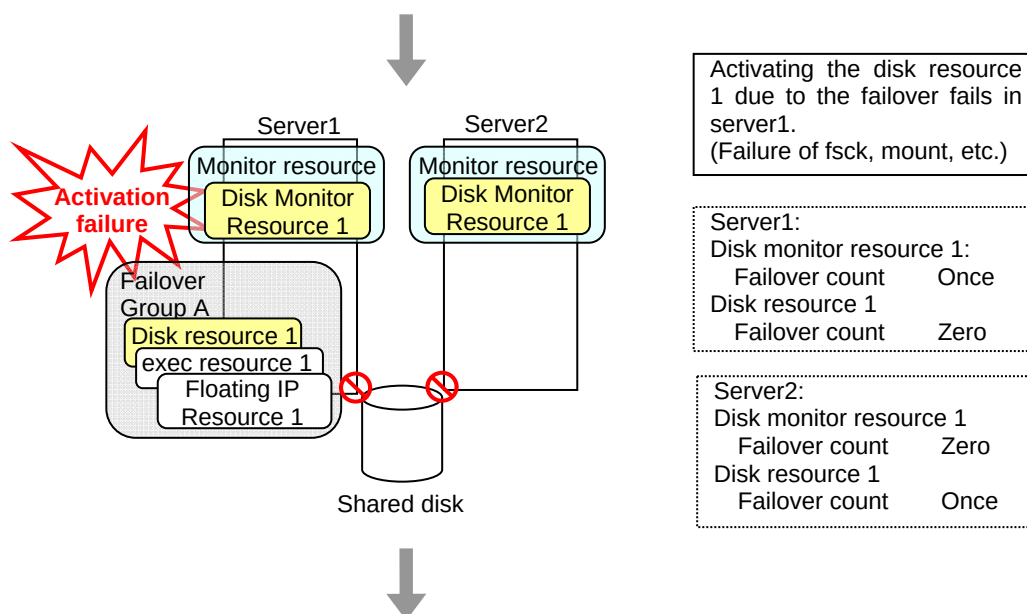


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

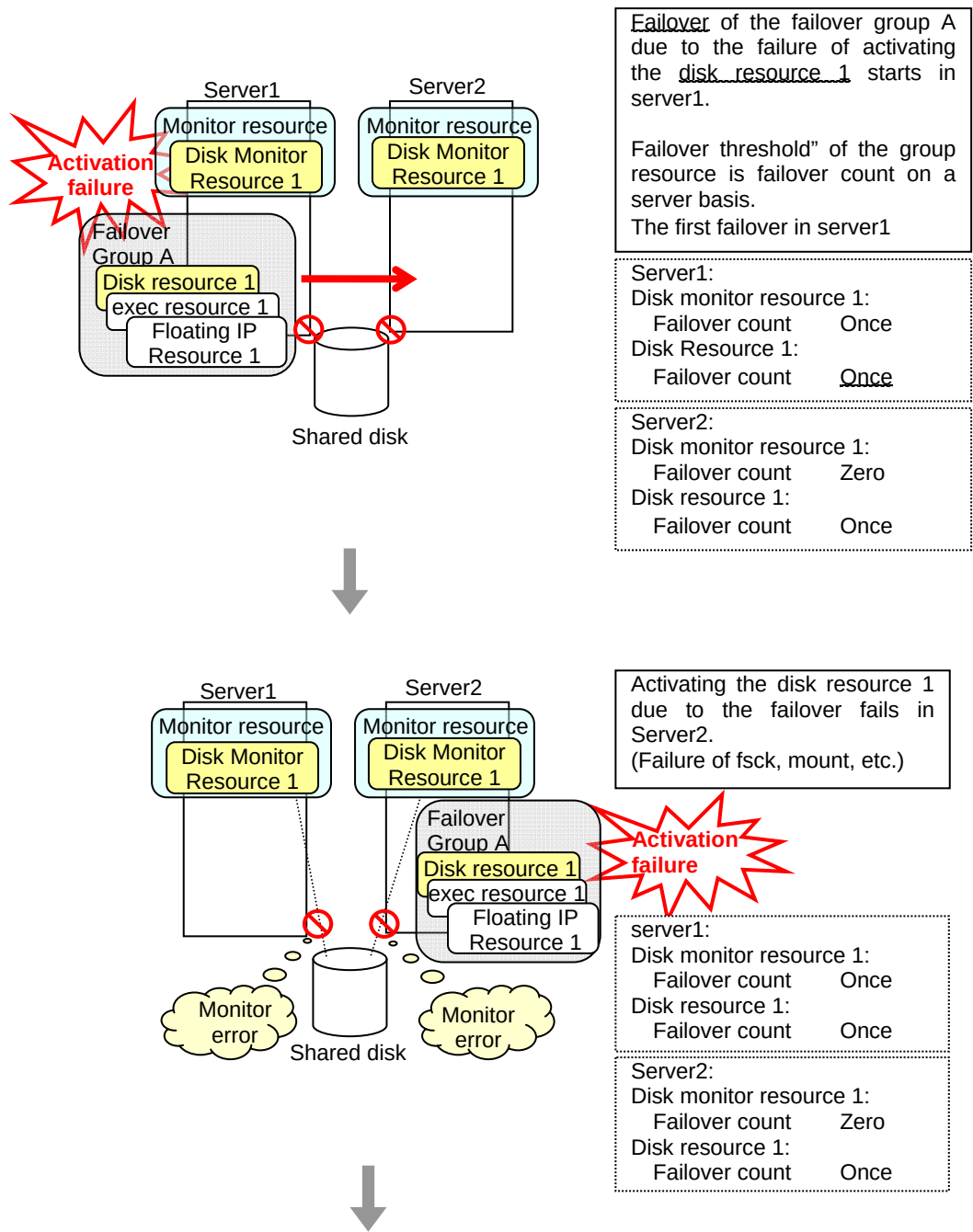


The disk monitor resource 1 detects an error in server2 as is the case in server1. However, no recovery action is taken because the failover group A, the recovery target, is activated.

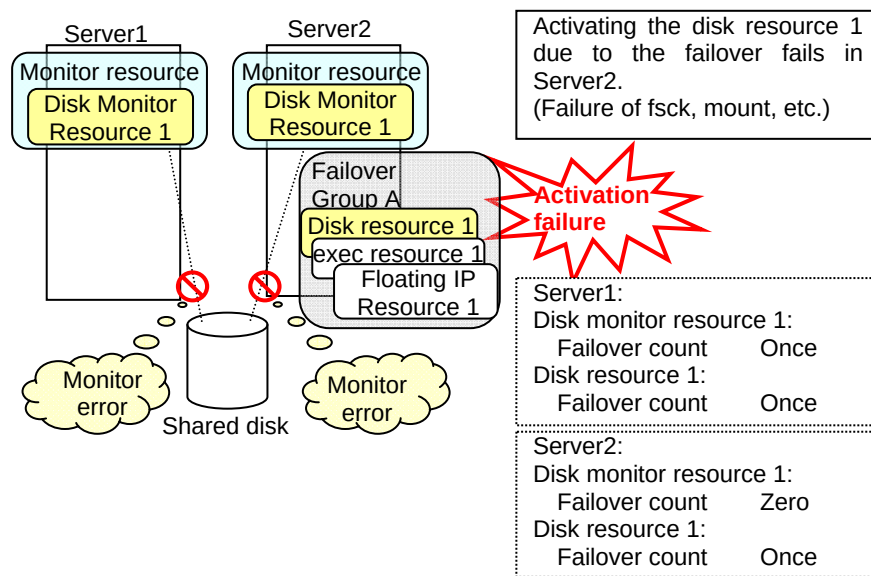
For more information on recovery executed by monitor resources against their recovery targets, see "Action when an error is detected by monitor resource" on page 457.



An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

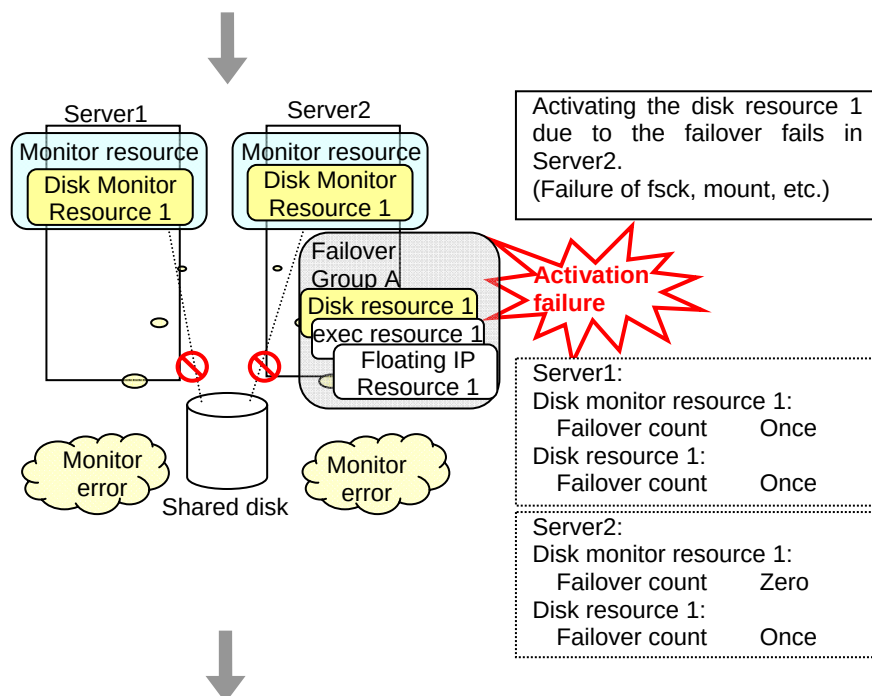


An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.

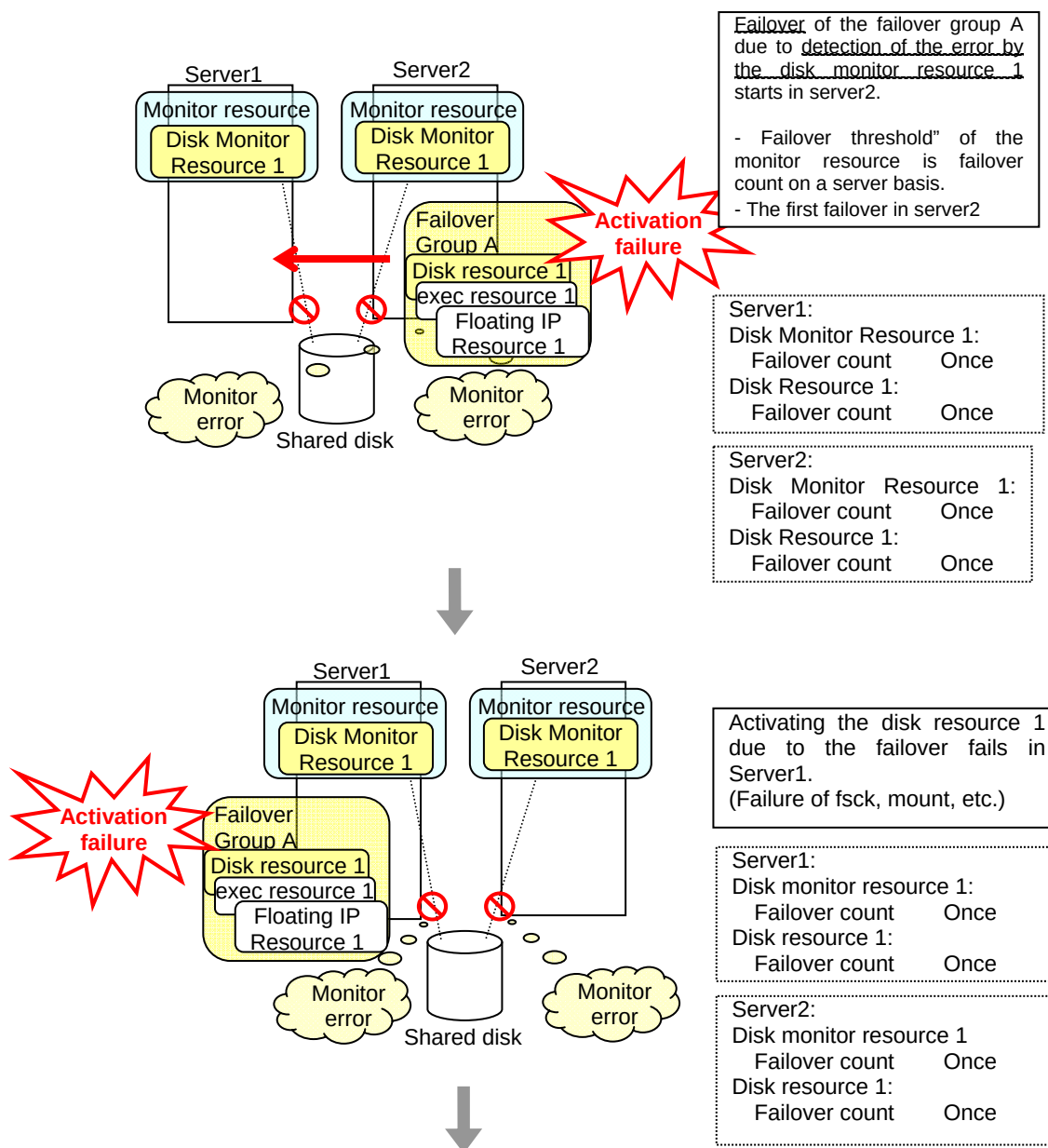


The final action is executed in server2 because the number of failovers due to failure of disk resource activation has exceeded its threshold.

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.



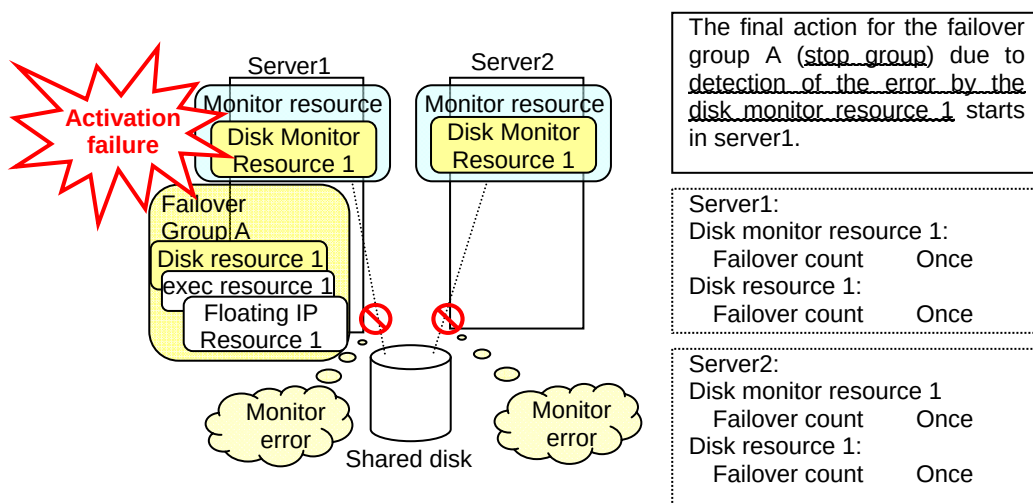
An error can be detected in deactivation of the disk resource depending on the location of the disk device failure.



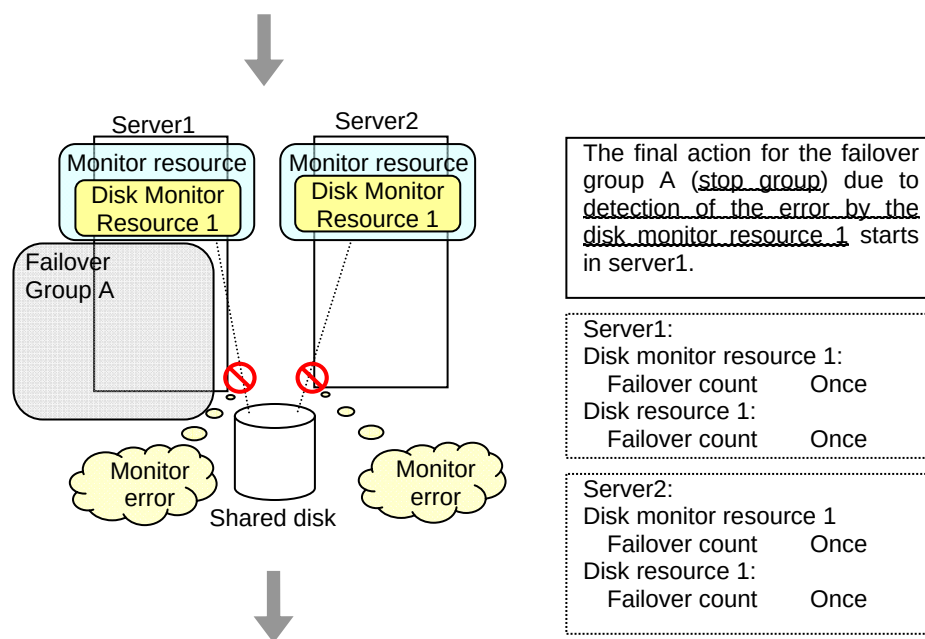
The final action is executed in server1 as is the case in server2 because the number of failovers due to failure of activating the disk resource 1 has exceeded the threshold.

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.

Recovery/pre-recovery action script

Upon the detection of a monitor resource error, a recovery script can be configured to run. Alternatively, before the reactivation, failover, or final action of a recovery target, a pre-recovery action script can be configured to run.

The script is a common file.

Environment variables used in the recovery/pre-recovery action script

ExpressCluster sets status information (the recovery action type) in the environment variables upon the execution of the script.

The script allows you to specify the following environment variables as branch conditions according to the operation of the system.

Environment variable	Value of the environment variable	Description
CLP_MONITORNAME ...Monitor resource name	Monitor resource name	Name of the monitor resource in which an error that causes the recovery/pre-recovery action script to run is detected.
CLP_VERSION_FULL ...ExpressCluster full version number	ExpressCluster full version number	ExpressCluster full version number. (Example) 3.1.0-1
CLP_PATH ...ExpressCluster installation path	ExpressCluster installation path	Path of ExpressCluster installation. (Example) /opt/nec/clusterpro
CLP_OSNAME ...Server OS name	Server OS name	Name of the server OS on which the script is executed. (Example) SunOS
CLP_ACTION ...Recovery action type	RECOVERY	Execution as a recovery script.
	RESTART	Execution before reactivation.
	FAILOVER	Execution before failover.
	FINALACTION	Execution before final action.
CLP_RECOVERYCOUNT ...Recovery script execution count	Recovery Script Execution Count	Count for recovery script execution.
CLP_RESTARTCOUNT ...Reactivation count	Reactivation count	Count for reactivation.
CLP_FAILOVERCOUNT ...Failover count	Failover count	Count for failover.

Writing recovery/pre-recovery action scripts

This section explains the environment variables mentioned above, using a practical scripting example.

Example of a recovery/pre-recovery action script

```
#!/bin/sh
# *****
# *           preaction.sh           *
# *****
```

```
if [ "$CLP_ACTION" = "RECOVERY" ]
then
```

Branched according to the environment variables for the cause of execution of the script.

Processing type:
Recovery
Execution timing for the processing:
Recovery action: Recovery script

```
elif [ "$CLP_ACTION" = "RESTART" ]
then
```

Processing type:
Pre-reactivation processing
Execution timing for the processing:
Recovery action: Reactivation

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

Processing type:
Recovery
Execution timing for the processing:
Recovery action: Failover

```
elif [ "$CLP_ACTION" = "FINALACTION" ]
then
```

Processing type:
Recovery
Execution timing for the processing:
Recovery action: Final action

```
fi
exit 0
```

Tips for recovery/pre-recovery action script coding

Pay careful attention to the following points when coding the script.

- ◆ When the script contains a command that requires a long time to run, log the end of execution of that command. The logged information can be used to identify the nature of the error if a problem occurs. `clplogcmd` is used to log the information.
- ◆ How to use `clplogcmd` in the script
With `clplogcmd`, messages can be output to WebManager alert view or OS syslog. For `clplogcmd`, see “Outputting messages (`clplogcmd` command)” in Chapter 3, “ExpressCluster command reference” in this guide.

(Ex. : Scripting image)

```
clplogcmd -m "recoverystart.."
recoverystart
clplogcmd -m "OK"
```

Note on the recovery/pre-recovery action script

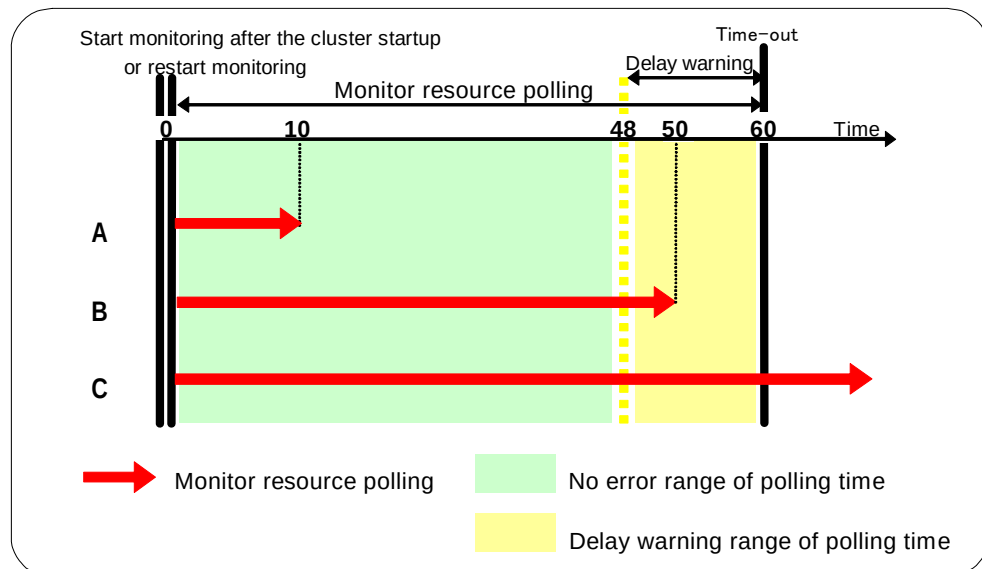
- ◆ Stack size for commands and applications activated from the script
The recovery/pre-recovery action script runs with the stack size configured to 2 MB. If the script has a command or application that requires a stack size of 2 MB or more to run, a stack overflow occurs.
If a stack overflow error occurs, adjust the stack size before the command or application is 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

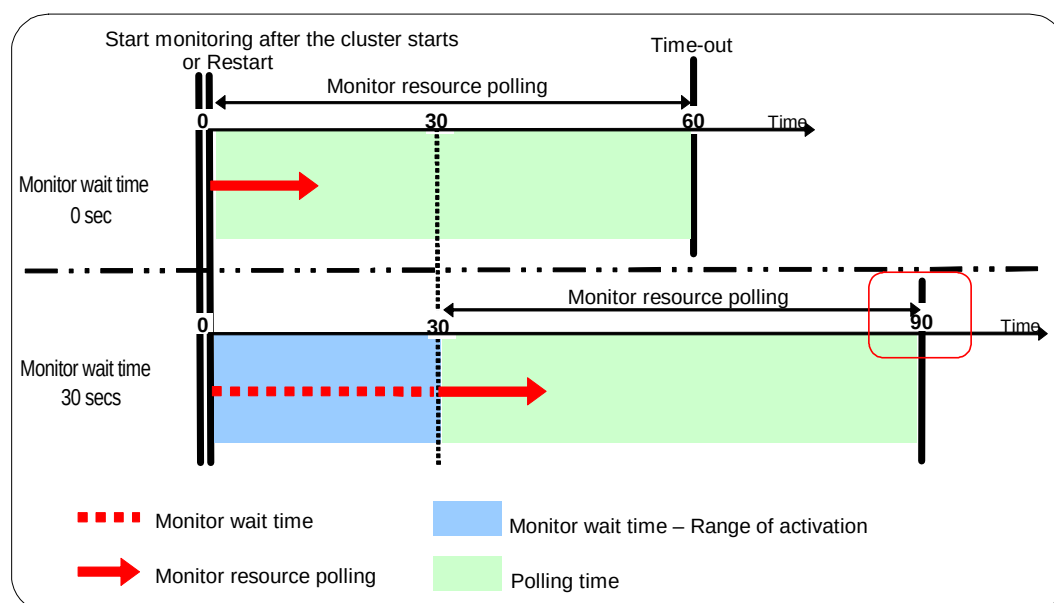
“Wait Time to Start Monitoring” refers to start monitoring after the time period specified as the waiting time elapses.

