ExpressCluster® X 2.1 *for Windows*

Reference Guide

Revision History

Edition	Revised Date	Description
First	06/15/2009	New manual
Second	09/30/2009	This manual has benn updated for the internal version 10.11.

Disclaimer

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form by any means, electronic or mechanical, for any purpose, without the express written permission of NEC Corporation.

Trademark Information

ExpressCluster® X is a registered trademark of NEC Corporation.

Intel, Pentium and Xeon are registered trademarks and trademarks of Intel Corporation.

Microsoft and Windows are registered trademarks of Microsoft Corporation in the United State and other countries.

Other product names and slogans written in this manual are trademarks and registered trademarks of their respective companies.

Table of Contents

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

ExpressCluster X Documentation Set

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

Getting Started Guide
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 supplement to the *Installation and Configuration Guide*.

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

Conventions

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

Note:

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

Important:

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

Related Information:

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

The following conventions are used in this guide.

Convention	Usage	Example
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**.
Angled bracket within the command line	Indicates that the value specified inside of the angled bracket can be omitted.	`clpstat -s[-h host_name]`
#	Prompt to indicate that a Linux user has logged on as root user.	`clpcl -s -a`
Monospace (courier)	Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters.	`c:\Program files\EXPRESSCLUSTER`
Monospace bold (courier)	Indicates the value that a user actually enters from a command line.	Enter the following: `clpcl -s -a`
Monospace italic (courier)	Indicates that users should replace italicized part with values that they are actually working with.	`clpstat -s [-h host_name]`

Contacting NEC

For the latest product information, visit our website below:

http://www.nec.com/global/prod/expresscluster/

Section I   Detailed functions of ExpressCluster

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

- Chapter 1   Functions of the WebManager
- Chapter 2   Functions of the Integrated WebManager
- Chapter 3   Function of the Builder
- Chapter 4   ExpressCluster command reference
- Chapter 5   Compatible command reference

Chapter 1   Functions of the WebManager

This chapter describes the functions of the WebManager.

This chapter covers:

Window of the WebManager
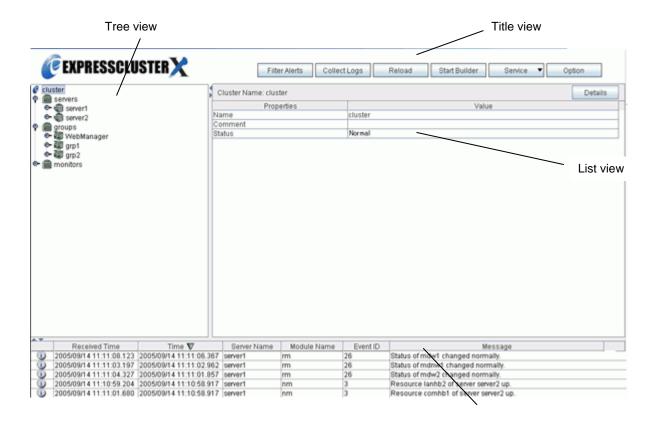
This chapter provides information about the WebManager window.

Note:
The information in this chapter is based on the window representation in an English environment. The language representation on the screen will depend on the locale of the OS of a management PC.

Main window of the WebManager

The WebManager window consists of four views.

Tree view

Title view

List view

Alert view

Title view

Six buttons in this view allow you to:

◆ Search for alert logs

◆ Collect ExpressCluster operation logs

◆ Reload the window

◆ Start the Builder

◆ Execute services

◆ Display or hide split bars

Tree view

Allows you to see a status of each cluster's resources such as server and group resources. For more information, refer to "Checking the status of each object in the tree view of WebManager" on page 30.

List view

Provides information on each cluster resource selected in the tree view.
If you click the **Details** button located on the upper right of the view, further information will be displayed in a dialog. For more information, see "Checking the cluster status by the WebManager list view" on page 51.

Alert view

Shows messages describing ExpressCluster operating status. For further information, see "Checking alerts using the WebManager" on page 56.

Title view of the WebManager

Six types of operations are available by using the buttons in the title view.
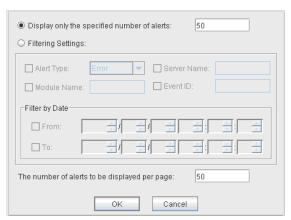
Searching for an alert by using the WebManager

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

Note:
For the information on alert logs, see "Checking alerts using the WebManager" on page 56.

1. Start the WebManager.
   (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

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

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 click **OK**. Past alert logs are displayed as many as you have specified.

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

To search by specifying search conditions:

    1. Click **Select the filter option**.

    2. Enter the search conditions in each field and start searching.

        Alert Type: Select this to search by alert type.

        Module Name: Select this to search by module type. The values you can enter are as follows:

Module Name	Category
pm	Whole ExpressCluster
rc	Group/resource related
rm	Monitor resource related
nm	Heartbeat resource related
lankhb	Kernel mode LAN heartbeat resource
disknp	DISK network partition resolution resource
fip	Floating IP resource
vcom	Virtual computer name resource
vip	Virtual IP resource
cifs	CIFS resource
diskw	Disk RW monitor resource
mdw	Mirror disk monitor resource
sdw	Disk TUR monitor resource
hdtw	Hybrid disk TUR monitor resource
diskagent	Disk agent monitor resource
sdfunc	Disk function related
mdadmn	Mirror disk related
hdadmn	Hybrid disk related
armcmd	Compatible commands
event	Event log
lcns	License related
logcmd	Message output command
ptun	Parameter tuning related
dn1000s	Network warning light alert related

mail	Mail alert related

> **Server Name**: Select this to search by server name.
>
> **Event ID**: Select this to search by an event ID. For more information on event ID, refer to Chapter 12, "Error Messages."
>
> **Start Time, Stop Time**: Select this to search by the time of the event occurrence. Enter the values in **Start Time** and **Stop Time**.
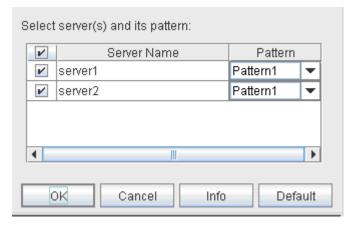
3. Enter the number of alerts to display on one page in **The number of alerts to be displayed per page:** and click **OK**. Research results are displayed based on the time an alert occurred.

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

Collecting logs by using the WebManager

Click the **Collect Logs** button to open 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, refer to Chapter 4, "ExpressCluster command reference."

OK

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

Cancel
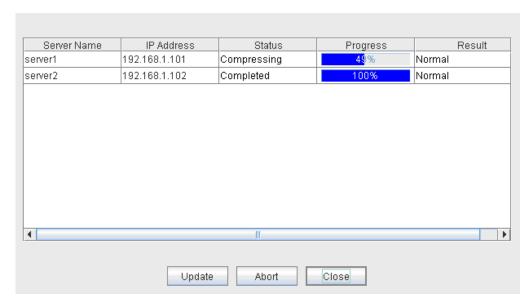
Closes this dialog box.

Info

Displays the information for each pattern.

Default

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

The dialog box of the log collection progress

Update

Updates the dialog box of the log collection progress.

Abort

Aborts the log collection.

Close

Closes the **Log Collection Progress** dialog box. Log collection is continued.

At this time, the display of **Collect Logs** in title view has changed to **Progress**. Click **Progress** to display the **Log Collection Progress** dialog box again.

Collect Logs Results

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

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

If you are using Internet Explorer 6.0 SP1 or later, the window described above may not be displayed. If the window is not displayed, enable the setting "Automatic prompting for file downloads" in the security settings, and collect logs again. Logs may not be downloaded properly when the window shown above is left without any action for more than 10 minutes.

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

Updating the WebManager information

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

Note:
The information in the WebManager is regularly updated and the latest status is not immediately displayed even if the status has changed. To display the latest information, click the **Reload** button after performing an operation.

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

Starting the Builder from the WebManager

Click **Start Builder** to reboot the Builder in the title view on the upper part of the WebManager reboots the Builder. For details on the Builder, refer to Chapter 3, "Function of the Builder."

Starting and/or stopping the cluster services from the WebManager
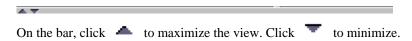
Click **Service** to display the following menus.

Menu	Description
Suspend Cluster	Stop the service temporarily.
Resume Cluster	Resume the suspended service.
Start Cluster	Start the service.
Stop Cluster	Stop the service.
Restart Manager	Restart the WebManager service.

Changing the screen layout on the WebManager

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

The split bars divide the views in the WebManager.

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

To display or hide the split bars in the WebManager:

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

2. In the title view, click the **Option** button.

3. When using the split bars, select **Display split bar**. When not using split bars, click to clear the check box.

4. Click **OK**.

Note:
Change the layout by dragging the bars that divide views even if the function of the split bars is turned off.
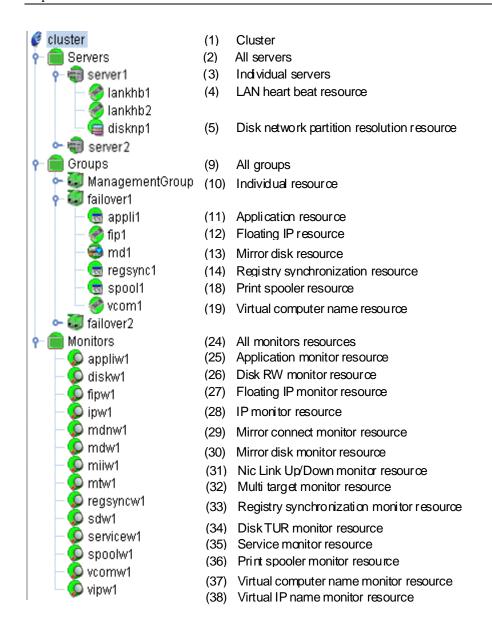
Checking the status of each object in the tree view of WebManager

You can see the status of the objects that configure the cluster on the WebManager by following the steps below.

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

2. On the left pane of the window, a tree is displayed. Check the status by looking at each icon and object color. The following is the brief overview of a tree.

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

cluster	(1)	Cluster
Servers	(2)	All servers
server1	(3)	Individual servers
lankhb1	(4)	LAN heart beat resource
lankhb2		
disknp1	(5)	Disk network partition resolution resource
server2		
Groups	(9)	All groups
ManagementGroup	(10)	Individual resource
failover1		
appli1	(11)	Application resource
fip1	(12)	Floating IP resource
md1	(13)	Mirror disk resource
regsync1	(14)	Registry synchronization resource
spool1	(18)	Print spooler resource
vcom1	(19)	Virtual computer name resource
failover2		
Monitors	(24)	All monitors resources
appliw1	(25)	Application monitor resource
diskw1	(26)	Disk RW monitor resource
fipw1	(27)	Floating IP monitor resource
ipw1	(28)	IP monitor resource
mdnw1	(29)	Mirror connect monitor resource
mdw1	(30)	Mirror disk monitor resource
miiw1	(31)	Nic Link Up/Down monitor resource
mtw1	(32)	Multi target monitor resource
regsyncw1	(33)	Registry synchronization monitor resource
sdw1	(34)	Disk TUR monitor resource
servicew1	(35)	Service monitor resource
spoolw1	(36)	Print spooler monitor resource
vcomw1	(37)	Virtual computer name monitor resource
vipw1	(38)	Virtual IP name monitor resource

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 ore more servers is down or in the pending status.
			Unknown	No information is acquired.
(3)	Individual server		Online	The server is running normally.
			Suspension (Network Partition Unsolved)	The network partition cannot be solved, because the disk network partition resolution resource is in the error status.
			Suspension (Isolated)	The server has been rebooted after it was shut down a way other than Suspend Cluster or a cluster shutdown.
			Offline or Unknown	The server is not working, or no information is acquired.
(4)	Kernel-mode LAN heartbeat resource		Normal	The resource can communicate with all servers.
			Warning	One or more servers in the cluster cannot be accessed.
			Error	The resource is not working normally.
			Unknown	No status is acquired.
			Not Used	The heartbeat resource is not registered.
(5)	Disk network partition resolution 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 disk network partition resolution resource is not registered.

No.	Icon		Status	Description
(6)	COM network partition resolution 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 network partition resolution resource is not registered.
(7)	PING network partition resolution 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 PING network partition resolution resource is not registered.
(8)	Majority Network Partition Resolution 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 Majority Network Partition Resolution Resource is not registered.
(9)	All groups		Normal	All groups are running normally.
			Warning	One or more groups are not running normally.
			Error	No groups are working normally.
			Unknown	No information is acquired.
(10)	Individual group		Online	The group has been started.
			Error	The group has an error.
			Offline or Unknown	The group is stopped, or no information is acquired.
(11)	Application resource		Online	The application resource has been started.
			Error	The application resource has an error.
			Offline or Unknown	The application resource is stopped, or no information is acquired.

Section I Detailed functions of ExpressCluster

No.	Icon		Status	Description
(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)	Mirror disk resource		Online	The mirror disk resource has been started.
			Error	The mirror disk resource has an error.
			Offline or Unknown	The mirror disk resource is stopped, or no information is acquired.
(14)	Registry synchronization resource		Online	The registry synchronization resource has been started.
			Error	The registry synchronization resource has an error.
			Offline or Unknown	The registry synchronization resource is stopped, or no information is acquired.
(15)	Script resource		Online	The script resource has been started.
			Error	The script resource has an error.
			Offline or Unknown	The script resource is stopped, or no information is acquired.
(16)	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.
(17)	Service resource		Online	The service resource has been started.
			Error	The service resource has an error.
			Offline or Unknown	The service resource is stopped, or no information is acquired.
(18)	Print spooler resource		Online	The print spooler resource has been started.
			Error	The print spooler resource has an error.
			Offline or Unknown	The print spooler resource is stopped, or no information is acquired.
(19)	Virtual computer name resource		Online	The virtual computer name resource has been started.
			Error	The virtual computer name resource has an error.

No.	Icon		Status	Description
			Offline or Unknown	The virtual computer name resource is stopped, or no information is acquired.
(20)	Virtual IP resource		Online	The virtual IP resource has been started.
			Error	The virtual IP resource has an error.
			Offline or Unknown	The virtual IP resource is stopped, or no information is acquired.
(21)	CIFS resource		Online	The CIFS resource has been started.
			Error	The CIFS resource has an error.
			Offline or Unknown	The CIFS resource is stopped, or no information is acquired.
(22)	NAS resource		Online	The NAS resource has been started.
			Error	The NAS resource has an error.
			Offline or Unknown	The NAS resource is stopped, or no information is acquired.
(23)	Hybrid disk resource		Online	The hybrid disk resource has been started.
			Error	The hybrid disk resource has an error.
			Offline or Unknown	The hybrid disk resource is stopped, or no information is acquired.
(24)	All monitor resources		Normal	All monitor resources are running normally.
			Warning	One or more monitor resources have an error, or monitoring is suspended on a server.
			Error	All monitor resources have errors.
			Unknown	No information is acquired.
(25)	Application monitor resource		Normal	The application is running normally.
			Warning	There are one or more servers with application problems, or monitoring is suspended on a server.
			Error	All servers have application errors.
			Unknown	No information is acquired.
(26)	Disk RW 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.

Section I Detailed functions of ExpressCluster

No.	Icon		Status	Description
			Unknown	No information is acquired.
(27)	Floating IP monitor resource		Normal	The floating IP address has no error.
			Warning	One or more servers cannot communicate with the floating IP address, or monitoring is suspended on a server.
			Error	No servers can communicate with the floating IP address.
			Unknown	No information is acquired.
(28)	IP monitor resource		Normal	The IP address of a target has no error.
			Warning	One or more servers cannot communicate with the IP address of the target, or monitoring is suspended on a server.
			Error	No servers can communicate with the IP address of the target.
			Unknown	No information is acquired.
(29)	Mirror connect monitor resource		Normal	The mirror connect is running normally.
			Warning	One of the servers has mirror connect problems, or monitoring is suspended on a server.
			Error	A mirror connect error has occurred on both servers.
			Unknown	No information is acquired.
(30)	Mirror disk monitor resource		Normal	The mirror disk is running normally.
			Warning	Mirroring is now being recovered, or monitoring is suspended on a server.
			Error	The mirror disk has an error. Mirror recovery is needed.
			Unknown	No information is acquired.
(31)	NIC Link Up/Down monitor resource		Normal	The NIC of a target has no error.
			Warning	One of servers has a problem with the NIC of the target, or monitoring is suspended on a server.
			Error	All servers have errors with the NIC of the target.
			Unknown	No information is acquired.
(32)	Multi target monitor resource		Normal	Multi target monitor resource is running normally.

No.	Icon		Status	Description
			Warning	Monitoring is suspended on a server, or one or more monitor resources registered in the multi target monitor resource have errors.
			Error	Multi target has an error.
			Unknown	No information is acquired.
(33)	Registry synchronization monitor resource		Normal	The registry synchronization is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The registry synchronization has an error.
			Unknown	No information is acquired.
(34)	Disk TUR 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 the servers have disk errors.
			Unknown	No information is acquired.
(35)	Service monitor resource		Normal	The service is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The service has an error.
			Unknown	No information is acquired.
(36)	Print spooler monitor resource		Normal	The print spooler monitor is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The print spooler has an error.
			Unknown	No information is acquired.
(37)	Virtual computer name monitor resource		Normal	The virtual computer name is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The virtual computer name has an error.
			Unknown	No information is acquired.
(38)	Virtual IP monitor		Normal	The virtual IP is running normally.

Section I Detailed functions of ExpressCluster

No.	Icon		Status	Description
	resource		Warning	Monitoring is suspended on a server.
			Error	The virtual IP has an error.
			Unknown	No information is acquired.
(39)	CIFS monitor resource		Normal	The CIFS is working normally.
			Warning	Monitoring is suspended on a server.
			Error	The CIFS has an error.
			Unknown	No information is acquired.
(40)	NAS monitor resource		Normal	The NAS is working normally.
			Warning	Monitoring is suspended on a server.
			Error	The NAS has an error.
			Unknown	No information is acquired.
(41)	Hybrid disk monitor resource		Normal	The Hybrid disk is working normally.
			Warning	Mirroring is now being recovered, or monitoring is suspended on a server.
			Error	The hybrid disk has an error. Mirror recovery is needed.
			Unknown	No information is acquired.
(42)	Hybrid disk TUR monitor resource		Normal	The disk is working normally.
			Warning	One of servers has a problem with the disk, or monitoring is suspended on a server.
			Error	All the servers have disk errors.
			Unknown	No information is acquired.
(43)	Custom monitor resource		Normal	No error is detected by monitor script.
			Warning	There is a server where monitoring is suspended, or an error has been detected in one of the servers.
			Error	Monitor script has detected an error.
			Unknown	No information is acquired.
(44)	DB2 monitor resource		Normal	The DB2 is working normally.
			Warning	Monitoring is suspended on a server.

No.	Icon		Status	Description
			Error	The DB2 has an error.
			Unknown	No information is acquired.
(45)	FTP monitor resource		Normal	The FTP is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The FTP has an error.
			Unknown	No information is acquired.
(46)	HTTP monitor resource		Normal	The HTTP is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The HTTP has an error.
			Unknown	No information is acquired.
(47)	IMAP4 monitor resource		Normal	The IMAP4 is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The IMAP4 has an error.
			Unknown	No information is acquired.
(48)	ODBC monitor resource		Normal	The ODBC is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The ODBC has an error.
			Unknown	No information is acquired.
(49)	Oracle monitor resource		Normal	The Oracle monitor resource is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The Oracle monitor resource has an error.
			Unknown	No information is acquired.
(50)	OracleAS monitor resource		Normal	The OracleAS monitor resource is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The OracleAS monitor resource has an error.
			Unknown	No information is acquired.

Section I Detailed functions of ExpressCluster

No.	Icon		Status	Description
(51)	OfficeScan CL monitor resource		Normal	OfficeScan client is running normally.
			Warning	Monitoring is suspended on some server.
			Error	OfficeScan client has an error.
			Unknown	No information is acquired.
(52)	OfficeScan SV monitor resource		Normal	OfficeScan server is running normally.
			Warning	Monitoring is suspended on some server.
			Error	OfficeScan server has an error.
			Unknown	No information is acquired.
(53)	POP3 monitor resource		Normal	The POP3 monitor resource is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The POP3 monitor resource has an error.
			Unknown	No information is acquired.
(54)	PostgreSQL monitor resource		Normal	The PostgreSQL is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The PostgreSQL has an error.
			Unknown	No information is acquired.
(55)	SMTP monitor resource		Normal	The SMTP monitor is running smoothly.
			Warning	Monitoring is suspended on a server.
			Error	The SMTP resource has an error.
			Unknown	No information is acquired.
(56)	SQL Server monitor resource		Normal	The SQL Server is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The SQL Server has an error.
			Unknown	No information is acquired.
(57)	Tuxedo monitor		Normal	The Tuxedo is running normally.

No.	Icon		Status	Description
	resource		Warning	Monitoring is suspended on a server.
			Error	The Tuxedo has an error.
			Unknown	No information is acquired.
(58)	Websphere monitor resource		Normal	The WebSphere is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The WebSphere has an error.
			Unknown	No information is acquired.
(59)	Weblogic monitor resource		Normal	The WebLogic is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The WebLogic has an error.
			Unknown	No information is acquired.
(60)	WebOTX monitor resource		Normal	The WebOTX is running normally.
			Warning	Monitoring is suspended on a server.
			Error	The WebOTX has an error.
			Unknown	No information is acquired.

Section I Detailed functions of ExpressCluster

Operations from the WebManager

You can operate a cluster by right-clicking (1) Cluster, (3) Individual server or (9) All groups and choosing an operation.

Objects of the cluster

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

◆ Shut down

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

The server that cannot communicate with the server (all LAN heartbeat resources are stopped) connected to the WebManager does not shut down.

◆ Reboot

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

◆ Service

If you select **Service**, **Suspend Cluster**, **Resume Cluster**, **Start Cluster**, **Stop Cluster** and **Restart Manager** are displayed on the shortcut menu.

◆ Switch Authorization

Change the authorization of the WebManager. For this operation, see "Switch authorization of the WebManager" on page 75.
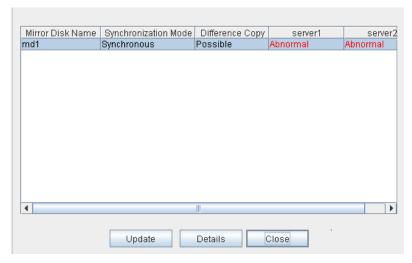
Server object

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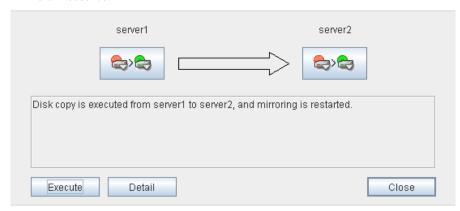
◆ Mirror Disk List

If you select this operation, the following dialog box of the mirror disk list is displayed, and the list of all mirror disk resources and hybrid disk resources is displayed.

- **Detail** (Starts **Mirror Disk Helper**)
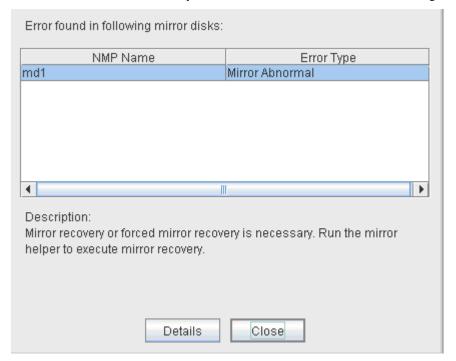
  Starts the **Mirror Disk Helper** dialog box for the selected mirror disk resource/hybrid disk resource.

For information on using the Mirror Disk Helper, see "Mirror disk helper" on page 59.

Section I Detailed functions of ExpressCluster

◆ Error Mirror Disk List

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

If there is a mirror disk with an error listed below in the cluster, the above dialog box will be displayed automatically.
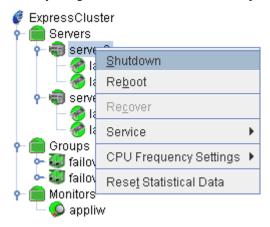
The description provides what you should do for the error.

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

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

Individual server objects

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

◆ Shut down

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

◆ Reboot

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

◆ Recover

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

◆ Service

Starts and stop the selected service. If you select this operation, the following dialog box is displayed for confirmation.

◆ Reset Statistical Data

Resets the selected statistical data of the server. If you select this operation, the following dialog box is displayed for confirmation.

◆ CPU Frequency Settings

Configures the CPU frequency control function of the selected server.

● Highest Frequency
Sets the CPU frequency to the highest.

● Lowest Frequency
Lowers the frequency to turn it to power-saving mode.
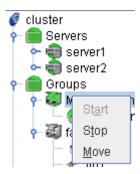
● Auto
Restores the CPU frequency control to the control by ExpressCluster.

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

Individual group objects

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

◆ Start (enabled only when the group is stopped)

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

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

Stops the selected group. When you select this operation, the following dialog box is displayed for confirmation.
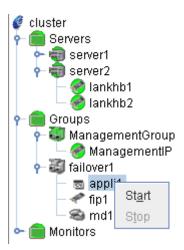
◆ Move (enabled only when the group has been started up)

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

Group resource objects (Except mirror disk resources/hybrid disk resources)

When you right-click a 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 selected this operation, the following dialog box is displayed for confirmation.

◆ Stop (enabled only when the group has been started up or when it has an error)
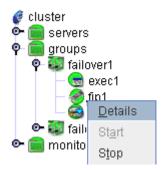
Stops the selected group resource. When you selected this operation, the following dialog box is displayed for confirmation.

Objects of mirror disk resource and hybrid disk resource

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

◆ Details

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

For information on using the Mirror Disk Helper, see "Mirror disk helper" on page 59.
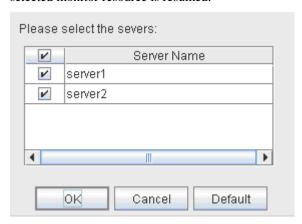
Monitor resource objects

When you right-click a monitor resource object, the following shortcut menu is displayed.
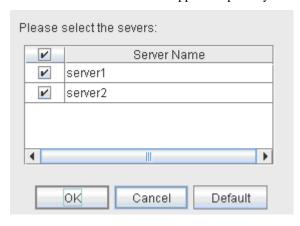
- ◆ Resume (enabled when the resource is stopped temporarily)

    Resumes a selected monitor resource. The dialog box for choosing the server on which the selected monitor resource is resumed.

- ◆ Suspend (enabled when the resource is monitoring)

    Resumes the selected monitor resource. The dialog box for choosing the server on which the selected monitor resource is stopped temporarily.

Checking the cluster status by the WebManager list view

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

To display information on the whole cluster

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

2. In this tree view, click the object icon   for the cluster. In the list view in the right pane of the window, **Name** and **Comment** are displayed.

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

Alert Service	Mirror Disk	Disk	Auto Recovery	Power Saving		
Heartbeat I/F	Timeout	Port Number	Recovery	Delay Warning		
Properties			Value			
Server Sync Wait Time			300			
Heartbeat Timeout			30000			
Heartbeat Interval			3000			
Server Internal Timeout			180			
Timeout Ratio			1			

Server Sync Wait Time: Time to wait for the other servers to start up (in seconds)
Heartbeat Timeout: Heartbeat timeout (in milliseconds)
Heartbeat Interval: The interval for sending heartbeats (milliseconds)
Server Internal Timeout: Internal communication timeout (in seconds)
Timeout Ratio: Current timeout ratio

Alert Service	Mirror Disk	Disk	Auto Recovery	Power Saving
Heartbeat I/F	Timeout	Port Number	Recovery	Delay Warning
Properties		Value		
Server Internal Port Number		29001		
Data Transfer Port Number		29002		
Kernel Mode Heartbeat Port Number		29106		
Client Service Port Number		29007		
WebManager HTTP Port Number		29003		
Alert Sync Port Number		29003		
Disk Agent Port Number		29004		
Mirror Driver Port Number		29005		

Server Internal Port Number: Port number for internal communication
Data Transfer Port Number: Port number for data transfer
Heartbeat Port Number: Port number for heartbeat
Kernel Mode Heartbeat Port Number: Port number for kernel-mode heartbeat
Client Service Port Number: Port number for client service
WebManager HTTP Port Number: Port number for WebManager
Alert Sync Port Number: Port number for alert synchronization
Disk Agent Port Number   Port number for disk agent
Mirror Driver Port Number   Port number for mirror driver (Only when Replicator/Replicator DR is used)

Alert Service	Mirror Disk	Disk	Auto Recovery	Power Saving
Heartbeat I/F	Timeout	Port Number	**Recovery**	Delay Warning

Properties	Value
Max Reboot Count	0
Max Reboot Count Reset Time	0
Use Forced Stop	Off
Forced Stop Action	BMC Power Off
Forced Stop Timeout (sec)	3

Max Reboot Count:	Maximum reboots count
Max Reboot Count Reset Time	Time to reset maximum reboot count (in seconds)
Use Forced Stop	Whether or not to perform the forced stop function
Forced Stop Action	Action of forced stop function
Forced Stop Timeout	Wait time until activation of failover group starts after forced stop has been performed (in seconds)

Alert Service	Mirror Disk	Disk	Auto Recovery	Power Saving
Heartbeat I/F	Timeout	Port Number	Recovery	**Delay Warning**

Properties	Value
Heartbeat Delay Warning	80
Monitor Delay Warning	80
COM Delay Warning	80

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

Alert Service	Mirror Disk	Disk	**Auto Recovery**	Power Saving
Heartbeat I/F	Timeout	Port Number	Recovery	Delay Warning

Properties	Value
Auto Recovery	On

Auto Recovery:	The setting whether server recovery is automatically performed after cluster server is rebooted from "Suspension (Isolated)."

Alert Service	Mirror Disk	Disk	Auto Recovery	Power Saving
Heartbeat I/F	Timeout	Port Number	Recovery	Delay Warning

Properties	Value
Server Down Notification	On
Cast Method	Unicast

Server Down Notification	When you set this to Enable, one server is allowed to tell the other servers that it is being shut down by the commands from WebManager or command line, so that a failover occurs independently of the heartbeat settings.

Note:
Even if **Server Down Notification** is set to **On,** failover is performed after heartbeat time-out when shutdown is performed with a method other than WebManager or a command.

Cast Method	This is the setting for the method to send a heartbeat (uni-cast/broadcast). When the IP address of the heartbeat I/F is IPv6. the broadcast cannot be used.

Only when Replicator/Replicator DR is used:

Properties	Value
Auto First Mirror Construction	On
Auto Mirror Recovery	On
Mirror Disk Disconnection Retry Threshold	10
Mirror Disk Disconnection Retry Interval	3
Mirror Disk Disconnection Final Action	Disconnect forcefully

Auto First Mirror Construction   Whether or not to perform auto mirror initial construction.

Auto Mirror Recovery: Whether or not to perform auto mirror recovery

Mirror Disk Disconnection Retry Threshold   Mirror disk disconnection retry threshold

Mirror Disk Disconnection Retry Interval   Mirror Disk Disconnection Retry Interval (in seconds)

Mirror Disk Disconnection Final Action   The final action at mirror disk disconnection

Properties	Value
Shared Disk Disconnection Retry Thresho...	10
Shared Disk Disconnection Retry Interval	3
Shared Disk Disconnection Final Action	Disconnect forcefully

Shared Disk Disconnection Retry Threshold   Shared disk disconnection retry threshold

Shared Disk Disconnection Retry Interval   Shared disk disconnection retry interval (in seconds)

Shared Disk Disconnection Final Action   Shared disk disconnection final action

Properties	Value
E-mail Address	
Use Network Warning Light	Off
Use Chassis Identify	Off
Enable Alert Setting	Off

E-mail Address   Alert mail address

Use Network Warning   Whether or not to use network warning light

Use Chassis Identify   Whether or not to use the chassis identify association function

Enable Alert Setting   Whether or not to enable setting

Properties	Value
Use CPU Frequency Control	On

Use CPU Frequency Control   Whether or not to use CPU frequency control

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

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

2. In the list view, select the object icon [icon]. In the right pane of the window, **Server Name**, **Type** (master server or other server), and **Status**.

Checking the status of individual server in the WebManager list view

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

2. If the object [icon] of a server is selected in the tree view, **Server Name**, **Comment**, **Version, Product, Internal Version, Install Path, IP address** and **Status** of the server, the **Heartbeat Name** and **Status** of heartbeat status and **Network partition resolution resource name** and **Status** of the network partition resolution resource status are displayed.

Server Name: server2		Details
Properties	Value	
Name	server2	
Comment		
Product	EXPRESSCLUSTER X 2.0 for Windows	
Internal Version	10.00	
Install Path	C:\Program Files\EXPRESSCLUSTER	
IP Address	192.168.16.145	
Status	Online	

Heartbeat Status	
Heartbeat Name	Status
lankhb1	Normal
lankhb2	Normal

Network Partition Resolution Status	
Network Partition Resolution Name	Status
disknp1	Normal
comnp1	Normal

Server Name:	Server name
Comment:	Comment for the server
Product	Name of the product
Internal Version:	Internal version
Install Path:	Install path of ExpressCluster
IP Address:	IP address of public LAN
Status:	Status of the server
Heartbeat Name:	Heartbeat resource name
Status:	Heartbeat resource status

Network partition resolution name: Network partition resolution resource name
Status   Network partition resolution resource status

3. Click **Details** to display the following in the dialog box.

Properties	Value
Network Warning Light IP Address	
BMC IP Address	
CPU Frequency Status	high

Network Warning Light IP Address   IP address of network warning light
BMC IP address   BMC IP address
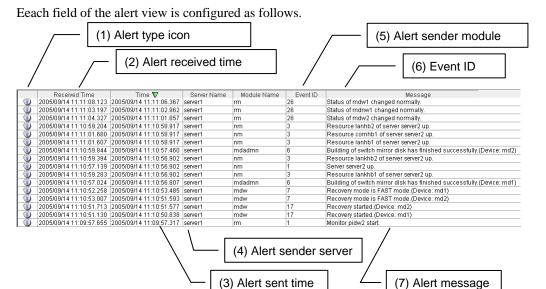
CPU Frequency Status   Current setting status of CPU frequency control

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

1. Start the WebManager. (http://*FIP_address_for_the_WebManager_group*:*port_number* (default value is 29003))

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

Checking alerts using the WebManager

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

Eeach field of the alert view is configured as follows.

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

Alert view fields

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

(1) Alert type icon

Alert type		Description
		Informational message
		Warning message
		Error message

(2) Alrert 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 name of a module that sent the alert.

Module type	Category
pm	ExpressCluster in general
rc	Group/resource related
rm	Monitor resource related
nm	Heartbeat resource related
lankhb	Kernel mode LAN heartbeat resource
disknp	Disk network partition resolution resource
fip	Floating IP resource
vcom	Virtual computer resource
vip	Virtual IP resource
cifs	CIFS resource
diskw	Disk RW resource monitoring
mdw	Mirror disk monitor resource
sdw	Disk TUR monitoring
hdtw	Hybrid disk TUR monitor resource
diskagent	Disk agent related
sdfunc	Disk function related
mdadmn	Mirror disk related
hdadmn	Hybrid disk related
armcmd	Compatible commands
event	Event log
lcns	License related
logcmd	Message output command
ptun	Parameter tuning related
dn1000s	Network warning light alert related
ptun	Mail alert related

(6) Event ID
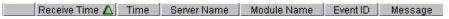
The event ID number set to each alert.

(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.
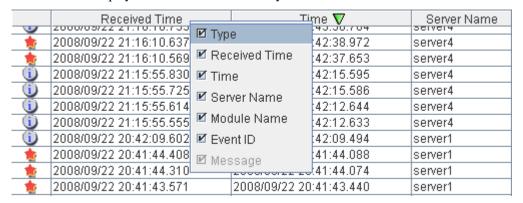
Whenever you select an item, the ▲ or ▼ mark is displayed in each field.
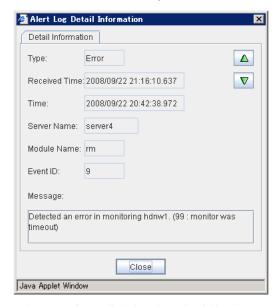
Mark	Purpose
▲	Sorts alerts in the ascending order of the selected field.
▼	Sorts alerts in the descending order of the selected field.

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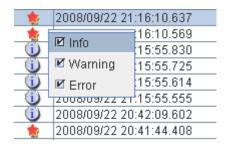
When you right-click this bar, the following pop-up window is displayed so that you can select the items to be displayed. All items are selected by default.

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

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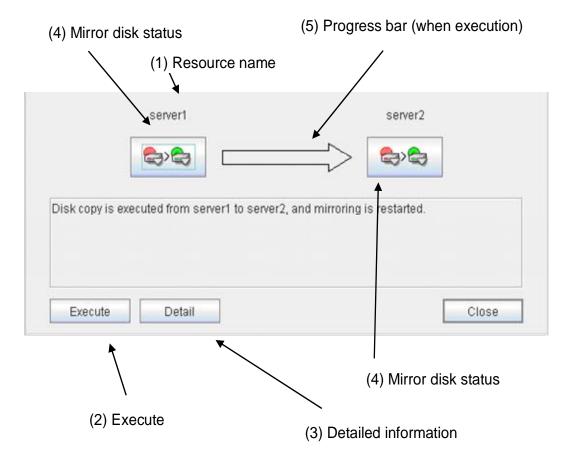
Mirror disk helper
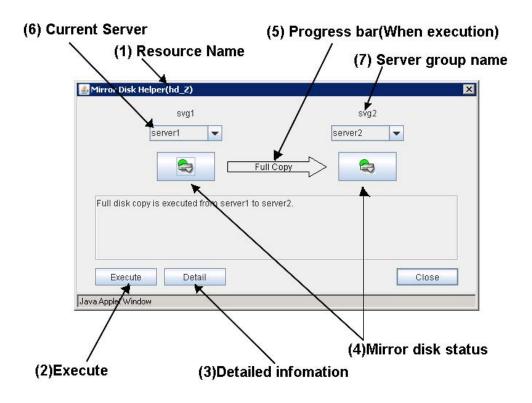
Overview of the mirror disk helper

The Mirror Disk Helper is a tool to help the recovery of mirror disk/hybrid disk. It is used by starting up from the WebManager. The following shows the layout of the Mirror Disk Helper.

For mirror disk resource

For hybrid disk resource

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

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

(1) Resource name

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

(2) Execute

When you click **Execute**, mirror recovery is started as displayed in the following dialog box. If there is any difference between the mirror disks in both servers, the mirror recovery is started.

If there is no difference between the mirror disks in both servers, the following dialog box is displayed.
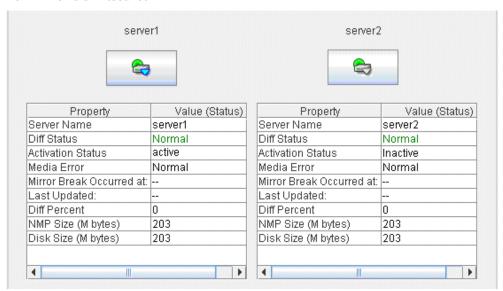
If you click **OK**, full copy of the mirror begins.

If auto mirror recovery is enabled, mirror recovery begins automatically. However, mirror recovery does not begin automatically if there is no difference between both servers, or if there are errors in mirror disks in both servers.

(3) Detailed information

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

For mirror disk resource

Server Name: Server name
Diff Status: Difference status of the mirror disk device
Active: Active status of the mirror disk device on the server
Media Error: Media error of the mirror disk resource
Mirror Break Occurred at: Mirror break time
Last Updated: The time that the data was updated the last time
Diff Percent: Difference rate
NMP Size: The data partition size as recognized by OS.
Disk Size: The physical size of data partition.
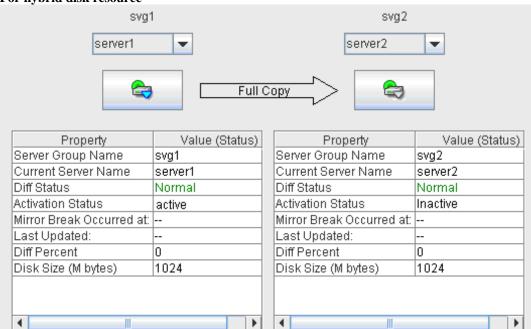
For hybrid disk resource

Property	Value (Status)
Server Group Name	svg1
Current Server Name	server1
Diff Status	Normal
Activation Status	active
Mirror Break Occurred at:	--
Last Updated:	--
Diff Percent	0
Disk Size (M bytes)	1024

Property	Value (Status)
Server Group Name	svg2
Current Server Name	server2
Diff Status	Normal
Activation Status	Inactive
Mirror Break Occurred at:	--
Last Updated:	--
Diff Percent	0
Disk Size (M bytes)	1024

Server Group Name   Server group name
Current Server Name   Name of the server that uploads and manages the disks in the server group.
Diff Status: Difference status of the mirror disk device
Activation Status: Active status of the mirror disk device on the server
Mirror Break Occurred at: Mirror break time
Last Updated: The time that the data was updated the last time
Diff Percent   Difference rate
Disk Size: The physical size of data partition

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

(4) Mirroring disk status

The following table shows the mirroring disk status of servers:

You can select what to perform for the mirror disk by clicking the icon.
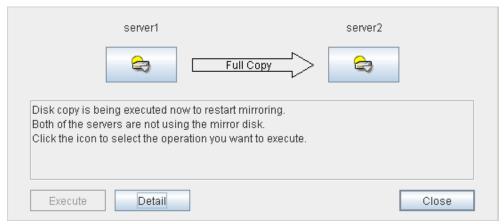
Icon	Mirroring disk status	Mirror color*
	Mirroring status is normal. The server is inactive.	Green
	Mirroring status is normal. The server is active.	Green
	Mirror recovery or forced mirror recovery is underway. The server is inactive.	Yellow
	Mirror recovery or forced mirror recovery is underway. The server is active.	Yellow
	There might be a difference, but it has not been determined which has the latest information. Mirror recovery is required.	Orange
	The server has an error. Mirror recovery is required.	Red
	The server is stopped or its status is unknown. Information on the server status cannot be acquired.	Gray
	Both systems are active.	Blue
	Cluster partition has an error.	Black

* To see the mirror color, run the clpmdstat command.

(5) Progress bar

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

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

(6) Current server (only hybrid disk resource)
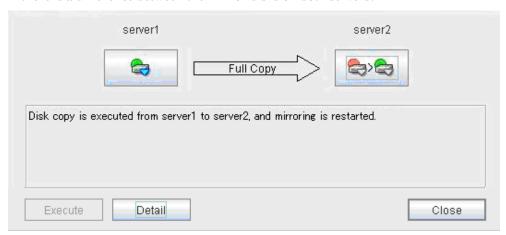
Current server displays the current server that updates and manages the disks. You can check the status of each member server of the server group by clicking the drop-down arrow. The current server is represented in the bold font. The server represented in gray font is in the down state.

When performing mirror recovery or cancelling access restrictions, you can select a server from the list shown by clicking the drop-down arrow to change a current server.

Recovering a mirror (forcefully)

1. Mirror recovery

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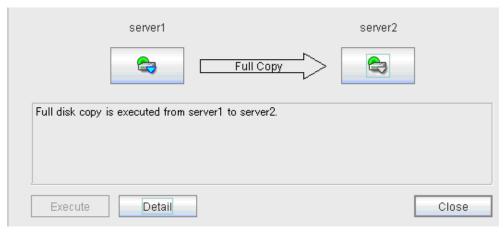
   If there is a difference between the mirror disks on both servers, and one of the servers has an error, the progress bar direction is fixed. When you click **Execute,** mirror recovery starts.

   When you click **Execute**, mirror recovery starts. If any group is active, the server with the active group becomes the source server. When it is possible to recover differences, only the difference is recovered. If it is impossible to recover differences, whole partition area is recovered.

   If there is no difference between the mirror disks on both servers:
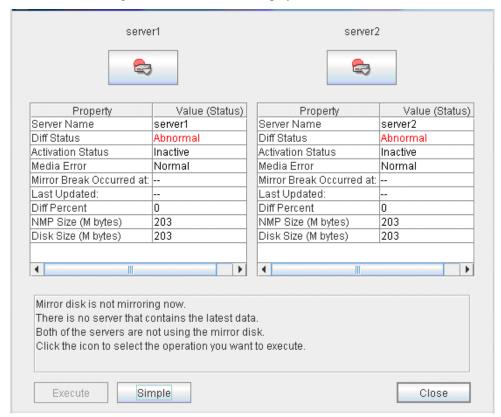
   If there is no difference, full copy of the mirror is performed.

   If there is no difference between the mirror disks of both servers, and both servers are running normally, the progress bar is displayed. When you click **Execute**, mirror recovery starts.

If the status of both servers is Error:

If both servers have errors, click **Details** to determine a source server. When you click **Details**, the following detailed information is displayed.
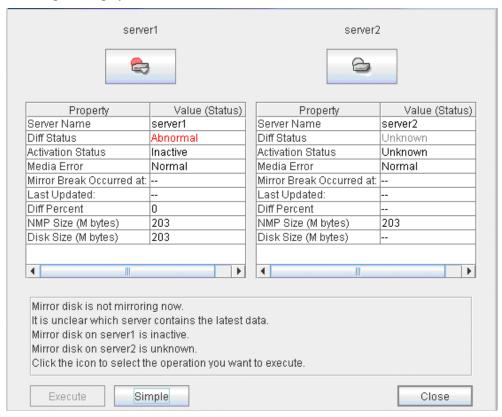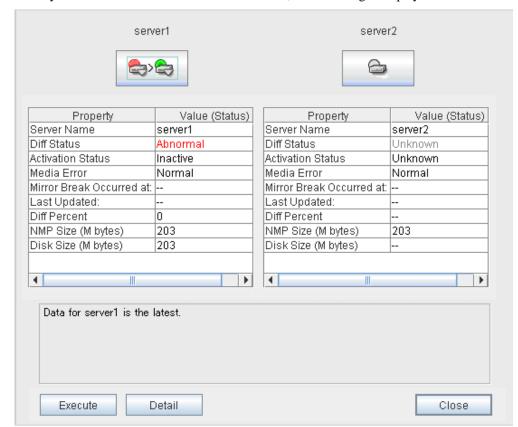
Check the **Last Data Update Time**, and choose a server with the latest data as the source server. Note that the time you see here is of the OS.

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

2. Forced mirror recovery only for a single server

When one server has an error while the other is in the unknown status or stopped, the Mirror Disk Helper is displayed.
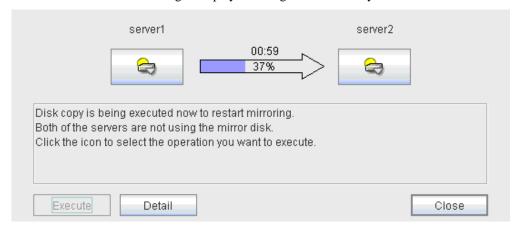
When you click the icon of the server with an error, the following is displayed:

When you click **Execute**, forced mirror recovery of only one server starts.

Stopping mirror recovery

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

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

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

Canceling access restriction

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

When you double-click the icon of the server with error, the following is displayed:

When you click **Execute**, access restriction is cancelled in the server with an error.

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

Note:
When the Auto Mirror Recovery is enabled and one of the servers is operating normally, it is necessary to disable Auto Mirror Recovery in advance or suspend the mirror disk monitor resource or hybrid disk monitor resource so that Auto Mirror Recovery does not operate when the access restriction is cancelled in the server that is abnormal.

Manually stopping and starting the WebManager

Once ExpressCluster is installed, the WebManager automatically starts and stops along with the operating system.

If you wish to stop and start the WebManager specifically, just stop or start the service for the WebManager from the Services console of Administrative Tools.

When you do not want to use the WebManager

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

For the settings of **Services** of **Administrative Tool**, change the "**Startup Type**" of the "ExpressCluster Manager" service into "Manual".

The WebManager can be configured on the **WebManager** tab in **Cluster Properties** of the Builder. For information on how to configure and reflect the settings, see "**WebManager tab**" on page 129.

Setting limitations on the connection and operation of the WebManager

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

Type of limitation

There are two ways to set usage limitations:

◆ Limiting the access by using client IP addresses

◆ Limiting the operation by using a password

Limiting the access by using client IP addresses

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

Add IP addresses to **IP Addresses of the Accessible Clients** on the **WebManager** tab in the **Cluster Properties** of the Builder. See "WebManager tab" on page 129.

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

Example: when using the Internet Explorer

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

If you limit operations, you cannot perform the following operations from the WebManager.
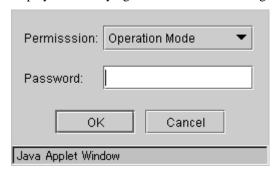
◆ Shutdown and shutdown reboot of a cluster

◆ Shutdown and shutdown reboot of servers

◆ Starting, stopping, and moving of groups

◆ Operation using the Mirror Disk Helper (only when the Replicator/Replicator DR is used)

◆ Starting up Builder

The limitation by using a password

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

To configure this limitation: in **Cluster Properties** of the Builder, click the **WebManager** tab and then **Control connection by using password**. See "WebManager tab" on page 129 for detailed information.

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

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

◆ The authorization dialog box is not displayed when the password limitation is not configured (you can log on to the WebManager without authorization).

◆ You cannot log on to the WebManager if you enter a wrong password three consecutive times.

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

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

◆ Shutdown and shutdown reboot of a cluster

◆ Shutdown and shutdown reboot of servers

◆ Starting, stopping, and moving of groups

◆ Operation using the Mirror Disk Helper (only when the Replicator/Replicator DR is used)

For the information on switching the authorization after log on and/or log out, "Switch authorization of the WebManager" on page 75.

Combination of the IP address and password
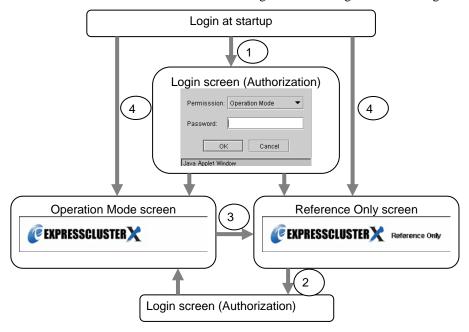
The operational limitations when using both IP addresses and passwords are the following:

Client IP address limitation	Password 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.

Switch authorization of the WebManager

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

1. Login 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. Login when a password for both operation mode and reference only is not set

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

Operating a cluster by using the WebManager

Cluster shutdown and cluster shutdown reboot

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

Mirror disk resource and hybrid disk resource

For the information on how to use the mirror disks and Mirror Disk Helper from the WebManager, see "Individual server objects" "Objects of mirror disk resource/hybrid disk resource"

Recovering servers

When **Off** is selected in **Auto Return** in **Auto Recovery** tab of the **Properties** in the Builder, if a server is shut down or rebooted without using Cluster Shutdown command , the server is started in the status of **Suspension (isolated)**. A server in this status does not run as a part of a cluster system. Thus you need to return the server to the cluster system after you finished the necessary maintenance work to the server. For the information on how to return a server to a cluster by using WebManager, see "Individual server"

Shutting down and rebooting an individual server

For the information on how to shut down and reboot an individual server from the WebManager, refer to "Individual server objects".

Starting, stopping, and moving an individual group

For the information on how to start, stop and move an individual group from the WebManger, refer to "Individual group objects."

Starting and stopping a group resource

For the information on how to start and stop a group resource from the WebManager, refer to "Group resource objects."

Resuming and suspending a monitor resource

For the information on how to resume and suspend a monitor resource, refer to "Monitor resource objects."

Limitations of the WebManager

◆ Information displayed by the WebManager does not always reflect the latest status. To acquire the latest information, click the **Reload** button.

◆ If a server fails while the WebManager is acquiring information, the information acquisition fails, which may result in the failure to show some objects.
You can either wait until the next auto refresh starts or click the **Reload** button to acquire the latest information.

◆ The ExpressCluster logs cannot be collected from two or more WebManagers simultaneously.

◆ If you work on the WebManager when no connectivity is established, it may take a while to regain control.

◆ While the mouse pointer is the hourglass which indicates that the OS is processing something, moving the cursor outside the browser may return to the arrow icon even if the process is still underway.

◆ 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.

◆ While the pointer in the WebManager appears an hourglass and you click **Start Builder** multiple times, the Builder may freeze. Do not operate the WebManager while the pointer appears as an hourglass.

Error messages on the WebManager

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

Level	Message	Cause	Solution
Info	Alert Service is already started.	The status of the alert service became normal.	-
Error	Alert service is inactive.	Starting the alert service failed.	Check the configuration of alert-related modules.
Error	Could not start the group because necessary responses have not been made.	No status can be acquired because the 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, operations can be continued.
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 details 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. Some servers may not be able to be accessed due to error.	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({0} : {1}).	Failed to connect to the WebManager.	Check if the ExpressCluster Web Alert service 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.
Error	Failed to get the latest alert log.	1) The alertlog.alt file does not exist or is corrupted. 2) The maximum 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

Level	Message	Cause	Solution
			number of the alert viewer 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 that failed to move the 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	Group is already stopped.	The group which is the target of the operation 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 ExpressCluster Web Alert service.
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 ExpressCluster Web Alert service.
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, operations can be

Section I Detailed functions of ExpressCluster

Level	Message	Cause	Solution
			continued.
Error	Operatable group does not exist.	The operation to the group failed.	Solve the problem that caused the failure of the operation to the group. For the detailed information on the error, see the alert log.
Error	Enter the number of alert logs displayed on each page.	The number of the alert log filter result to be displayed (for example, the number of logs in a window) is not set.	Specify the number of the alert log filter result to be displayed.
Error	Enter the event ID.	The ID for alert log search is not set.	Specify the ID for alert log search.
Error	Enter the module name.	The name of the module for the alert log search is not set.	Specify the name of a module for the alert log search.
Error	Enter the number of searches.	The number of alert logs to be searched is not set.	Specify the number of alert logs to be searched for.
Error	Enter the page number.	The page to show the results of the alert log research is not set.	Specify the page to show the results of the alert log research.
Error	Enter the server name.	The name of a server for alert log search is not set.	Specify the name of the server to be searched for.
Error	The selected server is invalid.	The server specified as the destination for moving the group is invalid.	Wait for a while to perform reloading to update the group status, and then perform the operation to the group.
Error	Specified server is not active.	The server that initiated the operation is not active.	Wait for a while to perform reloading to update the group, and then perform the operation.
Warning	The cluster tree obtained from server may not be completed.	An error occurred while acquiring the server status.	Try reloading later.
Error	The number of alert logs per page you have entered is not in the specified range (1~{0}).	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.	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 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 details 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,

ExpressCluster X 2.1 for Windows Reference Guide

Level	Message	Cause	Solution
			operations can be continued.
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, operations can be continued.
Warning	The number of searches entered is less than 1.	The ID set for alert log search is smaller than one.	Specify a value of 1 or greater.
Error	Page number entered is less than 1.	The number of pages specified for the alert log search is smaller than one.	Specify a value of 1 or greater.
Error	The page number entered is greater than the total page number.	The number of pages specified for alert log search is greater than the total page number.	Specify the number that is smaller than the total page number.
Warning	The properties got from server may not be completed.	Failed to acquire some information.	Try reloading later.
Error	There are servers that failed to stop.	There is a server that may have failed to shut down the cluster.	Check if the server is down. If it is not down, check that ExpressCluster is running.
Error	The value in "From" is incorrect. Enter the correct value.	The time set for start of alert log search is invalid.	Set a correct time.
Error	The value set in "From" is later than the value in "To".	The time set for start of the alert log search is later than the time set for end.	Set a correct time.
Info	The total number of pages has been changed. The server alert log will be updated.	The number of total pages of alert log filter results is updated. New alerts may have been issued while the search results were being displayed.	To reflect added alerts to the search results, close the window displaying the search results and perform search again.
Error	Failed to get mirror disk list from server.	An internal error of the Disk Agent occurred. Communication from the WebManager server to the ExpressCluster Web Alert service failed. The process on the server timed out.	Make sure that the Disk Agent is working. If the Disk Agent is not started, reboot the server.
Error	Failed to get mirror status.	The Disk Agent failed to acquire mirror disk status. An internal error of the Disk Agent occurred. Communication from the ExpressCluster Web Alert service to the Disk Agent has failed. The process in the server timed out.	Check if the Disk Agent is active. If the Disk Agent is not started, reboot the server.
Error	Failed to recover the mirror.	An error occurred while performing mirror recovery.	Make sure that the Disk Agent is operating. If the Disk Agent is not started, restart the server.
Error	Detected disk error while recovering the mirror.	A disk error was detected during the mirror recovery.	Run the clpmdstat --mirror command to check disk error status

Section I Detailed functions of ExpressCluster

Level	Message	Cause	Solution
			on each server.
Error	Failed to recover the mirror since mirror status has changed.	Mirror recovery failed because the mirror status is changed after the Mirror Disk Helper dialog box was displayed.	Close this error message dialog box, and the information will be updated.
Confirmation	Data on two disks are identical. Are you sure to execute a mirror recovery?	The mirror disks on both servers have no difference. Do you want to continue mirror recovery?	-
Confirmation	{0} is recovering now. Are you sure to stop?	Do you want to stop mirror recovery?	-
Error	Failed to stop recovery.	Failed to stop the mirror recovery.	The server may be heavily loaded. Start up the Mirror Disk Helper again.
Error	Failed to get recovery status.	Acquiring information on the progress of mirror recovery failed.	The server may be heavily loaded. Start up the Mirror Disk Helper again.
Error	The local applet version does not match the server's. Close the browser and clear the applet cache.	A mismatch between the Java applet and the server occurred because the Java cache remains.	Exit the browser. Clear the cache of Java and restart the browser.
Error	Failed to recover since NMP size of "{0}" is smaller than "{1}".	Data partition size of the source server is larger than that of the destination server when recovering a mirror. The recovery is stopped. Initial mirror may not have been configured properly.	Specify a server as a source whose data partition size is smaller.
Error	Failed to get server list.	Failed to get a server list.	Check if there are many log collection operations. Retry later.
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 collecting logs.	Check the result in dialog box showing the progress of log collection (See "Collecting logs (clplogcc command)").
Error	Failed to Login (Internal error)	An internal error occurred when logging on to the WebManager.	Try logging on to the WebManager again. Start the ExpressCluster Web Alert service if the error still occurs.
Error	Failed to login.	Incorrect password was entered three consecutive times.	Try logging on to the WebManager again with a correct password.
Error	Incorrect password.	Incorrect password was entered.	Enter a correct password.
Error	Authorization failed.	Password was changed while accessing the WebManager.	Try logging on to the WebManager again.
Error	Authorization failed. (Internal error.)	An internal error occurred when accessing to the WebManager.	Try logging on to the WebManager again. Reboot the

Level	Message	Cause	Solution
			ExpressCluster Web Alert service if the error still occurs.
Error	Failed to connect to the server.	Failed to communicate with the WebManager.	Check if the ExpressCluster Web Alert service is working on the server. Check if connecting to the server can be performed successfully.
Error	Failed to get the list of mirror disk error.	Disk Agent failed to get the information on the mirror disk. Internal error of the Disk Agent occurred. The access to the Disk Agent from the ExpressCluster Web Alert service failed. The processing timed out on the server.	Check if the Disk Agent is operating. If the Disk Agent is not operating, restart the server.
Error	Failed to get the data for the cluster tree view from the server.	Failed to get the cluster data of the destination server. Failed to get all cluster data in the cluster tree view.	Check if ExpressCluster is operating by running a command on the destination server Check if all cluster management IPs in the tree view are running normally.
Error	Another user is performing auto-search now. Try it again later.	Auto-search has already been performed from the other manager.	Retry auto-search later.
Error	Internal error.	An internal error of the WebManager has occurred.	Perform the auto-search again. If an error still occurs, restart the ExpressCluster Web Alert service.
Warning	Failed to obtain a part of the cookie data.	The cookie file that supports the IP address was corrupted.	Delete the cookie file and open the window again.
Warning	Could not save the cluster list because cookie is not allowed. Make cookie settings enabled to display the list of clusters, and then restart your browser.	Cookie is not allowed to be used by the browser.	Allow cookie by the browser.
Error	The specified cluster "{0}" has been registered.	The cluster with the same name already exists in the tree view of the cluster.	Use the cluster data that already exists in the tree view.
Info	The cluster "{0}" has been successfully registered.	The cluster has already been registered in the tree view.	-
Error	The cluster cannot be unregistered now because it is being updated to the latest data. Try again later.	The screen is updating by getting the latest data from the WebManager server.	Try again after updating the data is completed.
Error	Failed to find this cluster. Check that the IP address or port	The cluster has not been found by the P address and port number entered.	Check if the IP address and the port number are correct.

Section I Detailed functions of ExpressCluster

Level	Message	Cause	Solution
	number is correct, and that the cluster is started.		Check if the cluster you want to find is operating.
Confirmation	Are you sure to unregister "{0}"?	Are you sure to delete the selected cluster from the management window?	
Error	Specify the IP address.	The IP address is not set.	Check if the IP address is set.
Error	Specify the port number.	The port number is not set.	Check if the port number is set.
Error	The specified IP address is invalid.	The specified IP address is invalid.	Specify the valid IP address.
Error	The specified IP address range is invalid.	The specified start IP address is larger than the stop IP address.	Set the valid IP address range.
Error	Specify the value of 1 ~ 65535 to the port number.	The port number is out of the range.	Specify the value of 1 ~ 65535 to the port number.
Error	The specified port range is invalid.	The specified start port number is larger than the stop port number.	Set the valid port number range.

Chapter 2   Functions of the Integrated WebManager
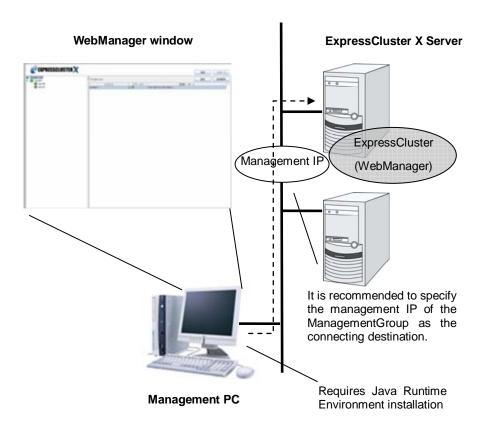
This chapter provides information on functions of the Java Applet version Integrated WebManager. Refer to "ExpressCluster® X Integrated WebManager Administrator's Guide" for the Java application version. Integrated WebManager.

This chapter covers:

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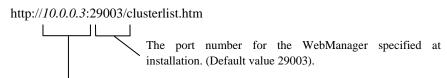
The Integrated WebManager is a function that collectively manages and monitors multiple cluster systems through the network. The following diagram shows the overview of the Integrated WebManager.

WebManager window   **ExpressCluster X Server**

Management IP

ExpressCluster
(WebManager)

It is recommended to specify the management IP of the ManagementGroup as the connecting destination.

Management PC

Requires Java Runtime Environment installation

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

Access to the Integrated WebManager

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

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

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

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

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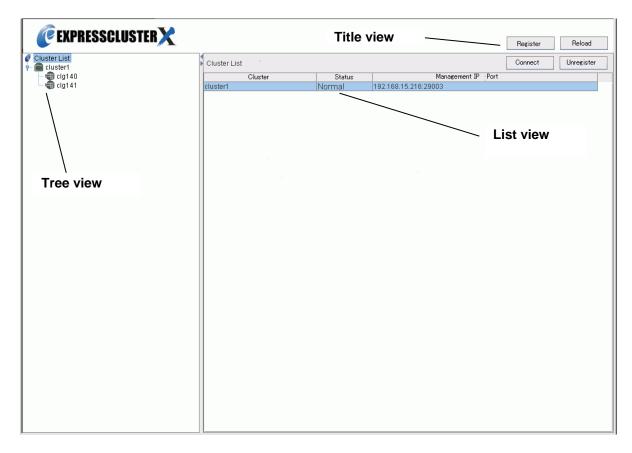
This section provides information on the window of the Integrated WebManager.

Note:
The windows of the Integrated WebManager used in this explanation are based on the display in the English environment. The language displayed on the Integrated WebManager's windows depends on the language used in the operating system of the machine on which it is running.

The main window of the WebManager

The window of the Integrated WebManager consists of three views.

Title view

The following operations can be performed by using two buttons.

◆ Register

◆ Reload

◆ Option (configures whether or not to substitute by the IP address of Public-LAN.)

Tree view

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

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

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

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

Cluster List   (1)   Whole cluster
cluster1   (2)   Cluster
clg140   (3)   Server
clg141

No.	Icon		Status	Description
(1)	Whole cluster		-	No status
(2)	Cluster		Normal	All servers have been started.
			Warning	One or more server is down or in the suspended status.
			Error	All servers are down or in the suspended status (isolated) .
			Unknown	No information is acquired.
(3)	Server		Online	The server is running normally.
			Warning	Some servers cannot communicate.
			Suspension (Network Partition Unsolved)	The network partition cannot be solved, because the disk network partition resolution resource is in the error status.
			Suspension (Isolated)	The server is shut down and rebooted. The cluster system did not stop or shut down the server.
			Offline or Unknown	The server is not working, or no information is acquired.
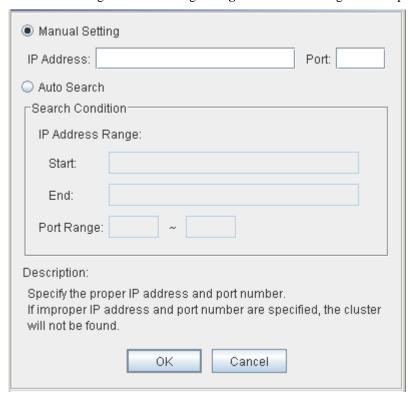
The title view of the Integrated WebManager

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

EXPRESSCLUSTER X   Register   Reload

How to register a cluster to the Integrated WebManager

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

Manual Setting

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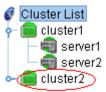
IP address

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

Port:

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

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

Auto Search

Detects clusters on the network and registers it to the Integrated WebManager automatically,.
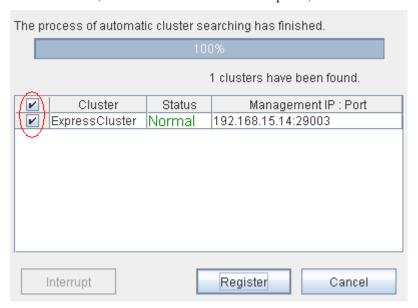
IP Address Range:

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

Port Range:

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

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

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

How to update the information on the Integrated WebManager

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

Note:

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

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

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

How to start up a WebManager from the Integrated WebManager

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

Start the WebManager by using the management IP

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

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

◆ Using **Connect**

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

◆ Using the right-click menu

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

How to remove a cluster from the Integrated WebManager

◆ Using **Unregister**

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

Clusters will be deleted in the order that is displayed on the tree view.

◆ Using the right-click menu

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

Error messages on the Integrated WebManager

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

Level	Message	Cause	Solution
Error	Failed to get the data for the cluster tree view from the server.	Failed to get the cluster information of the destination server.	Check if ExpressCluster is operating in destination server by using the clpstat command.
		Failed to get all cluster information in the cluster tree view.	Check if all cluster management IPs in the cluster tree are operating properly.
Error	Another user is performing auto-search now. Try it again later.	Other WebManager has already performed auto-search.	Perform auto-search after waiting for a while.
Error	Internal error.	Internal error has occurred in the WebManager.	Perform auto-search again.
			If this error occurs again, restart the WebManager service.
Warning	Failed to obtain a part of the cookie data.	Cookie file corresponding to the IP address of the server connected to the browser is corrupted.	Delete the cookie file, close the browser, and then restart the browser.
Warning	Could not save the cluster list because cookie is not allowed. Make cookie settings enabled to display the list of clusters, and then restart your browser.	Use of cookie is prohibited by the browser.	Allow cookie on your browser.
Error	The specified cluster "{0}" has been registered.	Same cluster name already exists in the cluster tree view.	-
Info	The cluster "{0}" has been successfully registered.	Specified cluster is registered to the tree.	-
Error	The cluster cannot be unregistered now because it is being updated to the latest data. Try again later.	Getting the latest information from the WebManager Server.	Try again after the update is completed.
Error	Failed to find this cluster. Check that the IP address or port number is correct, and that the cluster is started.	The cluster was not found by the IP address and port number that you have entered.	Check if the IP address and port number is correct.
			Check if the cluster that you want to find is operating.
Confirmation	Are you sure to unregister "{0}"?	Are you sure to delete the selected cluster?	-
Error	Specify the IP address.	The IP address is not set.	Close the error dialog box and configure the IP address of the cluster.
Error	Specify the port number.	The port number is not set.	Close the error dialog box and set the port number of the cluster.
Error	The specified IP address is invalid.	The specified IP address is invalid.	Close the error dialog box and set the correct IP address.
Error	The specified IP address range is invalid.	The value of start IP address is larger than stop IP address.	Specify the correct IP address range.

Level	Message	Cause	Solution
Error	Specify the value of 1 - 65535 to the port number.	The value of port number is outside of the range.	Specify the value between 1 through 65535.
Error	The specified port range is invalid.	The value of start port number is larger than stop port number.	Specify the correct range of port number.

Chapter 3   Function of the Builder

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

Overview of the Builder

The ExpressCluster X Builder is a tool for creating and changing the cluster configuration data (config and/or script) for the ExpressCluster Ver3.0 or later.

Note:

"Host name" in this guide represents the short name that excludes the domain name from a frequently qualified domain name (FQDN).

The table below describes the icons in "Using the menu bar of the Builder" and "Parameter details."

These icons represent the operations required to reflect the changes of items to the cluster. The table below shows the priorities of required operations in the descending order (high (1) to low (6)) if you make changes in multiple items.

Icon	Priority	How to change	Refer to
ShutdownReboot	1	Shut down and reboot cluster	The *Installation and Configuration Guide* Chapter 8, "Preparing to operate a cluster system."
StopRestart	2	Stop and restart the cluster daemon	The *Installation and Configuration Guide* Chapter 8, "Preparing to operate a cluster system."
SuspendResume	3	Suspend and resume the cluster daemon	The *Installation and Configuration Guide* Chapter 8, "Preparing to operate a cluster system."
GroupStopRestart	4	Stop and resume the group	The *Installation and Configuration Guide* Chapter 8, "Preparing to operate a cluster system."
MStopRestart	5	Stop and resume the WebManager Stop and resume the alert log	The *Reference Guide* Chapter 1 "Function of the WebManager"
(No icon)	6	Upload only	The *Installation and Configuration Guide* Chapter 8, "Preparing to operate a cluster system."

To form a new cluster, refer to the *Installation and Configuration Guide*.

Considerations for using the Builder

◆ The following products' cluster configuration data is not compatible.

The Builder except the ExpressCluster X 1.0/2.0/2.1 for Windows

The trekking tool of the ExpressCluster for Linux

The trekking tool of the ExpressCluster for Windows Value Edition

◆ If you close the Web browser (by clicking **Exit** from the menu or clicking **X** at the top right-hand corner of the window frame), the changes made will be discarded. Even when you changed the configuration data, no dialog box asks if you need to save the changes. To save the changes, click **File** from the menu bar on the Builder and then click **Save** before you exit.

◆ If you reload data on the Web browser (by selecting **Refresh** from the menu or clicking **Reload** on the toolbar), the changes 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** on the **WebManager** tab (See "WebManager tab" on page 129 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.

◆ In the environment where both Microsoft Windows Vista™ and Internet Explorer 7 are used, disable **Protected Mode** on the security setting of Internet Explorer 7.

◆ The JIS 2004 unique characters supported by Microsoft Windows Vista™ are not supported. You cannot enter or view any character added by JIS 2004.

Limitations on using the Builder
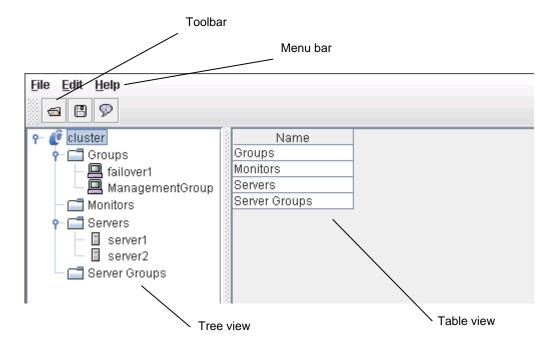
◆ If you change the screen resolution while the Builder is running, the Java VM stack trace (example: NullPointerException) may be logged on the Java console. The Builder can keep running.

◆ 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 135), 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.

Details on the Builder screen

This topic explains the Builder screen layout.

Overview of the ExpressCluster X Builder

The screen layout of the Builder is displayed below.