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:

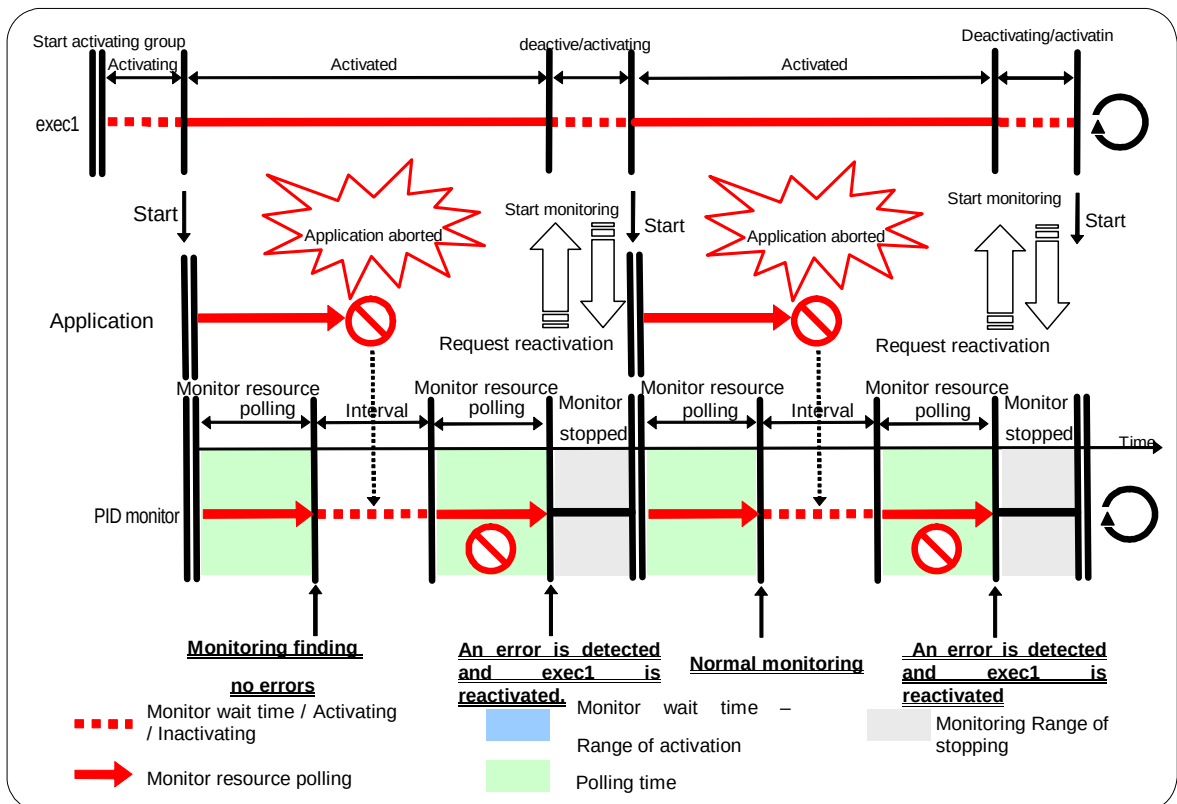
Configuration of PID Monitor resource

<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

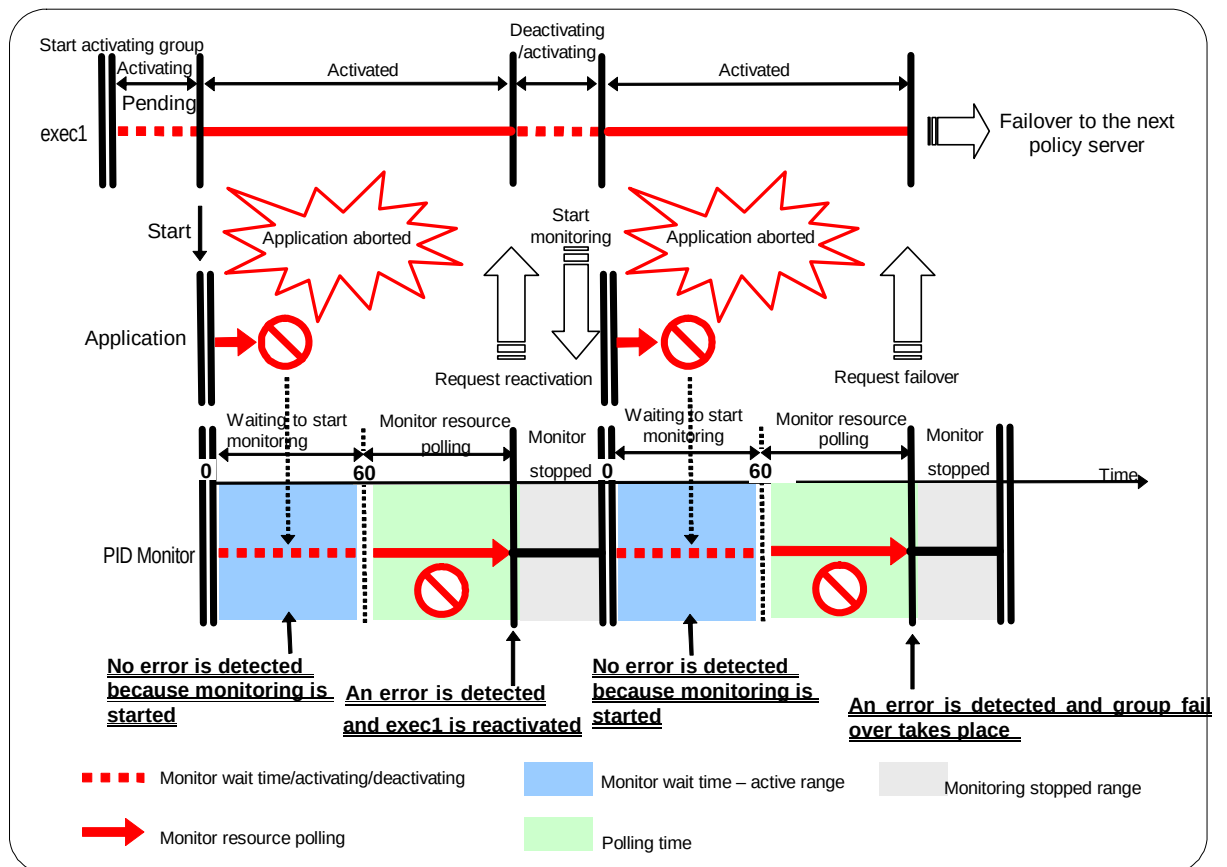


The reason why recovery action is endlessly repeated is because the initial monitor resource polling has terminated successfully. The current count of recoveries the monitor resource has executed is reset when the status of the monitor resource becomes normal (finds no error in the monitor target). Because 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>**

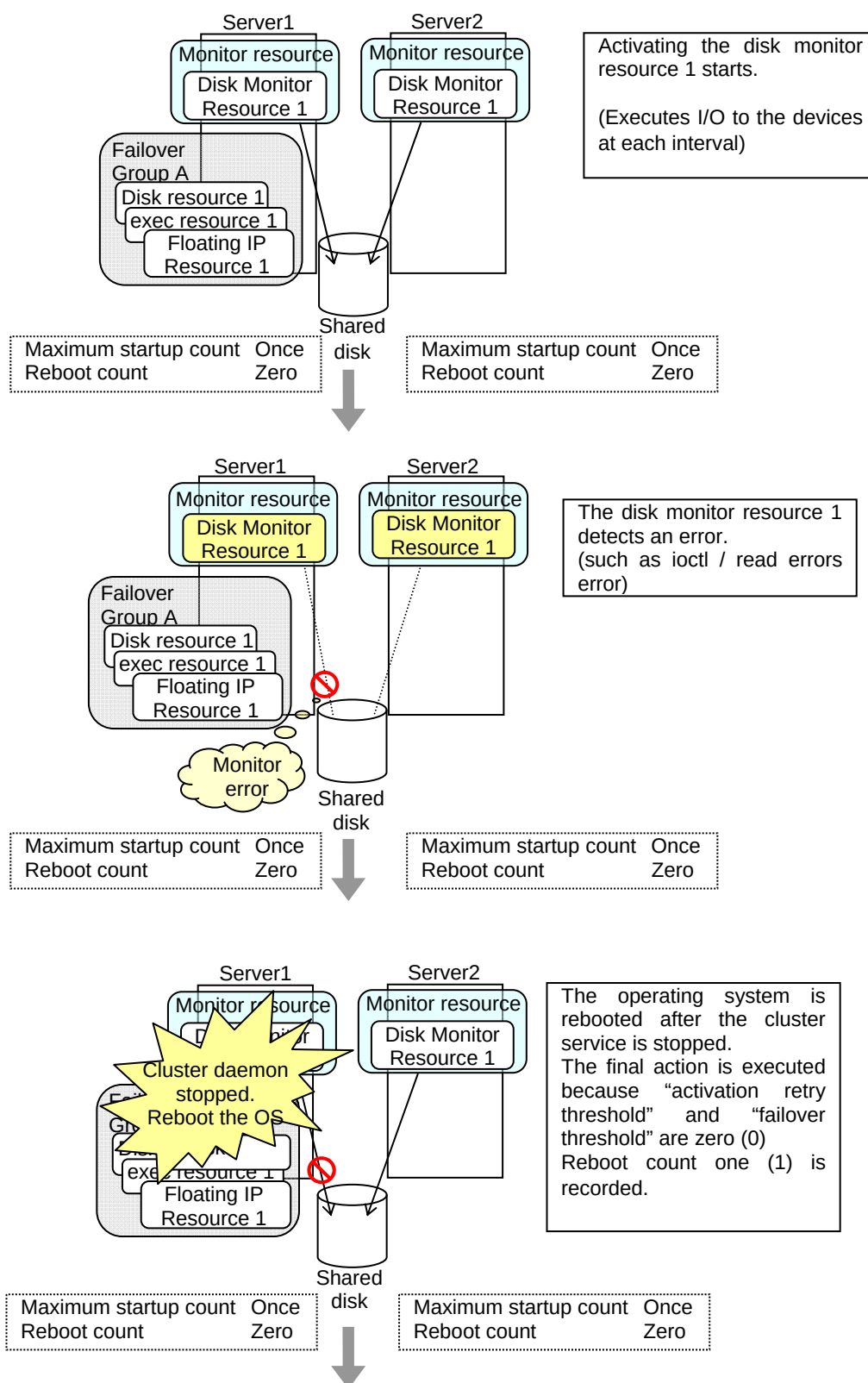
Interval	60 sec
Timeout	120 sec
Retry Count	3 times

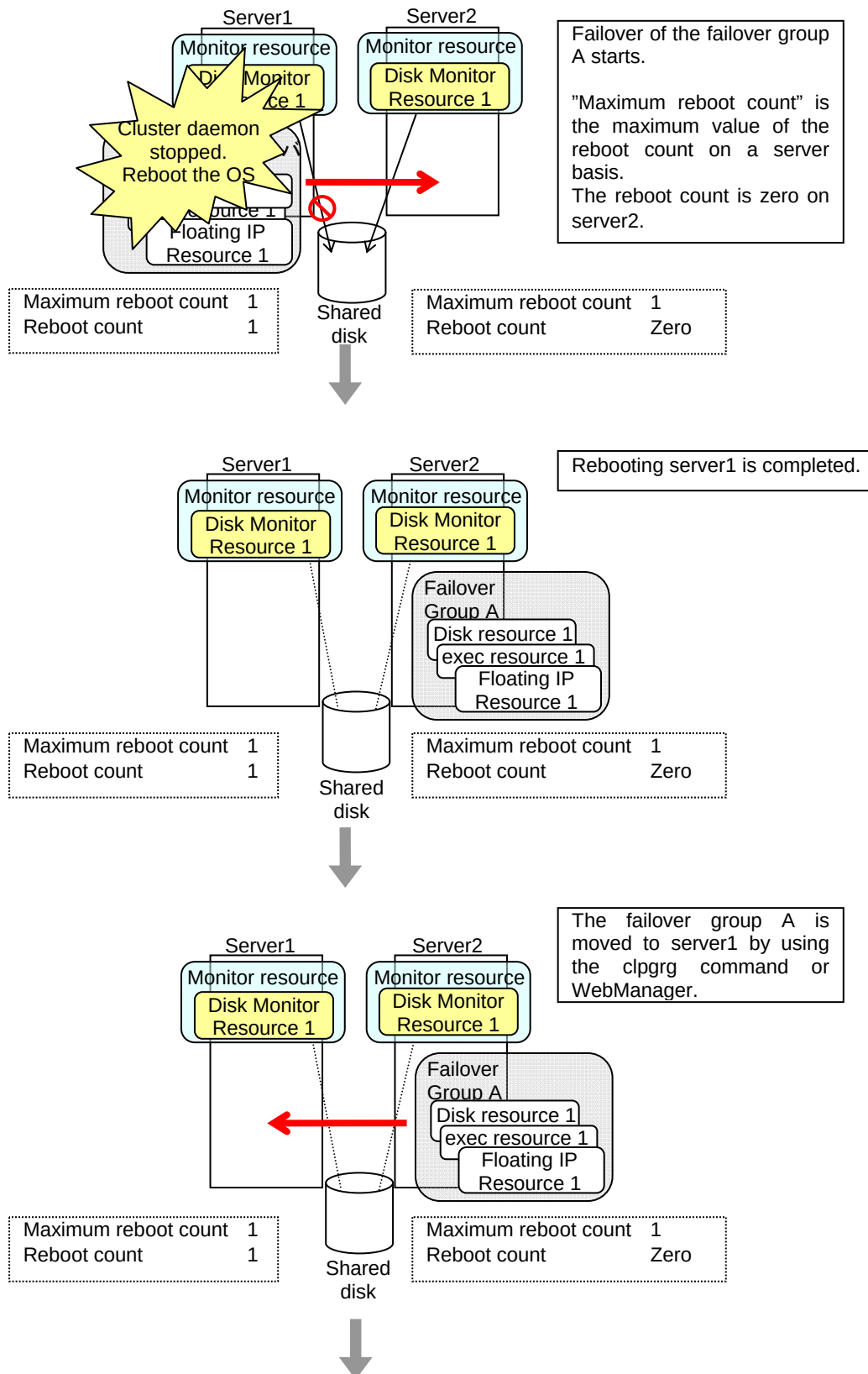
<Error detection>

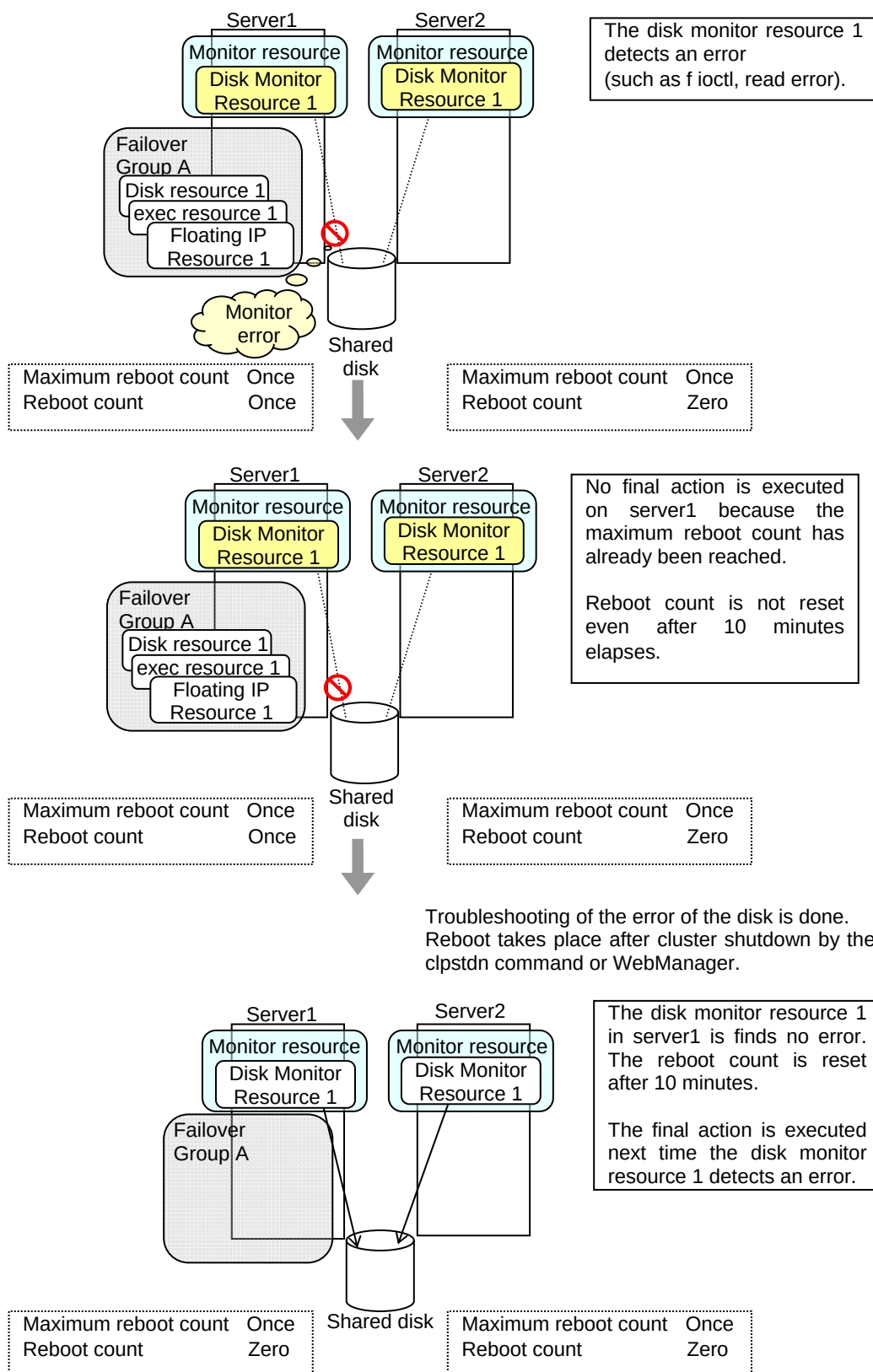
Recovery Target	Failover Group A
Reactivation Threshold	0 time
Failover Threshold	0 time
Final Action	Stop cluster service and reboot OS

<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)

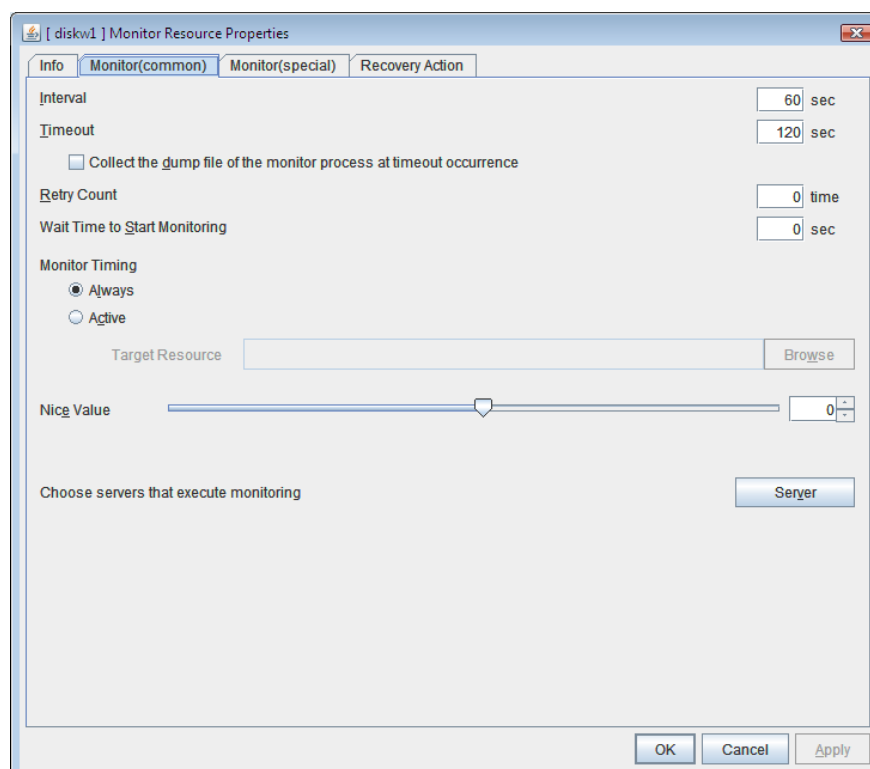
1. In the tree view shown on the left pane of the Builder, right-click the **Monitors** icon. In the table view shown on the right side of the screen, right-click the icon of the monitor resource whose comment you want to change, and then click **Properties. Group** Properties dialog box is displayed.
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.

Notes:

The time to wait until starting to monitor the following resources is either the monitor timeout time or the start monitoring wait time (whichever is longer).

- Dynamic DNS monitor resource
 - Message receive monitor resource
 - Custom monitor resource (whose monitor type is **Asynchronous**)
 - Virtual IP monitor resource
 - MySQL Monitor Resource
 - Oracle Monitor Resource
 - PostgreSQL Monitor Resource
 - Process Name Monitor Resource
-

Monitor Timing

Set the monitoring timing. Select the timing from:

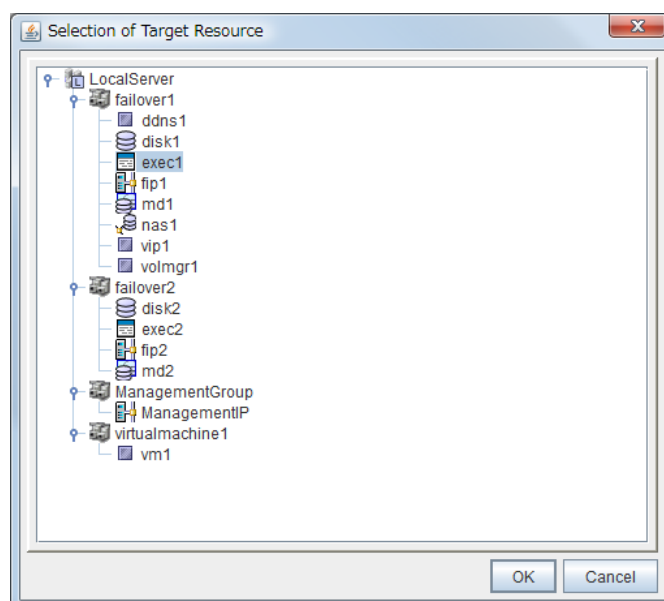
- ◆ Always:
Monitoring is performed all the time.
- ◆ Active:
Monitoring is not started until the specified resource is activated.

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**.

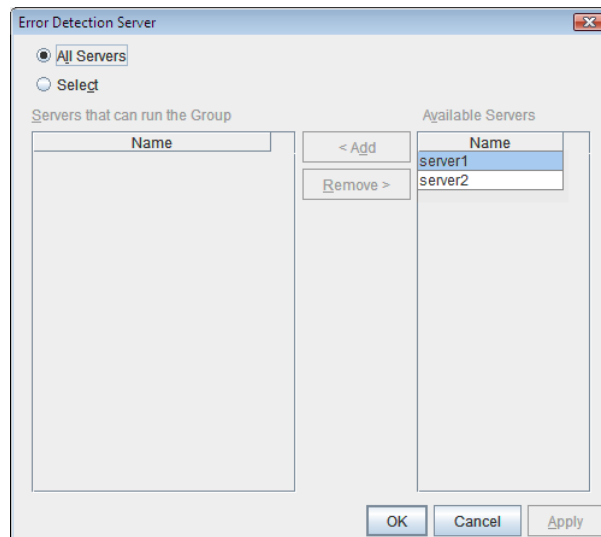


Nice Value

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

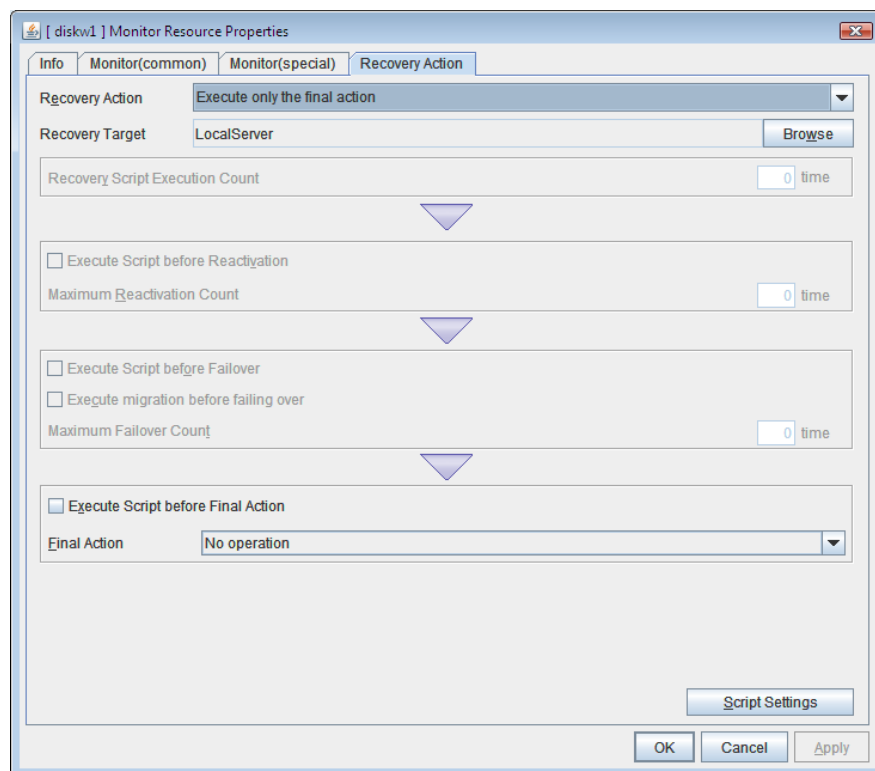
Servers registered in **Available Servers** monitor the resources. One or more servers need to be set to **Available Servers**.

- ◆ **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

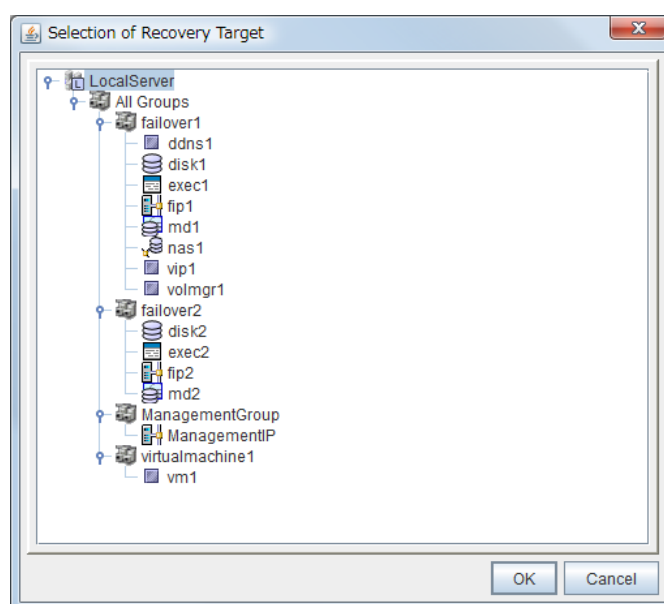
Reactivate the selected group or group resource as the recovery target until the maximum reactivation count. When reactivation fails or the same error is detected after reactivation, and the count reaches to the maximum count, execute the selected action as the final action.

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**.

**Recovery Script Execution Count** 0 to 99

Specify the number of times to allow execution of the script configured by **Script Settings** when an error is detected. If this is set to zero (0), the script does not run.

Execute Script before Reactivation

- ◆ When selected:
A script/command is executed before reactivation. To configure the script/command setting, click **Settings**.
- ◆ When cleared:
Any script/command is not executed.

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.

When the group to which dynamic failover or a resource which belongs to that group is set as a recovery target of an IP monitor resource or NIC Link Up/Down monitor resource, reactivating the recovery target fails because a monitor resource registered in the exception list detects an error.

Execute Script before Failover

- ◆ When selected:
A script/command is executed before failover. To configure the script/command setting, click **Settings**.
- ◆ When cleared:
Any script/command is not executed.

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.

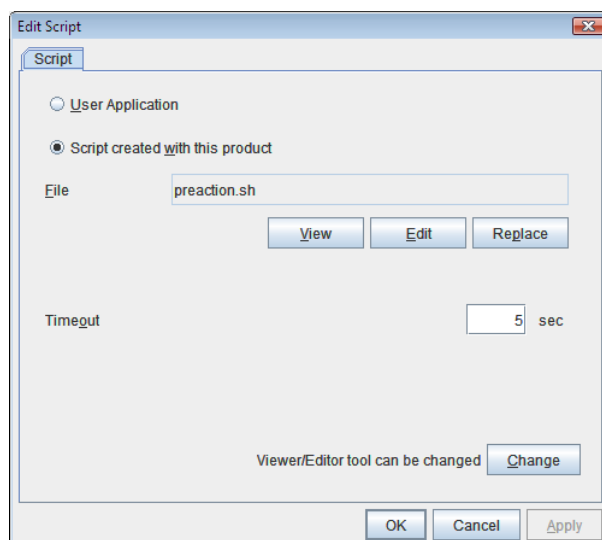
Execute Script before Final Action

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.

Script Settings

Click here to display the **Edit Script** dialog box. Configure the recovery or pre-recovery action script or commands.



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

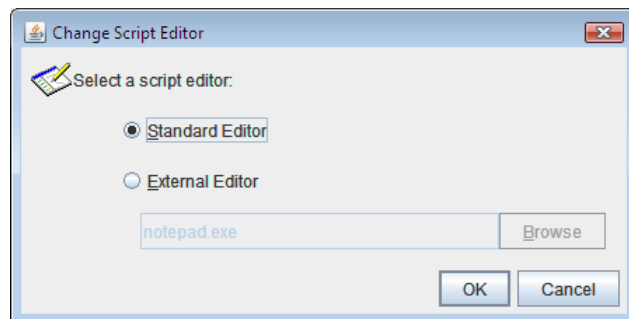
Click here to replace the contents of a script file with the contents of the script file which you selected in the file selection dialog box when you select **Script created with this product**. You cannot replace the script file if it is currently displayed or edited. Select a script file only. Do not select binary files (applications), and so on.

Timeout (1 to 9999)

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 LocalServer 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

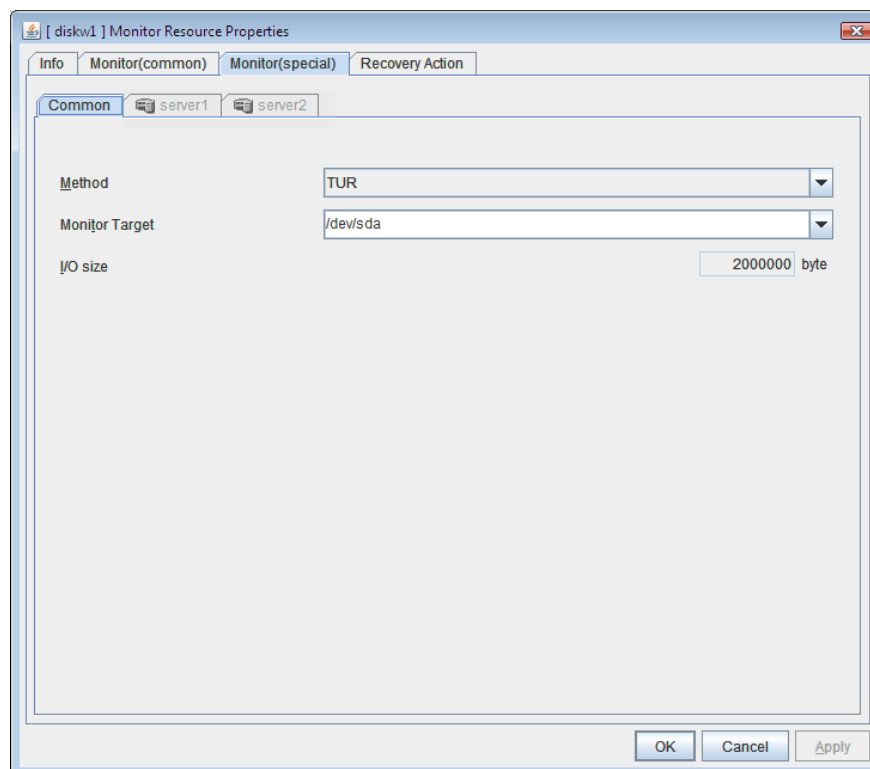
Some setting values of monitor resources can be set for individual servers. For the resources which can be configured on a server basis, the tabs of servers are displayed on the **Monitor(special)** tab.