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

Tree view
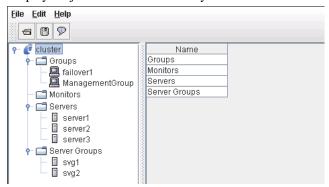
The following objects are displayed in the tree view:

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

ExpressCluster X 2.1 for Windows Reference Guide

Table view
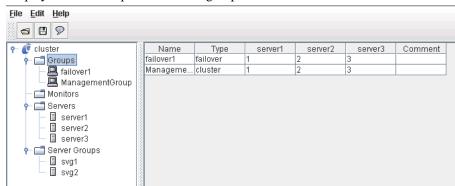
Table for cluster name selection

Displays objects in the root hierarchy.

Table for group selection

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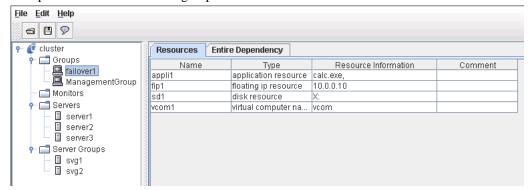
Column name	Overview
Name	Displays the group names in alphanumerical order.
Type	Displays the group type.
Server names (The number of columns dynamically increases or decreases according to the number of servers)	Represents the startup order of groups on the servers displayed by column names. The top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

Table for group name selection

Resources
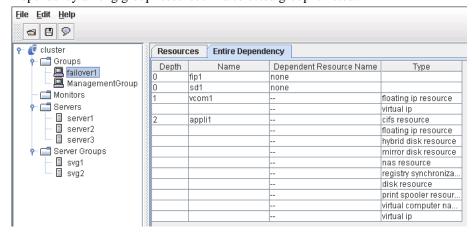
Group resources in the selected group are listed.

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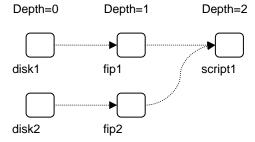
Dependency List

Dependency among group resources in a selected group is listed.

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

The levels of depth are illustrated below. Arrows (->) in the figure represent the group resource activation order.
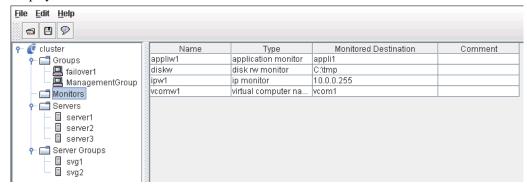
The dependencies in this figure are listed below. These are not the default dependencies, but specified with resource names.

Depth	Name	Dependent Resource Name	Type
0	disk1	none	-
0	disk2	none	-
1	fip1	disk1	disk resource
1	fip2	disk2	disk resource
2	script1	fip1	floating ip resource
-	-	fip2	floating ip resource

Table for monitor resource selection
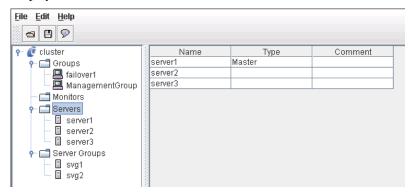
Displays the list of monitor resources.

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

Table for server selection
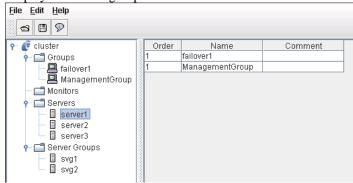
Displays the list of servers.

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

Table for server name selection
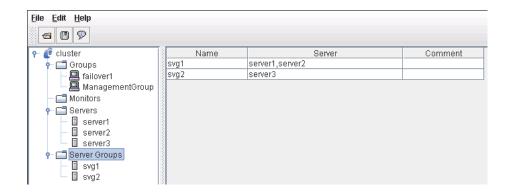
Displays the list of groups allowed to start on the selected server.

Column name	Overview
Order	Displays the server priority. The groups in the name cells start on servers in this order. "1" is displayed for the top priority. This list is displayed in the descending order of priority. This field is blank if the group does not have a specific startup order of servers (if it follows the servers' priorities). The WebManager group is not displayed.
Name	Displays the group name.
Comment	Displays comments specified for the group.

Table for server group selection

Displays the list of server groups.
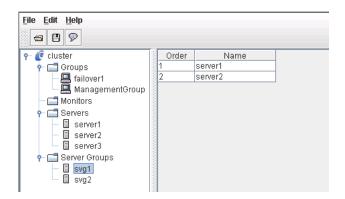
Column name	Overview
Name	Displays the server group name.
Server	Displays the names of servers in the server group.
Comment	Displays comments specified for the servers.

Table for server group name selection

Displays the list of servers in the selected server group.

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

Pop-up menu

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

If select	Displayed menu	Refer to
no_cluster_name	Cluster Generation Wizard	Creating a new cluster (on page 108)
cluster_name	Remove Cluster	Removing an object (on page 116)
	Rename Server	Renaming an object(on page 117)
	Properties	Properties (on page 117)
Servers	Add Server	Adding an object (on page 116)
	Properties	Properties (on page 117)
server_name	Remove Server	Removing an object (on page 116)
	Rename Server	Renaming an object (on page 117)
	Properties	Properties (on page 117)
Monitor Resources	Add monitor resource	Adding an object (on page 115)
Groups	Add Group	Adding an object (on page 115)
group_name	Add Resource	Adding an object (on page 115)
	Remove Group	Removing an object (on page 116)
	Rename Group	Renaming an object (on page117)
	Properties	Properties (on page 117)
group_resource_name	Remove Resource	Removing an object (on page 116)
	Rename Resource	Renaming an object (on page 117)
	Properties	Properties (on page 117)
monitor_resource_name	Remove Monitor Resource	Removing an object (on page 116)
	Rename Monitor Resource	Renaming an object (on page 117)
	Properties	Properties (on page 117)
Server Groups	Add server group	Adding an object (on page 115)
server_group_name	Remove server group	Removing an object (on page 116)
	Rename server group	Renaming an object (on page 117)
	Properties	Properties (on page 117)

Using a tool bar of the Builder

The Builder provides a toolbar:

File   Edit   Help
🗁 💾 💬

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

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

Button	Function	Refer to
🗁	Opens a file. This is the same as clicking **File** from the menu bar, and pointing to **Open**.	"Opening the configuration file" (on page 108)
💾	Saves a file. This is the same as clicking **File** from the menu bar and then selecting **Save**	"Saving the configuration file" (on page 109)
💬	Displays the version information. This is the same as clicking **Help** from the menu bar and then selecting **Version Information**.	"Checking the version information of the Builder"(on page 117)
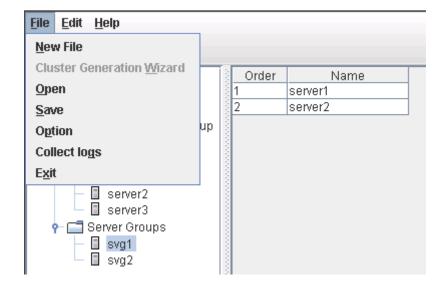
Using the menu bar of the Builder

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

Select **File** to display the following menu.

Menu	Function
New File	Creates a new cluster.
Cluster Generation Wizard	Starts the cluster generation wizard.
Open	Opens the configuration file.
Save	Saves the configuration file.
Download the Configuration File	Downloads the configuration file reflected to the cluster.
Upload the Configuration File	Uploads the configuration file and reflect it to the cluster.
Option	Starts the **Option** dialog box.
Collect logs	Starts the **Collect 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 109.

3. On the left pane of the screen on the tree view displayed, right-click the cluster icon and click **Cluster Generation Wizard**. Use the **Cluster Generation Wizard** to create a cluster.

For the **Cluster Generation Wizard,**, refer to Chapter 5, "Creating the cluster configuration data" in the *Installation and Configuration Guide*.
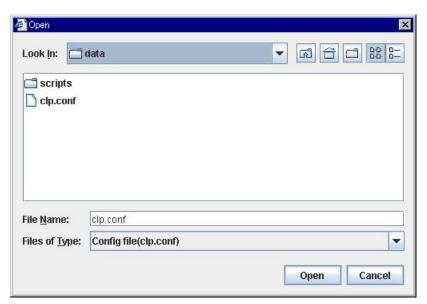
Opening the configuration file

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

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

How to use:

1. Click **Open** from the **File** menu.

2. The **Open** dialog is displayed. Select an appropriate configuration file and click **Open**. The data of the configuration file is displayed in the Builder.

For **File Name**, select or type "clp.conf."

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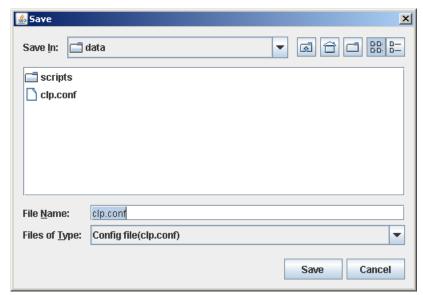
Click **Save** to save the cluster configuration data you are editing. This menu becomes available if you have created a cluster configuration data. Save the file as "clp.conf."

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

◆ The server exists.

◆ Kernel-mode LAN heartbeat resource exists.

How to use:

1. Select **Save** from the **File** menu.

2. The **Save** dialog is displayed. Select an appropriate place to save the configuration file and click **Save**.

For **File Name**, select or type "clp.conf."

Note:
When using Builder on the server on which ExpressCluster is operated, do not edit etc\clp.conf in the ExpressCluster installation path. Otherwise, messages regarding how to reflect the changes are not properly displayed, and/or ExpressCluster may not work properly. Save the file on a different directory temporarily.
When uploading is performed by using the clpcfctrl command, specify the directory where the file is saved by using the -x option.

Downloading the configuration file

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 109.

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.**

Note:
Do not create a folder or a file under the <ExpressCluster installation path>\scripts on the server. Downloading the configuration file may fail if you create a file or a folder.

Uploading the configuration file

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.

◆ A server exists.

◆ A LAN heartbeat resource of kernel mode exists.

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

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

Message	Solution
The upload is completed successfully.	-
The upload is completed successfully. To apply the changes you made, from the Service menu, restart the WebManager and then start the cluster.	-
The upload is completed successfully. To apply the changes you made, shutdown and the reboot the cluster. Shut down all servers when the cluster is stopped.	-

Message	Solution
The upload is completed successfully. To apply the changed you made, restart the WebManager from the Service menu.	-
There is the disk information that is not configured. Are you sure you want automatic configuration?	Some GUID information of the volume is not configured. If you select **Yes**, automatic configuration is performed by determining the current GUID information from the derive letter.
There is the HBA information that is not configured. Are you sure you want automatic configuration?	The HBA information is not configured for the server where the information of HBA for accessing the shared disk was configured at the time of the installation. If you select **Yes**, the information configured at the time of the installation is inherited.
There is difference between the disk information in the configuration information and the disk information in the server. Are you sure you want automatic modification?	The combination between the GUID information of the volume and the drive letter does not match with the one on the actual servers. If you select **Yes**, automatic configuration is performed by determining the current GUID information from the derive letter.
The upload was stopped. To upload the configuration file, suspend the cluster from the Service menu.	Since the cluster has not been stopped, uploading the cluster configuration data has been cancelled. Stop the cluster first, and then upload the data again.
The upload was stopped. To upload the configuration file, stop the groups to which you made changes.	Since the cluster has not been suspended, uploading the cluster configuration data has been cancelled. Suspend the cluster first, and then upload the data again.
The upload was stopped. To upload the configuration file, stop the resources to which you made changes.	Since the group whose settings have been changed has not been stopped, uploading the cluster configuration data has been cancelled. Stop the group whose settings have been changed, or the group to which the resource whose settings have been changed belongs, and then upload the data again.
The upload was stopped. Applying the cluster configuration file failed in one or more servers.	Since the resource whose settings have been changed has not been stopped, uploading the cluster configuration data has been cancelled. Stop the resource whose settings have been changed, and then upload the data again.
The upload was stopped. Applying the cluster configuration file failed in one or more servers.	Since there is a server that failed to send the cluster configuration data, uploading the cluster configuration data has been cancelled. Upload the data again.
The upload was stopped. There is one ore more servers that cannot be connected to. To apply cluster configuration information forcibly, run the clpcfctrl command on the server.	Since there is a server that cannot be connected to exist in the cluster, uploading the cluster configuration data has been cancelled. Make sure that all the servers in the cluster have been started, and then upload the cluster configuration data. Even if a server that cannot be connected to exists in the cluster, to upload the cluster configuration data forcibly, refer to "Creating a cluster and backing up configuration data (clpcfctrl command)" in Chapter 4 "ExpressCluster command reference."
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.

Section I Detailed functions of ExpressCluster

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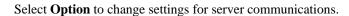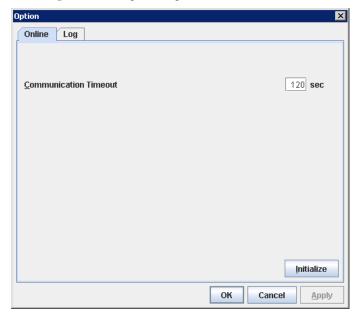
(2) Save the cluster configuration data that you have saved on a server in the cluster.
    Example) Save the data in C:\config that you have saved in step (1) in the C:\tmp
          directory on a server in the cluster.

(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 "C:\tmp" --force
```

Changing communication settings

Select **Option** to change settings for server communications.

Communication Timeout (0 to 999)
This is the time-out value when accessing a server.

Changing log level settings of Builder

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

Log Level

Configure the level of internal logs that Builder produces during operating.

- 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
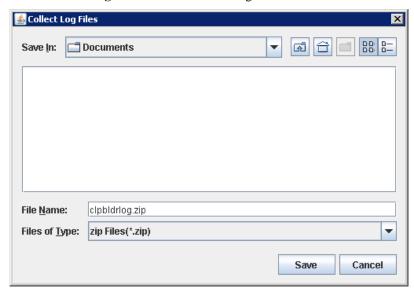
    Select this to read logs of internal trace, and those from the information, warning and error levels. The greater the number is, more detailed the trace is.

Output on JAVA Console

Click this to configure whether or not to report logs to the JAVA console.

Collecting Builder logs

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

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

Exiting from the Builder

Exit from the Builder by selecting **Exit**. Do not exit from your Web browser.
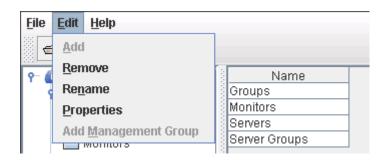
If any change was made in the cluster configuration data, a dialog box asks if you want to save the changes.

Select **Yes** to save the changes. The dialog box where you can specify a folder to save the file is displayed. For how to save the file, refer to "Saving the configuration file" on page 109. Select **No** if you do not need to save the changes. Exit from the Builder discarding the changes you made in the cluster configuration data.

Edit menu

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

Menu	Function
Add	Adds the object.
Remove	Deletes the selected object.
Rename	Changes the name of the selected object.
Properties	Displays the properties of the selected object.
Add Management Group	Adds the management group.

Adding an object

Displays the wizard for adding a server, group, group resource or 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	How to change
🗀 Groups	Group	SuspendResume
🖥 *group_name*	Group resource	SuspendResume GroupStopRestart
🗀 Monitors	Monitor resource	SuspendResume
🗀 Servers	Server	SuspendResume
🗀 Server Groups	server group	SuspendResume

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

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, select **New File** from the **File** menu.

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.	SuspendResume
Group Name	- A recovery target of monitor resource[1]. - Has group resources.	SuspendResume GroupStopRestart
Group Resource Name	- A recovery target of monitor resource[1]. - A target object in the monitoring timing of monitor resource[1]. - To be monitored by the mirror disk monitor resource[1]. - A mirror disk resource that uses the mirror connect to be monitored by the mirror disk connect monitor resource[1]. - Other group resources in the same group depend on it.	SuspendResume GroupStopRestart
Monitor Resource Name	- No condition for those other than mirror disk monitor resource. - **Auto Mirror Recovery** is selected on the **Mirror Disk** tab of **Cluster Properties** for mirror disk monitor resource.	SuspendResume
Server Group Name	- The server group is registered as the server group of failover group.	SuspendResume

---

[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.

[server1] Change Server Name

Enter a new server name

New Name   server

OK   Cancel

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.	**SuspendResume** **GroupStopRestart**
Group Resource Name	-Up to 63 characters (63 bytes) -Names cannot start or end with a hyphen (-) or space.	**SuspendResume** **GroupStopRestart**
Cluster Name Monitor Resource Name		**SuspendResume**
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 63 characters (63 bytes) - Neither hyphen (-) nor space can be the first or last letter in names. - A name consisting of only numbers is not allowed. -Do not use "localhost" as a server name.	When changing a server name, you have to be careful. For the procedure of change, see Chapter 10, "The system maintenance information " in the *Reference Guide.*
Server Group Name	- The naming conventions the same as the host name of TCP/IP that can be set by the OS. - Up to 31 characters (31 bytes) - Neither hyphen (-) nor space can be used for the first and last letters in names. - A name consisting only of numbers is not acceptable.	

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

Properties

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

For details, see "Parameter details" on page 118.

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**.

EXPRESSCLUSTER and Builder versions are displayed.

Section I Detailed functions of ExpressCluster
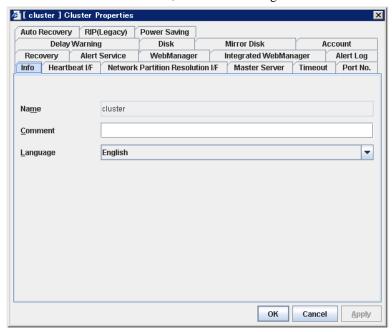
Parameter details

Cluster properties

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

Info tab

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

Name

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

Comment
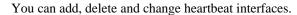
You can enter a comment for the cluster. Only alphanumeric characters are allowed.
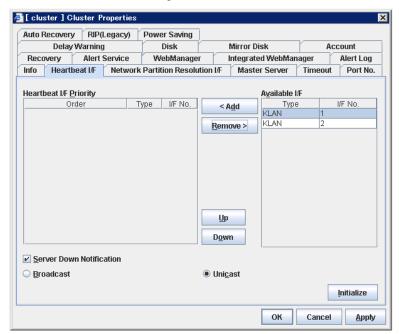
Language `SuspendResume` `MStopRestart`

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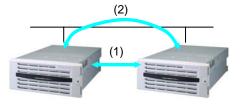
◆ English

◆ Japanese

Heartbeat I/F tab

You can add, delete and change heartbeat interfaces.

Heartbeat interfaces used by ExpressCluster are listed in **Heartbeat I/F Priority**. Heartbeat interfaces that are not in use are listed in **Available I/F**. Types of heartbeat devices are as follows:

(1) Interconnect for LAN heartbeat (kernel mode)
(2) Public LAN heartbeat (kernel mode)

Heartbeat devices types are displayed on this tab as follows:

Heartbeat device type	Type	How to display in Available I/F[2]
Interconnect for LAN heartbeat (kernel mode)	KLAN	Add to "Interconnect LAN I/F tab."
Public LAN heartbeat (kernel mode)		

◆ If one or more servers are defined, you have to define at least one LAN interface in **Heartbeat I/F Priority**. It is recommended to specify two or more LAN interfaces.

◆ The priority order of the LAN heartbeat for interconnect should be set higher than that of public LAN heartbeat. You can adjust the order by using the **Up** and **Down** buttons after adding the priority order of the LAN heartbeat for interconnect to the **Heartbeat I/F Priority**.

◆ Two or more kernel mode LAN heartbeat resources and shared kernel mode LAN heartbeat resources for interconnect and public are recommended to be specified.

---
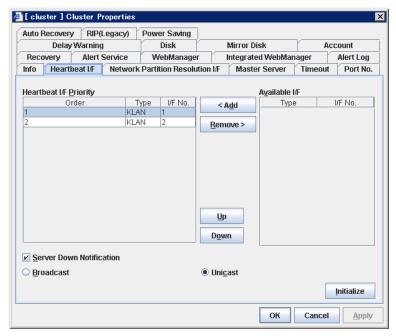
[2] Numbers you see in **I/F No.** cells are those you specified on each tab in **Server Properties**.
Section I Detailed functions of ExpressCluster

Add   SuspendResume

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

Remove   SuspendResume

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

Up & **Down**   SuspendResume

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

Server Down Notification

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

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

◆ When selected:

   Server down will be notified.

◆ When cleared:

   Server down will not be notified.

Broadcast and Unicast   SuspendResume

Select the communication method of a heartbeat from the following.

◆ Broadcast
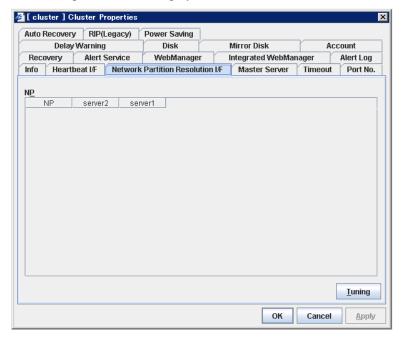
   Communicate in broad cast method. However, it cannot be used with IP v6.

ExpressCluster X 2.1 for Windows Reference Guide

◆ Unicast

Communicate in unicast method

Network Partition Resolution I/F tab

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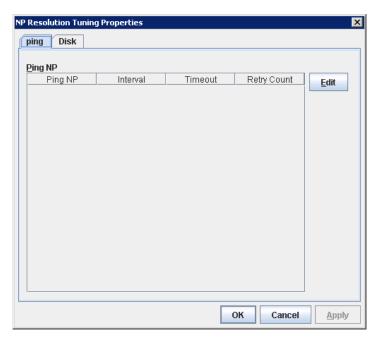
Tuning

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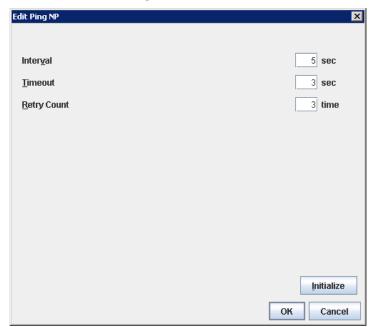
Ping tab

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

Edit

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

◆ Interval (2 to 999) SuspendResume

This value indicates an interval to issue the ping command.

◆ Timeout (1 to 999) SuspendResume

This value indicates the time-out of the ping command.

◆ Retry Count (1 to 999) SuspendResume

This value indicates the times to reissue the ping command.
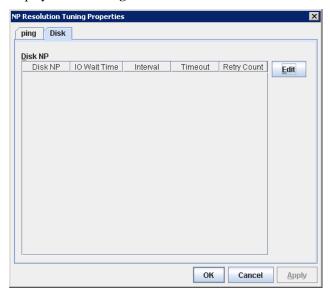
*Set each value according to the following requirements.

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

Requirement 2: Interval > Timeout
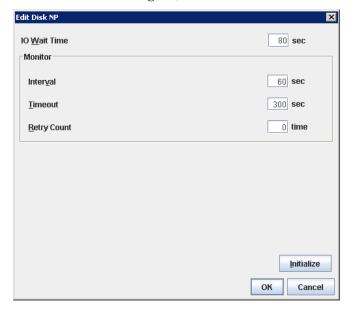
Disk tab

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

Edit

This operation is used to edit the detailed setting of the Disk NP. Select the Disk NP that you want to edit from the **Ping NP**, and select **Edit**.
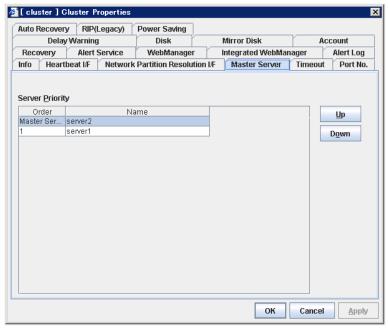
◆ IO Wait Time (1 to 9999) `SuspendResume`

This is the time to wait for IO of a disk.

◆ Interval (1 to 999) `SuspendResume`

This is the interval to perform monitoring.

◆ Timeout (5 to 999) `SuspendResume`

This is the time-out to perform monitoring.

◆ Retry Count (0 to 999)   `SuspendResume`

This is the count to retry monitoring.

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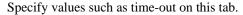
Define the priorities of servers on this tab. All registered servers are listed here. Master server is the server that contains the master of the cluster configuration data. This is the top priority server.
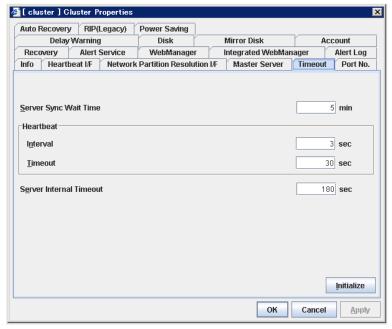
Up & Down   `SuspendResume`

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

Timeout tab

Specify values such as time-out on this tab.

Server Sync Wait Time (0 to 99)

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

Heartbeat

◆ **Interval** (1 to 99)　　**SuspendResume**

Interval of heartbeats

◆ **Timeout** (2 to 9999)　　**SuspendResume**

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

• This time-out should be longer than the interval.

Server Internal Timeout (1 to 9999)　　**SuspendResume**
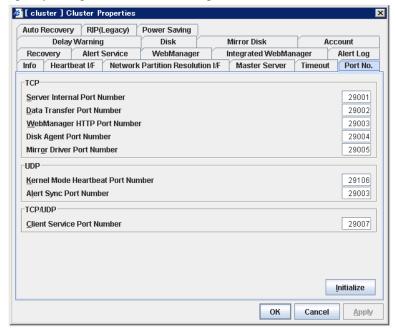
The time-out to be used in the ExpressCluster Server internal communications

Initialize

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

Port No. tab

Specify TCP port numbers and UDP port numbers.

TCP

No TCP port numbers can be overlapped. When the Replicator/Replicator DR is used, they should not be overlapped with any mirror data port number of any mirror disk resources and hybrid disk resource.

◆ **Server Internal Port Number** (1 to 65535[3])   `SuspendResume` `MStopRestart`

This port number is used for internal communication.

◆ **Data Transfer Port Number** (1 to 65535[3])   `ShutdownReboot`

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

◆ **WebManager HTTP Port Number** (1 to 65535[3])   `MStopRestart`

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

◆ **Disk Agent Port Number** (1 to 65535 [3])   `ShutdownReboot`
This port number is used for a disk agent port number.

◆ **Mirror Driver Port Number** (1 to 65535 [3])   `ShutdownReboot`
This port number is used for a mirror driver.

UDP

No UDP port numbers can be overlapped.

◆ **Kernel Mode Heartbeat Port Number** (1 to 65535[3])   `SuspendResume`

This port number is used for kernel mode heartbeat.

◆ **Alert Sync Port Number** (1 to 65535[3])   `MStopRestart`

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

---

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

TCP/UDP
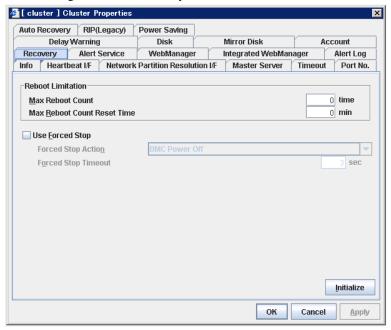
◆ **Client Service Port Number** (1 to 65535 [3])   `ShutdownReboot`
This port number is used for client service.

Initialize

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

Recovery tab

Make settings on 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)   `SuspendResume`

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)   `SuspendResume`

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. If the time to reset the maximum reboot count is set to zero (0), the number of reboot will be unavailable, thus, shutdown/reboot are executed every time at failure detection regardless of the maximum reboot count.

Use Forced Stop

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

Section I Detailed functions of ExpressCluster

- On

  If selected, the forced stop function is enabled.

  When you use the forced stop function, configure the information in 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 hardware reset of the server by using the hwreset command or the ipmitool command.

- BMC Power off

  Use this to power off the server by using the hwreset command. The OS may be shut down depending on how the **Power Options** of OS is configured. For further information, see *Notes on the forced stop* in the Chapter 10 "Other monitor settings.".

- BMC Power Cycle

  Use this to perform the Power Cycle (powering on/off) by using the hwreset command. The OS may be shut down depending on how the ACPI of OS is configured. For further information, see *Notes on the forced stop* in the Chapter 10 "Other monitor settings."
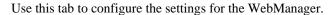
- BMC NMI
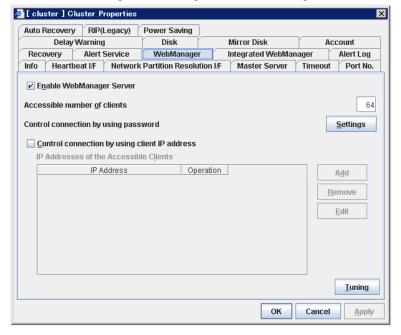
  Use this to generate NMI by using the hwreset command. The behavior after NMI is generated depends on the OS settings.

Forced Stop Timeout (0 to 999)

Configure the timeout value when performing Forced Stop. When one of the above commands is executed, activation of the failover group starts after the time specified elapsed.

WebManager tab

Use this tab to configure the settings for the WebManager.

Enable WebManager Server `MStopRestart`

Enables the WebManager Server.
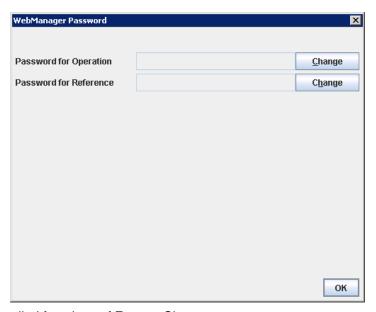
◆ When selected: the WebManager server is enabled.

◆ When cleared: the WebManager server is disabled.

Accessible number of clients (1 to 999) `MStopRestart`

Specify the number of client machines that can be connected.

Control connection by using password

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

◆ **Password for Operation**

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

◆ **Password for Reference**

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

● **Old Password** (Within 255 bytes)

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

● **New Password** (Within 255 bytes):

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

● **Password Confirmation** (Within 255 bytes)

Enter the password again which you entered in **New Password**.

Control connection by using client IP address   MStopRestart

If selected, accesses are controlled by client IP addresses.

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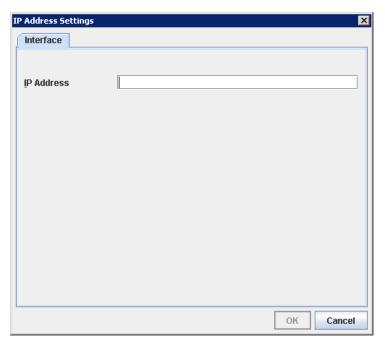
Add, **Remove** and **Edit** buttons are enabled.

◆ When cleared:

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

Add   MStopRestart

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

◆ IP **Address** (within 80 bytes)

Specify a client IP address that can be connected.

- IP address: 10.0.0.21

- Network address: 10.0.1.0/24

Remove   `MStopRestart`

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

Edit   `MStopRestart`

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

Control connection by using client IP address   `MStopRestart`

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

◆ When selected:
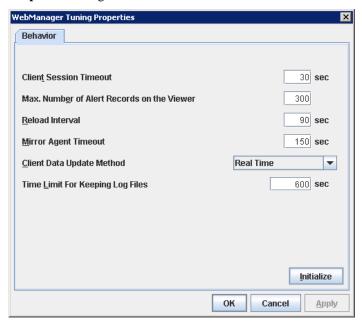
A client can operate a cluster and display its status.

◆ When cleared:

A client can only view the status of a cluster.

Tuning Properties

Use **Tuning** to tune the WebManager. Click **Tuning** to open the **WebManager Tuning Properties** dialog box.

◆ **Client Session Timeout** (1 to 999)　**MStopRestart**

Specify the client session time-out. A time-out is determined if the time specified here elapses after the last communication between the WebManager Server and the WebManager.

◆ **Max. Number of Alert Records on Viewer** (1 to 999)　**MStopRestart**

Specify the maximum number of alert viewer records to display on the Alert Viewer of the WebManager.

◆ **Screen data update interval**　(0 to 999)　**MStopRestart**

Specify the screen data update interval. At this time interval, the WebManager screen is refreshed.

◆ **Mirror agent timeout** (1 to 999)　**MStopRestart**

Specify the mirror agent time-out. A time-out is determined if the time specified here elapses till the mirror disk information is acquired.

◆ **How to update client data**　**MStopRestart**

You can select the method to update the screen data of the WebManager from the following.

- Polling
  The screen data is updated regularly.

- Real Time
  The screen data is updated on the real time.

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

Time limit determines when the log collection information temporarily saved on the server will be deleted. When the time specified here has elapsed, the log collection information will be deleted unless you save the file when the dialog box asking you if you save the log collection information is displayed.

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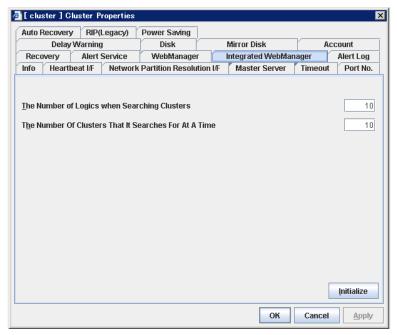
Click **Initialize** to reset all settings on this dialog to default.

◆ **The Number Of Clusters That It Searches For At A Time**

Configure the number of clusters to acquire the information at a time when the cluster information is uploaded.

Integrated WebManager tab
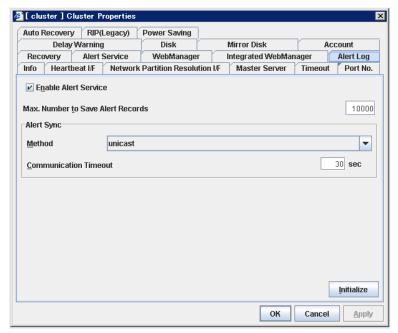
The Number of Logics when Searching Clusters (1 to 100)   MStopRestart

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

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

Set the number of clusters by which information collection is made at a time.

Alert Log tab

Configure the settings for the alert log.

Enable Alert Service   `MStopRestart`

Select this to start ExpressCluster Web Alert service for the server.

◆   When selected:

   ExpressCluster Web Alert service is enabled.

◆   When cleared:

   ExpressCluster Web Alert service is disabled.

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

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

Alert Sync: Method   `MStopRestart`

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)   `MStopRestart`
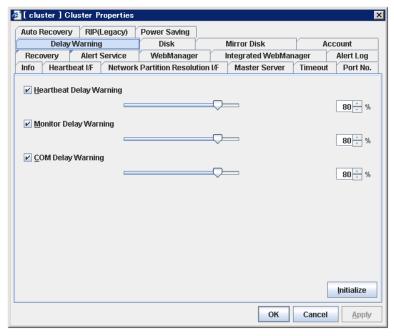
Specify a communication time-out. A communication time-out is determined if the time specified here elapses after the last communication between ExpressCluster Web Alert service and servers.

Initialize

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

Delay Warning tab

Configure the settings for Delay Warning on this tab. See "Delay warning of monitor resources" in Chapter 7, "Monitor resource details" for more information.

Heartbeat Delay Warning (1 to 99)　　**SuspendResume**

Set a percentage of heartbeat time-out at which the heartbeat delay warning is issued. If the time for the percentage passes without any heartbeat response, the warning will be produced in an alert log.

Monitor Delay Warning (1 to 99)　　**SuspendResume**

Set a percentage of monitor time-out at which the monitor delay warning is issued. If the time for the percentage passes without any monitor response, the warning will be produced in an alert log.
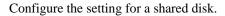
COM Delay Warning (1 to 99)　　**SuspendResume**
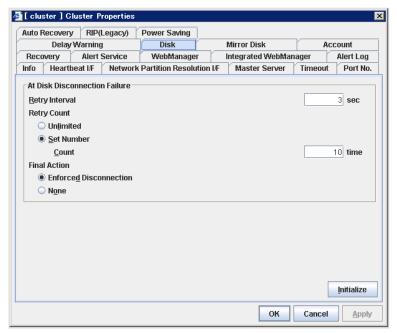
Set a percentage of COM I/F delay warning. If the time for the percentage passes without any COM response, the warning will be produced in an alert log.

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.

Disk tab

Configure the setting for a shared disk.

Retry interval when failing to disconnect a disk (1 to 10)   MStopRestart

Set the interval time required to retry disconnecting, when disconnecting a shared disk has failed.

Retry count when failing to disconnect a disk (0 to 180)   MStopRestart

Set the count to retry disconnecting when disconnecting a shared disk has failed.

◆ Infinite

Select this to retry disconnecting a disk infinitely.

◆ Specifying the retry count

Select this to specify the count to retry to disconnect a disk.

Final action when failing to disconnect a disk   MStopRestart

If the count to disconnect a shared disk again is specified, set the action that will be taken in the case that disconnecting is failed for the specified count

◆ Disconnecting forcibly

Select this to disconnect a disk forcibly.

◆ Not disconnect forcibly

Select this not to disconnect a disk forcibly.

Initialize
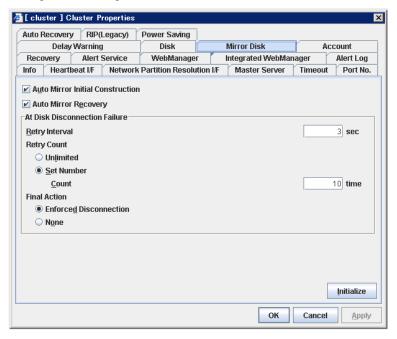
This operation is used to return the value to the default value. Click **Initialize** to set the default values to all items.

Mirror disk tab

Configure the setting for a mirror disk.

Auto Mirror Initial Construction

Specify whether to perform the mirror initial construction automatically when the newly created mirror disk resource is activated for the first time.

◆   When selected

    Mirror initial construction is performed automatically.

◆   When cleared

    Auto mirror initial construction is not performed

Auto Mirror Recovery

An automatic mirror recovery is performed when any difference occurs in the data of mirror disks between both servers. There is a case that mirror recovery cannot be performed automatically even if it is selected. For the detail information, see "Automatically recovering from mirroring" in Chapter 11, "Trouble Shooting."

◆   When selected

    Mirror recovery is performed automatically.

◆   When cleared

    Mirror recovery is not performed automatically.

Retry interval when failing to disconnect a disk (1 to 10)

Set the interval time required to retry disconnecting, when disconnecting a mirror disk has failed.

Retry count when failing to disconnect a disk (0 to 180)

Set the count to retry disconnecting when disconnecting a mirror disk has failed.

◆ Infinite

Select this to retry disconnecting a disk infinitely.

◆ Specifying the retry count

Select this to specify the count to retry to disconnect a disk.

Final action when failing to disconnect a disk

If a retry count is set for mirror disk disconnection, set the action when that will be taken in the case that disconnection still fails after the specified retry count exceeds.

◆ Disconnecting forcibly

Select this to disconnect a disk forcibly

◆ Not disconnect forcibly

Select this not to disconnect a disk forcibly.

Initialize
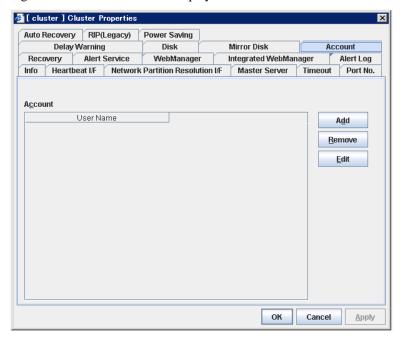
This operation is used to return the value to the default value. Click **Initialize** to set the defaults value to all items.
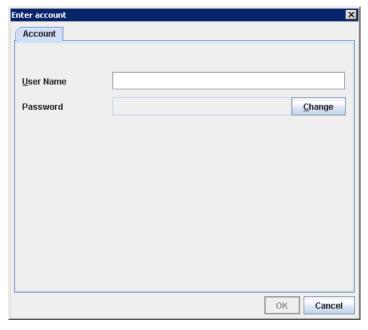
Account tab

Register and/or delete the user account that is used in the ARMLOAD compatible command. You can set up to sixteen user accounts for one cluster system. The accounts that have already set on the all cluster servers are the target to be registered. The user accounts that are currently registered on the **Account** are displayed.

Add

Use **Add** to add a user account on the Account List. Click **Add** to display the dialog box where an account is entered.

◆ User Name

Enter a user account name to be registered. When specifying an account of a domain, enter, for example, "*Domain Name\Account Name.*"

◆ Password

Enter a password of the user account to be registered.

Remove
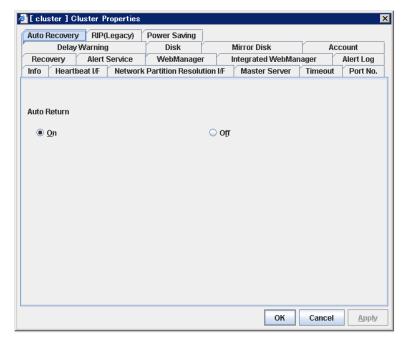
Use **Remove** to remove a user account from the Account List. Select a user account you want to remove from the Account List and click Remove.

Edit

Use **Edit** to edit a user account. Select a user account you want to edit from the **Account** and click **Edit**. The Entry of Account dialog box where the selected account is preset is displayed.

Auto Recovery tab

Configure whether to perform "Auto Recovery" when a cluster server is restarted after server failure has occurred.
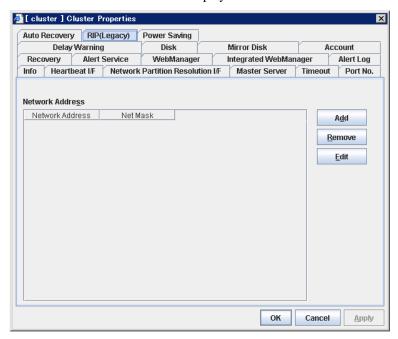
Auto Return

◆ On

Select this to perform the auto recovery.

◆ Off

Select this not to perform the auto recovery.
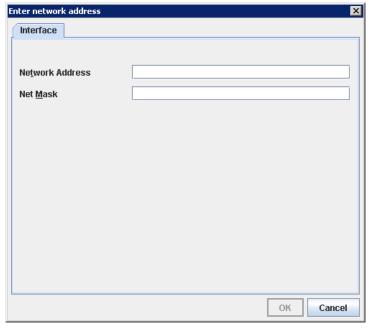
RIP (Legacy) tab

With the virtual IP resource configured with the Builder in the older version (X1.0), configure the IP address of the public LAN that sends RIP. As to the version X2.1, you do not have to configure this fir mo of cases because it is configured at the properties of virtual IP resource. When connecting to the ExpressCluster Server from a remote LAN by using a virtual IP address, RIP must be sent to the public LAN which a router is connected to. The broadcast address of the RIP which is set on the cluster is displayed on the **Network Address**.

Add

Use **Add** to add a network address to the **Network Address**. Selecting **Add** displays a dialog box to enter a network address.

◆ Network Address

Enter a network address to be registered.

ExpressCluster X 2.1 for Windows Reference Guide

◆ Net Mask

Enter a network mask to be registered.

Remove

Use **Remove** to remove a network address from the **Network Address**. Select a network address you want to remove and click **Remove**.

Edit
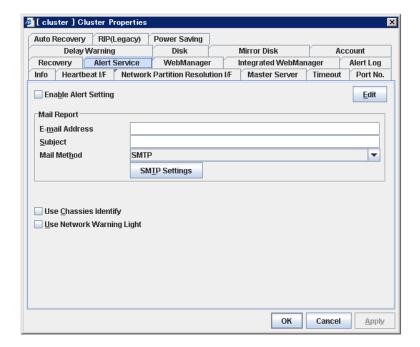
Use **Edit** to edit a network address. Select a network you want to edit from the **Network Address** and click **Edit**. The entry of network address dialog box where a network address is preset is displayed.

Alert service tab

Configure the alert service, chassis identify, and network warning light.

Note:

To use the mail alert function and network warning light, ExpressCluster X Alert Service 2.1 for Windows is required.

Enable Alert Setting

Configures whether or not to modify the default value of the alert settings. To modify the settings, click Edit to configure the destination address.

If you clear the checkbox, the destination address you have modified returns to the default settings temporarily.

For the default settings of the destination address, see the *messages reported by eventlog and alert* in the Chapter 13 "Error messages."

E-mail Address (Within 255 bytes)

Enter the mail address of alert destination. To specify multiple mail addresses, separate each of them by semi-colon ";".

Subject (Within 127 bytes)

Enter the mail subject.

Mail Method

Configure the mail method. In this version, SMTP is the only option in this

◆ **SMTP**
   Sends the alert by communicating with directly the SMTP server.

Use Chassis Identify
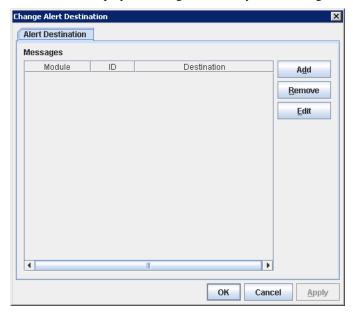
Configure whether or not to use the chassis identify function.

Use Network Warning Light

Configure whether or not to use the warning light (dedicated product) controlled by network. The IP address of warning light is entered on the server property.
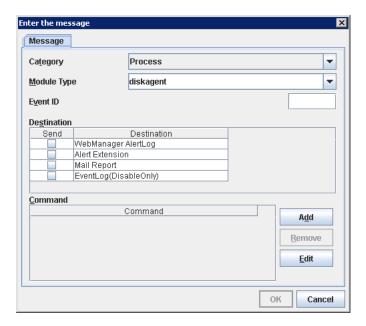
Change Alert Destination

Select **Edit** to display the dialog box where you can change alert destination.

Add

Add the alert ID of the destination which you want to customize. Click **Add** to open the dialog box for entering the message.

ExpressCluster X 2.1 for Windows Reference Guide

Category

Select a main category of module types.

Module Type (within 31 bytes)

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

Event ID

Enter the message ID of the module type for which you want to change the destination. For information on the message IDs, refer to *messages reported by eventlog and alert* in the Chapter 13 "Error messages."

Destination

Select a message destination from the following options.
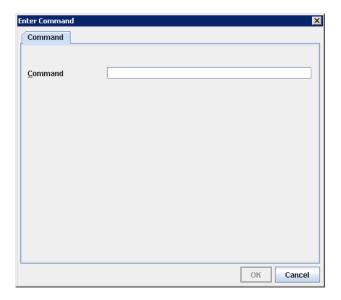
- WebManager Alertlog
  This sends messages to the alert view of the WebManager.

- Alert Extension
  This executes the specified function by using the alert extension function. Modify the extension settings by using the **Add** button and/or the **Edit** button. (The command must be specified within four lines.)

- Mail Report
  Uses the mail report function.

- Event Log (Disable only)
  Disables the settings for the OS to report logs to the event log. You cannot configure the settings to report messages that are not reported to event logs.)

Add

Add a command of the alert extension function. Click **Add** button to display the dialog box for entering a command.

Command (Within 511 bytes)

Enter any command you want to use.

- Keyword
  If you specify %%MSG%%, the message of the target event ID is inserted.
  You cannot specify multiple %%MSG%% for one command.
  Configure the command within 511 bytes including the description of %%MSG%%.
  If you set %%MSG%% as an argument for a command, you need to add backslash (\)
  and double quotation (") like below.

```
<any command you want to use> \"%%MSG%%\"
```

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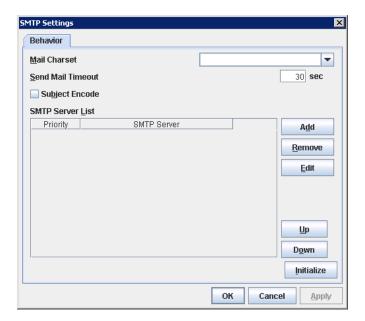
Click this to remove a command of the alert extension function. Select the command, and then, click **Remove**.

Edit

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

SMTP Settings

Click this to display the SMTP Settings dialog box which is used for the mail alert.

Mail Charaset (within 127 bytes)

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

Send Mail Timeout (1 – 999)

Configure the timeout value for the communication with SMTP server.

Subject Encode
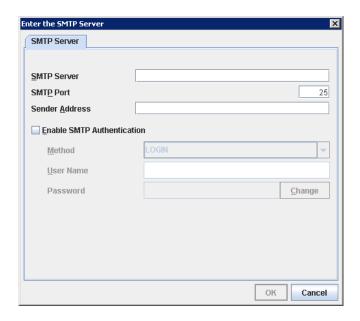
Configure whether or not to encode the subject of e-mails.

SMTP Server List

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

Add

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

SMTP Server (within 255 bytes)

Configure the IP address of the SMTP server.

SMTP Port (1 – 65535)

Configure the port number of the SMTP server.

Sender Address (within 255 bytes)

Configure the address from which mail report is sent.

Enable SMTP Authentication

Configure whether or not to enable SMTP authentication.

Method

Select a method of SMTP authentication.

User Name (within 255 bytes)

Configure the user name used for SMTP authentication.

Password (within 255 bytes)

Configure the password used for SMTP authentication.

Remove
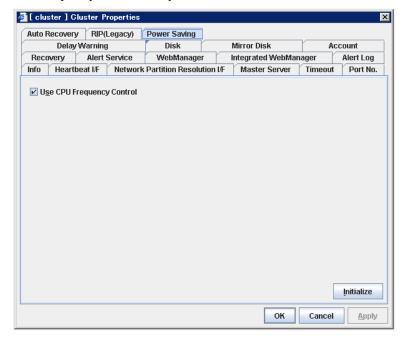
Select this to remove the SMTP server.

Edit

Use this button to modify the settings of SMTP server.

Power saving tab

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

Use CPU Frequency Control

Select the checkbox when you use CPU frequency control. If you uncheck the checkbox, CPU frequency control is disabled.

Initialize

This operation is used to return the value to the default value. Click **Initialize** to set the defaults value.

Related Information：

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

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

Note：

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

Note：

If you disable CPU frequency control function with CPU frequency changed, the CPU frequency does not return to the state before changing.

In this case, return the CPU frequency to the defined value by the following way.

Windows Server 2003:

Execute the following command at a command prompt.

  # powercfg /X "Always On" /processor-throttle-ac none

The character string to be specified with /X option is the name selected in the current setting of [Power Options] -> [Power Schemes] in [Control Panel].

Windows Server 2008:

Select [Balanced] in [Power Options] -> [Select a power plan] in [Control Panel].

Server Properties

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

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

◆   One server cannot have two or more IP addresses that belong to the same network address. Likewise, containment is not allowed as follows.

  •   IP address: 10.1.1.10, Subnet mask: 255.255.0.0

  •   IP address: 10.1.2.10, Subnet mask: 255.255.255.0

Interface of each server

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

When an interface was added:

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

When an interface was removed:

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

◆   When **Yes** is selected:
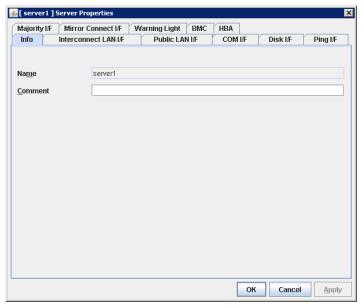
The interface of the same type and the last number will automatically be removed from the other servers so that all servers have the same number of interfaces.

◆   When **No** is selected:

The interface of the same type and the last number will not be removed from the other servers. On the server where you have removed an interface, its I/F No. will not be removed, but set to blank.

Info tab

You can display the server name, and 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
You can specify a comment for the server. Only alphanumeric characters are allowed.
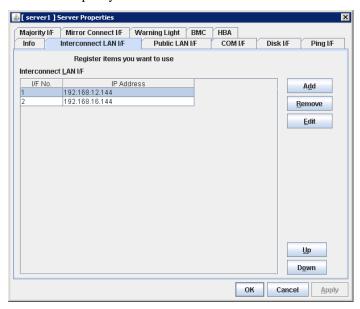
Interconnect LAN I/F tab

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

You have to specify more than one interconnect LAN interface.
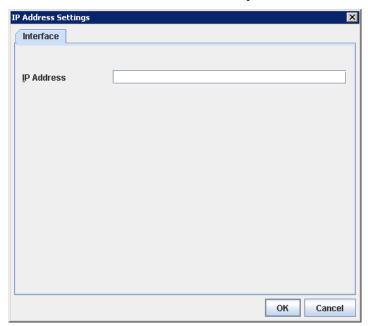
Note:

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

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

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

Add   `SuspendResume`

Use **Add** to add an interface. Click **Add** to open the **IP Address Settings** dialog box.

◆ **IP Address** (within 80 bytes)
Enter an IP that is actually used for interconnect LAN.

Remove   `SuspendResume`

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

Edit

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

Note:
Be careful when you change an IP address of the server. For how to change the IP addresses, see Chapter 10, "The system maintenance information."

Note:
Do not specify address in IPv6 format for Windows Server 2003 environment.
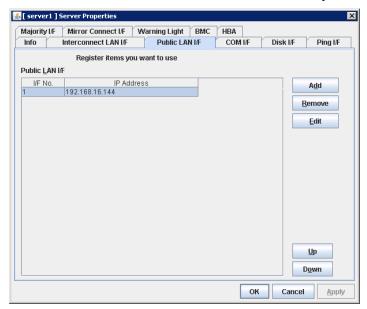
Up & **Down**   `SuspendResume`

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

Public LAN I/F tab

You can add, remove and edit a public LAN interface. Registered I/F No. and IP addresses are listed in **Public LAN I/F**. For details of heartbeat, see Chapter 8, "Heartbeat resources."

Add   `SuspendResume`

Use **Add** to add an interface. Click **Add** to open the **IP Address Settings** dialog box.

◆ **IP Address** (within 80 bytes)

Enter an IP that is actually used for public LAN.

Remove   `SuspendResume`

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

Edit

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

Note:
Be careful when you change an IP address of the server. For how to change the IP addresses, see Chapter 10, "The system maintenance information."

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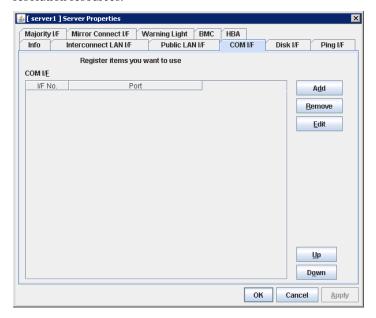
Use **Up** and **Down** to change I/F No. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.
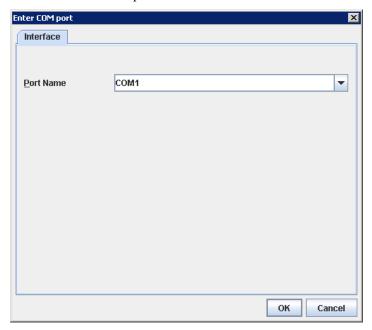
COM I/F tab

You can add, remove and edit a COM interface to be used for the network partition resolution by COM method. Registered I/F No. and devices are listed in **COM I/F**. This is used for 2-node cluster. For details of network partition resolution, see Chapter 9 "Details on network partition resolution resources."

Add   **SuspendResume**

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

◆ **Port Name** (up to 1023 bytes)

Enter an actual device name for the COM port. You cannot register a port name that is registered in **COM I/F**.

Remove SuspendResume

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

Edit SuspendResume

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

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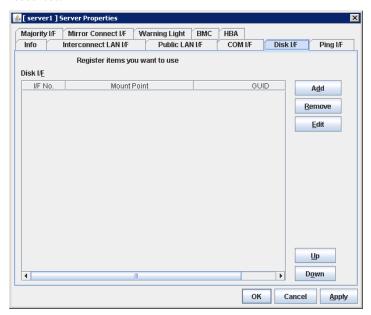
Use **Up** and **Down** to change the I/F number. Select an interface from the interface list and click **Up** or **Down**. The selected row moves accordingly.

Disk I/F tab
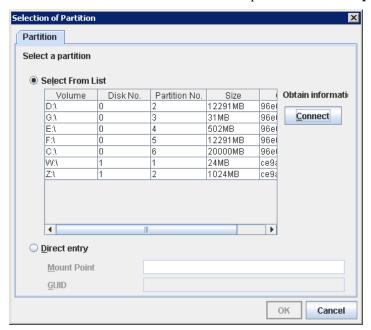
 You can add, remove and edit a disk interface to be used for network partition resolution by the disk method. The interface numbers, mount points, and GUIDs currently registered in **Disk I/F** are listed.

 For details of network partition resolution, see Chapter 9, "Network partition resolution resources."

Add   `SuspendResume`

Use **Add** to add an interface. Select **Add** to open the **Selection of partition** dialog box.

◆   **Select From List**

Select the partition device (partition for a disk heartbeat) to be used for the network partition resolution in the Disk method form the list. You can get the list of partitions by clicking **Connect**.

◆ **Direct entry**

Select **Direct entry** to change the mouse point which is allocated to the selected partition.

Important:

For the partition for a disk heartbeat, specify a filtering-set unformatted partition on the shared disk connected to HBA. Do not specify the partition set for disk heartbeat for a disk resource partition, cluster partition of a mirror disk resource and the data partition. Otherwise, data on the shared disk may be corrupted.

◆ **Remove**   `SuspendResume`

Select **Remove** to delete the interface. Select the interface to delete from the I/F list, and click **Remove**.

◆ **Edit**   `SuspendResume`
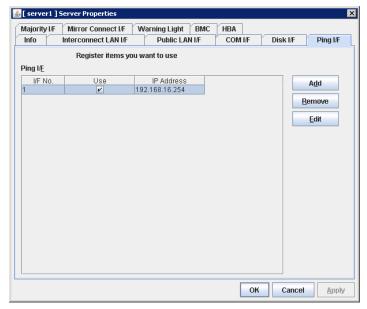
Select **Edit** to edit the device. Select the interface to edit from the I/F list, and click **Edit.** The **Selection of partition** dialog where the selected device name has been entered is displayed.

◆ **Up & Down**   `SuspendResume`

Select **Up** or **Down** to change the interface number. Select the interface to change from the I/F list and click **Up** or **Down**. The selected line moves.
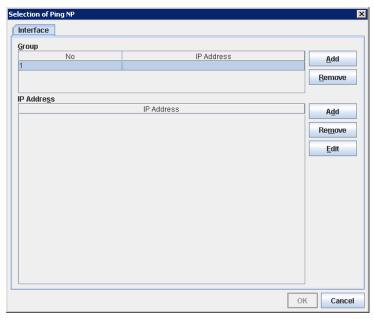
Ping I/F tab

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

Add   SuspendResume

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

◆ **Group**

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

◆ **IP Addresses**

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

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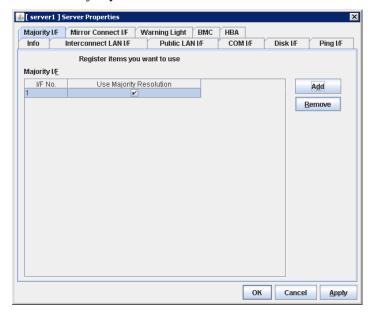
Use **Remove** to remove an interface. Select an interface you want to remove from the I/F list and click **Remove**.

Edit `SuspendResume`

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

Majority I/F tab

Configure whether to use the network partition resolution with the majority method. The interface numbers that is currently registered in the and whether to use those numbers are displayed on the majority I/F list. Whether to use an interface can be configured in the check box within the Majority I/F list

Add   SuspendResume
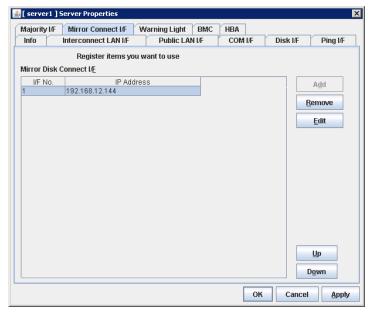
Use **Add** to add an interface. Click **Add** to add an interface.

Remove   SuspendResume
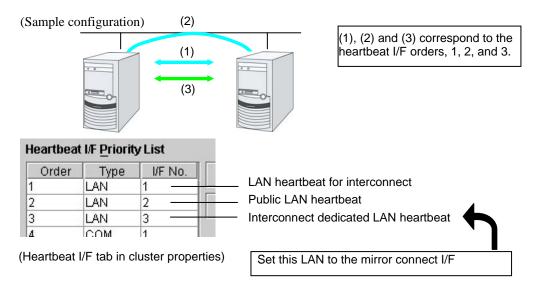
Use **Remove** to delete an interface. Select an interface you want to remove from **Majority I/F** and click **Remove**.

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

You can add, remove and edit a mirror connect interface. The I/F number and the IP addresses currently registered in **Mirror Connect I/F** are listed. You have to specify a mirror connect interface.
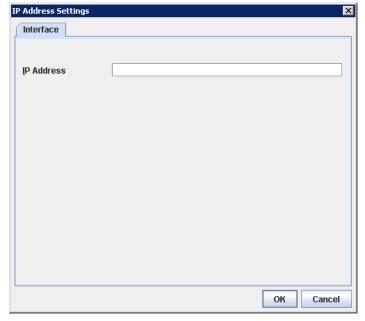
◆ Specify the IP address of LAN heartbeat for interconnect.

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

(Sample configuration) (2)

(1), (2) and (3) correspond to the heartbeat I/F orders, 1, 2, and 3.

(1)

(3)

Heartbeat I/F Priority List

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

LAN heartbeat for interconnect
Public LAN heartbeat
Interconnect dedicated LAN heartbeat

(Heartbeat I/F tab in cluster properties)

Set this LAN to the mirror connect I/F

Add   **SuspendResume**

Use **Add** to add an interface. Click **Add** to open the **IP Address Settings** dialog box.

◆ **IP Address** (within 80 bytes)

   Enter an actual IP to be used for mirror connect.

Remove   **SuspendResume**

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

You cannot remove an I/F number that is set for the mirror disk resource or hybrid disk resource. To remove such an I/F number, change its mirror connect interface setting of mirror disk resource or hybrid disk resource.

Edit

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

Note:
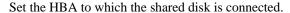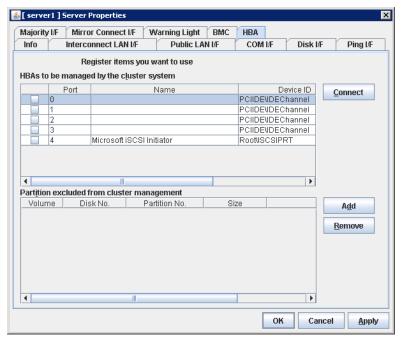
Be careful when you change a server IP address. For how to change an IP address, see Chapter 10, "The system maintenance information."

Up & **Down**   SuspendResume

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

HBA tab

Set the HBA to which the shared disk is connected.

◆ **HBAs to be managed by the cluster system** `ShutdownReboot`

Set the access to the shared disk. If the check box is selected, access to all disks connected to the HBA is controlled when starting the OS next time. To protect data, it is required to select the check box of the HBA to which the shared disk is connected.

If the HBA list is not displayed, it can be displayed by clicking the **Connect** button.

Important:

- Do not connect the shared disk to any HBA whose check box is not selected. Even though the check box is selected, do not connect to the shared disk when the OS is not started again after configuring the settings. Data on the shared disk may be corrupted.

- Do not select the checkboxes other than those of HBAs to which the shared disk is connected. If access to the system partition on which the OS has been installed is restricted, the OS may not be started.

- Do not select the checkboxes of HBA that connects the mirroring target internal disk if you use mirror disk resource. Starting mirror disk resource fails.

◆ **Partition excluded from cluster management** `SuspendResume`

When a disk other than the shared disk is connected to the HBA set in **HBAs to be managed by the cluster system**, register the partitions on the disk. The access to the partitions registered with this list is not restricted.

Important:
In principle, do not register the partitions on the shared disk that can be accessed from multiple servers. Data on the shared disk may be corrupted.

Connect

Select this to get the HBA data by connecting to the server.

Add
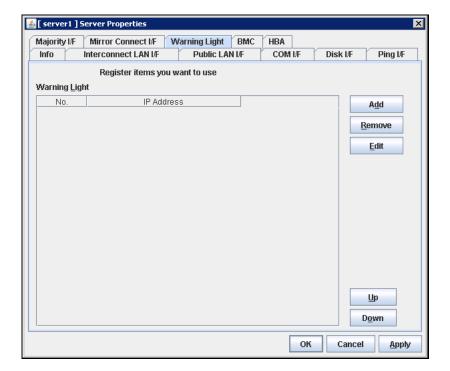
Add a partition that should not be restricted in its access in **Partition excluded from cluster management**.

Remove

Remove the selected partition from **Partition excluded from cluster management.**
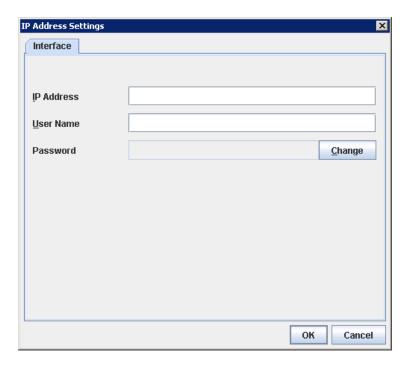
Warning light tab

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

Add

Use this button to add an IP address of warning light. Click **Add** to open the **IP Address Settings** dialog box.

IP Address Settings dialog box (screenshot):

- Title bar: **IP Address Settings**
- Tab: **Interface**
- **IP Address** [text field]
- **User Name** [text field]
- **Password** [field] **Change**
- **OK** **Cancel**

◆ IP Address (within 80 bytes)

Enter an IP address of the warning light.

Note:

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

◆ User Name

Enter the user name of the execution account on the server used for controlling the warning light.

◆ Password

Enter the password of the execution account on the server used for controlling the warning light.

Note:
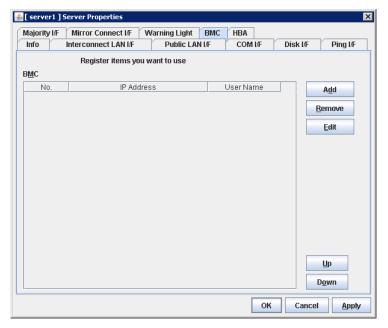
For Windows Server 2008, enter Administrator for user name, Administrator for password. For Windows Server 2003, you can omit the user name and password.

Edit

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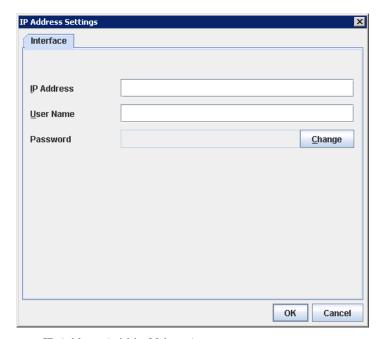
BMC tab

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 new settings. Click **Add** to open the **IP Address Settings** dialog box.

◆ IP Address (within 80 bytes)

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

◆ User Name (within 255 bytes)

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

If you do not enter anything, do not configure the argument of user name when the hwreset command or the alarms command is executed.

◆ Password (within 255 bytes)

Enter the password of user configured above.

For information on user name of BMC and how to configure the 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.

Parameters list

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

"How to change [1]-[6]" represents the way you reflect changes of parameters on servers. Applicable method is marked with "O." For details of [1]-[6], see "Overview of the Builder" on page 96.

Parameters	Default	How to change					
		1	2	3	4	5	6
Cluster Properties							
Info Tab							
Name	-			O			
Comment	-						O
Language	English			O		O	
Heartbeat I/F Tab							
Order (Up, Down)	-			O			
Type (Add, Remove)	-			O			
Server Down Notification	On						O
Broadcast/Unicast	Unicast			O			
Network Partition Resolution I/F Tab							
NP Resolution Tuning Properties							
Ping Tab							
Interval	5 seconds			O			
Timeout	3 seconds			O			
Retry Count	3 seconds			O			
Disk Tab							
IO Wait Time	80 seconds			O			
Interval	60 seconds			O			
Timeout	300 seconds			O			
Retry count	zero			O			
Master Server Tab							
Order (Up, Down)	The order you added servers			O		O	
Timeout Tab							
Server Sync Wait Time	5 minutes						O
Heartbeat Interval	3 seconds			O			
Heartbeat Timeout	30 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	
Disk Agent Port Number	29004	O					
Mirror Driver Port Number	29005	O					
Kernel Mode Heartbeat Port Number	29106			O			
Alert Sync Port Number	29003					O	
Client Service Port Number	29007	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 power off						O
Forced Stop Timeout	3 sec						O
Alert Service Tab							
Enable Alert Service	Off						O
Mail Address							O
Subject	-						O
Mail Method	SMTP						O
Use Chassis Identify	Off	O					
Use Network Warning Light	Off			O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Alert Destination Tab							
Messages (Add, Remove, Edit)	-						
Message Tab							
Category	Process						
Module Type	apisv						
Event ID	-						
Destination WebManager Alert Log	On						
Destination Mail Report	On						
Destination Alert Extension	Off						
Command (Add, Remove, Edit)	-						
SMTP setting							
Mail Charaset	-						
Send Mail Timeout	30 sec						
Subject Encode	Off						
SMTP Server (Up, Down)	-						
SMTP Server List (Add, Remove)	-						
Enter the SMTP Server							
SMTP Server	-						
SMTP Port	25						
Sender Address	-						
Enable SMTP Authentication	Off						
Method	LOGIN						
User name	-						
Password	-						
WebManager Tab							
Enable WebManager Server	On					O	
Accessible number of clients	64					O	
Control connection by using client IP address	Off					O	
IP Addresses of the Accessible Clients (Add, Remove, Edit)	-					O	
Operation	On					O	
Web Manager Password							
Password for Operation	-						O
Password for Reference	-						O
WebManager Tuning Properties							
Behavior Tab							
Client Session Timeout	30 seconds					O	
Max. Number of Alert Records on the Viewer	300					O	
Screen Data Refresh Interval	90 seconds					O	
Mirror Agent Timeout	150 seconds					O	
Client Data Update Method	Real Time					O	
Time Limit For Keeping Log Files	600 seconds					O	
Integrated WebManager Tab							
The Number of Logics when Searching Clusters	10					O	
The Number Of Clusters That It Searches For At A Time	10					O	
Alert Log Tab							
Enable Alert Service	On					O	
Max. Number to Save Alert Records	10000					O	
Alert Sync Method	Unicast (fixed)					O	
Alert Sync Communication Timeout	30 seconds					O	
Delay Warning Tab							
Heartbeat Delay Warning	On 80%			O			
Monitor Delay Warning	On 80%			O			
COM Delay Warning	On 80%			O			
Disk Tab							
Retry Interval At Disk Disconnection Failure	3 seconds						O
Retry Count At Disk Disconnection Failure	Specify the count						O

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Set Retry Count At Disk Disconnection Failure	10 times						O
Final Action At Disk Disconnection Failure	Enforced Disconnection						O
Mirror Disk Tab							
Auto Mirror Initial Construction	On						O
Auto Mirror Recovery	On						O
Retry Interval At Disk Disconnection Failure	3 seconds						O
Retry Count At Disk Disconnection Failure	Specify the count						O
Set Retry Count At Disk Disconnection Failure	10 times						O
Final Action At Disk Disconnection Failure	Enforced Disconnection						O
Account Tab							
Account List (Add, Remove, Edit)	-						O
Auto Recovery Tab							
Auto Return	On						O
RIP Tab (Legacy)							
List of Network Address (Add, Remove, Edit)	-						O
Power Saving Tab							
Use CPU Frequency Control	Off						O
Add Server				O		O	
Remove Server				O		O	
Server Properties							
Info Tab							
Name	-		O				
Comment	-						O
Interconnect LAN I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
IP Address (Edit)[4]	-						
IP Address (Up, Down)	-			O			
Public LAN I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
IP Address (Edit)[4]	-						
IP Address (Up, Down)	-			O			
COM I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
Device (Edit, Up, Down)	-			O			
Disk I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
Mount Point (Edit, Up, Down)	-			O			
GUID (Edit, Up, Down)	-			O			
Ping I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
Use	On-			O			
IP Address (Edit, Up, Down)				O			
Majority I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
Use Majority Resolution	On-			O			
Mirror Connect I/F Tab							
I/F Number (Add, Remove)	The order you added I/Fs	O					
IP Address (Edit)[4]	-	O					
Warning Light Tab							
I/F Number (Add, Remove)	The order you added I/Fs			O			
IP Address (Edit, Up, Down)	-			O			
BMC Tab							
Number (Add, Remove)	The Order you added			O			
IP Address (Edit)	-			O			
User Name	-			O			

---

[4] 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.

Parameters	Default	How to change					
		1	2	3	4	5	6
Password	-			O			
HBA Tab							
HBAs to be managed by the cluster system	-	O					
Partitions to be managed by the cluster system	-			O			
Add Server Group				O			
Remove Server Group			O				
Server Group Properties							
Info Tab							
Name	failover		O				
Comment	-						O
Server Group Tab							
Order (Up, Down)	The order you added to "Servers that can run the Group."	O					
Add	-	O					
Remove	-	O					
Add Group				O			
Remove Group				O	O		
Group Properties							
Info Tab							
Name	-			O	O		
Comment	-						O
Startup Server Tab							
Order (Up, Down)	The order you added to "Servers that can run the Group."			O			
Name (Add, Remove)	-			O			
Attribute Tab							
Startup Attribute	Auto Startup			O			
Failover Exclusive Attribute	Off			O			
Failover Attribute	Auto Failover			O			
Failback Attribute	Manual Failback			O			
Logical Service Tab							
Logical Service Name (Add, Remove)	-						O
Server Group Tab							
Add, Remove, Up, Down	The order you added to "Servers that can run the Group."	O					
Add Group Resource				O	O		
Remove Group Resource				O	O		
Group Resource Common Properties							
Info Tab							
Name	Default value per each resource			O	O		
Comment							O
Application Resource Properties							
Dependency Tab							
Follow the default dependence	On • floating ip resources • virtual IP resources • virtual computer name • disk resources • mirror disk resources • print spooler resources • registry synchronization • CIFS resources • NAS resource			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count	zero			O			
Failover Target Server	Stable operation server			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Failover Threshold	Set as many as the number of the servers			O			
Set Number	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Resident Type	Resident				O		
Start Path	-				O		
Stop Path	-						O
Application Resource Tuning Properties							
Parameter Tab							
Start Script Synchronous, Asynchronous	Synchronous						O
Start Script Timeout	1800 seconds						O
Stop Script Synchronous, Asynchronous	Synchronous						O
Stop Script Timeout	1800 seconds						O
Target VCOM Resource Name	-				O		
Allow to Interact with Desktop	Off				O		
Start Tab							
Current Directory	-						O
Option Parameter	-						O
Window Size	Hide						O
Exec User Domain	-				O		
Exec User Account	-				O		
Exec User Password	-				O		
Execute from the Command Prompt	Off						O
Stop Tab							
Current Directory	-						O
Option Parameter	-						O
Window Size	Hide						O
Exec User Domain	-						O
Exec User Account	-						O
Exec User Password	-						O
Execute from the Command Prompt	Off						O
Floating IP Resource Properties							
Dependency Tab							
Follow the default dependence	On (No default is set)			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	5 times			O			
Failover Target Server	Stable Operation Server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
IP Address	-				O		
Floating IP Resource Tuning Properties							
Parameter Tab							

Parameters	Default	How to change 1	2	3	4	5	6
Run ping	On						O
ping Interval	1 second						O
ping Timeout	1000 milliseconds						O
ping Retry Count	5 times						O
ping Forced FIP Activation	Off						O
Mirror Disk Resource Properties							
Dependency Tab							
Follow the default dependence	On (No default is set)			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Mirror Disk No.	1			O	O		
Data Partition Drive Letter	-			O	O		
Cluster Partition Drive Letter	-			O	O		
Cluster Partition Offset Index	0			O	O		
Servers that can run the group (Add, Remove)	-		O				
Data Partition (Edit)	-			O	O		
Cluster Partition (Edit)	-			O	O		
Mirror Disk Resource Tuning Properties							
Mirror Tab							
Execute the initial mirror construction	On			O	O		
Mirror Connect Timeout	20 seconds			O	O		
Request Queue Maximum Size	2048 [KB]			O	O		
Mode	Synchronous			O	O		
Kernel Queue Size	2048 [KB]			O	O		
Application Queue Size	2048 [KB]			O	O		
Thread Timeout	30 seconds			O	O		
Communication Band Limit	Unlimited			O	O		
History Files Store Folder	-			O	O		
History Files Size Limit	Unlimited			O	O		
Registry Synchronization Resource Properties							
Dependency Tab							
Follow the default dependence	On • floating ip resources • virtual IP resources • virtual computer name • disk resources • mirror disk resources • print spooler resources			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Registry List (Add, Remove)	1			O	O		
Registry Synchronization Resource Tuning Properties							
Parameter Tab							
Delivery Interval	1 second			O			
Script Resource Properties							
Dependency Tab							
Follow the default dependence	On • floating ip resources • virtual IP resources • virtual computer name • disk resources • mirror disk resources • print spooler resources • registry synchronization resource • CIFS resource • NAS resource			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings tab							
Retry Count	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Script (Add, Remove, Edit)	-						O
Script Resource Tuning Properties							
Parameter Tab							
Start Script Synchronous, Asynchronous	Synchronous						O
Start Script Timeout	1800 seconds						O
Stop Script Synchronous, Asynchronous	Synchronous						O
Stop Script Timeout	1800 seconds						O
Target VCOM Resource Name	-						O
Allow to Interact with Desktop	Off						O
Disk Resource Tuning Properties							
Dependency Tab							
Follow the default dependence	On (No default is set)			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			

ExpressCluster X 2.1 for Windows Reference Guide

Parameters	Default	How to change					
		1	2	3	4	5	6
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Drive Letter				O	O		
Servers that can run the group (Add, Remove)				O	O		
GUID (Edit)				O	O		
Service Resource Properties							
Dependency Tab							
Follow the default dependence	On • floating IP resources • virtual IP resources • virtual computer name resources • disk resources • mirror disk resources • print spooler resources • registry synchronization • CIFS resources • NAS resource			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Service Name					O		
Service Resource Tuning Properties							
Parameter Tab							
Start Script Synchronous, Asynchronous	Synchronous						O
Start Script Timeout	1800 seconds						O
Stop Script Synchronous, Asynchronous	Synchronous						O
Stop Script Timeout	1800 seconds						O
Target VCOM Resource Name	-				O		
Service Tab							
Start Parameters	-				O		
Do not assume it as an error when the service is already started	Off				O		
Print Spooler Resource Properties							
Dependency Tab							
Follow the default dependence	On • disk resources • mirror disk resources • NAS resource			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Printer Name	-			O			
Partition	-			O			
Spool Directory	-			O			
Virtual Computer Name Resource Properties							
Dependency Tab							
Follow the default dependence	On • floating IP resources • virtual IP resources			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	5 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Virtual Computer Name	-			O	O		
Target FIP Resource Name	-			O	O		
Virtual Computer Name Resource Tuning Properties							
Parameter Tab							
Dynamic Registration to DNS	Off			O	O		
Associated IP address	FIP			O	O		
Virtual IP Resource Properties							
Dependency Tab							
Follow the default dependence	On (No default is set)			O	O		
Dependent Resources (Add, Remove)	-			O	O		
Settings Tab							
Retry Count at Activation Failure	5 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
IP Address	-				O		
Net Mask	-				O		
Destination IP Address	-				O		
Source IP Address	-				O		

ExpressCluster X 2.1 for Windows Reference Guide

		Parameters	Default	How to change					
				1	2	3	4	5	6
		Send Interval	30 seconds				O		
		Use Routing Protocol	RIPver1				O		
		Virtual IP Resource Tuning Properties							
		Parameter Tab							
		Run ping	On						O
		Interval	1 second						O
		timeout	1000 milliseconds						O
		Retry Count	5 times						O
		Forced VIP Activation	Off						O
		RIP Tab							
		Next Hop IP Address	-				O		
		Metric	3				O		
		Port Number	520				O		
		RIPng Tab							
		Metric	1				O		
		Port Number	521				O		
CIFS Resource Properties									
	Dependency Tab								
		Follow the default dependence	On • disk resources • mirror disk resources			O	O		
		Dependent Resources (Add, Remove)				O	O		
	Settings Tab								
		Retry Count at Activation Failure	Zero			O			
		Failover Target Server	Stable operation server			O			
		Failover Threshold	Set as many as the number of the servers			O			
		Specify the count	-			O			
		Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
		Execute Script before Final Action	Off						O
		Retry Count at Deactivation Failure	zero			O			
		Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
		Execute Script before Final Action	Off						O
	Details Tab								
		Auto-saving of shared configuration of drive	Off				O		
		Target drive	-				O		
		Shared configuration file	-				O		
		Shared Name	-				O		
		Folder	-				O		
		Comment	-				O		
		CIFS Resource Tuning Properties							
		Cache Tab							
		Cache Enable	Off				O		
		Cache Setting	Automatic cache				O		
		User Tab							
		User Count Limit	Unlimited				O		
		Access Permission	everyone read				O		
NAS Resource Properties									
	Dependency Tab								
		Follow the default dependence	On • Floating IP resource • Virtual IP resource			O	O		

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Dependent Resources (Add, Remove)				O	O		
Settings Tab							
Retry Count at Activation Failure	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Drive	-				O		
Folder	-				O		
User name	-				O		
Password	-				O		
NAS Resource Tuning Properties							
Disconnection Tab							
Retry Count	3				O		
Retry Interval	5				O		
Hybrid Disk Resource Properties							
Dependency Tab							
Follow the default dependence	On (No default is set)			O	O		
Dependent Resources (Add, Remove)				O	O		
Settings Tab							
Retry Count at Activation Failure	0 times			O			
Failover Target Server	Stable Operation Server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action at Activation Failure Detection	No Operation (Not activate next resources)			O			
Execute Script before Final Action	Off						O
Retry Count at Deactivation Failure	zero			O			
Final Action at Deactivation Failure	Stop the cluster service and shut down OS.			O			
Execute Script before Final Action	Off						O
Details Tab							
Hybrid disk number	1			O	O		
Data partition drive letter	-			O	O		
Cluster partition driver letter	-			O	O		
Cluster partition offset index	0			O	O		
Hybrid Disk Resource Tuning Properties							
Mirror Tab							
Execute the initial mirror construction	On			O	O		
Mirror Connect Timeout	20 seconds			O	O		
Request Queue Maximum Size	2048 KB			O	O		
Mode	Synchronous			O	O		
Kernel Queue Size	2048 KB			O	O		
Application Queue Size	2048 KB			O	O		
Thread Timeout	30 seconds			O	O		
Communication Band Limit	Unlimited			O	O		
History Files Store Folder	-			O	O		
History Files Size Limit	Unlimited			O	O		
Add Monitor Resource				O			
Remove Monitor Resource				O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Monitor Resource Properties							
Info Tab							
Name	-			O			
Comment	-						O
Application Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times (if the recovery target is other than clusters)			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Disk RW Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	300 seconds			O			
Retry Count	zero			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero (if the recovery target is other than clusters)			O			
Failover Target Server	Stable Operation Server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
File Name	-			O			
I/O size	2000000 [byte]			O			
Action on Stall	Generate an Intentional Stop Error			O			
Floating IP Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times (if the recovery target is other than clusters)			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Monitor NIC Link Up/Down	Off-						O
IP Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times (if the recovery target is other than clusters)			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address (ADD, Remove, Edit)	-						O
Ping Timeout	1000 milliseconds						O
Mirror Connect Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	zero			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set Number			O			
Set Number	-			O			

ExpressCluster X 2.1 for Windows Reference Guide

Parameters	Default	How to change					
		1	2	3	4	5	6
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Mirror Disk Resource	-			O			
Mirror Disk Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	999 seconds			O			
Retry Count	zero			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Mirror Disk Resource	-			O			
NIC Link Up/Down Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 [time]			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Always			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Individually Set Up Servers (Add, Remove, Edit)	-						O
Multi Target Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Always			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			

Section I Detailed functions of ExpressCluster

Parameters		Default	How to change					
			1	2	3	4	5	6
	Servers that can run the Group (Add, Remove)	-			O			
	Error Detection Tab							
	Recovery Target	-			O			
	Reactivation Threshold	3 times			O			
	Failover Target Server	Stable operation server			O			
	Failover Threshold	Set as many as the number of the servers			O			
	Set Number	-			O			
	Final Action	No Operation			O			
	Execute Script before Final Action	Off						O
	Parameter Tab							
	Monitor Resource List (Add, Remove)	-			O			
Registry synchronous Monitor Resource Properties								
	Monitor Tab							
	Interval	60 seconds			O			
	Timeout	60 seconds			O			
	Retry Count	1 time			O			
	Wait Time to Start Monitoring	0 second			O			
	Monitor Timing	Active			O			
	Target Resource	-			O			
	Error Detection Server							
	Error Detection Server	All Servers			O			
	Servers that can run the Group (Add, Remove)	-			O			
	Error Detection Tab							
	Recovery Target	-			O			
	Reactivation Threshold	3 times			O			
	Failover Target Server	Stable operation server			O			
	Failover Threshold	Set as many as the number of the servers			O			
	Specify the count	-			O			
	Final Action	No Operation			O			
	Execute Script before Final Action	Off						O
Disk TUR Monitor Resource Properties								
	Monitor Tab							
	Interval	60 seconds			O			
	Timeout	300 seconds			O			
	Retry Count	zero			O			
	Wait Time to Start Monitoring	0 second			O			
	Monitor Timing	Always			O			
	Target Resource	-			O			
	Error Detection Server							
	Error Detection Server	All Servers			O			
	Servers that can run the Group (Add, Remove)	-			O			
	Error Detection Tab							
	Recovery Target	-			O			
	Reactivation Threshold	zero			O			
	Failover Target Server	Stable operation server			O			
	Failover Threshold	Set as many as the number of the servers			O			
	Specify the count	-			O			
	Final Action	No Operation			O			
	Execute Script before Final Action	Off						O
	Parameter Tab							
	Disk Resource	-			O			
Service Monitor Resource Properties								
	Monitor Tab							

Parameters	Default	How to change					
		1	2	3	4	5	6
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Print Spooler Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Virtual Computer Name Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Virtual IP Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
CIFS Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Access Check	No operation			O			
Path	-			O			
Check	Read			O			
NAS Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	60 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	3 times			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Hybrid Disk Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	999 seconds			O			
Retry Count	0 times			O			
Wait Time to Start Monitoring	10 seconds			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Hybrid Disk Resource	-			O			
Hybrid Disk TUR Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	300 seconds			O			
Retry Count	0 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Hybrid Disk Resource	-			O			
Custom Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	0 times			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Always			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Monitor Script Path Type	Script created with this product			O			
Monitor Script Type	Synchronous			O			
Normal Return Value of Monitor Script	0			O			
DB2 Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	Stop the cluster service and shut down OS.			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Database Name	-			O			
Instance Name	DB2			O			
Password	-			O			
Monitor Table Name	DB2WATCH			O			
FTP Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1			O			
Port No	21			O			
User Name	-			O			
Password	-			O			
HTTP Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Folder	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Connecting Destination	127.0.0.1			O			
Port Number	80			O			
Monitor URL	-			O			
Protocol	HTTP			O			
IMAP4 Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop cluster service and			O			

Section I Detailed functions of ExpressCluster

191

Parameters	Default	How to change					
		1	2	3	4	5	6
	shutdown OS						
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1			O			
Port Number	143			O			
User Name	-			O			
Password	-			O			
Certification Method	AUTHENTICATELOGIN			O			
ODBC Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	-			O			
User Name	-			O			
Password	-			O			
Monitor Table Name	ODBCWATCH			O			
Oracle Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Connect String	-			O			
User Name	sys			O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Password	-			O			
OS Authentication	Off			O			
SYSDBA/DEFAULT	SYSDBA			O			
Monitor Table Name	ORAWATCH			O			
Character Set	(Following the setting of the application)			O			
OfficeScan CL Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 seconds			O			
Monitor Timing	Always (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	0 times			O			
Failover Destination Server	Stable operation server			O			
Failover Threshold	Set in accordance with the number of the servers			O			
Specify the count	-			O			
Final Action	No Operation			O			
Execute Script before Final Action	Off						O
OfficeScan SV Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout⊦	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 seconds			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	0 times			O			
Failover Destination Server	Stable operation server			O			
Failover Threshold	Set in accordance with the number of the servers			O			
Specify the count	-			O			
Final Action	Stop cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
POP3 Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1			O			
Port Number	110			O			
User Name	-			O			
Password	-			O			
Certification Method	APOP			O			
PostgreSQL Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Database Name	-			O			
IP Address	127.0.0.1			O			
Port Number	5432			O			
User Name	postgres			O			
Password	-			O			
Monitor Table Name	PSQLWATCH			O			
SMTP Monitor Resource Properties							
Monitor Tab							
Interval	30 seconds			O			
Timeout	60 seconds			O			
Retry Count	3 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add,	-			O			

Parameters	Default	How to change					
		1	2	3	4	5	6
Remove)							
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
IP Address	127.0.0.1			O			
Port Number	25			O			
User Name	-			O			
Password	-			O			
Certification Method	CRAM-MD5			O			
Email Address	-			O			
SQL Server Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Database Name	-			O			
Instance Name	MSSQLSERVER			O			
User Name	SA			O			
Password	-			O			
Monitor Table Name	SQLWATCH			O			
Tuxedo Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change 1	2	3	4	5	6
Reactivation Threshold	zero			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Application Server Name	BBL			O			
Config File	-			O			
Websphere Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Application Server Name	server1			O			
Profile Name	default			O			
User Name	-			O			
Password	-			O			
Install Path	C:\Program Files\IBM\WebSphere\AppServer			O			
Weblogic Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	2 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							

ExpressCluster X 2.1 for Windows Reference Guide

Parameters	Default	How to change					
		1	2	3	4	5	6
IP Address	127.0.0.1			O			
Port	7002			O			
Account Shadow	Off			O			
On Config File	-			O			
On Key File	-			O			
Off User Name	weblogic			O			
Off Password	-			O			
Authority Method	DemoTrust			O			
Key Store File	-			O			
Install Path	C:\bea\weblogic92			O			
WebOTX Monitor Resource Properties							
Monitor Tab							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	1 times			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Connecting Destination	localhost			O			
Port Number	6212			O			
User Name	-			O			
Password	-			O			
OracleAS Monitor Resource Properties							
OracleAS Monitor Resource Properties							
Interval	60 seconds			O			
Timeout	120 seconds			O			
Retry Count	1 time			O			
Wait Time to Start Monitoring	0 second			O			
Monitor Timing	Active (fixed)			O			
Target Resource	-			O			
Error Detection Server							
Error Detection Server	All Servers			O			
Servers that can run the Group (Add, Remove)	-			O			
Error Detection Tab							
Recovery Target	-			O			
Reactivation Threshold	zero			O			
Failover Target Server	Stable operation server			O			
Failover Threshold	Set as many as the number of the servers			O			
Specify the count	-			O			
Final Action	Stop the cluster service and shutdown OS			O			
Execute Script before Final Action	Off						O
Parameter Tab							
Instance Name	-			O			

Section I Detailed functions of ExpressCluster

Parameters	Default	How to change					
		1	2	3	4	5	6
Install path	C:\product\10.1.3.2\companionC DHome_1			O			

Upper limits of registration

	Builder version	You can register up to
Cluster	2.0.0-1 or later	1
Server	2.0.0-1 or later	32
Group	2.0.0-1 or later	64
Group resource (Per one group)	2.0.0-1 or later	256
Monitor resource	2.0.0-1 or later	384
Heartbeat resource	2.0.0-1 or later	16
Network Partition Resolution Resource	2.0.0-1 or later	64
Mirror disk resources and hybrid disk resources (Per cluster) in total	2.0.0-1 or later	8

Section I Detailed functions of ExpressCluster

Chapter 4   ExpressCluster command reference

This chapter describes commands that are used on ExpressCluster.

This chapter covers:

Operating the cluster from the command line

ExpressCluster provides various commands to operate a cluster by the command prompt. 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 application 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.

ExpressCluster commands

Commands for configuring a cluster		
Command	**Description**	**Page**
clpcfctrl.exe	Distributes configuration data created by the Builder to servers.	269
	Backs up the cluster configuration data to be used by the Builder.	
Commands for displaying status		
Command	**Description**	**Page**
clpstat.exe	Displays the cluster status and configuration information.	204
Commands for cluster operation		
Command	**Description**	**Page**
clpcl.exe	Starts, stops, suspends, or resumes the ExpressCluster service.	251
clpdown.exe	Stops the ExpressCluster service and shuts down the server.	256
clpstdn.exe	Stops the ExpressCluster service across the whole cluster and shuts down all servers.	257
clpgrp.exe	Starts, stops, or moves groups.	258
clptoratio.exe	Extends or displays the various time-out values of all servers in the cluster.	276
clpmonctrl.exe	Suspends or resumes monitor resources on a single server.	313
clprsc.exe	Stops or resumes group resources	318
clpcpufreq.exe	Controls CPU frequency	323
clpledctrl.exe	Controls Chassis Identify	325

ExpressCluster X 2.1 for Windows Reference Guide

clptrnreq.exe	Requests the server to execute a process	327
clpbmccnf.exe	Changes the information on BMC user name and password	330
clphookctrl.exe	Configures the shutdown hook function	332

Log-related commands		
Command	**Description**	**Page**
clplogcc.exe	Collects logs and OS information.	263
clplogcf.exe	Modifies and displays a configuration of log level and the file size of log output.	279

Script-related commands		
Command	**Description**	**Page**
clplogcmd.exe	Writes texts in the script resource script to create a desired message to the output destination	311

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.

Mirror-related commands (when the Replicator/Replicator DR is used)		
Command	**Description**	**Page**
clpmdstat.exe	Displays a mirroring status and configuration information.	288
clpmdctrl.exe	Activates/deactivates a mirror disk resource, or recovers mirror.	293
clphdstat.exe	Displays a hybrid disk status and configuration information.	302
clphdctrl.exe	Activates/deactivates a hybrid disk resource, or recovers mirror.	307
clpvolsz.exe	Checks and adjusts the size of partitions to be mirrored.	297
clphdsnapshot.exe	Controls the access restriction or alike when snap shot backups of data partition in the hybrid disk resource are collected	299

Mirror-related commands (when the Replicator/Replicator DR is used)		
Command	**Description**	**Page**
clpmdstat.exe	Lights off the network warning light.	322

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 [<srvname>] [--detail] [-h <hostname>]
clpstat--hb [<hbname>] [--detail] [-h host_name]
clpstat--np [<npname>] [--detail] [-h <hostname>]
clpstat --svg [<svgname>] [-h <hostname>]
clpstat--grp [<grpname>] [--detail] [-h <hostname>]
clpstat--rsc [<recname>] [--detail] [-h <hostname>]
clpstat--mon [<monname>] [--detail] [-h <hostname>]
```

Description	This command line displays a cluster status and configuration data.

Option	-s	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 each network partition resolution on each server.
	-i	Displays the configuration information of the whole cluster.
	--cl	Displays the cluster configuration data. Displays the Mirror Agent information as well for the Replicator/Replicator DR.
	--sv [*server_name*]	Displays the server configuration information. By specifying the name of a server, you can display information of the specified server.
	--hb [*hb_name*]	Displays heartbeat resource configuration information. By specifying the name of a heartbeat resource, you can display only the information on the specified heartbeat.
	--np [*np_name*]	Displays the configuration information on the network partition resolution resource. By specifying the name of a network partition resolution resource, you can display only the information on the specified network partition resolution resource.

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

Return Value	0	Success
	Other than 0	Failure

Remarks	According to the combination of options, configuration information shows information in various forms.

Note:

Run this command as a user with Administrator privileges. The ExpressCluster service must be activated on the server where you run this command. When you specify the name of a server for the –h option, the server should be in the cluster.

Examples of information displayed after running these commands are provided in the next section.

Error Messages

Message	Cause/Solution
Log in as administrator.	Log in as a user with Administrator privileges.
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 service is active	Check if the ExpressCluster service is operating.
Invalid server status.	Check if the ExpressCluster service is operating.
Server is not active. Check if the cluster service is active.	Check if the ExpressCluster service is operating.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid server name in the cluster.
Invalid heartbeat resource name. Specify a valid heartbeat resource name in the cluster.	Specify the valid heart beat resource name in the cluster.
Invalid network partition resource	Specify the valid network partition

Section I Detailed functions of ExpressCluster

name. Specify a valid network partition resource name in the cluster.	resolution resource name 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 service is stopped in the cluster.	Check if there is any server on which the ExpressCluster service has stopped in the cluster.
Invalid parameter.	An invalid value may be specified to command argument.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set a longer timeout.	A time-out occurred in the ExpressCluster internal communication. If time-out keeps occurring, set the internal communication time-out longer.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

Examples of executing the command that displays status (clpstat command)

Displaying the status

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

Example of the display after running the command

```
==================== CLUSTER STATUS ====================
 Cluster : cluster                                    > See (1)
 <server>
  *server1........: Online         server1            -> See (2)
     lanhb1       : Normal         LAN Heartbeat       -> See (3)
     lanhb2       : Normal         LAN Heartbeat       -> See (3)
     pingnp1      : Normal         ping resolution  -> See (4)
   server2 ........: Online        server2
     lanhb1       : Normal         LAN Heartbeat
     lanhb2       : Normal         LAN Heartbeat
     pingnp1      : Normal         ping resolution
 <group>
   ManagementGroup : Online        Management Group  ->See (5)
     current      : server1
     ManagementIP : Online         10.0.0.10
   failover1 ......: Online        failover group1   ->See (6)
     current      : server1
     fip1         : Online         10.0.0.11          ->See (7)
     md1          : Online         I:
     script1      : Online         script resource1
   failover2 ......: Online        failover group2
     current      : server2
     fip2         : Online         10.0.0.12
     md2          : Online         J:
     script1      : Online         script resource2
 <monitor>
   fipw1          : Normal         fip1               ->See (8)
   fipw2          : Normal         fip2
   ipw1           : Normal         ip monitor1
   mdnw1          : Normal         md1
   mdnw2          : Normal         md2
   mdw1           : Normal         md1
   mdw2           : Normal         md2
========================================================
```

(1) Cluster   : Cluster name

(2) Server name   : Status   Server comment
    "*" indicates the server has executed this command.

(3) Heartbeat resource name   : Heartbeat resource comment

(4) NP resolution resource name : NP resolution resource comment

(5) Management group name   : Management group comment

(6) Group name   : Group comment

    current   : Server name
    Shows the server to which the group belongs now.

(7) Group Resource Name   : Status   Group resource comment

(8) Monitor Resource Name : Status   Monitor resource comment

Information on each status is provided in "Status Descriptions" on page 249.

Displaying a group map (clpstat command)

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

Example of the display after running the command:

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

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

(1) Cluster   :Cluster name

(2) server n   :Server name (n is the index number of a server)
    "*" indicates the server has executed this command.

(3) server n [*server_status*]   : Group Name [*status*] Group Name [*status*] .
    Displays the status of groups in the n-th server.

    In the example above, the groups failover1 and failover2 exist on server0, and the group failover 3 exists on server 3.

◆   Groups that are not running are not displayed.

◆   Information on each status is provided in "Status Descriptions" on page 249.

Displaying the status of monitor resources (clpstat command)

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

Example of the display after running the command:

```
=================== MONITOR RESOURCE STATUS ==================
  Cluster : cluster            -> see (1)
  *server0 : server1           -> see (2)
   server1 : server2           -> see (2)

  Monitor0 [fipw1 : Normal] -> see (3)
  ----------------------------------------------------------------
    server0 [o] : Online          -> see (4)
    server1 [o] : Offline         -> see (4)

  Monitor1 [fipw2 : Normal]
  ----------------------------------------------------------------
    server0 [o] : Offline
    server1 [o] : Online

  Monitor2 [ipw1 : Normal]
  ----------------------------------------------------------------
    server0 [o] : Online
    server1 [o] : Online

  Monitor3 [mdnw1 : Normal]
  ----------------------------------------------------------------
    server0 [o] : Online
    server1 [o] : Online

  Monitor4 [mdnw2 : Normal]
  ----------------------------------------------------------------
    server0 [o] : Online
    server1 [o] : Online
```

ExpressCluster X 2.1 for Windows Reference Guide

```
      Monitor5 [mdw1 : Normal]
-----------------------------------------------------------------
    server0 [o] : Online
    server1 [o] : Online

    Monitor6 [mdw2 : Normal]
-----------------------------------------------------------------
    server0 [o] : Online
    server1 [o] : Online
=================================================================
```

(1) Cluster : Cluster name

(2) server n : Server name (n is the index number of a server)
     "*" indicates the server has executed this command.

(3) Monitor n [*monitor_resource_name*: *status*]
     (n is the identification number of a monitor resource)
     The status of a monitor resource gathering status information per server is displayed here.

(4) server n [*server_status*]   : status
     Displays the status of each monitor resource per server.

Information on each status is provided in "Status Descriptions" on page 249.

Displaying the status of heartbeat resources (clpstat command)

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

Example of the display after running the command:

```
==================  HEARTBEAT RESOURCE STATUS  ================
Cluster : cluster          -> see (1)
 *server0 : server1        -> see (2)
   server1 : server2       -> see (2)
   HB0 : lanhb1            -> see (3)
   HB1 : lanhb2            -> see (3)

  [on server0 : Online] -> see (4)
           HB   0  1      -> see (5)
-----------------------------------------------------------------
   server0: o  o     -> see (5)
   server1: o  x     -> see (5)

  [on server1 : Online]
   HB   0  1
-----------------------------------------------------------------
   server0 : o  x
   server1 : 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 (3).

Detailed information on each status is provided in "Status Descriptions" on page 249.

The status of the example shown above:

The example above presents the status of all heartbeat resources seen from server0 and server1 when the kernel-mode LAN heartbeat resource that has the second-highest priority is disconnected.

Because kernel-mode LAN heartbeat resource lankhb1 is not able to communicate from both servers, communication to server1 on server0 or communication to server0 on server1 is unavailable.

The rest of heartbeat resources on both servers are in the status allowing communications.

Displaying the status of network partition resolution resources (clpstat command)

Specify the –p option to the clpstat command and execute the command to display the status of the network partition resolution resources.

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 : disknp1  -> see (3)
   NP1 : pingnp2  -> see (3)

   [on server0 : Online]  -> see (4)
        NP   0  1  -> see (5)
-------------------------------------------------------------------
   server0: o  o    Same as above.
   server1: o  o    Same as above.

   [on server1 : Online]
        NP   0  1
-------------------------------------------------------------------
   server0 : o  o
   server1 : 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) NP n   : network partition resolution resource name
     (n is the identification number of a network partition resolution resource)

(4) [on server n : *status*]
     Displays the status of the server whose index number is n.

(5)   NP   0   1   2 …

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).

ExpressCluster X 2.1 for Windows Reference Guide

Detailed information on each status is provided in "Status Descriptions" on page 249.

Displaying the cluster configuration data (clpstat command, --cl option)

To display the configuration data of a cluster, run the clpstat command with the -i, --cl, --sv, --hb, --np, --svg, --grp, --rsc, or --mon option. You can see more detailed information by specifying the –detail option. See a separate section, "Parameter details" on page 118 for details of each item of the list.

To display the cluster configuration data, run the clpstat command with the --cl option.

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
  [Cluster Name: cluster]                              -> see (1)
   Comment: failover cluster                           -> see (2)
  <Heartbeat I/F>
   Server Down Notification    : Enable                -> see (3)
   Cast Method                 : Unicast               -> see (4)
  <Timeout>
   Server Sync Wait Time       : 300                   -> see (5)
   Heartbeat Timeout           : 90000                 -> see (6)
   Heartbeat Interval          : 3000                  -> see (7)
   Server Internal Timeout     : 180                   -> see (8)
   Timeout Ratio               : 1                     -> see (9)
  <Port Number>
   Server Internal Port Number : 29001                 -> see (10)
   Data Transfer Port Number   : 29002                 -> see (11)
   Kernel Heartbeat Port Number : 29106                -> see (12)
   Client Service Port Number  : 29007                 -> see (13)
   WebManager HTTP Port Number : 29003                 -> see (14)
   Alert Sync Port Number      : 29003                 -> see (15)
   Disk Agent Port Number      : 29004                 -> see (16)
   Mirror Driver Port Number   : 29005                 -> see (17)
  <Recovery>
   Max Reboot Count            : 0                     -> see (18)
   Max Reboot Count Reset Time : 0                     -> see (19)
   Use Forced Stop             : Enable                -> see (20)
   Forced Stop Action          : BMC power off         -> see (21)
   Forced Stop Timeout         : 30                    -> see (22)
  <Power Saving>
   Use CPU Frequency Control   : Off                   -> see (23)
  <Delay Warning>
   Heartbeat Delay Warning     : 80                    -> see (24)
   Monitor Delay Warning       : 80                    -> see (25)
   COM Delay Warning           : 80                    -> see (26)
  <Alert Service>
   E-mail Address              :                       -> see (27)
   Use Network Warning Light   : Enable                -> see (28)
   Use Chassis Identify        : Off                   -> see (29)
   Enable Alert Setting        : Off                   -> see (30)
  <Mirror Disk>
   Auto Mirror Initial Construction: Enable            -> see (31)
   Auto Mirror Recovery        : Enable                -> see (32)
   Mirror Disk Disconnection Retry Threshold: 10       -> see (33)
   Mirror Disk Disconnection Retry Interval: 3         -> see (34)
   Mirror Disk Disconnection Final Action: Disconnect forcefully
                                                       -> see (35)
  <Disk>
   Shared Disk Disconnection Retry Threshold: 10       -> see (36)
```

```
  Shared Disk Disconnection Retry Interval: 3        -> see (37)
  Shared Disk Disconnection Final Action: Disconnect forcefully
                                                     -> see (38)
 <Auto Recovery>
  Auto Return                      :Off              -> see (39)
=============================================================
```

◆ The items in dotted frame are displayed when the --detail option is used.

Explanation of each item

(1) Cluster : Cluster name

(2) Comment : Comment

<Heartbeat I/F>

(3) Server Down Notification : Server Down Notification

(4) Cast Method : Heartbeat Cast Method

<Timeout>

(5) Server Sync Wait Time : Time to wait for synchronization (in seconds)

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

(7) Heartbeat Interval : Heartbeat send interval (in milliseconds)

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

(9) Timeout Ratio : Current time-out ratio

<Port Number>

(10) Server Internal Port Number : Internal communication port number

(11) Data Transfer Port Number : Data transfer port number

(12) Kernel Heartbeat Port Number : Kernel mode heartbeat port number

(13) Client Service Port Number : Client Service Port Number

(14) WebManager HTTP Port Number: WebManager HTTP port number

(15) Alert Sync Port Number : Alert synchronous port number

(16) Disk Agent Port Number : Disk Agent Port Number

(17) Mirror Driver Port Number : Mirror Driver Port Number

<Recovery>

(18) Max Reboot Count : Maximum reboot count

(19) Max Reboot Count Reset Time : Time to reset the maximum reboot count (in seconds)

(20) Use Forced Stop : Forced stop

(21) Forced Stop Action : Forced stop action

(22) Forced Stop Timeout : Forced stop timeout

<Power Saving>

(23) Use CPU Frequency Control   : CPU frequency control

<Delay Warning>

(24) Heartbeat Delay Warning   : Delay warning of heartbeat resource (%)

(25) Monitor Delay Warning   : Delay warning of monitor resource (%)

(26) COM Delay Warning   : Delay warning of COMNP resource (%)

<Alert Service>

(27) E-mail Address   : E-mail address to be reported

(28) Use Network Warning Light   : Network warning light

(29) Use Chassis Identify   : Chassis Identify

(30) Enable Alert Setting   : Alert setting

The items of the information on mirror are displayed when not using the Replicator/Replicator DR as well.

<Mirror Disk>

(31) Auto Mirror Initial Construction   : Auto Mirror Initial Construction

(32) Auto Mirror Recovery   : Auto Mirror Recovery

(33) Mirror Disk Disconnection Retry Threshold : Mirror Disk Disconnection Retry Threshold

(34) Mirror Disk Disconnection Retry Interval   : Mirror Disk Disconnection Retry Interval (in seconds)

(35) Mirror Disk Disconnection Final Action   : Mirror Disk Disconnection Final Action

<Disk>

(36) Shared Disk Disconnection Retry Threshold   : Shared Disk Disconnection Retry Threshold

(37) Shared Disk Disconnection Retry Interval   : Shared Disk Disconnection Retry Interval (in seconds)

(38) Shared Disk Disconnection Final Action   : Shared Disk Disconnection Final Action

<Auto Recovery>

(39) Auto Return   : Auto Recovery of Servers

Displaying only the configuration data of certain servers (clpstat command with the --sv option)

When you want to display only the cluster configuration data on a specified server, specify the name of the server after the --sv option in the clpstat command. To see the details, specify the **--**detail option. When the server name is not specified, cluster configuration data of all the servers is displayed.

Example of a command entry

```
# clpstat --sv server1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Server0 : server1]                                          -> see (1)
  Comment            : server1                               -> see (2)
  Product            : ExpressCluster x 2.1 for Windows  -> see (3)
  Internal Version   : 10.11                                 -> see (4)
  Install Path       : C:\Program Files\EXPRESSCLUSTER   -> see (5)
  IP Address         : 10.0.0.1                              -> see (6)
  Network warning light IP Address
                     : 10.0.0.10                             -> see (7)
  BMC Address        : 10.0.0.11                             -> see (8)
  CPU Frequency Status :high                                 -> see (9)
```

◆   The items in dotted frame are displayed when the --detail option is used.

Explanation of each item

(1) [Server n: server_name]   (n is index number of a server)

(2) Comment   : Comment

(3) Product   : Product

(4) Internal Version   : Internal Version

(5) Install Path   : Install Path

(6) IP Address   : Public LAN address

(7) Network Warning Light IP Address

                          : Network warning light IP address

(8) BMC IP Address   : BMC IP address

(9) CPU Frequency Status : CPU Frequency Status

Displaying only the resource information of certain heartbeats (clpstat command with the --hb option)

When you want to display only the cluster configuration data on a specified heartbeat resource, specify the name of the heartbeat resource after the --hb option in the clpstat command. If you want to see the details, specify the --detail option. When the heartbeat resource is not specified, the cluster configuration data of all the heartbeat resources is displayed.

Example of a command entry (For a kernel-mode LAN heartbeat resource)

```
# clpstat –-hb lankhb1 --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 marked by the solid line are common to all heartbeat resources.

◆ The lines below "Comment" are displayed when the --detail option is used.

Information common to all heartbeat resources

(1) [HB n: heartbeat_resource_name]
    (n is the identification number of a heartbeat resource)

(2) Type   : Heartbeat resource type

(3) Comment   : Comment

Description of item

(4) IP Address : Interconnect address

◆ Tips

By using the --sv option and the --hb option together, you can see the information as follows.

Command Line **# clpstat --sv --hb --detail**

```
==================== CLUSTER INFORMATION =================
[Server0 : server1]
 Comment              : server1
 Product              : ExpressCluster x 2.1 for Windows
 Version              : 10.11
 Install Path         : C:\Program Files\EXPRESSCLUSTER
 IP Address           : 10.0.0.1
 Network Warning Light IP Address
                      : 10.0.0.10
 BMC IP Address       : 10.0.0.11
 CPU Frequency Status : high
   [HB0 : lankhb1]
     Type             : lankhb
     Comment          : LAN Heartbeat
     IP Address       : 192.168.0.1
   [HB1 : lanhb2]
     Type             : lankhb
     Comment          : LAN Heartbeat
     IP Address       : 10.0.0.1
[Server1 : server2]
```

```
        Comment             : server2
        Product             : ExpressCluster x 2.1 for Windows
        Version             : 10.11
        Install Path        : C:\Program Files\EXPRESSCLUSTER
        IP Address          : 10.0.0.2
        Network Warning Light IP Address
                            : 10.0.0.10
        BMC IP Address      : 10.0.0.12
        CPU Frequency Status : high
          [HB0 : lankhb1]
            Type            : lankhb
            Comment         : LAN Heartbeat
            IP Address      : 192.168.0.2
          [HB1 : lankhb2]
            Type            : lankhb
            Comment          : LAN Heartbeat
            IP Address      : 10.0.0.2
        ============================================================
```

Displaying only the resource information of certain network partition resolutions (clpstat command with the --np option)

When you want to display only the cluster configuration data on a specified network partition resolution resource, specify the name of the network partition resolution resource after the --np option in the clpstat command. If you want to see the details, specify the --detail option. If the network partition name is not specified, the cluster configuration data on all the network partition resources is displayed.

Example of a command entry (For a DISK network partition resolution **resource)**

```
# clpstat --np disknp1 --detail
```

Example of the display after running the command:

```
=================== CLUSTER INFORMATION =====================
  [NP0 : disknp1]                                         -> see (1)
    Type                    : disknp                      -> see (2)
    Comment                 : disk resolution             -> see (3)
    <server1>
    Volume Mount Point      : H:\                          -> see (4)
    Disk I/O Wait Time      : 80                           -> see (5)
    <server2>
     Volume Mount Point     : H:\
     Disk I/O Wait Time     : 80
=============================================================
```

◆ The items marked by the solid line are common to all network partition resolution resources.

◆ The lines below "Comment" are displayed when the --detail option is used.

Information common to all network partition resolution resources

(1) [NP n: network partition resolution resource name]
(n is the identification number of a network partition resolution resource)

(2) Type : Network partition resolution resource type

(3) Comment : Comment

Description of items

(4) Volume Mount Point : Volume mount point

(5) Disk I/O Wait Time : Disk I/O wait time

Example of a command entry (For a COM network partition resolution resource)

```
# clpstat --np comnp1 --detail
```

Example of the display after running the command:

```
=================== CLUSTER INFORMATION =====================
  [NP0 : comnp1]
    Type                     : comnp
    Comment                  : com resolution
    <server1>
    Port Name                : COM1                  -> see (1)
    <server2>
    Port Name                : COM1
=====================================================================
```

Description of item

(1) Port Name : COM port name

Example of a command entry (For a PING network partition resolution resource)

```
# clpstat --np pingnp1 --detail
```

Example of the display after running the command:

```
=================== CLUSTER INFORMATION =====================
  [NP0 : pingnp1]
    Type                     : pingnp
    Comment                  : ping resolution
    <server1>
     IP Addresses            : 10.0.0.254           -> see (1)
     Ping Interval           : 5                    -> see (2)
     Ping Timeout            : 3                    -> see (3)
     Ping Retry Count        : 3                    -> see (4)
    <server2>
     IP Addresses            : 10.0.0.254
     Ping Interval           : 5
     Ping Timeout            : 3
     Ping Retry Count        : 3
=====================================================================
```

Description of items

(1) IP Addresses : IP addresses of ping destination

(2) Ping Interval: Ping interval (in seconds)

(3) Ping Timeout : Ping time-out (in seconds)

(4) Ping Retry Count : Ping retry count

Example of a command entry (For a majority network partition resolution resource)

```
# clpstat --np majonp1 --detail
```

Example of the display after running the command:

```
=================== CLUSTER INFORMATION =====================
  [NP0 : majonp1]
    Type                     : majonp
    Comment                  : majority resolution
=====================================================================
```

Description of item

There is no item specific to a majority network partition resolution resource.

Displaying only the configuration data of certain server groups (clpstat command with the --svg option)

When you want to display only the cluster configuration data on a specified server group, specify the name of the server group after the --svg option in the clpstat command. When a server group name is not specified, the cluster configuration data on all the server groups is displayed.

Example of a command entry

```
# clpstat --svg servergroup1
```

Example of the display after running the command:

```
===================== CLUSTER INFORMATION =====================
  [Server group 0 : servergroup1]    -> see (1)
    Server0 : server1                 -> see (2)
    Server1 : server2                 -> see (2)
    Server2 : server3                 -> see (2)
===============================================================
```

◆ Description of item

(1) [ServerGroup n : *server_group_name*]   (n is the identification number of a server group)

(2) Server n   : n is the priority number in a server group

Displaying only the configuration data of certain groups (clpstat command with the --grp option)

When you want to display only the cluster configuration data on a specified group, specify the name of the group after the --grp option in the clpstat command. If you want to see the details, specify the --detail option. When the group name is not specified, the cluster configuration data on all the groups is displayed.

Example of a command entry

```
# clpstat --grp --detail
```

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
  [Group0 : ManagementGroup]                              -> see (1)
    Type                         : cluster               -> see (2)
    Comment                      :                       -> see (3)
    Startup Attribute            : Auto Startup           -> see (4)
    Failover Exclusive Attribute : Off                   -> see (5)
    Failback Attribute           : Manual Failback        -> see (6)
    Failover Attribute           : Auto Failover          -> see (7)
    Servers that can run the Group: 0  server1            -> see (8)
  [Group1 : 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
  [Group2 : failover2]
    Type                         : failover
    Comment                      : failover group2
    Startup Attribute            : Auto Startup
    Failover Exclusive Attribute : Off
```

```
        Failback Attribute          : Auto Failback
        Failover Attribute          : Auto Failover
        Servers that can run the Group: 0  server1
                                      : 1  server2
==============================================================
```

◆ The items below "Comment" are displayed when the --detail option is used.

(1) [Group n : *group_name*]   (n is the identification number of a group)

(2) Type   : Group type

(3) Comment   : Comment

(4) Startup Attribute   : Startup type
    • Manual Startup
    • Auto Startup

(5) Failover Exclusive Attribute : Startup exclusive attributes
    • No Exclusion
    • Normal
    • Absolute

(6) Failback Attribute   : Failback attribute
    • Manual Failback
    • Auto Failback

(7) Failover Attribute   : Failover attribute
    • Manual Failover
    • Auto Failover

(8) Servers that can run the Group : Failover order

   Servers that can run the Group are displayed in the failover policy sequence.

Displaying only the configuration data of a certain group resource (clpstat command with the --rsc option)

When you want to display only the cluster configuration data on a specified group resource, specify the group resource after the --rsc option in the clpstat command. If you want to see the details, specify the --detail option. When the group resource name is not specified, the cluster configuration data on all the group resources is displayed.

Example of a command entry (For floating IP resource)

```
# clpstat --rsc fip1 --detail
```

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
[Resource0 : fip1]                                   ->see (1)
  Type                      : fip                    -> see (2)
  Comment                   : 10.0.0.11              -> see (3)
  Failover Target Server    : stable operation server-> see (4)
  Failover Threshold        : Number of Servers      -> see (5)
  Retry Count at Activation Failure: 5               -> see (6)
  Retry Interval at Activation Failure: 5            -> see (7)
  Final Action at Activation Failure:
  No Operation (Not activate next resource)          -> see (8)
  Execute Script before Final Action: Off            -> see (9)
  Retry Count at Deactivation Failure : 0            -> see (10)
  Retry Interval at Inactivation Failure: 5          -> see (11)
  Final Action at Deactivation Failure: Stop the cluster
  service and shut down OS                           -> see (12)
  Execute Script before Final Action: Off            -> see (13)
  Depended Resources        :                        ->see (14)
    IP Address              : 10.0.0.11              -> see (15)
  Run ping                  : On                     -> see (16)
  Ping Timeout(msec)        : 1000                   -> see (17)
  Ping Retry Count          : 5                      -> see (18)
  Ping Retry Interval(sec)  : 1                      -> see (19)
  FIP Force Activation      : Off                    -> see (20)
============================================================
```

- The items marked by the solid line are common to all resources.

- The items marked by the dotted lines are displayed when the --detail option is used.

Information common to all 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 Target Server   : Failover target server

- **The most prioritized server**

- **Stable operation server**

(5) Failover Threshold   : Failover count

(6) Retry Count at Activation Failure :   Activation retry count

(7) Retry Interval at Activation Failure   : Activation retry interval (in seconds)

(8) Final Action at Activation Failure   : Final action at activation failures

- **No Operation (Activate next resource)**

- **No Operation (Not activate next resource)**
- **Stop Group**
- **Stop cluster service**
- **Stop the cluster service and shut down**
- **Stop cluster service and reboot OS**
- **Generate an Intentional Stop Error**

(9) Execute Script before Final Action : Whether or not to execute script upon activation failure

(10) Retry Count at Deactivation Failure : Deactivation retry count

(11) Retry Interval at Inactivation Failure : Deactivation retry interval (in seconds)

(12) Final Action at Deactivation Failure : Final action at inactivation failures

- **No Operation (Deactivate next resource)**
- **No Operation (Not deactivate next resource)**
- **Stop the cluster service and shut down**
- **Stop cluster service and reboot OS**
- **Generate an Intentional Stop Error**

(13) Execute Script before Final Action : Whether or not to execute script upon deactivation failure

(14) Dependent Resources : Dependent resources

Explanation of each item

(15) IP Address : Floating IP address

(16) Run ping : Run ping / Do not run ping

(17) Ping Timeout (msec) : Time-out of ping to confirm redundancy (in milliseconds)

(18) Ping Retry Count : ping retry count

(19) Ping Retry Interval (sec) : ping retry interval (in seconds)

(20) Forced FIP Activation : Floating IP force activation

Example of a command entry (For virtual IP resource)

```
# clpstat --rsc vip1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Resource0 : vip1]
  Type                         : vip
  Comment                      : 10.0.1.11
  Failover Target Server       : stable operation server
  Failover Threshold           : Number of Servers
  Retry Count at Activation Failure: 5
  Retry Interval 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
  Retry Interval at Inactivation Failure: 0
  Final Action at Deactivation Failure: Stop the cluster service
                                         and shut down OS
  Execute Script before Final Action: Off
  Dependent Resources          :
  IP Address                   : 10.0.1.11          see-> (1)
  Subnet Mask                  : 255.255.255.0      see -> (2)
  Run ping                     : Enable             see -> (3)
  ping Timeout (msec)          : 1000               see -> (4)
  Ping Retry Count             : 5                  see -> (5)
  Ping Retry Interval (sec)    : 1                  see -> (6)
  VIP Force Activation         : Disable            see -> (7)
```

Explanation of each item

(1) IP Address   : Virtual IP address

(2) Subnet Mask   : Subnet mask of the virtual IP address

(3) Run ping   : Run ping / Do not run ping

(4) Ping Timeout (msec)   : Time-out of ping to confirm redundancy (in milliseconds)

(5) Ping Retry Count   : Ping retry count

(6) Ping Retry Interval (sec) : Ping retry interval (in seconds)

(7) VIP Forced Activation   : Virtual IP forced activation

Example of a command entry (For virtual computer name resource)

 # clpstat --rsc vcom1 --detail

Example of the display after running the command:

```
===================== CLUSTER INFORMATION =================
  [Resource0 : vcom1]
    Type                       : vcom
    Comment                    : vcom11
    Failover Target Server     : stable operation server
    Failover Threshold         : Number of Servers
    Retry Count at Activation Failure: 5
    Retry interval 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
    Retry interval at Activation Failure: 5
    Final Action at Deactivation Failure: Stop the cluster service
                                          and shut down OS
    Execute Script before Final Action: Off
    Dependent Resources        : fip1
    Virtual Computer Name      : vcom11            -> see (1)
    Target FIP Resource Name   : fip1             -> see (2)

===========================================================
```

(1) Virtual Computer Name   : Virtual computer name

(2) Target FIP Resource Name   : bind target FIP resource name

Example of a command entry (For disk resource)

 # clpstat --rsc sd1 --detail

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Resource 0 : sd1]
  Type                         : sd
  Comment                      : I:
  Failover Target Server       : stable operation server
  Failover Threshold           : Number of Servers
  Retry Count at Activation Failure: 0
  Retry Interval 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
  Retry Interval at Inactivation Failure  : 5
  Final Action at Deactivation Failure: Stop the cluster service
                                     and shutdown OS
  Execute Script before Final Action: Off
  Dependent Resources          : disk1,fip1
  Drive Letter                 : I:                    -> see (1)

===========================================================
```

Explanation of each item

(1) Drive Letter   : Mount point of the volume

Example of a command entry (Mirror disk resource: when the Replicator is used)

 # clpstat --rsc md1 --detail

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ===================
   [Resource0 : md1]
     Type                          : md
     Comment                       : I:
     Failover Target Server        : stable operation server
     Failover Threshold            : Number of Servers
     Retry Count at Activation Failure: 0
     Retry Interval 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
     Retry Interval at Inactivation Failure  : 5
     Final Action at Deactivation Failure: Stop the cluster service
                                     and shut down OS
     Execute Script before Final Action: Off
     Depended Resources            :
     Mirror Disk No.               : 1                 -> see (1)
     Drive Letter                  : I:                -> see (2)
     Cluster Partition - Drive Letter: H:              -> see (3)
     Cluster Partition - Offset Index  : 0             -> see (4)
     Execute the initial mirror construction: Enable   -> see (5)
     Mode                          : Synchronous       -> see (6)
     Request Queue Maximum Size(KB): 2048              -> see (7)
     Mirror Connect Timeout(sec) : 20                  -> see (8)
     Asynchronous - History Files Store Folder:        -> see (9)
     Asynchronous - Kernel Queue Size (KB): 2048       -> see (10)
     Asynchronous - Application Queue Size(KB): 2048   -> see (11)
     Asynchronous - Thread Timeout(sec): 30            -> see (12)
===========================================================
```

Explanation of each item

(1) Mirror Disk No.: Mirror disk number

(2) Drive Letter   : Drive letter

(3) Cluster Partition - Drive letter : Drive letter

(4) Cluster Partition - Offset Index   : Offset index

(5) Execute the initial mirror construction   : Execute the initial mirror construction/Do not execute the initial mirror construction

(6) Mode   : Synchronous/Asynchronous

(7) Request Queue Maximum Size(KB) : Maximum size of the request queue (KB)

(8) Mirror Connect Timeout(sec) : Mirror connect time-out (in seconds)

(9) Asynchronous - History Files Store Folder   : History file storage folder

(10) Asynchronous - Kernel Queue Size (KB): Kernel queue size (KB)

(11) Asynchronous - Application Queue Size(KB)   : Application queue size (KB)

(12) Asynchronous - Thread Timeout(sec): Thread time-out (in seconds)

Example of a command entry (For print spooler resource)

```
# clpstat --rsc spool1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Resource0 : spool1]
  Type                         : regsync
  Comment                      :
  Failover Target Server       : stable operation server
  Failover Threshold           : Number of Servers
  Retry Count at Activation Failure: 0
  Retry Interval 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
  Retry Interval at Inactivation Failure  : 5
  Final Action at Deactivation Failure: Stop the cluster service
                                   and shutdown OS
  Execute Script before Final Action: Off
  Dependent Resources          : md1
  Printer Name                 : NEC MultiImpact 700EX -> see (1)
  Partition                    : I:                    -> see (2)
  Spool Directory              : \SPOOL1               -> see (3)
============================================================
```

Explanation of each item

(1) Printer Name   : Printer name

(2) Partition   : Partition

(3) Spool directory   : Spool directory

Example of a command entry (For a registry synchronization resource)

 # clpstat --rsc regsync1 --detail

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
[Resource0 : regsync1]
  Type                          : regsync
  Comment                       :
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Retry Count at Activation Failure: 0
  Retry Interval 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
  Retry Interval at Inactivation Failure  : 5
  Final Action at Deactivation Failure: Stop the cluster service
                                  and shutdown OS
  Execute Script before Final Action: Off
  Dependent Resources           : fip1,vcom1,md1
  Registry Key                  : HKEY_LOCAL_MACHINE\SOFTWARE\A
                                -> see (1)
```

Explanation of each item

(1) Registry Key   : Registry key

Example of a command entry (For application resource)

```
# clpstat --rsc appli1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Resource0 : appli1]
  Type                          : appli
  Comment                       : notepad
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Retry Count at Activation Failure  : 0
  Retry Interval 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
  Retry Interval at Inactivation Failure  : 5
  Final Action at Deactivation Failure: Stop the cluster service
                                   and shutdown OS
  Execute Script before Final Action: Off
  Depended Resources            : fip1,vcom,md1
  Resident Type                 : Resident            -> see (1)
  Target VCOM Resource Name :                         -> see (2)
  Start Path                    : C:\WINDOWS\notepad.exe-> see (3)
  [Start] Type                  : Synchronous         -> see (4)
  [Start] Timeout(sec)      : 1800                    -> see (5)
  [Start] Current Directory :                         -> see (6)
  [Start] Option Parameter  :                         -> see (7)
  [Start] Window Size       : Hide                    -> see (8)
  [Start] Domain            :                         -> see (9)
  [Start] Account           :                         -> see (10)
  [Start] Allow to Interact with Desktop: Disable     -> see (11)
  [Start] Execute from the Command Prompt: Disable    -> see (12)
  Stop Path                     :                     -> see (13)
  [Stop ]Type               : Synchronous             -> see (14)
  [Stop ]Timeout(sec)       : 1800                    -> see (15)
  [Stop ] Current Directory :                         -> see (16)
  [Stop ]Option Parameter   :                         -> see (17)
  [Stop ]Window Size        : Hide                    -> see (18)
  [Stop ]Domain             :                         -> see (19)
  [Stop ]Account            :                         -> see (20)
  [Stop ]Allow to Interact with Desktop: Disable      -> see (21)
  [Stop ] Execute from the Command Prompt: Disable    -> see (22)
==========================================================
```

Explanation of each item

(1) Resident Type   : Resident/Non-Resident

(2) Target VCOM Resource Name   : Virtual computer name resource of target

(3) Start Path   : Application path at start

(4) [Start] Type   : Synchronous/Asynchronous at start

(5) [Start] Timeout (sec)   :Time-out period at start (in seconds)

(6) [Start] Current Directory   : Execution directory at start

(7) [Start] Option Parameter   : Option parameter at start

(8) [Start] Window Size   :Window size at start

(9) [Start] Domain   :Domain at start

(10) [Start] Account   :Account at start

(11) [Start] Allow to Interact with Desktop   :Allow to interact with desktop at start/Do not allow to interact with desktop at start

(12) [Start] Execute from the Command Prompt :Execute from the command prompt at start/Do not Execute from the command prompt at start

(13) Stop Path   : Application path at stop

(14) [Stop]Type   : Synchronous/Asynchronous at stop

(15) [Stop]Timeout(sec)   : Time-out period at stop (in seconds)

(16) [Stop]Current Directory   : Execution directory at stop

(17) [Stop]Option Parameter   : Option parameter at stop

(18) [Stop]Window Size   : Window size at stop

(19) [Stop]Domain   : Domain at stop

(20) [Stop]Account   : Account at stop

(21) [Stop]Allow to Interact with Desktop   : Allow to interact with desktop at stop/Do not allow to interact with desktop at stop

(22) [Stop]Execute from the Command Prompt : Execute from the command prompt at stop/Do not execute from the command prompt at stop

Example of a command entry (For script resource)

```
# clpstat --rsc script1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Resource0 : script1]
  Type                        : script
  Comment                     : script resource1
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Retry Count at Activation Failure: 0
  Retry Interval 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
  Retry Interval at Inactivation Failure  : 5
  Final Action at Deactivation Failure: Stop the cluster service
                                  and shut down OS
  Execute Script before Final Action: Off
  Depended Resources          : fip1,vcom,md1
  Target VCOM Resource Name   :                      -> see (1)
  Start Path                  : start.bat            -> see (2)
  [Start] Type                : Synchronous          -> see (3)
  [Start] Timeout(sec)        : 1800                 -> see (4)
  [Start] Allow to Interact with Desktop: Disable    -> see (5)
  Stop Path                   : stop.bat             -> see (6)
  [Stop ]Type                 : Synchronous          -> see (7)
  [Stop ]Timeout(sec)         : 1800                 -> see (8)
  [Stop ]Allow to Interact with Desktop:Disable      -> see (9)
==========================================================
```

Explanation of each item

(1) Target VCOM Resource Name   : Target VCOM resource name

(2) Start Path   : Path of start script

(3) [Start] Type   :Synchronous/Asynchronous of start script path

(4) [Start] Timeout (sec)   :Time-out period of start script (in seconds)

(5) [Start] Allow to Interact with Desktop   :Allow to interact with desktop at start / Do not allow to interact with desktop at start

(6) Stop Path   : Path of stop script

(7) [Stop]Type   : Synchronous/Asynchronous of stop script

(8) [Stop]Timeout (sec)   : Time-out period (in seconds) of stop script

(9) [Stop]Allow to Interact with Desktop allow to interact with desktop at stop   : Allow to interact with desktop at stop /Do not

Example of a command entry (For service resource)

 # clpstat --rsc service1 --detail

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ====================
   [Resource0 : service1]
     Type                          : service
     Comment                       : Telnet
     Failover Target Server        : stable operation server
     Failover Threshold            : Number of Servers
     Retry Count at Activation Failure  : 0
     Retry Interval 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
     Retry Interval at Inactivation Failure  : 5
     Final Action at Deactivation Failure: Stop the cluster service
                                         and shut down OS
     Execute Script before Final Action: Off
     Dependent Resources           : fip1,vcom,md1
     Service Name                  : Telnet                -> see (1)
     Start Parameters              :                       -> see (2)
     Do not assume it as an error when the service is already started:
     Disable                                               -> see (3)
     Target VCOM Resource Name :                           -> see (4)
     [Start] Type              : Synchronous               -> see (5)
     [Start] Timeout(sec)      : 1800                      -> see (6)
     [Stop]Type                : Synchronous               -> see (7)
     [Stop]Timeout(sec)        : 1800                      -> see (8)
==============================================================
```

Explanation of each item

(1) Service Name   : Service name/Service display name

(2) Start Parameter : Parameter to give when service starts

(3) Do not assume it as an error when the service is already started   : Behaviors when service has been already started

(4) Target VCOM Resource Name   : Target VCOM resource name

(5) [Start] Type   :Synchronous/Asynchronous when service starts

(6) [Start] Timeout (sec)   :Time-out period (in seconds) when service starts

(7) [Stop] Type   :Synchronous/Asynchronous when service stops

(8) [Stop] Timeout(sec)   :Time-out period (in seconds) when service stops

◆ 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 : ManagementGroup]
    Comment                       :
   [Resource0 : ManagementIP]
     Type                         : fip
     Comment                      :
     IP Address                   : 10.0.0.10
  [Group1 : failover1]
    Comment                       : failover group1
   [Resource0 : fip1]
     Type                         : fip
     Comment                      : 10.0.0.11
     IP Address                   : 10.0.0.11
   [Resource1 : md1]
     Type                         : md
     Comment                      : I:
     Mirror Disk No.              : 1
     Drive Letter                 : I:
   [Resource2 : script1]
     Type                         : script
     Comment                      : script resource1
     Start Path                   : start.bat
     Stop Path                    : stop.bat
  [Group2 : failover2]
    Comment                       : failover group2
   [Resource0 : fip2]
     Type                         : fip
     Comment                      : 10.0.0.12
     IP Address                   : 10.0.0.12
   [Resource1 : md2]
     Type                         : md
     Comment                      : J:
     Mirror Disk No.              : 2
     Drive Letter                 : J:
   [Resource2 : script2]
     Type                         : script
     Comment                      : script resource2
     Start Path                   : start.bat
     Stop Path                    : stop.bat
===========================================================
```

Displaying only the data of a certain monitor resource (clpstat command with the --mon option)

When you want to display only the cluster configuration data on a specified monitor resource, specify the name of the monitor resource after the --mon option in the clpstat command. If you want to see the details, specify --detail option. When a monitor resource name is not specified, the configuration data of all the monitor resources is displayed.

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

```
# clpstat –mon fipw1 --detail
```

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
 [Monitor0 : fipw1]                                            -> see (1)
  Type                          : fipw                         -> see (2)
  Comment                       : fip1                         -> see (3)
  Monitor Timing                : Active                       -> see (4)
  Target Resource               : fip1                         -> see (5)
  Interval                      : 60                           -> see (6)
  Timeout                       : 60                           -> see (7)
  Retry Count                   : 1                            -> see (8)
  Final Action                  : No Operation                 -> see (9)
  Execute Script before Final Action: Off                      -> see (10)
  Recovery Target               : failover1                    -> see (11)
  Recovery Target Type          : Group                        -> see (12)
  Reactivation Threshold        : 3                            -> see (13)
  Failover Target Server        : Stable operation server
                                                               -> see (14)
  Failover Threshold            : Number of Servers            -> see (15)
  Wait Time to Start Monitoring : 0                            -> see (16)
  Monitor NIC Link Up/Down      : Enable                       -> see (17)
============================================================
```

◆ The items marked by the solid line are common to all resources.

◆ The items marked by the dotted line are displayed when the --detail option is used.

Explanation of items common to all monitor resources

(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
  • Active

(5) Target Resource   : Monitor target resource

(6) Interval   : Monitor interval

(7) Timeout   : Monitor time-out (in seconds)

(8) Retry Count   : Monitor retry count

(9) Final Action   : Action taken when the retry count exceeds
    No Operation
    Stop Group
    Stop the cluster service
    Stop the cluster service and shutdown OS
    Stop cluster service and reboot OS

Generate an Intentional Stop Error

(10) Execute Script before Final Action   : Whether or not to execute script before final action

(11) Recovery Target   : Target to be recovered when an error is detected

(12) Recovery Target Type   : Type of a target to be recovered when an error is detected
Group
Resource
Itself

(13) Reactivation Threshold   : Restart count

(14) Failover Target Server   : Failover target server

- The most prioritized server

- Stable operation server

(15) Failover Threshold   : Failover count

(16) Wait Time to Start Monitoring: Time to wait for the start of monitoring

Explanation of each item

(17) Monitor NIC Link Up/Down : Monitor NIC Link Up/Down/Do not monitor NIC Link
                                       Up/Down

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

```
# clpstat –mon vipw1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : vipw1]
  Type                          : vipw
  Comment                       : vip1
  Monitor Timing                : Active
  Target Resource               : vip1
  Interval                      : 60
  Timeout                       : 60
  Retry Count                   : 1
  Final Action                  : No Operation
  Execute Script before Final Action: Off
  Recovery Target               : failover1
  Recovery Target Type          : Group
  Reactivation Threshold        : 3
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Wait Time to Start Monitoring : 0
===========================================================
```

Explanation of each item

There is no item specific to virtual IP monitor resource.

Example of a command entry (For virtual computer name monitor resource)

```
# clpstat –mon vcomw1 --detail
```

Example of the display after running the command:

```
====================  CLUSTER INFORMATION  ==================
[Monitor0 : vcomw1]
  Type                          : vcomw
  Comment                       : vcom1
  Monitor Timing                : Active
  Target Resource               : vcom1
  Interval                      : 60
  Timeout                       : 60
  Retry Count                   : 1
  Final Action                  : Stop the cluster service and shut
                                    down OS
  Execute Script before Final Action: Off
  Recovery Target               : cluster
  Recovery Target Type          : Itself
  Reactivation Threshold        : 0
  Failover Target Server        : stable operation server
  Failover Threshold            : 0
  Wait Time to Start Monitoring : 0
=============================================================
```

Explanation of each item

There is no item specific to virtual computer name monitor resource.

Example of a command entry (For disk TUR monitor resource)

`# clpstat –mon sdw1 --detail`

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
[Monitor0 : sdw1]
  Type                          : sdw
  Comment                       :
  Monitor Timing                : Always
  Target Resource               :
  Interval                      : 60
  Timeout                       : 300
  Retry Count                   : 0
  Final Action                  : No Operation
  Execute Script before Final Action: Off
  Recovery Target               : failover1
  Recovery Target Type          : Group
  Reactivation Threshold        : 0
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Wait Time to Start Monitoring : 0
  Disk Resource                 : sd1                    -> see (1)
============================================================
```

Explanation of each item

(1) Disk Resource   : Target disk resource name

Example of a command entry (For disk RW monitor resource)

 # clpstat --mon diskw1 --detail

Example of the display after running the command:

```
====================  CLUSTER INFORMATION  ==================
[Monitor0 : diskw1]
  Type                        : diskw
  Comment                     :
  Monitor Timing              : Always
  Target Resource             :
  Interval                    : 30
  Timeout                     : 300
  Retry Count                 : 0
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : failover1
  Recovery Target Type        : Group
  Reactivation Threshold      : 0
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Wait Time to Start Monitoring : 0
  File Name                   : C:\a.txt           -> see (1)
  I/O Size (byte)             : 2000000            -> see (2)
  Action on Stall             : STOP Error         -> see (3)
=============================================================
```

Explanation of each item

(1) File Name   : File name

(2) I/O size (byte) : I/O size (in bytes)

(3) Action on Stall : Actions taken when an stall is detected

Example of a command entry (For mirror disk monitor resource)

```
# clpstat --mon mdw1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : mdw1]
  Type                          : mdw
  Comment                       :
  Monitor Timing                : Always
  Target Resource               :
  Interval                      : 30
  Timeout                       : 999
  Retry Count                   : 0
  Final Action                  : No Operation
  Execute script Before Final Action: Off
  Recovery Target               : md1
  Recovery Target Type          : Resource
  Reactivation Threshold        : 0
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Wait Time to Start Monitoring : 0
  Mirror Disk Resource Name     : md1                  -> see (1)
============================================================
```

Explanation of each item

(1) Mirror Disk Resource Name   : Target mirror disk resource name

Example of a command entry (For mirror connect monitor resource)

 # clpstat --mon mdnw1 --detail

Example of the display after running the command:

```
====================  CLUSTER INFORMATION  ==================
[Monitor0 : mdnw1]
  Type                        : mdnw
  Comment                     :
  Monitor Timing              : Always
  Target Resource             :
  Interval                    : 60
  Timeout                     : 10
  Retry Count                 : 0
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : md1
  Recovery Target Type        : Resource
  Reactivation Threshold      : 0
  Failover Target Server      : stable operation server
  Failover Threshold          : 0
  Wait Time to Start Monitoring : 0
  Mirror Disk Resource Name   : md1                 -> see (1)
=============================================================
```

Explanation of each item

(1) Mirror Disk Resource Name : Target mirror disk resource name

Example of a command entry (For print spooler monitor resource)

 # clpstat --mon spoolw1 --detail

Example of the display after running the command:

```
===================  CLUSTER INFORMATION  ==================
[Monitor0 : spoolw1]
  Type                        : spoolw
  Comment                     : spool1
  Monitor Timing              : Active
  Target Resource             : spool1
  Interval                    : 60
  Timeout                     : 60
  Retry Count                 : 1
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : failover1
  Recovery Target Type        : Group
  Reactivation Threshold      : 3
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Wait Time to Start Monitoring : 0
============================================================
```

Explanation of each item

There is no item specific to print spooler monitor resources.

Example of a command entry (For registry synchronization monitor resource)

```
# clpstat --mon regsyncw1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : regsyncw1]
  Type                          : regsyncw
  Comment                       : regsync1
  Monitor Timing                : Active
  Target Resource               : regsync1
  Interval                      : 60
  Timeout                       : 60
  Retry Count                   : 1
  Final Action                  : No Operation
  Execute Script before Final Action: Off
  Recovery Target               : failover1
  Recovery Target Type          : Group
  Reactivation Threshold        : 3
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Wait Time to Start Monitoring : 0
===========================================================
```

Explanation of each item

There is no item specific to registry synchronous monitor resources.

Example of a command entry (For application monitor resource)

`# clpstat --mon appliw1 --detail`

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : appliw1]
  Type                        : appliw
  Comment                     : appli1
  Monitor Timing              : Active
  Target Resource             : appli1
  Interval                    : 60
  Timeout                     : 60
  Retry Count                 : 1
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : failover1
  Recovery Target Type        : Group
  Reactivation Threshold      : 3
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Wait Time to Start Monitoring : 0
===========================================================
```

Explanation of each item

There is no item specific to application monitor resources.

Example of a command entry (For service monitor resource)

```
# clpstat --mon servicew1 --detail
```

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : servicew1]
  Type                          : servicew
  Comment                       : service1
  Monitor Timing                : Active
  Target Resource               : service1
  Interval                      : 60
  Timeout                       : 60
  Retry Count                   : 1
  Final Action                  : No Operation
  Execute Script before Final Action: Off
  Recovery Target               : failover1
  Recovery Target Type          : Group
  Reactivation Threshold        : 3
  Failover Target Server        : stable operation server
  Failover Threshold            : Number of Servers
  Wait Time to Start Monitoring : 0
===========================================================
```

Explanation of each item

There is no item specific to service monitor resources.

Example of a command entry (For IP monitor resource)

 # clpstat --mon ipw1 --detail

Example of the display after running the command:

```
==================== CLUSTER INFORMATION ==================
[Monitor0 : ipw1]
  Type                         : ipw
  Comment                      :
  Monitor Timing              : Always
  Target Resource             :
  Interval                    : 60
  Timeout                     : 60
  Retry Count                 : 1
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : failover1
  Recovery Target Type        : Group
  Reactivation Threshold      : 3
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Wait Time to Start Monitoring : 0
  IP Addresses                 : 10.0.0.254          -> see (1)
                               : 10.0.0.253
  Ping Timeout (msec)          : 1000               -> see (2)
===========================================================
```

Explanation of each item

(1) IP Addresses   : Monitor Target IP Addresses

(2) Ping Timeout (msec)   : ping time-out time (in milliseconds)

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 ==================
[Monitor0 : miiw1]
  Type                         : miiw
  Comment                      :
  Monitor Timing               : Always
  Target Resource              :
  Interval                     : 60
  Timeout                      : 60
  Retry Count                  : 1
  Final Action                 : No Operation
  Execute Script before Final Action: Off
  Recovery Target              : cluster
  Recovery Target Type         : Itself
  Reactivation Threshold       : 0
  Failover Target Server       : stable operation server
  Failover Threshold           : 0
  Wait Time to Start Monitoring : 0
===========================================================
```

Explanation of each item

There is no item specific to NIC Link Up/down monitor resources.

Example of a command entry (For multi target monitor resource)

`# clpstat --mon mtw1 --detail`

Example of the display after running the command:

```
===================== CLUSTER INFORMATION ==================
[Monitor0 : mtw1]
  Type                         : mtw
  Comment                      :
  Monitor Timing              : Always
  Target Resource             :
  Interval                    : 60
  Timeout                     : 60
  Retry Count                 : 1
  Final Action                : No Operation
  Execute Script before Final Action: Off
  Recovery Target             : failover1
  Recovery Target Type        : Group
  Reactivation Threshold      : 3
  Failover Target Server      : stable operation server
  Failover Threshold          : Number of Servers
  Wait Time to Start Monitoring : 0
  Monitor Resources           : appliw1              -> see (1)
                              : fipw1
=============================================================
```

Explanation of each item

(1) Monitor Resources : Monitor resources to be grouped

Displaying all cluster configuration data (clpstat command with the -i option)

By specifying the -i option, you can display the configuration information that is shown when --cl, --sv, --hb, --np, --svg, --grp, --rsc, and --mon options are all specified.

If you run the command with the -i option and the --detail option together, all the detailed cluster configuration data is displayed. Because this option displays large amount of information at a time, use a command, such as the more 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, --np, --svg, --grp, --rsc, and/or --mon option. For example, you can use these options as follows:

Example of a command entry:

If you want to display the detailed information of the server whose name is "server0," the group whose name is "failover1," and the group resources of the specified group, enter:

```
# clpstat --sv server0 --grp failover1 --rsc --detail
```

Status Descriptions

Server		
Function	**Status**	**Description**
Status display	Online	Starting
Heartbeat resource status display	Offline	Offline pending
	Warning	Heartbeat resource failure
	Isolated	Suspension (isolated)
	Online Pending	Now being started
	Offline Pending	Now being stopped
	Pending	Suspension (Network partition unsolved)
	Unknown	Status unknown
Group map display	o	Starting
Monitor resource status display	i	Suspension (isolated)
	p	Now being started/stopped, , Network partition unsolved
	x	Offline Pending
	-	Status unknown

Heartbeat Resource		
Function	**Status**	**Description**
Status display	Normal	Normal
	Warning	Failure (Some)
	Error	Failure (All)
	Not Used	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
	Caution	Failure (Some)
	Error	Failure (All)
	Unused	Not used
	Unknown	Status unknown
Network partition resolution resource status display	o	Able to communicate
	x	Unable to communicate
	-	Not used or status unknown

Section I Detailed functions of ExpressCluster

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 time-out]
clpcl -r [-a] [-h hostname] [-w time-out]
clpcl -return [-h hostname]
clpcl --suspend [--force] [-w time-out]
clpcl --resume
```

Description	This command starts, stops, return, suspends, or resumes the ExpressCluster service.