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

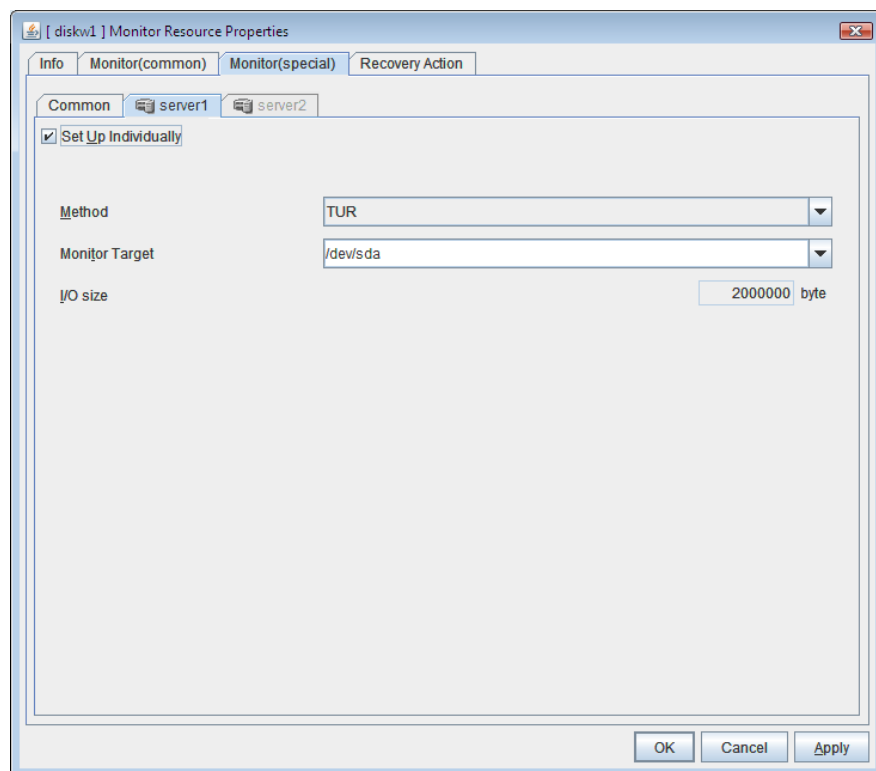
For the parameters that can be configured for individual servers, see the descriptions of parameters on monitor resources. On those parameters, the **Server Individual Setup** icon is displayed.

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 5 “Monitor resource details” on page 445 and later.

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) on page 495.”

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 510 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:

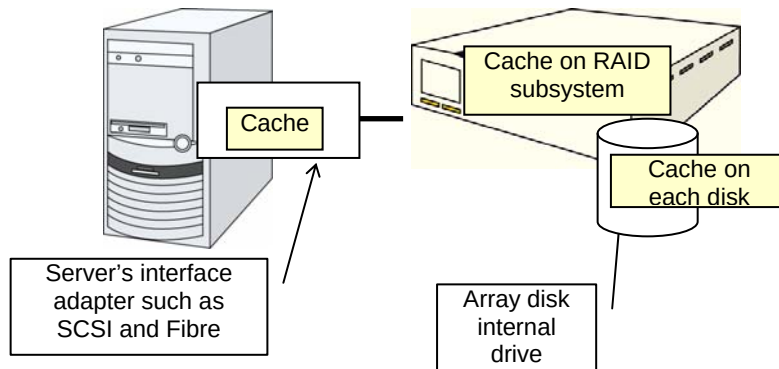
- ◆ WRITE (FILE)
 - The file of the specified path is created, written, and deleted to be judged.
 - Validity of the written data is not judged.

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.

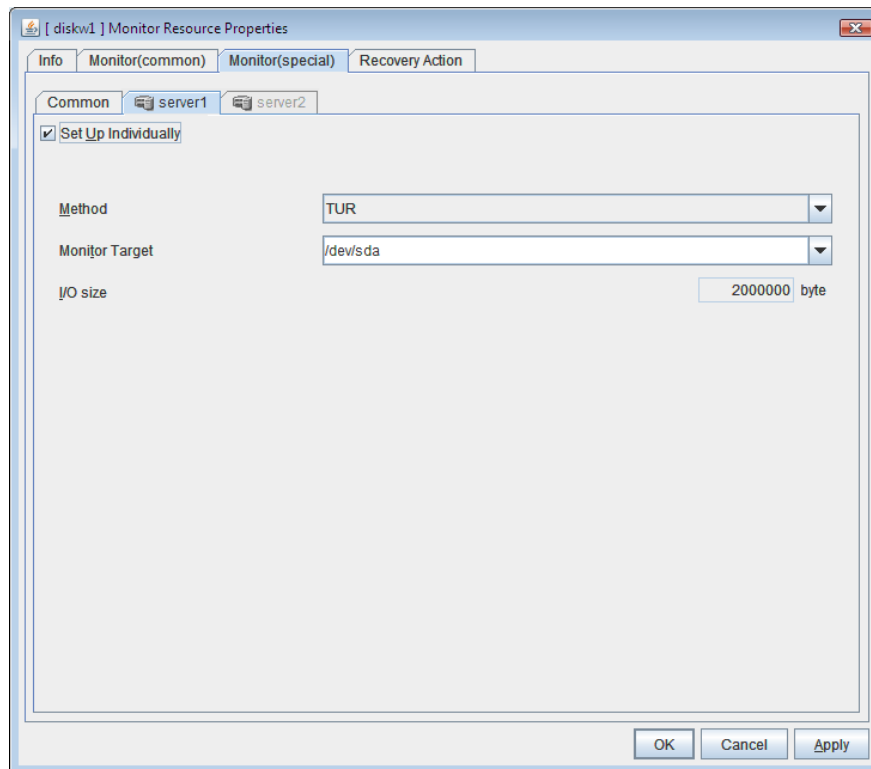
When you specify a READ I/O size, verify that READ can detect I/O errors on the disk with that size by intentionally creating I/O errors.



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

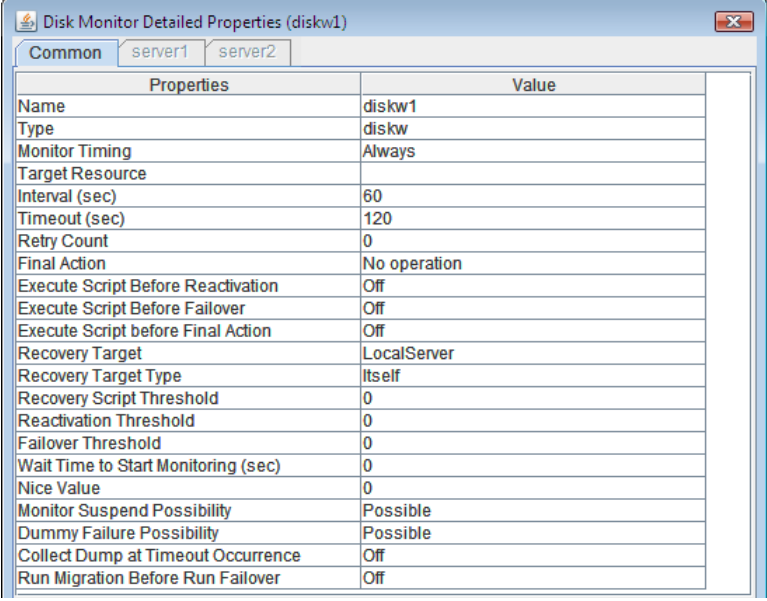
Details

Commonserver1server2

Properties	Value
Comment	
Method	TUR
Monitor Target	/dev/sda
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

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



Properties	Value
Name	diskw1
Type	diskw
Monitor Timing	Always
Target Resource	
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	LocalServer
Recovery Target Type	Itself
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off

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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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

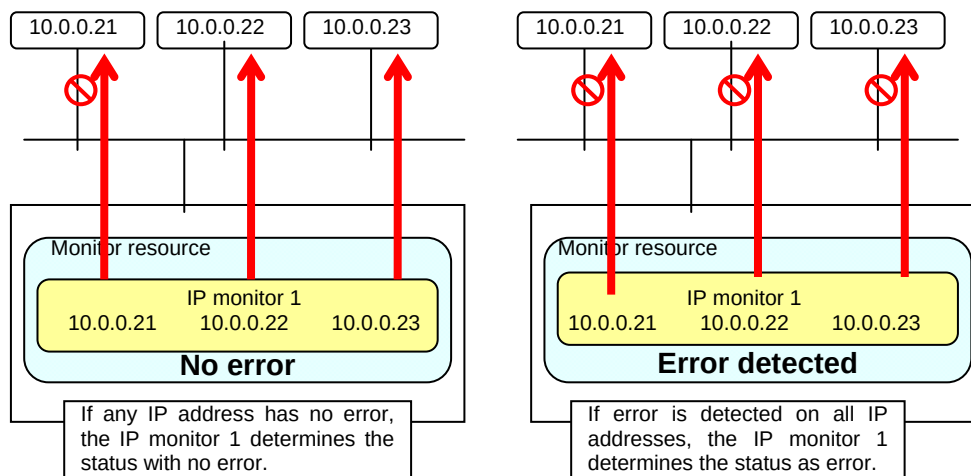
Understanding IP monitor resources

IP monitor resource monitors IP addresses using the ping command.

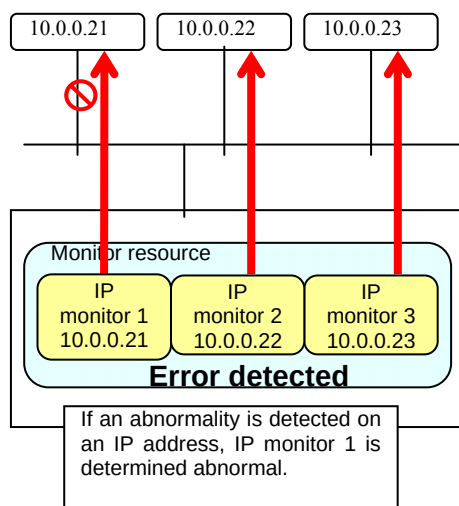
Monitoring by IP monitor resources

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.



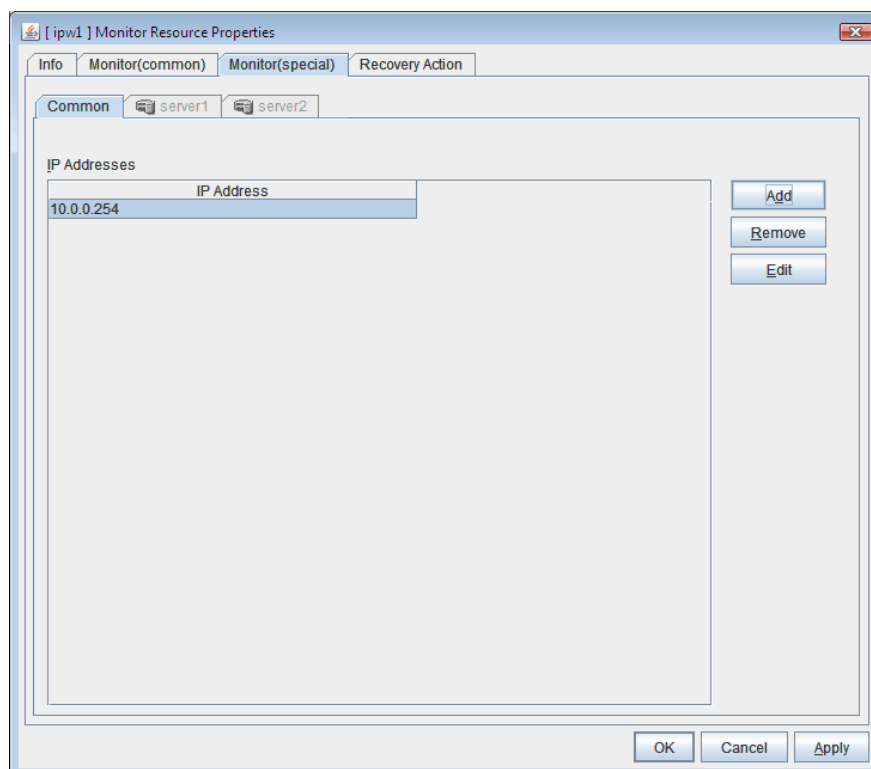
- ◆ If you want to establish error when any one of IP addresses has an error, create one IP monitor resource for each IP address.



Displaying and changing IP monitor resource details

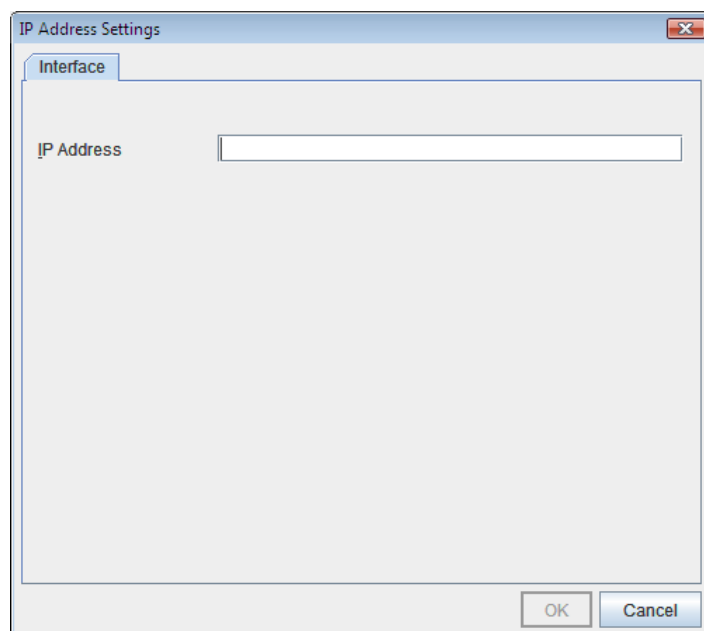
1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the name of the target IP monitor resource, and click the **Monitor(special)** tab in the **Monitor 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

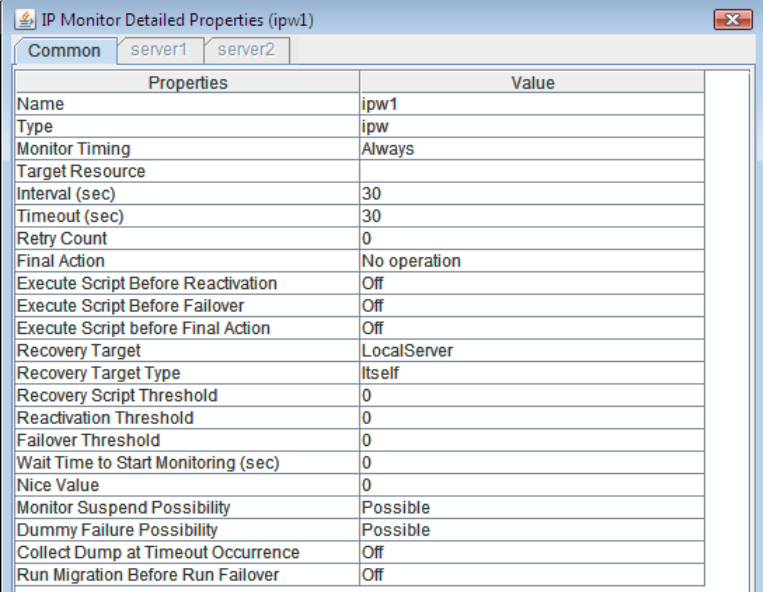
 server1

 server2

Properties	Value
Comment	
IP Addresses	10.0.0.254
Status	Normal
Resource Status on Each Server	
Server Name	Status
clg39	Normal
clg40	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

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



Properties	Value
Name	ipw1
Type	ipw
Monitor Timing	Always
Target Resource	
Interval (sec)	30
Timeout (sec)	30
Retry Count	0
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	LocalServer
Recovery Target Type	Itself
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off

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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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

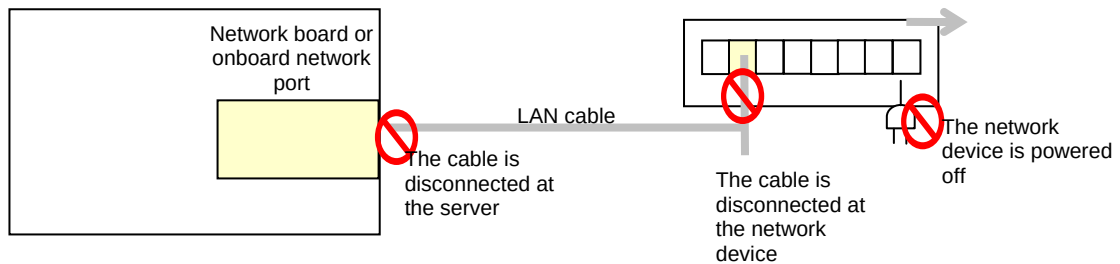
NIC Link UP/Down monitor resource has been tested to work in the following network interfaces.

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 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

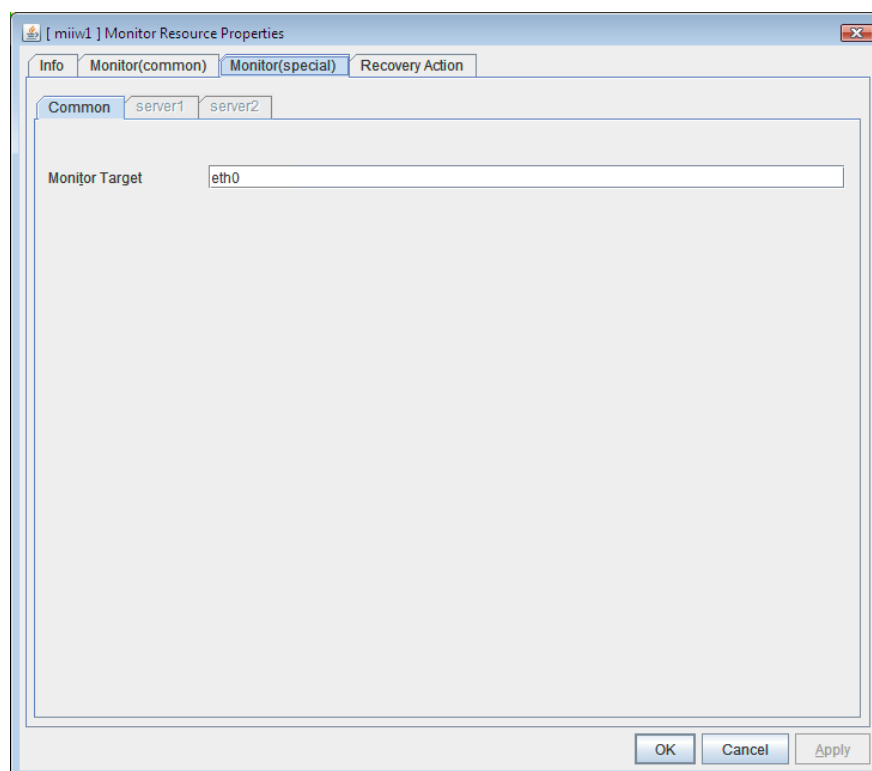


- ◆ The `ioctl()` to the NIC driver is used to find how the server is linked to the network. (For the IP monitoring, the status is judged by the ping response from the specified IP address.)
- ◆ You can monitor an NIC dedicated to interconnect. If you do this in the environment where two nodes are directly 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

Common

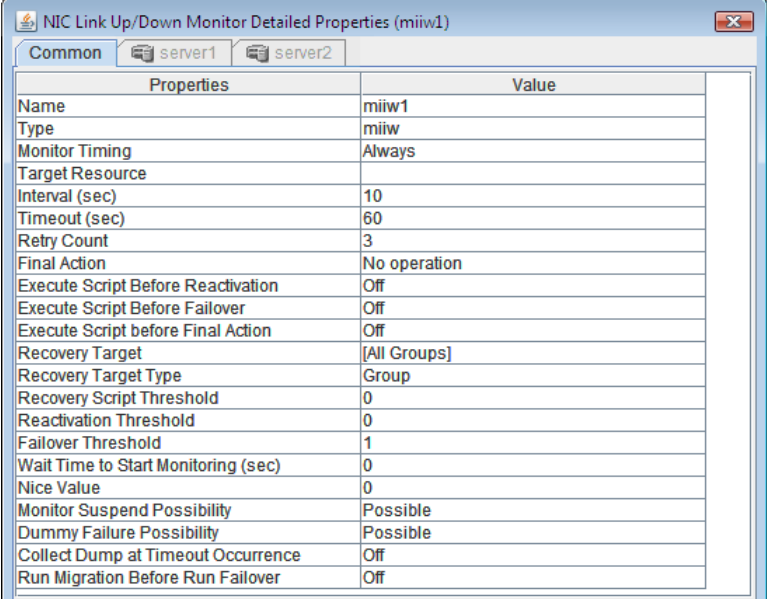
server1

server2

Properties	Value
Comment	
Monitor Target	eth0
Status	Normal
Resource Status on Each Server	
Server Name	Status
clg39	Normal
clg40	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

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



Properties	Value
Name	miiw1
Type	miiw
Monitor Timing	Always
Target Resource	
Interval (sec)	10
Timeout (sec)	60
Retry Count	3
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	[All Groups]
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off

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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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 495.

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

Common

server1

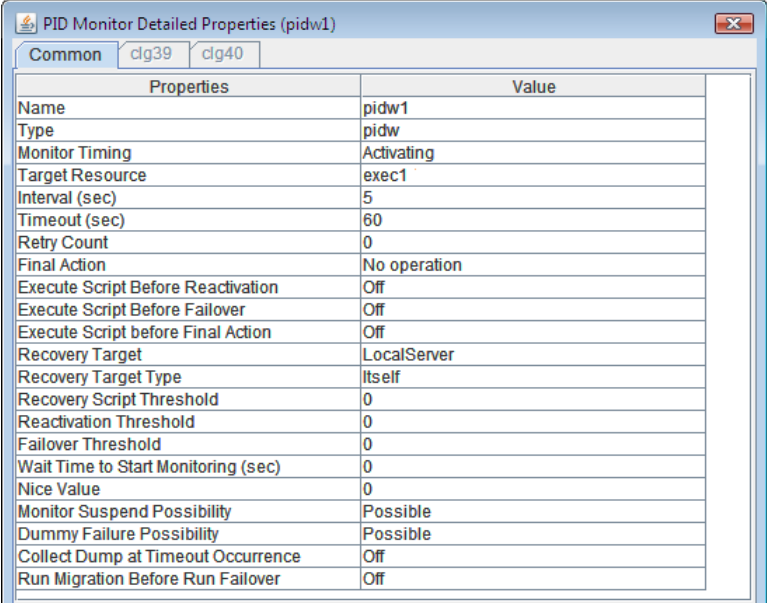
server2

Properties	Value
Comment	
Target PID	14602
Status	Normal
Resource Status on Each Server	
Server Name	Status
server1	Normal
server2	Offline

Comment:	Comment of the PID monitor resource
Target PID:	PID of the process monitored by the PID monitor resource
Status:	PID monitor resource status

Server Name:	Server name
Status:	Status of the monitor resource on the server

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



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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	LocalServer
Recovery Target Type	Itself
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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 “Software Supported OS versions” in Chapter 3, “Installation requirements for ExpressCluster” in 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

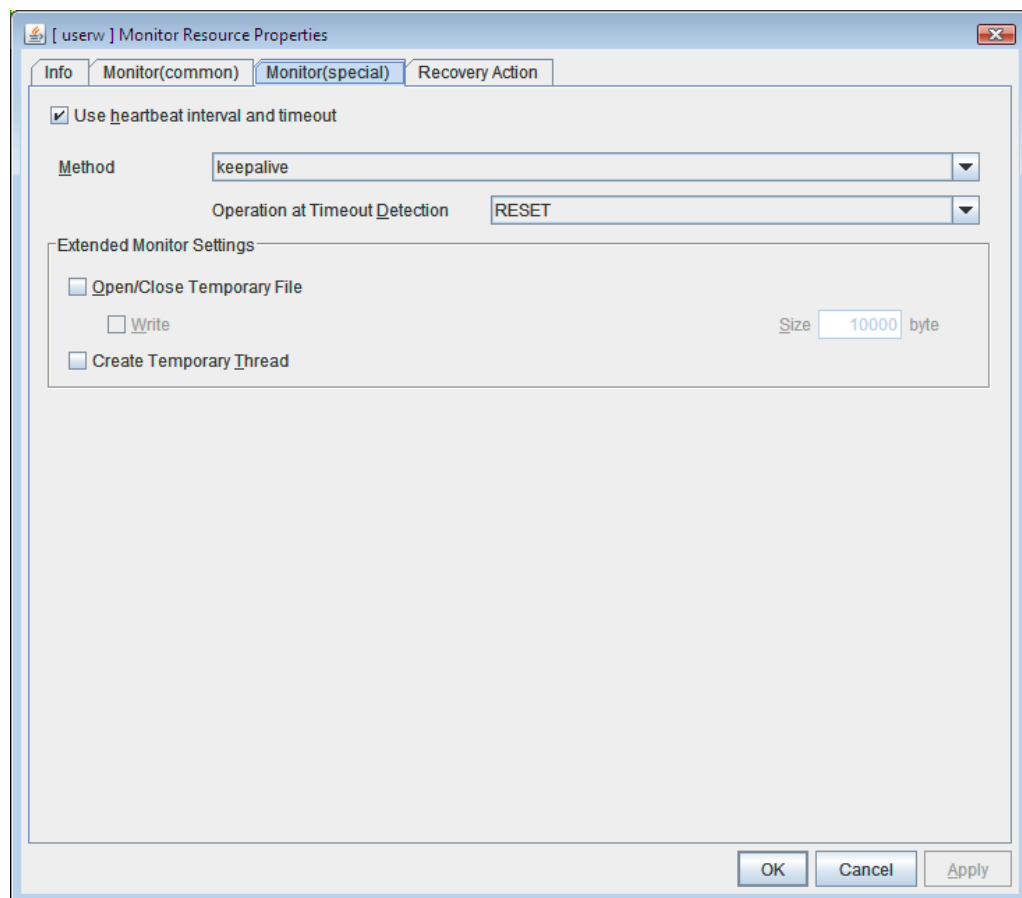
Common notes on all the monitoring methods:

- ◆ 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

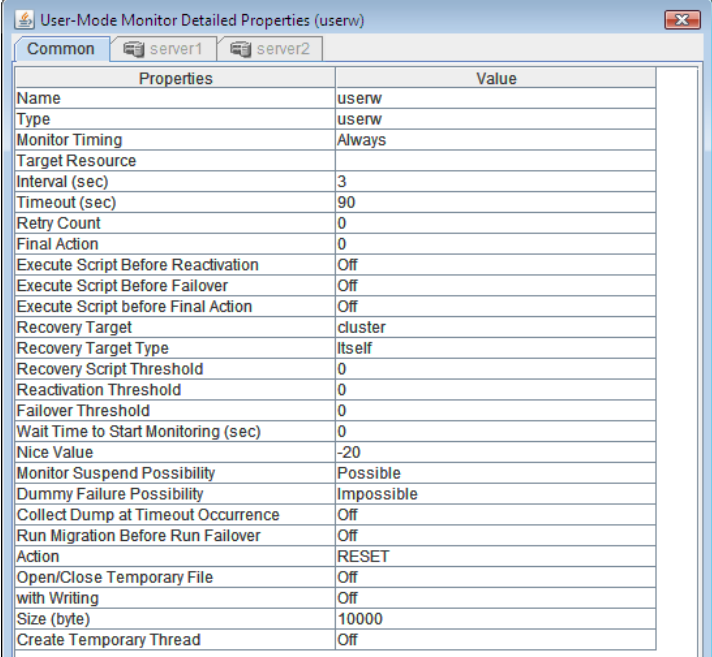
server1

server2

Properties	Value
Comment	
Method	keepalive
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

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



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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	-20
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Impossible
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):	Timeout for monitor resource error decision (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 Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	Whether the pre-reactivation script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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:

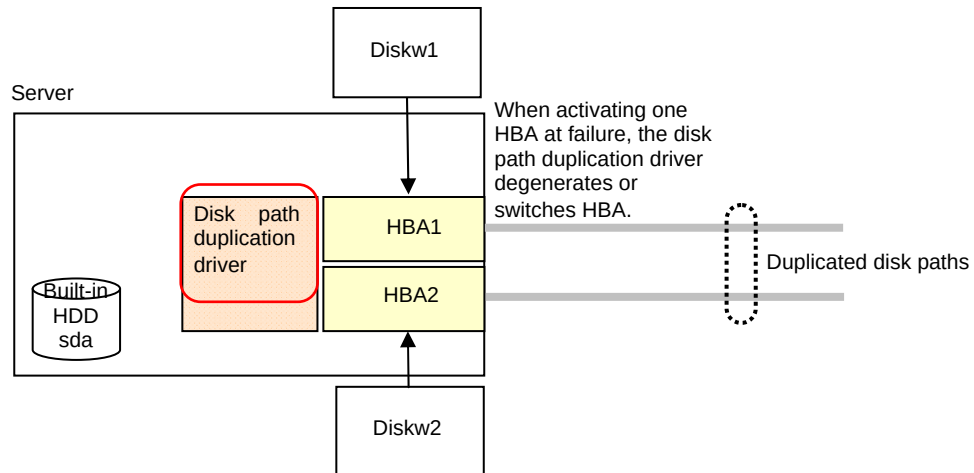
The number of registered monitor resources	2
Error Threshold	2
Warning Threshold	1

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.