Option	-s	Starts the ExpressCluster service.
	-t	Stops the ExpressCluster service.
	-r	Restarts the ExpressCluster service.
	--return	Returns the ExpressCluster service.
	--suspend	Suspends the entire cluster
	--resume	Resumes the entire cluster
	-a	Executed the command on all servers
	-h *host_name*	Makes a request to run the command to the server specified in *host_name*. Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
	-w *time-out*	When --t, --r, or --suspend option is used, specify the wait time in seconds that the clpcl command waits for the ExpressCluster service to be completely stopped or suspended. When a time-out is not specified, it waits for unlimited time. When "0 (zero)" is specified, it does not wait. When the -w option is not specified, it waits for twice the heartbeat time-out (in seconds).
	--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	Run this command as a user with Administrator privileges.
	For the name of a server for the -h option, specify the name of a server in the cluster that allows name resolution.
	When you suspend the cluster, the ExpressCluster service 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
	3. via the IP address whose name was resolved by the server name in the cluster configuration data
	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 ExpressCluster service in the local server
	`# clpcl –s` `Command succeeded`
	Example 2: Activating the ExpressCluster service in server1 from server0
	`# clpcl -s -h server1` `Start server1 : Command succeeded.`
	If a server name is specified, the display after running the command should look similar to above.
	Start *server_name* : Execution result
	Example 3: Activating the ExpressCluster service in all servers

	`# clpcl -s -a`
	`Start server0 : Command succeeded.`
	`Start server1 : Performed startup processing to the active cluster service.`

	When all the servers are activated, the display after running the command should look similar to above.
	Start *server_name* : Execution result
	Example 4: Stopping the ExpressCluster service in all servers

	`# clpcl -t -a`
	`Stop server0 : Command succeeded.`
	`Stop server1 : Command succeeded.`

	When all the servers are stopped, the display after running the command should look similar to above. Stop *server_name* : Execution result.
	When the stopping process fails, the display may be different from the example above depending on the process.
	Wait for the stopping of all servers of the ExpressCluster service.

◆ Suspend and Resume

When you want to update the cluster configuration data or ExpressCluster, you can stop the ExpressCluster service 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 ExpressCluster service should be activated in all servers in the cluster.

The following functions stop when the cluster is suspended because the ExpressCluster service stops while active resources stay active.

- All heartbeat resources stop.

- All network partition resolution resources stop.

- All monitor resources stop.

- You cannot work on groups or group resources (start, stop, or move).

- You cannot display or change the cluster status by the WebManager or with the clpstat command.

- The following commands are disabled;

  - clpstat

  - clpcl options other than --resume

  - clpdown

  - clpstdn

  - clpgrp

  - clptoratio

  - clpmonctrl

Error Messages

Message	Cause/Solution
Log in as administrator.	Log in as a user with Administrator privileges.
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 service.	The stopping process has been executed to the stopped ExpressCluster service.
Performed startup processing to the active cluster service.	The startup process has been executed to the activated ExpressCluster service.
Command timeout.	The command timed out.
Failed to return the server. Check the status of failed server.	Failed to return the server. Check the status of the failed server.
Could not connect to the server. Check if the cluster service is active.	Check if the ExpressCluster service 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.
Failed to obtain the service name.	Failed to obtain the service name.
Failed to operate the service.	Failed to operate the service.
Resumed the cluster service that is not suspended.	Resumed the ExpressCluster service that is not suspended.
invalid server status.	Check if the ExpressCluster service is activated.
Server is busy. Check if this command is already run.	This command may be run already. Check it.
Server is not active. Check if the cluster service is active.	Check if the ExpressCluster service is activated.
There is one or more servers of which cluster service is active. If you want to perform resume, check if there is any server whose cluster service is active in the cluster.	When you execute the command to resume, check if there is no server in the cluster on which the ExpressCluster service is activated.
All servers must be activated. When suspending the server, the cluster service need to be active on all servers in the cluster.	When you execute the command to suspend, the ExpressCluster service 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 suspended.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid name of a server 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 on which the ExpressCluster service has stopped in the cluster.
invalid parameter.	The value specified as a command parameter may be invalid.

Message	Cause/Solution
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set the longer timeout.	A timeout occurred in the ExpressCluster internal communication. If time-out keeps occurring, set the internal communication time-out longer.
Processing failed on some servers. Check the status of failed servers.	If stopping process is executed to all servers, there is one or more servers 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 if the memory or OS resource is sufficient.

Section I Detailed functions of ExpressCluster

Shutting down a specified server (clpdown command)

clpdown: the clpdown command shuts down a specified server.

Command line

```
clpdown [-r] [-h hostname]
```

Description	This command stops the ExpressCluster service and shuts down a server.

Option	None	Shuts down a server.
	-r	Reboots the server.
	-h *host_name*	Makes a processing request to the server specified in *host_name*. 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	Run this command as a user with Administrator privileges.
	For the name of a server for the -h option, specify the name of a server in the cluster.
	When the Replicator/Replicator DR is used, do not run this command while activating a group.
	A group can not be deactivated while it is being activated. Because of this, the OS may shut down while the mirror disk resource/hybrid disk resource is not deactivated properly, which can result in mirror break.

Example of a command entry	**Example 1:** Stopping and shutting down the ExpressCluster service 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 251.

Shutting down the entire cluster (clpstdn command)

clpstdn: the clpstdn command shuts down the entire cluster

Command line

clpstdn [-r] [-h *hostname*]

Description	This command stops the ExpressCluster service in the entire cluster and shuts down all servers.

Option	None	Executes cluster shutdown.
	-r	Executes cluster shutdown reboot.
	-h *host_name*	Makes a processing request to the server specified in *host_name*. 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	Run this command as a user with Administrator privileges.
	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.
	When the Replicator/Replicator DR is used, do not execute this command while activating a group.
	A group cannot be deactivated while it is being activated. Because of this, the OS may shut down while the mirror disk resource/hybrid disk resource is not deactivated properly, which can result in mirror break.

Example of a command entry	**Example 1:** Shutting down the cluster
	
	  # clpstdn
	
	Example 2: Performing the cluster shutdown reboot
	
	  # clpstdn -r

Error Message	See "Operating the cluster (clpcl command)" on page 251.

Operating groups (clpgrp command)

clpgrp: the clpgrp command operates groups

Command line

clpgrp -s [*group_name*] [-h *hostname*] [-f]

clpgrp -t [*group_name*] [-h *hostname*] [-f]

clpgrp -m *group_name* [-h *hostname*] [-a *host_name*]

Description	This command starts, deactivates or moves 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.
	-h *host_name*	Makes a processing request to the server specified in *host_name*. Makes a processing request to the server on which this command runs (local server) if the -h option is omitted.
	-a *host_name*	Defines the server which is specified by *host_name* 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.

Return Value	0	Success
	Other than 0	Failure

Notes	Run this command as a user with Administrator privileges.
	The ExpressCluster service 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
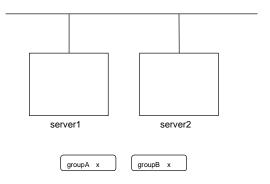
The following is an example of status transition when operating the groups.

Example: The cluster has two servers and two groups.
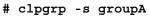
Failover policy of group
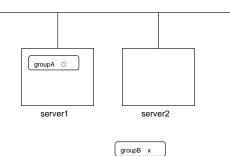
   groupA   server1 -> server2

   groupB   server2 -> serve

1.   Both groups are stopped.

```
server1                server2
```

```
groupA  x         groupB  x
```

2.   Run the following command on server1.

   # clpgrp -s groupA

```
groupA  ○

server1                server2
```

```
groupB  x
```
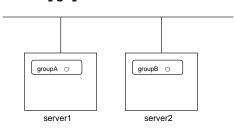
GroupA starts in server1.

3.   Run the following command in server2.

   # clpgrp -s

```
groupA  ○          groupB  ○

server1                server2
```
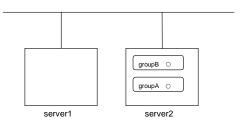
All groups that are currently stopped but can be started start in server2.

4. Run the following command in server1

clpgrp -m groupA

server1   server2
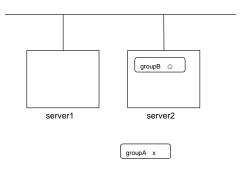
GroupA moves to server2.

5. Run the following command in server1

clpgrp -t groupA -h server2

server1   server2

GroupA stops.

6. Run the following command in server1.
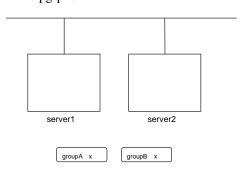
clpgrp -t

No operable group does not exist.

When the command is run, the error message, "No operable group does not exist.", 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

server1   server2

Groups which were started in server2 can be forcefully deactivated from server1.

ExpressCluster X 2.1 for Windows Reference Guide

Error message

Message	Cause/Solution
Log in as administrator.	Log in as a user with Administrator privileges.
Invalid configuration data. 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 service is active.	Check if the ExpressCluster service is operating.
Invalid server status. Check if the cluster service is active.	Check if the ExpressCluster service is operating.
Server is not active. Check if the cluster service is active.	Check if the ExpressCluster service is operating.
Invalid server name. Specify a valid server name in the cluster.	Specify the valid 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 on which the ExpressCluster service has stopped in the cluster.
Invalid parameter.	The value specified as a command parameter may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set a longer timeout.	A time-out occurred in the ExpressCluster internal communication. If time-out keeps occurring, set the internal communication time-out longer.
Specify a group name when -m option is used.	Specify a group name for the -m option
Invalid server. Specify a server that can run and stop the group, or a server that can be a target when you move the group.	Server that starts and 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.
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

Section I Detailed functions of ExpressCluster

Message	Cause/Solution
	clpstat command.
Failed to start one or more resources. Check the status of group.	Check the status of group by using the Web Manager or the clpstat command.
Failed to stop one or more 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.	The group is now being started or stopped. Wait for a while and try again.
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.
Server is isolated.	The server has been suspended. The server is rebooted after it went down.
Some invalid status. Check the status of cluster.	The status is invalid. Check the status of the cluster.
Log in as administrator.	Check if the memory or OS resource is sufficient.

ExpressCluster X 2.1 for Windows Reference Guide

Collecting logs (clplogcc command)

clplogcc: the clplogcc command collects logs.

Command line

```
clplogcc [ [-n targetnode1 -n targetnode2 ......] ]
        [-t collect_type] [-o path] [--local]
```

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

Option	None	Collects logs in the cluster.
	-t *collect_type*	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.
	-o *path*	Specifies the output destination of collector files. When this option is skipped, logs are output under tmp of the installation path.
	-n *targetnode*	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.
	--local	Collects logs on the local server without going through the data transfer server. 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 cab, decompress them using an appropriate application.

Notes	Run this command as a user with Administrator privileges.
	All servers in the cluster should check that the data transfer server is active.
	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 Please wait, now collecting.. server status result ----------------------------- server0 Completion Normal server1 Completion Normal ```
	The execution results of the server that collected logs are displayed.
	Server name Progress Result

Execution Result	For this command, the following processes are displayed.	
	Steps in Process	**Meaning**
	Preparing	Initializing
	Connecting	Connecting to the server
	Compressing	Compressing log files
	Transmitting	Sending log files
	Disconnecting	Disconnecting from the server
	Completion	Finished collecting logs

The following results (server status) are displayed:

Result (server status)	**Meaning**
Normal	Completed successfully
Canceled	Canceled by the user
Invalid Parameters	Parameters are invalid
Compression Error	There was an error while compressing files
Timeout	Time-out occurred.
Busy	The server is busy.
No Free Space	No free space on the disk.
File I/O Error	There was a file I/O error.
Unknown Error	Failure caused by other errors

Error Message

Message	Cause/Solution
Log in as administrator.	Log in as a user with Administrator privileges.
Invalid option.	Specify a valid option.
Collect type must be specified 'type1' or 'type2' or 'type3'. Incorrect collection type is specified.	Invalid collection type is specified.
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.
Failed to obtain properties.	Failed to obtain the properties.
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 name. Specify a valid server name in the cluster.	Specify the invalid server name in the cluster.
Failed to collect log.	Failed to collect logs.
Server is busy. Check if this command is already run.	This command may be run already. Check it.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

Section I Detailed functions of ExpressCluster

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	n
(2) event log	y	y	y
(3) Dr.Watson Log	y	y	y
(4) user dump	y	n	n
(5) Diagnostics Report	y	n	n
(6) Registry	y	y	n
(7) Script	y	y	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.

◆ Information to be collected by default
  - Logs of each module in the ExpressCluster Server
  - Attribute information on each module (dir) in the ExpressCluster Server
    - In bin
    - In alert/bin, webmgr/bin
    - In %SystemRoot%\system32\drivers
  - ExpressCluster version information
  - OS information
  - update log
  - CPU license and node license
  - Configuration file
  - Policy file
  - Shared memory dump
  - Host name and domain name information (hostname execution result)
  - Network information (netstat execution result)
  - Memory usage status (mem execution result)
  - Process existing status (tasklist execution result)
  - ipconfig (ipconfig execution result)
◆ event log
  - application log (AppEvent.Evt)
  - system log (SysEvent.Evt)
◆ Dr.Watson Log
  - drwtsn32.log
◆ User dump
  - user.dmp
◆ Diagnostics Report
  - the result of running msinfo32.exe

◆ Registry
  • Registry information of the ExpressCluster Server
    - HKLM\SOFTWARE\NEC\EXPRESSCLUSTER\Alert
    - HKLM\SOFTWARE\NEC\EXPRESSCLUSTER\MirrorList
    - HKLM \SOFTWARE\NEC\EXPRESSCLUSTER\RC
    - HKLM \SOFTWARE\NEC\EXPRESSCLUSTER\VCOM
    - registry information of diskfltr
  • Registry information of OS
    - HKLM\SYSTEM\CurrentControlSet\Services\Disk
    - HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\DOS Devices
    - HKLM\SYSTEM\MountedDevices
    - HKLM\SYSTEM\CurrentControlSet\Enum\SCSI
    - HKLM\SYSTEM\CurrentControlSet\Enum\STORAGE
    - HKLM\SYSTEM\CurrentControlSet\Services\symc8xx

◆ Script

Start/stop script for a group that was created with the Builder.

If you specify a user-defined script, it is not included in the log collection information. It must be collected separately.

Output paths of log files (-o option)

◆ Log file is named and be saved as "*server_name*-log.cab"

◆ Since log files are compressed by cab, decompress them by using an appropriate application.

If not specifying -o option

Logs are output in tmp of installation path.

When the -o option is specified:

If you run the command as follows, logs are located in the specified c:\tmp directory.

```
# clplogcc -o C:\tmp
```

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 at emergency OS shutdown

The OS resource information is collected when the cluster service that forms the cluster fails due to termination by an internal status error. Information to be collected is as follows:

◆ Information created by running a command
- Host name and domain name information (hostname execution result)
- Network information (netstat execution result)
- Memory usage status (mem execution result)
- Process existing status (tasklist execution result)
- ipconfig (ipconfig execution result)

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)

clpcfctrl --push: the clpcfctrl --push command delivers cluster configuration data to servers.

Command line

```
clpcfctrl --push -[l|w] [-x <path>] [-c <hostname>|<IP>] [-h
          <hostname>|<IP>]
          [-p <portnumber>] [--force]
```

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.
	-x	Specify this option to deliver the configuration data that is in the specified directory.
	-w	Displays that the graphic character code of the cluster configuration data file to be delivered is SJIS.
		In general, it is not necessary to specify this option
		You cannot specify -l and -w together. Specify either -l or -w.
	-c	Specifies a server to access for acquiring a list of servers. Specify a host name or IP address.
	-h	Specifies a server to which configuration data is delivered. Specify host name or IP address.
		If this option is omitted, configuration data is delivered to all servers.
	-p	Specifies a port number of data transfer port.
		When this option is omitted, the default value will be used.
		In general, it is not necessary to specify this option.
	--force	Even if there is a server on which the data transfer service does not start up, the configuration data is delivered forcefully.

Return Value	0	Success
	Other than 0	Failure

Notes	Run this command as a user with Administrative authority.
	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
	When delivering the cluster configuration data, the current cluster configuration data and the configuration data to be delivered are compared.
	If there is any change in the configuration data, the following message output. Follow the instructions of the message to complete the delivery.

Message	Solution
Please stop the ExpressCluster.	Stop the server.
Please suspend the ExpressCluster	Suspend the server.
Please stop the following groups.	Stop the group of which setting has been changed.
Reboot of a cluster is necessary to reflect setting.	Shut down and reboot the cluster to reflect the change of settings.
To apply the changes you made, restart the ExpressCluster Web Alert service.	Restart the Web Alert service to reflect the change of settings.
To apply the changes you made, restart the ExpressCluster Manager service.	Restart the ExpressCluster Manager service to reflect the change of settings.
Start of a cluster is necessary to reflect setting.	This is the message displayed at the initial cluster configuration. Start the cluster.

Example of command execution	**Example 1:** Generating a cluster from the floppy disk with the data saved by the Builder on Windows
| | ```
# clpcfctrl --push -x C:\tmp\config
  file delivery to server 10.0.0.11 success.
  file delivery to server 10.0.0.12 success.
  Command succeeded.(code:0)
``` |
| | **Example 2:** Delivering configuration data that was saved on the file system using the Builder on Windows |
| | ```
# clpcfctrl --push -x C:\tmp\config –h 10.0.0.11
  Command succeeded.(code:0)
``` |

Error Message

Message	Cause/Solution
Log in as administrator.	Log in as a user with Administrator privileges.
This command is already run.	This command has already been run.
invalid option.	This option is invalid. Check the option.
Invalid mode. Check if --push or --pull option is specified.	Check if the --push is specified.
Invalid host name. Server specified by -h option is not included in the configuration	The server specified with -h is not included in configuration data. Check if the specified server name or IP address is correct.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check if the memory or OS resources are 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 cluster.	Reinstall the ExpressCluster Server.
Failed to load the cfctrl.pol file. Reinstall the RPM cluster.	Reinstall the ExpressCluster Server.
Failed to get the install path. Reinstall the RPM cluster.	Reinstall the ExpressCluster Server.
Failed to initialize the trncl library. Check if memory or OS resources are sufficient.	Check if the memory or OS resources are sufficient.
Failed to connect to trnsv. Check if the other server is active.	Accessing the server has failed. Check if the 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 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

Section I Detailed functions of ExpressCluster

Message	Cause/Solution
	server has started up.
Failed to upload the configuration file. 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
Canceled to deliver the configuration file since it failed to connect to one or more server. If you want to deliver the configuration file to servers that can be connected, run the command again with "--force" option.	Canceled the delivery of the configuration data. There are some servers that failed to connect. If you want to deliver the configuration data only to the server that can be connected, run the command again by using the –force option.
The directory "work" is not found. Reinstall the RPM.	Reinstall the ExpressCluster Server.
Failed to make a working directory.	Check if the memory or OS resources are 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 not a directory.	
Failed to change the character code set (EUC to SJIS).	
Failed to change the character code set (SJIS to EUC).	
Failed to allocate memory.	Check if the memory or OS resources are sufficient.
Failed to change the directory.	
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 copy the file.	
Failed to create the mutex.	
Internal error. Check if memory or OS resources are sufficient.	

ExpressCluster X 2.1 for Windows Reference Guide

Backing up the cluster configuration data

clpcfctrl --pull: the clpcfctrl --pull command backups cluster configuration data.

Command line

```
clpcfctrl --pull -[l|w] [-x <path>] [-h <hostname>|<IP>]
          [-p <portnumber>]
```

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.
	-x	Specify this option when backing up configuration data in the specified directory.
	-w	Save the configuration data with graphic character code, SJIS.
		You cannot specify both -l and -w together.
		You cannot omit both -l and –w.
	-l	Save the configuration data with graphic character code, EUC.
		You cannot specify both -l and -w together.
		You cannot omit both -l and –w.
	-h	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	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.

Return Value	0	Success
	Other than 0	Failure

Notes	Run this command as a user with Administrator privileges.
	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 data into the specified directory
	```# clpcfctrl --pull -x C:/tmp/config``` ```Command succeeded.(code:0)```
	Example 2: Backing up configuration data of the specified server into the specified directory
	```# clpcfctrl --pull -x C:/tmp/config -h 10.0.0.11``` ```Command succeeded.(code:0)```

Error Message

Message	Cause/Solution
Log in as administrator.	Log on as a user with Administrator privileges.
This command is already run.	This command has already been run.
invalid option.	The option is invalid. Check the option.
Invalid mode. Check if --push or --pull option is specified.	Check if the --pull is specified.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check if the memory or OS resources are 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 cluster.	Reinstall the ExpressCluster Server.
Failed to load the cfctrl.pol file. Reinstall the cluster.	Reinstall the ExpressCluster Server.
Failed to get the install path. Reinstall the cluster.	Reinstall the ExpressCluster Server.
Failed to initialize the trncl library. Check if memory or OS resources are sufficient	Check if the memory or OS resources are sufficient.
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.
The directory "work" is not found. Reinstall the cluster.	Reinstall the ExpressCluster Server.
Failed to make a working directory.	Check if the memory or OS resources are 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 not a directory.	
Failed to change the character code	

Message	Cause/Solution
set (EUC to SJIS).	
Failed to change the character code set (SJIS to EUC).	
Failed to allocate memory.	Check if the memory or OS resources are sufficient.
Failed to change the directory.	
Failed to make a directory.	
Failed to remove the directory.	
Failed to remove the file.	
Failed to open the file.	
Failed to read he file.	
Failed to write the file.	
Failed to copy the file.	
Failed to create the mutex.	Check if the memory or OS resources are sufficient.
Internal error. Check if memory or OS resources are sufficient.	

Adjusting time-out temporarily

clptoratio: the clptoratio command extends or displays the current time-out ratio.

Command line

```
clptoratio  -r <ratio> -t <time>
clptoratio  -i
clptoratio  -s
```

Description	This command displays or temporarily extends the various time-out values of the following on all servers in the cluster. + Monitor resource + Heartbeat resource + Disk Agent + Alert synchronous service + WebManager service The current time-out ratio is displayed.

Option	-r	Specifies the time-out ratio.
	ratio	Use 1 or larger integer. The maxim time-out ratio is 10,000. If you specify "1," you can return the modified time-out ratio to the original as you can do so when you are using the -i option.
	-t *time*	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 time-out ratio.
	-s	Refers to the current time-out ratio.

Return Value	0	Success
	Other than 0	Failure

Remarks	When the cluster is shutdown, the time-out ratio you have set will become ineffective. However, if any server in the cluster is not shutdown, the time-out ratio and the extension period that you have set will be maintained.
	With the -s option, you can only refer to the current time-out ratio. You cannot see other information such as remaining time of extended period.
	You can see the original time-out value by using the status display command.
	Heartbeat time-out # clpstat --cl --detail
	Monitor resource time-out # clpstat --mon *monitor_resource_name* --detail

Notes	Run this command as a user with Administrator privileges.
	Make sure that the ExpressCluster service is activated in all servers in the cluster.
	When you set the time-out ratio, make sure to specify the extension period. However, if you set "1" for the time-out ratio, you cannot specify the extension period.
	You cannot specify a combination such as "2m3h," for the extension period.

Example of a command entry	**Example 1:** Doubling the time-out ratio for three days
	`# clptoratio -r 2 -t 3d`
	Example 2: Setting back the time-out ratio to original
	`# clptoratio -i`
	Example 3: Referring to the current time-out ratio
	`# clptoratio -s`
	present toratio : 2
	The current time-out ratio is set to 2.

Error Message

Message	Cause/Solution
Log in as administrator.	Log on as a user with Administrator privileges.
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. ex) 2m, 3h, 4d	Set a valid extension period.
Set the extension period in a range less than the maximum extension period.	Set the extension period which does not exceed the maximum extension period.
Could not connect to the server. Check if the cluster service is active.	Check that the ExpressCluster service is operating.
Server is not active. Check if the cluster service is active.	Check that the ExpressCluster service is operating.
Connection was lost. Check if there is a server where the cluster service is stopped in the cluster.	Check if there is any server in the cluster that the ExpressCluster service stopped.
Invalid parameter.	The value specified as the command parameter may be invalid.
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set a longer timeout.	A time-out occurred in the ExpressCluster internal communication. If time-out keeps occurring, set the internal communication time-out longer.
Processing failed on some servers. Check the status of failed servers.	There is a server in which the processing has failed. Check the statuses of servers in the cluster. Run the command with all servers in the cluster activated.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resources are sufficient.

Modifying the log level and size

clplogcf: the clplogcf command modifies and displays log level and log output file size.

Command line

clplogcf -t *<type>* -l *<level>* -s *<size>*

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 to the -t option" for types which can be specified.
	-l	Specifies a log level.
		You can specify one of the following for a log level.
		1, 2, 4, 8, 16, 32
		You can see more detailed information as the log level increases.
		See the list of "Default log levels and log file sizes" for default values of each module type.
	-s	Specifies the size of a file for log output.
		The unit is byte.
	None	Displays the entire configuration information currently set.

Return Value	0	Success
	Other than 0	Failure

Remarks	Each type of output logs from ExpressCluster uses two log files. Therefore, it is necessary to have the disk space that is twice larger than what is specified by -s.

Notes	Run this command as a user with Administrator privileges.
	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 administrator.	Log on as a user with Administrator privileges.
invalid option.	The option is invalid. Check the option.
change configuration failed. (Perhaps clpevent is not running.)	clpevent may not have been started.
invalid level	The specified level is invalid.
invalid size	The specified size is invalid.
load config file failed.	Non-clustered server.
initialize xml library failed.	Check if the memory or OS resources are sufficient.
print current configuration failed.	clpevent may not be started yet.

Types that can be specified for the -t option (y=yes, n=no)

Type	Module	Description
alert	clpaltinsert.exe	Alert
apicl	clpapicl.dll	API client library
apisv	clpapisv.dll	API server
appli	clpappli.dll	Application resource
appliw	clpappliw.dll	Application monitor resource
armdrive	armdrive.exe	Drive letter setting command
bmccnf	clpbmccnf.exe	BMC information update command
cfctrl	clpcfctrl.exe	Cluster generation, cluster information and backup command
cl	clpcl.exe	Cluster startup and stop command
clpdnld	clpdnld.exe	Downloader
clpgetsvcstat	clptrnsv.exe	Transaction server
clpshmstat	clpshmstat.dll	Node status management library
clsv	clpclsv.dll	Client server
commcl	clpcommcl.dll	Common communication client library
comnp	clpcomnp.dll	COM network partition resolution resource
cpufreq	clpcpufreq.exe	CPU frequency control command
diskagcl	clpdiskagcl.dll	Disk agent communication client
diskagent	clpdiskagent.exe	Disk agent
diskfltr	clpdiskfltr.dll	Disk filtering library
disknp	clpdisknp.dll	DISK network partition resolution resource
diskutil	clpdiskutil.dll	Mirror disk/disk shared library
diskw	clpdiskw.dll	Disk RW monitor resource
down	clpdown.exe	Server shutdown command
event	clpevent.dll	Event log
exping	clpexpng.dll	PING execution management
fip	clpfip.dll	Floating IP resource
fipw	clpfipw.dll	Floating IP monitor resource
genw	genw.dll	Custom monitor resource
grp	clpgrp.exe	Group startup, stop and move command
hblog	clplanhb.dll	Kernel-mode LAN heartbeat resource
hd	clphd.dll	Hybrid disk resource
hdadmn	clphdadmn.dll	Hybrid disk management library
hdapi	clphdapi.dll	Hybrid disk internal API
hddac	clphddac.dll	Hybrid disk control library
hdfunc	clphdfunc.dll	Hybrid disk function library
hdnm	clphdnm.dll	Hybrid disk node management
hdsnapshot	clphdsnapshot.exe	Hybrid disk snapshot backup command

Section I Detailed functions of ExpressCluster

Type	Module	Description
hdtw	clphdtw.dll	Hybrid disk TUR monitor resource
hdw	clphdw.dll	Hybrid disk monitor resource
ipw	clpipw.dll	IP monitor resource
lankhb	clplanhb.dll	Kernel-mode LAN heartbeat resource
lcns	clplcns.dll	License library
ledctrl	clpledctrl.exe	Chassis identify control command
logc	clplogcc.exe	Log collection library
logcc	clplogcc.exe	Collect logs command
logcf	clplogcf.exe	Log level and size modification command
logcmd	clplogcmd.exe	Alert producing command
majonp	clpmajnp.dll	Majority network partition resolution resource
md	clpmd.dll	Mirror disk resource
mdadmn	clpmdadmn.dll	Mirror disk management library
mdclose	mdclose.exe	Mirror disk resource close command
monctrl	clpmonctrl.exe	Monitor resource control command
mdfunc	clpmdfunc.dll	Mirror disk function library
mdnw	clpmdnw.dll	Mirror connect monitor resource
mdopen	mdopen.exe	Mirror disk resource open command
mdw	clpmdw.dll	Mirror disk monitor resource
miiw	clpmiiw.dll	NIC Link Up/Down monitor resource
monctrl	clpmonctrl.exe	Monitor resource control command
mtw	clpmtw.dll	Multi target monitor resource
nm	clpnm.exe	Node map management
oldapi	clpoldapi.exe	Compatible API
oldapi_cnf	clpoldapi.exe	Compatible API
oldapi_evt	clpoldapi.exe	Compatible API
oldapi_if	clpoldapi.exe	Compatible API
oldapi_sts	clpoldapi.exe	Compatible API
pingnp	clppingnp.dll	Compatible API
oldapi_cnf	clpoldapi.exe	Compatible API
pingnp	clppingnp.dll	PING network partition resolution resource
pm	clppm	Process management
pmsvc	clppmsvc.exe	Process management
ptun	clpptun.dll	Parameter tuning
ptunlib	clpptun.dll	Parameter tuning
rc	clprc.exe	Group and group resource management
rc_ex	clprc.exe	Group and group resource management
regsync	clpregsync.dll	Registry synchronization resource

Type	Module	Description
regsyncw	clpregsync.dll	Registry synchronization monitor resource
resdllc	clpresdllc.dll	Resource control library
rm	clprm.dll	Monitor management
script	clpscript.dll	Script resource
scrpc	clpscrpc.exe	Script
scrpl	clpscrpl.ece	Script
sd	clpsd.dll	Disk resource
sdadmn	clpsdadmn.dll	Disk management library
sddknp	clpsddknp.dll	DISK network partition resolution resource
sdfunc	clpsdfunc.dll	Disk function library
sdw	clpsdw.dll	Disk TUR monitor resource
sem	clpsem.dll	Semaphore library
service	clpservice.dll	Service resource
servicew	clpservicew.dll	Service monitor resource
shmcm	clpshmcm.dll	Shared memory library
shmevt	clpshmevt.dll	Event library
shmnm	clpshmnm.dll	Shared memory library
shmrm	clpshmrm.dll	Shared memory library
spool	clpspool.dll	Print spool resource
spoolw	clpspoolw.dll	Print spool monitor resource
starup	clpstartup.exe	Startup
stat	clpstat.exe	Status display command
stdn	clpstdn.exe	Cluster shutdown command
toratio	clptoratio.exe	Time-out ratio modification command
trncl	clptrncl.dll	Transaction library
trnreq	clptrnreq.exe	Inter-cluster processing request command
trnsv	clptrnsv.exe	Transaction server
vcom	clpvcom.dll	Virtual computer name resource
vcomw	clpvcomw.dll	Virtual computer name monitor resource
vip	clpvip.dll	Virtual IP resource
vipw	clpvipw.dll	Virtual IP monitor resource
webalert	clpaltd.exe	Alert synchronization
webmgr	clpwebmc.exe	WebManager
xml	xlpxml.dll	XML library

Section I Detailed functions of ExpressCluster

Default log levels and log file sizes

Type	Level	Size (byte)
alert	4	1000000
apicl	4	5000000
apisv	4	5000000
appli	4	1000000
appliw	4	1000000
armdrive	4	1000000
bmccnf	4	1000000
cfctrl	4	1000000
cifs	4	1000000
cl	4	1000000
clpdnld	4	1000000
clpgetsvcstat	4	1000000
clpshmstat	4	1000000
clsv	4	1000000
commcl	4	1000000
comnp	4	1000000
cpufreq	4	1000000
diskagcl	4	1000000
diskagent	4	1000000
diskfltr	4	1000000
disknp	4	1000000
diskutil	4	1000000
diskw	4	1000000
down	4	1000000
event	4	1000000
exping	4	1000000
fip	4	1000000
fipw	4	1000000
genw	4	1000000
grp	4	1000000
hblog	4	1000000
hd	4	1000000
hdadmn	8	1000000
hdapi	8	1000000
hddac	4	4000000
hdfunc	8	8000000
hdnm	8	4000000
hdsnapshot	8	2000000

Type	Level	Size (byte)
hdtw	4	1000000
hdw	4	2000000
ipw	4	1000000
lankhb	4	1000000
lcns	4	1000000
ledctrl	4	1000000
logc	4	1000000
logcc	4	1000000
logcf	4	1000000
logcmd	4	1000000
majonp	4	1000000
md	4	1000000
mdadmn	4	1000000
mdclose	4	1000000
mdctrl	4	1000000
mdfunc	4	2000000
mdnw	4	1000000
mdopen	4	1000000
mdw	4	1000000
miiw	4	1000000
monctrl	4	1000000
mtw	4	1000000
nas	4	1000000
nasw	4	1000000
nm	4	2000000
oldapi	4	1000000
oldapi_cnf	4	1000000
oldapi_evt	4	1000000
oldapi_if	4	1000000
oldapi_sts	4	1000000
pingnp	4	1000000
pm	4	1000000
pmsvc	4	2000000
ptun	4	1000000
ptunlib	4	1000000
rc	4	2000000
rc_ex	4	2000000
regsync	4	1000000
regsyncw	4	1000000

Section I Detailed functions of ExpressCluster

Type	Level	Size (byte)
resdllc	4	2000000
rm	4	2000000
script	4	1000000
scrpc	4	1000000
scrpl	4	1000000
sd	4	1000000
sdadmn	4	1000000
sddknp	4	1000000
sdfunc	4	1000000
sdw	4	1000000
sem	4	1000000
service	4	1000000
servicew	4	1000000
shmcm	4	1000000
shmevt	4	1000000
shmnm	4	1000000
shmrm	4	1000000
spool	4	1000000
spoolw	4	1000000
stat	4	1000000
stdn	4	1000000
toratio	4	1000000
trncl	4	2000000
trnsv	4	2000000
trnreq	4	1000000
vcom	4	1000000
vcomw	4	1000000
vip	4	1000000
vipw	4	1000000
webalert	4	1000000
webmgr	4	1000000
xml	4	1000000
	Total	141000000 * 2

Monitoring Agent Types that can be specified for the -t option

Type	Module	Description
db2w	clp_db2w.dll	DB2 Monitor (Database Agent)
ftpw	clp_ftpw.dll	FTP Monitor (Internet Server Agent)
httpw	clp_httpw.dll	HTTP Monitor (Internet Server Agent)
imap4w	clp_imap4w.dll	IMAP4 Monitor (Internet Server Agent)
odbcw	clp_odbcw.dll	ODBC Monitor (Database Agent)
oracleasw	clp_oracleasw.dll	OracleAS Monitor (Application Server Agent)
oraclew	clp_oraclew.dll	Oracle Monitor (Database Agent)
oscw	clposcw.dll	OfficeScan CL Monitor (Anti-Virus Agent)
ossw	clp_ossw.dll	OfficeScan SV Monitor (Anti-Virus Agent)
otxw	clp_otxw.dll	WebOTX Monitor (Application Server Agent)
pop3w	clp_pop3w.dll	POP3 Monitor (Internet Server Agent)
psqlw	clp_psqlw.dll	PostgreSQL Monitor (Database Agent)
smtpw	clp_smtpw.dll	SMTP Monitor (Internet Server Agent)
sqlserverw	clp_sqlserverw.dll	SQL Server Monitor (Database Agent)
tuxw	clp_tuxw.dll	Tuxedo Monitor (Aplication Server Agent)
wasw	clp_wasw.dll	Websphere Monitor (Aplication Server Agent)
wlsw	clp_wlsw.dll	Weblogic Monitor (Aplication Server Agent)

Monitoring Agent Default Values of Log Level/Log File Size

Type	Level	Size (byte)
db2w	4	1000000
ftpw	4	1000000
httpw	4	1000000
imap4w	4	1000000
odbcw	4	1000000
oracleasw	4	1000000
oraclew	4	1000000
oscw	4	1000000
ossw	4	1000000
otxw	4	1000000
pop3w	4	1000000
psqlw	4	1000000
smtpw	4	1000000
sqlserverw	4	1000000
tuxw	4	1000000
wasw	4	1000000
wlsw	4	1000000
	Total	17000000 * 2

Section I Detailed functions of ExpressCluster

Mirror-related commands

Mirror status display commands

clpmdstat: the clpmdstat command displays status related to mirroring and configuration information.

Command line:

```
clpmdstat --mirror mirrordisk-alias
clpmdstat --active mirrordisk-alias
clpmdstat --detail mirrordisk-alias
clpmdstat --list
```

Description	This command displays the status related to mirroring.
	This command displays mirror disk resources configuration information.

Option	--mirror	Displays mirror disk resource status.
	--active	Displays status of mirror disk activation.
	--detail	Displays mirror disk resources configuration information.
	--list	Displays a list of mirror disk resources.
Parameter	*mirrordisk-alias*	Specifies a mirror disk resource name.

Return value	0	Success
	Other than 0	Failure

Notes	Run this command as a user with Administrator privileges.

Example display after running this command	An example of the display after running this command is provided in the next section.

Error Messages

Message	Cause/Solution
clpmdstat failed. An internal error occurred.	Check if the memory or OS resources are sufficient.
clpmdstat failed. A network error occurred.	Check the connection status of the interconnect.
clpmdstat failed. The resource name is invalid.	Specify the valid mirror disk resource name.
clpmdstat failed in the internal processes(%2). The error code is %3.	Reboot the local server.

Example display after running the mirror status display command

◆ Displaying the status of mirror disk resource

The status of specified mirror disk resource is displayed by specifying the --mirror option.
There are three types of display depending on the status of mirror disk resource:

• When the status of mirror disk resource is Normal:
```
Mirror Status: Normal
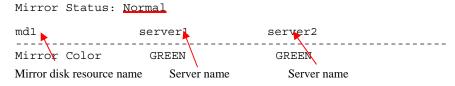
md1              server1            server2
------------------------------------------------------------
Mirror Color     GREEN              GREEN
```
Mirror disk resource name   Server name   Server name

Explanation of each item

Item	Description		
Mirror Status	Status of mirror disk resource		
	Status	**Description**	
	Normal	Normal	
	Recovering	Mirror is recovering	
	Abnormal	Abnormal	
	No Construction	Initial mirror construction is not done	
Mirror Color	Status of mirror disk on each server		
	Status	**Description**	
	GREEN	Normal	
	YELLOW	Mirror is recovering	
	RED	Abnormal	
	GRAY	Being stopped, Unknown status	
	BLUE	Both disks are active	

• When the status of mirror disk resource is abnormal
```
Mirror Status: Abnormal

md1              server1            server2
------------------------------------------------------------
Mirror Color     GREEN              RED
Lastupdate Time  2004/02/24 15:41:07 --
Break Time       2004/02/24 15:40:38 --
Disk Error       OK                 OK
Difference Percent 1%                0%
```

Explanation of each item

Item	Description
Mirror Status	Status of mirror disk resource *1
Mirror Color	Status of mirror disk on each server *1
Lastupdate Time	Last time when the data was updated on the server.
Break Time	Time when mirror break has occurred
Disk Error	Status of disk I/O

Item	Description		
	Status	**Description**	
	OK	Normal	
	ERROR	Error (No I/O)	
	--	Unknown	
Difference Percent	Percentage of differences in the data on each server.		

*1 Refer to. "When the status of mirror disk resource is Normal:"

- During mirror recovery

```
Mirror Status: Recovering

md1                  server1            server2
------------------------------------------------------------
Mirror Color         YELLOW             YELLOW

Recovery Status    Value
---------------------------------------
Status:            Recovering
Direction:         server1 -> server2
Percent:           15%
Used Time:         00:00:21
Remain Time:       00:01:59
```

Explanation of each item

Item	Description		
Mirror Status	Status of mirror disk resource *1		
Mirror Color	Status of mirror disk on each server *1		
Status	Status of mirror recovery		
	Status	**Description**	
	Preparing	Preparing for copy (This status may last for a while if I/O load is high when resource is getting started during recovery)	
	Recovering	Being recovered	
	Completing	Recovering is being completed	
	Nothing	Canceling recovery	
Direction	Direction of mirror recovery Display either [source server] -> [destination server] , or [destination server] <- [source server]		
Percent	Percentage of how much data is already recovered		
Used Time	Elapsed time since recovering has started		
Remain Time	Estimated time to complete recovering the remaining data. It is estimated by the speed of already recovered data. The time may be different depending on server load.		

•*1 Refer to ."When the status of mirror disk resource is Normal:".

◆ Displaying active status of mirror disk resource

Active status of the specified mirror disk resource is displayed when the --active option is specified:

```
Mirror Name: md1

Server Name      Active Status
-------------------------------------------------------
server1          Active
server2          Inactive
```

Status of mirror partition device

Active Status	Description
Active	Active
Inactive	Not active
--	Unknown

◆ Displaying mirror disk resource information

Configuration information of the specified mirror disk resource is displayed when the --detail option is specified:

```
Mirror Name: md1

Server Name      Drive Letter        NMP/Disk Size
------------------------------------------------------------
server1          F:                  1024MB/1024MB
server2          F:                  1024MB/1024MB
```

Explanation of each item

Item	Description
Mirror Name	Mirror disk resource name
Server Name	Server name
Mount Point	Mount point
Drive Letter	Data partition drive letter
NMP/Disk Size(MB)	NMP: the smaller size of data partition of servers
	Disk Size: actual data partition size

◆ Displaying the list of mirror disk resources

The list of mirror disk resources is displayed when the --list option is specified.

```
Mirror Name       Server Name       Drive Letter
-------------------------------------------------
md1               server1          F:
                  server2          F:
md2               server1          G:
                  server2          G:
```

Explanation of each item:

Item	Description
Mirror Name	Mirror disk resource name
Server Name	Server name
Drive Letter	Data partition drive letter

Mirror disk resource operation command

clpmdctrl: the clpmdctrl command operates mirror disk resources.

Command line:

```
clpmdctrl --active mirrordisk-alias
clpmdctrl --deactive mirrordisk-alias
clpmdctrl --force recovery-source-servername mirrordisk-alias
clpmdctrl --recovery mirrordisk-alias
clpmdctrl --cancel mirrordisk-alias
clpmdctrl --rwait mirrordisk-alias [-timeout time] [-rcancel]
```

Note:
Do not use the --active, and --deactive options when the ExpressCluster service is started. If you use them, there will be an error.

Description	This command activates/deactivates mirror disk resource and recovers mirror.

Option	--active	Activates the mirror disk resource on the local server.
		If the status of mirror disk resource is normal, mirroring is performed.
		If the status of mirror disk resource is not normal, mirroring will not be performed.
	--deactive	Deactivates the activated mirror disk resource on the local server.
	--break	Stops mirroring of the mirror disk and makes the data status not to be the latest on the server where the command is executed. The status of the mirror disk resource on the server that the command is executed becomes abnormal. The status of the mirror disk resource remains the same as long as the command is not executed on the server.
		Mirroring restarts when mirror recovery is ececuted. The mirror data is not synchronized until mirror recovery is executed if mirror writing occurs.
	--force	Forcefully performs mirror recovery for the specified mirror disk resource.
	--recovery	Performs either full mirror recovery or differential mirror recovery for the specified mirror disk resource.
		Whether to perform full or differential mirror recovery is determined automatically.
	--cancel	Cancels mirror recovery.
	--rwait	Waits the completion of the mirror recovery of the specified mirror disk resource.
	-timeout *time*	Specifies the timeout period of mirror recovery completion (second). This option can be omitted. When this option is omitted, timeout is not executed and waits for the completion of mirror recovery.

	-rcancel	Intermits mirror recovery when the timeout of waiting of mirror recovery completion occurred. This option can be set when "-timeout option" is set. When this optin is omitted, the mirror recovery continues even after the timeout occurrence.
Parameter	*recovery-source-servername*	Specify a server name of the copy source.
	mirrordiisk-alia	Specify a mirror disk resource name.

Return Value	0	Success
	1	Invalid parameter
	3	Other error
	4	Target mirror disk is not configuring mirror, or the mirror configuring failed on the process. (Only when "--rwait option" is specified, including the case when mirror recovery is interrupted by -rcancel.)
	5	Timeout of mirror recovery of target mirror disk occurs（Only when --rwait -timeout option is specified)

Notes	Run this command as a user with Administrator privileges.
	When performing forced mirror recovery only for the local server while the remote server is not running, specify the server that is forcefully mirror recovered as a copy source.
	When performing mirror recovery again after mirror recovery failed, specify the same server you used last time for mirror recovery as a copy source.
	To resume the forced mirror recovery that was suspended by selecting **Cancel**, use this command for forced mirror recovery.

Example of command execution	**Example 1:** When activating the mirror disk resource md1: **# clpmdctrl --active md1** <md1@server1>: active successfully **Example 2:** When deactivating the mirror disk resource md1: **# clpmdctrl --deactive md1** <md1@server1>: deactive successfully **Example 3:** When mirror recovering the mirror disk resource md1: **# clpmdctrl --recovery md1**

Error Messages

Message	Cause/Solution
clpmdctrl failed. An internal error occurred.	Check if the memory or OS resources are sufficient.
clpmdctrl failed. The resource is busy.	Try again later.
clpmdctrl failed. A network error occurred.	Check the connection status of the interconnect.
clpmdctrl failed. Cannot establish the mirror disk connection.	Check if the cluster configuration data is valid.
clpmdctrl failed. The resource name is invalid.	Specify the valid mirror disk resource name.
clpmdctrl failed. The status is invalid.	Check the mirror disk status.
clpmdctrl failed. The resource is not initialized.	Check if the partition is allocated and the disk can be identified by OS. Check also that the cluster configuration data is valid.
clpmdctrl failed. The resource has not performed initial mirror construction.	Initial mirror configuration is necessary.
clpmdctrl failed. Cannot lock the mirror disk.	Check if the memory or OS resources are sufficient.
clpmdctrl failed. The license is not registered.	Register the license.
clpmdctrl failed. The trial version has expired.	Register the license.

Section I Detailed functions of ExpressCluster

Message	Cause/Solution
clpmdctrl failed. The license authentification failed.	Register the license.
clpmdctrl failed. Cannot find the history folder.	Check if the cluster configuration data is valid.
clpmdctrl failed. The partition size between servers does not match.	Check the partition size of the mirror disk.
clpmdctrl failed. The mirror connect is not initialized.	Check the connection status of the mirror connect. Check also that the cluster configuration data is valid.
clpmdctrl failed. Cannot find the partition specified for the cluster partition.	Check if the partition is allocated and the disk can be identified by OS.
clpmdctrl failed. Cannot find the partition specified for the data partition.	Check if the partition is allocated and the disk can be identified by OS.
clpmdctrl failed. Cannot change the drive letter for the cluster partition.	Check the drive letter specified to the cluster configuration data. Check if the drive letter has already been used by other partition.
clpmdctrl failed. Cannot change the drive letter for the data partition.	Check the drive letter specified to the cluster configuration data. Check if the drive letter has already been used by other partition.
clpmdctrl failed. The server name is invalid.	Specify the valid server name.
clpmdctrl failed. %2 is running.	Execute while ExpressCluster Server is being stopped.
clpmdctrl failed. The mirror disk *[MD resource name]* can not be controlled on this server.	Check the mirror disk status.
clpmdctrl failed. The mirror disk *[MD resource name]* is not copying.	Check the mirror disk status.
clpmdctrl failed in the internal processes(%2). The error code is %3.	Reboot the local server.
[MD resource name] status is invalid.	Target mirror disk is not configuring mirror, or the mirror configuring failed on the process.
[MD resource name] mirror recovery timed out.	Check if the specified timeout period is appropriate, or if the disk I/O or communication delay is not occurring due to heavy loads.

Partition size tuning command

clpvolsz: the clpvolsz command enlarges and shrinks the disk partition size.

Command line:

```
clpvolsz drive-letter [size]
```

Description	This command checks the sizes of data partitions mirrored by mirror disk resource. If the partitions are not of the same size, the command adjusts the sizes.

Parameter	*drive-letter*	Specify the drive letter of the target partition drive.
	size	Specify the partition size by byte. If nothing is specified, the current size is displayed.

Return value	0	succeeded in displaying the size
	1	succeeded in changing the size
	2 or greater	abnormal

Notes	Run this command as a user with Administrator privileges.
	You cannot extend the partition size by this command.
	Shrinking the partition size by using this command may cause the change of the drive latter. After shrinking the partition size, make sure to use **Disk Management**. (Navigate from **Control Panel** to **Administrative Tools**, **Computer Management** , **Disk Management**) to rescan the disk and check the drive letter and configure as necessary.
	When the target partition has been registered as data partition/cluster partition in the cluster configuration information of the mirror disk resource, delete the mirror disk resource before shrinking the partition size and register again after shrinking and reconfiguration of drive letter.
	The partition size is coordinated by MBR. Typically, it is a multiple of 512 bytes .

Examples	Example 1 : When checking the Z drive size

> **# clpvolsz z:**
> **Drive <z:> 8,587,160,064**

Example 2: When shrinking the Z drive size to **8,587,159,552Byte**

 # clpvolsz z: 8587159552
Drive <z:> 8,587,160,064 -> 8,587,159,552

Execute it? [Y/N] ->y

SUCCESS

Error messages

Message	Causes/Solution
ERROR:invalid parameter.	The parameter is incorrect. Check the number of arguments and formats are set correctly.
ERROR:larger than partition size.	The value larger than the current partition size is set. Specify a smaller value.
ERROR:drive not found.	The specified drive is not found. Check if you have specified the right drive.
ERROR:drive open failed.	The specified drive cannot be opened. Check if the drive can be accessed.
ERROR:partition not found.	The partition number on the specified drive cannot be found. Check if you have checked the right driver.
ERROR:partition size zero.	The partition size of the specified server is 0. Check if the target partition is basic volume in the MBR format.
ERROR:device layout info.	Acquiring disk partition configuration information has failed. Check if the target partition is in the MBR format.
ERROR:device geometry info.	Acquiring the disk geometry information has failed. Check if the disk device is working properly.
ERROR:device no info.	Acquiring Device No. / Partition No has failed. Check the target partition is basic volume in the MBR format.
ERROR:set device info.	Configuration of partition information has failed on the disk. Check if writing to disks is not prohibited.
ERROR:memory alloc error.	Reserving the resource has failed. Check if the memory or OS resource is enough.

Snapshot backup command of hybrid disk resource

clphdsnapshot: the clphdsnapshot is used for operating hybrid disk resource snapshot.

Command line:
clphdsnapshot --open *hybriddisk-alias*
clphdsnapshot --close *hybriddisk-alias*

Description		This command interrupts the mirroring of hybrid disk resource and cancels the data partition access restriction to allow collection of snapshot backup, and then resumes ordinary status by resuming mirroring.
Option	--open	Interrupts mirroring and allows collecting the snapshot backups on the server on which the command is executed by cancelling the data partition access restriction, and then resumes mirroring. When the auto mirror recovery is set to be enabled, this setting is made to disable temporarily.
	--close	Restricts access to the data partition. If the auto mirror recovery is set to be enabled, the disablement is canceled and then, mirroring is resumed.
Parameter	*hybriddisk-alias*	Specifies the hybrid disk resource name.
Return Value	0	The command is successfully executed.
	1	Invalid parameter.
	2	The target resource is not mirrored. (Only when using the --open option)
	3	The target resource is already in the snapshot status on other server, or forcibly activated (Only when using --open option.)
	4	The target resource is already in the snapshot status (only when using the --open option)
	5	The target resource is not in the snapshot status. (Only when using the --close option.)
	6	The target resource is now on mirror recovery.
	7	The target resource does not exist in local server.
	8	The command is executed on the active server group.
	9	Other errors

Notes
This command must be executed by the user with administrator privilege.

This command should be executed on one of the standby server group which works as a copy destination of mirroring for the active hybrid disk resource that is properly mirrored. This command cannot be executed on a server in active server group (i.e., server in the same group as the server whose resources are activated.)

Example of command execution
The following shows how backup of the Z drive which is mirrored at the hybrid disk resource hd_Z is collected.

1. Execute the command below on the server 3 in the standby server group.

```
# clphdsnapshot --open hd_Z
Command succeeded.
```

2. Collect backup of the Z drive at the server 3 by using the backup tool.

3. Execute the command below on the server 3.

```
# clphdsnapshot --close hd_Z
Command succeeded.
```

4. When the auto mirror recovery is set to be disabled, run the mirror recovery manually.

Error Messages

Message	Cause/Solution
Invalid parameter.	The parameter is invalid. Check if there is any error in its format or parameter.
%1 is not mirroring, or not active.	Snapshot backup cannot be performed on a hybrid disk resource which is deactivated or is not mirrored. Try again after activating the resource on another server group and while the mirroring is performed.
%1 is busy on *%2*	Check that the target resource is already in the snapshot status on another server in the same server group, or is not forcefully activated.
%1 has already opened.	The command is executed by specifying the --open option for the resource that is already been in the snapshot status. Check the execution procedures.

ExpressCluster X 2.1 for Windows Reference Guide

%1 has already opened.	The command is executed with the --close option for the resource that is not in snapshot status by the – open option. Make sure that the command with the --open option has been executed successfully.
%1 is copying.	A snapshot backup cannot be performed for the hybrid disk resource in the process of mirror recovery. Try again after the mirror recovery has been completed.
%1 is not available to *%2*.	Snapshot backups cannot be collected on a server on which the target resource cannot be activated. Execute it on a server on which the failover group containing this resource can be started.
Don't execute at active server group.	Snap shot back cannot be performed on a hybrid disk resource that is already activated in another serer in the same server group. Execute it on a server in the standby server group.
Internal error. %1	Check the status of the cluster partition/data partition of the target resource. Make sure that memory or OS resource is sufficient.

Hybrid disk status display command

clphdstat: the clphdstat command displays the status and configuration information on hybrid disk.

Command line

clphdstat --mirror *hybriddisk-alias*
clphdstat --active *hybriddisk-alias*
clphdstat --config

Description	This command displays various status on hybrid disk and the configuration information on hybrid disk resource.	
Option	--mirror	Displays the status of hybrid disk resource.
	--active	Displays the activation status of hybrid disk resource.
	--config	Displays the configuration information on hybrid disk resource.
Parameter	*hybriddisk-alias*	Specifies the hybrid disk resource name.
Return Value	0	Success
	Other than 0	Failure
Notes	This command must be executed by the user with administrator privilege.	
Example of command display	See the next section for command display examples.	

Error Message

Message	Cause/Solution
Invalid parameter.	The parameter is invalid. Check if there is any error in its format or parameter.
All servers are down.	Check that at least one server having the target hybrid disk resource is operating, and then execute the command again.
Internal error. %1	Restart the local server.

Display examples of hybrid disk status display command

◆ Hybrid disk resource status display

When the --mirror option is specified, the status of the specified hybrid disk resource is displayed.

There are two types of hybrid disk resource status display depending on the hybrid disk resource status.

• When the hybrid disk resource status is other than Recovering

```
Status:              Abnormal
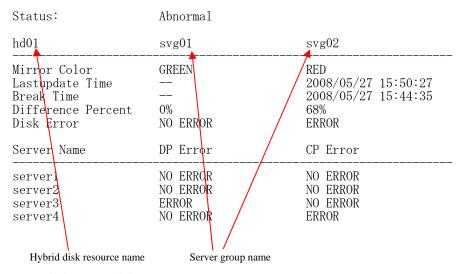
hd01                 svg01                svg02
------------------------------------------------------------
Mirror Color         GREEN                RED
Lastupdate Time      --                   2008/05/27 15:50:27
Break Time           --                   2008/05/27 15:44:35
Difference Percent   0%                   68%
Disk Error           NO ERROR             ERROR

Server Name          DP Error             CP Error
------------------------------------------------------------
server1              NO ERROR             NO ERROR
server2              NO ERROR             NO ERROR
server3              ERROR                NO ERROR
server4              NO ERROR             ERROR
```

Hybrid disk resource name   Server group name

Description on each item

Item Name	Description
Status	Hybrid disk resource status | Status	Description
Normal	Normal
Recovering	Mirror is being recovered
Abnormal	Abnormal
No Construction	Mirror initial construction has not been performed
Uncertain	Unknown status or undefined of new/old	

Mirror Color	Hybrid disk status in each server
	<table><tr><td>**Status**</td><td>**Description**</td></tr><tr><td>GREEN</td><td>Normal</td></tr><tr><td>YELLOW</td><td>Mirror is being recovered</td></tr><tr><td>RED</td><td>Abnormal</td></tr><tr><td>ORANGE</td><td>Undefined of new/old</td></tr><tr><td>GRAY</td><td>Stopped or Unknown</td></tr><tr><td>BLUE</td><td>Both systems are active</td></tr></table>
Lastupdate Time	Time when the data was last updated on the server
Break Time	Time when mirror break occurred
Difference Percent	Percentage of difference data on servers
Disk Error	Disk I/O status <table><tr><td>**Status**</td><td>**Description**</td></tr><tr><td>NO ERROR</td><td>Normal</td></tr><tr><td>ERROR</td><td>Abnormal（Unable to I/O）</td></tr><tr><td>--</td><td>Unknown</td></tr></table>
DP Error	Whether or not there is data partition I/O error in servers
CP Error	Whether or not there is cluster partition I/O error in servers

- When the hybrid disk resource status is Recovering

```
Status:              Recovering

hd01                 svg01                    svg02
------------------------------------------------------------------
Mirror Color         YELLOW         ->        YELLOW
                                    40%

Recovery Status
------------------------------------------------------------------
Source Server        server1
Destination Server   server3
Used Time            00:00:28
Remain Time          00:00:14
```

Description on each item

Item Name	Description
Mirror Status	Hybrid disk resource status *1
Mirror Color	Hybrid disk status in servers *1
	Copy direction of mirror recovery is shown with an arrow.
	-> ：Copy from the left server group to the right

	server group Or <- : Copy from the right server group to the left server group
	Progress of copying is shown as xx%.
Source Server	Copy source server name
Destination Server	Copy destination server name
Used Time	Time passed since copying started
Remain Time	Estimated time required to complete copying Because it is estimated from the copy rate of the finished part, the value may vary due to load status of the servers or other factors.

*1 See "•. When the status of mirror disk resource is Normal".

◆ Hybrid disk resource active status display

When the --active option is specified, active status of the specified hybrid disk resource is displayed.

```
HD Resource Name:      hd01

Server Name           Active Status        Current Server
------------------------------------------------------------
svg01
   server1            Active               CURRENT
   server2            Inactive             --
svg02
   server3            Force Active         CURRENT
   server4            Inactive             --
```

Server group name

Active status

Active Status	Description
Active	Active
Inactive	Inactive
Force Active	Forced activation
--	Unknown

Current server

Currrent Server	Description
CURRENT	Current server
--	Non-current server

◆ Hybrid disk resource configuration information display

When the --config option is specified, configuration information on all hybrid disk resources are displayed.

```
HD Resource Name:       hd01
Syncmode:               Sync

Config               svg01                   svg02
------------------------------------------------------------
Drive Letter         Z:                      Z:
Disk Size            1027MB                  1027MB
Server Name          server1                 server3
                     server2                 server4
```

Description on each item

Item Name	Description
HD Resource Name	Hybrid disk resource name
Syncmode	Synchronization mode
Drive Letter	Drive letter of the data partition
Disk Size	Data partition size
Server Name	Member server of each server group

Hybrid disk resource operation command

clphdctrl: the clphdctrl command operates hybrid disk resource.

Command line

clphdctrl --active *hybriddisk-alias* -n
clphdctrl --active *hybriddisk-alias* -f
clphdctrl --deactive *hybriddisk-alias*
clphdctrl --break *hybriddisk-alias* -n
clphdctrl --break *hybriddisk-alias* -f
clphdctrl --force *hybriddisk-alias*
clphdctrl --recovery *hybriddisk-alias* [-f or -a] [*dest -servername*]
clphdctrl --cancel *hybriddisk-alias*
clphdctrl --rwait *hybriddisk-alias* [-timeout *time*] [-rcancel]

Note: Make sure that the ExpressCluster service has been stopped when you use the --active or --deactive option.

Description	Activates/deactivates hybrid disk resource and recovers mirror.

Option	--active	Activates hybrid disk resource on the local server.
		If the status of hybrid disk resource is normal, mirroring is performed.
		If the status of hybrid disk resource is not normal, mirroring will not be performed.
	-n	Specifies normal activation for activation mode.
	-f	Specifies forced activation for activation mode.
	--deactive	Deactivates the activated hybrid disk resource on the local server.
	--break	Stops mirroring of the hybrid disk resource and makes the data status not to be the latest on the server where the command is executed. The data is not synchronized until mirror recovery is completed even if writing on the hybrid disk takes place.
	-n	Specifies the degeneration mode as normal degeneration. In the case of normal degeneration, mirroring is intermitted and the server becomes not the latest status only when the mirroring is executed normally on the hybrid disk.

	-f	Specifies the degeneration mode as forced degeneration mode. In the case of forced degeneration, mirroring is intermitted and the server becomes not the latest status even if the mirroring target server/server group status is abnormal or unknown.
	--force	Performs forced mirror recovery on the specified hybrd disk resource.
	--recovery	Performs either full mirror recovery or differential mirror recovery for the specified hybrid disk resource with the local server as copy source.
	-f	Specifies full copy for recovery mode. This cannot be specified when -a is specified.
	-a	Automatically selects the recovery mode. When the difference can be identified, differential copy is performed. When the difference cannot be identified, full copy is performed. This cannot be specified when -f is specified. When neither -f or -a is specified, the recovery mode is automatically selected.
	--cancel	Cancels mirror recovery.
	--rwait	Waits for the completion of the specified disk resource mirror recovery.
	-timeout *time*	Specifies the time of mirror recovery completion timeout (second). This option can be omitted. When this option is omitted, timeout is not executed and waits for the completion of mirror recovery.
	-rcancel	Intermits mirror recovery when waiting for the mirror recovery completion is timed out. This option can be set when -timeout option is set. When this optin is omitted, the mirror recovery continues even after the timeout takes place.
Parameter	*hybriddisk-alias*	Specifies the hybrid disk resource name.
	dest-servername	Specifies the copy destination server name. When you omit this, the copy destination server is automatically determined from another server group.
Return Value	0	Success
	Other than 0	Failure
	101	Invalid parameter
	102	Invalid status including the case when --rwait option is specified and mirror recovery is intermitted by -rcancel.
	103	Operations for the same resource are executed

	simultaneously from other servers.
104	Operations for the same resource were executed simultaneously from the own server.
106	The server that command is executed does not have the target resource.
107	I/O error occured on the cluster partition or on the data partition.
109	Waiting for the completion of Mirror recovery of the target hybrid disk is timed out. (Only when --rwait -timeout option is specified)
110	Other errors

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

When performing mirror recovery again after mirror recovery failed, specify the same server you used last time for mirror recovery or another server in the same server group which this server belongs to as a copy source.

To resume mirror recovery that was suspended by selecting **Cancel**, use this command for forced mirror recovery.

Example of command execution

Example 1: When activating hybrid disk resource hd1

> # **clphdctrl --active hd1**
> Command succeeded.

Example 2: When deactivating hybrid disk resource hd1

> # **clphdctrl --deactive hd1**
> Command succeeded.

Example 3: When recovering mirror for hybrid disk resource hd1

> # **clphdctrl --recovery hd1**
> Command succeeded.

Error Message

Message	Cause/Solution
Invalid parameter.	The parameter is invalid. Check if there is any error in its format or parameter.
The status of *[HD_resource_name]* is invalid.	Check the status and execute the command again.
This command is already run in another server.	After finishing the command which is currently executed, execute the command again.
This command is already run in the local server.	After finishing the command which is currently executed, execute the command again.

Section I Detailed functions of ExpressCluster

[copy_destination_serve_name] is down.	Start the server which has been specified as copy destination, or specify another server as copy destination to execute the command again.
[local_server_name] is not included in Servers that can run the Group *of* *[HD_resource_name]*.	Execute the command from the server where the target HD resource can be started.
Disk error.	Check if there is not HW failure in the disk or disk path where cluster partition or data partition exists.
Mirror recovery of *[HD resource name]* is timed out.	Check if the specified timeout time is appropriate, or if the disk I/O or communication delay is not occurring due to heavy load.
Internal error. [*error_code*]	Restart the local server.

Message output command

clplogcmd: the clplogcmd command registers the specified text into alert.

Command line:

```
clplogcmd -m message [--alert] [-i ID] [-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 script resource script.

Description	Write this command in the script resource script and output messages you want to send to the destination.
	Messages are produced in the following format:
	`[ID] message`

Options	-m message	Specifies text to be produced in message. This option cannot be omitted. The maximum size of message is 498 bytes.
		You may use alphabets, numbers, and symbols. See below (*) for notes on them.
	--alert	This parameter can be omitted. You can specify only alert as the output destination of this command.
		See "Directory structure of ExpressCluster" in Chapter 10, "The system maintenance information" for more information on output destinations.
	-i ID	Specify message ID.
		This parameter can be omitted. The default value 1 is set for the ID when the parameter is omitted.
	-l level	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 to level when the parameter is omitted.
		See "Checking alerts using the WebManager" on page 56 for more information.

Return Value	0	Success
	Other than 0	Failure

Notes	Run this command as a user with Administrator privileges.
	The specification of the –i option is different from that of the Linux version. The event ID that is displayed in alert is fixed and unchangeable in the Windows version

Example of command execution	**Example 1**: When specifying only message
	When the following is written in the script resource script, text is produced in alert.
	```clplogcmd -m test1```
	The following is displayed in the alert view of the WebManager:
	Example 2: When specifying message, message ID, and level:
	When the following is written in the script resource script, the text is produced in alert.
	```clplogcmd -m test2 -i 100 -l ERR```
	The following alert is displayed on the alert view of the WebManager:

* 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.)

When there is a space in text, it must be placed in enclosed in double quotes (" ").

The symbol % cannot be used in text.

Controlling monitor resources (clpmonctrl command)

clpmonctrl: the clpmonctrl command controls the monitor resources.

Command line:

```
clpmonctrl -s [-m resource name ...] [-w wait time]
clpmonctrl -r [-m resource name ...] [-w wait time]
```

Note:

This command must be run on all servers that control monitoring because the command controls the monitor resources on a single server.

Description	This **command** suspends and/or resumes monitor resources on a single server.

Option	-s, --suspend	Suspends monitoring
	-r, --resume	Resumes monitoring
	-m, --monitor	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	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 ExpressCluster service is suspended
	12	Waiting for cluster synchronization
	90	Monitoring control wait time-out
	128	Duplicated activation
	255	Other internal error

Example of command execution	Monitor resource configuration
	``` # 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 through 4 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 suspending only the IP monitor resource (ipw1):

```
# clpmonctrl -s -m ipw1
Command succeeded.
# clpstat -m
=== MONITOR RESOURCE STATUS ===
               Cluster : cluster
                  *server0 : server1
                   server1 : server2

              Monitor0 [ipw1 :  Caution]
              ---------------------------------------------------------
               server0 [o]  :   Suspend
               server1 [o]  :   Online

              Monitor1 [miiw1:    Normal]
              ---------------------------------------------------------
               server0 [o]  :   Online
               server1 [o]  :   Online

              Monitor2 [userw :    Normal]
              ---------------------------------------------------------
               server0 [o]  :   Online
               server1 [o]  :   Online
              ================================
```

Example 4: When resuming only the IP monitor resource (ipw1):

```
# clpmonctrl -r -m ipw1
Command succeeded.
# clpstat –m
```

```
=== MONITOR RESOURCE STATUS ===
         Cluster : cluster
           *server0 : server1
            server1 : server2

           Monitor0 [ipw1 : Normal]

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

           Monitor1 [miiw1: Normal]

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

           Monitor2 [userw :  Normal]

           ---------------------------------------
------------------------
            server0 [o]   : Online
            server1 [o]   : Online
================================
```

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

Notes	Run this command as a user with Administrator privileges.
	Check the status of monitor resource by using the status display command or WebManager.
	Before you run this command, use the clpstat command or WebManager to verify that the status of monitor resources is in either "Online" or "Suspend."
	In the case of a monitor resource of which monitor timing is "Active", if a target resource stops temporarily in the active status, and then the target resource or the group which the target resource belongs to is activated, the monitor resource which has been stopped temporarily cannot detect an error. This is because the monitor resource does not start monitoring.
	The following are examples of the case described above:
	1. Stops an application monitor that is monitoring application resource temporarily.
	2. Reactivate the application resource or the group that the application resource belongs to.
	This reactivation procedure applies both manual and automatic when a monitor resource detects an error and reactivates an application by the recovery operation.

Error Messages

Message	Causes/Solution
Command succeeded.	The command ran successfully.
You are not authorized to run the command. Log in as Administrator.	You are not authorized to run this command. Log in as a user with Administrator privileges.
Initialization error. Check if memory or OS resources are sufficient.	Check 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 service by using the command such as ps command.	The cluster has been stopped. Check the activation status of the ExpressCluster service by using the ps command.
The cluster has been suspended. The cluster service has been suspended. Check activation status of the cluster service by using a command such as the ps command.	The ExpressCluster service has been suspended. Check the activation status of the ExpressCluster service 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 synchronization of the cluster is completed.
Monitor %1 was unregistered, ignored. The specified monitor resources %1is not registered, but continues processing. Check the cluster configuration data by using the Builder. %1: monitor resource name	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
The command is already executed. Check the execution state by using the "ps" command or some other command.	The command has already been run. Check the status by using the ps command.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

Controlling group resources (clprsc command)

clprsc: the clprsc command controls group resources

Command line:

```
clprsc -s resource_name [-h hostname] [-f]
clprsc -t resource_name [-h hostname] [-f]
```

Description	This command starts and stops group resources.	

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
        lankhb1                        : Normal
        lankhb2                        : Normal
        pingnp1                        : Normal
      server2........................................: Online
        lankhb1                        : Normal
        lankhb2                        : Normal
        pingnp1                        : Normal
```

```
<group>
    ManagementGroup ...................... : Online
        current                          : server1
        ManagementIP                     : Online
    failover1........................................ : Online
        current                          : server1
        fip1                             : Online
        md1                              : Online
        script1                          : Online
    failover2........................................ : Online
        current                          : server2
        fip2                             : Online
        md2                              : Online
        script1                          : Online
<monitor>
    fipw1                                : Normal
    fipw2                                : Normal
    ipw1                                 : Normal
    mdnw1                                : Normal
    mdnw2                                : Normal
    mdw1                                 : Normal
    mdw2                                 : Normal

    ==================================
```

Example 1: When stopping the resource (fip1) of the group (failover 1)

clprsc -t fip1

Command succeeded.

#clpstat

========== CLUSTER STATUS   ==========

<abbreviation>

```
<group>
    ManagementGroup ...................... : Online
        current                          : server1
        ManagementIP                     : Online
    failover1........................................ : Online
        current                          : server1
        fip1                             : Offline
        md1                              : Online
        script1                          : Online
    failover2........................................ : Online
        current                          : server2
```

```
                              fip2                      : Online
                              md2                       : Online
                              script1                   : Online
                       <abbreviation>
```

Example 2: When starting the resource (fip1) of the group(failover 1)

```
# clprsc -s fip1

Command succeeded.