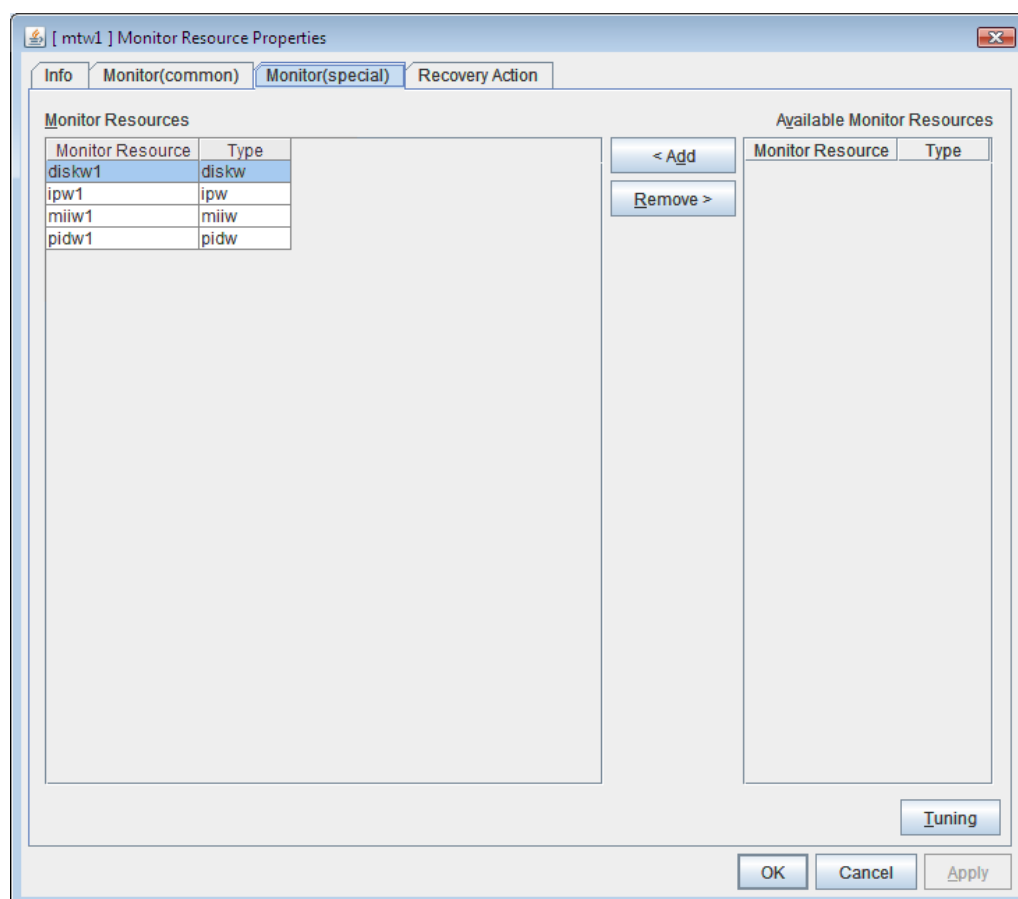
Displaying and changing the details of the multi target monitor resource

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**.

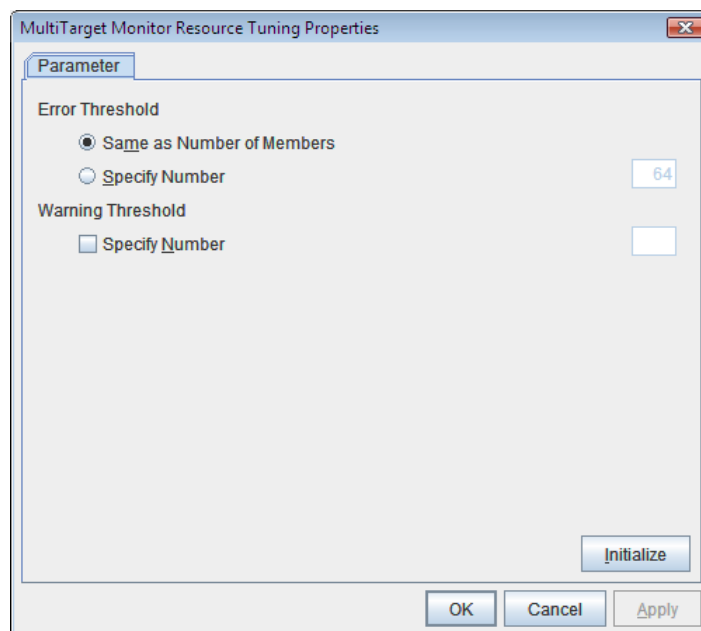
Remove

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

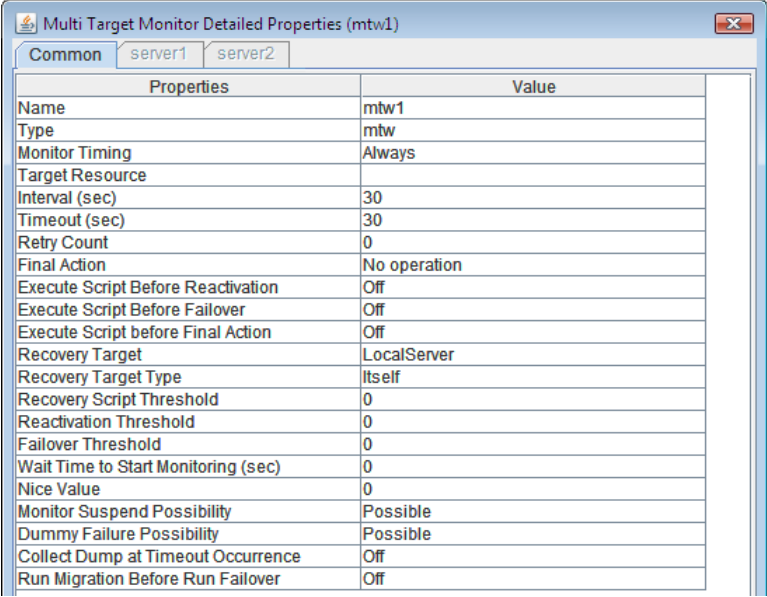
1. Start the WebManager
2. When you click an object for a multi target monitor resource  in the tree view, the following information is displayed in the list view.

Multi Target Monitor Name: mtw1		Details
Common	server1	server2
Properties		Value
Comment		
Monitor Resources		ipw1 miw1
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

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



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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	LocalServer
Recovery Target Type	Itself
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	0
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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

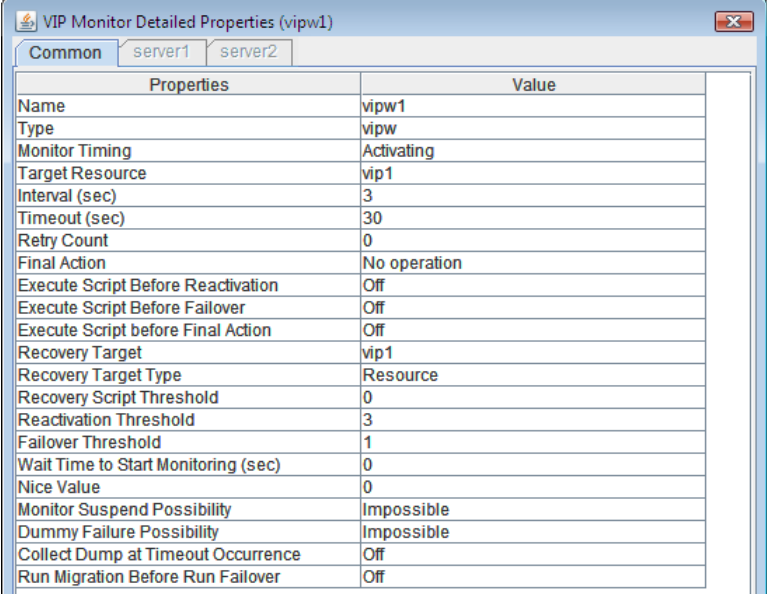
The name of a Virtual IP resource to be monitored

Status of virtual IP monitor resource

Server name

Status of monitor resource of the server

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



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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	vip1
Recovery Target Type	Resource
Recovery Script Threshold	0
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Impossible
Dummy Failure 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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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.

Notes on custom resources

When the monitor type is **Asynchronous**, and the monitoring retry count is set to 1 or more, monitoring cannot be performed correctly. When you set the monitor type to **Asynchronous**, also specify 0 as the monitoring retry count.

When the monitor type is **Asynchronous**, the monitoring timeout setting is used for the wait time to start monitoring. Change the monitoring timeout setting to adjust the time that the system waits prior to starting monitoring.

ExpressCluster X3.0.4-1 and earlier versions allowed the monitor resource monitoring setting **Collect the dump file of the monitor process at timeout occurrence** to be configured, but this function did not provide sufficient useful information for custom monitor resources. Therefore, this function has been dropped from ExpressCluster X3.1 and later versions from those configurable for custom monitor resources.

To use an alternative logging function, specify **Log Output Path** for custom monitor resources to output logs.

When Script Log Rotate is enabled, the logs are written to the specified file after the script finishes. Therefore, the logs are not written because the script does not finish when the monitor type is asynchronous. Disabling Script Log Rotate when the monitor type is asynchronous is recommended. In addition, when Script Log Rotate is enabled and the script name is [start.sh], [stop.sh], or [genw.sh], the specified script must be a shell script.

Monitoring by custom monitor resources

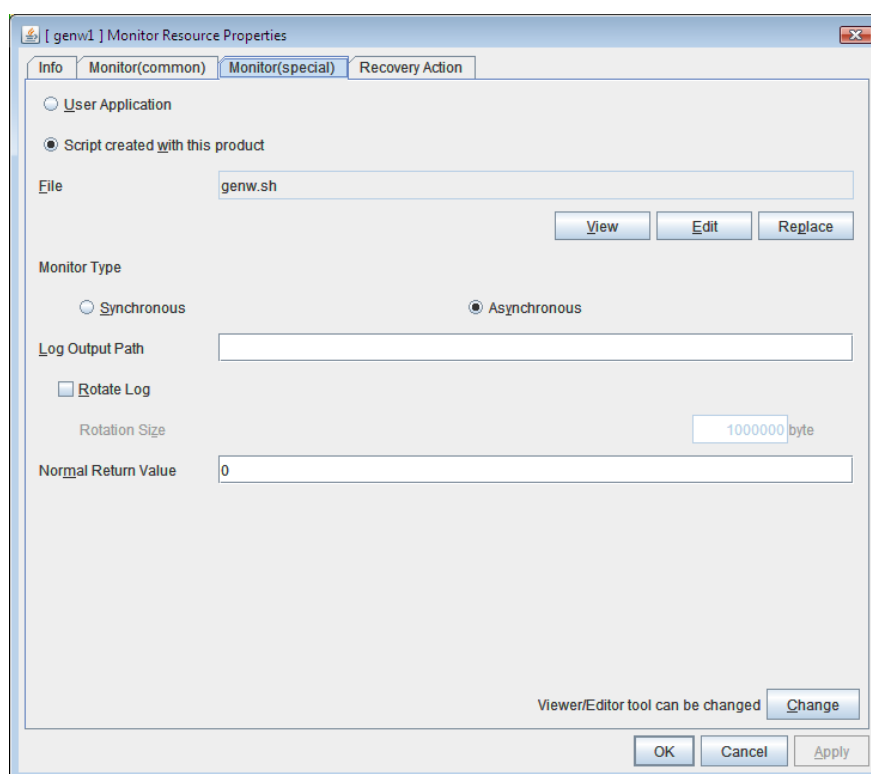
Custom monitor resources monitor system by an arbitrary script.

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

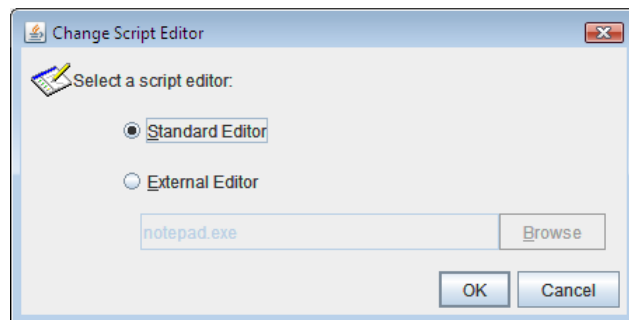
Click here to edit the script file with the editor when you select **Script created with this product**. Overwrite the script file to apply the change. You cannot edit the script file if it is currently displayed or edited. You cannot modify the name of the script file.

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.

Pay careful attention to the free space in the file system because the log is unlimitedly output when the file name is specified and the **Rotate Log** check box is unchecked.

When the **Rotate Log** check box is checked, output log files are rotated.

Rotate Log

Turn this off to output execution logs of scripts and executable files with no limit on the file size. Turn it on to rotate and output the logs. In addition, note the following.

Enter the log path in 1009 bytes or less in Log Output Path. If the path exceeds 1009 bytes, the logs are not output.

The log file name must be 31 bytes or less. If the name exceeded 31 bytes, it is cut after the 31st byte.

If some custom monitor resources are configured to rotate logs, and the log file names are the same but the log paths are different, the Log Rotate Size may be incorrect.
(ex. /home/foo01/log/genw.log, /home/foo02/log/genw.log)

Rotation Size (1 to 9999999)

Specify a file size for rotating files when the **Rotate Log** check box is checked.

The log files that are rotated and output are configured as described below.

File name	Description
Log Output Path specified_file_name	Latest log file.
Log Output Path specified_file_name.pre	Former log file that has been rotated.

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:

Comment of the custom monitor resource

Monitor Path:

Path to the monitor script

Status:

Custom monitor resource status

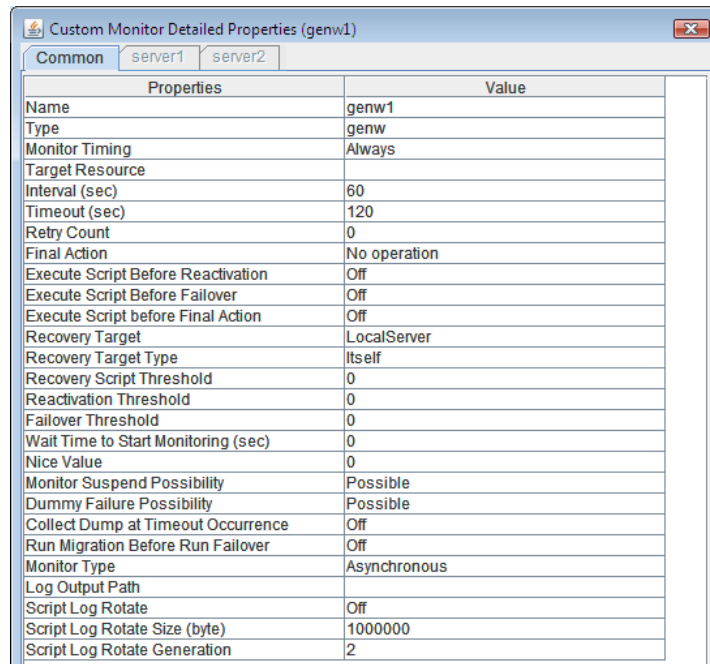
Server Name:

Server name

Status:

Status of the monitor resource on the given server

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



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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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:	Script execution log type for log output destination
External File Output Path:	External file output destination when a script is executed

Script Log Rotate	Whether Script Log Rotate is executed
Script Log Rotate Size (byte)	Script Log Rotate size (byte)
Script Log Rotate Generation	Script Log Rotate generation number

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.

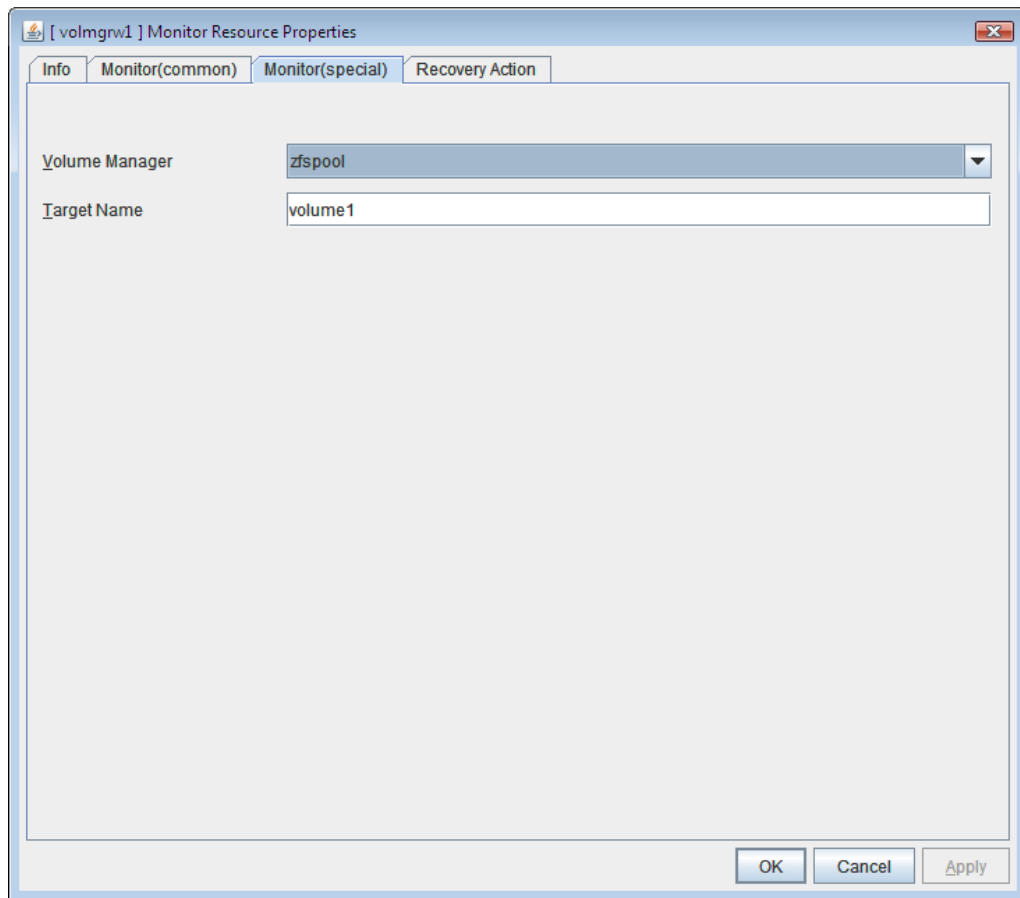
- ◆ zfspool (ZFS storage pool)

Note on volume manager monitor resources

- ◆ Volume monitor resource is created automatically when a volume manager resource is created. One volume monitor resource is created per volume manager resource automatically.
Volume monitor resources are initially defaulted, so configure appropriate resource settings as needed.

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 **Monitro(special)** tab in the **Monitor Resource Property** window.
3. On the **Monitro(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

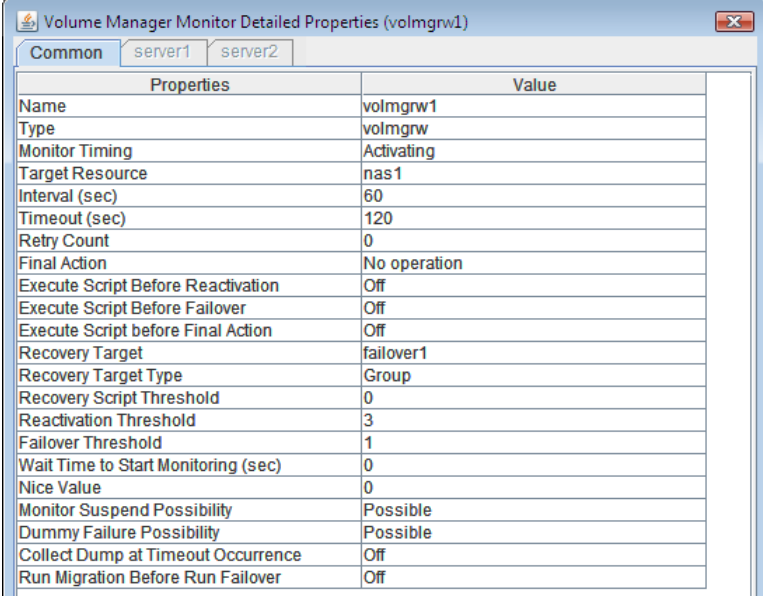
server1

server2

Properties	Value
Comment	
Volume Manager	zfspool
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

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



Properties	Value
Name	volmgrw1
Type	volmgrw
Monitor Timing	Activating
Target Resource	nas1
Interval (sec)	60
Timeout (sec)	120
Retry Count	0
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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 for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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

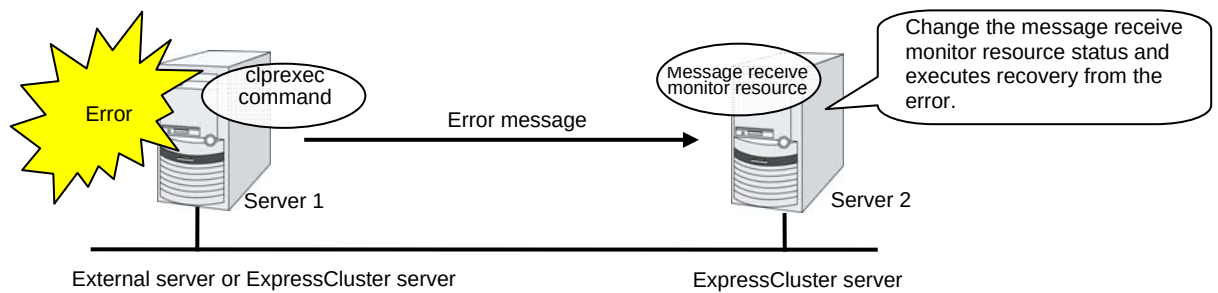
Understanding message receive monitor resources

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.

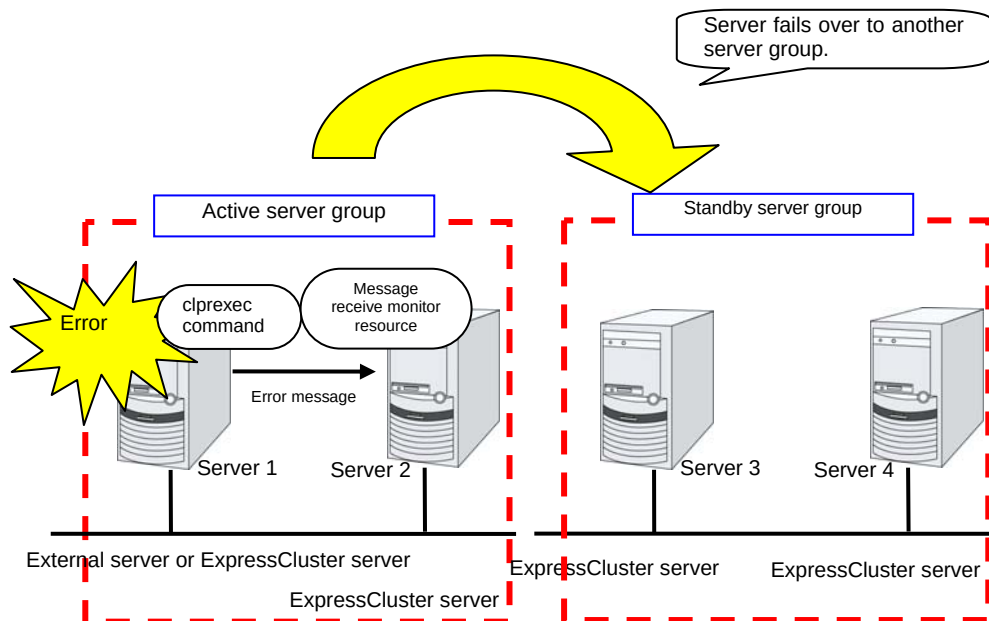
Monitoring by message receive monitor resources

- ◆ 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.



Failover to a server group at another site

- ◆ Upon the reception of notification of the occurrence of an error, failover from the active server group to another server group is allowed.
- The following server group and other settings must be specified.
 - Group resource for recovery
 - [Use Server Group Settings] is checked
 - Message receive monitor
 - [Execute failover to the recovery target] is specified for the recovery target
 - [Execute Failover outside the Server Group] is checked
- ◆ Upon the execution of server group failover to another site, the dynamic failover settings and inter-server group failover settings are disabled. The server fails over to the server having the highest priority in a server group other than that to which it belongs.

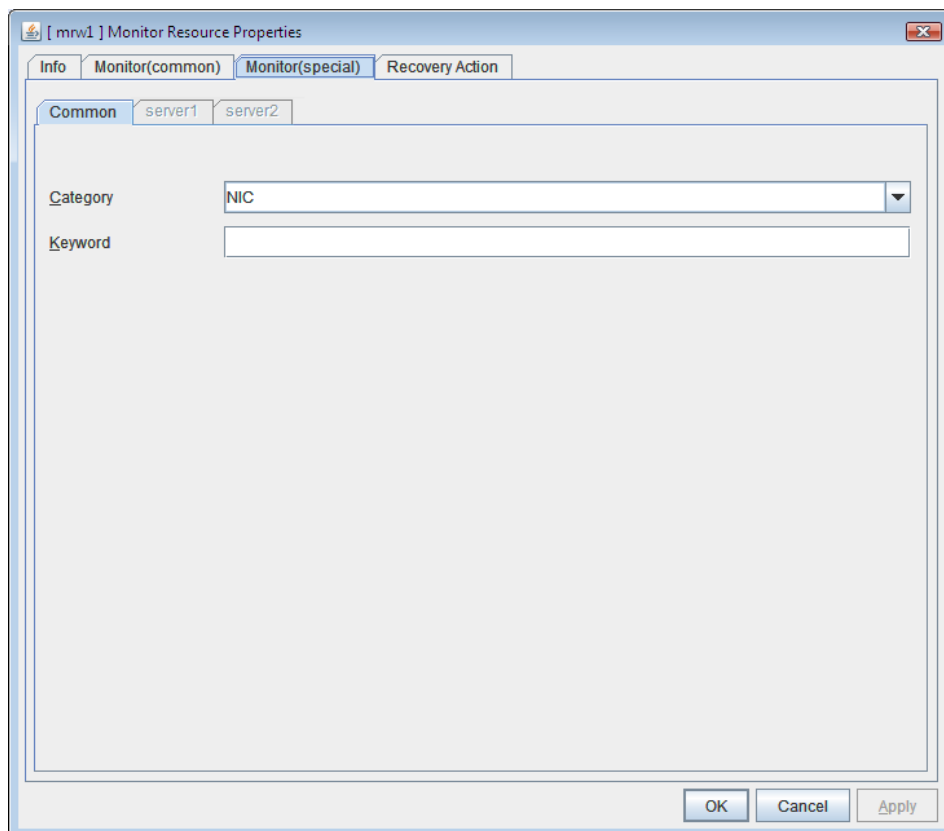


Notes on message receive monitor resources

- ◆ 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 “Requesting processing to cluster servers (clprexec command)” in Chapter 3, “ExpressCluster command reference” in this guide.
- ◆ 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.
- ◆ When the recovery action is **Executing failover to outside the Server Group**, and if **Execute Another Server Group Failover** is checked for the recovery target, the server always fails over to a server in a server group other than the active server group. If, however, the above-mentioned settings are configured but the server group is not set as the recovery target group, the failover destination is determined according to the ordinary failover policy.