#clpstat

========== CLUSTER STATUS   ==========
<Abbreviation>
<group>
   ManagementGroup ......................: Online
       current                   : server1
       ManagementIP              : Online
   failover1 ........................: Online
       current                   : server1
       fip1                      : Online
       md1                       : Online
       script1                   : Online
   failover2........................: Online
       current                   : server2
       fip2                      : Online
       md2                       : Online
       script1                   : Online
   <Abbreviation>
```

Notes	Run this command as a user with Administrator 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.

Message	Causes/Solution
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,
Internal communication timeout has occurred in the cluster server. If it occurs frequently, set the longer timeout.	Timeout has occurred in internal communication in the ExpressCluster. Set the internal communication timeout longer if this error occurs frequently.
The group resource is busy. Try again later.	Because the group resource is in the process of starting or stopping, wait for a while and try again.
An error occurred on group resource. Check the status of group resource.	Check the group resource status by using the WebManager or the clpstat command.
Could not start the group resource. Try it again after the other server is started, or after the Wait Synchronization time is timed out.	Wait till the other server starts or the wait time times out, then start the group resources.
No operable group resource exists in the server.	Check there is a processable group resource on the specified server,.
The group resource has already been started on the local server.	Check the group resource status by using the WebManager or clpstat command.
The group resource has already been started on the other server. To start the group resource on the local server, stop the group resource.	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.
Depending 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.
Server is isolated.	The server is suspended. (Rebooting after down)
Internal error. Check if memory or OS resources are sufficient.	Not enough memory space or OS resource. Check if there is enough space.

Section I Detailed functions of ExpressCluster

Network warning light switch off command

clpdn1000s: the clpdn1000s commsswtiches off the network warning light.

Command line:

clpdn1000s -h *host_name*

Description	This command switches off the network warning light corresponding to the specified server.	
Option	-h host_name	Specify the target server whose network warning light you want to switch off.
		This must be configured.
Return value	0	Completed successfully.
	Other than 0	Terminated due to a failure.
Notes	This command must be executed by a user with the administrator privilege.	

CPU frequency control command

clpcpufreq The clpcpufreq command controls CPU frequency.

Command line:

clpcpufreq --high [-h *hostname*]

clpcpufreq --low [-h *hostname*]

clpcpufreq -i [-h *hostname*]

clpcpufreq -s [-h *hostname*]

Description	This command enables/disables power-saving mode by CPU frequency control.	
Option	--high	Sets CPU frequency to the highest.
	--low	Sets CPU frequency to the lowest.
	-i	Switch to automatic control by cluster.
	-s	Displays the current CPU frequency level.
		high: Frequency is the highest
		low: Frequency is lowered and it is in power-saving mode
	-h	Requests the server specified in hostname for processing.
		If this is omitted, it requests the local server for processing.
Return Value	0	Completed successfully.
	Other than 0	Terminated due to a failure.

Example
```
# clpcpufreq -s
  high
  Command succeeded.(code:0)

# clpcpufreq -- high
  Command succeeded.(code:0)

# clpcpufreq --low -h server1
  Command succeeded.(code:0)
```

Remark If the **Use CPU frequency control** checkbox is not selected in the power saving settings in cluster properties, this command results in error.

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

When you use CPU frequency control, it is required that frequency is changeable in the BIOS settings, and that the CPU supports frequency

control by Windows OS power management function.

Error Messages

Message	Cause/Solution
Log in as Administrator.	Log in as a user with Administrator privileges.
This command is already run.	This command has already been run.
Invalid option.	This option is invalid. Check the option.
Invalid mode. Check if --high or --low or -i or -s option is specified.	Check if either of the --high, --low, -I or -s option is specified.
Failed to initialize the xml library. Check if memory or OS resources are sufficient.	Check to see if the memory or OS resource is sufficient.
Failed to change CPU frequency settings.	Check the BIOS settings and the OS settings. Check if the cluster is started. Check if the setting is configured so that CPU frequency control is used.
Failed to acquire CPU frequency settings.	Check the BIOS settings and the OS settings. Check if the cluster is started. Check if the setting is configured so that CPU frequency control is used.
Failed to create the mutex.	Check if the memory or OS resource is sufficient.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

Chassis identify control command

clpledctrl

The clpledctrl command controls the chassis identify function.

Command line:

clpledctrl -d [-h *hostname*] [-a] [-w *timeout*]

clpledctrl -i [-h *hostname*] [-a] [-w *timeout*]

Description   This command disables/enables chassis identify function.

Option

-d	Disables the chassis identify function.
-i	Enables the chassis identify function.
-h *hostname*	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 –h *hostname*.
-w *timeout*	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 administrator 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 -h 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 -h 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 Administrator.	Log in as a user with Administrator privileges.
Invalid option.	The command line option is invalid. Specify the correct option.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.
Could not connect to all data transfer server. Check if the server has started up.	Could not connect to all the IP addresses specified. Check the IP addresses and the status of the target server.
Could not connect to the data transfer server. Check if the server has started up.	Could not connect to all the IP addresses specified. Check the IP addresses and the status of the target server.
Command timeout	The cause may be heavy load on OS and so on. Check this.
Chassis identify is not setting or active at all server.	Chassis identify is disabled or not used.
All servers are busy. Check if this command is already run.	This command may be run already. Check it.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Specify a valid server name in the cluster.

Inter-cluster processing request command

clptrnreq   The clptrnreq command requests a server to execute a process.

Command line:

clptrnreq -t *request_code* -h *IP* [-r *resource_name*] [-s *script_file*] [-w *timeout*]

Description	The command issues the request to execute specified process to the server in another cluster.

Option	-t *request_code*	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 *IP*	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. The maximum number of IP addresses you can specify is 32.
		When you specify group failover for request code, specify the IP addresses of all the servers in the cluster.
	-r *resource_name*	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 *script_file*	Specifies the file name (within 30 characters) 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 *timeout*	Specifies the timeout value of the command by the second. The minimum value is 5 seconds.
		If the -w option is not specified, the command waits for 1 second shorter than script time out.

Return Value	0	Completed successfully.
	Other than 0	Terminated due to a failure.

Notes   This command must be executed by a user with the administrator 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.

It is required that ExpressCluster for Windows of internal version 10.02 or later, or ExpressCluster for Linux of internal version 2.0.2_1 or later is set up in the server which executes this command and the server with the IP address specified by -h.

Examples   Example 1: When performing a failover on the group having the appli1 resource of another cluster

clptrnreq –t GRP_FAILOVER –h 10.0.0.1,10.0.0.2 –r appli1

GRP_FAILOVER 10.0.0.1: Success

GRP_FAILOVER 10.0.0.2: Group that specified resource (appli1) belongs is offline.

Example 2: When executing the scrpit1.bat script by the server with IP address 10.0.0.1

clptrnreq –t EXEC_SCRIPT –h 10.0.0.1 –s script1.bat

EXEC_SCRIPT 10.0.0.1: Success

Error messages

Message	Cause/solution
Log in as Administrator.	Log in as a user with Administrator privileges.
Invalid option.	The command line option is invalid. Specify the correct option.
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 resources are sufficient.	Check if the memory or OS resource is sufficient.
Command timeout	The cause may be heavy load on OS and so on. Check this.
Failed to obtain the list of nodes. Specify a valid server name in the cluster.	Failed to obtain the list of nodes. Specify a valid IP address.
Could not connect to all data transfer server. Check if the server has started up.	Could not connect to all IP addresses specified. Check the IP addresses and the status of the target server.
Could not connect to the data transfer server. Check if the server has started up.	Could not connect to the IP address specified. Check the IP address and the status of the target server.
GRP_FAILOVER *IP*: Group that specified resource (*resouce_name*) belongs to is offline.	Failover process is not performed because the group to which the specified resource belongs is not started on the target server.
EXEC_SCRIPT *IP*: Specified script (*script_file*) does not exist.	The script does not exist on the specified server. Check it.

EXEC_SCRIPT *IP*: Specified script (*script_file*) is not executable.	The specified script could not be executed. Check that execution is permitted.
reqest_code IP : 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.
reqest_code IP : REQEST_TYPE failed in execute.	The execution processing of the request type failed. (Either of a present request type Failover or Script is specified.)

BMC information change command

clpbmccnf

The clpbmccnf command changes the information on BMC user name and password.

Command line:

clpbmccnf [-u *username*] [-p *password*]

Description	This command changes the user name/password for the LAN access of the baseboard management controller (BMC) which ExpressCluster uses for chassis identify or forced stop.

Option	-u *username*	Specifies the user name for BMC LAN access used by ExpressCluster. A user name with Administrator privilege needs to be specified. The -u option can be omitted. Upon omission, when the -p option is specified, the value currently set for user name is used. If there is no option specified, it is configured interactively.
	-p *password*	Specifies the password for BMC LAN access used by ExpressCluster. The -p option can be omitted. Upon omission, when the -u option is specified, the value currently set for password is used. If there is no option specified, it is configured interactively.

Return Value	0	Completed successfully.
	Other than 0	Terminated due to a failure.

Notes	This command must be executed by a user with the administrator privilege.
	Execute this command when the cluster is in normal status.
	BMC information update by this command is enabled when the cluster is started/resumed next time.
	This command does not change the BMC settings. Use a tool attached with the server or other tools in conformity with IPMI standard to check or change the BMC account settings.

Examples	When you changed the IPMI account password of the BMC in server1 to mypassword, execute the following on server1:
	# clpbmccnf -p mypassword
	Alternatively, enter the data interactively as follows:
	# clpbmccnf
	New user name: <- If there is no change, press **Return** to skip

New password: **********

Retype new password: **********

Cluster configuration updated successfully.

Error messages

Message	Cause/solution
Log in as Administrator.	Log in as a user with Administrator privileges.
Invalid option.	The command line option is invalid. Specify the correct option.
Failed to download the cluster configuration data. Check if the cluster status is normal.	Downloading the cluster configuration data has been failed. Check if the cluster status is normal.
Failed to upload the cluster configuration data. Check if the cluster status is normal.	Uploading the cluster configuration data has been failed. Check if the cluster status is normal.
Invalid configuration file. Create valid cluster configuration data by using the Builder.	The cluster configuration data is invalid. Check the cluster configuration data by using the Builder.
tmp_dir already exists. Please delete it and try again.	The folder to store temporary file already exists. Delete the folder and execute the command again.
Can not remove directory: *tmp_dir*.	Deleting the folder to store temporary file failed. Delete the folder separately.
Internal error. Check if memory or OS resources are sufficient.	Check if the memory or OS resource is sufficient.

Shutdown hook configuration command

clphookctrl   The clphookctrl command configures the shutdown hook function.

Command line:

clphookctrl -s [-m *mode*]

clphookctrl -m *mode*

clphookctrl -t

Description   This command configures the function which hooks the OS shutdown process to execute node shutdown or restart of ExpressCluster. By using this function, OS shutdown or restart can be performed after successfully terminating or moving the operating failover group when OS shutdown is performed by other than ExpressCluster.

Option   -s   Enables the shutdown hook function.

                    -t   Disables the shutdown hook function.

                    -m *mode*   Configures the process to be executed after the OS shutdown hook. Specify either of the following for mode:

                                            SHUTDOWN   Server shutdown (preset value)

                                            REBOOT   Server restart

Return Value   0   Completed successfully.

                    Other than 0   Terminated due to a failure.

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

                    The configuration by the -s option is enabled when the ExpressCluster Server service is started next time. Configuration by other options are enabled immediately.

                    Shutdown hook function cannot be used in Windows Server 2008.

Examples   If there is a possibility that OS shutdown is executed by the application or middleware other than ExpressCluster, you can cancel the OS shutdown to perform ExpressCluster server shutdown by executing the following command in each cluster server.

                    # clphookctrl -s

                    Note that in this case although OS restart is executed, it is shut down so that the server is not restarted. Upon restarting the OS, it is required to execute the following command to change the operation settings in advance.

ExpressCluster X 2.1 for Windows Reference Guide

```
# clphookctrl –m REBOOT
```

Error messages

Message	Cause/solution
Invalid option.	The command line option is invalid. Specify the correct option.
Failed to open/edit the registry.	Registry operation has been failed. Check if it is executed with Administrator privilege and ExpressCluster is installed correctly.

Chapter 5   Compatible command reference

This chapter describes compatible commands.

This chapter covers:

Compatible command overview

Compatible commands have compatibility with commands used in ExpressCluster Ver8.0 or earlier in functions. This section explains how to use compatible commands.

Note on compatible commands

The following is the note on compatible commands.

◆ To use a compatible command, the name of a cluster, server and group needs to be configured according to the naming rules of the conventional version.

Compatible commands

Commands that can be used only in scripts		
command	Description	Page
armbcast.exe	Displays a default or optional message on the client on which the ExpressCluster client is running.	338
armlog.exe	Registers log messages to the log file.	339
armload.exe	Starts an application. The application started by the armload.exe can be stopped by the armkill.exe in any position of a script.	340
armkill.exe	Stops the application started by the armload.exe.	347
armgwait.exe	Waits for the start or stop of groups	349
armcall.exe	Executes a command specified as a parameter or a program exclusively on nodes.	350
armgetcd.exe	Retrieves the value specified to the desired variable by the armsetcd.exe command. This command can be used for branch conditions of scripts.	352
armsetcd.exe	Sets the value to the desired variable. This value can be referred by the armgetcd.exe command.	353
armwhshr.exe	Monitors errors on the connection to the shared name.	354

ExpressCluster X 2.1 for Windows Reference Guide

Commands that can be used both in and outside scripts.		
command	Description	Page
armaswth.exe	Starts or stops the application or service, or suspends or resumes the monitoring or the application or service that is started by the armload.exe command.	358
armdown.exe	Shuts down a server when you want to fail over a group intentionally, such as when starting or stopping the application or service fails.	361
armfover.exe	Moves or fails over groups.	362
armgstrt.exe	Starts groups.	363
armgstop.exe	Stops groups.	364
armloadc.exe	Start or stop the application or service, or suspends or resumes the monitoring.	365
armpause.exe	Suspends scripts. This command can be used as a debugger. Permit the interaction with desktop. You can configure the setting for the interaction with desktop on the **Service** of **Administrative Tools** on **Programs**.	367
armsleep.exe	Suspends the script execution for a specified time.	368
armnsadd.exe	Starts sharing a network drive. This command functions in the same way as the net share *shared_name=path_name*.	369
armnsdel.exe	Releases the network sharing forcibly specified by the net share *shared_name=path_name*.	370
armwsset.exe	Sets the IP address returned by executing gethostbyname() on the local server to the specific application.	371
Commands that can be used only outside scripts		
command	Description	Page
armdelay.exe	Sets or refers to the delay time of the ExpressCluster service startup on the NEC Express5800/ft series or servers that have equivalent fault-tolerant functions.	373
armem.exe	Sets or refers to the mode at emergency shutdown.	374
armstdn.exe	Shuts down a cluster.	375
armmode.exe	Returns servers to a cluster.	376
mdopen.exe	Permits an access to the mirror disk.	377
mdclose.exe	Prohibits an access to the mirror disk.	378

Important:
The installation directory contains executable-format files and script files that are not listed in this guide. Do not execute these files other than ExpressCluster. Any problems caused by not using ExpressCluster will not be supported.

Displaying the messages on ExpressCluster clients (armbcast command)

armbcast.exe: the armbcast.exe command displays the messages on ExpressCluster clients.

Command line:

```
Format 1 armbcast.exe  /ID n /S group_name
Format 2 armbcast.exe  /MSG msg_strings [/A | /S group_name]
```

Description	This command displays the default or optional messages on monitors of clients.

Parameter	/ID *n*	Displays a message that corresponds to the ID specified in *n*. You need to register this message in advance.
		This parameter cannot be specified with /MSG.
	/MSG *msg_strings*	Displays a character string *msg_strings* on clients. The maximum size of a string is 127 bytes.
		When the character string includes spaces, enclose it in double quotation marks. When you use double quotation marks in the string, describe them as \".
		This parameter cannot be specified with /ID.
	/A	Displays a message on all clients.
	/S *group_name*	Displays a message on all clients that use the group specified in *group_name*.
		When using a Format 1, you cannot omit this parameter.
		When using a Format 2, you cannot specify this parameter with /A. You can omit /A and /S. When omitted, /A is assumed to be specified.

Return Value	0	Success
	7	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Notes	This command cannot be used when recovering servers to a cluster (when the environment variable of start script "CLP_EVENT" is "RECOVER").

Remarks	This command can be used only in scripts.

Registering the messages on a log file or an alert log (armlog command)

armlog.exe: The armlog exe command registers the messages on a log file or an alert log.

Command line:

armlog.exe   *log_strings* [/arm]

Description	This command registers specified messages to a log file or an alert log.
	The messages are registered on the log file (arm.log) of the server on which this command is run. They are also displayed on the Alert view of the WebManager.

Parameter	*log_strings*	Specifies a message string to be registered.
		The maximum size of a string is 128 bytes (when a string is displayed on the Alert view, the size is 111 bytes).
		When the character string includes spaces, enclose it in double quotation marks. When you use double quotation marks in the string, describe them as \".
	/arm	Displays a message on the Alert view of the WebManager.
		When this parameter is omitted, a message is registered only to a log file.

Return Value	0	Success
	1	Logs were not registered due to an error.
	8	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Remarks	This command can be specified only in scripts.

Starting the applications or services (armload command)

armload.exe: the armload.exe command starts applications or services.

Command line: (Format 1: application Format 2: service)
```
Format 1 armload.exe watchID [[/U user-name] | [/WINDOW size]]
        [/WIDKEEP] [/C [CMD]] [<mode>] exec-name
        [parameter-1 parameter-2 .....]
```

For *<mode>*, one of the following can be specified.
```
*  /W
*  /M [/FOV [/CNT count]]
*  /R retry [/H hour] [/SCR] [/FOV [/CNT count]]
   [/INT time]
```

```
Format 2 armload.exe watchID /S [/A] [/WIDKEEP] [/WAIT time]
        [/C [CMD]] [<mode>] service-name
        [parameter-1 parameter-2 .....]
```

For *<mode>*, one of the following can be specified.
```
*  /M [/FOV [/CNT count]]
*  /R retry [/H hour ] [/SCR] [/FOV [/CNT count]]
   [/INT time]
```

Description	This command starts applications or services.
	A failover or restart occurs when the started application or service fails (when specified as a monitoring target). Monitoring failures continues until the application or service is terminated by ARMKILL.
	A failure is a loss of a process for the application, and a service stop (SERVICE_STOPPED) and abnormal termination for the service.

Parameter	*watchID*	ID for monitoring.
		This ID is used for terminating the application or service by the ARMKILL command. Be aware of the following notes when using this parameter:
		* The same IDs cannot be specified within a cluster.
		* You cannot use IDs starting with "NEC" since those are already allocated (IDs of "NEC_*product_name*+ something extra" are used for the product programs of NEC).
		* Specify the ID with alphanumeric characters of up to 255 bytes (case-sensitive).

		/U *user-name*	Specifies the user account name that runs the application.
			This parameter is optional. When omitted, the application is started with the local system account.
			* This parameter cannot be specified in Format 2.
			* When specifying this parameter, refer to (3) on Note.
		/WINDOW *size*	Specifies the window size of an application. The following can be specified to *size*.
			maximum The application or service starts with windows of a maximum size.
			normal The application or service starts with windows of a size specified by the application.
			hide The application or service starts with hidden windows.
			This parameter is optional. When omitted, the application or service starts with windows of a minimum size.
			* This parameter cannot be specified in Format 2.
		/C [CMD]	Specifies the format to pass the parameter-n to the application or service. Specify this option when the parameter-n ends with an escape character (\). Refer to the following examples to specify the parameter-n.
			Example 1) when the command passes "c:\" to app.exe. ARMLOAD WatchID /C app.exe c:\ Example 2) when the command passes "c:\Program Files\" to app.exe. Enclose "c:\Program Files\" in double quotation marks, and add escape characters for the number of escape characters in the end. armload WatchID /C app.exe "c:\Program Files\\"
			* Specify "CMD" as well when specifying this parameter and the type of application is command.
		/WIDKEEP	Starts or stops the application or service with no monitoring parameter (/M, /R) specified by using the ExpressCluster Task Manager or the ARMLOADC command.
			* This option is ignored when /W, /M or /R is specified.
		/W	Waits until the execution of the application is terminated. When this parameter is specified, controls are not returned from this command until the application terminates. This parameter is optional.
			* This parameter cannot be specified with /M or /R.
			* This parameter cannot be specified in Format 2.

Section I Detailed functions of ExpressCluster

	/M	Monitors the application or service. This parameter is optional. When omitted, monitoring is not performed.
		* This parameter cannot be specified with /W or /R.
		* When you use this parameter without specifying /FOV, servers are shut down at failure.
	/R *retry*	Monitors the application or service and specifies the threshold of the restart count. This parameter is optional. When omitted, monitoring is not performed.
		* The value from 1 through 9 can be specified.
		* This parameter cannot be specified with /M or /W.
	/H *hour*	Specifies the time to reset the restart count of the application or service to 0. The value indicates the time from the group startup. The time can be specified by the hour. This parameter is optional.
		* The value from 1 through 24 can be specified.
		* Restart count is not reset if this parameter is omitted with the parameter /R specified.
	/SCR	When this parameter is specified, the application or service is restarted by scripts. This parameter is optional.
		* The application or service is restarted by itself if this parameter is omitted with the parameter /R specified.
	/FOV	Fails over groups when the restart count threshold is exceeded on the application or service monitoring. This parameter is optional.
		* Servers are shut down if this parameter is omitted with the parameter /M or /R specified.
	/CNT *count*	A failover is not performed when the number of failovers already performed exceeds the count specified by this option. This is to avoid servers from repeating failing over endlessly. The number of failovers is counted for each server.
		The value from 1 through 255 can be specified.
		When omitted, 8 is specified.
		The failover count is reset to 0 on a specific server when: the normal status continues more than 1 hour the server is restarted the failover group is activated
	exec-name	Specifies an executable file name.
		* This parameter cannot be specified in Format 2.
	parameter-n	Passed to an executable file. This parameter is optional.
	/S	Specifies that the target to be started is a service.
		* This parameter cannot be specified in Format 1.

		/A	Specify this parameter when you want to specify the service as a monitoring target even though it is already started. This parameter is optional. * This parameter cannot be specified in Format 1.
		/WAIT *time*	Specifies the time to wait for the completion of a service startup by the second. When this parameter is specified, this command does not return controls while waiting for the service to complete startup (SERVICE_RUNNING) or within the wait time. This parameter is optional. When omitted, the command does not wait for the completion of a startup. * This parameter cannot be specified in Format 1. * The value from 0 through 3600 can be specified. When 0 is specified, the command waits for the completion of a startup endlessly.
		/INT *time*	Specifies restart interval of the application or service, or scripts by the second. This parameter is optional When omitted, 0 (second) is specified to the restart interval. * This parameter is valid when /R or /R and /SCR options are specified. * The value from 0 through 3600 can be specified.

		service-name	Specifies the service name.
			
			* This parameter cannot be specified in Format 1.
			
			For *service-name*, specify one of the following:
			
			(1) Specify the service name that is displayed on the **Services** on the **Administrative Tools**.
			
			(2) Specify xxxx that matches with the service name displaying "DisplayName", the key of xxxx of the following registry in **Services** on **Administrative Tools**.
			
			HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\xxxx
			
			Example) For FTP service of IIS
			
			Name displayed on the **Service** window
			
			    FTP Publishing Service
			
			Name displayed on the registry
			...\Services\MSFTPSVC
			    DisplayName:REG_SZ: FTP Publishing Service
			Format:
			armload WatchID /S "FTP Publishing Service"
			
			or
			armload WatchID /S MSFTPSVC

Section I Detailed functions of ExpressCluster

Return Value	0	Success (the target application or service has started)
	1	Cannot start the target application or service
	2	Cannot perform process monitoring
	3	The specified watchID is already used.
	4	Time-out occurred while waiting for the service to complete startup (the service is starting up).
	8	The ExpressCluster Server service is not started.
	9	The parameter is invalid.

Remarks	(1)	This command can be used only in scripts.
	(2)	Multiple parameters can be specified for a command that is passed to an executable file.
	(3)	The figure below indicates operations performed when the application or service started by ARMLOAD fails.
		1. The application or service is started by ARMLOAD
		2. A failure occurs
		3. Threshold check
		4. When the threshold is not exceeded, the application or service is restarted by scripts.
		4.-1: Stop script execution 4-2: Start script execution
		5. When the threshold is exceeded, a failover occurs or a server shuts down
		5-1: Stop script execution 5-2: Fails over to another ExpressCluster server

ExpressCluster X 2.1 for Windows Reference Guide

Notes	(1)	This command can be specified only in scripts.
	(2)	When you start the application with GUIs without specifying an account, select **Allow service to interact with desktop** on the ExpressCluster Server service. When not selected, GUIs of the application are not displayed.

	(3)	When you specify a user account, it should have "local logon" permission. For information on the user permissions, see the help of the domain user administrator.
		
		When you specify the domain of an account explicitly, specify the following. Note that the domain name and the user name should be within 15 characters.
		
		When the account is a local administrator:
		    armload watchid /u administrator ap.exe
		When the account is a domain\administrator:
		    armload watchid /u domain\administrator ap.exe

	(4)	When you use the monitoring function (/M option) of the ARMLOAD command, specify Dr. Watson (DRWTSN32.EXE) as a default debugger used by the operating system. To check this setting, go to the registry \\HKEY_LOCAL_MACHINE\Software\Microsoft\ Windows NT\CurrentVersion\AeDebug and find the value with the name "Debugger" or "Auto." Check if the value of "Auto" is set to 1, and "Debugger" to "DRWTSN32." When the setting values are different from those, change the settings to use Dr.Watson in addition to the default debugger you are using. For this setting, start Dr.Watson by running the drwtsn32 –i command on the command prompt. At OS installation, the value of "Auto" is set to 1, and "Debugger" to "DRWTSN32."
	(5)	Applications not suitable for ARMLOAD monitoring function The applications whose processes do not stay resident persistently are not suitable for the process monitoring (*). Since the process monitoring is assumed to monitor processes that stay persistently and do not terminate by themselves, it determines that an error occurs on an application when the started process is terminated. (*) The following applications are examples: An application whose process started by ARMLOAD does not stay resident persistently An application whose process started by ARMLOAD starts its child process, and the process started first does not stay resident persistently (ARMLOAD only monitors the process it started)
	(6)	The application that requires GUIs may be terminated when it is started by the ARMLOAD command and logged off. To prevent the application from being terminated, start it with an account (/U option).

Limitations	(1)	The ARMLOAD command with an account cannot be used in a batch program that is run with an account.
	(2)	The application that is run with an account (including a child process) cannot use the LogonUser() function.
	(3)	Do not execute a 16-bits application since it cannot be terminated by the ARMKILL command.
	(4)	When including spaces in a parameter, enclose it in quotation marks. Example) ARMLOAD Wid1 "\Program Files\Application.exe"
	(5)	Only the process that is started by the ARMLOAD command can be terminated by the ARMKILL command.
	(6)	Do not run the applications (XXXX.EXE) that ExpressCluster provide.
	(7)	The ARMLOAD command may terminate abnormally (return value 1: Cannot start the target application or service) if the application with an account is started while it cannot access the domain controller (due to a failed server or network disconnection, etc.).

Terminating the application or service (armkill command)

armkill.exe: the armkill exe command terminates the application or service.

Command line:

```
armkill.exe watchID [/C | /T time]
```

Description	This command terminates the application or service that was started up by the ARMLOAD command.
	When one service is operated (monitoring target) with several ARMLOAD commands (when several ARMLOAD commands with /A option operate one service), the service is not terminated until ARMKILL is run for all *watchID*.

Parameter	*watchID*	Specifies the monitoring ID of the application or service you want to terminate.
		Use the ID specified when the application or service was started up by the ARMLOAD command.
	/C	Cancels the monitoring of the application or service but does not terminate the application or service.
		This parameter is optional. When omitted, the application or service is terminated. This parameter cannot be specified with the /T parameter.
	/T *time*	Sets the termination wait time of the application or service.
		The range that can be specified is from 0 to 3600 seconds. If 0 is specified, the command waits for the completion of termination of the application or service endlessly. This parameter is optional. When omitted, the wait time is set to 40 seconds. This parameter cannot be specified with the /C parameter.

Return Value	0	Success (the target application or service was terminated).
	1	The application or service has already been terminated.
	2	The application or service was not terminated. (The application or service is being terminated.)
	8	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Remarks	(1)	This command can be specified only in scripts.
	(2)	To terminate the application, this command sends the WM_CLOSE message to it. If the application does not terminate within the specified time (/T time), this command executes the TerminateProcess() for the target application to forcibly terminate the application process.
	(3)	To terminate the service, the requirement to stop the service is sent to the service control manager (SCM). When terminating the service has not been completed within the specified time (/T time), the return value of 2 is returned.
	(4)	If /C is specified on this command, the application or service cannot be terminated by ARMKILL.

Waiting for the start or stop of groups (armgwait command)

armgwait.exe: the armgwait.exe command waits for the start or stop of groups.

Command line:

armgwait.exe *group_name* [*time-out*] [/stop]

Description	This command waits for the start or stop of groups.
	This command waits until the status of a group becomes active (when waiting for activation) or inactive (when waiting for termination), or until the specified time is exceeded.

Parameter	*group_name*	Specifies a name of the group whose completion of start or stop the command waits for.
	time-out	Specifies the time-out by the second.
		When this parameter is omitted, the time-out value is set to default (120 seconds).
	/stop	Waits until the group is terminated.
		When this parameter is omitted, this command waits for the startup of the group.

Return Value	0	The status of the failover group is active or inactive.
	1	The time-out has elapsed.
	7	The ExpressCluster Server service has not been started.
	8	The specified group does not exist.
	9	The parameter is invalid.

Notes	Do not run this command directly from the start or stop script. When using this command from those scripts, prepare the batch file on which the command is described, and then run the batch file on the start or stop script by writing "START *batch_file_name*" on it.

Remarks	This command can be run only in scripts. Follow the process on Note when using this command on the start or stop script.

Exclusive control between servers command (armcall command)

armcall.exe: the armcall. exe command runs commands or programs exclusively on nodes.

Command line:

```
armcall.exe   [/L lockname ] exec_name [parameter  ...]
```

Description	This command executes a program from a script without terminating it, and returns the control to the script that is invoked again. This program is executed exclusively between nodes.

Parameter	/L lockname	Specifies the lock name. When this option is omitted, "Default" is specified for the name.
		The commands are run exclusively for each lock name specified by this parameter.
	exec_name	Specifies the command or program to be run.
	parameter ...	Specifies the command line information required to run the program specified in exec_name.

Return Value	0	Success
	8	The program was not run due to an error.
	9	The parameter is invalid.

Remarks	This command can be run only in scripts.

Examples	When the process <A> must be run on all nodes, and the running of process <A> must be exclusive between nodes:

Time
```
        <A>    :    :    :
             <A>   :    :
                  <A>    :
                       <A>
```

start.bat
```
armcall   work.bat
```

work.bat
```
<A>
```

When the process <A> should be run only on one node and the process <B> should be run at all nodes, and the process <B> must be started after the completion of the process <A>.

Time
```
        <A>    :    :    :
        <B>   <B>   <B>   <B>
```

start.bat
```
armcall   work.bat
<B>
```

work.bat
```
armgetcd /C SHORI
IF ERRORLEVEL 1 GOTO
END
<A>
armsetcd /C SHORI 1
:END
```

Retrieving the cluster wide variable or local variable (armgetcd command)

armgetcd.exe: the armgetcd.exe command retrieves the cluster wide variable or local variable.

Command line:

```
armgetcd.exe  [/C] variable
```

Description	This command retrieves the setting value of the cluster wide variable or local variable specified by the armsetcd command.

Parameter	/C	Retrieves the setting value of the cluster wide variable. When this parameter is omitted, the value of the local variable is retrieved.
	variable	Specifies the variable name set by the ARMSETCD command.

Return Value	0	The value could not be retrieved due to an error.
	1-255	The value set by the ARMSETCD command is returned.

Remarks	This command can be specified only in scripts.
	If you specify the variable name which is not set by the armsetcd command, 0 is returned.

Setting the cluster wide variable or local variable (armsetcd command)

armsetcd.exe: The armsetcd.exe sets the cluster wide variable or local wide variable.

Command line:

```
armsetcd.exe  [/C]  variable  value
```

Description	This command sets the cluster wide variable or the local variable.
	The setting value of the variable set by this command can be referred by using the armgetcd command on the same or other scripts.
	The cluster wide variable is shared between servers in a cluster. The variable set by the armsetcd command on one server can be referred or changed on another server.
	The local variable is valid only on the server on which the armsetcd command is run.

Parameter	/C	Sets the variable as a cluster wide variable.
		When this parameter is omitted, the variable is set as a local variable.
	variable	Specifies the name of the variable to be set. Specify the name with up to 127 alphanumeric characters.
		(The name is case-sensitive.)
	value	Specifies the value to be set to the variable on *variable* in integers from 1 through 255.

Return Value	0	Success
	8	The variable was not set due to an error.
	9	The parameter is invalid.

Remarks	This command can be run only in scripts.
	Variable names are controlled separately for the cluster wide variable and the local variable. Thus, you can set both variables with one variable name. In this case, those are operated as two different variables.
	The local variable is valid until the ExpressCluster Server service of the server on which this command was run is terminated.
	The cluster wide variable is valid until the ExpressCluster Server services of all servers in a cluster are terminated.

Monitoring errors on the connection to the shared resources (armwhshr command)

armwhshr.exe: the armwhshr.exe command monitors errors on the connection to the shared name.

Command line:

```
armwhshr.exe  share-name  ip-addr  [/INT time]  [/LOG log-strings]
       [/PROC exec-name parameter-1 parameter-2 ... parameter-n]
```

Description	This command monitors errors on the connection to the shared name. It checks if the ping is reached to the specified shared name server or monitors the connection error to the shared name. It registers the event log (ID:3514) when the ping is reached normally and an error occurred while connecting to the shared name. However, the event log is not registered when the connection error is already detected. It is registered when the status of connection changes from normal to error. With options, this command sends messages to the WebManager and starts specified executable files.

Parameter	*share-name*	Specifies a shared name (UNC name).
	ip-addr	Specifies the IP address of a server that possesses shared name.
	/INT *time*	Specifies monitoring interval (by the second). The range which can be specified is from 30 through 86400. This parameter is optional. When omitted, 180 (sec) is set for the interval.
	/LOG *log-strings*	Specifies the character string to be reported to the WebManager when an error occurs on the connection to a shared name. It is reported to the WebManager every time an error on the connection to the shared name is detected. Maximum of 111 bytes can be specified for the string. If the string includes spaces, enclose it in double quotation marks. When you use the double quotation marks in the strings, describe them with \ (\"). This parameter is optional.
	/PROC *exec-name*	Specifies the name of an executable file that is started when an error occurs on the connection to the shared name. The executable file is started when the status of shared name connection changes from normal to abnormal. This parameter is optional.
	parameter-n	This parameter is passed to the executable file. This parameter is optional.

Return Value	0	Success
	1	The parameter is invalid.
	2	Insufficient memory
	8	The ExpressCluster Server service has not been started.

How to use	When using the ARMWHSHR command, configure the following settings.
	(1) Registering the user account Register the user account with an administrator right.
	(2) Describing the ARMWHSHR command in scripts Create a new failover group for monitoring errors on the connection to the shared name(*), and describe the ARMWHSHR command in scripts.
	* Setting a failover group 1. Add only one server to the **Servers that can run the Group** by clicking the **Startup Server** tab on the **Group Properties**.
	For example, to monitor errors on the connection to the shared name (temp) of the server (server name: server public LAN IP address: 100.100.100.1), describe the following in the start script:
	(Lines in the script that is run when CLP_EVENT is START) ARMLOAD watchID /U Administrator ARMWHSHR \\server\temp 100.100.100.1
	Describe the following in the stop script (Lines in the script that is run when CLP_EVENT is START) ARMKILL watchID

Usage example	This command is used to confirm whether the local disk of the server can be accessed from the network. On the cluster system with 2 servers, accessibility to local disks on both servers from the network can be checked by monitoring another server from both servers. The following indicates the examples of configuration and script descriptions. Example:

	Server Information:		
		Server1	Server2
	Server name	server1	server2
	Public LAN IP address	100.100.100.1	100.100.100.2
	Shared name	(1)share1	(1)share2
		(2)share3	
	Script example		
	(1) Start.bat of Server 1 IF "%CLP_EVENT%" == "START" GOTO NORMAL GOTO EXIT :NORMAL ARMLOAD W1 /U Administrator ARMWHSHR \\server2\share2 100.100.100.2 :EXIT EXIT		
	(2) Stop.bat of Server 1 ARMKILL W1 EXIT		
	(3) Start.bat of Server 2 IF "%ARMS_EVENT%" == "START" GOTO NORMAL GOTO EXIT :NORMAL ARMLOAD W2 /U Administrator ARMWHSHR \\server1\share1 100.100.100.1 ARMLOAD W3 /U Administrator ARMWHSHR \\server1\share3 100.100.100.1 :EXIT EXIT		
	(4) Stop.bat of Server 2 ARMKILL W2 ARMKILL W3 EXIT		

Notes	This command can be specified only in scripts.

Controlling the applications or services started by the armload command (ExpressCluster Task Manager)

armaswth.exe: the armaswth.exe command lists applications or services started by the armload command in GUI.

Command line:

armaswth.exe

Description	This command lists the applications or services started by the armload command in GUI. In addition, it can start or stop the applications or services, and suspend or resume the monitoring in the same way as the armload command.

Remarks	This command can be specified both in and outside scripts.

Screen image

Description:

- Application/Service Name
  Displays the names of applications or services started by the ARMLOAD command. Icons indicate the following status:

  $\boxed{\text{A}}$: Application that is not monitored
  $\boxed{\text{A}}$: Application that is being monitored
  $\boxed{\text{A}}$: Application that is not a monitoring target
  $\boxed{\text{S}}$: Service that is not monitored
  $\boxed{\text{S}}$: Service that is being monitored
  $\boxed{\text{S}}$: Service that is not a monitoring target

  Background colors of icons indicate the following status:
  $\boxed{}$: Started / Being started
  $\boxed{}$: Stopped / Being stopped

- Failover Group Name
  Displays the group names that the started applications or services belong to
- Type
  Displays the types (application or service)
- Running Status
  Started: Application or service has started
  Stopped: Application or service has not started
  Starting: Application or service is being started
  Stopping: Application or service is being stopped
- Monitoring status
  Monitoring: Application or service is being monitored
  Not monitoring: Application or service is not being monitored
  Not monitored: Application or service is not a monitoring target (is not set as a monitoring target but started by the ARMLOAD command)

Sort

Click the fields of "Application/service name," "Failover group name," "WatchID," "Type," "Start status" and "Monitoring status" to sort the lists of each item (ascending / descending).

Operation

Same as the ARMLOADC command, four operations of monitoring stop, monitoring resume, stop, start can be performed. Operations that can be performed vary depending on the status of the application or service start and the monitoring. For details, see "ARMLOADC command."

Select the application on the list (you cannot select multiple applications), and operate it by one of the following ways:

- **Operation** menu
- Toolbar
- Shortcut menu displayed by right-clicking the application name (shown below)

Settings

To configure the settings, click **Settings** on the **Option** menu or on the toolbar.

Update Interval of Application/Service List

Specify the interval to automatically update the application or service list by the second. The value from 0 through 3600 can be specified. When 0 is set, the list is not updated automatically. The default is 10 (seconds).

Timeout to stop Application/Service

Specify the wait time to stop when stopping the application or service by the second. The value from 0 through 3600 can be specified. When 0 is set, the termination of the application or service is waited endlessly. The default is 40 (seconds). If the application or service is not stopped after the stop time is exceeded, the application is forcibly stopped. This setting is used only when the application or service is stopped by the ExpressCluster Task Manager.

Shutting down the server (armdown command)

armdown.exe: the armdown.exe command shuts down the server.

Command line:

armdown.exe   [reboot | off | stop]

Description	This command stops the ExpressCluster service of the server on which this command is run, and shuts down the server.

Parameter	No parameter	Shuts down the server and turns off the power.
	reboot	Shuts down the server and reboots it. This parameter cannot be specified with "off" or "stop" parameter.
	off	Shuts down the server and turns off the power. This parameter cannot be specified with "off" or "stop" parameter.
	stop	Stops the ExpressCluster Server service without shutting down the server. This parameter cannot be specified with "reboot" or "off" parameter.

Return Value	0	Success (The server shutdown has started).
	8	The ExpressCluster Server service is not running.
	9	The parameter is invalid.

Notes	Do not run this command directly from the start or stop script. When using this command from those scripts, prepare the batch file on which the command is described, and then run the batch file on the start or stop script by writing "START *batch_file_name*" on it.

Remarks	This command can be specified both in and outside scripts. When running this command on the start or stop script, follow the steps on Notes.
	To shut down whole cluster normally, run the armstdn command.

Moving or failing over a group (armfover command)

armfover.exe: the armfover.exe command moves or fails over a group

Command line:

armfover.exe [/F] *group_name*

Description	This command moves or fails over a group.
	A group is moved or failed over to a server other than the current one that is operating normally and has the highest priority.

Parameter	/F	Fails over a group.
		When this parameter is omitted, a group is moved.
		When a group is failed over, "FAILOVER" is set to the environment value of the start script "CLP_EVENT" on the destination server.
		When a group is moved, "START" is set to the environment value of the start script "CLP_EVENT" on the destination server.
	group_name	Specifies the name of the group to be moved or failed over.

Return Value	0	Success (the group was moved or failed over).
	7	The specified group has not been started.
	8	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Notes	Do not run this command directly from the start or stop script. When using this command from those scripts, prepare the batch file on which the command is described, and then run the batch file on the start or stop script by writing "START *batch_file_name*" on it.

Remarks	This command can be specified both in and outside scripts. When running this command on the start or stop script, follow the steps on Notes.

Starting a group (armgstrt command)

armgstrt.exe: the armgstrt.exe command starts a group

Command line:

armgstrt.exe *group_name* [*host_name*]

Description	This command starts a group on a specified server

Parameter	*group_name*	Specifies the name of a group to be started
	host_name	Specifies the name of a server on which a group is started. When this parameter is omitted, the server is determined according to a group failover policy.

Return Value	0	Success
	1	The status on which the specified operation is not available. (checking if the shared disk is powered on or not)
	7	The specified group has already been started.
	8	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Notes	Do not run this command directly from the start or stop script. When using this command from those scripts, prepare the batch file on which the command is described, and then run the batch file on the start or stop script by writing "START *batch_file_name*" on it.

Remarks	This command can be specified both in and outside scripts. When running this command on the start or stop script, follow the steps on Notes.

Stopping a group (armgstop command)

armgstop.exe: the armgstop.exe command stops a group

Command line:

armgstop.exe *group_name*

Description	This command stops a group.

Parameter	*group_name*	Specifies the name of a group to be stopped.

Return Value	0	Success
	7	The specified group has not been started.
	8	The ExpressCluster Server service has not been started.
	9	The parameter is invalid.

Notes	Do not run this command directly from the start or stop script. When using this command from those scripts, prepare the batch file on which the command is described, and then run the batch file on the start or stop script by writing "START *batch_file_name*" on it.

Remarks	This command can be specified both in and outside scripts. When running this command on the start or stop script, follow the steps on Notes.

Starting or stopping the application or service, suspending or resuming the monitoring (armloadc command)

armloadc.exe: the armloadc.exe command starts or stops the application or service, or suspends or resumes the monitoring.

Command line:

```
armloadc.exe  watchID  /W  mode  [/T time]
```

Description	This command starts or stops the application or service, or suspends or resumes the monitoring.
	This command terminates when the operations of starting or stopping the application or service is completed.

Parameter	watchID	This ID is for monitoring. Specify the ID used when the application or service is started by the ARMLOAD command.	
	/W mode	Controls the monitoring. The following values can be specified for mode.	
		pause	Suspends the monitoring of the application or service.
		continue	Resumes the monitoring of the application or service. When the application or service has terminated, the monitoring is resumed after a startup.
		start	Starts the application or service.
		stop	Terminates the application or service. When the application or service is being monitored, it is terminated after suspending the monitoring.
	/T time	This parameter is valid when "continue," "start" or "stop" is specified to mode of /W mode. When "continue" or "start" is specified to mode of /W mode: Specifies the wait time to start the service (this parameter is invalid for the application). The value from 0 through 3600 (seconds) can be specified. When 0 is specified, the command waits for the startup of the service endlessly. This parameter is optional. When omitted, the command only starts the service and returns the control without waiting for completion of start. When "stop" is specified to mode of /W mode: Specifies the wait time to stop the service. The value from 0 through 3600 (seconds) can be specified. When 0 is specified, this command waits for the termination of the application or service endlessly. This parameter is optional. When omitted, the command waits for maximum of 40 seconds.	

Return Value	0	Success
	1	The status is invalid.
	2	The application or service was not stopped. (The application or service is being started or stopped)
	7	An error occurred in WIN32API.
	9	The parameter is invalid.

Remarks	(1) This command can be specified both in and outside scripts.
	(2) To terminate the application, send WM_CLOSE message to the application. When the application is not terminated within the specified time (/T time), run TerminateProcess() to forcibly terminate the application process.
	(3) To start or stop the service, send requests for start or stop of the service to the service control manager (SCM). When the start or stop has not been completed within the specified time (/T time), the return value of 2 is returned.
	(4) Refer to the table below for the values that can be specified in *mode*. If *mode* is invalid, the return value of 1 is returned.

Notes	Before stopping the service (mode = stop), suspend the monitoring of watchID (mode=pause) which is monitoring the same service name, if any. A service error is detected (event ID=3506 - 3510) if the service is stopped without suspending the monitoring.

Application/Service specification matrix

Status / Mode	Monitoring				Suspending monitoring			
	Started	Starting	Terminating	Terminated	Started	Starting	Terminating	Terminated
pause	O	O	X	-	X	X	X	X
continue	X	X	X	-	O	O	O (*2)	O (*2)
start	X	X	X	-	X	X	X	O
stop	O (*1)	O	X	-	O	O	X	X

O: Executable   X:Not executable (Invalid status)   :This combination does not exist.

(*1) When "stop" is executed, monitoring of the application or service is suspended, and the application and service is stopped.
(*2) When "continue" is executed, the application and service is started, and monitoring of the application or service is resumed.

Suspending the script execution until the user's direction (armpause command)

armpause.exe: the armpause.exe command displays the message box, and suspends the script execution until the user clicks the **OK** button.

Command line:

```
armpause.exe  msg_strings
```

Description	This command displays the message box and suspends the script execution. When the user clicks the **OK** button on the message box, the script execution is resumed.

Parameter	*msg_strings*	Specifies the character string to be displayed on the message box. Maximum of 128 bytes can be specified.

Return Value	0	Displaying the message was terminated.
	1	The message cannot be displayed.
	9	The parameter is invalid.

Notes	To use this command in scripts, select **Allow service to interact with desktop** on the properties of the ExpressCluster Server service.

Remarks	This command can be specified both in and outside scripts.

Suspending the script execution for the specified time (armsleep command)

armsleep.exe: the armsleep.exe command suspends the script execution until the specified time is exceeded.

Command line:

armsleep.exe *seconds* [/NOLOG]

Description	This command suspends the script execution until the specified time is exceeded.

Parameter	*seconds*	Specifies the time to suspend the script execution by the second.
	/NOLOG	When this parameter is specified, the execution of this command is not registered to the log file (arm.log).

Return Value	0	Success
	9	The parameter is invalid.

Remarks	This command can be specified both in and outside scripts.

Starting the network sharing of the directory (armnsadd command)

armnsadd.exe: the armnsadd.exe command starts the network sharing of the directory.

Command line:

```
armnsadd.exe   share_name   path
```

Description	This command starts the network sharing of the directory. This is the same function as "net share *shared_name=path_name*."

Parameter	*share_name*	Specifies the shared name of the network sharing to be started.
	path	Specifies the directory to be shared by entering full path.

Return Value	0	Success
	1	The parameter is invalid.
	2	The path name cannot be found.
	3	The shared name is invalid.
	5	No access right.
	7	Insufficient memory.
	8	Already shared by the same shared name.
	9	Other error

Remarks	This command can be specified both in and outside scripts.
	When using the net share command, it waits for the entry on the console when the shared name of more than 8 characters is specified. Thus, it is not suitable to be used in scripts. In such a case, use this command instead of the net share command.

Stopping the network sharing of the directory (armnsdel command)

armnsdel.exe: the armnsdel.exe command starts the network sharing of the directory.

Command line:

```
armnsdel.exe  share_name
```

Description	This command stops the network sharing of the directory. This is the same function as "net share *shared_name*/delete."

Parameter	*share_name*	Specifies the shared name of the network sharing to be stopped.

Return Value	0	Success
	1	The parameter is invalid.
	5	The access was denied.
	8	Insufficient memory
	2310	The shared name cannot be found.

Remarks	This command can be specified both in and outside scripts.
	The net share command waits for the entry on the console depending on the status of connection to the clients when the network sharing is stopped. In such a case, use this command instead of the net share command. This command stops the network sharing regardless of the status of connection to the clients.

Setting the IP address returned by gethostbyname() (armwsset command)

armwsset.exe: the armwsset.exe command sets the IP address returned by the gethostbyname() executed on the local server.

Command line:

```
Format1  armwsset.exe [/P] path [ip_address  ...]
Format2  armwsset.exe /L
Format3  armwsset.exe /DEL
```

Description	This command sets the IP address returned by the gethostbyname() executed on the local server.
	Use this command when you want to return the virtual IP address as a local server's IP address that the application retrieves.

Parameter	/P	If this parameter is specified, settings are not deleted at system reboot. The settings are maintained after the system is restarted.
		When this parameter is omitted, settings are deleted at system reboot.
	path	Specifies the full path to the executable file of the target application.
	ip_address...	Specifies the IP address returned by the gethostbyname().
		More than one IP address can be specified by separating them by spaces.
		When multiple addresses are specified, those are set in the array returned by gethostbyname()in the described order.
		When this parameter is omitted, the settings of the application specified by *path* are deleted.
	/L	Lists the current settings.
	/DEL	Deletes all current settings.

Return Value	0	Success
	1	Failed to configure the settings.

Notes	The settings by this command function only when the application downloads wsock32.dll directly as a socket library. They do not function when the application uses ws2_32.dll.
	Run this command before starting the application.
	To use this command, execute the following steps for each application in advance.
	(1) Copy wsock32.dll that is included with OS and stored in %SystemRoot%\system32 to the stored directory for the application program, and change the name to "wsock__.dll."
	(2) Copy wsock32.dll stored in the **accessories** folder under the ExpressCluster installation directory to the stored directory of the application program.
	(3) Execute the steps above on all servers that run the application.

Remarks	This command can be specified both in and outside scripts.

Setting or displaying the start delay time (armdelay command)

armdelay.exe: the armdelay.exe command sets or displays the delay time at the ExpressCluster service startup.

Command line:

```
armdelay.exe  /N [seconds]
```

Description	This command sets or displays the delay time at startup of the ExpressCluster Server service or the ExpressCluster Disk Agent service.

Parameter	/N [*seconds*]	Sets or displays the delay time at startup of the ExpressCluster Server service or the ExpressCluster Disk Agent by the second. These services are started after the delay time is exceeded.
		For *seconds*, the value from 0 through 3600 can be specified.
		When *seconds* is omitted, the current setting values are displayed.

Return Value	0	Success
	7	An error occurred in WIN32API.
	9	The parameter is invalid.

Remarks	This command can be specified only outside scripts.
	The default value of the delay time immediately after the installation is 0 second.
	The delay time specified by this command is valid until the ExpressCluster Server is uninstalled.
	The delay time must be set for each server. The setting values are valid only on the server on which this command was run.
	Normally, changing the delay time is not required. Setting the delay time is needed when using the ExpressCluster on the fault-tolerant servers such as NEC Express5800/ft series.

Setting or displaying operations at the occurrence of the emergency shutdown (armem command)

armem.exe: the armem.exe command sets or displays the operation mode at the occurrence of emergency shutdown.

Command line:

```
armem.exe      /M [shutdown | reboot | poweroff]
```

Description	This command sets or displays the operation mode at the occurrence of the emergency shutdown.

Parameter	/M	Displays the current operation mode.
	/M shutdown	This parameter is for compatibility. It functions in the same way as the poweroff parameter.
	/M reboot	Reboots the server after shutdown.
	/M poweroff	Powers off the server after shutdown.

Return Value	0	Success
	7	An error occurred in WIN32API.
	9	The parameter is invalid.

Remarks	This command can be specified only outside scripts.
	The default value of the operation mode immediately after the installation is "shutdown."
	The operation mode specified by this command is valid until the ExpressCluster Server is uninstalled.
	The operation mode must be set for each server. The setting values are valid only on the server on which this command was run.

Shutting down the whole cluster (armstdn command)

armstdn.exe: the armstdn.exe command shuts down the whole cluster.

Command line:

armstdn.exe   [reboot | off | stop]

Description	This command stops the ExpressCluster service in the whole cluster, and shuts down all servers.

Parameter	No parameter	Powers off the server after shutdown.
	reboot	Reboots the server after shutdown.
		This parameter cannot be specified with the *off* or *stop* parameter.
	off	Powers off the server after shutdown.
		This parameter cannot be specified with the *reboot* or *stop* parameter.
	stop	Stops only the ExpressCluster Server service without shutting down the server.
		This parameter cannot be specified with the *reboot* or *off* parameter.

Return Value	0	Success
	8	The ExpressCluster Server service is not running.
	9	The parameter is invalid.

Notes	Servers which cannot be communicated from the server on which this command was run are not shut down.
	Do not run this command while activating a group. Since a group cannot be inactivated while being activated, an emergency shutdown is executed.

Remarks	This command can be specified only outside scripts.

Returning the server with the status of "Suspension (isolated)" (armmode command)

armmode.exe: the armmode.exe command returns the server whose status is "Suspension (isolated)" to the normal status.

Command line:

```
armmode.exe   [/F]
```

Description	This command returns the server whose status is "suspension (isolated)" to the normal status.
	Run this command on the server whose status is "suspension (isolated)."

Parameter	No parameter	Returns the server
	/F	This parameter is for compatibility.
		When specified, the command functions in the same way when no parameter is specified.

Return Value	0	Success
	1	The status of the server is not "Suspension (isolated)."
	8	The ExpressCluster Server service is not running.
	9	The parameter is invalid.

Remarks	This command can be specified only outside scripts.
	When the server did not shut down normally, the status of the server becomes "Suspension (isolated)" at the next server startup. On the server of that status, activating a group is prohibited. Activating a group becomes possible after returning the server to the normal status by this command.

Permitting an access to the mirror disk (mdopen command)

mdopen.exe: the mdopen.exe command permits an access to the mirror disk.

Command line:

mdopen.exe   *mirrordisk_alias*

Description	Normally, the mirror disk is accessible only when the resource is activated. In other cases the access is prohibited.
	This command permits the access to the inactivated mirror disk.

Parameter	*mirrordisk_alias*	Specifies the mirror disk resource name to which you want to permit the access.

Return Value	0	Success
	1	The parameter is invalid.
	2	The mirroring is in progress. The access cannot be permitted.
	3 or larger	Other error (possible causes are described below) • The Replicator/Replicator DR is not used. • There is a task accessing the target mirror disk resource. • Internal error

Notes	When accessing the mirror disk is permitted by using this command, be sure to prohibit the access using the mdclose command before recovering the mirror.

Remarks	This command can be specified only outside scripts.
	This command is available only when the Replicator/Replicator DR is used.
	This command is for executing the snapshot backup by a batch processing. For details on the snapshot backup, see "Section III Maintenance" in this guide.

Prohibiting an access to the mirror disk (mdclose command)

mdclose.exe: the mdclose.exe command prohibits an access to the mirror disk.

Command line:

mdclose.exe   *mirrordisk_alias*

Description	This command prohibits the access to the mirror disk that is permitted by the mdopen command.
	Do not run this command when there is no task accessing the specified mirror disk resource.

Parameter	*mirrordisk_alias*	Specifies the name of a mirror disk resource to which you want to prohibit the access.

Return Value	0	Success
	1	The parameter is invalid.
	2 or larger	Other error (possible causes are described below)
		• The Replicator/Replicator DR is not used.
		• There is a task accessing the target mirror disk resource.
		• Internal error

Notes	When accessing the mirror disk is permitted using the mdopen command, be sure to prohibit the access using this command before recovering the mirror.

Remarks	This command can be specified only outside scripts.
	This command is available only when the Replicator/Replicator DR is used.
	This command is for executing the snapshot backup by a batch processing. For details on the snapshot backup, see "Section III Maintenance" in this guide.

Permitting an access to the shared disk (sdopen command)

sdopen.exe: the sdopen.exe command permits an access to the shared disk

Command line:

sdopen.exe   *disk_resource_name*

Description	In general, the shared disk is accessible only when the disk resource is activated. In other cases the access is prohibited.
	This command permits the access to the inactivated disk resource.

Parameter	*disk_resource_name*	Specifies the disk resource name to which you want to permit the access.

Return Value	0	Success
	1	The parameter is invalid.
	3 or larger	Other error (possible causes are described below) • Invalid HBA settings • Invalid drive letter settings • Internal error

Notes	Make sure that the disk resource is inactivated before using this command. If this command is executed in the state that the disk resource is activated, data on the shared disk may be corrupted.
	When access to the shared disk is permitted by using this command, be sure to prohibit the access by using the sdclose command before activating the disk resource. If the disk resource us activated in the state where the access is not prohibited, data on the shared disk may be corrupted.

Remarks	This command can be used only outside scripts.

Prohibiting an access to the shared disk (sdclose command)

sdclose.exe: the sdclose command prohibits an access to the shared disk

Command line:

sdclose.exe   *disk_resource_name*

Description	This command prohibits accesses to the disk resource that are permitted by the sdopen command.

Parameter	*disk_resource_name*	Specifies the disk resource name to which you want to prohibit the access.

Return Value	0	Success
	1	The parameter is invalid.
	3 or larger	Other error (possible causes are described below) • Invalid HBA settings • Internal error

Notes	When accessing the disk resource is permitted by using the sdopen command, be sure to prohibit the access by using this command before activating the disk resource.

Remarks	This command can be used only outside scripts.

Error messages of the compatible commands

Message	Description	Solution
armbcast succeeded.	armbcast succeeded.	-
armbcast has received an invalid parameter.	armbcast received an invalid parameter.	Specify the valid input parameter.
armbcast failed in the internal processes (1%03d). The error code is 0x%x.	armbcast T failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
Cannot execute armbcast.	armbcast cannot be executed.	armbcast cannot be used when the arms_event of the start script is in the recover status. This is because the server is recovering the cluster.
armcall succeeded. command name=%.16s.	armcall succeeded.	-
armcall has received an invalid parameter.	armcall received an invalid parameter.	Specify an valid input parameter.
armcall failed to lock the file.	armcall failed to acquire the privilege to write lock for exclusive access control.	Check if the memory is sufficient and/or OS is stable.
armcall received a console close signal. The server will be shut down.	The server was shut down because the armcall console window was closed by a user's request.	-
armcall failed in the internal processes ("%03d"). The error code is 0x%x.	armcall failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
armcall failed to execute the command line. The error code is 0x%x.	Execution of exec-name specified in the command line of armcall failed.	Check if the valid values are specified for the path name, file name and parameter-n in the command lines.
armdown succeeded. option=%s.	armdown succeeded.	-
armdown has received an invalid parameter. option=%s.	armdown received an invalid parameter.	Specify an valid input parameter.
armdown shuts down the server. option=%s.	armdown started a server shutdown.	-
armdown cannot execute specified action. option=%s	armdown cannot be executed.	The server may have failed. Check it.
armdown failed in the internal processes (%03d). The error code is 0x%x.option=%s	armdown failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
armem succeeded.mode=%s.	armem succeeded.	-
armem has received an invalid parameter.	armem received an invalid parameter.	Specify a valid input parameter.
armdown failed in the internal processes (%04d). The error code is 0x%x.option=%s	armem failed in the internal process.	Check if the memory is sufficient and/or OS is stable.
armforver succeeded. option=%s group-name=%s	armforver succeeded.	-
armforver has received an invalid parameter. option=%s group-name=%s	armforver received an invalid parameter.	Specify a valid input parameter.
Cannot execute armfover . option=%s group-name=%s	armforver cannot be executed.	Check if the failover group is being stopped or is already stopped.

Section I Detailed functions of ExpressCluster

Message	Description	Solution
armfover failed in the internal processes (1%03d). The error code is 0x%x.option=%s.group-name=%s.	armforver failed in the internal process.	Check if the memory is sufficient and/or OS is stable.
armgetcd succeeded.	armgetcd succeeded.	-
armgetcd has received an invalid parameter.	armgetcd received an invalid parameter.	Specify a valid input parameter.
armgetcd received a consol close signal. The server will be shut down.	The server was shut down. This is because the console window of armgetcd was closed by a user's request.	-
armgetcd failed in the internal processes ("%03d"). The error code is 0x%x.	armgetcd failed in the internal process.	Check if the memory is sufficient and/or OS is stable.
armgstrt succeeded. group-name=%s.server-name=%s.	armgstrt succeeded.	-
armgstrt has received an invalid parameter.group-name=%s.server-name=%s.	armgstrt received an invalid parameter.	Specify a valid input parameter.
armgstrt failed in the internal processes (1%03d). The error code is 0x%x.group-name=%s.server-name=%s.	armgstrt failed in the internal process.	Check if the memory is sufficient and/or OS is stable.
armgstrt cannot execute the specified operation. group-name=%s server=%s	armgstart is not in the status to execute the specified operation.	The failover group is being started or it has been started, or the server may not be operating successfully. Check them.
armgstop succeeded. group-name=%s	armgstop succeeded.	-
armgstop has received an invalid parameter. group-name=%s	armgstop received an invalid parameter.	Specify a valid input parameter.
armgwait succeeded.	armgwait succeeded.	-
armgwait has received an invalid parameter.	armgwait received an invalid parameter.	Specify a valid input parameter.
armgwait timed out.	armgwait timed out.	Check the target failover group name.
armgwait failed to run the internal processes (1%03d). The error code is 0x%x.	armgwait failed in the internal process.	Check if the memory is sufficient and/or OS is stable.
armkill (WID="%0.16s") succeeded.	armkill succeeded.	-
armkill has received invalid WID ("%0.10s") as a parameter.	armload is not executed by the specified WID.	Check the command line (watcID) of the armload.
armkill has received an invalid parameter.	armkill received an invalid parameter.	Specify a valid input parameter.
armkill (WID="%0.16s") forcefully terminated application.	The application was forcefully terminated because it did not end within a designated time period.	Examine the application to find why it did not terminate within the designated time period.
armkill (WID="%0.16s") could not forcefully terminated application.	The application was forcefully terminated, because it did not end within a designated time period. However the forced termination failed.	Same as above
armkill (WID="%0.16s") could not stop the service.	The service did not end within the specified time period.	Examine the service to find why it did not end within the specified time period.

Message	Description	Solution
armkill (WID="%0.16s") has failed in the internal processes (3%03d). The error code is 0x%x.	armkill failed in the internal process.	When the "internal process" is 3060, the application is already closed. Examine the application to find why it ended.
		If not above, check if the memory is sufficient and/or OS is stable.
armkill (WID="%0.32s") failed to stop the service. Detailed information:%0.160s	Armkill failed to stop the service.	The request to stop the service that was asked to the service control manager failed. Investigation needs to be conducted in the service.
armload (WID="%0.16s") succeeded.	armload succeeded.	-
armload has received invalid WID ("%0.16s") as an invalid parameter.	WID is overlapped.	Specify a unique WID.
armload has received an invalid parameter.	armload received an invalid parameter.	Specify an valid input parameter.
armload (WID="%0.16s") has reached the maximum number of processes that can be run simultaneously.	An attempt to start up applications/services more than executable number of applications/servers (256) was made	Create scripts to make the number of running applications/ services within 256.
armload has received WID ("%0.16s") that exceeds the maximum character count as a parameter.	The character string of WID has more than 256 characters	Make the character string of WID to have up to 255 characters.
armload(WID="%0.16s") detected the service starting time-out.	The service did not end within a designated time period.	Examine the service to find why it did not end within the designated time period.
armload (WID="%0.16s") failed in the internal processes(1%03d). The error code is 0x%x.	armload failed in the internal processes.	Check if the memory is sufficient and/or OS is stable.
armpoll has received an invalid parameter.	Command monitoring process received an invalid parameter.	Check if the memory is sufficient and/or OS is stable.
armpoll (WID="%0.16s") detected extinction of the application. The stop code is %d.	Command monitor process did not detect any application.	Detected an application termination. Examine the application to find why it ended.
armload (WID="%0.16s") couldn't log on to user ("%0.32s"). The error code is 0x%x.	Failed to log on to the user account.	Check user account registration information (user ID, password), and if the domain name is indicated, also check the domain name in NEC ExpressCluster manager.
armload (WID="%0.16s") failed to execute the command line. The error code is 0x%x.	Failed to start the application.	Check if the valid path name and file name are specified in the exec-name of the armload command line. Check if a valid value is specified to the parameter-n.
armload (WID="%0.16s") could not log on to user ("%0.32s"). The error code is 0x%x.	Failed to acquire a password of a user account.	Check if the user account registration is done in NEC ExpressCluster manager .
armload (WID="%0.16s") could not log on to user ("%0.32s"). The error code is 0x%x.	Command monitoring process failed in internal processing.	Check if the memory is sufficient and/or OS is stable.
Command monitor process (WID="%0.16s") detected a failure in the services. The stop code is %d & %d.	Command monitor process detected a failure of the service.	Detected service termination. Examine the service to find it terminated.

Message	Description	Solution
Command monitor process (WID="%0.16s") failed to get the environmental variable name.	Command monitor process failed in acquiring an environmental variable name.	It may have been started from outside of the scripts Start from outside of script is not supported.
		If not above, check if memory is sufficient, and/or OS is stable.
Command monitor process (WID="%0.16s") restarted script.	Command monitor process restarted scripts.	Due to detection of application/service termination, the scripts restarted.
Command monitor process (WID="%0.16s") restarted application.	Command monitor process restarted the application.	Due to detection of termination of the application, the application restarted.
Command monitor process (WID="%0.16s") restarted Service	Command monitor process restarted the service	Due to detection of termination of the service, the restarted.
Command monitor process (WID="%0.16s") completed the failover of the group ("%0.10s").	Command monitor process performed a failover to the group.	Due to detection of application/service termination, the failover group failed over.
Command monitor process (WID="%0.16s") shut down the server.	Command monitor process shut down the server.	Due to detection of application/service termination, the server shut down.
armpoll (WID="%0.16s") has received an invalid service name ("%0.10s") as a parameter.	armload received an invalid service name as a parameter.	In the armload command line, check if the valid service name is specified for service-name. Check if the valid value is designated for parameter-n as well.
armload (WID=""%0.16s"") failed to get user (""%0.32s"") information. The user name may be incorrect. The error code is 0x%x.	Failed to acquire a domain name from the user name.	Check if the user name is registered in the system.
armpoll (WID="%0.16s") detected extinction of the application.	Command monitor process did not detect any application (Failed to acquire the application termination code of the application).	Detected termination of an application. Examine the application to find why it terminated.
armload (WID="%0.16s") failed to start the service. The error code is 0x%x.	Failed to start the service.	Examine the service to find why it failed to start.
Command monitor process (WID="%0.16s") failed to fail over the group(%s). The error code is 0x%x.	Command monitor process failed to failover the group.	Check if the failover destination server is operating successfully as a cluster.
Command monitor process (WID="%0.32s") failed to stop the service. Detailed information:%0.160s	Command monitor process failed to stop the service.	The service stop request for the service control manager failed. Examine the service.
Command monitor process (WID="%0.16s") forcefully terminated the application.	Command monitor process forced to finish the application.	The application was forcefully terminated by TerminateProcess() because it could not end within the specified time period. Check the application.
Command monitor process (WID="%0.16s") failed to forcefully terminate the application.	Command monitor process failed to finish the application.	The application could not end within the specified time period due to the WM_CLOSE message. An attempt to forcefully terminate by the TerminateProcess() was made. However it did not end. Check the application.

Message	Description	Solution
Command monitor process (WID="%0.16s") failed to stop Service.	Command monitor process failed to stop Service.	Service did not end within the specified time period. Check the Service.
armloadc succeeded.WatchID=%0.16s.mode=%s.time=%s.	armloadc succeeded.	-
armloadc received an invalid parameter. WatchID=%0.16s.mode=%s.time=%s.	armloadc received an invalid parameter.	Specify a valid input parameter.
Cannot execute armloadc. WatchID=%0.16s.mode=%s.time=%s.	armloadc cannot be executed.	Check "startup state" and "monitoring state" by NEC ExpressCluster task manager. Check whether or not armloadc can be executed by referring to application/service specification matrix of command reference (armloadc).
armloadc detected time-out while waiting to start/stop the application/service. WatchID=%0.16s mode=%s time=%s	Application/service did not end within the designated time period.	Examine the application/service to find why it did not end within the designated time period.
armloadc Win32API error.WatchID=%0.16s.mode=%s.time=%s.	armloadc failed in the internal processing.	Check if the memory is sufficient and/or OS is unstable.
armmode succeeded.option=%s.	armmode succeeded.	-
armloadc received an invalid parameter. WatchID=%0.16s.mode=%s.time=%s.	armloadc received an invalid parameter.	Specify a valid input parameter.
armmode cannot execute the specified action (%03d). option=%s.	armmode cannot execute the specified operation.	Force-return (/F) : Some servers are not isolated. Check the servers. Server isolation (/I) : The local server is not operating successfully in the cluster. Or there are no two or more servers that are working successfully in the cluster. Check the servers. Server isolation (/I) : The local server is not operating successfully in the cluster. Check the server.
armmode failed in the internal processes(%03d).The error code is 0x%x.option=%s.	armmode failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
armnsadd succeeded (share=%.80s,path=%.80s).	armnsadd succeeded.	-
armnsadd has received an invalid parameter.	armnsadd received an invalid parameter.	Specify a valid input parameter.
armnsadd failed to run the internal processes (1%03d). The error code is 0x%x.	armnsadd failed in the internal processing.	If the internal process is 1020, the shared name has more than 80 characters. Specify it within 80 characters.

Section I Detailed functions of ExpressCluster

Message	Description	Solution
		If the internal process is 1040, the path name is invalid. Check the path name.
		If the internal process is 1050, the shared name is invalid. Check if you did not use characters that cannot be specified for shared names.
		If the internal process is 1060, you do not have the privilege to access the path name. Check the access privilege.
		If the internal process is 1090, the same name is already used. Specify a shared name that does not overlap with others.
		If not above, check if the memory is sufficient, and/or OS is stable.
armnsdel succeeded (share=%.80s).	armnsdel succeeded.	-
armnsdel has received an invalid parameter.	armnsdel received an invalid parameter.	Specify a valid input parameter.
armnsdel failed to run the internal processes (1%03d). The error code is 0x%x.	armnsdel failed in the internal processing.	If the internal process is 1030, you do not have the privilege to access the shared name. Check the access privilege.
		If the internal process is 1060, the shared name cannot be found. Check the name.
		If not above, check if the memory is sufficient, or OS is stable.
armpause succeeded.	armpause succeeded.	-
armpause has received an invalid parameter.	armpause received an invalid parameter.	Specify a valid input parameter.
armpause cannot display the message.	armpause cannot display dialog messages.	Check if the memory is sufficient and/or OS is stable.
armsetcd succeeded.	armsetcd succeeded.	-
armsetcd has received an invalid parameter.	armsetcd received an invalid parameter.	Specify a valid input parameter.
armsetcd received a consol close signal. The server will be shut down.	server shutdown was executed because armsetcd console window was closed by user's request.	-
armsetcd failed in the internal processes ("%03d"). The error code is 0x%x.	armsetcd failed in the internal processing.	Check if the memory is sufficient And/or OS is stable.
armsleep succeeded.	armsleep succeeded.	-
armsleep has received an invalid parameter.	armsleep received an invalid parameter.	Specify a valid input parameter.
armstdn failed in the internal processes(%03d).The error code is 0x%x.option=%s.	armstdn failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
armstdn succeeded.cmd=%s	armstdn succeeded.	-
Failed to shut down the cluster. The server is not operating as a cluster.	Failed to acquire a cluster name.	The server is not operating as cluster. Check it.

Message	Description	Solution
Failed to shut down the cluster. The error code is 0x%x.	armwhshr failed in internal processing.	Check if the memory is sufficient and/or OS is stable.
Failed to shut down the cluster. ExpressCluster Server Service is not started.	"The ExpressCluster Server" service is not started.	"The ExpressCluster Server" service is not started. Check it.
armwhshr has received an invalid parameter.	armwhshr received an invalid parameter.	Specify a valid input parameter.
armwhshr failed in the internal processes(1%03d). The error code is 0x%x.	armwhshr failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
armwhshr detected connection error to share-name(%.48s).The error code is 0x%x.	armwhshr detected error in connection to the shared name.	The shared name cannot be used. Recover devices that are associated to the shared name.
		1.OS is unstable. Check it.
		2. Make sure that power is supplied to the devices.
		3. Make sure that the devices and the servers are connected properly.
armwhshr detected connection recovery to shared name(%.48s). The error code is 0x%x.	rmwhshr detected recovery of connection to the shared name.	-
mdopen failed. An internal error occurred.	mdopen failed. An internal error occurred.	Check if the memory is sufficient and/or OS is stable.
mdopen failed. The resource is busy.	mdopen failed. The resource is busy.	Retry later.
mdopen failed. A network error occurred.	mdopen failed. A network error occurred.	Check how the interconnect is connected.
mdopen failed. Cannot establish the mirror disk connection.	mdopen failed to establish the communication of the mirror disk.	Check if the cluster configuration data is valid.
mdopen failed. The resource name is invalid.	mdopen failed. The resource name is invalid.	Check if the cluster configuration data is valid.
mdopen failed. The status is invalid.	mdopen failed. The status is invalid.	Mirror recovery is required.
mdopen failed. The resource is not initialized.	mdopen failed. The resource is not initialized.	Check if the partition is allocated , the disk is recognized by OS and the cluster configuration data is correct.
mdopen failed. The resource is not performed first mirror construction.	mdopen failed. Initial mirror construction is not done for resources.	Initial mirror construction is required.
mdopen failed. Cannot lock the mirror disk.	mdopen failed to lock the mirror disk.	Check if the memory is sufficient and/or OS is stable.
mdopen failed. The license is not registered.	mdopen failed. The license is not registered.	Register the license.
mdopen failed. The trial version has expired.	mdopen failed. The trial version has expired.	Register the license.
mdopen failed. The license authentification failed.	mdopen failed. The license authentification failed.	Register the license.
mdopen failed. Cannot find the history folder.	mdopen failed. The history folder cannot be found.	Check if the cluster configuration data is correct.
mdopen failed. The mirror connect is not initialized.	mdopen failed. The mirror connect is not initialized.	Check the connection status of the mirror connect. Check if the cluster configuration data is correct.

Section I Detailed functions of ExpressCluster

Message	Description	Solution
mdopen failed. Cannot find the partition specified for the cluster partition.	mdopen failed. The partition specified for the cluster partition cannot be found.	Check if the partition is allocated and the disk is recognized by OS.
mdopen failed. Cannot find the partition specified for the data partition.	mdopen failed. The partition specified for the data partition cannot be found.	Check if the partition is allocated and the disk is recognized by OS.
mdopen failed. Cannot change the drive letter for the cluster partition.	mdopen failed. The drive letter for the cluster partition could not be changed.	Check the specification of the drive letter of the cluster configuration data. Make sure that the drive letter is not used by any other partitions.
mdopen failed. Cannot change the drive letter for the data partition.	mdopen failed. The drive letter for the data partition could not be changed.	Check the specification of the drive letter of the cluster configuration data. Make sure that the drive letter is not used by any other partitions.
mdopen failed. The server name is invalid.	mdopen failed. The server name is invalid.	Check if the cluster configuration data is correct.
mdopen has received an invalid parameter.	mdopen received an invalid parameter.	Specify a valid input parameter.
mdopen failed in the internal processes(%2). The error code is %3.	mdopen failed in the internal processing.	Check if the memory is sufficient and/or OS is stable.
mdopen succeeded. The mirror disk resource is %2.	mdopen succeeded.	-
mdclose failed. An internal error occurred.	mdclose failed. An internal error occurred.	Check if the memory is sufficient and/or OS is stable.
mdclose failed. The resource is busy.	mdclose failed. The resource is busy.	Retry it later.
mdclose failed. A network error occurred.	mdclose failed. A network error occurred.	Check the connection status of the interconnect.
mdclose failed. Cannot establish the mirror disk connection.	mdclose failed to establish the mirror disk connection.	Check if the cluster configuration data is correct.
mdclose failed. The resource name is invalid.	mdclose failed. The resource name is invalid.	Check if the cluster configuration data is correct.
mdclose failed. The status is invalid.	mdclose failed. The status is invalid.	Mirror recovery is required.
mdclose failed. The resource is not initialized.	mdclose failed. The resource is not initialized.	Check if the partition is allocated, if the disk is identified by OS and if the cluster configuration data is correct.
mdclose failed. The resource has not performed initial mirror construction.	mdclose failed. The initial mirror construction has not been done for the resource.	Initial mirror construction is required.
mdclose failed. Cannot lock the mirror disk.	mdclose failed to lock the mirror disk.	Check if the memory is sufficient and/or OS is stable.
mdclose failed. The license is not registered.	mdclose failed. The license is not registered.	Register the license.
mdclose failed. The trial version has expired.	mdclose failed. The trial version has expired.	Register the license.
mdclose failed. The license authentification failed.	mdclose failed. The license authentification failed.	Register the license.
mdclose failed. Cannot find the history folder.	mdclose failed to find the history folder.	Check if the cluster configuration data is correct.

Message	Description	Solution
mdclose failed. The mirror connect is not initialized.	mdclose failed. The mirror connect is not initialized.	Check the connection status of the mirror connect. Check if the cluster configuration data is correct.
mdclose failed. Cannot find the partition specified for the cluster partition.	mdclose failed to find the partition specified for the cluster partition.	Check if the partition is allocated and if the disk is identified by OS.
mdclose failed. Cannot find the partition specified for the data partition.	mdclose failed to find the partition specified for the data partition.	Check if the partition is allocated and if the disk is identified by OS.
mdclose has received an invalid parameter.	mdclose received an invalid parameter.	Specify a valid input parameter.
mdclose failed in the internal processes(%2). The error code is %3.	mdclose failed in the internal processing.	Check if the memory is sufficient and OS is stable.
mdclose succeeded. The mirror disk resource is %2.	mdclose succeeded.	-
sdopen succeeded. (%2)	sdopen succeeded.	-
sdopen failed. Internal error occurred. (%1)	sdopen failed. Internal error occurred.	Check if the memory and/or the resource of OS are sufficient.
sdopen failed. Failed to load cluster configuration data. (%1)	sdopen failed to load cluster configuration data.	Check if the cluster configuration data exists in the place it should be.
sdopen failed. Failed to unload cluster configuration data. (%1)	sdopen failed to unload cluster configuration data.	Check if the cluster configuration data exists in the place it should be.
sdopen failed. Failed to get cluster configuration data. (%1)	sdopen failed to acquire the cluster configuration data.	Check if the cluster configuration data is correct.
sdopen failed. Failed to allocate memory. (%1)	sdopen failed to allocate memory.	Check if the memory and/or the resource of OS are sufficient.
sdopen failed. Failed to activate resource. (%1)	sdopen failed to activate resource.	Check if the setting of HBA is correct.
sdopen failed. Failed to create thread. (%1)	sdopen failed to create thread.	Check if the memory and/or the resource of OS are sufficient.
sdopen failed. Timeout occurred on thread. (%1)	sdopen failed. Timeout occurred on thread.	Check if the memory and/or the resource of OS are sufficient.
sdopen failed. Failed to dismount the partition specified by the resource. (%1)	sdopen failed to dismount the partition specified by the resource.	The partition may be being used. Check it.
sdopen failed. Failed to lock the partition specified by the resource. (%1)	sdopen failed to lock the partition specified by the resource	The partition may be being used. Check it.
sdopen failed. Server does not exist in cluster configuration data. (%1)	sdopen failed. The server does not exist in cluster configuration data.	Check if the server exists in the cluster configuration data.
sdopen failed. Resource does not exist in cluster configuration data. (%1)	sdopen failed. The resource does not exist in cluster configuration data.	Check if the resource exists in the cluster configuration data.
sdopen failed. Cannot find the specified partition. (%1)	sdopen failed to find the specified partition.	Check if the specified partition is recognized by OS.
sdopen failed. Cannot change the drive letter. (%1)	sdopen failed to change the drive letter.	Check if the specified drive letter is not used in other partitions.
sdclose succeeded. (%2)	sdclose succeeded.	-
sdclose failed. Internal error occurred. (%1)	sdclose failed. Internal error occurred.	Check if the memory and/or the resource of OS are sufficient.

Message	Description	Solution
sdclose failed. Failed to load cluster configuration data. (%1)	sdclose failed to load cluster configuration data.	Check if the cluster configuration data exists in the place it should be.
sdclose failed. Failed to unload cluster configuration data. (%1)	sdclose failed to unload cluster configuration data.	Check if the cluster configuration data exists in the place it should be.
sdclose failed. Failed to get cluster configuration data. (%1)	sdclose failed to acquire the cluster configuration data.	Check if the cluster configuration data is correct.
sdclose failed. Failed to allocate memory. (%1)	sdclose failed to allocate memory.	Check if the memory and/or the resource of OS are sufficient.
sdclose failed. Failed to deactivate resource. (%1)	sdclose failed to deactivate resource.	Check if the setting of HBA is correct.
sdclose failed. Failed to create thread. (%1)	sdclose failed to create thread.	Check if the memory and/or the resource of OS are sufficient.
sdclose failed. Timeout occurred on thread. (%1)	sdclose failed. Timeout occurred on thread.	Check if the memory and/or the resource of OS are sufficient.
sdclose failed. Failed to dismount the partition specified by the resource. (%1)	sdclose failed to dismount the partition specified by the resource.	The partition may be being used. Check it.
sdclose failed. Failed to lock the partition specified by the resource. (%1)	sdclose failed to lock the partition specified by the resource.	The partition may be being used. Check it.
sdclose failed. Server does not exist in cluster configuration data. (%1))	sdclose failed. Server does not exist in cluster configuration data.	Check if the server exists in the cluster configuration.
sdclose failed. Resource does not exist in cluster configuration data. (%1)	sdclose failed. The resource does not exist in cluster configuration data.	Check if the resource exists in the cluster configuration.
sdclose failed. Cannot find the specified partition. (%1)	sdclose failed to find the specified partition.	Check if the specified partition is recognized by OS.

Section II　Resource details

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

- Chapter 6　Group resource details
- Chapter 7　Monitor resource details
- Chapter 8　Heartbeat resources
- Chapter 9　Details on network partition resolution resources
- Chapter 10 Other monitor settings

Chapter 6   Group resource details

This chapter provides information on group resources that constitute a failover group.
For overview of group resources, see Chapter 2, "Design a system configuration" in the *Installation and Configuration Guide*.

This chapter covers:

Group resources

Currently supported group resources are as follows:

Group resource name	Abbreviation	Functional overview
Application resources	appli	Refer to "Understanding application resources" on page 432.
Floating IP resources	fip	Refer to "Understanding floating IP resources" on page 439.
Mirror disk resources	md	Refer to "Understanding mirror disk resources" on page 447.
Registry synchronization resources	regsync	Refer to "Understanding registry synchronization resources" on page 463.
Script resources	script	Refer to "Understanding script resources" on page 470.
Disk resources	sd	Refer to "Understanding disk resources" on page 499.
Service resources	service	Refer to "Understanding service resources" on page 503.
Print spooler resources	spool	Refer to "Understanding print spooler resources" on page 509.
Virtual computer name resources	vcom	Refer to "Understanding virtual computer name resources" on page 513.
Virtual IP resources	vip	Refer to "Understanding virtual IP resources" on page 523.
CIFS resources	cifs	Refer to "Understanding CIFS resources" on page 535.
NAS resources	nas	Refer to "Understanding NAS resources" on page 541.
Hybrid disk resource	hd	Refer to "Understanding hybrid disk resources" on page 545.

What is a group?

A group is a unit to perform a failover. Up to 128 group resources can be registered for each group. Rules regarding to operations at failover (failover policies) can be set per group.

The properties that can be set on each group are described below:

Servers that can run the Group

Select and set the servers that can run the group from the servers that configure a cluster. Specify the order of priority to the servers that can run the group for running the group.

Startup Attribute

Sets the startup attribute of a group to the auto startup or manual startup.

In the case of the auto startup, when a cluster is started, a group is started up automatically on the server that has the highest priority among the servers that can run the group.

In the case of the manual startup, a group is not started even when a server is started up. After starting the server, start up the group manually by using the WebManager or the clpgrp command. For details on the WebManager, see Chapter 1, "Functions of the WebManager." For details on the clpgrp command, see Chapter 4, "ExpressCluster command reference."

Failover Exclusive Attribute

Sets the failover exclusive attribute of the group at failover. The following shows the failover exclusive attributes.

Off

Exclusion is not performed at failover. Failover is performed on the server of the highest priority among the servers that can fail over.

Normal

Exclusion is performed at failover. Failover is performed on the server on which the other normal exclusion groups are not started and which is given the highest priority among the servers that can run the group.

However, if the other normal exclusion groups have already been started on all servers that the failover can be performed, exclusion is not performed. Failover is performed on the server that is given the highest priority among the servers on which failover can be performed.

Absolute

Exclusion is performed at failover. Failover is performed on the server on which the other normal exclusion groups are not started and which is given the highest priority among the servers that can run the group.

However, failover is not performed if the other absolute exclusion groups have already been started on all servers on which failover can be performed.

Note:
Exclusion is not performed to the normal and absolute exclusion groups. Normal exclusion is performed only among the normal exclusion groups. Absolute exclusion is performed only among the absolute exclusion groups. In either case, exclusion is not performed with the no-exclusion group. For details on the failover exclusive attribute, see "Understanding failover policy."

- Failover Attribute

Set either auto failover or manual failover.

In the case of auto failover, failover is automatically performed when a heartbeat is timed out. In the case of manual failover, failover is not automatically performed when a heartbeat is timed out. In that case, perform failover manually by using the WebManager or the clpgrp command. For details on the WebManager, see Chapter 1, "Functions of the WebManager" and for the details of the clpgrp command, see Chapter 4, "ExpressCluster command reference."

Note:
Even if the failover attribute is set to the manual failover, the failover is performed automatically when the startup of a group failed or when a monitor resource detected an error. The failover is not performed automatically only when a heartbeat is timed out.

- Failback Attribute

Set either auto failback or manual failback.

In the case of the auto failback, failback will be automatically performed when the server that is given the highest priority is started after a failover.

In the case of the manual failback, a failback is not performed even if a server is started. Perform a failback manually by using the WebManager or executing the clpgrp command. For details on the WebManager, see Chapter 1, "Functions of the WebManager, for details on the clpgrp command, see Chapter 4, "ExpressCluster command reference."

A group that registers a mirror disk resource cannot configure the setting of auto failback.

- Logical Service

Set the logical service name.

The logical service is the character string that is used as an identifier when using an application which identifies a group by using the compatible API of ExpressCluster Ver8.0 or earlier.

Understanding failover policy

A failover policy is a rule that determines a server to be the failover destination from multiple servers, and it is defined by the properties of a group. When you configure the failover policy, avoid making certain servers more heavily loaded at a failover.

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

<Symbols and meaning>

Server status	Description
o	Normal (properly working as a cluster)
od	Suspended (not recovered as a cluster yet)
×	Stopped (cluster is stopped)

3-node configuration:

Group	Order of server priorities		
	1st priority server	2nd priority server	3rd priority server
A	server1	server3	server2
B	server2	server3	server1

2-node configuration:

Group	Order of server priorities	
	1st priority server	2nd priority server
A	server1	server2
B	server2	server1

It is assumed that the group startup attributes are set to auto startup and the failback attributes are set to manual failback for both Group A and B. It is also assumed that the servers are configured not to recover automatically from the status of being suspended. Whether to perform auto recovery from the suspended status is set ON/OFF of **Auto Return** on the **Auto Recovery** tab in **Cluster Properties**.

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

- For groups whose failover exclusive attributes are normal or full, the server which they start up or fail over is determined by the failover priority to the server. If a group has two or more servers of the same failover priority, it is determined by the order of numbers, the specific symbols and alphabets of the group name.

- The failover priority of the WebManager group is determined by the server priority. You can specify server priority on the **Master Server** tab in **Cluster Properties**.

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. Server1 cluster recovery
6. Cluster shutdown
7. Move Group A
8. Failure of server2:   Fails over to the next priority server.
9. Failure of server2:   Fails over to the next priority server.
10. Failure of server3:   Fails over to the next priority server
11. Failure of server2:   Fails over to the next priority server.
12. Failure of server2:   Fails over to the next priority server.

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

Server

```
X  <- Server 1
X  <- Server 2
X  <- Server 3
```

```
O  A
X
O  B
```
(8) Failure of server 2

```
X
X
O  AB
```
(9) Failure of server 2

```
X
O  AB
X
```
(10) Failure of server 3

```
O  B
X
O  A
```
(11) Failure of server 2

```
O  A
O  B
X
```
(12) Failure of server 3

```
X
X
X
```
(1) Cluster startup
(2) Cluster shutdown

```
O  A
O  B
O
```
(3) Failure of server 1

```
X
O  B
O  A
```
(4) Server 1 on

```
Od
O  B
O  A
```
(5) Server 1 recovery

```
O
O  B
O  A
```

(7) Move group A

(6) Cluster shutdown

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. Server1 cluster recovery
6. Cluster shutdown
7. Move group A
8. Failure of server2: Fails over to a server where a normal exclusive group is not active.
9. Failure of server2: Normal exclusive groups of all servers are active, but the server fails over to a server because there is a server that can start normal exclusive groups.
10. 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.
11. Failure of server2: Fails over to a server where a normal exclusive group is not active.
12. 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:

```
        Server
      ┌─────────┐
      │ X  <- Server 1
      │ X  <- Server 2
      │ X  <- Server 3
      └─────────┘
```

```
┌───────┐                                ┌───────┐        ┌───────┐          ┌───────┐   ┌───────┐
│ O  A  │   (8)Failure of                │ X     │        │ X     │          │ O  B  │   │ O  A  │
│ X     │   server 2                     │ X     │        │ O  B  │          │ X     │   │ O  B  │
│ O  B  │ ◄───────────┐                  │ O  A  │        │ X     │          │ O  A  │   │ X     │
└───────┘             │                  └───────┘        └───────┘          └───────┘   └───────┘
                      │                  (9) Failure of   (10) Failure of    (11) Failure of   (12) Failure of
                      │                  server 2         server 3           server 2          server 3
                      │
┌───────┐  (1)Cluster │  ┌───────┐        ┌───────┐         ┌───────┐          ┌───────┐
│ X     │  startup    │  │ O  A  │        │ X     │         │ Od    │          │ O     │
│ X     │ ──────────► │  │ O  B  │        │ O  B  │         │ O  B  │          │ O  B  │
│ X     │             │  │ O     │        │ O  A  │         │ O  A  │          │ O  A  │
└───────┘  ◄────────── └─(3) Failure of   └───────┘  (4)Server 1  └───────┘  (5)Server 1   └───────┘
           (2)Cluster     server 1                   on                      recovery
           shutdown
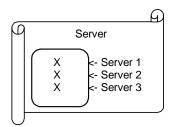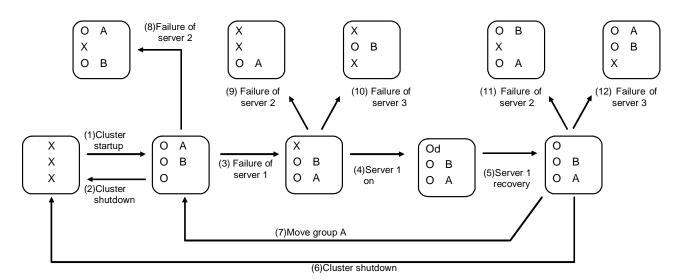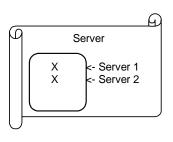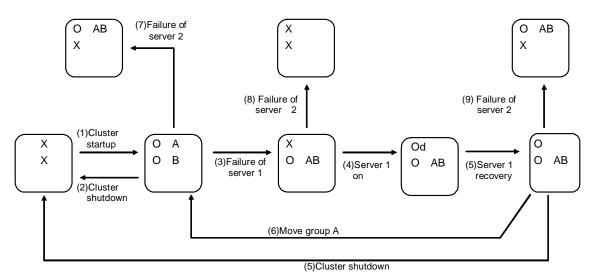
                               (7)Move group A

                               (6)Cluster shutdown
```

1. Cluster startup
2. Cluster shutdown
3. Failure of server1:   Fails over to the next priority server.
4. Server1 power on
5. Server1 cluster recovery
6. Cluster shutdown
7. Move group A
8. Failure of server2:   Fails over to the next priority server.
9. Failure of server2:   Does not failover (Group B stops).
10. Failure of server3:   Does not failover (Group A stops).
11. Failure of server2:   Fails over to the server where no full exclusive group is active.
12. 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. Server1 cluster recovery
6. Cluster shutdown
7. Move group A
8. Failure of server2:   Fails over to the standby server of Group B.
9. Failure of server2
10. 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:

◆ When an error in activation of group resources is detected:

- When an error in activation of group resources is detected, activation is retried.

- When activation retries fail as many times as the number set to **Retry Count at Activation Failure**, a failover to the server specified in **Failover destination** takes place.

- If the failover fails as many times as the number set to **Failover Threshold**, the action configured in **Final Action** is performed.

◆ When an error in deactivation of group resources is detected:

- When an error in deactivation of group resources is detected, deactivation is retried.

- When deactivation retries fail as many times as the number set to **Retry Count at Deactivation Failure**, the action configured in **Final Action** is performed.

Note:
Failovers are counted on a server basis. **Failover Threshold** is the maximum failover count on a server.

The failover count is reset in a server where the group activation succeeded and a certain time has passed.

The following describes how an error in activation of group resources is detected:

When the following settings are made:
    Retry Count at Activation Failure   3 times
    Failover Threshold   The same number as the number of severs
                                                          (In the following case, 2 times)
    Final Action   Stop Group

server1   server2

Failover Group A

Disk resource 1

Shared disk

Start activation processing of disk resource 1 (resource under failover group A).
(Execute mount processing of the file system and other processing)

server1   server2

Failover Group A

Disk resource 1

Activation failed

Shared disk

There is an error in activation processing of disk resource 1.
(mount error caused by disk path failure)

server1   server2

Failover Group A

Disk resource 1

Shared disk

Activation processing of disk resource 1 is retried up to 3 times.

"Activation retry count" indicates this retry count.

When retry count is exceeded

server1 server2	Start failover processing of failover group A.
Failover Group A	
Disk resource 1	First failover processing.
server1 server2	

Failover Group A	Start activation processing of disk resource 1. (Execute mount processing of the file system and other processing)
Disk resource 1	When an error is detected, activation processing of disk resource 1 is retried up to 3 times.
Shared disk	

When retry count of the resource activation is exceeded also on server 2.

server1 server2	Start failover processing of failover group.
Failover Group A	
Disk resource 1	Second failover processing.
Shared disk	

server1   server2

Failover
Group A

Disk
resource 1

Shared disk

Start activation processing
of disk resource 1.

When retry count of the resource
activation is exceeded also on server
1.

Do not execute failover processing
because failover threshold is 2.

server1   server2

Failover
Group A

Shared disk

Start group stop processing
of failover group A.

"Final action" is an action to
be taken after retry count of
failover is exceeded.

Section II Resource details

Final action

When activation fails even though the failover performed as many times as the number set to **Failover Threshold**, the action configured in **Final Action** is performed. The final action can be selected from the following operations.

- No Operation (Activate next resource)

Activates the group resource which depends on the group resource that an activation error is detected.

- No Operation (Not activate next resource)

Does not activate the group resource which depends on the group resource that an activation error is detected.

- Stop Group

Deactivates all resources in the group which the group resource that an activation error is detected belongs.

- Stop cluster service

Stops the ExpressCluster Server service of the server that an activation error is detected.

- Stop the cluster service and shutdown OS

Stops the ExpressCluster Server service of the server that an activation error is detected, and shuts down the OS.

- Stop cluster service and reboot OS

Stops the ExpressCluster Server service of the server that an activation error is detected, and reboots the OS.

- Generating of intentional Stop Error

Generate a stop error intentionally on the server that an activation error is detected.

Reboot count limit

If **Stop cluster service and shutdown OS** or **Stop cluster service and reboot OS** is selected as the final action to be taken when any error in activation or deactivation is detected, you can limit the number of shutdowns or reboots caused by detection of activation or deactivation errors.

This maximum reboot count is the upper limit of reboot count of each server.

Note:

The maximum reboot count is the upper limit of reboot count of a server because the number of reboots is recorded per server.

The number of reboots that are taken as a final action in detection of an error in group activation or deactivation and those by monitor resources are recorded separately.

If the time to reset the maximum reboot count is set to zero (0), the number of reboots will be unavailable, thus, shutdown/reboot is executed every time at detecting failure regardless of the maximum number of reboot.

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

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

If the ExpressCluster Server service is started successfully after rebooting OS, 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
    Failover Threshold   0
    Final Action   Stop cluster service and reboot OS
    Max Reboot Count   1
    Max Reboot Count Reset Time   10 minutes

server1   server2

Failover
Group A

Disk
resource 1

Start activation processing of disk resource 1 (resource under failover group A) (Execute mount processing of the file system and other processing)

Max reboot count   1
Current reboot count   0

Max reboot count   1
Current reboot count   0

Shared disk

server1   server2

Failover
Group A

Disk
resource 1

Activity
failed

There was an error during the activation processing of the disk resource 1.

Max reboot count   1
Current reboot count   0

Shared disk

Max reboot count   1
Current reboot count   0

server1   server2

Failover
Group

Cluster stop
and reboot

OS is rebooted after stopping the cluster.

Execute final action because "Retry Count at Activation Failure" and "Failover Threshold" are set to zero (0). 1 is recorded on the reboot count in server 1.

Max reboot count   1
Current reboot count   1

Shared disk

Max reboot count   1
Current reboot count   0

ExpressCluster X 2.1 for Windows Reference Guide

server1   server2

| Failover Group A |
| Disk resource 1 |

Start activation processing of disk resource 1 (resource under failover group A)

(Execute mount processing of the file system and other processing)

| Max reboot count | 1 |
| Current reboot count | 1 |

| Max reboot count | 1 |
| Current reboot count | 0 |

Shared disk

Resource activity is successful in server 2.
Reboot is completed in server 1.

server1   server2

| Failover Group A |
| Disk resource 1 |

Move the failover group A to server 1 by using the clpgrp command and the WebManager.

| Max reboot count | 1 |
| Current reboot count | 1 |

| Max reboot count | 1 |
| Current reboot count | 0 |

Shared disk

Section II Resource details

server1　　　　server2

Failover
Group A

Disk
resource 1

Start activation processing
of disk resource 1 (resource
under failover group A)
(Execute mount processing
of the file system and other
processing)

Max reboot count　　　1
Current reboot count　　1

Shared disk

Max reboot count　　　1
Current reboot count　　0

server1　　　　server2

Failover
Group A

Disk
resource 1

Activity
failed

There was an error during
the activation processing of
the disk resource 1.

Max reboot count　　　1
Current reboot count　　1

Shared disk

Max reboot count　　　1
Current reboot count　　0

server1　　　　server2

Failover
Group A

Disk
resource 1

Final action is not performed
because it has reached the
max reboot count.
The current reboot count is
not reset after 10 minutes.
The group has an activation
error.

Max reboot count　　　1
Current reboot count　　1

Shared disk

Max reboot count　　　1
Current reboot count　　0

Remove a disk error

```
                          server1        server2

                     ┌──────────────┐ ┌──────────┐
                     │  Failover    │ │          │      ┌────────────────────────┐
                     │  Group A     │ │          │      │ Reboot      after cluster │
                     │              │ │          │      │ shutdown   by  using  the │
                     │  Disk        │ │          │      │ clpstdn  command  or  the │
                     │  resource 1  │ │          │      │ WebManager.             │
                     └──────────────┘ └──────────┘      └────────────────────────┘

    ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐       ┌─┐    ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
      Max reboot count      1         │ │      Max reboot count      1
      Current reboot count  1         └─┘      Current reboot count  0
    └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                    Shared disk
```

Startup of Group A is successful

```
                          server1        server2

                     ┌──────────────┐ ┌──────────┐      ┌────────────────────────┐
                     │  Failover    │ │          │      │ Group A started up normally. │
                     │  Group A     │ │          │      │ The reboot count is reset │
                     │              │ │          │      │ after 10 minutes.       │
                     │  Disk        │ │          │      │                         │
                     │  resource 1  │ │          │      │ The final action is executed │
                     └──────────────┘ └──────────┘      │ when disk activation error is │
                                                        │ detected at next Group A │
                                                        │ startup.                │
                                                        └────────────────────────┘

    ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐       ┌─┐    ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
      Max reboot count      1         │ │      Max reboot count      1
      Current reboot count  0         └─┘      Current reboot count  0
    └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                    Shared disk
```

Resetting the reboot count

Run the clpregctrl command to reset the reboot count. For details on the clpregctrl command, see Chapter 4, "ExpressCluster command reference."

Displaying and changing the settings of group properties

You can display and change the settings of the group properties by using **Resources** tab of the Builder.

Renaming a group

SuspendResume **GroupStopRestart**

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

1. In the tree view in the left pane of the Builder, right-click the icon of the group that you want to change its comment, and then click **Properties**. The **Group Properties** dialog box is shown.
2. On the **Info** tab, the group name and comment are displayed. Enter a new comment.

Note:
You cannot change the group name on the **Info** tab. To change the group name, right-click the icon of the group as described in the step 1 above. Click **Rename Group** and enter a new name.

Displaying and changing the settings of servers that starts up the group

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**.

2. In the **Group Properties** dialog box, click **Startup Server** tab. In **Servers that can run the Group**, servers that can start the group and their priority are shown. In **Available Servers,** the servers that can be registered with **Servers that can run the Group** are shown.

3. Set the startup servers by following the procedures below:

Add   `SuspendResume`

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   `SuspendResume`

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   `SuspendResume`

Use these buttons to change the priority of the servers that can be started. Select a server whose priority you want to change from **Servers that can run the Group**. Click **Up** or **Down** to move the selected row upward or downward.

Note: When you configure a server groups, delete servers that do not belong to the server group from **Servers that can run the Group**. Add servers belonging to the server group to **Servers that can run the Group**. Pay extra attention when adding/deleting servers after creating a group or server group.

Displaying and changing the server group settings

When a group contains a hybrid disk resource, two server groups need to be configured so as to perform disk mirroring between servers.

1. In the tree view in the left pane of the Builder, right-click the icon of the group of which you want to display / change the settings, and click **Properties**. The **Group Properties** dialog box is displayed.

2. Server groups that can start groups are displayed in **Server Groups that can run the Group**. Server groups that can be registered in **Server Groups that can run the Group** are displayed in **Available server groups**.

3. Configure the settings of the server groups to be used by following the description below.

Add

Use this button to add a server group to **Server Groups that can run the Group**. Select a server group you want to add from **Available server groups** and click **Add**. The server group will be added to **Server Groups that can run the Group**.

Delete

Use this button to delete a server group from **Server Groups that can run the Group**. Select a server group you want to delete from **Servers that can run the Group** and click **Delete**. The server group will be added to **Available server group**.

Up and **Down**

Use these buttons to change the priority of the server groups. Select a server group whose priority you want to change from **Available server groups** and click **Up** or **Down**. The selected line will move.

ExpressCluster X 2.1 for Windows Reference Guide

Displaying and changing the group attribute

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**.

2. In the **Group Properties** dialog box, click the **Attribute** tab. Specify **Startup Attribute**, **Failover Exclusive Attribute**, **Failover Attribute**, and **Failback Attribute** of this group by following the procedures on the next page:

Startup Attribute   SuspendResume

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.

Failover Exclusive Attribute   SuspendResume

This attribute determines the server to which ExpressCluster automatically fails over. You can select from Off, Normal, and Absolute.

Failover Attribute   SuspendResume

Select if the failover is performed automatically when server fails.

Failback Attribute   SuspendResume

Select if the failback is performed automatically to the group when a server that has a higher priority than other server where the group is active is started. For groups that have mirror disk resources or hybrid disk resources, select manual failback.

For details on the group attribute, see "What is a group?."

Displaying and changing Logical Service

1. In the tree view in the left pane of the Builder, right-click the icon of the group of which you want to change the attribute, and click **Properties**. The **Group Properties** dialog box is displayed.

2. Click the **Logical Service** tab. Add a logical service to the **Logical Service**.

Add

Use this button to add a logical service to the **Logical Service**.

Up to 48 logical service names can be registered within the failover group. The same logical service name can be registered multiple times as long as it is registered with different failover groups.

Delete

Use this button to delete the selected logical service name from the **Logical Service**.

Edit

Use this button to display the **Entry of Logical Service Name** dialog box.

Logical Service Name   Within 31 bytes

Enter the Logical Service Name that you want to add within 31 bytes.

For details on the group attribute, see "What is a group?."

Displaying and changing the settings of group resources

You can display and change the settings of the group resources by using the **Resource Properties** in the Builder.

Renaming a group resource

SuspendResume   GroupStopRestart

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

1. In the tree view in the left pane of the Builder, click the icon of the group to which the group resource whose comment you want to change belongs. Group resources of the selected group will be listed on the table view in the right pane of the screen.

2. Right-click the name of the group resource whose comment you want to display or change, and click Resource Properties.

3. On the **Info** tab, the group resource name and comment are shown. Enter new comment (within 127 bytes).

Note:

You cannot change the group resource name on the **Info** tab. To change the group name, right-click the icon of the group resource as described in the step 1 above. Click **Rename Group** and enter new name.

Understanding the settings of dependency among group resources

By specifying dependency among group resources, you can specify the order of activating them.

◆ 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 **Dependency List** tab on the table view shown in the right pane of the Builder.

The following shows an example of the depth of dependency of resources that belong to a group.

Depth	Name	Dependent Resource Name	Type
0	fip1	none	
1	sd1	fip1	floating ip resource
2	appli1	fip1	floating ip resource
		sd1	disk resource

Activation order

fip1 → sd1 → appli1

Deactivation order

appli1 → sd1 → fip1

Displaying and configuring the settings of dependency among 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. In list of group resources shown in the table view in the right pane, right-click the group resource whose dependency settings you want to display and configure. Click **Properties**, and then click the **Dependency** tab.

3. Set the dependency as described below:

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

> Default dependency resource type is shown in **Dependent Resources**.
>
> Nothing is shown in **Available Resources**.

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

> Group resource names and types are shown in **Dependent Resources**.
>
> Group resources that can be added to **Dependent Resources** are listed in **Available Resources**. Group resources whose dependency is looped (that depend on depended group resource) are not shown. Group resources in **Dependent Resources** are not shown either.

Follow the default dependence SuspendResume GroupStopRestart

Select if the selected group resource follows the default ExpressCluster dependency.

◆ When Follow the default dependence is selected:
The selected group resource depends on the type(s) of resources.
See "Parameters list" in Chapter 2, "Functions of the Builder" for the default dependency of each resource.
When there is more than one resource of the same type, the selected group resource depends on all resources of that type.

◆ When Follow the default dependence is not selected:
   The selected group resource depends on the specified resource.

Add   SuspendResume   GroupStopRestart

It is used when adding the group resource selected in **Available Resources** to **Dependent Resources**.

Remove   SuspendResume   GroupStopRestart

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

You can display and change the operation settings of actions when a group resource error is detected (when group resources are active/inactive) by using the **Settings** tab of the Builder.

1. In the tree view shown in the left pane of the Builder, click the icon of the group to which the group resource you want to display or change whose behavior at the time when a group resource error 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 you want to view or set whose behavior at the time when a group resource error is detected. Click **Properties**, and then click the **Settings** tab.

3. Specify the behavior at the time when a group resource error is detected by following the procedures below:

◆ When an error in activation of the group resource is detected:
   When an error is detected while activating the group resource, try activating it again. When the activation retry count exceeds the number of times set in **Retry Count at Activation Failure**, failover to the server specified in the **Failover Target Server** 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)　SuspendResume

Enter how many times to retry activation when an activation error is detected. If you set this to zero (0), the activation will not be retried.

Failover Target Server　SuspendResume

Select a Failover Target Server for the failover that takes place after activation retries upon activation error detection have failed for the number of times specified in **Retry Count at Activation Failure**.

- Stable operation server
  The failover destination is the server where least resource errors have been detected.
  If two or more servers that meet the above condition exist, failover takes place by selecting one of them according to the failover policy of the group.

- Server with the highest priority
  Failover takes place according to the failover policy settings of the group.

Failover Threshold (0 to 99)　SuspendResume

Enter how many times to retry failover after activation retry fails as many times as the number of times set in **Retry Count at Activation Failure** when an error in activation is detected.

If you set this to zero (0), failover will not be executed.

- Set as many as the number of the servers
  Set the failover threshold count to the number of servers.

- Specify the count
  Specify any number for the failover threshold count.

Final Action   `SuspendResume`

Select an action to be taken when activation retry failed the number of times specified in **Activation Retry Threshold** and failover failed as many times as the number of times specified in **Failover Threshold** when an activation error is detected.

Select a final action from the following:

- No Operation (Activate next resource)

- No Operation (Not activate next resource)

- Stop Group

- Stop cluster service

- Stop cluster service and shutdown OS

- Stop cluster service and reboot OS

- Generating of intentional Stop Error

For details on the final action, see "Final action."

Execute Script before Final Action

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

- When selected:
  A script/command is run before executing final action. To configure the script/command setting, click **Settings**.

- When cleared:
  Any script/command is not run.

Retry Count at Deactivation Failure (0 to 99)   `SuspendResume`

Enter how many times to retry deactivation when an error in deactivation is detected.

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

Final Action   `SuspendResume`

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)

- No Operation (Not deactivate next resource)

- Stop cluster service and shutdown OS

- Stop cluster service and reboot OS

- Generating of intentional Stop Error

For details on the final action, see "Final action."

Note:
If you select **No Operation** 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.

Execute Script before Final Action

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

- · When selected:
  A script/command is run before executing final action. To configure the script/command setting, click **Settings**.

- · When cleared:
  Any script/command is not run.

Displaying and changing the script when a group resource activation/deactivation failure is detected

You can display and change the setting of a script which is run before executing final action when a group resource failure is detected (when group resources are active/inactive) by using the **Settings** tab of the Builder.

1. In the tree view shown in the left pane of the Builder, click the icon of the group to which the group resource you want to view or set whose behavior at the time when a group resource activation/deactivation failure is detected belongs.

2. The list of group resources will be shown in the table view on the right pane. Right-click the group resource which you want to display or set whose behavior at the time when a group resource error is detected. Click **Properties**, and then click the **Settings** tab.

3. Click **Settings** in **Recovery Operation at Activation Failure Detection** or **Recovery Operation at Deactivation Failure Detection** to display the **Edit Script** dialog box. Set the script/command to be run before executing final action.

User Application

Use an executable file (executable batch 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 you specify only the name of the executable file, you must configure the path with environment variable in advance. If there is any blank in the absolute path or the file name, put them in double quotation marks ("") as follows.

Example:

"C:\Program Files\script.bat"

If you want to execute VBScript, enter a command and VBScript file name as follows.

Example:

cscript script.vbs

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 batch file or execution file) when you select **User Application**.

View

Click here to display the script file with an editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

Edit

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

Replace

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

Timeout (0 to 99)

Specify the maximum time to wait for completion of script to be executed. The default value is set as 5.

Change

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

Standard Editor

Select here to use a standard editor (Notepad in Windows) as a script editor.

External Editor

Select here to specify an arbitrary script editor. Click **Browse** to specify the editor to be used.

Displaying the properties of the whole groups by using the WebManager

1. Startup WebManager (*http://FIP_address_for_the_WebManager_group:port_number* (the default value is 29003))

2. Click the object for the all groups ⬛ in the tree view. The following information is displayed in the list view.

Groups Name: Groups		
Group Name	Current Server	Status
ManagementGroup	server1	Online
failover1	server1	Online

Groups Name: Group name
Current Server: Server that the group is currently active
Status: Group status

Displaying the properties of a certain group by using the WebManager

1. Startup the WebManager (*http://FIP_address_for_the_WebManager_group:port_number* (the default value is 29003)).

2. Click the object for a certain group ⬛ in the tree view. The following information is displayed in the list view.

Group Name: failover 1		Details
Properties	Value	
Name	failover1	
Comment		
Status	Online	

Group Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Resource Status	
Resource Name	Status
appli1	Online
fip1	Online
md1	Online
regsync1	Online
spool1	Online
vcom1	Online

Name: Group name

Comment: Group comment
Status: Group status
Server Name: Server name
Status: Status of the group on the server
Resource Name: Resource name of the group

ExpressCluster X 2.1 for Windows Reference Guide

Status: Status of the resources of the group

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

Properties	Value
Type	cluster
Startup Attribute	Auto Startup
Failover Exclusive Attribute	No Exclusion
Failback Attribute	Manual Failback
Failover Attribute	Auto Failover
Servers that can run the Group	server1
	server2

Type: Group type
Startup Attribute: Startup type of the group (auto/manual)
Failover Exclusive Attribute: Startup exclusive attribute
Failback Attribute: Failback attribute of the group (auto/manual)
Failover Attribute: Failover attribute of the group (auto/manual)
Servers that can run the Group: Order of the servers that the group failover

Understanding server groups

This section provides information about server groups.

Server groups are groups of servers that are required when hybrid disk resources are used.

Upon using hybrid disk resources in a shared disk device, servers connected by the same shared disk device are configured as a server group.

Upon using hybrid disk resources in a non-shared disk, a single server is configured as a single server group.

Server group 1

The server which uses a hybrid disk resource on the shared disk (the server from which mirroring is performed, and the mirroring destination server) is a server in the server group.

This figure omits public-LAN.

Displaying / changing the server group settings

You can display and change the settings of the server group by using **Server Group Properties** of the Builder.

Renaming a server group (Server group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to rename, and then click **Rename Server Group**.

2. The **Change Server Group Name** dialog box is displayed. Enter a new name.

Displaying and changing the comment of a server group (Server group properties)

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to change its comment, and then click **Properties**. The **Server Group Properties** dialog box is shown.

2. On the **Info** tab, the server group name and comment are displayed. Enter or modify the comment within 127 bytes.

Note:

You cannot change the server group name on the **Info** tab. To change the group name, right-click the icon of the group as described in the step 1 above. Click **Rename Server Group** and enter a new name.

Displaying and changing the settings of servers belonging to a server group (Server group properties)

You can change the servers that belong to a server group.

1. In the tree view in the left pane of the Builder, right-click the icon of the server group that you want to display and change the settings, and then click **Properties**. The **Server Group Properties** dialog box is shown.

2. Click the **Server Group** tab.

3. In **Servers that can run the Group**, servers that can start the group and their order are shown. The smaller the number, the higher priority the server has. In **Available Servers**, the servers that can be registered with **Servers that can run the Group** are shown.

4. Configure the server group settings according to the following explanation.

Add

Use **Add** to add a server that can run the group. Select the server you want to add from **Available Servers** list and then click **Add**. The selected server is added to the **Servers that can run the Group**.

Remove

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

Up & **Down**

Use **Up** and **Down** to change the priority of a server that can run the group. Select the server whose priority you want to change, and then click **Up** or **Down**. The selected row moves accordingly.

Note: Make sure that the priority of the **Servers that can run the Group** consists with the failover policy of the failover group to which the resource using this server group belongs.

Displaying the server group properties with WebManager

1. Start WebManager.

2. In the tree view, click the object . The following will be displayed in the list view.

Server Groups	
ServerGroup Name	Server Name
server-group-1	server1
	server2
server-group-2	server2

Server group name   Server group name
Server name   Server names which belong to the server group

Understanding application resources

You can register applications managed by ExpressCluster and executed when a groups in ExpressCluster starts, stops, fails over or moves. It is also possible to register your own applications in application resources.

Dependency of application resources

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

Group resource type
Floating IP resource
Virtual IP resource
Virtual computer name resource
Disk resource
Mirror disk resource
Hybrid disk resource
Print spooler resource
Registry synchronization resource
CIFS resource
NAS resource

Application resources

Application resources are the programs that are executable from the command line by the files whose extension is exe, cmd, bad, or other.

Note on application resources

◆ An application to be run from application resources must be installed on all servers in failover and must have the same version.

Displaying and changing the application resource details

1. In the tree view shown on the left pane of the Builder, click the icon of the group to which the application resource whose detailed information you want to display or 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 the application resource that you want to display or change. Click **Properties**, and then click **Details** tab.

3. Display and/or change the settings by following the description below.

Resource Properties: Details tab

Resident Type `GroupStopRestart`

Specify the type of the application. Select one of the following:

- **Resident**
  Select this when the application resides in ExpressCluster.

- **Non-resident**
  Select this when the application does not reside (Process returns right after being executed) in ExpressCluster.

Start Path Within 1023 bytes `GroupStopRestart`

Specify the name of the file that can be run when the application resource is started.

Stop Path Within 1023 bytes

Specify the name of the file that can be run when the application resource is stopped. This cannot be set when the resident type is Resident.

Note:
For the Start Path and Stop Path, specify an absolute path to the executable file or the name of the executable file of which the path configured with environment variable is effective. Do not specify a relative path. If it is specified, starting up the application resource may fail.

Tuning

Use this button to display the **Application Resource Tuning Properties** dialog box. Configure the detailed settings for the application resources.

Application Resource Tuning Properties

Parameter tab

Detailed parameter settings are displayed on this tab.

Synchronous (Start)

This setting is not available for a resident application.

If the application is non-resident, select this to wait for the application to stop when it is run.

Asynchronous (Start)

This setting is not available for a resident application.

If the application is non-resident, select this so as not to wait for the application to stop when it is run.

Synchronous (Stop)

If the application is resident, select this to wait for the currently running application to stop.

If the application is non-resident, select this to wait for the application to stop when it is run.

Asynchronous (Stop)

If the application is resident, select this so as not to wait for the currently running application to stop.

If the application is non-resident, select this so as not to wait for the application to stop when it is run.

Timeout (Start) (0 to 9999) SuspendResume

This setting is not available for a resident application.

Configure the time-out value to wait (synchronous) for a non-resident application to stop when the application is run. A value can be entered only when **Synchronous** is selected. If the application does not stop within the time-out value set here, it is considered as an error.

Timeout (Stop) (0 to 9999) SuspendResume

Configure the time-out value to wait (synchronous) for currently running resident application(s) to stop or for a non-resident application to stop when the application is run.

The time-out value can be set only when **Synchronous** is selected. If the application does not stop within the time-out value set here, it is considered as an error.

Target VCOM Resource Name　`GroupStopRestart`

Select a virtual computer name used as a computer name for the application resource. Virtual computer names and resource names that exist in the failover group where the application resource belong to are listed.

Allow to Interact with the Desktop　`GroupStopRestart`

Specify whether to allow the application to be run to interact with desktop. If this is selected, the application screen is displayed on the desktop when the application starts running. This setting is not available when an Exec User is specified on the **Start** and **Stop** tabs.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Start and Stop tabs

A detailed setting for starting and stopping the application is displayed.

Current Directory　　Within 1023 bytes

Specify a directory for running the application.

Option Parameter　　Within 1023 bytes

Enter parameters to be entered for the application. If there are multiple parameters, delimit parameters with spaces. For a parameter that includes a space, enclose the parameter with double quotation marks.

Example: "param　1" param2

Window Size

Select the size of the window for running the application from the following:

· **Hide**

The application is not displayed.

· **Normal**

The application is displayed in a regular window size.

· **Maximize**

The application is displayed in a maximum window size.

· **Minimize**

The application is displayed in a minimum window size.

Exec User Domain `GroupStopRestart`

Specify the domain of a user account that runs the application.

In the case of **Stop** tab, it is unnecessary to stop and/or resume the group.

Exec User Account `GroupStopRestart`

Specify the user account that runs the application.

In the case of **Stop** tab, it is unnecessary to stop and/or resume the group.

Exec User Password `GroupStopRestart`

Specify the password for the user account that runs the application.

In the case of **Stop** tab, it is unnecessary to stop and/or resume the group.

Execute from the Command Prompt

Specify whether to run the application from the command prompt (cmd.exe). Specify this when running an application (such as JavaScript and VBScript) whose extension is other than exe, cmd, or bat.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Displaying the application 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 an object for an application resource in the tree view. The following information is displayed in the list view.

Application Name: appli1		Details
Properties	Value	
Name	appli1	
Comment		
Resident Type	Resident	
Start Path	C:\appli\appli1.exe	
Stop Path		
Status	Online	

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Name of the application resource
Comment:	Comment on the application resource
Resident Type:	Resident type of the application resource
Start Path:	Start path of the application
Stop Path:	Stop path of the application
Status:	Status of the application resource
Server Name:	Server name
Status:	Status of the application resource in the given server

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

Properties	Value
Type	appli
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	No Operation (Deactivate next resource)
Execute Script before Final Action	Off
Dependent Resources	
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Target VCOM Name	
[Start]Type	Synchronous
[Start]Timeout (seconds)	1800
[Start]Current Directory	
[Start]Option Parameter	
[Start]Window Size	Hide
[Start]Domain	
[Start]Account	
[Start]Allow To Interact With Desktop	Off
[Start]Execute From Command Prompt	Off
[Stop]Type	Synchronous
[Stop]Timeout (seconds)	1800
[Stop]Current Directory	
[Stop]Option Parameter	
[Stop]Window Size	Hide
[Stop]Domain	
[Stop]Account	
[Stop]Allow To Interact With Desktop	Off
[Stop]Execute From Command Prompt	Off

Type: Resource type
Failover Target Server: Determination method of Failover Target Server
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 at a deactivation error
Execute Script before Final Action: Whether or not script is executed upon deactivation failure
Dependent Resources: Dependent resources
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval
Target VCOM Name: VCOM name that the application uses
[Start]Type: Execution type of Start application
[Start] Timeout (Second):   Timeout for Start application
[Start]Current Directory: Directory for Start application
[Start]Option Parameter: Option parameter to be passed to Start application
[Start]Window Size: Window size of the Start application
[Start]Domain: Domain of the account that runs Start application
[Start]Account: Account that runs Start application
[Start]Allow to Interact with Desktop: Allow Start application to communicate with desktop
[Start]Execute from the Command Prompt: Run Start application from the command prompt
[Stop]Type: Execution type of Stop application
[Stop]Timeout(Second):   Timeout for Stop application
[Stop]Current Directory: Directory for Stop application
[Stop]Option Parameter: Option parameter to be passed to Stop application
[Stop]Window Size: Window size of the Stop application
[Stop]Domain: Domain of the account that runs application
[Stop]Account: Account that runs Stop application
[Stop]Allow to Interact with Desktop: Allow Stop application to communicate with desktop
[Stop]Execute from the Command Prompt: Run Stop application from the command prompt

Understanding floating IP resources

Dependencies of floating IP resources

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, you can assign global IP addresses such as Internet.

You can also allocate IPv6addresses to floating IP addresses.

Routing

You do not need to make settings for the routing table.

Conditions to use

Floating IP addresses are accessible to the following machines:

◆ Cluster server itself

◆ Other servers in the same cluster and the servers in other clusters

◆ Clients on the same LAN as the cluster server and clients on remote LANs

If the following conditions are satisfied, machines other than the above can also access floating IP addresses. However, connection is not guaranteed for all models or architectures of machines. Test the connection thoroughly by yourself before using those machines.

◆ TCP/IP is used for the communication protocol.

◆ ARP protocol is supported.

Even over LANs configured with switching hubs, floating IP address mechanism works properly. When a server goes down, the TCP/IP connection the server is accessing will be disconnected.

Notes on floating IP resources

If OS stalls with the floating IP address activated, the resource failover may fail when the following settings are made:

◆ Run ping .is On.

◆ **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

◆ 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.

◆ Specify "Off" to **Run ping**
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 **Run ping** is set to On and **Forced FIP Activation** is set to Off

* When **Run ping** is set to Off

* When **Run ping** is set to On and **Forced FIP Activation** is set to On

Notes on allocating floating IP addresses to IPv6 addresses

◆   IPv6 addresses should not be specified in Management Resources in Management Group.

◆   In the setting of virtual computer name resource, setting connection of floating IP resource assigned to IPv6 is invalid.

◆   When the floating IP address is set to perform to register in virtual computer name resource dynamically and it is selected to correspond to virtual computer name, the floating IPaddress cannot be allocated to IPv6 address.

◆   For Windows Server 2008, it is necessary to add the **Routing and Remote Access** service to each cluster server to enable the LAN routing. This is not required when the interconnect LAN with the highest priority is common to public LAN.

◆   When an IPv6 address is used as a virtual IP address in Windows Server 2003, it is necessary to specify public LAN as the interconnect with the highest priority.

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 Properties: Details tab

IP Address   GroupStopRestart

Enter the floating IP address to be used.

Follow the instruction below to enter an IPv6 address.

Example: fe80::1

With the default value of prefix length 64 bit, floating IP resource searches for the addresses that have matching prefix on the local computer and adds floating IP address to the matching index. When there is more than one matching address, address is added to the index that has the largest index value.

In order to specify the prefix length explicitly, specify the prefix length after the address.

Example: fe80::1/8

In order to specify the index explicitly, specify %index after the address.

Example: fe80::1%5

The example above shows how to add a floating IP address to the index5.

Tuning

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

Floating IP Resource Tuning Properties

Detailed settings on floating IP resource are displayed.

Run ping

Specify this to verify if there is any overlapped IP address before activating floating IP resource by using the ping command.

◆ When selected:

The ping command is used.

◆ When cleared:

The ping command is not used.

ping

These are the detailed settings of the ping command used to check if there is any overlapped IP address before activating floating IP resource.

◆ **Interval** (0 to 999) **SuspendResume**
Set the interval to issue the ping command in seconds.

◆ **Timeout** (1 to 999999) **SuspendResume**
Set time-out of the ping command in milliseconds.
Retry count (0 to 999) **SuspendResume**
Set retry count of the ping command.

◆ **Forced FIP Activation**
Specify whether to forcibly activate floating IP address when an overlapped IP address is detected by command check.

When selected:

Forced activation is performed.

When cleared:

Forced activation is not performed.

Initialize

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

Displaying the properties of floating IP resource with the WebManager

1. Start the WebManager. (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003.))

2. 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
Properties	Value	
Name	fip1	
Comment		
IP Address	10.0.0.12	
Status	Online	

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Floating IP resource name
Comment:	Comment
Status:	Status of floating IP resource
IP Address:	IP address used by floating IP resource
Server Name:	Server name
Status:	Status of floating IP resource of the server

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

Properties	Value
Type	fip
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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	No Operation (Deactivate next resource)
Execute Script before Final Action	Off
Dependent Resources	
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Ping Execute	On
Ping Timeout (milliseconds)	1000
Ping Retry Threshold	5
Ping Retry Interval (seconds)	1
FIP Force Activation	Off

Type:	Resource type
Failover Target Server	Determination method of Failover Target Server
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 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 at deactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Retry Interval at Activation Failure:	Activation retry interval
Retry Interval at Inactivation Failure:	Deactivation retry interval
Ping Execute:	Ping to verify redundancy
Ping Timeout(Second):	Timeout of ping to confirm redundancy (in milliseconds)
Ping Retry Threshold:	Ping retry threshold count
Ping Retry Interval(Second):	Ping retry interval
FIP Force Activation:	Forced floating IP activation

Understanding mirror disk resources

Dependencies of mirror disk resources

By default, this function does not depend on any group resource type.

Mirror disk

Mirror disks are a pair of disks that mirror disk data between two servers in a cluster.

Mirroring is performed by partition. It requires the RAW partition (cluster partition) to record the management data as well as the data partition that is to be mirrored. In addition, the license of ExpressCluster X Replicator 2.0/2.1 for Windows is necessary on both servers that mirroring is performed.

The specifications of the disks need to be the same on both servers in order to use them as mirror disks.

Examples:

◆ Disk type and geometry

The size of the data partitions has to be completely the same by byte on both servers. If the disk size and geometry are different on each server, it may be unable to create partitions that are exactly the same size. Thus the geometry of disks which are used to secure data partitions needs to be the same on both servers.
It is recommended to use disks of the same model on both servers.
Example:

Combination	server1	server2
Correct	SCSI	SCSI
Correct	IDE	IDE
Incorrect	IDE	SCSI

Combination		Head	Sector	Cylinder
Correct	server1	240	63	15881
	server2	240	63	15881
Incorrect	server1	240	63	15881
	server2	120	63	31762

If it is not possible to make both servers have exactly the same disk type and geometry, check the size of data partitions in precise by using the clpvolsz command. If the disk size does not match, shrink the larger partiotin by using the clpvolsz command again.

For more information about the clpvolsz command, see "Chapter 4 ExpressCluster command reference."

◆ Drive letter of partition

Configure the same drive letter for a data partition and cluster partition on both servers.

Example: Adding a SCSI disk to both servers to create a pair of mirroring disks.

Example: Using available area of the IDE disk on which OS of both servers are stored to create a pair of mirroring disks.

A mirror partition (cluster partition, data partition) can be allocated on the same disk as OS.

When the maintainability at occurrence of failure is important:
It is recommended to have another disk for a mirror than a disk for OS in advance.

When a logical disk cannot be added because of the limitations of the hardware RAID specifications:
When it is difficult to change the configuration of a logical disk since hardware RAID is pre-installed:
A mirror partition (cluster partition, data partition) can be allocated on the same disk as OS.

◆ Disk allocation

One mirror disk resource can perform mirroring to only one partition. However, multiple partitions can be mirrored by creating multiple mirror disk resources.

It is possible to create multiple mirroring resources by allocating multiple data partitions and cluster partitions on a single disk.

Example: Adding one SCSI disk to both servers to create two pairs of mirroring disks.

- Allocate a cluster partition and two data partitions in a pair on a single disk.

- Assign 0 and 1 for the offset index of the cluster partition management area to be used in each data partition.

Example: Adding two SCSI disks for both servers to create two mirroring partitions.

- Secure a cluster partition and data partition on the first disk and a data partition on the second disk.

- Routing and Remote AccessAssign 0 and 1 for the offset index of the cluster partition management area to be used in each data partition.

- A cluster partition can be secured on each disk. In that case, the offset index is assigned to be 0 and 0.

- When performing mirroring in the asynchronous mode, an access to a cluster partition is generated in accordance with writing in a data partition. The access to a disk can be distributed by securing a cluster partition and data partition on separate disks.

Data partition

Partitions where data that is mirrored by ExpressCluster (such as application data) is stored are referred to as data partitions. Allocate data partitions as follows:

◆ Data partition size

There is no limitation for partition size. Allocate any size of partition. However, if the size is too large when copying completely at the time of initial construction and/or changing disks, the maintainability is deteriorated. This is because the larger the size is, the more it takes time to copy completely. Thus, it is recommended to set the size of the data partition 100GB or less in total.

◆ File system
Format the partition with NTFS. FAT/FAT32 is not supported.

◆ Allocate the partition on a basic disk. The dynamic disk is not supported.

◆ When making data partitions as logistical partitions on the extended partition, make sure the data partitions are logical partition on both servers. The actual size may be different even the same size is specified on both basic partition and logical partition

◆ The access to the data partition is controlled by ExpressCluster.

Cluster partition

Dedicated partitions used in ExpressCluster for mirror partition controlling are referred to as cluster partition.

Allocate cluster partitions as follows:

◆ Cluster partition size
17 MB or more. Depending on the geometry, the size may be larger than 17 MB, but that is not a problem.

◆ A cluster partition and data partition for data mirroring should be allocated in a pair.

◆ You do not need to make the file system on cluster partitions. Do not format.

◆ The access to a cluster partition is limited.

Access control of a data partition

The data partition to be mirrored by a mirror disk resource can be accessed only from the active server where a mirror disk resource is activated.

◆ ExpressCluster is responsible for the access control of the file system. Application's accessibility to a data partition is the same as switching partition (disk resources) that uses shared disks.

◆ Mirror partition switching is done for each failover group according to the failover policy.

◆ By storing data required for applications on data partitions, the data can be automatically used after failing over or moving failover group.

Understanding mirror parameters

The maximum size of request queues

Configure the size of queues which is used for the mirror disk driver to queue I/O requests on the communication among servers. If you select a larger value, the performance will improve but more memory will be required. If you select a smaller value, less memory will be used but the performance may be lowered.

Note the following when setting the number of queues:

◆ The improvement in the performance is expected when you set a larger value under the following conditions:

  • Large amount of physical memory is installed on the server and there is plenty of available memory.

  • The performance of the disk I/O is high.

◆ It is recommended to select a smaller value under the conditions:

  • Small amount of physical memory is installed on the server.

  • I/O performance of the disk is low.

Mirror Connect Timeout

This is the time required to cut a mirror connect when there is no response on the communication among servers and/or when the data synchronization has not completed at the time of mirror recovery and/or data synchronization. The time for time-out needs to be configured longer, if the line speed of the mirror connect is slow and/or the load to the mirror disk is high.

Initial Mirror Construction

Specify if initial mirroring is configured when activating cluster for the first time after the cluster is created.

◆ Execute the initial mirror construction

  An initial mirroring is configured (disk images of the data partition are fully copied) when activating cluster for the first time after the cluster is created.

◆ Do not execute initial mirror construction

  Assume that data in the data partition has already matched among servers and do not configure initial mirroring at initial startup after constructing a cluster. When constructing a cluster, it is necessary to make the disk image of the data partition (physical data) identical without using ExpressCluster.

Mode

Switch the synchronization mode of mirroring.

Mode	Overview	Explanation
Synchronous	Complete match of the data in the active and standby servers is guaranteed.	Writing the data to the mirrored disk is finished when writing the data to both local and remote disks is finished.
Asynchronous	The order to write in the updated data is guaranteed. However, the latest updated data may be lost, if a failover is performed in the state that a mirror disk resource cannot be deactivated as servers are down.	Writing the data to the mirrored disk is finished when writing the data to the local disk is finished. The data is transferred to the remote disk after writing request is queued and performed on the background. After queuing is kept in the kernel space memory, it is transferred to the user space memory. When the volume of data reaches a limit that the user space memory can keep, the data is sent out to a temporary file and kept there.

Kernel Queue Size

Specify the size of the request for writing to the remote disk to be kept in the kernel space memory when the mode is set to "Asynchronous." Normally, default value is specified.

Input and output are completed, if writing data can be saved in the kernel queue.

If taking data into the application queue is delayed as the load on CPU is high, the size is set larger. However, if the size is too large, it will result in compressing the system resource.

Application Queue Size

Specify the size of the request for writing to the remote disk to be kept in the user space memory when the mode is set to "Asynchronous." Normally, the default value is used. However, if a high-speed network is used, the frequency of creating a temporary file can be reduced and the overhead caused by input and output can be decreased by making the queue size larger.

Upper Bound of Communication Band

When the mode is" asynchronous", the server tries to transfer data that has been queued to the standby server. When the channel for mirror connection is used for connections for other applications, the communication band may become busy. In this case, by setting the bound of communication band for the mirror connect communication, the impact on other communications can be reduced. If the communication band for mirror connect is smaller than the average amount of data to be written into the mirror disk, the queued data cannot be fully transferred to the standby server, which can result in overflow and suspension of mirroring. The bandwidth should be large enough for data to be written into the business application.

This function makes a limit to the communication band by having a maximum of one-second pause when the total amount of data to be transferred per second exceeds the configured value. If the size of data to be written into the disk at a time is greater than the configured value, expected performance may not be achieved. For example, even if you set the value of communication band limit to be 64Kbyte or smaller, the actual amount of communication during copy can be greater than the configured value because the size of data to be transferred for a copy of a mirror disk at a time is 64 Kbyte.

History Files Store Folder

Specify the folder that keeps the temporary file which is created when the request for writing to the remote disk in the "Asynchronous" mode cannot be recorded in the application queue. When the communication band runs short, data is recorded up to the limit of the disk space if the limit of the history file size is not specified. Thus, specifying a folder on the system disk runs out of the empty space and the system behavior may become unstable. Therefore, if you want to suspend mirroring when recording data is exceeded a certain size, create a dedicated partition or specify the limit of the history file size. Do not specify any folder on the cluster partition and data partition to the history files store folder.

Thread Timeout

This is the time that time-out is occurred when data cannot be transferred to the application queue from the kernel queue in the mode of "Asynchronous." When it is timed out, a mirror connect is cut.

Timeout may occur, if the data transfer to the application queue is delayed due to high load. In this case, increase the timeout value.

Examples of mirror disk construction

◆ Execute the initial mirror construction

If you can prepare the application data which will be duplicated before cluster construction, it should be crated in the data partition of the primary mirror disk in advance. (ex. the initial data of a database)

◆ Do not execute the initial mirror construction

Follow the procedures below to have identical data in the data partition on both servers:

1. If application data to be duplicated can be prepared before configuring a cluster, create it on data partition of the mirror disk on the active server in advance (ex. initial data of the database).

2. Install ExpressCluster and configure a cluster without executing the initial mirror construction.

3. Shut down the cluster.

4. Remove disks that have data partitions on both servers, and connect to the Linux server. Then copy the data in the data partition on the active server to the data partition on the standby server by using the dd command in the state that disks are not mounted.

5. Return disks to the active and standby server and start both servers.

Note on mirror disk resources

Set both servers so that the identical partitions can be accessed under the identical drive letter. If a drive letter different from those used on partition is set, the drive letter will be changed when the mirror disk resource is started. If the drive letter is used on any other partitions, starting up the mirror disk resource will fail.

Displaying and changing the details of mirror disk resources

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the mirror disk resource whose detailed information and settings you want to display and/or change belongs.
2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired mirror disk resource name, and click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

Mirror Disk Resource: Details tab

Mirror Disk Number   `SuspendResume`   `GroupStopRestart`

Select the number to be allocated to the mirror partition.

Data Partition Driver Letter (up two 1023 bytes)   `SuspendResume`   `GroupStopRestart`

Specify the drive letter of the data partition.

Cluster Partition Drover Letter (up to 1023 bytes)   `SuspendResume`   `GroupStopRestart`

Specify the drive letter to the cluster partition.

Cluster Partition Offset Index   `SuspendResume`   `GroupStopRestart`

Select an index number for the area used in the cluster partition. When using the multiple mirror disks, assign different numbers for each mirror disk so that the areas to be used in the cluster partition are not overlapped.

Add `ShutdownReboot`

Click this button to add the selected server to **Servers that can run the group**. When this button is clicked, the dialog box that allows for selection of a partition of the selected server is displayed.

◆ **Data Partition**
   Select a partition to be used as a data partition from the list. The GUID of the selected data partition is displayed.

◆ **Cluster Partition**
   Select a partition to be used as a cluster partition from the list. The GUID of the selected cluster partition is displayed.

◆ **Connect**
   Use this button to connect to the server and obtain the list of partitions.

Important:
Specify different partitions for data partition and cluster partition. If the same partition is specified, data on the mirror disk may be corrupted. Make sure not to specify the partition on the shared disk for the data partition and cluster partition.

Delete `ShutdownReboot`

Use this button to delete a server from **Servers that can run the group**.

Edit `SuspendResume`   `GroupStopRestart`

Use this button to display the dialog box to select the partition of the selected server.

Tuning

Opens the **Mirror Disk Resource Tuning Properties** dialog box. You make detailed settings for the mirror disk resource there.

Tuning mirror disk resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the mirror disk resource whose detailed information and settings you want to display and/or change belongs.

2. The group resource list is displayed on the table view in the right pane of the window. Right-click the desired mirror disk resource name, click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.

3. On the **Details** tab, click **Tuning** to display the **Mirror Disk Resource Tuning Properties** dialog box. Display and/or change the detailed settings as described below.

Mirror tab

The advanced settings of mirror are displayed.

Execute the initial mirror construction SuspendResume GroupStopRestart

Specify whether to execute an initial mirror construction (full copy of data partition) when configuring a cluster.

◆ When selected
Execute an initial mirror construction. In general, specify this.

◆ When cleared
Handle as it is configured without executing an initial mirror construction. Specify this if the data partition contents are already the same and full copying is not required.

Mirror Connect Timeout (2 to 999) SuspendResume GroupStopRestart

Specify the time-out for mirror connect.

Request Queue Maximum Size (512 to 65535) SuspendResume GroupStopRestart

Specify the size of queue that a mirror disk driver uses to queue I/O requests on the communication among servers.

Mode `SuspendResume` `GroupStopRestart`

Switch the mode of the mirror data synchronization.

◆ Synchronous
Write in the local disk and remote disk simultaneously to queue the completion.

◆ Asynchronous
After writing in the local disk, write in the remote disk. Queue for the completion of writing in the local disk.

Kernel Queue Size (512 to 65535) `SuspendResume` `GroupStopRestart`

Specify the queue size of the kernel space to save the I/O data of the asynchronous mirror temporarily.

Application Queue Size (512 to 65535) `SuspendResume` `GroupStopRestart`

Specify the queue size of the user space to save the I/O data of the asynchronous mirror temporarily.

Thread Timeout (2 to 999) `SuspendResume` `GroupStopRestart`

Specify the time-out when it becomes unable to transfer from the kernel queue to the application queue.

Upper Bound of Communication Band (0 to 999999999) `SuspendResume` `GroupStopRestart`

Set the upper limit of communication band in Mirror Connect

History Files Store Folder Within 256 bytes `SuspendResume` `GroupStopRestart`

Specify the destination folder to store the file when I/O data is overflowed form the application queue. It is required to specify a folder that has sufficient free space so that the remote disk and the asynchronous I/O data can be kept as a file.

Do not specify any folder in the cluster partition and data partition to the history files store folder. Additionally do not specify a folder that contains two byte characters in the path.

Max. size of history files size (0 to 999999999) `SuspendResume` `GroupStopRestart`

Set the size limit of temporary files stored in the history file store folder. If the upper limit of size is specified, mirroring will stop when it reaches the limit. The configured value is only applied to the limit of the temporary file size for the mirror disk resources and not applied to the amount of the temporary files in the folder.

Initialize

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

Displaying the mirror disk 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 an object for a mirror disk resource in the tree view. The following information is displayed in the list view.

Mirror Disk Name: md1	Details
Properties	**Value**
Name	md1
Comment	
Mirror Disk Number	1
Drive Letter	F:
Status	Online

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Mirror disk resource name

Comment: Mirror disk resource comment
Mirror Disk No.:   Mirror disk number allocated to the mirror partition
Drive Letter: Drive letters of the data partition
Status: Status of the mirror disk resource

Server Name: Server name
Status: Status of the mirror disk resource in the given server

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

Properties	Value
Type	md
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Retry Count at Activation Failure	0
Final Action at Activation Failure	No Operation (Not activate next resource)
Execute Script before Final Action	Off
Retry Count at Deactivation Failure	0
Final Action at Deactivation Failure	No Operation (Deactivate next resource)
Execute Script before Final Action	Off
Dependent Resources	
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Cluster Partition - Drive Letter	E:
Cluster Partition - Offset Index	0
Initial Mirror Construction	On
Mode	Synchronous
Max. Number of Request Queues(KB)	2048
Mirror Connect Timeout(sec)	20
Asynchronous - History Files Store Folder	
Asynchronous - Kernel Queue Size(KB)	2048
Asynchronous - Application Queue Size(KB)	2048
Asynchronous - Thread Timeout(sec)	30
Asynchronous - Max. Size of History File(MB)	Unlimited
Asynchronous - Upper Bound of Communication Band(KB/sec)	Unlimited

Type: Resource type

Failover Target Server   Determination method of Failover Target Server

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 at deactivation error

Execute Script before Final Action: Whether or not script is executed upon deactivation failure

Dependent Resources: Dependent resource

Retry Interval at Activation Failure   Interval to perform activation retry when an activation Error is detected

Retry Interval at Inactivation Failure   Interval to perform inactivation retry when an activation error is detected.

Cluster Partition
   Cluster Partition Drive Letter: Drive letters of the cluster partition
   Cluster Partition Offset Index: Index number for the area to be used for cluster partition

Initial mirror construction: Whether to execute an initial mirror construction when configuring a cluster

Mode: Synchronization mode of the mirror data

Request Queue Maximum Size (KB):   Size of queue for the mirror disk drive to queue I/O requests on the communication among servers.

Mirror Connect Timeout (Second):   Time until mirror connect is cut when there is no response on the communication among servers and the data synchronization has not completed at the time of mirror recovery and data synchronization.

Asynchronous:

History Files Store Folder:	Folder to keep the writing requests to the remote disk in files
Kernel Queue Size (KB):	Size to keep the writing request to the remote disk in the kernel space memory
Application Queue Size (KB):	Size to keep the writing request to the remote disk in the user space memory
Thread Timeout:	Timeout when it became unable to transfer data form the kernel queue to the application queue
Max. size of history file size (MB):	Upper limit of amount of files stored in history files store folder.
Upper Bound of Communication Band (KB/sec.):	
	Upper limit of communication band on Mirror Connect.

Understanding registry synchronization resources

Dependencies of registry synchronization resources

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource
Virtual computer name resource
Disk resource
Mirror disk resource
Hybrid disk resource
Print spooler resource

Registry synchronization resources

Registry keys to be synchronized at failover can be configured. When the content in a registry key set as synchronization target is updated while registry synchronization resource is active, the updated content is reflected to the registry of the Failover Target Server.

The following describes how a registry synchronization resource synchronizes registry:

3. When there is a registry synchronization resource in a failover group, update of a registry key that has been configured is monitored when the registry synchronization resource is activated.

4. When the registry key update is detected, what is in the registry key is saved as a file in the local disk. Then the file is delivered to each Failover Target Server.

5. The servers that received the file keep it in their local disks. If a failover occurs and registry synchronization resource is activated in a server that received the file, the content of the file is restored in the corresponding registry key.

Notes on registry synchronization resources

◆ Do not open synchronization target registry keys in the standby server.

  · If a synchronization target registry key is opened when a failover occurs, restoration of the registry will fail. To start and stop applications that use the synchronization target registry key, use a script resource within a control of ExpressCluster.

◆ Minimize the number of synchronization target registry keys. Do not set more than needed. It is not recommended to set a registry key that is frequently updated as a synchronization target registry key.

  · Saving in a file and delivering the file to other servers is done every time a synchronization target registry key is updated. The number of synchronization target registry keys and frequency of updating them can affect the system performance.

◆ For the synchronization target registry keys, the following can be set. The registry keys other than those listed below cannot be synchronized.

  · Any key under the HKEY_USERS

  · Any key under the HKEY_LOCAL_MACHINE

  Do not set the following keys.

  · Keys under the HKEY_LOCAL_MACHINE/SOFTWARE/NEC/ExpressCluster

  · HKEY_LOCAL_MACHINE/SOFTWARE/NEC

  · HKEY_LOCAL_MACHINE/SOFTWARE

  · HKEY_LOCAL_MACHINE

  Do not set the keys that are in parent-child relationship within the same resource.

◆ Up to 16 synchronization target registry keys can be set per resource.

◆ The following restrictions apply to names of the synchronization target registry keys:

  · The characters that can be used for registry key are determined by the OS specifications.

  · Up to 259 bytes can be used. Do not set the key name of 260 or larger bytes.

Displaying and changing the details of registry synchronization resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the registry synchronization 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 registry synchronization name, click **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Display and/or change the detailed settings on the **Details** tab as described below.

Add SuspendResume   GroupStopRestart

Use this button to add a registry key to monitor. The **Entry of registry key** dialog box is displayed.

ExpressCluster X 2.1 for Windows Reference Guide

Enter registry key

Registry

Registry Key [▼]

OK   Cancel

Registry Key

Enter a registry key to synchronize and click **OK**.

Delete SuspendResume   GroupStopRestart

Click this button to delete a registry key from synchronization target listed in **Registry List**.

Edit SuspendResume   GroupStopRestart

The **Entry of registry key** dialog box is displayed. The selected registry keys are listed in **Registry List**. Edit a registry key and click **OK**.

Tuning registry synchronization resource

1. From the tree view displayed in the left pane of the window, click the icon of the group to which the registry synchronization 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 registry synchronization resource name, select **Properties** on the shortcut menu. In the properties dialog box, click the **Details** tab.
3. Clicking **Tuning** on the **Details** tab displays the **VxVM Volume Resource** dialog box. Display and/or change the detailed settings as described below.

Registry Synchronization Resource Tuning Properties

Parameter tab

The detailed setting for registry synchronization resource is displayed.

Delivery Interval   (1 to 99)   SuspendResume

Specify the interval to deliver the updated registry key information to other servers.

◆ When short-time interval is set

　· Updated information is immediately delivered to other servers.

　· The system may get heavily loaded by frequently updating a registry key.

◆ When long-time interval is set

　· A delay in delivering updated information to other servers may occur. If a failover occurs before delivery of the updated information is not completed, it will not be delivered to the Failover Target Server.

　· Increase in system load due to synchronization can be reduced when a registry key is frequently updated.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Displaying the registry synchronization 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 an object for registry synchronization resource in the tree view. The following information is displayed in the list view.

Registry Synchronization Name: regsync1	Details
Properties	**Value**
Name	regsync1
Comment	
Registry Key	HKEY_LOCAL_MACHINE\SOF...
Status	Online

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name:	Registry synchronization resource name
Comment:	Registry synchronization comment
Registry Key:	Registry key to be synchronized
Status:	Status of the registry synchronization resource
Server Name:	Server name
Status:	Status of registry synchronization resource on the given server

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

Properties	Value
Type	regsync
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	fip1,md1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5

Type:	Resource type
Failover Target Server	Determination method of Failover Target Server
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 at an deactivation error
Execute Script before Final Action: Whether or not script is executed upon deactivation failure
Dependent Resources: Dependent resource
Retry Interval at Activation Failure: Retry interval when activation failure is detected
Retry Interval at Inactivation Failure: Retry interval when deactivation failure is detected

Understanding script resources

You can register scripts managed by ExpressCluster and run when starting, stopping, failing over, or moving a group in ExpressCluster. It is also possible to register your own scripts for script resources.

Note:

The same version of the application to be run from script resources must be installed on all servers in failover policy.

Dependencies of script resources

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource
Virtual computer name resource
Disk resource
Mirror disk resource
Hybrid disk resource
Print spooler resource
Registry synchronization resource
CIFS resource
NAS resource

Scripts in script resources

Types of scripts

Start script and stop script are provided in script resources. ExpressCluster runs a script for each script 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 script of script resource

When ExpressCluster runs a script, it records information such as the condition when the script is run (script starting factor) in environment variables.

You can use the environment variables on the table below as branching condition to write code for your system operation.

The environment variable of a stop script returns the content of the start script that was run immediately before as a value. Start script does not set environment variables of CLP_FACTOR and CLP_PID.

The environment variable of 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/ARMLOAD command error.
	FAILOVER	The script was run on the Failover Target Server: - by the server's failing; - due to the detection of a monitor resource/ARMLOAD command error; or - because activation of group resources failed.
	RECOVER	The server is recovered. The script is started/restarted due to detection of a monitor resource/ARMLOAD command error

Environment Variable	Value of environment variable	Meaning
CLP_FACTOR …group stopping factor	CLUSTERSHUTDOWN	The group was stopped by stopping the cluster.
	SERVERSHUTDOWN	The group was stopped by stopping the server.
	GROUPSTOP	The group was stopped by stopping the group.
	GROUPMOVE	The group was moved by moving the group.
	GROUPFAILOVER	The group failed over because an error was detected in monitor resource; or the group failed over because of activation failure in group resources.
	GROUPRESTART	The group was restarted because an error was detected in monitor resource.
	RESOURCERESTART	The group resource was restarted because an error was detected in monitor resource.
CLP_LASTACTION …process after cluster shutdown	REBOOT	In case of rebooting OS
	HALT	In case of halting OS
	NONE	No action was taken.
CLP_SERVER …server where the script was run	HOME	The script was run on the primary server of the group.
	OTHER	The script was run on a server other than the primary server of the group.
CLP_DISK …partition connection information on shared or mirror disks	SUCCESS	There was no partition with connection failure.
	FAILURE	There was one or more partition with connection failure.
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 name of the group to which the script belongs.
CLP_RESOURCENAME …Resource name	Resource name	Represents the name of the resource to which the script belongs.
CLP_PID …Process ID	Process ID	Represents the process ID of the start script when the properties of the start script are set to asynchronous. This environment variable is null when the start script is set to synchronous.

Execution timing of script resource scripts

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, a 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	First priority server	Second 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.

← Server 1

← Server 2

Cluster status transition diagram

This diagram illustrates a typical status transition of cluster.

Numbers (1) to (13) in the diagram correspond to descriptions as follows.

(1) Normal startup

Normal startup here refers to 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. bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	START
		CLP_SERVER	HOME
B	(1)	CLP_EVENT	START
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	START
		CLP_SERVER	HOME

(2) Normal shutdown

Normal shutdown here refers to a cluster shutdown immediately after the start script corresponding to a stop script was run by performing normal startup or by moving a group (online failback).

Environment variables for Stop. bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	START
		CLP_SERVER	HOME
B	(1)	CLP_EVENT	START
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	START
		CLP_SERVER	HOME

(3) Failover at the failed server1

The start script of a group that has server1 as its primary server will be run on a lower priority server (server2) if 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.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	HOME

ExpressCluster X 2.1 for Windows Reference Guide

(4) Recovering server1 to cluster

When server1 that has been rebooted (operating as non-cluster) returns to a cluster, the start script of the failover group that was running when a failover occurred is run in server1. This means recovery is executed in the server where the failover has occurred.

To execute a recovery (for example, recovering database information in a local disk), you need to write CLP_EVENT(=RECOVER) as a branching condition. Even if recovery is not required, you need to write the script not to start the operation.

For data mirroring operation, data is restored (reconfiguration of mirror set) at cluster recovery.

Environment variables for Start.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	RECOVER
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	RECOVER
		CLP_SERVER	HOME

(5) Cluster shutdown after failover of server1

The stop scripts of the Group A and C are run on server2 to which the groups failed over (the stop script of Group B is run by a normal shutdown).

Environment variables for Stop. bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER
B	(1)	CLP_EVENT	START
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER

(6) Moving of Group A and C

After the stop scripts of Group A and C are run on server2 to which the groups failed over, their start scripts are run on server1.

Environment variables for Stop.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	FAILOVER [1]
		CLP_SERVER	OTHER
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER

Environment variables for Start. bat

Group		Environment variable	Value
A	(2)	CLP_EVENT	START
		CLP_SERVER	HOME
C	(2)	CLP_EVENT	START
		CLP_SERVER	HOME

---

[1] Environment variables in a stop script take those in the previous start script.
For moving in "(6) 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 "(6) Moving of Group A and C", the environment variable is START.

(7) server1 startup (Auto recovery mode)

Auto recovery of server1 is executed. The start script of the failover group operated when a failover occurred is run in server1. This means, recovery is executed in the server where the failover occurred. Note what is stated in "(4) **Recovering server1 to cluster**." For data mirroring operation, data is restored (reconfiguration of mirror set) at cluster recovery.

Environment variables for Start.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	RECOVER
		CLP_SERVER	HOME
C	(1)	CLP_EVENT	RECOVER
		CLP_SERVER	HOME

(8) 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. bat for server1

Group		Environment variable	Value
C	(1)	CLP_EVENT	START
		CLP_SERVER	HOME

Start. bat for server1

Group		Environment variable	Value
C	(1)	CLP_EVENT	RECOVER
		CLP_SERVER	HOME

Start.bat for Server2

Group		Environment variable	Value
C	(2)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER

(9) Moving of Group C

Move the Group C that failed over to server2 in (8) from server2 to server1. Run the stop script on server2, and then run the start script on server1.

Stop bat. (because this failed over in (8))

Group		Environment variable	Value
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER

Start.bat

Group		Environment variable	Value
C	(2)	CLP_EVENT	START
		CLP_SERVER	HOME

(10)   Stopping Group B

The stop script of Group B is run on server2.

Stop. bat

Group		Environment variable	Value
B	(1)	CLP_EVENT	START
		CLP_SERVER	HOME

(11)   Starting Group B

The start script of Group B is run on server2.

Start.bat

Group		Environment variable	Value
B	(1)	CLP_EVENT	START
		CLP_SERVER	HOME

(12) Stopping Group C

The stop script of Group C is run on server2.