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.

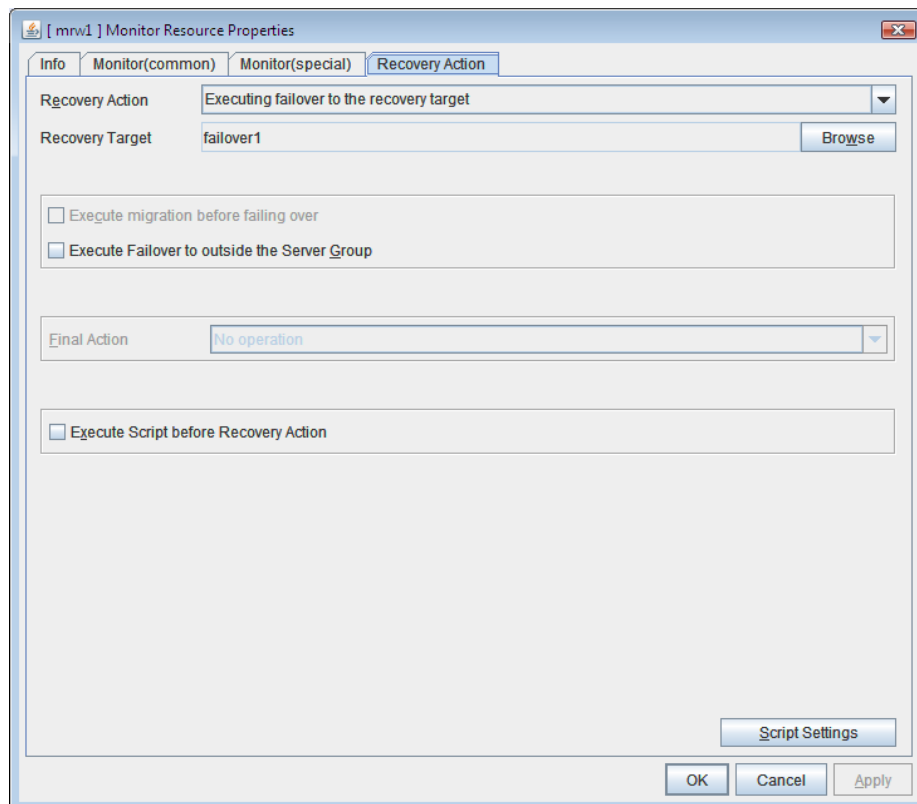
Keyword (within 1,023 bytes)

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.

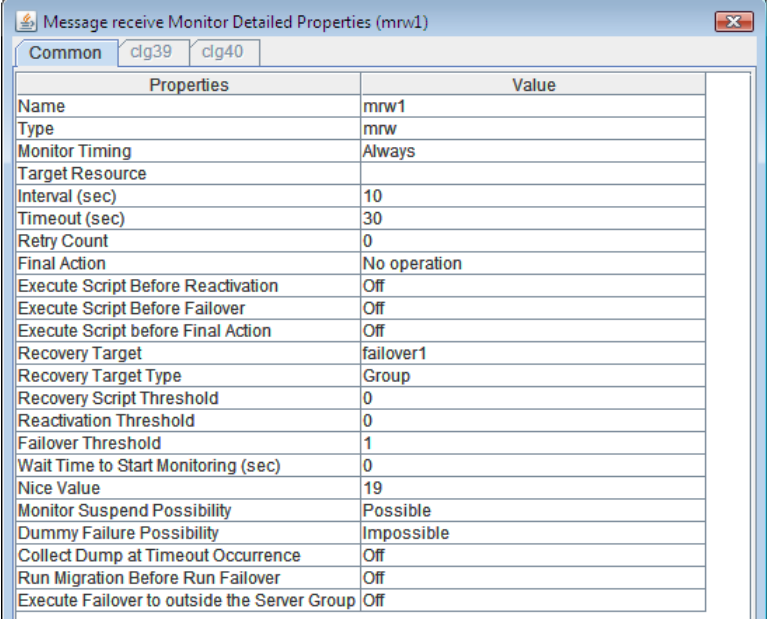


Recovery Action

Select the action to take when a monitor error is detected.

- ◆ Executing the recovery script
Execute the recovery script 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.

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



Properties	Value
Name	mrw1
Type	mrw
Monitor Timing	Always
Target Resource	
Interval (sec)	10
Timeout (sec)	30
Retry Count	0
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	19
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Impossible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off
Execute Failover to outside the Server Group	Off

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 for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
Recovery Target:	Recovery target when an error is detected
Recovery Target Type:	Recovery target type when an error is detected
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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
Execute Failover to outside the Server Group:	Failover to a server in a server group other than the active server group

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

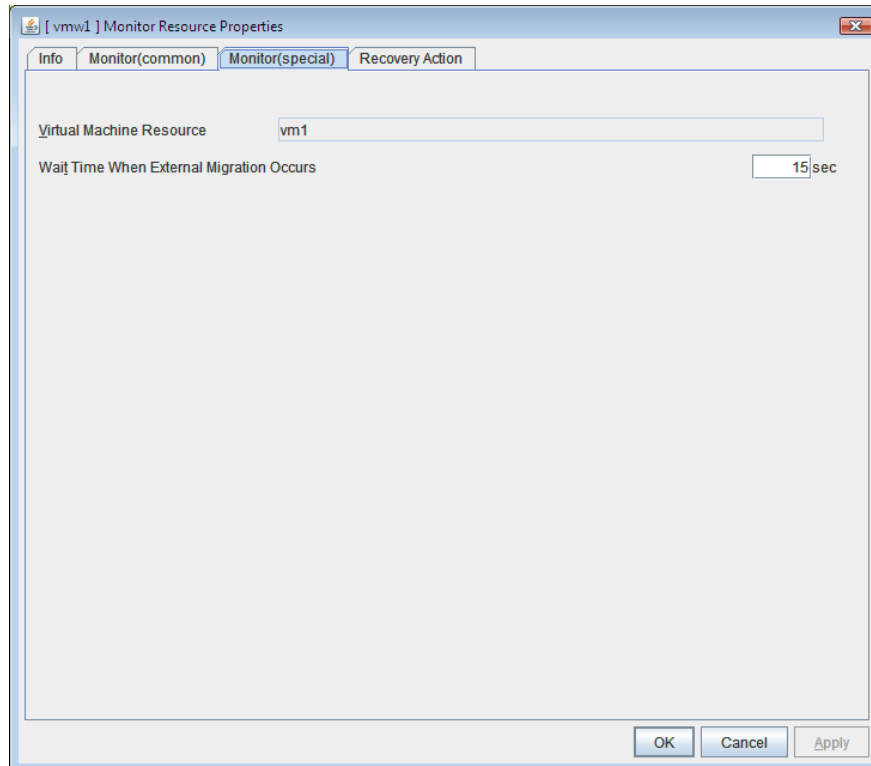
The `zoneadm` command is used to monitor virtual machines.

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

Common

server1

server2

Properties	Value
Comment	
virtual machine resource name	vm1
Status	Normal
Resource Status on Each Server	
Server Name	Status
server1	Normal
server2	Normal

Comment:

VM Resource Name:

Status

Comment on the VM monitor resource

Virtual machine resource name

Status of the VM monitor resource

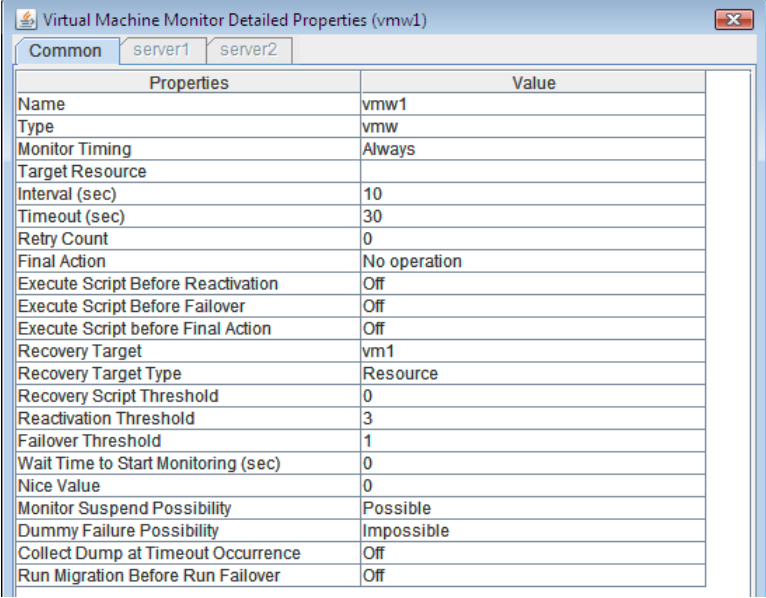
Server Name:

Status:

Name of the server

Status of the monitor resources on each server

When you click **Details**, the following information is displayed in the 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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	vm1
Recovery Target Type	Resource
Recovery Script Threshold	0
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Impossible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off

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 for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
Recovery Target:	Recovery target when an error is detected
Recovery Target Type:	Recovery target type when an error is detected
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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:

Comment on the Dynamic DNS monitor resource

Monitor Target:

Monitor target Dynamic DNS resource name

Status

Status of the Dynamic DNS monitor resource

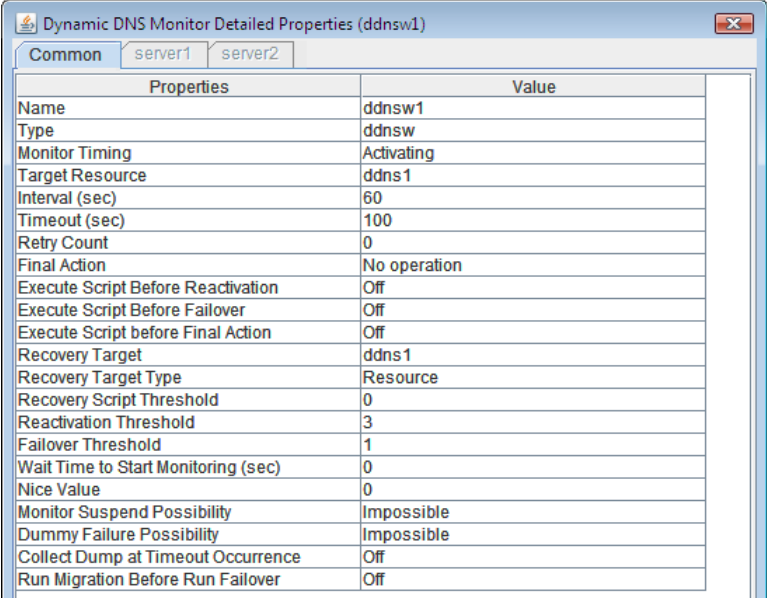
Server Name:

Name of the server

Status:

Status of the monitor resource on each server

When you click **Details**, the following information is displayed in the 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 Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	ddns1
Recovery Target Type	Resource
Recovery Script Threshold	0
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Impossible
Dummy Failure 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 for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
Recovery Target:	Recovery target when an error is detected
Recovery Target Type:	Recovery target type when an error is detected
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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 process name monitor resources

Notes on process name monitor resources

If there are two or more processes having the name specified for the monitor target, only one process is selected according to the following conditions and is subject to monitoring.

1. When the processes are in a parent-child relationship, the parent process is monitored.
2. When the processes are not in a parent-child relationship, the process having the earliest activation time is monitored.
3. When the processes are not in a parent-child relationship and their activation times are the same, the process having the lowest process ID is monitored.

Up to 1023 bytes can be specified for the monitor target process name. To specify a monitor target process with a name that exceeds 1023 bytes, use a wildcard (*).

If the name of the target process is 1024 bytes or longer, only the first 1023 bytes can be recognized as the process name. If you use a wild card (such as *) to specify a process name, specify a string containing the first 1023 or fewer bytes.

If the name of the target process is long, the latter part of the process name is omitted and output to the log.

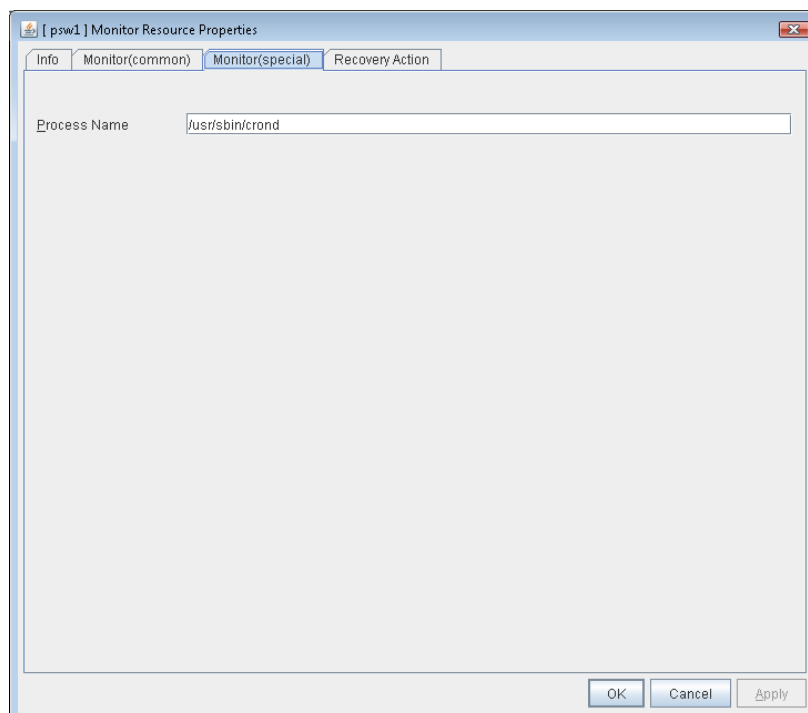
If the name of the target process includes double quotations("") or a comma (,), the process name might not be correctly output to an alert message

Settings for process name monitor resources

Those processes having the specified process name are monitored. The process ID is determined by the process name, and the error state is determined if the process ID vanishes. Process stalls cannot be detected.

Displaying and changing the details of the process name monitor resources

1. Click the **Monitors** icon on the tree view displayed 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 **Monitor(special)** tab in **Properties**.
3. On the **Monitor(special)** tab, display or change the advanced settings by following the instructions below.



Process name

Set the name of the target process. The process name can be obtained by using the `ps(1)` command

Wild cards can be used to specify a process name by using one of the following three patterns. No other wild card pattern is permitted.

[prefix search]	<string included in the process name>*
[suffix search]	*<string included in the process name>
[partial search]	*<string included in the process name>*

Displaying the process name monitor resource properties with WebManager

1. Start the WebManager.
2. Click an object for a process name monitor resource  in the tree view. The following information is displayed in the list view.

Process Name Monitor Name: psw1		Details
Common server1 server2		
Properties	Value	
Comment		
Process Name	/usr/sbin/cron	
Status	Normal	
Resource Status on Each Server		
Server Name	Status	
server1	Normal	
server2	Normal	

Comment:

Monitor Target:

Status:

Comment on the process name monitor resource

Name of the process to be monitored

Status of the process name monitor resource

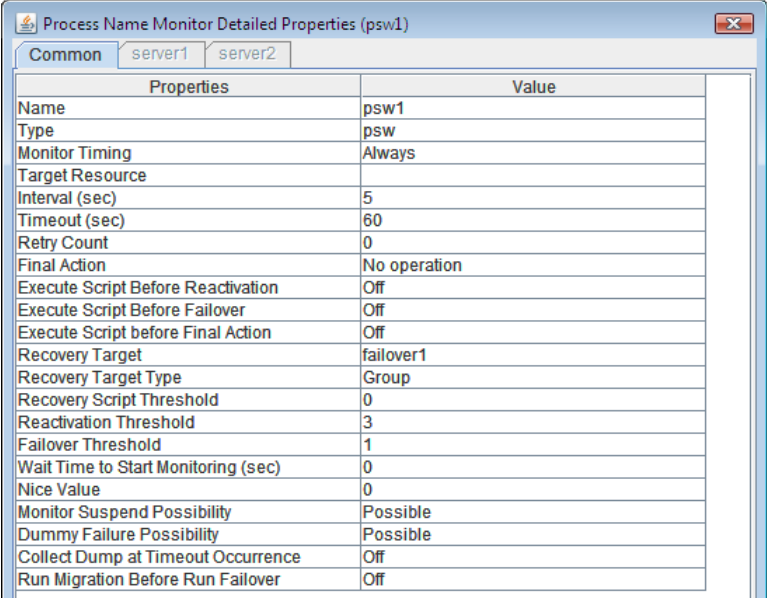
Server Name:

Status:

Server name

Status of the monitor resource on the server

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



Properties	Value
Name	psw1
Type	psw
Monitor Timing	Always
Target Resource	
Interval (sec)	5
Timeout (sec)	60
Retry Count	0
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	3
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off

Name:	Name of the process name monitor resource
Type:	Monitor resource type
Monitor Timing:	Monitor resource monitoring start time
Target Resource:	Name of the process to be monitored
Interval (sec):	Interval between monitor target status checks (in seconds)
Timeout (sec):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
Recovery Target:	Recovery target when an error is detected
Recovery Target Type:	Recovery target type when an error is detected
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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 "Software Applications supported by monitoring options" in Chapter 3, "Installation requirements for ExpressCluster" in 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.

Regarding the monitor levels described in the next subsection "How MySQL monitor resources perform monitoring", when "Level 1" or "Level 2" is selected, ExpressCluster does not create monitor tables during monitoring. Instead, monitor tables must be created manually beforehand.

Selectable monitor level	Prior creation of a monitor table
Level 1 (monitoring by select)	Required
Level 2 (monitoring by update/select)	Required
Level 3 (create/drop table each time)	Optional

Create a monitor table using either of the following methods:

Use SQL statements (in the following example, the monitor table is named mysqlwatch)

```
sql> create table mysqlwatch (num int not null primary key) ENGINE=<engine>;
sql> insert into mysqlwatch values(0);
sql> commit;
```

Use ExpressCluster command

```
clp_mysqlw --createtable -n <MySQL_monitor_resource_name>
```

To manually delete a monitor table, execute the following command:

```
clp_mysqlw --deletetable -n <MySQL_monitor_resource_name>
```

How MySQL monitor resources perform monitoring

MySQL monitor resources perform monitoring according to the specified monitor level.

- ◆ Level 1 (monitoring by select)

Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message

- ◆ Level 2 (monitoring by update/select)

Monitoring with reference to and update of the monitoring table. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (update/select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

- ◆ Level 3 (create/drop table each time)

Creation/deletion of the monitor table by statement as well as update. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

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.

The screenshot shows the 'Monitor Resource Properties' dialog box for a MySQL monitor resource. The 'Monitor(special)' tab is selected, displaying the following settings:

Property	Value
Monitor Level	Level 3 (create/drop table each time)
Database Name	MYSQldb
IP Address	127.0.0.1
Port	3306
User Name	user1
Password	
Table	mysqlwatch
Storage Engine	MyISAM
Library Path	/usr/lib/mysql/libmysqlclient.so.15

At the bottom of the dialog box are buttons for 'OK', 'Cancel', and 'Apply'.

Monitor Level

Select one of the following levels. You cannot omit this level setting.

- ◆ Level 1 (monitoring by select)

Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.
- ◆ Level 2 (monitoring by update/select)

Monitoring with reference to and update of the monitoring table. SQL statements executed for the monitor table are of (update/select) type.
- ◆ Level 3 (create/drop table each time)

Creation/deletion of the monitor table by statement as well as update. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

Default value: Level 3 (create/drop table each time)

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

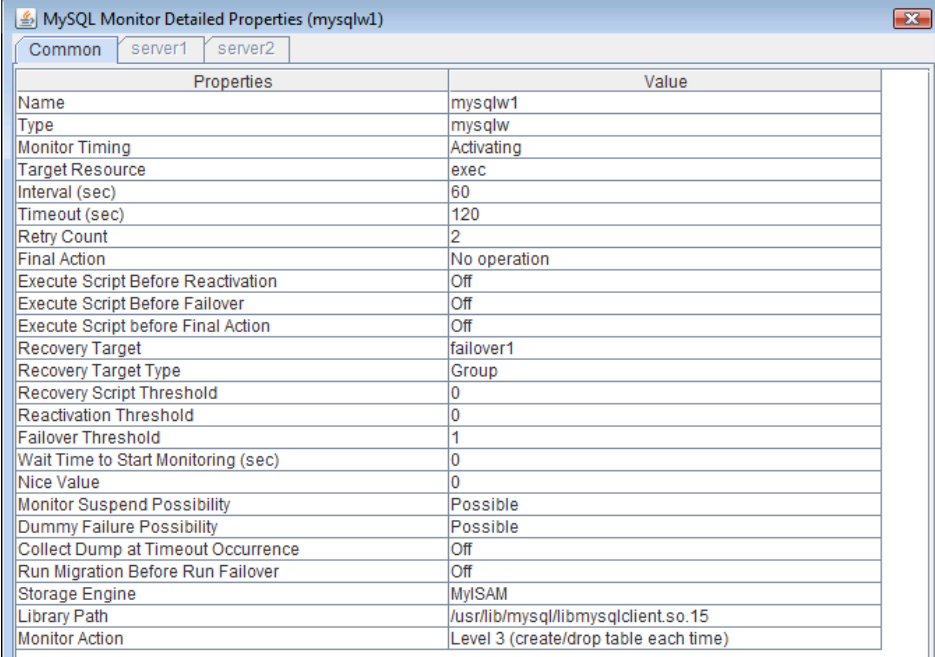
Details

Commonserver1server2

Properties	Value
Comment	
Database Name	MYSQLDB
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

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



Properties	Value
Name	mysqlw1
Type	mysqlw
Monitor Timing	Activating
Target Resource	exec
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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
Monitor Action	Level 3 (create/drop table each time)

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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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
Monitor Action:	Monitor level

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 "Software Applications supported by monitoring options" in Chapter 3, "Installation requirements for ExpressCluster" in 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.

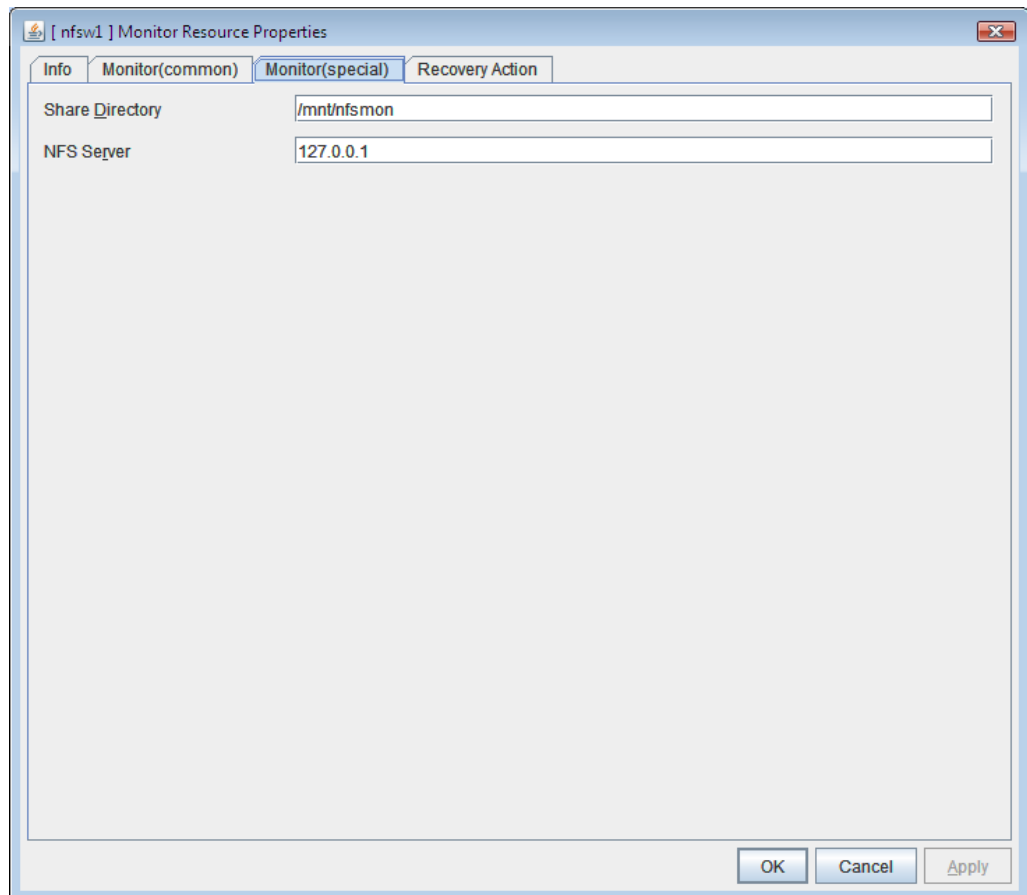
This monitor resource assumes the following result as an error:

(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 **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 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

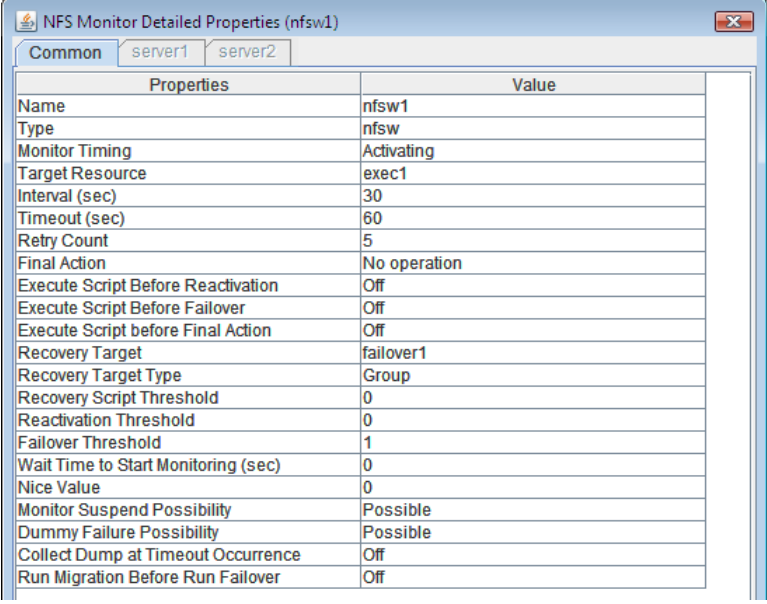
Displaying the NFS monitor resource properties with the WebManager

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		Offline
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

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



Properties	Value
Name	nfs1
Type	nfs
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	30
Timeout (sec)	60
Retry Count	5
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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 "Software Applications supported by monitoring options" in Chapter 3, "Installation requirements for ExpressCluster" in 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.

A connection timeout is detected if 90% of the value set for timeout has passed and the Oracle monitor resource has not been able to connect to Oracle.

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.

For the user specified with the user name parameter, the default is sys, but when a monitoring-dedicated user has been configured, the following access permissions must be provided for that user (if the sysdba permission is not provided):

- CREATE TABLE
- DROP ANY TABLE
- SELECT
- INSERT
- UPDATE
- ◆ 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.
- ◆ Select the language displayed in the ClusterPro Web Manager alert viewer and OS messages (syslog) for the character code of the monitor resource if an error message is generated from Oracle..
- ◆ 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.
- ◆ The character code settings have no effect on the operation of Oracle..

Regarding the monitor levels described in the next subsection "How Oracle monitor resources perform monitoring", when "Level 1" or "Level 2" is selected, ExpressCluster does not create monitor tables during monitoring. Instead, monitor tables must be created manually beforehand.