```
Server 1          Server 2
                   [C] [B]
  [A]
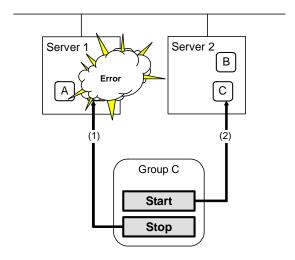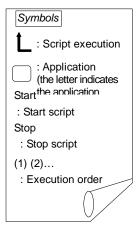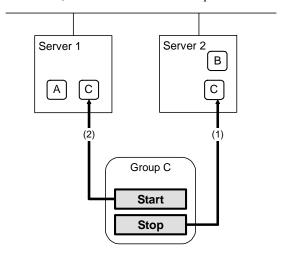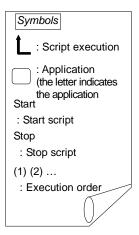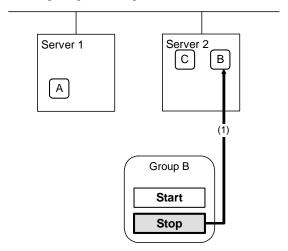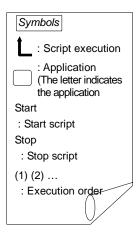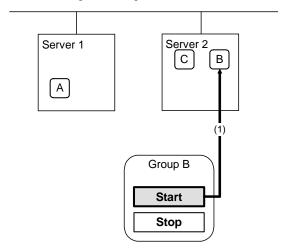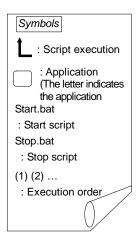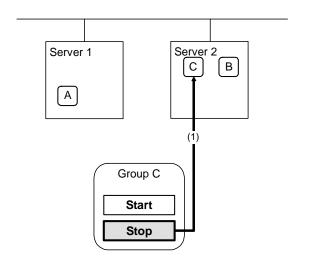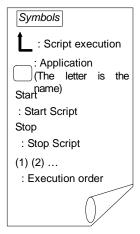
                  (1)
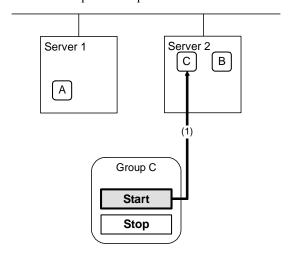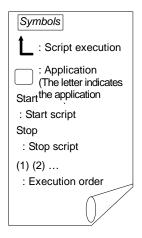
          Group C
          ┌─────────────┐
          │   Start     │
          │   Stop      │
          └─────────────┘
```

Symbols

↑ : Script execution

☐ : Application (The letter is the name)

Start : Start Script

Stop : Stop Script

(1) (2) … : Execution order

Stop.bat

Group		Environment variable	Value
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER

(13) Starting Group C

The start script of Group C is run on server2.

```
Server 1          Server 2
                   [C] [B]
  [A]

                  (1)
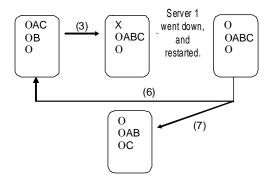
          Group C
          ┌─────────────┐
          │   Start     │
          │   Stop      │
          └─────────────┘
```

Symbols

↑ : Script execution

☐ : Application (The letter indicates the application)

Start : Start script

Stop : Stop script

(1) (2) … : Execution order

Start

Group		Environment variable	Value
C	(1)	CLP_EVENT	START
		CLP_SERVER	OTHER

Additional 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 the failed server1" in the cluster status transition diagram

A group has server1 as its primary server. If an error occurs on server1, the group's 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) in the start script in advance.

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

Environment variables for Start. bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER
		CLP_PRIORITY	2
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER
		CLP_PRIORITY	2

Example 2: "(6) Moving of Group A and C" in the cluster status transition diagram

After the stop scrip of Group C is run on server2 from which the group failed over, the start script is run on server3.

Environment variables for Stop. bat

Group		Environment variable	Value
C	(1)	CLP_EVENT	FAILOVER
		CLP_SERVER	OTHER
		CLP_PRIORITY	2

Environment variables for Start. bat

Group		Environment variable	Value
C	(1)	CLP_EVENT	START
		CLP_SERVER	OTHER
		CLP_PRIORITY	3

Additional information 2

When a monitor resource or ARMLOAD command starts or restarts a script:

The environment variables to run a start script when a monitor resource or ARMLOAD command detected an error in application are as follows:

Example 1: a monitor resource or ARMLOAD command detected an error and restarts Group A on the server1.

Environment variable for Stop.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	The same value as when the start script is run

Environment variable for Start.bat

Group		Environment variable	Value
A	(2)	CLP_EVENT	RECOVER
	(3)	CLP_EVENT	START

* start.bat is executed twice.

Example2: a monitor resource or ARMLOAD command detected an error and restarts Group A on server2 through failover to server2.

Environment variable for Stop.bat

Group		Environment variable	Value
A	(1)	CLP_EVENT	The same value as when the start script is run

Environment variable for Start.bat

Group		Environment variable	Value
A	(2)	CLP_EVENT	RECOVER
	(3)	CLP_EVENT	FAILOVER

Writing scripts

This section describes how you actually write script codes in association with timing to run scripts as mentioned in the previous topic.

Numbers in brackets "(*number*)" in the following example script code represent the actions described in "Execution timing of script resource scripts" on page **473**.

A. Group A start script: a sample of **stop.bat**

```
rem *************************************
rem *             START.BAT             *
rem *************************************
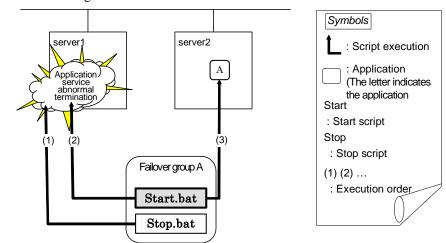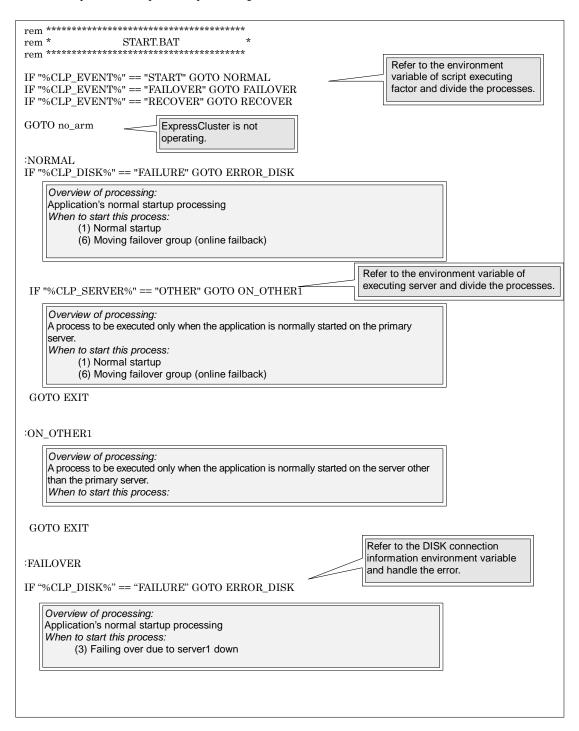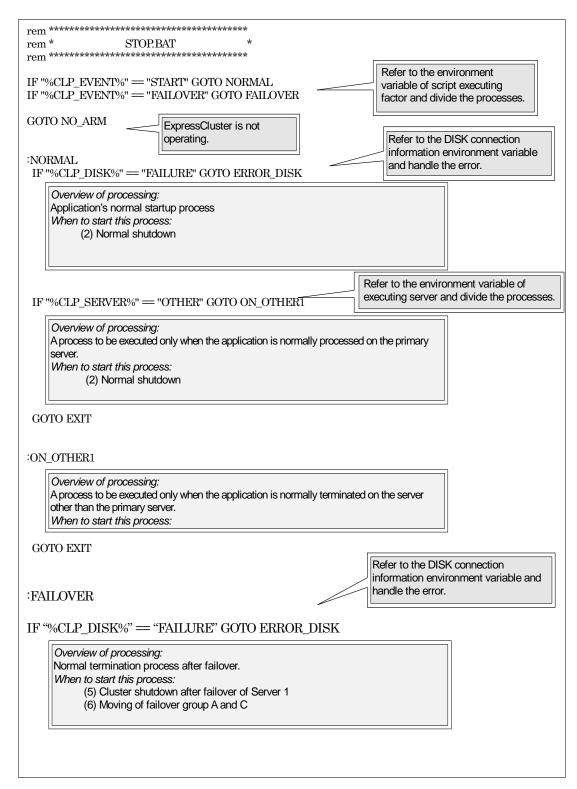
IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER
IF "%CLP_EVENT%" == "RECOVER" GOTO RECOVER

GOTO no_arm
```

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

> ExpressCluster is not operating.

```
:NORMAL
IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK
```

Overview of processing:
Application's normal startup processing
When to start this process:
    (1) Normal startup
    (6) Moving failover group (online failback)

> Refer to the environment variable of executing server and divide the processes.

```
IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTHER1
```

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
    (6) Moving failover group (online failback)

```
GOTO EXIT


:ON_OTHER1
```

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:

```
GOTO EXIT


:FAILOVER

IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK
```

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

Overview of processing:
Application's normal startup processing
When to start this process:
    (3) Failing over due to server1 down

IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTHER2

> 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:*

GOTO EXIT

:ON_OTHER2

> *Overview of processing:*
> A process to be executed only when the application is terminated on the non-primary
> server after failover.
> *When to start this process:*
>   (3) Failing over due to server1 down

GOTO EXIT

:RECOVER

> *Overview of processing:*
> Recovery processing after cluster recovery
> *When to start this process:*
>   (4) Cluster recovery

GOTO EXIT

:ERROR_DISK   Disk-related error handling

:no_arm

:EXIT
exit

B. Group A stop script: a sample of **stop.sh**

```
rem **************************************
rem *                STOP.BAT                *
rem **************************************

IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER

GOTO NO_ARM

:NORMAL
  IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK
```

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

> ExpressCluster is not operating.

> 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:*
>   (2) Normal shutdown

```
  IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTHER1
```

> 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 processed on the primary server.
> *When to start this process:*
>   (2) Normal shutdown

```
  GOTO EXIT


:ON_OTHER1
```

> *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:*

```
  GOTO EXIT


:FAILOVER

IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK
```

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

> *Overview of processing:*
> Normal termination process after failover.
> *When to start this process:*
>   (5) Cluster shutdown after failover of Server 1
>   (6) Moving of failover group A and C

IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTEHR2

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 terminated on the primary server after failover
> *When to start this process:*

GOTO EXIT

:ON_OTHER2

> *Overview of processing:*
> A process to be executed only when the application is terminated on the non-primary server after failover.
> *When to start this process:*
>   (5) Cluster shutdown after failover of Server 1
>   (6) Moving of Group A and C

GOTO EXIT

:ERROR_DISK   Disk-related error handling

:NO_ARM

:EXIT
exit

ExpressCluster X 2.1 for Windows Reference Guide

Tips for creating scripts

◆ The clplogcmd command, though which message output on the WebManager alert view is possible, is available.

Displaying and changing the settings of the script resource details

You can display and change the settings of the detail information of the script resources by using **Resource Properties** of the Builder.

Displaying and changing the script resource details

1. In the tree view shown on the left pane of the Builder, click the icon of the group to which the script resource whose detailed information you want to display or 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 the script resource that you want to display or change. Click **Properties**, and then click **Details** tab.

3. Display and/or change the settings by following the description below.

Change

Open 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

Open the script resource tuning properties dialog box. You can make advanced settings for the script resource.

Displaying and/or changing the script 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 script 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 script resource name. Then click **Properties** and select the **Details** tab.

3. Display and/or change the settings by following the description below.

The default script file names, start.bat and stop.bat, are listed on **Scripts**.

Add

Use this button to add a script other than start.bat script and stop.bat script.

Delete

Use this button to delete a script. The start.bat script and stop.bat script cannot be deleted.

View

Use this button to display the selected script file on the script editor. Changes made and saved by the editor are not reflected.

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

Edit

Use this button to edit the selected script file on the script editor. To reflect changes, overwrite the file. If the selected script file is being viewed or edited, you cannot edit it. You cannot rename the script file

Replace

Opens the **Open** dialog box, where you can select a file.

Note:

The file will not be deleted even if you delete a script file from the Builder. If the cluster configuration data is reloaded by restarting the Builder after deleting the script file, the deleted script file will be displayed in the **Scripts**.

The content of the script file selected in the **Resource Property** is replaced with the one selected in the **Open** dialog box. If the selected script file is being viewed or edited, replacement cannot be achieved. Select a script file, not a binary file such as an application program.

Tuning script resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the script 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 script resource name. Then click **Properties** and select the **Details** tab.

3. On the **Details** tab, click **Tuning** to display **Script Resource Tuning Properties** dialog box.

4. Display and/or change the settings by following the description below.

Parameter tab

Common to all start scripts and stop scripts

Synchronous

Select this button to wait for a script to end when it is run.

Asynchronous

This cannot be selected.

Timeout   0 to 9999   SuspendResume

When you want to wait for a script to end (when selecting **Synchronous**), specify how many seconds you want to wait before a time-out. This box is enabled when **Synchronous** is selected. If the script does not complete within the specified time, it is determined as an error.

Target VCOM Resource Name

Configure this to use a virtual computer name as a computer name used for script resources. Virtual computer names and resource names that exist in a failover group to which script resources belong are listed.

ExpressCluster X 2.1 for Windows Reference Guide

Allow to Interact with Desktop

Specify whether to allow the script to be run to communicate with desktop. If this is selected, progress status of the script can be checked on the screen. It is effective if used when debugging the script.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Displaying the script 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 an object for script resource in the tree view. The following information is displayed in the list view.

Script Name: script1		Details
Properties	Value	
Name	script1	
Comment		
Start Path	start.bat	
Stop Path	stop.bat	
Status	Online	

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Script resource name
Comment:	Script resource comment
Start Path:	Path of the start script for script resource
Stop Path:	Path of the stop script for script resource
Status:	Status of script resource
Server Name:	Server name
Status:	Script resource status on the given server

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

Properties	Value
Type	script
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	fip1,sd1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Target VCOM Name	
[Start]Type	Synchronous
[Start]Timeout (seconds)	1800
[Start]Allow To Interact With Desktop	Off
[Stop]Type	Synchronous
[Stop]Timeout (seconds)	1800
[Stop]Allow To Interact With Desktop	Off

Type: Resource type
Failover Target Server Determination method of Failover Target Server
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 at a deactivation error
Execute Script before Final Action: Whether or not script is executed upon deactivation failure
Dependent Resources: Dependent resources
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval
Target VCOM Name: VCOM name that the script uses
[Start]Type: Type of start application
[Start]Timeout (Second): Timeout for start application
[Start]Allow to Interact with Desktop: Allow start application to communicate with desktop
[Stop]Type: Type of stop application
[Stop]Timeout (Second): Timeout for stop application
[Stop]Allow to Interact with Desktop: Allow stop application to communicate with desktop

Understanding disk resources

Dependencies of disk resources

By default, this function does not depend on any group resource type.

Disk resources

A disk resource refers to a switching partition on a shared disk accessed by more than one server that constitutes a cluster.

◆ Switching partitions

A switching partition refers to a partition on a shared disk connected to more than one server in a cluster.

Switching is done on a failover group basis according to the failover policy. By storing data required for applications on a switching partition, the data can be automatically inherited when failover takes place or a failover group is moved.

A switching partition should be accessible with the same drive letter in the same area on all servers.

◆ Size of switching partitions

There is no restriction on partition size. Allocate any size for partition.

◆ File system

Format partitions with NTFS. FAT and FAT32 are not supported.

◆ Access control

ExpressCluster controls access to file system.

◆ Configuring Host Bus Adapters (HBAs)

When more than one server is connected to a shared disk, simultaneous access from servers to the file system can corrupt the data. It is necessary to control accesses to a partition on a shared disk.

In ExpressCluster, accesses to a shared disk are controlled by HBA (Host Bus Adapter) settings. Configure HBAs that connect a shared disk to control accesses. For details, refer to "HBA tab" in Chapter 3, "Function of the Builder."

◆ Configuring DISK network partition solution resource

When a disk resource is used, it is recommended to use DISK network partition solution resource. For details on DISK network partition solution resources, refer to "Understanding network partition resolution by DISK method" in Chapter 9, "Details on network partition resolution resources."

Notes on disk resources

Note 1 Make settings so that the same partition is accessible with the same drive letter on all servers.

Note 2 If a drive letter different from the one used on partition is set, the drive letter will be changed when the disk resource is started up. If the drive letter is used on other partitions, starting up the disk resource will fail.

Note 3 Dynamic disk is not supported. If a partition on dynamic disk is used for disk resource, starting up the disk resource will fail.

Note 4 Configure HBAs for a partition used for disk resource. If a partition without HBA configuration is used for disk resource, starting up resource will fail.

When HBA configuration is changed, OS reboot is required to reflect the changes. If OS is not rebooted after changing HBA configuration, starting up disk resource will fail.

For details on HBA configuration, refer to "HBA tab" in Chapter 3, "Function of the Builder."

Displaying and changing the details of disk resources

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 then click **Details** tab.

3. In the **Details** tab, you can display and/or change the settings by following the description below.

Disk Resource Properties: Details tab

Drive Letter   Within 1023 bytes   SuspendResumeGroupStopRestart

Specify the drive letter for the disk to be used.

Add   SuspendResume   GroupStopRestart

Use this button to add a server to **Servers that can run the group**. The list of added server partitions is displayed in the **Selection of Partition** dialog box.

Delete   SuspendResume   GroupStopRestart

Use this button to delete a server from **Servers that can run the group**.

Edit   SuspendResume   GroupStopRestart

The **Selection of Partition** dialog box of the selected server is displayed.

◆ **Selection of Partition**
Select the partition to be used as switching partition from the list. GUID of the selected switching partition is displayed. GUID is an identifier used to uniquely identify partitions.

◆ **Connect**
Connects to the server and obtain the list of partitions.

Important:

For a partition specified by disk resource, specify the partition on the shared disk that is connected to the filtering configured HBA.

Make sure not to specify a partition specified by disk resource to partition for disk heartbeat resource, or cluster partition or data partition for mirror disk resource. Data on the shared disk may be corrupted.

Displaying the disk 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 an object for a disk resource ⬤ in the tree view. The following information is displayed in the list view.

Disk Name: sd1	Details
Properties	Value
Name	sd1
Comment	
Drive Letter	X:
Status	Online

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: Disk resource name
Comment: Comment
Drive Letter: Drive letter of switching partition
Status: Status of disk resource

Server Name: Server name
Status: Resource status of the given server

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

Properties	Value
Type	sd
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5

Type:	Resource type
Failover Target Server	Determination method of failover target server
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 at a deactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resource
Retry Interval at Activation Failure :	Activation retry interval
Retry Interval at Inactivation Failure:	Deactivation retry interval

Understanding service resources

You can register services managed by ExpressCluster and run when starting, stopping, failing over, or moving groups in ExpressCluster. It is also possible to register your own services to service resources.

Dependencies of service resources

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource
Virtual computer name resource
Disk resource
Mirror disk resource
Hybrid disk resource
Print spooler resource
Registry synchronization resource

CIFS resource
NAS resource

Service resources

A service resource refers to a service managed by the OS service control manager.

Notes on service resources

- Service executed in service resource must be installed on all servers in failover policy.

Displaying and changing the details of service resource

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the service 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 service 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.

Service resource details tab

Service Name   Within 1023 bytes   **GroupStopRestart**

Specify the service name or service display name used in the service resource.

Tuning

Use this button to display the service resource tuning properties dialog box. You can make advanced settings for the service resource.

Service resource tuning properties

Parameter tab

The detailed setting for parameters is displayed.

Synchronous

When the service is started up, it waits for "Started." Typically, the status changes from "Stopping" to "Started" when the service is started.

When stopping the service, it waits for that the status of service becomes "Stopped." Typically, the status changes from "Stopping" to "Stopped" when the service is stopped.

Asynchronous

No synchronization is performed.

Timeout (0 to 9999)   SuspendResume

Specify the time-out for the status of the service to become "Started" at the time starting the service. The time-out can be specified only when **Synchronous** is selected. If the status of the service does not change to "Started" within the time-out, it is determined as an error.

Specify the time-out for the stats of the service to become "Stopped" at the time stopping the service. The time-out can be specified only when **Synchronous** is selected. If the status of the service does not change to "Stopped" within the time-out, it is determined as an error.

Target VCOM Resource Name   GroupStopRestart

Configure this to use a virtual computer name as a computer name used for the service resource. The virtual computer name and resource name that exist in a failover group which the service resource belongs to are listed.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Service tab

The settings for the service are displayed.

Start Parameters   Within 1023 bytes   **GroupStopRestart**

Specify a parameter for the service. When there are multiple parameters, leave a space between parameters. For a parameter that includes a space, enclose the parameter by double quotation marks. Note that backslash \ cannot be used.

Example: "param 1" param2

Do not assume it as an error when the service is already started   **GroupStopRestart**

- When selected

  When the service is started, if the service is already started up, activation status is kept.

- When cleared

  When the service is started, if the service is already started up, it is considered as activation error.

Initialize

Click **Initialize** to reset the values of all items to their default values.

Note:
When Do not assume it as an error when the service is already started is selected, service resources that have the same service name can be registered to multiple groups. In this case, do not configure Target VCOM Resource Name. If it is configured, status of service resources becomes abnormal when multiple groups are started on one server.

Displaying the service 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 an object for service resource   in the tree view. The following information is displayed in the list view.

Service Name: service1	Details
Properties	Value
Name	service1
Comment	
Service Name	Sample
Start Parameters	
Status	Online

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Service resource name
Comment:	Service resource comment
Service Name:	Service name for the service resource
Start Parameters:	Start parameter of the service
Status:	Status of the service resource
Server Name:	Server name
Status:	Service resource status on the given server

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

Properties	Value
Type	service
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	fip1,sd1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
When service has already started, the error is not caused	No
Target VCOM Name	
[Start]Type	Synchronous
[Start]Timeout (seconds)	1800
[Stop]Type	Synchronous
[Stop]Timeout (seconds)	1800

Type: Resource type
Failover Target Server   Determination method of Failover Target Server
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
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval
Do not assume it as an error when the service is already started:
                      Check the status of the service when starting the service.
Target VCOM Name: VCOM name that the service uses
[Start]Type: Type of execution when the service is started
[Start]Timeout: Timeout for the service start
[Stopped]Type: Type of execution when stopping the service
[Stopped]Timeout: Timeout for the service stop

Understanding print spooler resources

Dependencies of print spooler resources

By default, this function depends on the following group resource types.

Group resource type
Disk resource
Mirror disk resource
Hybrid disk resource

Print spooler resources

Print spooler resources make the printer functions failover by creating a spool directory on the partition of the disk resource or mirror disk resource.

Notes on print spooler resources

Note 1   All servers should use the same printer name, same port and same shared name in their printer definitions and configure the settings for local printer.

Note 2   Set the spool directory on a partition of a disk resource or mirror disk resource because the printer spool directory should fail over.

Displaying and changing the details of print spooler resources

1. From the tree view displayed on the left pane of the Builder, click the icon of the group to which the print spooler 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 print spooler 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.

Spool resource properties: Details tab

Printer Name   Within 220 bytes   `SuspendResume`

Specify the printer name to be used.

Partition   Within 7 bytes   `SuspendResume`

Select a drive letter for the spool directory. Select a drive letter on disk resource or mirror disk resource.

Spool Directory Within 244 bytes   `SuspendResume`

Specify a path for the spool directory. Specify a path after the drive letter starting with a back slash \.

Example: `\PRINTER\SPOOL`

Displaying the print spooler 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 an object for print spooler resource ⬤ in the tree view. The following information is displayed in the list view.

Print Spooler Name: spool1	Details
Properties	**Value**
Name	spool1
Comment	
Printer Name	printer1
Partition	F:
Spool Directory	\spool
Status	Online

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Print spooler resource name
Comment: Print spooler resource comment
Printer Name: Printer name used for the print spooler resource
Partition: Partition for the spooler directory
Spooler Directory: Spooler directory
Status: Status of the print spooler resource

Server Name: Server name
Status: Print spooler resource status on the given server

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

Properties	Value
Type	spool
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	md1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5

Type: Resource type
Failover Target Server   Determination method of Failover Target Server
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
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval

Understanding virtual computer name resources

Dependencies of virtual computer name resources

By default, this function depends on the following group resource types.

Group resource type
Floating IP resource
Virtual IP resource

Virtual computer name resources

Client applications can be connected to a cluster server by using a virtual computer name. The servers can be connected to each other by using a virtual computer name. By using a virtual computer name, 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.

Only client applications on Windows machine can connect to the cluster server by a virtual computer name.

Determining virtual computer name

◆ A computer name used as a virtual computer name should satisfy the following conditions:

◆ The name should be different from cluster server names.

◆ The name should be different from any computer names of machines connected to the same network segment.

◆ The name should be within 15 characters.

◆ The name should consist of letters from alphabet, numbers, and/or hyphen.

◆ The name is not case-sensitive.

Linking virtual computer name and floating IP address

Once a virtual computer name is linked with a floating IP address, the combination of the virtual computer name and floating IP address can be written to the client's LMHOSTS file. To configure this, use the Builder. Select **Virtual Computer Name Resource Properties**, and click **Details** tab, and then click **Target FIP Resource Name**. This configuration allows using the virtual computer name from a remote LAN.

If the virtual computer name and floating IP address are not linked, the virtual computer name cannot be used from a remote LAN. WINS needs to be set to use virtual computer names from a remote LAN. For information on how to configure WINS, refer to the next section "Configuring **WINS** server".

Configuring WINS server

To use a virtual computer name from a remote LAN without linking the virtual computer name to a floating IP address, set the WINS server as follows:

◆ When installing the WINS server to cluster servers

1. Install the WINS server on all servers in a cluster. If you are prompted to reboot the servers after installation, click **No**.

2. Configure the settings described from step 3 to 6 on all cluster servers.

3. Open **Control Panel** and double-click **Network Connections.** Double-click **Local Area Connection** and open **Local Area Connection Properties**.

4. Click **Internet Protocol (TCP/IP)** and click **Properties**.

5. Click **Advanced** and click **WINS** tab.

6. Add the IP addressees of public LAN in all servers in a cluster to the WINS address (The order of usage does not matter.)

7. Shut down and reboot the cluster.

8. Install the WINS server on the client on a remote LAN by following the same steps.

◆ When setting the WINS server on a server other than a cluster server

1. Install WINS server on a server other than a cluster server.

2. Open **Control Panel** and double-click **Network Connections.** Double-click **Local Area Connection** and open **Local Area Connection Properties**.

3. Click **Internet Protocol (TCP/IP)** and click **Properties**.

4. Click **Advanced** and click **WINS** tab.

5. In **WINS addresses**, add the IP addresses of WINS server.

6. Repeat the steps above for all servers in the cluster.

7. Shut down and reboot the cluster.

8. Install the WINS server to the client on a remote LAN by following the same steps.

Services available to the virtual computer name

The following services are available to the virtual computer name:

◆ TCP/IP name resolution (from computer name to IP address)

◆ Network drive connection

◆ Network printer connection

◆ Pipe with the name

◆ RPC (pipe with the name, TCP/IP)

Notes on virtual computer name resources

Note 1 Create a virtual computer name control process（clpvcomp.exe）per virtual computer name resource to be activated. Make sure not to stop the process by mistake. An error of process disappearance can be detected by virtual computer name monitoring resources.

Note 2 The following services are not available to the virtual computer name:
1. Mail slot
2. RPC (NetBIOS)

Note 3 Network printer connection cannot be set up from Control Panel. Use the net use command for set up. The net use command displays information related to connecting or disconnecting a computer to shared resources. The command controls network connectivity in the next logon as well. For details on the net use command, refer to the OS Help.

Note 4 When the virtual computer name and floating IP address are not linked, the following needs to be considered:

・ In the x64 environment, the configuration where the virtual computer name and the floating IP address are not linked is not supported.
Do not forget to link them in the x64 environment.

・ When using the virtual computer name from Windows 98 or Windows Me client, install ExpressCluster Client and configure client settings.

・ It may take a few minutes to reconnect to the cluster after failover due to a failure of the server. This can be avoided by installing the ExpressCluster Client and configuring client settings.

・ It may take a few minutes to display the virtual computer name in the network computer after the cluster is started.

・ The virtual computer name cannot be written to LMHOSTS.

・ When you have the settings to use a DNS server and the DNS server is associated with WINS, switching by failover cannot be done while cache information of the virtual computer name remaining on the DNS server. Configure the time to retain cache for WINS to approximately 1 second on the DNS server.

Note 5 The NetBEUI protocol cannot be used if the virtual computer name and floating IP address are linked.

Note 6 Multiple virtual computer names cannot be liked to the same floating IP.

Note 7 To register a virtual computer name with the WINS server on a remote network, configure the following settings in cluster servers:

1. Open **Control Panel**, and double-click **Network Connections**
2. From the menu, click **Advanced**, and then click **Advanced Settings**. Select **Adapters and Bindings** tab.
3. Change the order of the BindPath. The public LAN (the network adapter with which the WINS server address is registered) should be on the top. **Adapters and Bindings** tab should look similar to the following:

Note 8 Communication by file sharing protocol (SMB/CIFS) using a virtual computer name owned by an activated group on the active server may fail due to an authentication error. Follow the procedures below to avoid the problem from occurring.

(Example 1)
The Explorer is started in the server where the group is active and the following address is entered in the address bar. However it results in causing an authentication error and cannot open the shared folder.
<Virtual computer name>/shared name

(Example 2)
In a server where the group was active, started the registry editor and specified the virtual computer name in "Connect Network Registry," but failed due to authentication error.
<Concerned OS>
- Every edition of Windows Server 2003
<Workaround>
1. Verify that the all servers are properly working from the WebManager.
2. Execute Steps 3 to 7 below in each server in the cluster.
3. From the **Start** menu, select **Run,** and run regedit.exe and add the following registry value:

ExpressCluster X 2.1 for Windows Reference Guide

> HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\p
> arameters
> Name (Type):
> DisableStrictNameChecking (DWORD type)
> Value:
> 0x1

4. If the following value exists in the following key, delete it:
   Key:
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa\MSV1_0
   Name (Type):
   BackConnectionHostNames (DWORD type)

5. Create a new multi-line string value for the same the name in Step 4 (BackConnectionHostNames), and set a virtual computer name.
   (Example) when there are two virtual computer names: vcom1 and vcom2

6. Close the registry editor.
7. (applicable only when the virtual computer name and the floating IP address are linked)
   In the system drive: \Windows\system32\drivers\etc\hosts, add an entry of the virtual computer name (not FQDN name but computer name only) and the linked floating IP address. When there are multiple virtual computer names linked with floating IP address, add entries for all of them.
   (Example) when the virtual computer name is "vcom1" and the linked floating IP address is "10.1.1.11":
   Add the following to the hosts file: 10.1.1.11   vcom1
8. Execute Steps 3 to 7 above in all servers. Then shut down the cluster and reboot all servers.

Note 9   Notes on registering a virtual computer name with DNS dynamically

1. Cluster server must be assigned in the domain.
2. DNS must be configured for the public LAN. ExpressCluster registers virtual computer name specified by public LAN with DNS.
3. DNS registration is performed when virtual computer name resource is activated. Failure of registration will not be recognized as an error.
4. A virtual computer name is deleted from DNS when virtual computer name resource is deactivated. Failure of deletion will not be recognized as an error.

Note 10 On Windows Server 2008, virtual computer name resource cannot be activated on the NIC that LAN cable is not connected.

Note 11 When Server service of OS is stopped, virtual computer name resource cannot be activated. If you want to use virtual computer name resource, do not disable/stop Server service.

Displaying and changing the details of virtual computer name resource

1. From the tree view on the left pane of the Builder, click the group icon where the virtual computer name resource whose details 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 virtual computer 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 computer name resource details tab

Virtual Computer Name   Within 15 bytes   `SuspendResume`   `GroupStopRestart`

Specify the virtual computer name.

Target FIP Resource Name   `SuspendResume`   `GroupStopRestart`

Select the floating IP resource name to be linked to the virtual computer name.

Tuning

Display the virtual computer name resource tuning properties dialog box to configure the details of virtual computer name resource.

Virtual Computer Resource Tuning Properties

Parameter tab

Display the details of setting the parameter.

Register with DNS dynamically `SuspendResume` `GroupStopRestart`

Specify whether or not to register with DNS dynamically during activation of resource.

IP address to be associated `SuspendResume` `GroupStopRestart`

Select one of the followings as IP address for registration with DNS dynamically to associate with virtual computer name.

- FIP
  Associates the floating IP address in selected in the target FIP resources name.

- Public
  Associates the public LAN address of a server to activate resources.

- Any Address

  Associates any IP address you want on a server basis.

Edit `SuspendResume` `GroupStopRestart`

When **Any Address** is selected for IP address to be associated, select your target server in **Servers**. Click **Edit** to specify an IP address on a server basis..

Initialize

Click this button to configure default values for all options.

Displaying the virtual computer name 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 an object for virtual computer name resource in the tree view. The following information is displayed in the list view.

Virtual Computer Name Name: vcom1	Details
Properties	Value
Name	vcom1
Comment	
Virtual Computer Name	server5
Target FIP Name	fip1
Status	Online

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	Virtual computer name resource name
Comment:	Comment for the virtual computer name resource
Virtual Computer Name:	Virtual computer name
Target FIP Resource Name:	Floating IP resource to be linked to the virtual computer name
Status:	Status of the virtual computer name resource
Server Name:	Server name
Status:	Status of the virtual computer name resource on the given server

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

Properties	Value
Type	vcom
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	fip1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5

Type: Resource type
Failover Target Server   Determination method of Failover Target Server
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
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval

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.

[Setting point of server　1]
A cluster server on the same LAN should be able to change a path by receiving RIP packets or to resolve path information of a virtual IP address by accessing a router.

[Setting point of server　2]
A cluster server on a different segment should be able to resolve path information of a virtual IP address by accessing a router.

Server 1

[Setting point of virtual IP resource　1]
Set an IP address which is not within a network address of LAN where a cluster server belongs, and does not conflict with existing IP addresses.

Server 2

[Setting point of router　1]
Each router should be able to control dynamic path by resolving RIP packets or to resolve the information regarding a virtual IP address path as static path information.

VIP

Router 1　　Router 2

RIP service: No　　RIP service: Yes　　RIP service: No

Client machine 1　　Client machine 2　　Client machine 3

Server 1 down

Failover

Server 1　　Server 2

[Setting point of virtual IP resource　2]
Make sure to set the IP address of where the packets are sent from on each server to send RIP packets properly.

VIP

[Setting point of router　2]
Set the value of a flush timer of each router within the timeout value of heartbeat.

Router　　Router

RIP service: No　　RIP service: Yes　　RIP service: No

Client machine 1　　Client machine 2　　Client machine 3

[Setting point of client　1]
A client on the same LAN should be able to change a path by receiving RIP packets or to resolve path information of a virtual IP address by accessing a router.

[Setting point of client　2]
A cluster machine on a different segment should be able to resolve path information of a virtual IP address by accessing a router.

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 conflict 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 that 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 belong to a different LAN that 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 belong to the same LAN that 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 the 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 IP resources

Virtual IP addresses do not support NetBIOS protocol.

◆ Even if you map a virtual IP address to a host name using LMHOSTS, it cannot be used for accessing and user authentication for Windows browsing, networks, and printer resources.

◆ Use a virtual computer name to automatically switch the connection destination with the NetBIOS protocol.

The following rule applies to virtual IP addresses.

◆ The number of a virtual IP resource to be registered on one cluster system is up to 64.

◆ To use a virtual IP resource, the names of a cluster, server and group need to be set according to the naming rules of Ver8.0 or earlier.

Adjust the value of the flush timer of the router within the value for heartbeat timeout. See "Timeout tab" in "Chapter 3 Function of the Builder" for details on heartbeat timeout.

Displaying and changing the details of virtual IP resource

1. From the tree view on the left pane of the Builder, click the group icon where the virtual IP resources whose details you want to display and/or change belong.

2. The group resource list is displayed in the table view in the right pane of the window. Right-click the desired virtual IP resource name, click **Properties,** and then click **Details** tab.

3. On **Details** tab, you can display and/or change the settings by following the description below.

Virtual IP resource details tab

IP Address   Within 45 bytes   `GroupStopRestart`

Enter the virtual IP address to use.

Net Mask   Within 45 bytes   `GroupStopRestart`

Specify the net mask of the virtual IP address to use. It is not necessary to specify it when the IPv6 address is specified as a virtual IP address.

Destination IP Address (within 45 bytes)   `GroupStopRestart`

Enter the destination IP address of RIP packets. The broadcast address is specified for IPv4 and the multicast address is specified for IPv6.

Source IP Address (within 45 bytes)   `GroupStopRestart`

Enter the IP address to bind for 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 on a server basis, 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) `GroupStopRestart`

Specify the send interval of RIP packets.

Use Routing Protocol (1 to 30) `GroupStopRestart`

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 one or more routing protocol.

Tuning

Use this button to display the **Virtual IP Resource Tuning Properties** dialog box. You can make advanced settings for the virtual IP resource.

Virtual IP Resource Tuning Properties

Parameter tab

Detailed setting for parameter is displayed.

Run ping

Use this button to configure whether or not to check if there is any overlapped IP address by the ping command before activating the virtual IP resource.

- When selected
  Check by using the ping command.

- When cleared
  Do not check by using the ping 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) `SuspendResume`
  Specify the interval to issue the ping command in seconds.

- Timeout (1 to 999999)　SuspendResume
  Specify the time-out for the ping command in milliseconds.

- Retry Count (0 to 999)　SuspendResume
  Specify how many retries of issuing the ping command are attempted.

- VIP Forced Activation
  Use this button to configure whether to forcibly activate the virtual IP address when an overlapped IP address is found using the ping command.

  · When selected
    Forcefully activate the virtual IP address.

  · When cleared
    Do not forcefully activate the virtual IP address.

Initialize

Click **Initialize** to reset the values of all items to their default values.

RIP tab

Detailed settings on RIP of virtual IP resource are displayed.

Next Hop IP Address　GroupStopRestart

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)　GroupStopRestart

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

Port GroupStopRestart

On **Port Number**, a list of communication ports used for sending RIP is displayed.

Add

Add a port number used for sending RIP. Click this button to display the dialog box to enter a port number.

Port Number

Enter a port number to be used for sending RIP, and click **OK**.

Delete

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

Edit

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

ExpressCluster X 2.1 for Windows Reference Guide

RIPng tab

Detailed settings of RIPng of virtual IP resource are displayed.

Metric (1 to 15)   GroupStopRestart

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

Port   GroupStopRestart

On **Port Number**, a list of ports used for sending RIPng is displayed.

Add

Add a port number used for sending RIPng. Click this button to display the dialog box to enter a port number.

Port Number

Enter a port number to be used for sending RIPng, and click **OK**.

Remove

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

Edit

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

Displaying the virtual IP resource properties with the WebManager

1. Start the WebManager. (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

2. Click an object for virtual IP resource in the tree view. The following information is displayed in the list view.

Virtual IP Name: vip1		Details

Common | server1 | server2

Properties	Value
Name	vip1
Comment	
IP Address	Refer to server's tab
Sub Net Mask	Refer to server's tab
Destination IP Address	Refer to server's tab
Source IP Address	Refer to server's tab
Send Interval	Refer to server's tab
Routing Protocol	Refer to server's tab
Status	Online

Name:	Virtual IP resource name
Comment:	Comment for the virtual IP resource
IP Address:	IP address of the virtual IP resource
Subnet Mask:	Subnet mask 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

Resource Status on Each Server

Server Name	Status
server1	Online
server2	Offline

Server Name:	Server name
Status:	Status of the virtual IP resource on the given server

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

Properties	Value
Type	vip
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Ping Execute	On
Ping Timeout (milliseconds)	1000
Ping Retry Threshold	5
Ping Retry Interval (seconds)	1
VIP Force Activation	Off
RIP Next Hop IP Address	
RIP Metric	3
RIP Port Number	520
RIPng Metric	1
RIPng Port Number	521

Type:	Resource type
Failover Target Server	Determination method of Failover Target Server
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
Retry Interval at Activation Failure:	Activation retry interval
Retry Interval at Inactivation Failure:	Deactivation retry interval
Ping Execute:	Issue the ping command to verify overlapped IP address
Ping Timeout (Millisecond): (millisecond)	Timeout for the ping command
Ping Retry Threshold:	Threshold value for retrying the ping command
Ping Retry Interval (Second):	Retry interval for the ping command
VIP Forced Activation:	Forcibly activate the virtual IP resource
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 CIFS resources

Dependencies of CIFS resources

By default, CIFS resources depend on the following group resources type:

Group resource type
Disk resource
Mirror disk resource
Hybrid disk resource

CIFS resources

CIFS resources control publicizing and removal of shared folders. By using CIFS resources, the folders on shared disks and mirror disks are publicized as a shared file.

There are two ways of publicizing as follows:

Specify shared configuration individually

Specify shared folder configuration in advance in configuration items of CIFS resources, and then publicize shared folder with the configuration specified at resource activation. You need to create CIFS resource per shared folder to be publicized.

Auto-save shared configuration of drive

When a specified folder on shared disk/mirror disk is shared and publicized, acquire the shared configuration and save it in the configuration file of shared disk/mirror disk. The shared configuration is once released when shared disk/mirror disk is deactivated, but the shared folder is publicized again with the saved configuration.

Notes on CIFS resources

When files on the shared disks or the mirror disks are publicized, the sharing settings, which are configured by   right-click, will be cleared by deactivation of disk resource or mirror disk resource, which will result in no inheritance to another server at a failover.. In this case, publicize and delete the shared folders by using the ARMNSADD and ARMNSDEL commands from scrip resource, or use CIFS resources.

When shared configuration of drive is automatically saved, shared configuration file configured as the saving destination is created as a hidden file. For the back up when the shared configuration file is corrupted, a file with ".bak" at the end of the specified file name is created in the same folder. Ensure not to use the same file name with the currently existing file.

A folder that the shared configuration file is to be created must have access permission to create/update a file for the local system account (SYSTEM). Without proper access permission, creation/updating of the shared configuration file fails. If both the shared configuration file and the backup file are deleted mistakenly, configuration data may be lost. It is recommended that these files should not be deleted by other account.

Displaying and changing the details of CIFS resources

From the tree view displayed on the left pane of the Builder, click the icon of the group to which the CIFS resource whose detailed information and settings you want to display and/or change belongs.

1. The group resources list is displayed on the table view in the right of the window. Right-click the desired CIFS resource name, and click **Properties.** In the properties dialog box, click the **Details** tab.

2. Display and/or change the detailed settings on the **Details** tab as shown below.

CIFS resource Details tab

Execute the automatic saving of shared configuration of drive   GroupStopRestart

Configure whether to save shared configuration of drive automatically. Check this when you want to set the auto-saving.

Target Drive   GroupStopRestart

Specify the drive letter of the target disk when you want to execute auto saving of shared configuration of drive.

Shared Configuration File (within 255 bytes)   GroupStopRestart

Specify the file that saves shared configuration of drive with full path. You need to specify a path of shard disk/mirror disk/hybrid disk within the same group.

The following configurations are executed when specifying shared configuration individually.

Shared name   Within 80bytes   GroupStopRestart

Specify the name of the shared folder, which is publicized by using CIFS resource.

Folder   Within 255bytes   GroupStopRestart

Specify the full path to the shared folder, which is publicized by CIFS resources.

Comment   Within 256bytes   GroupStopRestart

Specify the comment of the shared folder, which is publicized by using CIFS resource.

Tuning

Display CIFS resource tuning properties dialog box. You can change the settings of the detail information of the CIFS resource.

CIFS resource tuning properties

Cache tab

Display the details of cache

Allow caching   `GroupStopRestart`

Set to enable the caching of shared folders.

Settings   `GroupStopRestart`

Select the caching settings if you choose to allow caching.

Choose one of the following settings.

- Auto Caching

- Manual Caching

- Auto Caching (Optimized for the performance)

Initialize

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

User tab

Display the detailed settings of restriction of the number of users and permission of access.

User Limit (1 to 9999) `GroupStopRestart`

Set the maximum number of users who can access the shared folder at a time.

Add `GroupStopRestart`

Add the settings of access permission for user account or user group to **Access Permission**.
When you click this button, the **Enter user** dialog box is displayed. Specify the user name and the permission.

Remove `GroupStopRestart`

Delete the access permission selected in **Permissions**.

Edit `GroupStopRestart`

Modify the access permission specified in **Permissions**. The **Enter user** dialog box is displayed. The specified access permission displayed in the **Enter user** allows you to modify permission.

Initialize

Click the **Initialize** button to initialize all the items to the default values.

User Name (Within 256 bytes)

Enter the Window User name or a group name. When using a domain account, enter in the format of "Domain name\User Name"

Permission

Select one of following settings for access permission of the entered user/group.

- Full control

- Change

- Read

- None

When **Off** is selected**,** access is denied.

Displaying CIFS resource properties with the WebManager.

1. Start WebManager.

   (*http://FIP_address_for_the_WebManager_group:port_number* (Default value is 29003.)

2. Click the object for CIFS resource in the tree view. The following information is displayed in the list view.

Properties	Value
Name	cifs
Comment	
Share Name	share
Path	Z:\share
Drive Administration	Off
Drive	Z:
Config File Path	Z:\share_config\share_config_date.conf
Status	Online

Name:	CIFS resource name
Comment:	CIFS resource comment
Share Name:	Name of the shared folder publicized by CIFS resource
Path:	Path to the shared folder publicized by CIFS resource
Drive Administration:	Execute auto-saving of shared configuration
Drive:	Target drive to execute auto-saving of shared configuration
File paths:	File path to save share configuration
Status:	Status of CIFS resource

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Server Name:	Server name
Status:	Status of CIFS resource on the given server

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

Properties	Value
Type	cifs
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	md1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
Comment	
User Limit	Maximum Allowed
Client-side Cache	On
CSC Method	Automatic Cashing (Optimized for performance)

Type: Resource type
Failover Target Server   Determination method of Failover Target Server
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 script is executed upon deactivation failure
Dependent Resources: Dependent resources
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval
Comment: Comment of the shared folder publicized by CIFS resource
User Limit: Maximum number of users that can simultaneously connect to the shared folder publicized by CIFS resource.
Client -side Cache: Whether or not to cache of the shared folder publicized by CIFS resource
CSC Method: Cache method of the shared folder publicized in CIFS resource

Understanding NAS resources

Dependencies of NAS resources

By default, NAS resources depend on the following group resources types:

Group resource type
Floating IP resource
Virtual IP resource

NAS resources

NAS resources control mounts / unmounts of a network drive. By storing data required for business operation on the network drive mounted by NAS resources, the data is taken over to the other servers in the case of failover or transfer of fail groups.

Notes on NAS resources

◆ NAS resources mount a network drive by local system account. Because applications and scripts activated by the application resources or script resources are executed in the local system unless otherwise specified, they can access this network drive. However applications with no permission to access the shared folder mounted as the network drive cannot access the network drive mounted by NAS resources.

◆ When multiple NAS resources mount the shared folders on the same file server, the same name should be configured as the account to access the file server.

◆ For the applications (databases) for which orders for the orders to disks and completion of writing should be assured the network drive may not be used as storage for data files.

◆ The network drive mounted by NAS resource is displayed as **Disconnected Network Drive** in **My computer** on explorer. The connection account information configured by NAS resources is not taken over to the logon session except local system account. When the login account has no right to the target shared folders, you cannot access this network drive from explorer unless you explicitly specify the connecting account to the server that has the shared folders.

Displaying and changing NAS resources

1. From the tree view displayed on the table view in the right of the window. Click the icon of the group to which the NAS resources whose detailed information and settings you want to display and/ or change belong.

2. The group resources list is displayed on the table view in the right of the window. Right-click the desired NAS resource name, and click **Properties**. In the properties dialog box, click the **Details** tab.

3. Display and/or change the detailed settings on the **Details** tab as shown below.

NAS resource details tab

Drive `GroupStopRestart`

Specify the drive letter of the network to be mounted by NAS resource.

Folder (Within 260 bytes) `GroupStopRestart`

Specify the shared folder mounted by NAS resource in the UNC format.

User Name (Within 96 bytes) `GroupStopRestart`

Specify the user name of the account required to mount shared folders by NAS resources.

Password (Within 96 bytes) `GroupStopRestart`

Specify the account password required to mount shared folders by NAS resource.

Tuning

Display NAS resource tuning properties dialog to set the details of NAS resource.

NAS resource tuning properties

Disconnect

Display the details about mounting of network drive.

Retry Count (1 to 999) `GroupStopRestart`

Specify the number of times to retry when failed to unmount.

Retry Interval (1to 999) `GroupStopRestart`

Specify the retry intervals when failed to unmount.

Initialize

Click the **Initialize** button to initialize all the items to the default values.

Displaying NAS resource properties with the WebManager

1. Start WebManager. (http://*FIP_address_for_the_WebManager_group: port_number*(Default value is 29003))

2. Click the object for NAS resource , in the tree view. the following information is displayed in the list view.

Name:	NAS resource name
Comment:	Comment of NAS resource
Drive:	Drive letters for network drive mounted by NAS resource
Network Resource:	Shared folders mounted by NAS resource
Status:	Status of NAS resource

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Server Name: Server name

Status: Status of NAS resource on the given server

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

Properties	Value
Type	nas
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
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
Dependent Resources	fip1
Retry Interval at Activation Failure	5
Retry Interval at Inactivation Failure	5
User Name	CLUSTER\CLUSTER
Disconnect Retry Threshold	3
Disconnect Retry Interval (seconds)	5

Type: Resource type
Failover Target Server: Determination method of failover server
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
Retry Interval at Activation Failure: Activation retry interval
Retry Interval at Inactivation Failure: Deactivation retry interval
User name: Account user name to mount shared folders in NAS resource
Disconnect Retry Threshold: The number of retires to be performed when unmounting fails
Disconnect Retry Interval (Second):   Interval between retires that are performed when unmounting fails

Understanding hybrid disk resources

Dependencies of hybrid disk resources

By default, hybrid disk resources do not depend on any group resource type.

Hybrid disk

A hybrid disk resource is a resource in which disk resource and mirror disk resource are combined. When you use a disk resource, a failover group can perform failover only to the cluster server connected to the same shared disk. On the other hand, in hybrid disk, by mirroring the data in the shared disk, failover can be performed to a server which is not connected to the shared disk. This enables configuring a remote cluster as in the following figure, where failover is performed in the active site upon normal failure, while failover can be performed to the stand-by site when a disaster occurs.

In hybrid disk, a group of servers that is connected to the shared disk is referred to as a server group. Disk mirroring is performed between two server groups. A server which does not use the shared disk is a server group in which there is only one server.

Like mirror disk resources, mirroring takes place in each partition, where RAW partition (cluster partition) to record management information is required as well as data partition which is the mirroring target. It is necessary that each server using hybrid disk resource has a license for ExpressCluster X Replicator DR 2.0/2.1 for Windows.

Notes on hybrid disk

◆ Data partition size

The sizes of data partitions to be mirrored need to be exactly the same by byte.

If the type or geometry of the disks differs, you may fail to configure the same size for partitions. If this happens, check the precise size of data partitions of the servers by the clpvolsz command before configuring hybrid disk resource. If the sizes are not consistent, run the clpvolsz command again to contract the larger partition.

For more information on the clpvolsz command, see "Chapter 4 ExpressCluster command reference".

Although there is no limit for data partition size, upon fully copying at the time of initial construction or disk replacement, too large data size will degrade the maintenance performance since the required time increases in proportion to the size. For this reason, we recommend data partition size of 100GB or smaller in total.

◆ Cluster partition size

Reserve at least 17MB. In some disk geometry it may be 17MB or larger, which is not a problem.

◆ Partition drive letter

Specify the same drive letters in each server for data partition and cluster partition.

Do not change the drive letter until deleting resources after configuring hybrid disk resources. If a drive letter has been changed, restore the drive letter when hybrid disk resource is started. When the original drive letter is used by other partition, starting mirror disk resource fails.

◆ Partition allocation

When a data partition on the shared disk is mirrored, the data partition and the cluster partition need to be allocated on the same shared disk (they do not have to be allocated on the same logical disk).

Allocate the data partition and the cluster partition on a basic disk in the MBR format. Dynamic disk is not supported.

When making data partitions as logical partitions on the extended partition, make sure the data partitions are logical partition on both servers. The actual size may be slightly different even the same size is specified on both basic partition and logical partition.

◆ Partition format

Format a data partition by NTFS. FAT/FAT32 is not supported.

It is not necessary to construct a file system in a cluster partition. Do not format it.

◆ Access control of a data partition

The data partition to be mirrored by a hybrid disk resource can be accessed only from the active server where a hybrid disk resource is activated. Access from other servers is restricted by ExpressCluster.

Access to the cluster partition is also restricted by ExpressCluster.

◆ Partition deletion

When you delete a data partition or cluster partition on the hybrid disk resource, delete the hybriddisk resource in Builder in advance.

◆ Server group settings

In a failover group having hybrid disk resource, it is necessary to register two server groups which are mirrored by the hybrid disk resource in the **Server Groups** tab of **Group Properties.** Configure the settings for these server groups in **Server Groups** in the tree view in Builder.

Displaying / changing the details of hybrid disk

1. Click the icon of the group to which the hybrid disk belongs.

2. The list of group resources is displayed in the table view in the right pane of the screen. Click the desired hybrid disk resource name, and then the **Details** tab in **Properties**.

3. In the **Details** tab, display / change the details settings according to the following description.

Hybrid disk resource details tab

Hybrid disk number
Select a disk number to be allocated to a hybrid disk resource. This number must be different from the ones for other hybrid disk resources and mirror disk resources.

Data partition drive letter (within 1023 bytes)
Specify the drive letter for the data partition.

Cluster partition drive letter (within 1023 bytes)
Specify the drive letter for the cluster partition. Multiple hybrid disks can use the same cluster partition, but it cannot be the cluster partition of the mirror disk resource.

Cluster Partition Offset Index
Select an index number for the area used in the cluster partition. When using the multiple hybrid disks, assign different numbers for hybrid disk so that the areas to be used in the cluster partition do not overlap.

Server groups

Information on each member server of the two server groups selected in the **Server Groups** tab in **Properties** of failover groups is displayed.

When you click the **Obtain information** button while Builder is online, GUID information of data and cluster partitions of each server can be acquired.

Tuning

The **Hybrid Disk Resource Tuning Properties** dialog box is displayed. You can configure the details on hybrid disk resources.

Tuning hybrid disk resources

In the tree view in the left pane of Builder, click the icon of the group to which the hybrid disk resource you want to display the detailed information or change the settings belongs.

1. The list of group resources is displayed on the table view in the right pane of the screen. Click the desired hybrid disk resource name, and then the **Details** tab in **Properties**.

2. In the **Details** tab, click **Tuning**.

3. The **Hybrid Disk Resource Tuning Properties** is displayed. Display / change the detailed settings according to the following description.

Mirror tab

Detailed settings on mirror are displayed.

Parameters on this configuration window are the same as those of mirror disk resources.

For information on what the parameters indicate and how to configure the settings, see "Understanding mirror disk resources" (P.447).

Displaying hybrid disk resource properties with WebManager

1. Start WebManager (http://*WebManager floating IP address for groups: port number* (default value 29003)).

2. Click the object of hybrid disk resource in the tree view. The following is displayed in the list view:

Name: Hybrid disk resource name
Comment: Hybrid disk resource comment
Hybrid Disk No.:   Hybrid disk number
Drive Letter: Drive letters of the data partition
Status: Status of the hybrid disk resource

Server name: Server name
Status: Hybrid disk resource status in the server

If you click the **Details** button, the following is displayed.

Type: Resource type
Failover Target Server: Determination method of Failover Target Server
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

Section II Resource details

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 at a deactivation error
Execute Script before Final Action:	Whether or not script is executed upon deactivation failure
Dependent Resources:	Dependent resources
Retry Interval at Activation Failure:	Activation retry interval upon activation failure detection
Retry Interval at Inactivation Failure:	Deactivation retry interval upon inactivation failure detection
Cluster Partition	
Cluster Partition Drive Letter:	Drive letters of the cluster partition
Cluster Partition Offset Index:	Index number for the area to be used for cluster partition
Execute the initial mirror construction:	Whether to execute an initial mirror construction when configuring a cluster
Mode:	Synchronization mode of the mirror data
Request Queue Maximum Size (KB):	Size of queue for the mirror disk drive to queue I/O requests on the communication among servers.
Mirror Connect Timeout (Second):	Time until mirror connect is cut when there is no response on the communication among servers and the data synchronization has not completed at the time of mirror recovery and data synchronization.
Asynchronous:	
History Files Store Folder:	Folder to keep the writing requests to the remote disk in files
Kernel Queue Size (KB):	Size to keep the writing request to the remote disk in the kernel space memory
Application Queue Size (KB):	Size to keep the writing request to the remote disk in the user space memory
Thread Timeout (Second):	Timeout when it became unable to transfer data form the kernel queue to the application queue
Max. size of history file size (MB):	Upper limit of amount of files stored in history files store folder.
Upper Bound of Communication Band (KB/sec.):	Upper limit of communication band on Mirror Connect.

Chapter 7   Monitor resource details

This chapter provides detailed information on monitor resources. Monitor resource is a unit to perform monitoring.

This chapter covers:

Monitor resources

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 resource are as follows:

Monitor resource name	Abbreviation	Functional overview
Application monitor resources	appliw	Refer to "Understanding application monitor resources" on page 603.
Disk RW monitor resources	diskw	Refer to "Understanding disk RW monitor resources" on page 605.
Floating IP monitor resources	fipw	Refer to "Understanding floating IP monitor resources" on page 609.
IP monitor resources	ipw	Refer to "Understanding IP monitor resources" on page 612.
Mirror connect monitor resources	mdnw	Refer to "Understanding mirror connect monitor resources" on page 617.
Mirror disk monitor resources	mdw	Refer to "Understanding mirror disk monitor resources" on page 621.
NIC Link Up/Down monitor resources	miiw	Refer to "Understanding NIC link up/down monitor resources" on page 625.
Multi target monitor resources	mtw	Refer to "Understanding multi target monitor resources" on page 629.
Registry synchronization monitor resources	regsyncw	Refer to "Understanding registry synchronization monitor resources" on page 635.
Disk TUR monitor resources	sdw	Refer to "Understanding disk TUR monitor resources" on page 637.

Monitor resource name	Abbreviation	Functional overview
Service monitor resources	servicew	Refer to "Understanding service monitor resources" on page 640.
Print spooler monitor resources	spoolw	Refer to "Understanding print spooler monitor resources" on page 642.
Virtual computer name monitor resources	vcomw	Refer to "Understanding virtual computer name resources" on page 513.
Virtual IP monitor resources	vipw	Refer to "Understanding virtual IP monitor resources" on page 646.
CIFS monitor resources	cifsw	Refer to "Understanding CIFS monitor resources" on page 535.
NAS monitor resources	nasw	Refer to "Understanding NAS monitor resources" on page 541.
Hybrid disk monitor resources	hdw	Refer to "Understanding hybrid disk monitor resources" on page 654.
Hybrid disk TUR monitor resources	hdtw	Refer to "Understanding hybrid disk TUR monitor resources" on page 657.
Custom monitor resources	genw	Refer to "Understanding custom monitor resources" on page 661.
DB2 monitor resources	db2w	Refer to "Understanding DB2 monitor resources" on page 665.
FTP monitor resources	ftpw	Refer to "Understanding FTP monitor resources" on page 669.
HTTP monitor resources	httpw	Refer to "Understanding HTTP monitor resources" on page 672.
IMAP4 monitor resources	imap4w	Refer to "Understanding IMAP4 monitor resources" on page 676.

Monitor resource name	Abbreviation	Functional overview
ODBC monitor resources	odbcw	Refer to "Understanding ODBC monitor resources" on page 680.
Oracle monitor resources	oraclew	Refer to "Understanding Oracle monitor resources" on page 684.
OracleAS monitor resources	oracleasw	Refer to "Understanding OracleAS monitor resources on page 689.
OfiiceScan CL monitor	oscw	Refer to "Understanding OfficeScan CL monitor resource" on page 693.
OfficeScan SV monitor	ossw	Refer to "Understanding OfficeScan SV monitor resource" on page 695.
POP3 monitor resources	pop3w	Refer to " Understanding POP3 monitor resources" on page 697.
PostgreSQL monitor resources	psqlw	Refer to "Understanding PostgreSQL monitor resources" on page 701.
SMTP monitor resources	smtpw	Refer to "Understanding SMTP monitor resources" on page 705.
SQL Server monitor resources	sqlserverw	Refer to "Understanding SQL Server monitor resources" on page 709.
Tuxedo monitor resources	tuxw	Refer to ""Understanding Tuxedo monitor resources on page 713.
Websphere monitor resources	wasw	Refer to "Understanding Websphere monitor resources" on page 717.
Weblogic monitor resources	wlsw	Refer to "Understanding Weblogic monitor resources" on page 722.
WebOTX monitor resources	otxw	Refer to "Understanding WebOTX monitor resources" on page 726.

Monitoring by monitor resources are done in one of two ways: monitoring the target all the time or monitoring the target when it is activated.

You cannot change monitoring timings of each monitor resource. The initial settings are shown below.

The default settings are as follows.

◆ Always monitor (From the cluster startup to the cluster stop)

   IP monitor resources

Mirror connect monitor resources

Mirror disk monitor resources

Hybrid disk monitor resources

Hybrid disk TUR monitor resources

NIC Link Up/Down monitor resources

Disk TUR monitor resources

Custom monitor resources

OfficeScan CL monitor resource

◆ Monitor while a group is activated (from activation to deactivation of the group)

Application monitor resources

Disk RW monitor resources

Floating IP monitor resources

Multi target monitor resources

Registry synchronization monitor resources

Service monitor resources

Print spooler monitor resources

Virtual computer name monitor resources

Virtual IP monitor resources

CIFS monitor resources

NAS monitor resources

DB2 monitor resources

FTP monitor resources

HTTP monitor resources

IMAP4 monitor resources

ODBC monitor resources

Oracle monitor resources

OracleAS monitor resources

OfficeScan SV monitor resource

POP3 monitor resources

PostgreSQL monitor resources

SMTP monitor resources

SQL Server monitor resources

Tuxedo monitor resources

Websphere monitor resources

Weblogic monitor resources

WebOTX monitor resources

Monitor timing of monitor resources

Monitor resource	Monitor timing	Target resource
Application monitor resources	When activated (Fixed)	appli
Disk RW monitor resources	Always or when activated	All resources
Floating IP monitor resources	When activated (Fixed)	fip
IP monitor resources	Always or when activated	All resources
Mirror connect monitor resources	Always (Fixed)	-
Mirror disk monitor resources	Always (Fixed)	-
NIC Link Up/Down monitor resources	Always or when activated	All resources
Multi target monitor resources	Always or when activated	All resources
Registry synchronization monitor resources	Always or when activated	regsync
Disk TUR monitor resources	Always or when activated	sd
Service monitor resources	When activated (Fixed)	service
Print spooler monitor resources	When activated (Fixed)	spool
Virtual computer name monitor resources	When activated (Fixed)	vcom
Virtual IP monitor resources	When activated (Fixed)	vip
CIFS monitor resources	When activated (Fixed)	cifs
NAS monitor resources	When activated (Fixed)	Nas
Hybrid disk monitor resources	Always (Fixed)	-
Hybrid disk TUR monitor resources	Always or when activated	Hd
Custom monitor resources	Always or when activated	All resources
DB2 monitor resources	When activated (Fixed)	All resources
FTP monitor resources	When activated (Fixed)	All resources

Section II Resource details

HTTP monitor resources	When activated (Fixed)	All resources
IMAP4 monitor resources	When activated (Fixed)	All resources
ODBC monitor resources	When activated (Fixed)	All resources
Oracle monitor resources	When activated (Fixed)	All resources
OracleAS monitor resources	When activated (Fixed)	All resources
OfiiceScan CL monitor	Always (Fixed)	-
OfficeScan SV monitor	When activated (Fixed)	All resources
POP3 monitor resources	When activated (Fixed)	All resources
PostgreSQL monitor resources	When activated (Fixed)	All resources
SMTP monitor resources	When activated (Fixed)	All resources
SQL Server monitor resources	When activated (Fixed)	All resources
Tuxedo monitor resources	When activated (Fixed)	All resources
Websphere monitor resources	When activated (Fixed)	All resources
Weblogic monitor resources	When activated (Fixed)	All resources
WebOTX monitor resources	When activated (Fixed)	All resources

Monitoring interval for monitor resources

All monitor resources monitor their targets at every monitoring interval.

The following describes the timeline of how a monitor resource monitors its target and finds an error with the monitoring interval settings:

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
Reactivation Threshold   0 time
Failover Threshold   1 time
Final Action   None

When an error occurs, it is detected at the next monitoring and the recovery operation for the recovery target starts.

When an error is detected (with monitor retry settings)

Examples of behavior when the following values are set:

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

<Error detection>
Recovery Target	group
Reactivation Threshold	0 time
Failover Threshold	1 time
Final Action	None

When an error occurs, it is detected at the next monitoring. 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
Reactivation Threshold	0 time
Failover Threshold	1 time

Final Action   None

Immediately after an occurrence of a monitoring time-out, the failover for the recovery target starts.

When a monitoring time-out 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 times

<Error detection>
Recovery Target   group
Reactivation Threshold   0 time
Failover Threshold   1 time
Final Action   none

When a monitoring time-out occurs, monitor retry is performed and failover is started for the recovery target.

Behavior when an error is detected by a monitor resource

When an error is detected, the following recovery actions are taken against the recovery target in sequence:

◆ Reactivation of recovery target: this takes place when an error is detected in a monitor target.

◆ Failover: this takes place when reactivation fails for the number of times set in the reactivation threshold.

◆ Final action: this takes place when the error is detected even after the failover is executed for the number of times set in the failover threshold.

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

Recovery target	Status	Reactivation[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
Cluster	-	-	-	Yes

---

[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.

ExpressCluster X 2.1 for Windows Reference Guide

Note:

Do not operate the following by running commands or using the WebManager when a group resource (e.g. disk resource, application 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, you can perform them 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. Note that when group resource or failover group is specified as recovery target, these counters are reset only when the status of all the monitor resources in which the same recovery targets are specified are normal.

An unsuccessful recovery action is also counted into reactivation count or failover count.

The following is an example of the progress when only one server detects an error while the gateway is specified as an IP address of the IP monitor resource:

Examples of behavior when the following values are set:

<Monitor>
Interval	30 sec
Timeout	30 sec
Retry Count	3 times

<Error detection>
Recovery Target	Failover Group A
Reactivation Threshold	3 times
Failover Threshold	1
Final Action	No Operation

Gateway

Public LAN (Also used for Interconnect)

server1   Interconnect   server2
          LAN

Monitor resource
IP monitor
resource 1

Monitor resource
IP monitor
resource 1

The IP monitor resource 1
starts monitoring.
(Whether or not the IP
address is activated is
checked every interval)

Failover Group A
Disk resource 1
Application resource 1
Floating IP
Resource 1

server1 and 2: IP monitor
resource 1
Reactivation count   zero
Failover count   zero

Monitor error
occurs.

Gateway

Public LAN (Also used for Interconnect)

Server1   Interconnect   server2
          LAN

Monitor
IP monitor
resource 1

Monitor
IP monitor
resource 1

The IP monitor resource 1
detects an error.
(for example, LAN cable
disconnection, NIC failure…)

Failover Group A
Disk resource 1
Application resource 1
Floating IP
Resource 1

server1: IP monitor resource 1
Reactivation count   zero
Failover count   zero

Gateway

Public LAN (Also used for Interconnect)

Server1   Interconnect   server2
          LAN

Monitor
IP monitor
resource 1

Monitor
IP monitor
resource 1

The IP monitor resource 1
retries monitoring up to 3 times.

"Retry Count" refers to this retry
count.

Failover Group A
Disk resource 1
Application resource 1
Floating IP
Resource 1

server1: IP monitor resource 1
Reactivation count   zero
Failover count   zero

When the monitoring retry count exceeds its
threshold:

Gateway

Public LAN (Also used for Interconnect)

Server1 | X | Interconnect LAN | server2

Monitor resource

IP monitor resource 1

Monitor resource

IP monitor resource 1

Failover Group A

Disk resource 1

Application resource 1

Floating IP Resource 1

Reactivation of the failover group A starts in server1.

"Reactivation Threshold" is the number of reactivation count on a server basis.

server1: IP monitor resource 1
Reactivation count   3 times

server2: IP monitor resource 1
Reactivation count   zero
Failover count   zero

No recovery action is taken because the status of the failover group A is "Stopped".

When the reactivation count exceeds its threshold on Server1

Gateway

Public LAN (Also used for Interconnect)

Server1 | X | Interconnect LAN | server2

Monitor resource

IP monitor resource 1

Monitor resource

IP monitor resource 1

Failover Group A

Disk resource 1
Application resource 1
Floating IP Resource 1

Failover of the failover group A starts in server1.

"Failover Threshold" is the number of failover count on a server basis.
The first failover is on server1

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

server2: IP monitor resource 1
Reactivation count
    zero
Failover count
    zero

Failover of the failover group A from server1 to server2

Section II Resource details