Selectable monitor level	Prior creation of a monitor table
Level 0 (database status)	Optional
Level 1 (monitoring by select)	Required
Level 2 (monitoring by update/select)	Required
Level 3 (create/drop table each time)	Optional

Create a monitor table using either of the following methods:

When creating by SQL statements (in the following example, the monitor table is named orawatch)

```
sql> create table orawatch (num number(11,0) primary key);
sql> insert into orawatch values(0);
sql> commit;
```

*Create this in a schema for the user specified with the user name parameter.

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 resources perform monitoring according to the specified monitor level.

- ◆ Level 0 (database status)

The Oracle management table (V\$INSTANCE table) is referenced to check the DB status (instance status). This level corresponds to simplified monitoring without SQL statements being executed for the monitor table.

An error is recognized if:

- (1) The DB (instance) status is in the inactive state (MOUNTED,STARTED)

- ◆ Level 1 (monitoring by select)

Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message

- ◆ Level 2 (monitoring by update/select)

Monitoring with reference to and update of the monitoring table. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (update/select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

- ◆ Level 3 (create/drop table each time)

Creation/deletion of the monitor table by statement as well as update. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

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.

The screenshot shows the 'Monitor Resource Properties' dialog box with the 'Monitor(special)' tab selected. The fields are as follows:

- Monitor Type:** listener and instance monitor
- Monitor Level:** Level 3 (create/drop table each time)
- Connect Command:** orcl
- User Name:** sys
- Password:** change_on_install
- Authority:** ☒ SYSDBA, ☐ DEFAULT
- Table:** orawatch
- ORACLE_HOME:** /opt/app/oracle/product/10.2.0/db_1
- Character Set:** AMERICAN_AMERICA.US7ASCII
- Library Path:** /opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1
- Collect detailed application information at failure occurrence:** ☐
- Collection Timeout:** 600 sec

Monitor Type

Select the Oracle features to be monitored.

◆ Monitor Listener and Instance (default)

According to the specified monitor level, database connection, reference, and update operations are monitored.

◆ Monitor Listener only

To check for the listener operation, use the `tnsping` Oracle command. For a monitor resource property, `ORACLE_HOME` must be set.

If `ORACLE_HOME` is not set, only connection operations for the items specified in the connect string are monitored. Use this to attempt recovery by restarting the Listener service upon a connection error.

Selecting this setting causes the monitor level setting to be ignored.

- ◆ **Monitor Instance only**

A direction (BEQ) connection to the database is established, bypassing the listener and, according to the specified monitor level, database connection, reference, and update operations are monitored. For a monitor resource property, ORACLE_HOME must be set. This is used for direct instance monitoring and recovery action setting without routing through the listener.

If ORACLE_HOME is not set, only the connection specified with the connect string is established, and any error in the connection operation is ignored. This is used to set the recovery action for a non-connection error together with an Oracle monitor resource for which **Monitor Listener only** is specified.

Monitor Level

Select one of the following levels. When the monitor type is set to **Monitor Listener only**, the monitor level setting is ignored.

- ◆ **Level 0 (database status)**

The Oracle management table (V\$INSTANCE table) is referenced to check the DB status (instance status). This level corresponds to simplified monitoring without SQL statements being executed for the monitor table.

- ◆ **Level 1 (monitoring by select)**

Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.

- ◆ **Level 2 (monitoring by update/select)**

Monitoring with reference to and update of the monitoring table. SQL statements executed for the monitor table are of (update/select) type.

- ◆ **Level 3 (create/drop table each time)**

Creation/deletion of the monitor table by statement as well as update. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

Default value: Level 3 (create/drop table each time)

Connect Command Within 255 bytes

Specify the connect string for the database to be monitored. You must specify the connect string.

When **Monitor Type** is set to **Monitor Instance only**, set ORACLE_SID.

Monitor Type	ORACLE_HOME	Connect Command	Monitor Level
Monitor Listener and Instance	Need not be specified	Specify the connect string	As specified
Monitor Listener only	Monitoring dependent on Oracle command if specified	Specify the connect string	Ignored
	Check for connection to the instance through the listener if not specified	Specify the connect string	Ignored
Monitor Instance only	Check for the instance by BEQ connection if specified	Specify ORACLE_SID	As specified
	Check for the instance through the listener if not specified	Specify the connect string	As specified

Default value: None for the connect string

User Name Within 255 bytes

Specify the user name to log on to the database. You must specify the name.

Specify the Oracle user who can access the specified database.

Default value: sys

Password Within 255 bytes

Specify the password to log on to the database.

Default value: change_on_install

Authority

Specify the database user authentication.

Default value: SYSDBA

Table Within 255 bytes

Specify the name of a monitor table created on the database. You must specify the name.

Make sure not to specify the same name as the table used for operation because a monitor table will be created and deleted. Be sure to set the name different from the reserved word in SQL statements.

Default value: orawatch

ORACLE_HOME Within 255 bytes

Specify the path name configured in ORACLE_HOME. Begin with [/]. This is used when **Monitor Type** is set to **Monitor Listener only** or **Monitor Instance only**.

Default value: None

Character Set

Specify the character set of Oracle. You must specify the character code.

Default value: None

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/libcIntsh.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

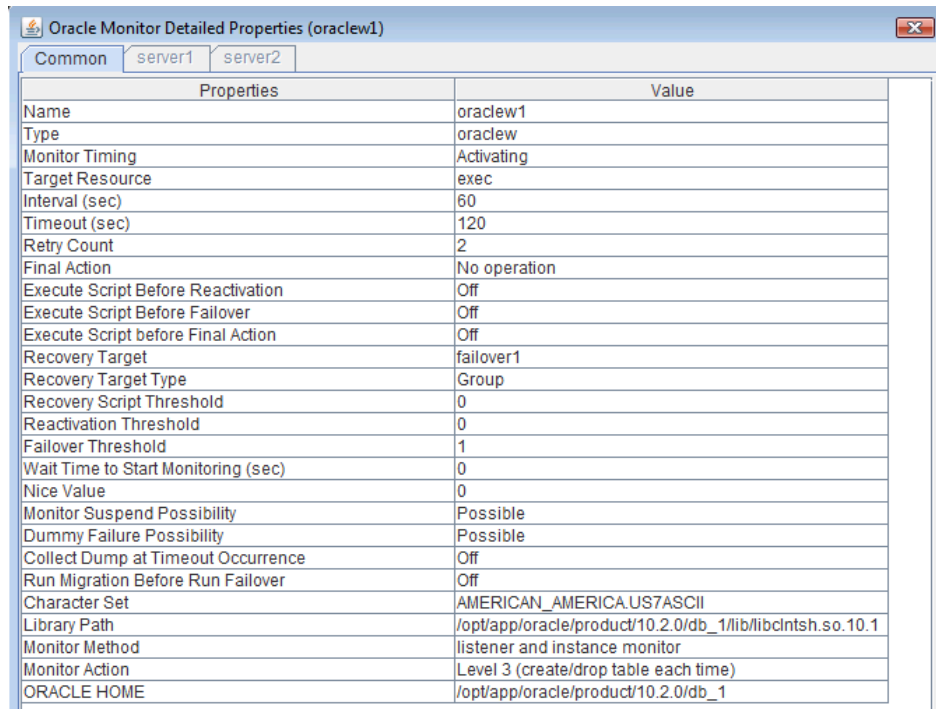
Displaying the Oracle monitor resource properties with the WebManager

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

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



Properties	Value
Name	oraclew1
Type	oraclew
Monitor Timing	Activating
Target Resource	exec
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off
Character Set	AMERICAN_AMERICA.US7ASCII
Library Path	/opt/app/oracle/product/10.2.0/db_1/lib/libclntsh.so.10.1
Monitor Method	listener and instance monitor
Monitor Action	Level 3 (create/drop table each time)
ORACLE HOME	/opt/app/oracle/product/10.2.0/db_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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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:	Monitor level
ORACLE_HOME	ORACLE_HOME path name

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 "Software Applications supported by monitoring options" in Chapter 3, "Installation requirements for ExpressCluster" in 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

Regarding the monitor levels described in the next subsection "How PostgreSQL monitor resources perform monitoring", when "Level 1" or "Level 2" is selected, ExpressCluster does not create monitor tables during monitoring. Instead, monitor tables must be created manually beforehand.

Selectable monitor level	Prior creation of a monitor table
Level 1 (monitoring by select)	Required
Level 2 (monitoring by update/select)	Required
Level 3 (create/drop table each time)	Optional

Create a monitor table using either of the following methods:

Use SQL statements (in the following example, the monitor table is named psqlwatch)

```
sql> CREATE TABLE psqlwatch (num INTEGER NOT NULL PRIMARY KEY);
sql> INSERT INTO psqlwatch VALUES(0);
sql> COMMIT;
```

Use ExpressCluster command

```
clp_psqlw --createtable -n <PostgreSQL_monitor_resource_name>
```

To manually delete a monitor table, execute the following command:

```
clp_psqlw --deletetable -n <PostgreSQL_monitor_resource_name>
```

How PostgreSQL monitor resources perform monitoring

PostgreSQL monitor resources perform monitoring according to the specified monitor level.

- ◆ Level 1 (monitoring by select)

Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message

- ◆ Level 2 (monitoring by update/select)

Monitoring with reference to and update of the monitoring table. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (update/select) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

- ◆ Level 3 (create/drop table each time)

Creation/deletion of the monitor table by statement as well as update. One SQL statement can read/write numerical data of up to 5 digits. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

An error is recognized if:

- (1) An error message is sent in response to a database connection or SQL statement message
- (2) The written data is not the same as the read data

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.

The screenshot shows the 'psqlw1 Monitor Resource Properties' dialog box with the 'Monitor(special)' tab selected. The fields are as follows:

Field	Value
Monitor Level	Level 3 (create/drop table each time)
Database Name	PSQLDB
IP Address	127.0.0.1
Port	5432
User Name	postgres
Password	
Table	psqlwatch
Library Path	/usr/lib/libpq.so.3.0

Monitor Level

Select one of the following levels. You cannot omit this level setting.

- ◆ Level 1 (monitoring by select)
Monitoring with only reference to the monitor table. SQL statements executed for the monitor table are of (select) type.
- ◆ Level 2 (monitoring by update/select)
Monitoring with reference to and update of the monitoring table. SQL statements executed for the monitor table are of (update/select) type.
- ◆ Level 3 (create/drop table each time)
Creation/deletion of the monitor table by statement as well as update. SQL statements executed for the monitor table are of (create / insert / select / drop) type.

Default value: Level 3 (create/drop table each time)

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: psqlwatch

Library Path Within 1023 bytes

Specify the home path to PostgreSQL. You must specify the path.

Default value: /usr/lib/libpq.so.3.0

Displaying the PostgreSQL monitor resource properties with the WebManager

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

PostgreSQL Monitor Name: psqlw1

Details

Commonserver1server2

Properties	Value
Comment	
Database Name	PSQLDB
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

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

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	exec
Interval (sec)	60
Timeout (sec)	120
Retry Count	2
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure Possibility	Possible
Collect Dump at Timeout Occurrence	Off
Run Migration Before Run Failover	Off
Library Path	/usr/lib/libpq.so.3.0
Monitor Action	Level 3 (create/drop table each time)

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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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
Monitor Action:	Monitor level

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 "Software Applications supported by monitoring options" in Chapter 3, "Installation requirements for ExpressCluster" in 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.

The screenshot shows a window titled "[sambaw1] Monitor Resource Properties". It has four tabs: "Info", "Monitor(common)", "Monitor(special)", and "Recovery Action". The "Monitor(special)" tab is selected. Inside the tab, there are five labeled text input fields: "Share Name" with the value "samba", "IP Address" with "127.0.0.1", "Port" with "139", "User Name" with "cluster", and "Password" which is empty. At the bottom right of the window are three buttons: "OK", "Cancel", and "Apply".

Share Name Within 255 bytes

Specify the shared name of samba server to be monitored. You must specify the name.

Default value: None

IP Address Within 79 bytes

Specify the IP address of samba server. You must specify the IP address.

Default value: 127.0.0.1

Port 1 to 65535

Specify the port number to be used by samba daemon. You must specify the port number.

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

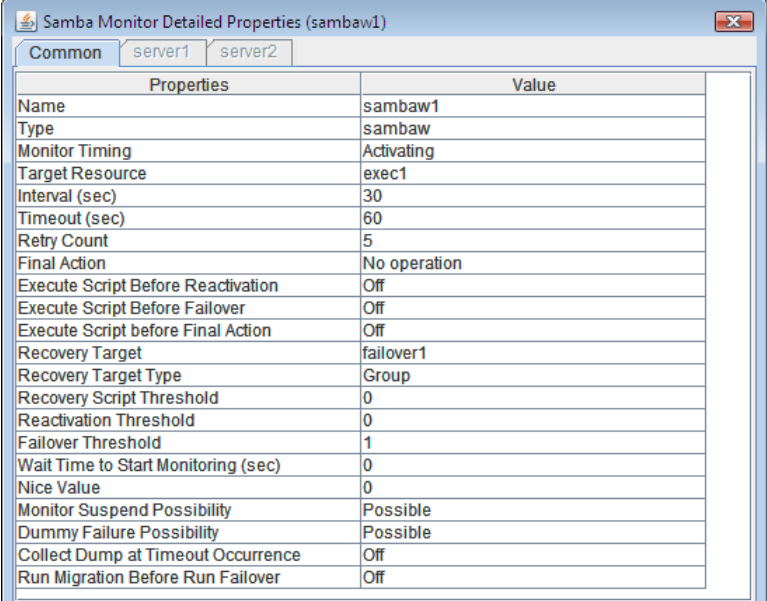
server2

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

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



Properties	Value
Name	sambaw1
Type	sambaw
Monitor Timing	Activating
Target Resource	exec1
Interval (sec)	30
Timeout (sec)	60
Retry Count	5
Final Action	No operation
Execute Script Before Reactivation	Off
Execute Script Before Failover	Off
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Recovery Script Threshold	0
Reactivation Threshold	0
Failover Threshold	1
Wait Time to Start Monitoring (sec)	0
Nice Value	0
Monitor Suspend Possibility	Possible
Dummy Failure 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):	Timeout for monitor resource error decision (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 Reactivation:	Whether the pre-reactivation script is executed upon the detection of an error
Execute Script before Failover:	Whether the pre-failover script is executed upon the detection of an error
Execute Script before Final Action:	Whether the pre-final-action script is executed upon the detection of an error
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
Recovery Script Threshold:	The number of times the recovery script is executed upon the detection of an error
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
Dummy Failure Possibility:	Possibility of Dummy Failure
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

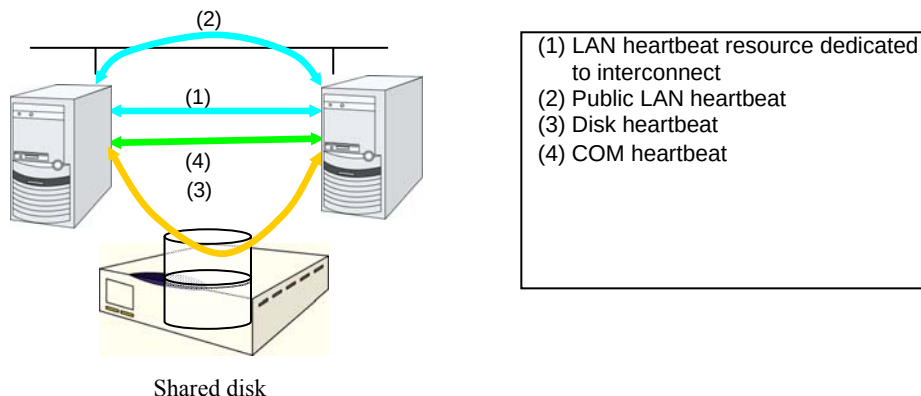
This chapter provides detailed information on heartbeat resources.

This chapter covers:

- What are heartbeat resources? 602
- Understanding LAN heartbeat resources 603
- Understanding disk heartbeat resources..... 604
- Understanding COM heartbeat resources 608

What are heartbeat resources?

Servers in a cluster monitor if other servers in the cluster are activated. For this monitoring, heartbeat resources are used.



Monitor resource name	Abbreviation	Functional overview
LAN heartbeat resource (1)(2)	lanhb	Uses a LAN to monitor if servers are activated. Used for communication within the cluster as well.
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.

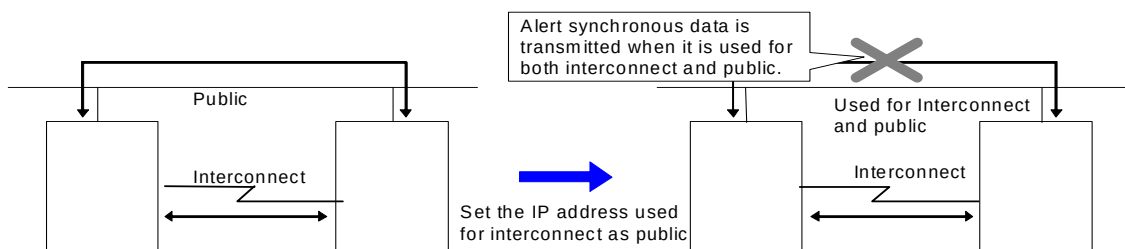
- ◆ You need to set at least one LAN heartbeat resource. It is recommended to set two or more LAN heartbeat resources.
- ◆ When you configure the settings of interfaces for disk heartbeat and COM heartbeat resources, follow the specifications described below

When a shared disk is used:	[Number of servers: up to 2] In principle, COM interface and disk interface [Number of servers: 3 or more] Disk interface
When a shared disk is not used:	[Number of servers: up to 2] COM interface

Understanding LAN heartbeat resources

LAN heartbeat resources

- ◆ 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

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

LAN Heartbeat Detailed Properties (lanhb1)	
Properties	Value
Name	lanhb1
Type	lanhb
Comment	LAN Heartbeat
Status	Normal
IP Address	192.168.11.39

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

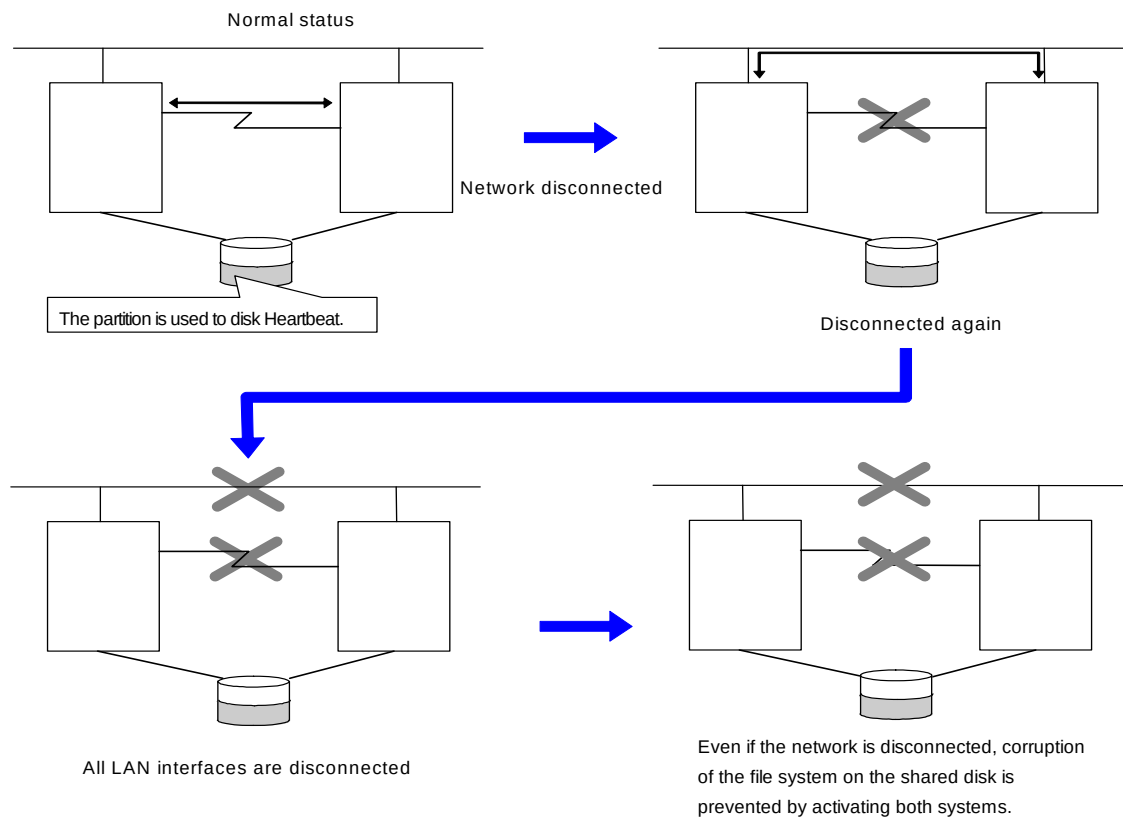
Understanding disk heartbeat resources

Setting the disk heartbeat resources

To use a heartbeat resource, you need to have the following settings.

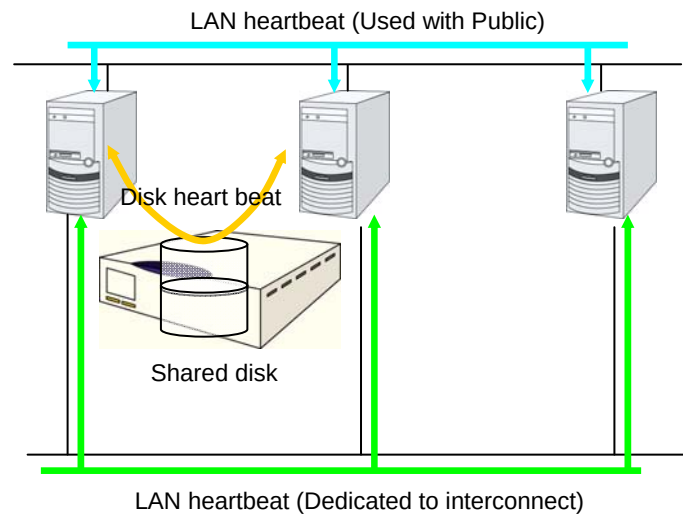
- ◆ Allocate a dedicated partition on the shared disk. (You do not need to create any file system.)
- ◆ Configure settings that allow all servers to access the dedicated partition on the shared disk by the same device name.

When a disk heartbeat resource is being used, it can be checked if other servers are active even if the network is disconnected.



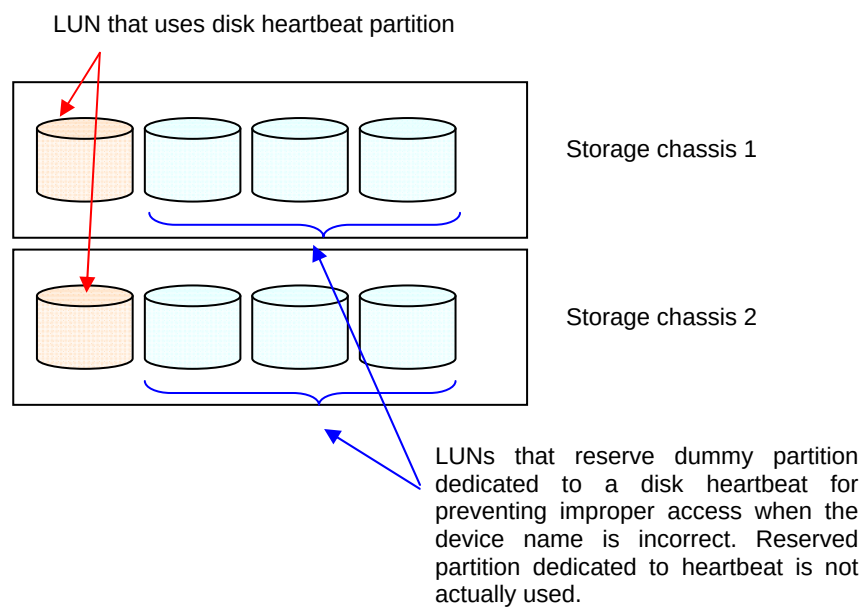
If the cluster consists of three or more servers, you can have a configuration using a disk heartbeat resource as below. You can configure the settings that allow usage of the disk heartbeat resource only among the servers in the cluster using the shared disk.

For details, see “Cluster properties Interconnect tab” in Chapter 2, “Function of the Builder” in this guide.



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

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

Disk Heartbeat Detailed Properties (diskhb1)	
Properties	Value
Name	diskhb1
Type	diskhb
Comment	DISK Heartbeat
Status	Normal
RAW Device Name	/dev/sdc1

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.

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

COM Heartbeat Detailed Properties (comhb1)	
Properties	Value
Name	comhb1
Type	comhb
Comment	COM Heartbeat
Status	Normal
Device Name	/dev/ttya

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..... 610
- Understanding the network partition resolution resources 610
- Understanding network partition resolution by PING method 611
- Network partition is unsolved..... 612

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.

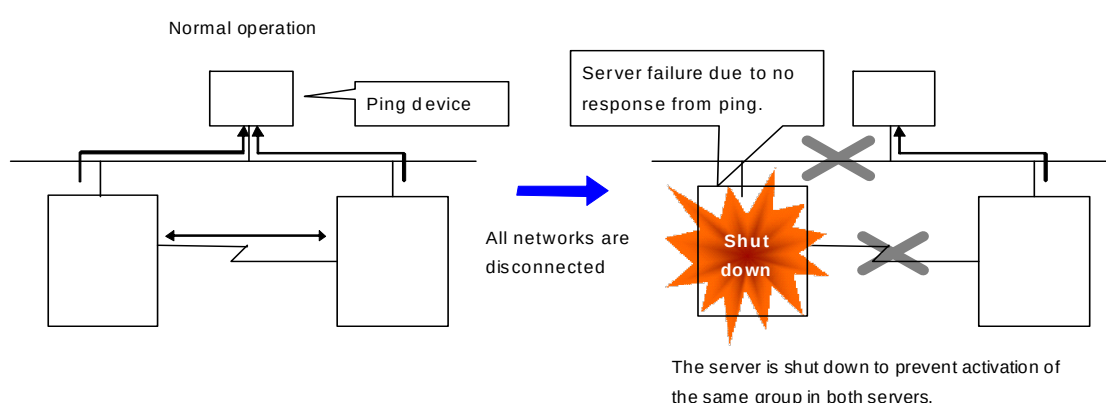
- ◆ If there is only one available LAN on the configuration, set the PING network partition resolution.

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 details, see “Cluster properties NP Resolution tab” in Chapter 2, “Function of the Builder” in this guide.

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

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

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.....	614
• IPMP.....	617
• Forced stop.....	618
• Chassis Identify.....	620
• Alert Service	622
• SNMP linkage.....	625
• Cluster service automatic startup prohibition after improper stop	632

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

- ◆ **On**

Shutdown is monitored. The heartbeat timeout (see Chapter 6 “Heartbeat resources details” on page 601) must be longer than the time required for the OS to shut down, including the applications quitting. It is recommended to choose **On** if you are using shared disks.

- ◆ **Performs only upon the occurrence of a group deactivation failure**

Shutdowns are monitored only upon the occurrence of a group deactivation failure. The heartbeat timeout (see Chapter 6 “Heartbeat resources details”) must be longer than the time required for the OS to shut down, including that needed for the applications to quit.

- ◆ **Off**

Shutdown is not monitored.

Shutdown monitoring method

You can select the shutdown method from the following:

- ◆ **keepalive**

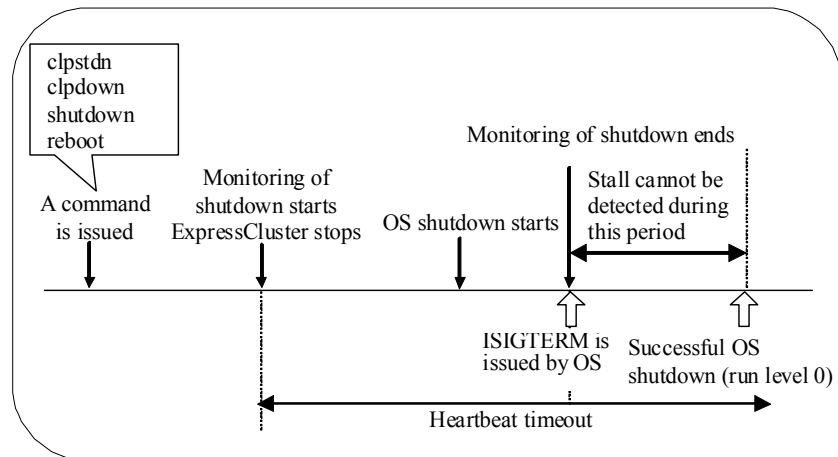
For this method, set the timer with using the clpka drivers of ExpressCluster.

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.”

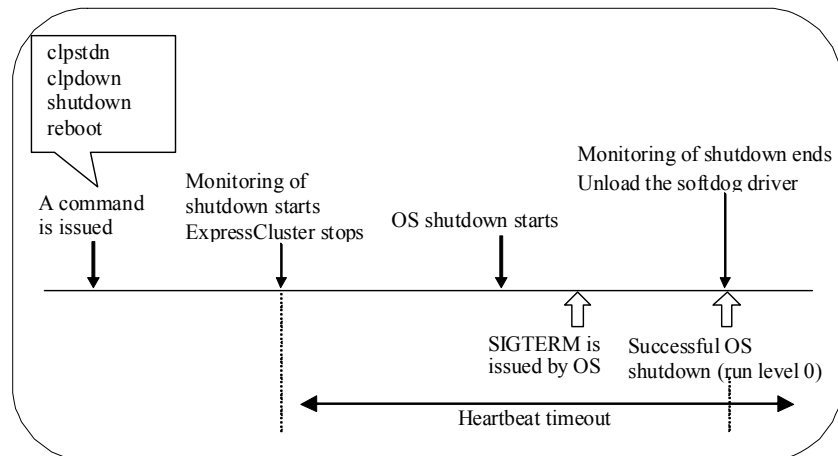
◆ Monitoring method: softdog

- Successful shutdown (when keepalive is selected and SIGTERM is enabled)



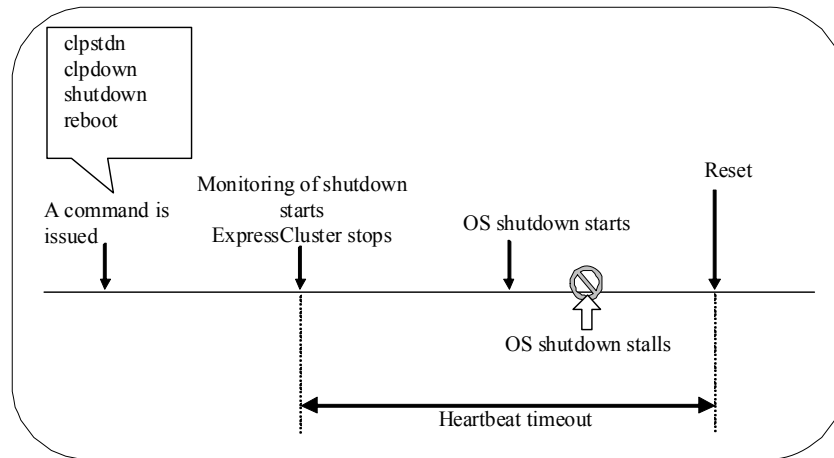
When SIGTERM is enabled, the stalled status cannot be detected because monitoring of the shutdown ends if the OS issues SIGTERM during shutdown.

- 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” on page 504 in this guide for options used for the actions.

Notes on the forced stop

- ◆ Notes on ipmitool
See “IPMI command” on page 504 in this guide.
- ◆ 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 the settings, see “Cluster properties Recovery tab” and “Server properties BMC tab” in Chapter 2, “Function of the Builder” in this guide.

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” on page 504 in this guide.
- ◆ 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 the settings, see “Cluster properties Recovery tab” and “Server properties BMC tab” in Chapter 2, “Function of the Builder” 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.

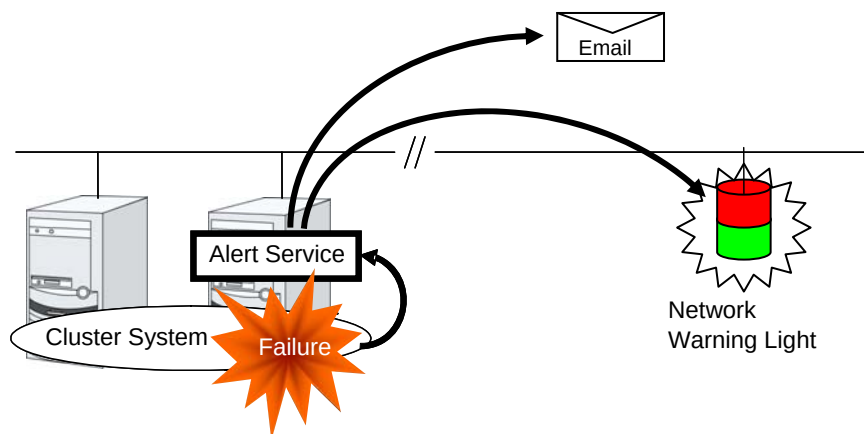
(2) Network Warning light

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.

(3) SNMP trap sending

When a WebManager alert message is displayed, the contents of the alert are sent with an SNMP trap.



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.
- ◆ Notify the servers that are configured as the destination of the details of errors by SNMP trap sending.

E-mail report notifies the content of the alert in the following format by e-mail.

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 3.1 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 mail” in Chapter 11, “Error messages” in this guide for information on which alert messages to be sent.
- ◆ You can change the alerts that are reported by e-mail. For details, see “Cluster properties Alert Service tab” in Chapter 2, “Function of the Builder” 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 “Turning off warning light (`clplamp` command)” in Chapter 3, “ExpressCluster command reference” in this guide.

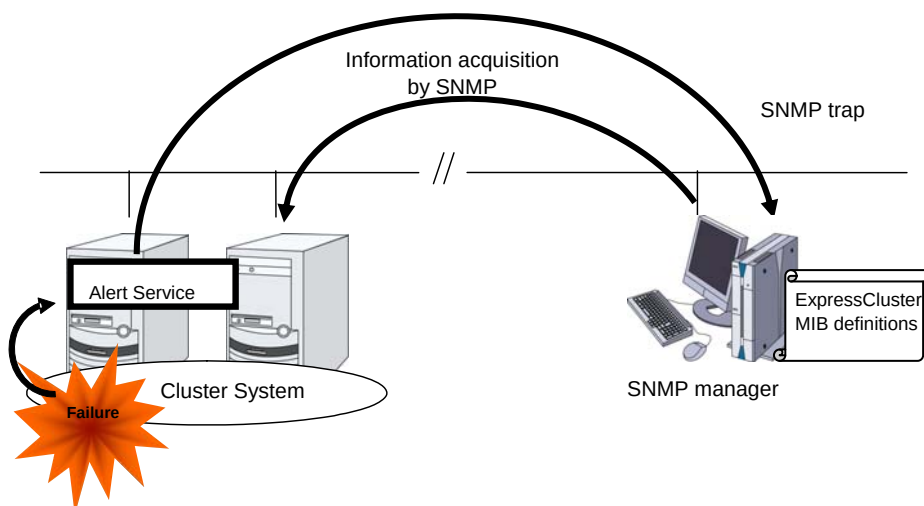
Operations of SNMP trap sending

- ◆ The contents of WebManager alert messages are sent with an SNMP trap. See “Messages reported by syslog, alert and mail, and SNMP trap” in Chapter 11, “ages” in this guide for information on which alert messages to be sent by SNMP trap.
- ◆ The alerts subject to SNMP trap sending can be changed. For more information, see “Cluster properties Alert Service tab” in Chapter 2, “Functions of the Builder” in this guide.
- ◆ For details on the SNMP trap, see “SNMP trap sending”.

SNMP linkage

SNMP linkage

SNMP linkage enables SNMP trap sending from ExpressCluster and information acquisition by SNMP from an SNMP manager according to the ExpressCluster MIB definitions.



ExpressCluster MIB definitions

The information sent/acquired with SNMP linkage is configured by the MIB definition files.

To use the functions of SNMP trap sending and information acquisition by SNMP, described later, MIB definition files are required.

To receive SNMP traps from ExpressCluster by using an SNMP manager, or to acquire cluster statuses from an SNMP manager, set the ExpressCluster MIB definition files in the SNMP manager.

For how to set the MIB definition files in an SNMP manager, refer to the manual for the SNMP manager.

The ExpressCluster MIB definition files are placed in the following directory on the ExpressCluster X CD-ROM.

<ExpressCluster_X_CD-ROM>\¥Common¥<version number>¥common¥mib

The MIB definition files provide the functions described below.

No.	MIB definition file	Description
(1)	NEC-CLUSTER-SMI.mib	Configures the ExpressCluster MIB tree root path.
(2)	NEC-CLUSTER-EVENT-MIB.mib	Configures the trap and MIB definitions for the ExpressCluster SNMP trap sending function.
(3)	NEC-CLUSTER-MANAGEMENT-MIB.mib	Configures MIB definitions for the following ExpressCluster information: • Cluster information • Server information • Group information

The available functions depend on the files set in the SNMP manager.

To receive SNMP traps from ExpressCluster:

- (1) NEC-CLUSTER-SMI.mib
- (2) NEC-CLUSTER-EVENT-MIB.mib

To acquire information by SNMP:

- (1) NEC-CLUSTER-SMI.mib
- (2) NEC-CLUSTER-MANAGEMENT-MIB.mib

SNMP trap sending

SNMP trap sending serves to send the contents of WebManager alert messages to the SNMP manager.

The traps to be sent are defined by NEC-CLUSTER-EVENT-MIB.

NEC-CLUSTER-EVENT-MIB defines the following MIB objects.

clusterEventNotifications group

This group defines the traps to be sent. The MIB objects defined for the group function as described below.

No.	SNMP TRAP OID	Description
(1)	clusterEventInformation	Trap for information level alerts. A clusterEvent group MIB object is attached.
(2)	clusterEventWarning	Trap for warning level alerts. A clusterEvent group MIB object is attached.
(3)	clusterEventError	Trap for error level alerts. A clusterEvent group MIB object is attached.

clusterEvent group

This group defines the information appended to the traps. The MIB objects defined for the group function as described below.

No.	SNMP OID	Description
(1)	clusterEventMessage	Indicates the alert message.
(2)	clusterEventID	Indicates the event ID.
(3)	clusterEventDateTime	Indicates the time at which the alert originated.
(4)	clusterEventServerName	Indicates the server from which the alert originated.
(5)	clusterEventModuleName	Indicates the module from which the alert originated.

Note:

The time-stamp variable in Trap-PDU and the SysUpTime variable in SNMPv2-Trap-PDU are set to 0.

Information acquisition by SNMP

By using the SNMP protocol, some information about the ExpressCluster configuration and status can be acquired. However, ExpressCluster does not include SNMP agent functions. For an SNMP agent, the Solaris System Management Agent snmpd daemon needs to be implemented separately.

SNMP agent

The SNMP agent serves to return a response about the configuration information or status information (GetResponse) to information acquisition requests (GetRequest, GetNextRequest) from an SNMP manager (network management software).

Note:

To use information acquisition by SNMP, you must take the steps described in "Setting up the SNMP linkage function" in the *Installation and Configuration Guide*.

MIB objects acquirable with SNMP linkage

The MIB objects that can be acquired with the SNMP linkage function are defined by NEC-CLUSTER-MANAGEMENT-MIB.

NEC-CLUSTER-MANAGEMENT-MIB defines the following MIB objects.

clusterGeneral group

This group is used to acquire cluster information. The MIB objects defined for the group function as described below.

No.	SNMP OID	Description										
(1)	clusterName	Indicates the name of the cluster.										
(2)	clusterComment	Indicates the comment of the cluster.										
(3)	clusterStatus	Indicates the current status of the cluster. The correspondence between the MIB value and the WebManager status is as described below. <table><tr><th>MIB value</th><th>WebManager status</th></tr><tr><td>normal</td><td> Normal</td></tr><tr><td>caution</td><td> Caution</td></tr><tr><td>error</td><td> Error</td></tr><tr><td>unknown</td><td>-</td></tr></table>	MIB value	WebManager status	normal	 Normal	caution	 Caution	error	 Error	unknown	-
MIB value	WebManager status											
normal	 Normal											
caution	 Caution											
error	 Error											
unknown	-											

clusterServer group

This group is used to acquire server information. Indexes on acquisition of clusterServerTable are sorted by server priority. The MIB objects defined for the group function as described below.

No.	SNMP OID	Description												
(1)	clusterServerLocalServerIndex	Indicates the index of the server receiving the present SNMP information acquisition request (clusterServerIndex).												
(2)	clusterServerTable	Indicates the information table for the server.												
(3)	clusterServerEntry	Indicates the server information list. The index for the list is clusterServerIndex.												
(4)	clusterServerIndex	Indicates the index for uniquely identifying the server.												
(5)	clusterServerName	Indicates the name of the server.												
(6)	clusterServerComment	Indicates a comment for the server.												
(7)	clusterServerStatus	Indicates the current status of the server. The correspondence between the MIB value and the WebManager status is as described below. <table><tr><th>MIB value</th><th>WebManager status</th></tr><tr><td>online</td><td> Online</td></tr><tr><td>caution</td><td> Suspension (Network Partition Unsolved)</td></tr><tr><td>isolated</td><td> Suspension (Isolated)</td></tr><tr><td>offline</td><td> Offline</td></tr><tr><td>unknown</td><td> Unknown</td></tr></table>	MIB value	WebManager status	online	 Online	caution	 Suspension (Network Partition Unsolved)	isolated	 Suspension (Isolated)	offline	 Offline	unknown	 Unknown
MIB value	WebManager status													
online	 Online													
caution	 Suspension (Network Partition Unsolved)													
isolated	 Suspension (Isolated)													
offline	 Offline													
unknown	 Unknown													
(8)	clusterServerPriority	Indicates the priority of the server.												
(9)	clusterServerProductName	Indicates the name of the ExpressCluster product installed on the server.												
(10)	clusterServerProductVersion	Indicates the version of the ExpressCluster product installed on the server.												
(11)	clusterServerProductInstallPath	Indicates the installation path of ExpressCluster on the server.												
(12)	clusterServerPlatformName	Indicates the name of the platform on the server.												

clusterGroup group

This group is used to acquire group information. The MIB objects defined for the group function as described below.

No.	SNMP OID	Description																
(1)	clusterGroupTable	Indicates the information table for the group.																
(2)	clusterGroupEntry	Indicates the group information list. The index for the list is clusterGroupIndex.																
(3)	clusterGroupIndex	Indicates the index for uniquely identifying the group.																
(4)	clusterGroupName	Indicates the name of the group.																
(5)	clusterGroupComment	Indicates a comment for the group.																
(6)	clusterGroupType	Indicates the type of the group. The correspondence between the MIB value and the group type is as described below. <table><tr><th>MIB value</th><th>Group type</th></tr><tr><td>failover</td><td>Failover group</td></tr><tr><td>cluster</td><td>Management group</td></tr><tr><td>virtualMachine</td><td>Virtual machine group</td></tr></table>	MIB value	Group type	failover	Failover group	cluster	Management group	virtualMachine	Virtual machine group								
MIB value	Group type																	
failover	Failover group																	
cluster	Management group																	
virtualMachine	Virtual machine group																	
(7)	clusterGroupStatus	Indicates the current status of the group. The correspondence between the MIB value and the WebManager status is as described below. <table><tr><th>MIB value</th><th>WebManager status</th></tr><tr><td>online</td><td> Online</td></tr><tr><td>onlineFailure</td><td> Online Failure</td></tr><tr><td>offlineFailure</td><td> Offline Failure</td></tr><tr><td>offline</td><td> Offline</td></tr><tr><td>unknown</td><td> Unknown</td></tr><tr><td>onlinePending</td><td> Online Pending</td></tr><tr><td>offlinePending</td><td> Offline Pending</td></tr></table>	MIB value	WebManager status	online	 Online	onlineFailure	 Online Failure	offlineFailure	 Offline Failure	offline	 Offline	unknown	 Unknown	onlinePending	 Online Pending	offlinePending	 Offline Pending
MIB value	WebManager status																	
online	 Online																	
onlineFailure	 Online Failure																	
offlineFailure	 Offline Failure																	
offline	 Offline																	
unknown	 Unknown																	
onlinePending	 Online Pending																	
offlinePending	 Offline Pending																	
(8)	clusterGroupCurrentServerIndex	Indicates the index of the server on which the group is currently active (clusterServerIndex). The return value of a deactivated group is -1.																

Cluster service automatic startup prohibition after improper stop

Cluster service automatic startup prohibition

This function prohibits the ExpressCluster service from automatically starting up at the next OS activation after the servers have been stopped by a means other than using WebManager, the `clpstdn` command, or the `clpcl -t -a` command.

When the automatic startup prohibition setting is enabled, the ExpressCluster service will not automatically start at the next server activation after the servers have been stopped by using the OS shutdown command, WebManager, the `clpstdn` command, or the `clpcl -t -a` command.

Even in cases where cluster shutdown or cluster stop is executed, if an error occurs in the ExpressCluster service stop sequence, or if the stop sequence is not executed due to the likes of an OS reset or a power interruption, the ExpressCluster service will not automatically start at the next OS activation.

Displaying and changing the automatic startup prohibition setting

- ◆ **Cluster service's not stop normal, prohibit automatic startup**
Prohibits cluster service automatic startup at the next OS activation if the servers are stopped by a means other than cluster shutdown or cluster stop, or if the cluster shutdown or stop sequence does not finish successfully.
- ◆ **Not prohibit cluster service automatic startup after improper stop**
Does not prohibit cluster service automatic startup.

Conditions for automatic startup prohibition

The conditions for automatic startup prohibition are as described below.

- ◆ The cluster is stopped by a means other than cluster shutdown or cluster stop.
- ◆ The cluster service stop sequence is not executed due to a reason such as an OS reset, panic, or power interruption.
- ◆ Group deactivation fails in the cluster service stop sequence as a result of cluster shutdown or stop.

Notes on automatic startup prohibition

- ◆ At OS activation, if the ExpressCluster service does not start automatically, activate the ExpressCluster service by using WebManager or the `clpcl` command.
- ◆ At OS activation, if the ExpressCluster service does not start automatically, WebManager alert messages and syslog messages are output.

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:

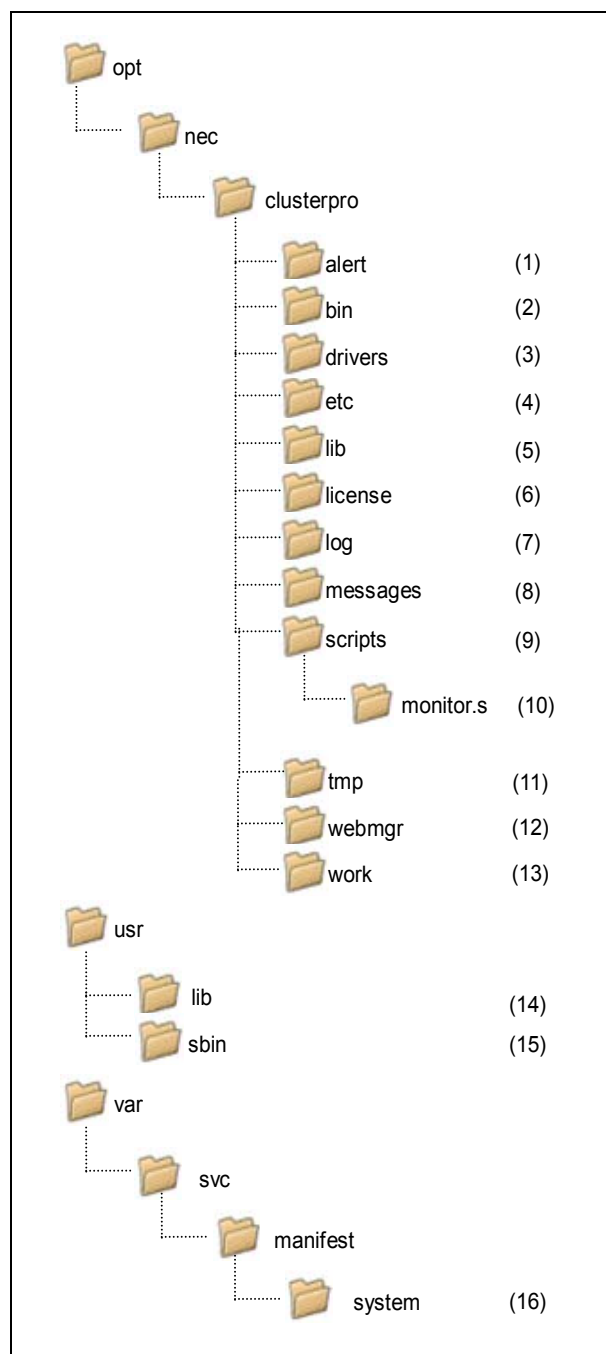
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• Log structure of ExpressCluster	638
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• What causes servers to shut down	640
• Configuring the settings to temporarily prevent execution of failover	643
• How to replace a server with a new one ~For a shared disk~	645
• Wait time for synchronized cluster startup	646
• Changing disk resources file system.....	647
• Changing the server configuration (add/delete).....	648
• Changing the server IP address.....	652
• Changing the host name	654

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 the performance logs
This is unused at present.
- (10) Directory for EXEC resource script of group resources
This directory stores EXEC resource scripts of group resources.
- (11) Directory for temporary files
This directory stores archive files created when logs are collected.
- (12) Directory for the 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.
- (13) Directory for the WebManager
This directory stores the ExpressCluster WebManager's modules and management files.
- (14) Directory for module tasks
This is a work directory for modules.
- (15) /usr/lib
This directory stores the symbolic links to the ExpressCluster Server's library.
- (16) /usr/sbin
This directory stores the symbolic links to the ExpressCluster Server's executable files.
- (17) /var/svc/manifest/system
This directory stores the ExpressCluster Server's manifesto files.

Log structure of ExpressCluster

The log directory in the ExpressCluster installation directory has the following structure:

ExpressCluster service logs

The ExpressCluster service logs include the following types and generations.

init_*.start.cur:	Log collected when the current service started
init_*.start.pre:	Log collected when the service one generation older started
init_*.stop.cur:	Log collected when the current service stopped
init_*.stop.pre:	Log collected when the service one generation older stopped

* represents a character string specific to each service.

evt:	clusterpro_evt
trn:	clusterpro_trn
md:	clusterpro_md
main:	clusterpro
webmgr:	clusterpro_webmgr
alert:	clusterpro_alertsync

The log level and size cannot be changed.

Two generations are automatically rotated. Generations older than the second are removed, starting with the oldest data.

Internal logs for each module

The ExpressCluster internal logs include the following types and generations for each module.

*.log.cur:	Current internal log
*.log.pre:	Internal log one generation older
*.err.cur:	Current error log
*.err.pre:	Error log one generation older

* represents the module name. For the module list, see “Modifying the log level and size (clplogcf command)” in Chapter 3, “ExpressCluster command reference” in this guide.

Two generations are automatically rotated. Generations older than the second are removed, starting with the oldest data.

Logs for error occurrence

These logs are used to collect emergency information when an error occurs during ExpressCluster processing.

For details on collection, see “Collecting logs (clplogcc command) Collecting information when a failure occurs” in Chapter 3, “ExpressCluster command reference” in this guide.

*.tar.gz:	Current log collected when errors occurred
*.tar.gz.1:	Log for error occurrence one generation older
*.tar.gz.9:	Log for error occurrence nine generations older

* represents the module name.

pm:	When an ExpressCluster service starts or stops
rc:	When an a group resource activation or deactivation error occurred
rm:	When a monitor resource error is detected

10 generations of error occurrence information are saved. Generations older than the tenth are removed, starting with the oldest data.

The log level and size cannot be changed.

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 ¹	-	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 ² /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 660.

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 of the network partition resolution, see Chapter 7, "Network partition resolution resources details" 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 extend the heartbeat timeout to an hour, or 3600 seconds, when the heartbeat timeout is set to 90 seconds:

```
clptoratio -r 40 -t 1h
```

For more information on the `clptoratio` command, see "Adjusting time-out temporarily (`clptoratio` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

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
```

For more information on the `clpmonctrl` command, see "Controlling monitor resources (`clpmonctrl` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

3. Inhibiting recovery action upon a monitor resource error

If suppression of recovery operation upon a monitor resource error is set, the monitor resource does not perform recovery even if it detects an error. To set this function, check

Inhibit the recovery action on the **Recovery** tab in **Cluster Properties** on the Builder. The setting is applied.

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
```

For more information on the `clptoratio` command, see "Adjusting time-out temporarily (`clptoratio` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

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
```

For more information on the `clpmonctrl` command, see "Controlling monitor resources (`clpmonctrl` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

3. Inhibit no recovery action upon a monitor resource error

The setting specifying suppression of the recovery operation upon a monitor resource error is released. To set this function, uncheck **Inhibit the recovery action** on the **Recovery** tab in **Cluster Properties** on the Builder. The setting is applied.

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 "Window of the WebManager Operating a cluster and cluster services on the WebManager" in Chapter 1, "Functions of the WebManager" in this guide.

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" in this guide.

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 "Creating a cluster and backing up configuration data (clpcfctrl command)" in 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 "Cluster properties Timeout tab" in Chapter 2, "Functions of the Builder" in 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.

```
# clpcl -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 "Setting up the ExpressCluster Server Installing the ExpressCluster Package" in Chapter 3, "Installing ExpressCluster" 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 "Setting up the ExpressCluster Server Installing the ExpressCluster Package" in Chapter 3, "Installing ExpressCluster" 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)
```

For information on troubleshooting `clpcfctrl` problems, see "Creating a cluster and backing up configuration data (`clpcfctrl` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

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.
For details, see "Uninstallation Uninstalling the ExpressCluster Server" in Chapter 10, "Uninstalling and reinstalling ExpressCluster" 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. For details, see "Uninstallation Uninstalling the ExpressCluster Server" in Chapter 10, "Uninstalling and reinstalling ExpressCluster" 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. For more information, see "Suspending ExpressCluster Disabling the ExpressCluster daemon" in Chapter 9, "Preparing to operate a cluster system" 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. For more information, see "Suspending ExpressCluster Disabling the ExpressCluster daemon" in Chapter 9, "Preparing to operate a cluster system" 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 integrated WebManager IP address

To change the integrated WebManager IP address, follow the instructions for changing the interconnect IP address. IP address for Integrated WebManager can be changed by **IP address for Integrated WebManager** on the **WebManager** tab of **Cluster Properties** in Builder.

Changing only the subnet mask of the integrated WebManager IP address

To change the subnet mask of the integrated WebManager 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 more information, see "Suspending ExpressCluster Disabling the ExpressCluster daemon" in Chapter 9, "Preparing to operate a cluster system" 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 information on troubleshooting `clpcfctrl` problems, see "Creating a cluster and backing up configuration data (`clpcfctrl` command)" in Chapter 3, "ExpressCluster command reference" in this guide.

To see how to stop and start daemons, see "Suspending ExpressCluster Disabling the ExpressCluster daemon" in Chapter 9, "Preparing to operate a cluster system" in the *Installation and Configuration Guide*.

Chapter 10 Troubleshooting

This chapter provides instructions for troubleshooting problems with ExpressCluster.
This chapter covers:

- Troubleshooting.....656

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:

```
# clplcncsc -l -p PRODUCT-ID
```

Use the product ID for **PRODUCT-ID**, which is specified in the -p option. For more information on product IDs, see "Managing licenses (clplcncsc command)" in Chapter 3, "ExpressCluster command reference" in this guide.

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 705.

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 706.

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 708.

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 711.

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 711.

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 713.

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 716.

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. 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. # clptoratio -r 3 -t 1d 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 : 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 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. 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.
Commands for logs		
Command	Description	Remarks
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	668
• Messages reported by syslog, alert, mail, and SNMP trap	668
• Driver syslog messages	704
• Detailed information in activating and deactivating group resources.....	705
• Detailed info of monitor resource errors.....	711

Messages

Messages reported by syslog, alert, mail, and SNMP trap

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	SNMP Trap
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 process terminated	The ExpressCluster daemon process was abnormally terminated. The system will be shut	Inactivating group resources may have failed. Take appropriate action according to the group	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			abnormally.	down.	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 656.	•	•	•	•
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	A request from %1 for	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			to power down by BMC from %1.	power-down by BMC has been received.					
pm	Info	41	Received a request to power cycle by BMC from %1.	A request from %1 for power-cycle by BMC has been received.	-	•	•		
pm	Info	42	Received a request to send NMI by BMC from %1.	A request from %1 for sending NMI by BMC has been received.	-	•	•		
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	Timeout occurred while waiting for all the servers to start up. (Internal communication with	Check that an error is not occurring on network adapter, or network is properly connected.	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			some servers.)	some servers is unavailable.)					
nm	Error	10	Status of resource %1 of server %2 is unknown.	Resources %1 status is unknown on Server %2.	Check that cable or network settings of the %1 resource are correctly configured.	•	•	•	•
nm	Error	20	Process %1 was terminated abnormally.	Process %1 was abnormally terminated.	Memory or OS resources may not be sufficient. Check them.	•	•	•	•
nm	Info	21	The system will be stopped.	The system will be shut down.	-	•	•		
nm	Info	22	The cluster daemon will be stopped.	The ExpressCluster daemon will be stopped.	-	•	•		
nm	Info	23	The system will be rebooted.	The system will be restarted.	-	•	•		
nm	Info	24	Process %1 will be restarted.	The process %1 will be restarted.	-	•	•		
nm	Error	30	Network partition was detected. Shut down the server %1 to protect data.	The network partition was detected. Server %1 will be shut down to protect data.	All the heartbeats cannot be used. Make sure that an error is not occurring on network adapter, or network is properly connected. Check the status of shared disk when using DISKHB. When using COMHB, check the COM cable is properly connected.	•	•		
nm	Error	31	An error occurred while confirming the network partition. Shut down the server %1.	An error occurred while the network partition is being confirmed. Server %1 will be shut down to protect data.	Make sure that an error is not occurring on network partition solution resource.	•	•		
nm	Error	32	Shut down the server %1. (reason:%2)	Server %1 will be shut down. (reason:%2)	All the heartbeats cannot be used. Make sure that an error is not occurring on network adapter, or 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	The combination of the network partition	Check the cluster configuration information.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			partition resources is invalid. (server name:%1)	resolution resources is invalid. (server name:%1)					
nm	Error	35	Failed to start the resource %1. Server name:%2	Starting the resource %1 failed. Server name:%2	Make sure that an error is not occurring on network partition resolution resource.	•	•		
nm	Info	36	The network partition %1 of the server %2 has been recovered to the normal status.	The network partition %1 of the server %2 has been recovered to the normal status.	-	•	•		
nm	Error	37	The network partition %1 of the server %2 has an error.		Make sure that an error is not occurring on network partition resolution resource.	•	•		
nm	Error	38	The resource %1 of the server %2 is unknown.		Check the cluster configuration information.	•	•		
nm	Info	39	The server %1 cancelled the pending failover.		-	•	•		
nm	Error	80	Cannot communicate with server %1.	An internal communication with server %1 is unavailable.	Make sure that an error is not occurring on network adapter, or network is properly connected.	•	•		
nm	Info	81	Recovered from internal communication error with server %1.	An internal communication with the server %1 has recovered from the abnormal status.	-	•	•		
rc	Info	10	Activating group %1 has started.	The group %1 has started.	-	•	•		
rc	Info	11	Activating group %1 has completed.	Starting the group %1 has completed.	-	•	•		
rc	Error	12	Activating group %1 has failed.	Starting the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•		
rc	Info	15	Waiting for group %1 to start has started.	Waiting for the group to start has started.	-	•	•		
rc	Info	16	Waiting for group %1 to start has been completed.	Waiting for the group to start has been normally completed.	-	•	•		
rc	Error	17	Group start was cancelled because waiting for group %1 to start was timed out.	Waiting for the group to start has timed out.	Check the status of the group waiting to start. If the group has not yet been started, re-perform the group operation after starting that group.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
rc	Warning	18	Waiting for group %1 to start has timed out. However, group start continues.	Waiting for the group to start has timed out. However, group start continues.	-				
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	25	Waiting for group %1 to stop has started.	Waiting for the group to stop has started.	-	•	•		
rc	Info	26	Waiting for group %1 to stop has been completed.	Waiting for the dependent group to stop has been normally completed.	-	•	•		
rc	Error	27	Group stop has been cancelled because waiting for group %1 to stop has timed out.	Waiting for the group to stop has timed out.	Check the status of the group waiting to stop. If the group has not yet been stopped, re-perform the group operation after stopping that group.	•	•		
rc	Warning	28	Waiting for group %1 to stop has timed out. However, group stop continues.	Stop waiting has timed out. However, group stop continues.	-				
rc	Info	30	Activating %1 resource has started.	Starting the resource %1 has started.	-		•		
rc	Info	31	Activating %1 resource has completed.	Starting the resource %1 has completed.	-		•		
rc	Error	32	Activating %1 resource has failed.(%2 : %3)	Starting the resource %1 has failed.	See "Detailed information in activating and deactivating group resources" on page in this guide.	•	•	•	•

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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 705.	•	•	•	•
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. 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 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	

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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. 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. 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 has completed.	Restarting the group %1 has completed.	-	•	•		
rc	Error	72	Restarting group %1 has failed.	Restarting the group %1 has failed.	Take appropriate action by following the group resource messages.	•	•		
rc	Info	74	Failback group %1 has started.	Failback group %1 has started.	-	•	•		
rc	Info	75	Failback group %1	Failback group %1 has	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			has completed.	been completed.					
rc	Error	76	Failback group %1 has failed.	Failback group %1 has failed.	Take appropriate action according to the group resource message.	•	•		
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 642.	•	•	•	•
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.	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
rc	Info	160	Script before final action upon activation failure in resource %1 started.	-	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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.	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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.	•	•		
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	NMI send by BMC is requested since activating resource	Cope with the problem by referring to the message of the group resource.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			resource(%1) failed.	(%1) failed.					
rc	Error	261	An attempt to reset system by keepalive driver due to failure of resource (%1) activation failed.	An attempt to reset system by keepalive driver due to failure of resource (%1) activation failed.	Check if the usage environment supports the keepalive driver.	•	•		
rc	Error	262	An attempt to panic system by keepalive driver due to failure of resource (%1) activation failed.	An attempt to panic system by keepalive driver due to failure of resource (%1) activation failed.	Check if the usage environment supports the keepalive driver.	•	•		
rc	Error	263	An attempt to reset system by BMC due to failure of resource(%1) activation failed.	An attempt to reset system by BMC due to failure of resource(%1) activation failed.	Check if the hwreset command can be used.	•	•		
rc	Error	264	An attempt to power down system by BMC due to failure of resource (%1) activation failed.	An attempt to power down system by BMC due to failure of resource (%1) activation failed.	Check if the hwreset command can be used.	•	•		
rc	Error	265	An attempt to power cycle system by BMC due to failure of resource(%1) activation failed.	An attempt to power cycle system by BMC due to failure of resource(%1) activation failed.	Check if the hwreset command can be used.	•	•		
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.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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.	•	•		
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.	System power reset by BMC has been	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			(destination server : %1)	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 detected in the monitor resource registered in the black list. 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 711.	•	•		
rm	Warning	5	The maximum number of monitor resources has been exceeded.	The maximum number of monitor resources is exceeded.	Check the cluster configuration data by using the Builder.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			(registered resource is %1)						
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 711. When a monitor timeout is detected, the following message appears in parentheses. (99 : Monitor was time-out.) If Dummy Failure is enabled, the following message is set in (). No action is needed in the latter case. (201 : Monitor failed for failure verification.)	•	•	•	•
rm	Info	10	%1 is not monitored.	%1 is not monitored.	-	•	•		
rm	Info	12	Recovery target %1 has stopped because an error was detected in monitoring %2.	The recovery target %1 is stopped because a problem was detected in monitoring %2.	-	•	•		
rm	Info	13	Recovery target %1 has restarted because an error was detected in monitoring %2.	The recovery target %1 is restarted because a problem was detected in monitoring %2.	-	•	•		
rm	Info	14	Recovery target %1 failed over because an error was detected in monitoring %2.	Failover of the recovery target %1 has been done because a problem has been detected in monitoring %2.	-	•	•		
rm	Info	15	Stopping the cluster has been required because an error was detected in monitoring %1.	Cluster shutdown is requested because a problem was detected in monitoring %1.	-	•	•		
rm	Info	16	Stopping the	System shutdown is	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			system has been required because an error was detected in monitoring %1.	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.	•	•		
rm	Error	24	The group of %1 resource is unknown.	The group that %1 resource belongs to is unknown.	The cluster configuration data may be inconsistent. Check the data.	•	•		
rm	Warning	25	Recovery will not be executed since the recovery target %1 is not active.	The recovery target %1 is not recovered because %1 is not activated.		•	•		
rm	Info	26	%1 status changed from error to normal.	Monitoring of %1 returned to normal from error.		•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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 in monitoring %1.	System reset by BMC has been required because an error was detected 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.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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	Your trial version	Register the valid license.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			in %.4s/%.2s/%.2s. (%1)	license is expired.					
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.	Custer 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 %1 upon failure in monitor resource %2 started.	Script before %1 upon failure in monitor resource %2 started.		•	•		
rm	Info	82	Script before %1 upon failure in monitor resource %2 completed.	Script before %1 upon failure in monitor resource %2 completed.		•	•		
rm	Error	83	Script before %1 upon failure in monitor resource %2 failed.	Script before %1 upon failure in monitor resource %2 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.	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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 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.		•	•		
rm	Normal	170	Recovery script has been executed since an error was detected in monitoring %1.	Recovery script has been executed since an error was detected in monitoring %1.		•	•		
rm	Abnormal	171	An attempt was made to execute the recovery script due to a %1 monitoring failure, but failed.	An attempt was made to execute the recovery script due to a %1 monitoring failure, but failed.	Check the cause of the recovery script failure and take appropriate action.	•	•		
rm	Info	180	Dummy Failure of monitor resource %1 is enabled.	Dummy Failure of monitor resource %1 is enabled.		•	•		
rm	Info	181	Dummy Failure of monitor resource %1 is disabled.	Dummy Failure of monitor resource %1 is disabled.		•	•		
rm	Info	182	Dummy Failure of all monitor will be	Dummy Failure of all monitor will be		•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			enabled.	enabled.					
rm	Info	183	Dummy Failure of all monitor will be disabled.	Dummy Failure of all monitor will be disabled.	-	•	•		
rm	Warning	184	An attempt was made to enable Dummy Failure of monitor resource %1, but failed.	An attempt was made to enable Dummy Failure of monitor resource %1, but failed.	Check whether monitor resource %1 corresponds to Dummy Failure.	•	•		
rm	Warning	185	An attempt was made to disable Dummy Failure of monitor resource %1, but failed.	An attempt was made to disable Dummy Failure of monitor resource %1, but failed.	Check whether monitor resource %1 corresponds to Dummy Failure.	•	•		
rm	Info	190	Recovery action caused by monitor resource error is disabled.	Recovery action caused by monitor resource error is disabled.	-	•	•		
rm	Info	191	Recovery action caused by monitor resource error is enabled.	Recovery action caused by monitor resource error is enabled.	-	•	•		
rm	Warning	192	Ignored the recovery action in monitoring %1 because recovery action caused by monitor resource error is disabled.	Ignored the recovery action in monitoring %1 because recovery action caused by monitor resource error is disabled.	-	•	•		
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.	-	•	•	trnsv	
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 a 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	Executed recovery	Check if recovery action	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			recovery action (%1) of monitoring %2, but it failed.	action when an error is detected (%1) of the monitor resource %2, but it failed.	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 has been completed.	Execution of script before action when an error is 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. 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. You need to set a longer timeout value if a heartbeat timeout occurs.				
lanhb	Warning	73	Heartbeats received by HB resource %1	A delay occurred in receiving heartbeats of	Check how the server against which the delay				

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			are delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6)	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.	was warned is loaded, and reduce the load. You need to set a longer timeout value if a heartbeat timeout occurs. 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 from HB resource %1 of server %2 are delayed.(timeout=%3*%4 actual-time=%5 delay warning rate=%6)	A delay occurred in heartbeats from the heartbeat resource %1 of the server %2. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server %2 is loaded, and reduce the load. You need to set a longer 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. 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	Check how the server against which the delay was warned is loaded, and reduce the load. You need to set a longer timeout value if a heartbeat				

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
				(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.	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.	•	•		
					You need to set a longer timeout value if a heartbeat timeout occurs.				
comhb	Warning	72	Heartbeat write of HB resource %1 is delayed.(server=%2 timeout=%3*%4 actual-time=%5 delay warning rate=%6).	A delay occurred in writing the heartbeats of the heartbeat resource %1. %2 is the server to which the data is written. Current timeout value is %3 (seconds) x %4 (tick count per second). The value actually measured when the delay occurred is %5 (tick count). The delay warning rate %6 (in %) has been exceeded.	Check how the server against which the delay was warned is loaded, and reduce the load.				
					You need to set a longer 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.				
					You need to set a longer timeout value if a heartbeat timeout occurs.				
monp	Error	1	An error occurred when initializing	Initialization error in the process %1 to be	Memory or OS resources may be insufficient, or the	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			monitored process %1. (status=%2)	monitored.	cluster configuration data is inconsistent. Check them. One of the following process messages below will be displayed if the cluster configuration data has not been registered. This does not cause any problem. + webmgr + webalert				
monp	Error	2	Monitor target process %1 terminated abnormally. (status=%d)	The process %1 to be monitored was abnormally terminated.	Memory or OS resources may not be sufficient. Check them.	•	•		
monp	Info	3	Monitor target process %1 will be restarted.	The process %1 to be monitored will be restarted.	-	•	•		
monp	Info	4	The cluster daemon will be stopped since the monitor target process %1 terminated abnormally.	The cluster will be shut down because the process %1 to be monitored was abnormally terminated	-	•	•		
monp	Error	5	Attempted to stop the cluster daemon, but failed.	Attempted to shut down the cluster, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•		
monp	Info	6	The system will be stopped since the monitor target process %1 terminated abnormally.	The system will be shut down because the process %1 to be monitored was abnormally terminated.	-	•	•		
monp	Error	7	Attempted to stop the system, but failed. (status=%#x)	Attempted to shut down the system, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•		
monp	Info	8	System will be rebooted since monitor target process %1 terminated abnormally.	The system will be restarted because the process %1 to be monitored was abnormally terminated.	-	•	•		
monp	Error	9	Attempted to reboot the system, but failed. (status=%#x)	Attempted to restart the system, but failed.	The cluster may not be activated, or memory or OS resources may not be sufficient. Check them.	•	•		
fip	Error	10	IP address %1 already exists on the network.	The IP address %1 exists on the network.	Check if the IP address is already used on the network.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
fip	Info	11	IP address %1 will be forcefully activated.	The IP address %1 will be forcibly activated.	-	•	•		
vip	Error	10	IP address %1 already exists on the network.	The IP address %1 already exists on the network.	Check if the IP address is not already used on the network.	•	•		
vip	Info	11	IP address %1 will be forcefully activated.	The IP address %1 will be forcefully activated.	-	•	•		
disk	Info	10	%1 of %2 has started.	Command %1 of the device %2 has been started.	-	•	•		
disk	Info	11	%1 of %2 was successful.	Command %1 of the device %2 was successful.	-	•	•		
disk	Error	12	%1 of %2 failed (ret=%3).	Command %1 of the device %2 failed with return value of %3.	See the manual of command %1.	•	•		
disk	Warning	13	Executing %1 of %2 with %3 option is necessary. Execute the command manually.	It is necessary to run the command %1 of the device %2 by specifying the option %3. Run the command manually.	Specify the option %3 manually to run the command %1.	•	•		
disk	Info	14	%1 of %2 with %3 option has started.	Command %1 of the device %2 has started by specifying the option %3.	-	•	•		
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.	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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	18	Automatic start is suspended because the cluster service was not stopped according to the normal procedure.	Automatic start has been suspended since Automatic startup after the system down was not set.	To start the cluster service, use the WebManager or clpcl command.	•	•		
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 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	-	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
				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 to suspend cluster from the %1(IP=%2).	There was a request to suspend cluster from server %1 where %2 is active.		•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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	There was a request to start group from server %1 where %2 is		•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			the %2(IP=%3).	active.					
apisv	Info	31	There was a request to start all groups from the %1(IP=%2).	There was a request to start all groups from server %1 where %2 is active.		•	•		
apisv	Info	32	There was a request to stop group(%1) from the %2(IP=%3).	There was a request to stop group from server %1 where %2 is active.		•	•		
apisv	Info	33	There was a request to stop all groups from the %1(IP=%2).	There was a request to stop all groups from server %1 where %2 is active.		•	•		
apisv	Info	34	There was a request to restart group(%1) from the %2(IP=%3).	There was a request to restart group from server %1 where %2 is active.		•	•		
apisv	Info	35	There was a request to restart all groups from the %1(IP=%2).	There was a request to start all groups from server %1 where %2 is active.		•	•		
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	43	There was a request to cancel	A request to cancel waiting for the		•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			waiting for the dependence destination group of group the %1 was issued from %2.	dependence destination group of group %1 was issued 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.		•	•		
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	62	There was a request to enable Dummy Failure of monitor resources from the %1(IP=%2).	A request to enable Dummy Failure of monitor resource was issued from %1.		•	•		
apisv	Info	63	There was a request to disable Dummy Failure of monitor resources from the %1(IP=%2).	A request to disable Dummy Failure of monitor resource was issued from %1.		•	•		
apisv	Info	70	There was a request to set CPU	There was a request to set CPU clock		•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			frequency level from the %1(IP=%2).	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.	•	•		
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	The execution of BMC	Check the server status.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			NMI was failed(0x%08x).	NMI failed.					
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(0x%08x).	Failed to fail over all groups.	Same as above.	•	•		
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	143	A request to cancel waiting for the dependency destination group of group %1 has failed(0x%08x).	Canceling waiting for the dependency destination group of group %1 has failed.	Same as above.	•	•		

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
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	162	A request to enable Dummy Failure of monitor resource was failed(0x%08x).	The monitor resource failed to start Dummy Failure..	Check the status of the monitor resource.	•	•		
apisv	Error	163	A request to disable Dummy Failure of monitor resource was failed(0x%08x).	The monitor resource failed to stop Dummy Failure.	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 warming	Notice by the network warning light	–	•	•		

Messages reported by syslog, alert, mail, and SNMP trap

Module type	Event type	Event ID	Message	Description	Solution	Reported to			
						alert	syslog	mail	SNMP Trap
			light succeeded.	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. The application may have abnormally terminated. Check how the application is working.
exec	Error	1	Command was not completed within %1 seconds.	A synchronous script or application did not successfully complete within the specified time.	There may be a problem in the content of the script. Check if the script is correct. The application may be stalling. Check if the application is working properly. You may be able to identify the cause from the logs in both cases. For details of the log output setting, see "Parameter details" in Chapter 2, "Functions of the Builder" in this guide.

Module Type	Type	Return value	Message	Description	Solution
exec	Error	1	Command was aborted.	A synchronous script or application terminated abnormally.	The application may have abnormally terminated. Check how the application is working. Memory or OS resources may not be 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 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 not be sufficient. Check them.
ipw	Error	6 8~21	Internal error. (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. (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	loctl was failed. (err=%1) Device=%2	Failed to control the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.
diskw	Error	13	loctl was failed by timeout. Device=%1	The device control failed due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	14	Open was failed. (err=%1) File=%2	Opening the file failed.	Check if there is a directory whose name is similar to the file name, the disk to be monitored is properly connected, powered on, or does not have any problem. Memory or OS resources may not be

Module Type	Type	Return value	Message	Description	Solution
					sufficient. Check them.
diskw	Error	15 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. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	16	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. Memory or OS resources may not be sufficient. Check them.
diskw	Error	17	Read was failed by timeout. Device=%1	Failed to read from the device due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	18	Write was failed. (err=%1) File=%2	Writing to the file failed.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. Memory or OS resources may not be sufficient. Check them.
diskw	Error	19	Write was failed by timeout. File=%1	Writing to the file failed due to timeout.	Check the disk to be monitored is properly connected, powered on, or does not have any problem. The system may be heavily loaded, memory or OS resources may not be sufficient. Check them.
diskw	Error	22 23 24 25 26 27	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

Module Type	Type	Return value	Message	Description	Solution
		28 29 30 31 32 34 40 43 44			
diskw	Error	41	SG_IO failed. (sg_io_hdr_t info:%1 SG_INFO_OK_MASK: %2)	SG_IO failed.	Check the disk to be monitored is properly connected, powered on, or does not have any problem.
diskw	Error	42	Parameter was invalid. File=%1	The specified file name is invalid.	Do not specify the file whose name starts with /dev. Specify a normal file.
diskw	Error	47	Device was invalid. 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. Rawdevice=%1 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. (err=%1)	Popen failed.	Popen failed. Memory or OS resources may not be sufficient. Check them.
diskw	Error	51	Bind was failed. Rawdevice=%1 Device=%2	Bind failed.	Bind failed. Memory or OS resources may not be sufficient. Check them.
diskw	Error	52	Stat was failed. (err=%1) 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. (pid=%1)	The process does not exist.	The process to be monitored disappeared for some reason.

Module Type	Type	Return value	Message	Description	Solution
pidw	Error	1	Internal error. (status=%1)	An error other than the errors mentioned above has occurred.	Memory or OS resources may not be sufficient. Check them.

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
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) Device=%2 Request=%3	The control request to the network driver has failed.	Check the network driver supports the control request of %3. For details on the verified NIC and network driver, see Chapter 5, "Monitor resource details" in this guide.
miiw	Error	13	MII was not supported or no such device. Device=%1	Either MII is not supported by NIC or the monitoring target does not exist.	For details on the verified NIC and network driver, see Chapter 5, "Monitor resource details" in this guide. Check the network interface name using a command such as ifconfig if the monitoring target does not exist.
miiw	Error	20	NIC %1 link was down.	NIC link failed.	Check that the LAN cable is connected properly
miiw	Error	98	Internal error. (status=%d)	Other internal error has occurred.	-

Virtual IP monitor resource

Module Type	Type	Return value	Message	Description	Solution
vipw	Error	1	Initialize error.	A failure was detected during initialization.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	2	Invalid interface. (err=%1)	Interface name of NIC is invalid.	Check the cluster configuration information using the Builder. Or check the interface name of NIC exists.
vipw	Error	3	Get IP Address information error. (err=%1)	Failed to acquire the socket address of IPv4 or IPv6 address family.	Check that the kernel configuration supports TCP/IP networking (IPv4 or IPv6).
vipw	Error	4	Socket creation error. (err=%1)	Failed to create a socket.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	5	Socket option error. (err=%1)	Failed to set the socket option.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	6	Socket bind error. (err=%1)	Failed to bind a socket with the IP address from which a socket is sent.	Check the cluster configuration information using the Builder. Or check the interface name of NIC exists.
vipw	Error	7	Socket I/O error. (err=%1)	Failed in control request to network driver.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	8	Packet send error. (err=%1)	Failed to send RIP packet.	Check if packet can be sent from the IP address using such as the ping command.
vipw	Error	90	Memory allocation error. (err=%1)	Failed to allocate internal memory.	Memory or OS resources may not be sufficient. Check them.
vipw	Error	92	Timeout.	Timeout occurred in monitoring.	-
vipw	Error	98	Internal error. (status=%1)	Other internal error occurred.	-

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. (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.

Module Type	Type	Return value	Message	Description	Solution
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. Command parameter is invalid.	Check the cluster configuration information using the Builder.
(see the list above)	Error	4	Detected function exception. [%1, ret=%2] %3: function name	A failure was detected.	Check the cluster configuration information using the Builder. The OS may be heavily loaded. Check it.

Module type	Type	Return value	Message	Description	Solution
(see the list above)	Error	5	Failed to connect to %1 server. [ret=%2] %3:	Failed to connect to the monitor target. The actual module type is displayed in %1.	Check the status of the monitor target.
(see the list above)	Error	6	Detected authority error.	Failed in the user authentication.	Check the user name, password, and access right.
(see the list above)	Error	7	Failed to execute SQL statement (%1). [ret=%2] %3:	Failed to execute SQL statement (%1). The actual module type is displayed in %1.	Check the cluster configuration information using the Builder.
(see the list above)	Error	8	Failed to access with %1. %2:	Failed in data access with monitor target. The actual module type is displayed in %1.	Check the status of monitor target.
(see the list above)	Error	9	Detected error in %1. %2:	A failure occurred on monitor target. The actual module type is displayed in %1.	Check the status of monitor target.
(see the list above)	Error	10	User was not superuser.	A user does not have the right as root user.	The user who executed the operation may not have a root user right. Or, memory or OS resources may not be sufficient. Check them.
(see the list above)	Error	11	Detected timeout error.	Communication timeout has occurred.	OS may be heavily loaded. Check it.
(see the list above)	Error	12	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. 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. The actual validity date is displayed in <i>Validity_date</i> .	-

Module type	Type	Return value	Message	Description	Solution
(see the list above)	Warning	71	Detected a monitor delay in monitoring %1. (timeout=%2*%3 actual-time=%4 delay warning rate=%5)	A monitoring delay was detected in monitoring %1. The current timeout value is %2 (second) x %3 (tick count per second). The actual measurement value at delay detection is %4 (tick count) and exceeded the delay warning rate %5 (%).	Check the load status of the server on which a monitoring delay was detected and remove the load. If a monitoring timeout is detected, extend it.
(see the list above)	Info	81	The collecting of detailed information triggered by monitor resource %1 error has been started (timeout=%2).	Collecting of detailed information triggered by the detection of a monitor resource \$1 monitoring error has started. The timeout is %2 seconds.	-
(see the list above)	Info	82	The collection of detailed information triggered by monitor resource %1 error has been completed.	Collecting of detailed information triggered by the detection of a monitor resource %1 monitoring error has been completed.	-
(see the list above)	Warning	83	The collection of detailed information triggered by monitor resource %1 error has been failed (%2).	Collecting of detailed information triggered by the detection of a monitor resource %1 monitoring error has failed. (%2)	-
(see the list above)	Error	99	Internal error. (status=%1)	An internal error was detected.	-

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Appendix A Glossary

Interconnect	A dedicated communication path for server-to-server communication in a cluster. (Related terms: Private LAN, Public LAN)
Virtual IP address	IP address used to configure a remote cluster.
Management client	Any machine that uses the WebManager to access and manage a cluster system.
Startup attribute	A failover group attribute that determines whether a failover group should be started up automatically or manually when a cluster is started.
Shared disk	A disk that multiple servers can access.
Shared disk type cluster	A cluster system that uses one or more shared disks.
Switchable partition	A disk partition connected to multiple computers and is switchable among computers. (Related terms: Disk heartbeat partition)
Cluster system	Multiple computers are connected via a LAN (or other network) and behave as if it were a single system.
Cluster shutdown	To shut down an entire cluster system (all servers that configure a cluster system).
Active server	A server that is running for an application set. (Related term: Standby server)
Secondary server	A destination server where a failover group fails over to during normal operations. (Related term: Primary server)
Standby server	A server that is not an active server. (Related term: Active server)
Disk heartbeat partition	A partition used for heartbeat communication in a shared disk type cluster.
Data partition	A local disk that can be used as a shared disk for switchable partition.
Network partition	All heartbeat is lost and the network between servers is partitioned. (Related terms: Interconnect, Heartbeat)
Node	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.
Heartbeat	Signals that servers in a cluster send to each other to detect a failure in a cluster. (Related terms: Interconnect, Network partition)

Public LAN	A communication channel between clients and servers. (Related terms: Interconnect, Private LAN)
Failover	The process of a standby server taking over the group of resources that the active server previously was handling due to error detection.
Failback	A process of returning an application back to an active server after an application fails over to another server.
Failover group	A group of cluster resources and attributes required to execute an application.
Moving failover group	Moving an application from an active server to a standby server by a user.
Failover policy	A priority list of servers that a group can fail over to.
Private LAN	LAN in which only servers configured in a clustered system are connected. (Related terms: Interconnect, Public LAN)
Primary (server)	A server that is the main server for a failover group. (Related term: Secondary server)
Floating IP address	Clients can transparently switch one server from another when a failover occurs. Any unassigned IP address that has the same network address that a cluster server belongs to can be used as a floating address.
Master server	Server displayed on top of the Master Server in Server Common Properties in the Builder

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