```
                                              Gateway
Public LAN (Also used for Interconnect)
    ●                                   ●                              ●
         Server1      X Interconnect  server2
                        LAN                          Failover of the failover group
      Monitor resource      Monitor resource         A completes in server2.
        IP monitor            IP monitor
        resource 1            resource 1             server1: IP monitor resource 1
                                                     Reactivation count   3 times
                         Failover Group A            Failover count       1

                          Disk resource 1
                       Application resource 1         server2: IP monitor resource 1
                                                      Reactivation count       zero
                          Floating IP                 Failover count           zero
                          Resource 1
```

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 IP address of the IP monitor resource.

Examples of behavior when the following values are set.

<Monitor>	
Interval	30 sec
Timeout	30 sec
Retry Count	3 times
<Error detection>	
Recovery Target	Failover Group A
Reactivation threshold	3 times
Failover Threshold	1
Final Action	No Operation

Gateway

Public LAN (Also used for interconnect)

Server1　Interconnect　server2
　　　　　　LAN

Monitor resource　　　　Monitor resource

IP monitor
resource 1

IP monitor
resource 1

The IP monitor resource 1
starts monitoring.
(Whether or not the IP address
is activated is checked every
interval)

Failover Group A

Disk resource 1

Application resource 1

Floating IP
resource 1

server1 and 2: IP monitor
resource 1
Reactivation count　　zero
Failover count　　　　zero

Monitor error
occurred.

Gateway

Public LAN (Also used for interconnect)

Server1　Interconnect　Server2
　　　　　　LAN

Monitor resource　　　　Monitor resource

IP monitor
resource 1

IP monitor
resource 1

The IP monitor resource 1, 2
detect an error.

Failover Group A

Disk resource 1

Application resource 1

Floating IP
resource 1

server1:　IP　monitor
resource 1
Reactivation count
　　zero

Gateway

Public LAN (Also used for interconnect)

Server1　Interconnect　server2
　　　　　　LAN

Monitor resource　　　　Monitor resource

IP monitor
resource 1

IP monitor
resource 1

The IP monitor resource 1
retries monitoring up to 3 times.

"Retry Count" refers to this retry
count.

Failover Group A

Disk resource 1

Application resource 1

Floating IP
resource 1

server1: IP monitor resource 1
Reactivation count　　zero
Failover count　　　　zero

When the monitoring retry count exceeds its threshold

Section II Resource details

Gateway

Public LAN (Also used for interconnect)

Server1   Interconnect   Server2
           LAN

Monitor resource   Monitor resource
IP monitor   IP monitor
resource 1   resource 1

Failover Group A

Disk resource 1

Application resource 1

Floating IP
resource 1

Reactivation of the failover group A starts in server1.

"Reactivation Threshold" is the number of reactivation count on a server basis. First reactivation processing on server1.

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   zero

server2: IP monitor resource 1
Reactivation count   zero
Failover count   zero

No recovery action is taken because the status of failover group A is "Stopped".

When reactivation count exceeds the threshold in server1

Gateway

Public LAN (Also used for interconnect)

Server1   Interconnect   server2
           LAN

Monitor resource   Monitor resource
IP monitor   IP monitor
resource 1   resource 1

Failover Group A

Disk resource 1

Application resource 1

Floating IP
Resource 1

Failover of the failover group A starts in server1.

"Failover Threshold" is the number of failover count on a server basis. The first failover is on server1

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

server2: IP monitor resource 1
Reactivation count   Zero
Failover count   Zero

No recovery action is taken because the status of failover group A is "Stopped".

Failover the failover group A from server1 to server2

Public LAN (Also used for interconnect)

Gateway

Server1 Interconnect server2
LAN

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

Failover Group A
Disk resource 1
Application resource 1
Floating IP Resource 1

The IP monitor resource 1 continues to detect the error in server2.

server1: IP monitor resource 1
Reactivation count   3 times

server2: IP monitor resource 1
Reactivation count   Zero

Public LAN (Also used for interconnect)

Gateway

Server1 Interconnect server2
LAN

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

ver Group A
Disk resource 1
Application resource 1
Floating IP Resource 1

The IP monitor resource 1 retries monitoring up to 3 times.

"Retry Count" refers to this retry count.

server1: IP monitor resource 1
Reactivation count   3 times

server2: IP monitor resource 1
Reactivation count   zero

When the monitoring retry count exceeds its threshold

Section II Resource details

Gateway

Public LAN (Also used for interconnect)

Interconnect
LAN

Server1   server2

Monitor resource   Monitor resource

IP monitor resource 1   IP monitor resource 1

Failover Group A

Disk resource 1

Application resource 1

Floating IP Resource 1

If the error continues, reactivation of the failover group A is retried up to 3 times.

Server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

No recovery action is taken because the status of failover group A is "Stopped"

server2: IP monitor resource 1
Reactivation count   3 times
Failover count   zero

When reactivation count also exceeds its threshold in server2

Gateway

Public LAN (Also used for interconnect)

Interconnect
LAN

Server1   Server2

Monitor resource   Monitor resource

IP monitor resource 1   IP monitor resource 1

Failover Group A

Disk resource 1

Application resource 1

Floating IP resource 1

Failover of the failover group A starts in server2.
The first failover is on server2

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

No recover action is taken because the status of failover group A is "Stopped".

server2: IP monitor resource 1
Reactivation count   3 times
Failover count   Zero

Failover the failover group A from server2 to server1

Public LAN (Also used for interconnect)

Gateway

Server1 Interconnect LAN server2

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

Failover Group
Disk resource 1
Application resource
Floating IP resource

The IP monitor resource 1 continues to detect the error in server1.

server1: IP monitor resource1
Reactivation count   3 times
Failover count   1

server2: IP monitor resource 1
Reactivation count   3 times
Failover count   1

Public LAN (Also used for interconnect)

Gateway

Server1 Interconnect LAN server2

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

Failover Group A
Disk resource 1
Application resource 1
Floating IP resource

The IP monitor resource 1 retries monitoring up to 3 times in server1.

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

server2: IP monitor resource 1
Reactivation count   3 times
Failover count   1

When the monitoring retry count of IP monitor resource 1 exceeds its threshold again in server1:
No reactivation is attempted because the reactivation threshold is 3.
No failover is attempted because the failover threshold is 1.
The final action starts.

Public LAN (Also used for interconnect)

Gateway

Server1 Interconnect LAN server2

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

Failover Group A
Disk resource 1
Application resource 1
Floating IP address

Final action of IP monitor resource 1 in server1 starts.

"Final action" is the action to be taken when failover count exceeds the threshold.

Additional Information

When the status of the monitor resource becomes normal from an error, the reactivation count and failover count are reset to zero (0). When an error is detected next time, the process will be exactly the same as what has been described up to here. (The description up to here assumed the interconnect LANs are working properly.)

If all interconnect LANs are disconnected, internal communications with other servers are blocked. As a result, even if an error is detected on a monitor target, failover of groups fails. To fail over a group when all interconnect LANs are disconnected, you can choose to shut down the server where an error is detected. This will allow other servers to detect the server is shut down and to start failover of the group.

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

Configuration example
<Monitor>
Interval   30 seconds
Timeout   30 seconds
Retry Count   3 times

<Error detection>
Recovery Object   Failover Group A
Reactivation Threshold   3 times
Failover Threshold   1
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.

When the failover count exceeds its threshold on server1

ExpressCluster X 2.1 for Windows Reference Guide

Public LAN (Also used for interconnect)

Gateway

server1   Interconnect   server2
LAN

Monitor resource

IP monitor
resource 1

Server
failure

Failover Group A

Disk resource

Application resource 1

Floating IP
address 1

Disk Heartbeat

Shared
disk

Final action is taken on server1. The cluster service stops, and then the server1 shuts down.
Following that the server1 failed, failover for the failover group A starts according to the failover policy.

"Final action" is the action to be taken when failover count exceeds the threshold.

server1: IP monitor resource 1
Reactivation count   3 times

server2: IP monitor resource 1
Reactivation count   Zero
Failover count   Zero

When the IP monitor resource on server2 continues to find the error.

Reactivation of the Failover Group A is executed on server2 as is the case on 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 failvoer.

When the failover count exceeds its threthhold, the final action is taken on server2 as is the case on server1.

Failover count exceeds its threshold on server2 too.

Public LAN (working also as Interconnect)

Gateway

Server1   Interconnect   server2
LAN

Server
failure

Server
failure

Disk Heartbeat

Shared disk

On server2, the final action is executed as is the case on server1. The cluster service stops, and then the server shuts down.

"Final action" is the action to be taken when failover count exceeded the threshold.

server2: IP monitor resource 1
Reactivation count   3 times
Failover count   Zero

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 following thresholds that the monitor resource keeps are reset. Note that when a group resource or failover group is specified as recovery target, these counters are reset only when the status of all the monitor resources in which the same recovery targets are specified become normal.

◆ 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 "Behavior when an error is detected by a monitor resource" on page 562 is executed and another monitoring error occurs after monitoring returns to normal.

Examples of behavior when the following values are set.
Configuration
    <Monitor>
    Interval   30 sec
    Timeout   30 sec
    Retry Count   3 times

    <Error detection>
    Recovery Target   Failover Group A
    Reactivation Threshold 3 times
    Failover Threshold   1

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

Monitoring error continues after execution of all recovery operations.

Gateway

Public LAN (Also working as Interconnect)

Server1   Interconnect LAN   server2

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

The final action for the IP monitor resource 1 is already executed in server1.

Failover Group A
Disk resource 1
Application resource 1
Floating IP resource 1

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

server1: IP monitor resource 1
Reactivation count   3 times
Failover count   1

When the gateway recovers:

Public LAN (Also working as Interconnect)

Gateway

Server1   Interconnect LAN   server2

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

The IP monitor resource 1 detects the gate way is working normally.
(It is checked if the IP address is active every interval)

Failover Group A
Disk resource 1
Application resource 1
Floating IP resource 1

server1, 2: IP monitor resource 1
Reactivation count   Zero
Failover count   Zero

The number of reactivations and failovers are reset because it has been detected that the status of the monitor target resource became normal.

When an error is detected in monitoring again.

Monitor error occurred

Gateway

Public LAN (Also working as Interconnect)

Server1   Interconnect   server2
            LAN

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

The IP monitor resource 1 and 2 detect an error

Failover Group A

Disk resource 1
Application resource 1
Floating IP resource 1

server1: IP Monitor resource1
Reactivation count   Zero
Failover count   Zero

Gateway

Public LAN (Also working as Interconnect)

Server1   Interconnect   server2
            LAN

Monitor resource
IP monitor resource 1

Monitor resource
IP monitor resource 1

The IP Monitor resource 1 retries monitoring up to 3 times. "Retry count" is this retry count.

Failover Group A

Disk resource 1
Application resource 1
Floating IP resource 1

server1: IP monitor resource1
Reactivation count   Zero
Failover count   Zero

When monitoring retry count exceeds its threshold

ExpressCluster X 2.1 for Windows Reference Guide

Reactivation of the failover group A starts in server1.

"Reactivation Threshold" is reactivation count on a server basis.
First reactivation processing in server1

server1: IP monitor resource1
Reactivation count   3 times
Failover count   Zero

server2: IP monitor resource 1
Reactivation count   Zero
Failover count   Zero

No recovery action is taken because the status of failover group A is "Stopped,"

When reactivation count exceeds the threshold on server1, failover of the failover group A takes place

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 TUR monitor resource and the disk resource of the Failover Group A:

Configuration of the TUR monitor resource

<Monitor>

Interval	60 seconds
Timeout	120 seconds
Retry Count	Zero

<Error detection>

Recovery Target	Failover Group A
Reactivation Threshold	Zero
Failover Threshold	1
Final Action	Stop Failover Group

Configuration of the failover group A: disk resource

<Activation error>

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

<Deactivation abnormality>

Deactivation Retry Threshold	Zero
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.

Failover of the failover group A due to the error detected by the TUR monitor resource 1 starts in server1.

"Failover threshold" of the monitor resource is failover count on a server basis. The first failover in server1.

server1:
Disk TUR monitor resource 1:
  Failover count   1
Disk resource 1:
  Failover count   Zero

server2:
Disk TUR monitor resource 1:
  Failover count   Zero
Disk resource 1:
  Failover count   Zero

Activating the disk resource 1 due to the failover fails in server2.

server1:
Disk TUR monitor resource 1:
  Failover count   Once
Disk resource 1:
  Failover count   Zero

server2:
Disk TUR monitor resource 1:
  Failover count   Zero
Disk resource 1:
  Failover count   Zero

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

Failover of the failover group A, due to the failure of activating the disk resource 1, starts in server2.

"Failover threshold" of the group resource is failover count on a server basis.
The first failover in server2

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Monitor resource
Disk TUR monitor resource 1

Failover Group A
Disk resource 1
Application resource 1
Floating IP resource 1

Activation failure

Shared disk

server1:
Disk TUR monitor resource 1:
Failover count   1
Disk resource 1:
   Failover count   Zero

server2:
Disk TUR Monitor Resource 1:
   Failover count   Zero
Disk Resource 1:
   Failover count   1

The TUR 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 "Behavior when an error is detected by a monitor resource" on page 562

Activating the disk resource 1 due to the failover fails in server1.

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Monitor resource
Disk TUR monitor resource 1

Activation failure

Failover Group A
Disk resource 1
Application resource 1
Floating IP resource 1

Shared disk

Server1:
Disk TUR monitor resource 1:
   Failover count   1
Disk resource 1
   Failover count   Zero

Server2:
Disk TUR monitor resource 1
   Failover count   Zero
Disk resource 1
   Failover count   1

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

Failover of the failover group A due to the failure of activating the disk resource 1 starts in server1.

Failover threshold" of the group resource is failover count on a server basis.
The first failover in server1

Server1:
Disk TUR monitor resource 1:
   Failover count   1
Disk Resource 1:
   Failover count   1

Server2:
Disk TUR monitor resource 1:
   Failover count   Zero
Disk resource 1:
   Failover count   1

Activating the disk resource 1 due to the failover fails in server2.

server1:
Disk TUR monitor resource 1:
   Failover count   Once
Disk resource 1:
   Failover count   Once

Server2:
Disk TUR monitor resource 1:
   Failover count   Zero
Disk resource 1:
   Failover count   Once

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

Server1

Monitor resource
Disk TUR monitor
resource 1

Server2

Monitor resource
Disk TUR monitor
Resource 1

Activating the disk resource 1
due to the failover fails in
server2.
(failure of fsck, mount ,etc.)

Failover
Group A
Disk resource 1
Application resource 1
Floating IP
resource 1

Activation failure

Monitor error

Monitor error

Shared
disk

Server1:
Disk TUR monitor resource 1:
    Failover count   1
Disk Resource 1:
    Failover count   1

Server2:
Disk TUR Monitor Resource 1:
    Failover count   Zero
Disk Resource 1:
    Failover count   Once

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.

The final action due to the
activation failure of the disk
resource 1 is executed in
server2.

Failover group A is activation
failure status.

Server1

Monitor resource
Disk TUR monitor
resource 1

Server2

Monitor resource
Disk TUR monitor
resource 1

Failover
Group A
Disk resource 1
Application resource 1
Floating IP
resource 1

Activation failure

Monitor
error

Monitor
error

Shared disk

Server1:
Disk TUR monitor resource 1:
    Failover count   1
Disk resource 1:
    Failover count   1

Server2:
Disk TUR monitor resource 1:
    Failover count   Zero
Disk resource 1:
    Failover count   1

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

Failover of the failover group A due to detection of the error by the disk TUR monitor resource 1 starts in server2.

"Failover threshold" of the monitor resource is a failover count on a server basis.

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Monitor resource
Disk TUR monitor resource 1

Failover Group A
Disk resource 1
Application resource
Floating IP resource 1

Activation failure

Monitor error

Shared disk

Monitor error

Server1:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1:
  Failover count   1

Server2:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1
  Failover count   1

Activating the disk resource 1 due to failover fails in server1.
(failure of fsck, mount, etc.)

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Monitor resource
Disk TUR monitor resource

Failover Group A
Disk
Application
Floating IP resource 1

Activation failure

Monitor error

Shared disk

Monitor error

Server1:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1:
  Failover count   1

Server2:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1:
  Failover count   1

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 for the failover group A (stop group) due to detection of the error by the disk TUR monitor resource 1 starts in server1.

Server1:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1:
  Failover count   1

Server2:
Disk TUR Monitor Resource 1:
  Failover count   1
Disk Resource 1:
  Failover count   1

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Disk TUR monitor resource 1

Activation failure

Failover Group A
Disk
Application resource
Floating IP resource 1

Monitor error

Shared disk

Monitor error

The final action is executed in server1 because the number of failovers due to monitoring error detected by the disk TUR monitor resource 1 has exceeded the threshold.

The final action for the failover group A (stop group) due to detection of the error by the disk TUR monitor resource 1 starts in server1.

Server1:
Disk TUR monitor resource 1:
  Failover count   1
Disk resource 1:
  Failover count   1

Server2:
Disk TUR monitor resource 1
  Failover count   1
Disk resource 1:
  Failover count   1

Server1
Monitor resource
Disk TUR monitor resource 1

Server2
Monitor resource
Disk TUR monitor resource 1

Failover Group A

Monitor error

Shared disk

Monitor error

After the Failover Group A is stopped due to the final action executed for the disk TUR monitor resource 1 in server1, nothing will happen even if an error is detected by the disk TUR monitor resource 1.

However, note that the final action for the disk TUR monitor resource 1 is executed in server2 if the Failover Group A is manually activated because the final action for the disk monitor TUR resource 1 is not executed yet.

Delay warning of monitor resources

When a server is heavily loaded, due to a reason such as applications running concurrently, a monitor resource may detect a monitoring time-out. It is possible to have settings to issue an alert at the time when the time for monitor processing (the actual elapsed time) reaches a certain percentages of the monitoring time before a time-out is detected.

The following figure shows timeline until a delay warning of the monitor resource is used.

In this example, the monitoring time-out is set to 60 seconds and the delay warning rate is set to 80%, which is the default value.

- **A.** The time for monitor processing is 10 seconds. The monitor resource is in normal status. In this case, no alert is used.

- **B.** The time for monitor processing is 50 seconds and the delay of monitoring is detected during this time. 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 time for monitor processing has exceeded 60 seconds of the monitoring time-out and the delay of monitoring is detected. 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 time for monitor processing for the monitor resource can be calculated at the time the server is heavily loaded, which will allow you to determine the time for monitoring time-out of a monitor resource.

◆ When 100 is set to the delay monitoring rate

The delay warning will not be is used.

Alert for the delay warning is used for the heartbeat resources as well.

Note:
Be sure not to set a low value, such as 0%, except for a test operation.

Related Information:
To configure the delay warning of monitor resources, click **Cluster Properties**, click **Delay Warning**, and select **Monitor Delay Warning**. For details, refer to "Parameter details" in Chapter 3, "Function of the Builder."

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 restart 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 application resource monitored by application 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 application monitor resource

<Monitor>
Interval   5 sec
Timeout   60 sec
Retry Count   Zero
Wait Time to Start Monitoring   0 sec (default)

<Error Detection>
Recover Target   appli1
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 application monitor resource

<Monitor>
Interval   5 sec
Timeout   60 sec
Retry Count   Zero
Wait Time to Start Monitoring   60 sec

<Error Detection>
Recover Target   appli1
Reactivation Threshold   1
Failover Threshold   1
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.

When **Stop cluster service and shutdown OS** or **Stop cluster service daemon and reboot OS** is selected as a final action to be taken when an error is detected by the monitor resource, the number of shutdowns or reboots can be limited.

Note:

The maximum reboot count is on a server basis because the number of reboots is recorded on a server basis.

The number of reboots caused by a final action in detection of error in group activation/deactivation and the number of reboots caused by a final action in detection of error by a monitor resource are recorded separately.

If the time to reset the maximum reboot count is set to zero (0), the number of reboots will not be reset.

The following is an example of the process when the number of reboots is limited.

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

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.

Section II Resource details

Configuration example

<Monitor>

Interval	60 sec
Timeout	120 sec
Retry count	3 times

<Error Detection>

Recovery Target	Failover group A
Reactivation Threshold	zero
Failover Threshold	zero
Final Action	Stop cluster service and reboot OS
< Reboot count limit>	
Maximum reboot count	1
Time to reset the maximum reboot count	10 minutes

server1   server2

Monitor resource
Disk TUR monitor
resource 1

Monitor resource
Disk TUR monitor
resource 1

Failover Group A

Disk resource
Application resource 1
Floating IP
resource 1

Shared disk

Maximum reboot count   1
Reboot count   Zero

Maximum reboot count   1
Reboot count   Zero

Activating the disk TUR
monitor resource 1 starts.

(Executes I/O to the devices
at each interval)

---

server1   server2

Monitor resource
Disk TUR monitor
resource 1

Monitor resource
Disk TUR monitor
resource 1

Failover Group A

Disk resource 1
Application resource
Floating IP
resource 1

Monitor error

Shared disk

Maximum reboot count   1
Reboot count   Zero

Maximum reboot count1
Reboot count   Zero

The disk TUR resource 1
detects an error.

---

server1   server2

Monitor resource
Disk TUR monitor
resource

Monitor resource
Disk TUR monitor
resource 1

Cluster daemon
stopped.
Reboot the OS.

Failov...

Disk r...
Application
resource 1
Floating IP
resource 1

Shared disk

Maximum reboot count   1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

The operating system is
rebooted after the cluster
service is stopped.
The final action is executed
because "activation retry
threshold" and "failover
threshold" are zero (0)
Reboot count one (1) is
recorded.

Section II Resource details

591

server1   server2

Monitor resource   Monitor resource
Disk Moni   Disk TUR monitor
                       resource 1

Cluster daemon
stopped.
Reboot the OS

plication
Floating IP
resource 1

Shared disk

Failover of the failover group A
starts.

"Maximum reboot count" is the
maximum value of the reboot
count on a server basis.
The reboot count is zero on
server2.

Maximum reboot count   1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

server1   server2

Monitor resource   Monitor resource
Disk TUR monitor   Disk TUR monitor
resource 1   resource 1

                      Failover
                      Group A
                      Disk resource
                      Application resource 1
                      Floating IP
                      resource 1

Shared disk

Rebooting server1 is
completed.

Maximum reboot count1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

server1   server2

Monitor resource   Monitor resource
Disk TUR monitor   Disk TUR monitor
resource 1   resource 1

                      Failover
                      Group A
                      Disk resource 1
                      Application resource 1
                      Floating IP
                      resource 1

Shared disk

The failover group A is
moved to server1 by using
the clpgrg command or
WebManager.

Maximum reboot count   1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

server1   server2

Monitor resource
Disk TUR monitor
resource 1

Monitor resource
Disk TUR monitor
resource 1

The disk TUR monitor
resource 1 detects an
error.

Failover
Group A
Disk resource
Application resource 1
Floating IP
resource 1

Monitor
error

Shared disk

Maximum reboot count   1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

server1   server2

Monitor resource
Disk TUR monitor
resource 1

Monitor resource
Disk TUR monitor
resource 1

No final action is executed on
server1   because   the
maximum reboot count has
already been reached.

Reboot count is not reset even
after 10 minutes elapses.

Failover
Group A
Disk resource 1
Application resource 1
Floating IP
resource 1

Shared disk

Maximum reboot count   1
Reboot count   1

Maximum reboot count   1
Reboot count   Zero

Troubleshooting of the error of the disk is done.
Reboot takes place after cluster shutdown by
the clpstdn command or WebManager.

server1   server2

Monitor resource
Disk TUR monitor
resource 1

Monitor resource
Disk TUR monitor
resource 1

The   disk   TUR   monitor
resource 1 in server1 is finds
no error. The reboot count is
reset after 10 minutes.

The final action is executed
next   time   the   disk   TUR
monitor resource 1 detects
an error.

Failover
Group A

Shared disk

Maximum reboot count   1
Reboot count   Zero

Maximum reboot count   1
Reboot count   Zero

Section II Resource details

Monitor resources that require a license

Monitor resources listed below require a license since they are optional products. To use these monitor resources, obtain and register a product license.

Optional product name	Monitor resource name
ExpressCluster X Database Agent 2.1 for Windows	DB2 monitor resources
	ODBC monitor resources
	Oracle monitor resources
	PostgreSQL monitor resources
	SQL Server monitor resources
ExpressCluster X Internet Server Agent 2.1 for Windows	FTP monitor resources
	HTTP monitor resources
	IMAP4 monitor resources
	POP3 monitor resources
	SMTP monitor resources
ExpressCluster X Application Server Agent 2.1 for Windows	OracleAS monitor resources
	Tuxedo monitor resources
	Websphere monitor resources
	Weblogic monitor resources
	WebOTX monitor resources
ExpressCluster X Anti-Virus Agent 2.1 for Windows	OfficeScan CL monitor resource
	OfficeScan SV monitor resource

For information on how to register a license, refer to Chapter 4, "Registering the license" in the *Installation and Configuration Guide*.

Displaying and changing the settings of group resources

Changing the name of a monitor resource

SuspendResume

1. In the tree view shown on the left pane of the Builder, click the icon of the monitor resource. In the table view shown on the right side of the screen, right-click the icon of the monitor resource whose name is to be changed, 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

1. In the tree view shown on the left pane of the Builder, right-click the icon of the monitor resource. 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** to display **Monitor Resource Properties.**
2. On the **Info** tab, the monitor resource name and comment are shown. Enter a new comment (within 127 bytes).

Note:
You cannot change the monitor 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 Monitor Resource** and enter a new name.

Displaying and changing the settings of a monitor resource

1. In the tree view shown on the left pane of the Builder, click the icon of the monitor resource.
2. The list of monitor resources is shown in the table view on the right side of the screen. Right-click the name of the monitor resource whose settings you want to change. Click **Properties**, and then click the **Monitor** tab.
3. On the **Monitor** tab, you can see and/or change the settings of monitor resource by following the description below.

Interval (1 to 999)　SuspendResume

Specify the interval to check the status of monitor target.

Timeout (5 to 999)　SuspendResume

When the normal status cannot be detected within the time specified here, the status is determined to be error.

Retry Count (0 to 999)　SuspendResume

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 you set this to zero (0), the status is determined as error at the first detection of an error.

Wait Time to Start Monitoring (0 to 9999)　SuspendResume

Set the wait time to start monitoring.

Monitor Timing　SuspendResume

Set the monitoring timing. Select the timing from:

• Always:

　Monitoring is performed all the time.

• When active:

　Monitoring is not started until the specified resource is activated.

Target Resource SuspendResume

The resource which will be monitored when activated is shown.

Browse

Click this button to open the dialog box to select the target resource. The cluster name, group names and resource names that are registered in the cluster are shown in a tree view. Select the target resource and click **OK**.

Choose servers that execute monitoring

Choose the servers that execute monitoring.

All Servers `SuspendResume`

All servers monitor the resources.

Select `SuspendResume`

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

Add `SuspendResume`

Click this button to add a server selected in **Available Servers** to **Servers that can run the Group**.

Remove SuspendResume

Delete a server selected from **Servers that can run the Group**.

Displaying and changing the settings when an error is detected by a monitor resource

1. In the tree view shown on the left pane of the Builder, click the icon of the monitor resource.

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 or display. Click **Properties**, and then click the **Error Detection** tab.

3. On the **Error Detection** tab, display and/or change the monitor settings by following the description below.

In this dialog box, you can configure the recovery target and an action to be taken at the time when an error is detected. By setting this, it allows failover of the group, restart of the resource and cluster when an error is detected. However, recovery will not occur if the recovery target is not activated.

Recovery Target SuspendResume

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 you can select the target resource. The cluster name, group names and resource names that are registered in the cluster are shown in a tree view. Select the target resource and click **OK**.

Reactivation Threshold (0 to 99)   `SuspendResume`

Specify how many times you allow reactivation when an error is detected. If this is set to zero (0), no reactivation is executed. This is enabled when a group or group resource is selected as a recovery target.

Failover Target Server   `SuspendResume`

Select a Failover Target Server for the failover that takes place after reactivation retries upon activation error detection have failed for the number of times specified in **Retry Count at Activation Failure**.

- Stable operation server
  The failover destination is the server where least resource errors have been detected.
  If two or more servers that meet the above condition exist, failover takes place by selecting one of them according to the failover policy of the group..

- Server with the highest priority
  Failover takes place according to the failover policy settings of the group.

Failover Threshold (0 to 99)   `SuspendResume`

Specify how many times you allow failover after reactivation fails for the number of times set in **Reactivation Threshold** when an error is detected. If this is set to zero (0), no failover is executed. This is enabled when a group or group resource is selected as a recovery target.

- Set as many as the number of the servers
  Specify the number of servers as the number of failovers to occur.

- Specify the count
  Specify any number of times to a failover threshold.

Final Action   `SuspendResume`

Select a final action to be taken after reactivation fails for the number of times set in **Reactivation Threshold**, and failover fails for the number of times set in **Failover Threshold** when an error is detected.

Select the final action from the options below:
- **No Operation**
  No action is taken.
- **Stop Group**

Section II Resource details

When a group or group resource is selected as a monitor target, this option stops the group or the group that the group resource belongs. This is disabled when a cluster is selected as a monitor target.

- **Stop cluster service**
  Stops the ExpressCluster Server service of the server that detected an error.
- **Stop cluster service and shutdown OS**
  Stops the ExpressCluster Server service of the server that detected an error, and then shuts down the OS.
- **Stop cluster service and reboot OS**
  Stops the ExpressCluster Server service of the server that detected an error, and then reboots the OS.
- **Generating of intentional Stop Error**
  Intentionally cause stop error for the server that detected an error.

Execute Script before Final Action

Select whether script is run or not before executing final action.

- When selected:

  A script/command is run before executing final action. To configure the script/command setting, click **Settings**.

- When cleared:
  Any script/command is not run.

Settings

Click here to display the **Edit Script** dialog box. Set the script/command to be run before executing final action.

User Application

Use an executable file (executable batch 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 you specify only the name of the executable file, you must configure the path with environment variable in advance. If there is any blank in the absolute path or the file name, put them in double quotation marks ("") as follows.

Example:

"C:\Program Files\script.bat"

If you want to execute VBScript, enter a command and VBScript file name as follows.

Example:

  cscript script.vbs

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 batch file or execution file) when you select **User Application**.

View

Click here to display the script file with the editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

Edit

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

Replace

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

Timeout (0 to 99)

Specify the maximum time to wait for completion of script to be executed. The default value is set as 5.

Change

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

Standard Editor

Select here to use a standard editor (Notepad in Windows) as a script editor.

External Editor

Select here to specify an arbitrary script editor. Click **Browse** to specify the editor to be used

Displaying and changing parameters of a monitor resource

Some monitor resources require parameter setting for monitoring. For displaying and changing parameters, please refer to explanations of each monitor resource that described on following pages.

Understanding application monitor resources

Application monitor resources monitor application resources.

Monitoring by application monitor resources

Application monitor resources monitor application resources in a server where they are activated. They regularly monitor whether applications are active or not. When they detect that applications do not exist, it is determined to be an error.

Displaying the application 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 an object for the application monitor resources 🔍 in the tree view. The following information is displayed in the list view.

Application Monitor Name: appliw1	Details
Properties	**Value**
Name	appliw1
Comment	
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name:	Application monitor resource name
Comment:	Comment for the application monitor resource
Status:	Status of the application monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	appliw
Monitor Timing	Activating
Target Resource	appli
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	ExpressCluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of times activation is retried when an activation error is detected
Failover Destination Server	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before start monitoring (in seconds)

Understanding disk RW monitor resources

Disk RW monitor resources monitor disk devices by writing dummy data to the file system.

Monitoring by disk RW monitor resources

Disk RW monitor resources write data to the specified file system (basic volume or dynamic volume) with the specified I/O size and evaluate the result. They solely evaluate whether data was written with the specified I/O size but do not evaluate validity of data. (Created file is deleted after writing)

OS and disk get highly loaded if the size of I/O is large. Depending on disk and/or interface being used, caches for various writing are mounted. Because of this, if the size of I/O is small, a cache hit may occur and an error in writing may not get detected. Intentionally generate a disk error to confirm that the size of I/O is sufficient to detect an error.

Note:
If you want multipath software to initiate path failover when disk path is not connected, you should set longer timeout for disk RW monitor resource than path failover time.

Displaying and changing disk RW monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target disk RW monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

File Name   Within 1023 bytes   SuspendResume

Enter the file name to access. This file is created upon monitoring and deleted after I/O completes.

Note:

Specify an absolute path for the file name. If a relative path is specified for the file name, the disk RW monitor resource may monitor the unexpected place.

Important:

Do not specify any existing file for the file name. If an existing file is specified for the file name, the data of the file is lost.

I/O size (1 to 9999999)   **SuspendResume**

Specify the I/O size for the disk to monitor.

Action when stalling is detected   **SuspendResume**

Specify the action to take when stalling is detected.

- No Operation

  No action is taken.

- HW Reset

  Reset the hardware.

- Generating of intentional Stop Error

  Intentionally cause a stop error.

Displaying the disk RW 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 an object for the disk RW monitor resources in the tree view. The following information is displayed in the list view.

Disk RW Monitor Name: diskw1	Details
Properties	Value
Name	diskw1
Comment	
File Name	X:\diskw
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: Disk RW monitor resource name
Comment: Comment for the disk RW monitor resource

File Name   Path to the file name on the file system to monitor
Status: Status of the disk RW monitor resource

Server Name: Server name
Status: Status of the disk RW monitor resource on the given server

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

Properties	Value
Type	diskw
Monitor Timing	Activating
Target Resource	sd1
Interval	30
Timeout	300
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
I/O Size (byte)	2000000
Action On Stall	Stop Error

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the error as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of times activation is retried when an activation error is detected
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before start monitoring (in seconds)
I/O size (Byte):	Write size (byte)
Action on Stall:	Action when stalling is detected

Understanding floating IP monitor resources

Floating IP monitor resources monitor floating IP resources.

Monitoring by floating IP monitor resources

Floating IP resources monitor floating IP resources in a server where they are activated. Floating IP monitor resources monitor whether floating IP addresses exist in the list of IP addresses. If a floating IP address does not exist in the list of IP addresses, it is determined to be an error.

Floating IP resources monitor link up/down of NIC where a floating IP address is active. If NIC link down is detected, it is considered as an error. In some NIC drivers, required DeviceIoControl may not be supported. In such a case, monitoring cannot be performed.

Displaying and changing floating IP monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target floating IP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Monitor NIC Link Up/Down

Specify whether to monitor NIC Link Up/Down.

Displaying the floating IP 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 an object for the application monitor resources in the tree view. The following information is displayed in the list view.

FIP Monitor Name: Fipw1	Details
Properties	**Value**
Name	Fipw1
Comment	
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name:	Floating IP monitor resource name
Comment:	Comment for floating the IP monitor resource
Status:	Status of the floating IP monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	fipw
Monitor Timing	Activating
Target Resource	fip1
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	A
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Monitor NIC Link Up/Down	Off

Type: Monitor resource type

Monitor Timing: Timing for the monitor resource to start monitoring

Interval: Interval between monitoring (in seconds)

Timeout: Time to elapse from detection of an error to establish the monitor resource as error (in seconds)

Target Resource: Resource to be monitored

Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error

Final Action: Final action at detection of an error

Execute Script before Final Action: Whether or not script is executed when a failure is detected

Recovery Target: Target to be recovered when an error is detected

Recovery Target Type: Type of target to be recovered when an error is detected

Reactivation Threshold: The number of times activation is retried when an activation error is detected

Failover Target Server: Determination method of Failover Target Server

Failover Threshold: The number of failovers to be made at detection of an error

Wait Time to Start Monitoring: Time to wait before start monitoring (in seconds)

Monitor NIC Link Up/Down: Monitor/Do not monitor NIC Link Up/Down

Understanding IP monitor resources

IP monitor resource is a monitor resource which monitors IP addresses by using the ping command depending on whether there is a response or not.

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 **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 IP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

IP addresses to be monitored are listed in **IP Addresses**.

 Add

Click **Add** to add an IP address to be monitored.

 A dialog box where you can enter an IP address is displayed.

IP Address (within 255 bytes)

Enter an IP address to be monitored in this field and click **OK**. The IP address to be entered here should be the one that exists on the public LAN.

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**.

Ping Timeout (1 to 999999)

Specify the time-out of the ping to be sent to monitor the IP address in milliseconds.

Displaying the IP 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 an IP monitor object, , in the tree view. The following information is displayed in the list view.

IP Monitor Name: ipw1	Details
Properties	Value
Name	ipw1
Comment	
IP Address List	192.168.0.254
Ping Timeout (milliseconds)	1000
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name: IP monitor resource name
Comment: Comment on the IP monitor resource
Status: IP monitor resource status
IP Addresses: IP address to be monitored
Server Name: Server name
Status: Status of the monitor resource on the server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Type	ipw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	A
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for monitor resource to start monitoring
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor
                                            resource as error (in seconds)
Target Resource: Resource to be monitored
Retry Count: The number of retries to be made from detection of an error in
                                            the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                            Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before start monitoring (in seconds)

ExpressCluster X 2.1 for Windows Reference Guide

Understanding mirror connect monitor resources

Note on mirror connect monitor resources

A mirror disk connect monitor resource monitors a network for mirroring. If communication of mirror data using the specified mirror connect fails, it is recognized as an error. This resource is automatically registered when the first mirror disk resource is added. Because mirror disk resources share the same mirror connect interface, only one interface is automatically registered. When this resource is deleted, be careful that auto mirror recovery cannot be executed.

Refer to "Automatically recovering from mirroring" in "Connecting mirror disks/hybrid disks manually" of "Chapter 12 Troubleshooting" for the details.

Displaying and changing the mirror connect monitor resource details ~For Replicator ~

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 mirror disk monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Note:

Do not change the settings shown below on the **Error Detection** tab. With these settings, you can send an alert message if an error is determined.

The **Error Detection** tab settings:

Recovery Target	Cluster name
Reactivation Threshold	Zero (Never)
Failover Threshold	Zero (Never)
Failover Target Server	Stable operation server
Final Action	No Operation

Mirror Disk Resource SuspendResume

The mirror disk resource to be monitored is displayed.

Browse

Click this button to display the dialog box where you can select a mirror disk resource to be monitored. Mirror disk resources registered with the cluster are displayed in a tree view. You can select only mirror disk resources in this view. Select a mirror disk resource and click **OK**.

Displaying the mirror connect monitor resource properties with the WebManager

1. Start the WebManager (*http://FIP_address_for_the_WebManager_group*: *port_numbe*r (the default value is 29003)).

2. Click a mirror connect monitor object, , in the tree view. The following information is displayed in the list view.

Mirror Connect Monitor Name: mdnw1	Details
Properties	Value
Name	mdnw1
Comment	
Mirror Disk Resource Name	md1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name:	Mirror connect monitor resource name
Comment:	Comment of the mirror connect monitor resource
Mirror Disk Resource Name:	Name of the mirror disk resource to be monitored by mirror connect monitor resource
Status:	Mirror connect monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	mdnw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	20
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	md1
Recovery Target Type	Resource
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish
                                        the monitor resource as error (in seconds)
Retry Count: The number of retries to be made from detection of an
                                        error in the monitor target to establish the monitor
                                        resource as error.
Final Action: Final action at detection of an error
Execute Script before Final Action: Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when a problem is
                                        detected
Reactivation Threshold: The number of reactivations to be made at detection
                                        of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an
                                        error
Wait Time to Start Monitoring: Time to wait before starting monitoring (in seconds)

Understanding mirror disk monitor resources

Mirror monitor resources monitor a mirror partition device or mirror driver works properly.

Note on mirror disk monitor resources

This resource is automatically registered when a mirror disk resource is added. A mirror disk monitor resource corresponding to the mirror disk resource is automatically registered.
When this resource is deleted, be careful that auto mirror recovery cannot be executed.

Refer to "Automatically recovering from mirroring" in "Connecting mirror disks/hybrid disks manually" of "Chapter 12 Troubleshooting" for the details.

Displaying and changing the mirror disk monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target mirror disk monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Note:
Do not change the settings shown below on the Error Detection tab.
The Error Detection tab settings:
Recovery object Mirror disk resource name
Reactivation threshold   Zero (Never)
Failover Target Server   Stable operation server
Failover threshold   Set as many as the number of the servers
Final Action   No Operation

Mirror Disk Resource SuspendResume

The mirror disk resource to be monitored is displayed.

Browse

Click this button to display the dialog box where you can select a mirror disk resource to be monitored. Mirror disk resources registered with the cluster are displayed in a tree view. You can select only mirror disk resources in this view. Select a mirror disk resource and click OK.

ExpressCluster X 2.1 for Windows Reference Guide

Displaying the mirror disk 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 an object for a mirror disk monitor resource, , in the tree view. The following information is displayed in the list view.

Mirror Disk Monitor Name: mdw1	Details
Properties	Value
Name	mdw1
Comment	
Mirror Disk Resource Name	md1
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name:	Mirror disk monitor resource name
Comment:	Comment of the mirror disk monitor resource
Mirror Disk Resource Name:	Name of the mirror disk resource to be monitored by the mirror disk monitor resource
Status:	Mirror disk monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	mdw
Monitor Timing	Always
Target Resource	
Interval	30
Timeout	999
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	md1
Recovery Target Type	Resource
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error.
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting monitoring (in seconds)

Understanding NIC link up/down monitor resources

NIC Link Up/Down monitor resource obtains the information on how the specified NIC is linked and monitors the linkage is up or down.

Note on NIC link up/down monitor resources

Some NIC drivers may not support the DeviceIoControl required for monitoring NIC, in which case you cannot use this monitor resource.

Configuration and range of NIC link up/down monitoring

◆ The DeviceIoControl to the NIC driver is used to find how the server is linked to the network. (For the IP monitoring, the status is judged by the ping response from the specified IP address.)

◆ You can monitor an NIC dedicated to interconnect (mirror connect). If you do this in the environment where two nodes are directly connected with a cross cable and one server fails, the other server is considered to be failing. This is because no link is established.
The recovery action to be taken at detection of error should be configured with the appropriate value.
For example, if you select **Stop cluster service and reboot OS**, other servers will continue to restart the OS endlessly.

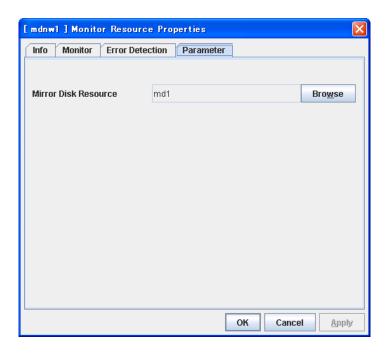## Displaying and changing the NIC link up/down monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target NIC Link Up/Down monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

NIC Link UP/Down monitor resource acquires the status of the specified NIC Link and monitors the status of being up and down of the Link.

NIC Link Up/Down monitor resource parameter tab

Add

Add the IP address of the NIC to be monitored to the list of monitoring servers.

Delete

Delete the IP address of the NIC to be monitored from the list of monitoring servers.

Edit

Edit the IP address of the NIC to be monitored.

NIC Link Up/Down monitor resource add/edit properties

IP Address Within 47 bytes

Specify the IP address of the NIC to be monitored.

Displaying the NIC link up/down 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 NIC Link Up/Down monitor resource object, 🔲, in the tree view. The following information is displayed in the list view.

NIC Link Up/Down Monitor Name: miiw1	Details
Properties	Value
Name	miiw1
Comment	
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

Name:	NIC Link Up/Down monitor resource name
Comment:	Comment of the NIC Link Up/Down monitor resource
Status:	NIC Link Up/Down monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Type	miiw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting monitoring (in seconds)

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

The table below describes status of a multi target monitor resource:

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, multi target monitor resource detects an error.
If the number of the monitor resources with the caution status exceeds the caution threshold, the status of the multi target monitor 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 monitor 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.

Displaying and changing the details of the multi target monitor resource

1. Click **Monitors** on the tree view displayed on the left pane of the Builder window.

2. List of monitor resources is displayed in the table view on the right side of the screen. Right-click the multi target monitor resource. Then click **Properties** and select **Parameter** tab.

3. On the **Parameter** tab, you can display 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.

Multi target monitor resource parameter tab

Add   SuspendResume

Click **Add** to add a selected monitor resource to **Monitor Resources.**

Remove   SuspendResume

Click **Remove** to delete a selected monitor resource from **Monitor Resources**.

ExpressCluster X 2.1 for Windows Reference Guide

Tuning multi target monitor resource

1. From the tree view displayed in the left pane of the Builder, click the **Monitors** icon.

2. The list of monitor resources is displayed on the table view in the right pane of the window. Right-click the target multi target monitor resource name. Click **Properties**, and then click **Parameters**.

3. Click **Tuning** on the **Parameters** tab. The **MultiTarget Monitor Resource Tuning Properties** dialog box is displayed.

4. The settings of multi target monitor resource can be displayed and changed by following the description below.

Parameter tab

Error Threshold

Select the condition for multi target monitor resources to be determined as an error.

· Same as Number of Members

The status of multi target monitor resources becomes "Error" when all monitor resources specified to be under the multi target monitor resource are failed, or when "Error" and "Offline" co-exist.

The status of multi target monitor resources becomes "Normal" when the status of all monitor resources specified to be under the multi target monitor resource are "Offline."

· Specify Number

The status of multi target monitor resources becomes "Error" when the number of monitor resources specified in **Error Threshold** becomes "Error" or "Offline."

When the status of some monitor resources among those specified to be under the multi target monitor resource, specify how many monitor resources need to be "Error" or "Offline" to determine that the status of multi target monitor resource is "Error."

Warning Threshold

· When selected:

When the status of some monitor resources among those specified to be under the multi target monitor resource, specify how many monitor resources need to be "Error" or "Offline" to determine that the status of multi target monitor resource is "Caution."

· When cleared:

Multi target monitor resources do not display an alert.

Initialize

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

Displaying the properties of the multi target monitor resource with the WebManager

1. Start the WebManager. (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

2. 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
Properties	**Value**
Name	mtw1
Comment	
Monitor Resource List	appliw1
	fipw1
	sdw1
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Online

Name:	Multi target monitor resource name
Comment:	Comment of the multi target monitor resource
Monitor Resources:	List of monitor resources
Status:	Multi target monitor resource status

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

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

Properties	Value
Type	mtw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor
                                          resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in
                                          the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                          Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding registry synchronization monitor resources

Registry synchronization monitor resources monitor registry synchronization resources.

Displaying and changing the details of the registry synchronization monitor resources

There is no detailed setting to be made for registry synchronization monitor resources.

Displaying the registry synchronization monitor resources 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 registry synchronization monitor resources object, , in the tree view. The following information is displayed in the list view.

Registry Synchronization Monitor Name: reg...	Details
Properties	**Value**
Name	regsyncw1
Comment	
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name:	Registry synchronization monitor resource name
Comment:	Comment of the registry synchronization monitor resource
Status:	Registry synchronization monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource status on the given server

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

Properties	Value
Type	regsyncw
Monitor Timing	Activating
Target Resource	regsync1
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the
                                                    monitor resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                                                    in the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                                    Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an
                                                    error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding disk TUR monitor resources

Disk TUR monitor resources monitor the disk specified by disk resource.

Notes on disk TUR monitor resources

Note 1   You cannot run the SISI Test Unit Ready command 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.

Note 2   TUR monitor resources, compared to disk RW monitor resources, burdens OS and disks less.

Note 3   In some cases, Test Unit Ready may not be able to detect actual errors in I/O to media.

Note 4   If you want multipath software to initiate path failover when disk path is not connected, you should set longer timeout for disk RW monitor resource than path failover time.

Displaying and changing the disk TUR monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target disk TUR monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Disk TUR monitor resource parameter tab

Disk Resource SuspendResume

Select a disk resource.

Browse

Click this button to display the disk resources that can be registered.

Disk TUR monitor resource: disk resource selection properties

Displaying the disk TUR monitor resources 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 TUR monitor resources object, , in the tree view. The following information is displayed in the list view.

Name:	Disk TUR monitor resource name
Comment:	Comment of the disk TUR monitor resource
Disk Resource:	Disk resource to be monitored.
Status:	Disk TUR monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource status on the given server

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

Properties	Value
Type	sdw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	300
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor
                             resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in
                             the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                             Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding service monitor resources

Service monitor resources monitor service resources.

Monitoring by service monitor resources

Service monitor resources monitor service resources in a server where they are activated. They regularly check the service status with the service control manager and if the status of the service resource becomes Stopped, it is considered as an error.

Displaying and changing the details of the service monitor resources

There is no detailed setting to be made for service monitor resources.

Displaying the service monitor resources 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 virtual computer name monitor object, , in the tree view. The following information is displayed in the list view.

Name:	Service monitor resource name
Comment:	Comment of the service monitor resource
Status:	Service monitor resource status
Server Name:	Server name
Status:	Status of the monitor resource status on the given server

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

Properties	Value
Type	servicew
Monitor Timing	Activating
Target Resource	service1
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor
                             resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in
                             the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                             Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding print spooler monitor resources

Print spooler monitor resources monitor print spooler resources. They regularly check the spooler service status with the service control manager and if the status of the print spooler monitor resource becomes Stopped, it is considered as an error.

Displaying and changing the details of the print spooler monitor resources

There is no detailed setting to be made for print spooler monitor resources.

Displaying the print spooler monitor resources 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 print spooler monitor resources object, , in the tree view. The following information is displayed in the list view.

Print Spooler Monitor Name: spoolw1	Details
Properties	**Value**
Name	spoolw1
Comment	
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Print spooler monitor resource name
Comment: Comment of the print spooler monitor resource
Status: Print spooler monitor resource status

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

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

Properties	Value
Type	spoolw
Monitor Timing	Activating
Target Resource	spool1
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor
                                    resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in
                                    the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                    Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Section II Resource details

Understanding virtual computer name monitor resources

Virtual computer name monitor resources monitor virtual computer name resources.

Monitoring by virtual computer name monitor resources

Virtual computer name monitor resources monitor virtual computer name resources in a server where they are activated. Virtual computer name monitor resources regularly check the virtual computer name control process. It is considered an error if the process is not found.

Virtual computer name monitor resource

Note 1 This monitor resource is automatically registered when the virtual computer name resource is added.

Note 2 The effective final actions when an error in this resource is detected is set to **Stop the cluster service and shutdown OS, Stop the cluster service and reboot OS** and **Generating of intentional Stop Error** only. This is because the OS reboot is required for correctly activating virtual computer name resource when virtual computer name control process disappeared. The default is **Stop the cluster service and shutdown OS.** If the virtual computer name control process is not found, the group fails over by shutting down or rebooting the server that detected an error.

Displaying and changing the details of the virtual computer name resources

There is no detailed setting to be made for virtual computer name monitor resources.

Displaying the virtual computer name 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 virtual IP monitor object, , in the tree view. The following information is displayed in the list view.

Virtual Computer Name Monitor Name: vco...   [Details]

Properties	Value
Name	vcomw1
Comment	
Status	Normal

Resource Status on Each Server

Server Name	Status
server1	Online
server2	Offline

Name: Virtual computer name monitor resource name
Comment: Comment of the virtual computer name monitor resource
Status: Status of the virtual computer name monitor resource

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

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

Properties	Value
Type	vcomw
Monitor Timing	Activating
Target Resource	vcom1
Interval	60
Timeout	60
Retry Count	1
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the
                               monitor resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                               in the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                               Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an
                               error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Section II Resource details

Understanding virtual IP monitor resources

Virtual IP monitor resources monitor virtual IP resources.

Monitoring by virtual IP monitor resources

Virtual IP monitor resources monitor virtual IP resources in a server where they are activated.
Virtual IP monitor resources monitor whether the virtual IP address exists in the list of IP
addresses. If the virtual IP address does not exist, it is considered as an error.

Displaying and changing the details of the virtual IP monitor resources

There is no detailed setting to be made for virtual IP monitor resources.

Displaying the virtual IP 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 an application monitor resources object, , in the tree view. The following
   information is displayed in the list view.

Name:	Virtual IP monitor resource name
Comment:	Comment of the virtual IP monitor resource
Status:	Status of the virtual IP monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	vipw
Monitor Timing	Activating
Target Resource	vip1
Interval	60
Timeout	60
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor resource as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                 Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding CIFS monitor resources

CIFS monitor resources monitor CIFS resources.

Monitoring by CIFS monitor resources

CIFS resources monitor CIFS resources in a server where they are activated.

CIFS monitor resources obtain the information of shared folders publicized on a server and monitor if the shared folders publicized by CIFS resources are contained. An error is detected when the shared folders publicized by CIFS resources do not exist.

CIFS monitor resources also monitor accessibility to the shared folders.
When auto-saving of shared configuration of drive is executed, activation monitoring of the function to share and save the shared configuration is also be executed.

Notes on CIFS monitor resources

◆ When access check needs to be performed, the specified access method must be permitted for the local system account in the CIFS resources to be monitored.

◆ When auto-saving of shared configuration of drive is executed on the monitoring target CIFS resource and the access check is executed on CIFS monitor resource, the specified access as a check method is executed on all the shared folder of the auto-saving target drive. When **Read** of folder check/file check is specified as checking method, the folder/file specified on **Path** must be on each shared folder.

Displaying and changing the details of CIFS monitor resources

1. From the tree view displayed on the left pane of the Builder. Click **Monitors**.

2. The monitor resources list is displayed on the table view in the right of the window. Right-click the desired CIFS monitor resource name, and click **Properties**. In the properties dialog box, click the **Parameter** tab.

3. Display and/or change the detailed settings on the **Parameter** tab.

Access Check   `SuspendResume`

Specify the way to check access to the shared folders.

◆   Disable (default)

Access check is not performed.

◆   Folder Check

Check if you can refer to the folder specified in **Path.**

◆   File Check

Check if reading and writing to the file specified in **Path** can be performed.

Path   (Within 256bytes)   `SuspendResume`

Specify the file/folder for access check by using a relative path from the shared folder.

For folder check, specify the folder in the shared folder.

When **Read/Write** is selected as a file check method, the specified file is newly created. Make sure to specify a file name that does not overlap with other file names.

When **Read** is selected a file check method, specify a file in the shared folder.

Check   `SuspendResume`

Select the way to check the access for **File Check**.

◆   Read/Write (default value)

Write data to the file and check it can be read.

◆   Read

Open the files and check it can be read.

Displaying CIFS monitor resource properties with the WebManager

1. Start the WebManager.

    (http://*CIFS_address_for_the_WebManager_group: port_number*

    (the default value is 29003.))

2. Click the application monitor object in the tree view.

CIFS Monitor Name: cifsw1	Details
Properties	Value
Name	cifsw1
Comment	
Status	Normal

Name:	CIFS monitor resource name
Comment:	Comment of CIFS monitor resource
States:	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

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

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

Properties	Value
Type	cifsw
Monitor Timing	Activating
Target Resource	cifs1
Interval	60
Timeout	60
Retry Count	1
Final Action	Stop Group
Execute Script before Final Action	Off
Recovery Target	A
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0
Access Cehck	Foldero check
Check Path	sample
Check Method	Read/Write

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring

ExpressCluster X 2.1 for Windows Reference Guide

Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)
Access Check:	The way of checking the access
Check Path:	The path for the folders/files to be checked
Check Method:	The way of performing file check

Section II Resource details

Understanding NAS monitor resources

NAS monitor resources monitor NAS resources.

Monitoring by NAS monitor resources

NAS monitor resources monitor NAS resources in a server where they are activated.

Check that the network drive mounted by NAS resources is connected.

Displaying and changing the details of NAS monitor resources

There is no detailed setting to be made for NAS monitor resources.

Displaying NAS monitor resources properties with the WebManager

1. Start the WebManager.

   (http://*FIP _address_for_the_WebManager_group:port_number* (Default value is 29003.))

2. Click the NAS monitor resources object, in the tree view. The following information is displayed in the list view.

CIFS Name: cifs1	Details
Properties	Value
Name	cifs1
Comment	
Share Name	share1
Path	I:\test1
Status	Offline

Name: NAS monitor resource name
Comment: Comment of NAS monitor resource
Status: Status of NAS monitor resource

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

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

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

Properties	Value
Type	nasw
Monitor Timing	Activating
Target Resource	nas1
Interval	60
Timeout	60
Retry Count	1
Final Action	Stop Group
Execute Script before Final Action	Off
Recovery Target	A
Recovery Target Type	Group
Reactivation Threshold	3
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0

Type: Monitor resource type

Monitor Timing: Timing for the monitor resource to start monitoring

Target Resource: Resource to be monitored.

Interval: Interval between monitoring (in seconds)

Timeout: Time to elapse from detection of an error to establish the monitor resource as error (in seconds).

Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error

Final Action: Final action at detection of an error

Execute Script before Final Action:
Whether or not script is executed when a failure is detected

Recovery Target: Target to be recovered when an error is detected

Recovery Target Type: Type of target to be recovered when an error is detected

Reactivation Threshold: The number of reactivations to be made at detection of an error

Failover Target Server: Determination method of Failover Target Server

Failover Threshold: The number of failovers to be made at detection of an error

Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding hybrid disk monitor resources

Hybrid disk monitor resources monitor a mirror partition device or mirror driver works properly.

Note on hybrid disk monitor resources

This resource is automatically registered when a hybrid disk resource is added. A hybrid disk monitor resource corresponding to the hybrid disk resource is automatically registered.
When this resource is deleted, be careful that auto mirror recovery cannot be executed.

Refer to "Automatically recovering from mirroring" in "Connecting mirror disks/hybrid disks manually" of "Chapter 12 Troubleshooting" for the details.

Displaying and changing the hybrid disk monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target mirror disk monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Note:

Do not change the settings shown below on the **Error Detection** tab.
The Error Detection tab settings:

Recovery object	Hybrid disk resource name
Reactivation threshold	Zero (Never)
Failover Target Server	Stable operation server
Failover threshold	Set as many as the number of the servers
Final Action	No Operation

Hybrid Disk Resource   SuspendResume

The hybrid disk resource to be monitored is displayed.

Browse

Click this button to display the dialog box where you can select a hybrid disk resource to be monitored. Hybrid disk resources registered with the cluster are displayed in a tree view. You can select only hybrid disk resources in this view. Select a hybrid disk resource and click **OK**.

Displaying the hybrid disk 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 an object for a hybrid disk monitor resource, , in the tree view. The following information is displayed in the list view.

Name: Hybrid disk monitor resource name
Comment: Comment of the hybrid disk monitor resource
Hybrid Disk Resource Name: Name of the hybrid disk resource to be monitored by the hybrid disk monitor resource
Status: Hybrid disk monitor resource status

Server Name	Status
server1	Online
server2	Online

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

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

Properties	Value
Type	hdw
Monitor Timing	Always
Target Resource	
Interval	30
Timeout	999
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	hd_Z
Recovery Target Type	Resource
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	10

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error.
Final Action: Final action at detection of an error
Execute Script before Final Action: Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting monitoring (in seconds)

Understanding hybrid disk TUR monitor resources

Hybrid disk TUR monitor resources monitor the disk specified by hybrid disk resource.

Notes on hybrid disk TUR monitor resources

Note 1   This resource is automatically registered when a hybrid disk resource is added. Hybrid disk TUR monitor resources corresponding hybrid disk resources are automatically registered.

When this resource is deleted, be careful that auto mirror recovery cannot be executed.

Refer to "Automatically recovering from mirroring" in "Connecting mirror disks/hybrid disks manually" of "Chapter 12 Troubleshooting" for the details.

Note 2   You cannot run the SISI Test Unit Ready command 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.

Note 3   TUR monitor resources, compared to disk RW monitor resources, burdens OS and disks less.

Note 4   In some cases, Test Unit Ready may not be able to detect actual errors in I/O to media.

Displaying and changing the hybrid disk TUR monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target disk TUR monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Note:

Do not change the settings shown below on the **Error Detection** tab.
The **Error Detection** tab settings:

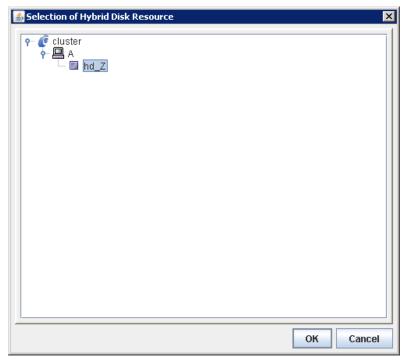|	
Recovery object	Hybrid disk resource name
Reactivation threshold	Zero (Never)
Failover Target Server	Stable operation server
Failover threshold	Set as many as the number of the servers
Final Action	No Operation

Hybrid disk TUR monitor resource parameter tab

Hybrid Disk Resource SuspendResume

Select a hybrid disk resource.

Browse

Click this button to display the hybrid disk resources that can be registered.

Displaying the hybrid disk TUR monitor resources 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 hybrid disk TUR monitor resources object, , in the tree view. The following information is displayed in the list view.

Hybrid-Disk TUR Monitor Name: hdtw1	Details

Common	server1	server2

Properties	
Name	hdtw1
Comment	
Hybrid Disk Resource	hd_Z
Status	Normal

Name: Hybrid disk TUR monitor resource name
Comment: Comment of the hybrid disk TUR monitor resource
Hybrid Disk Resource: Hybrid disk resource to be monitored.
Status   Hybrid disk TUR monitor resource status

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Online

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

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

Properties	Value
Type	hdtw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	300
Retry Count	0
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	hd_Z
Recovery Target Type	Resource
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing for the monitor resource to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)

Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the monitor resource as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	
	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)

Understanding custom monitor resources

Custom monitor resources monitor system by executing an arbitrary script.

Monitoring by custom monitor resources

Custom monitor resources monitor system by an arbitrary script.

When Monitor Type is **Synchronous**, custom monitor resources regularly run a script and detect errors from its error code.

When Monitor Type is **Asynchronous**, custom monitor resources run a script upon start monitoring and detect errors if the script process disappears.

Displaying and changing the details of the custom monitoring resources

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target custom monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

User Application

Use an executable file (executable batch 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 batch file or execution file) when you select **User Application**.

View

Click here to display the script file with a editor when you select **Script created with this product**. The information edited and stored with the editor is not reflected. You cannot display the script file if it is currently displayed or edited.

Edit

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

Replace

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

Change

Click here to display the **Change Script Editor** dialog. You can change editor for displaying or editing a script to an arbitrary editor.

Standard Editor

Select here to use a standard editor (Notepad in Windows) as a script editor.

External Editor

Select here to specify an arbitrary script editor. Click **Browse** to specify the editor to be used.

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.

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 Web Manager

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.

Properties	Value
Name	genw
Comment	
Monitor Path	genw.bat
Status	Normal

Name: Custom monitor resource name
Comment: Comment of the custom monitor resource
Monitor Path: Path to the monitor script

Server Name	Status
server2	Offline
server1	Offline

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

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

Common	server2	server1	
Properties			Value
Type			genw
Monitor Timing			Always
Target Resource			
Interval			60
Timeout			120
Retry Count			1
Final Action			No Operation
Execute Script before Final Action			Off
Recovery Target			ExpressCluster
Recovery Target Type			Itself
Reactivation Threshold			0
Failover Target Server			Stable Server
Failover Threshold			0
Wait Time to Start Monitoring			0
Monitor Type			Synchronous
Normal Return Value			0

Type:	Monitor resource type
Monitor Timing:	Timing for the monitor resource to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the monitor resource as error (in seconds)
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of times activation is retried when an activation error is detected
Failover Destination Server	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before start monitoring (in seconds)
Monitor Type	Execution method of monitor type

Understanding DB2 monitor resources

DB2 monitor resources monitor DB2 database that runs on the server.

DB2 monitor resources

Note 1   For the supported DB2 versions, refer to the *Getting Started Guide*.

Note 2   DLL interface (DB2CLI.DLL/DB2CLI64.DLL) needs to be installed on servers where monitoring is performed because DB2 CLI is used for monitoring. For target monitoring resources, specify a service resource or a script resource that starts DB2. Monitoring starts after the target resource is activated; however, if the database cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring**.

Note 3   A monitor table is created when monitoring is started and it is deleted when monitoring is stopped due to the stop of the failover group. When monitoring is temporarily stopped or when server fails before the failover group stops due to system error, the monitor table will not be deleted. It is not an error even if an alert message saying that "a monitor table exists" is displayed next time when monitoring is started.

Note 4   DB2 may produce operation logs for each monitoring. Configure DB2 settings if this needs to be adjusted.

Monitoring by DB2 monitor resources

A monitor table is created on the database. Maximum of 10-digits numeric data is read and written by issuing SQL statements. As a result of monitoring, the following is considered as an error:

(1)   When connection to the database fails.

(2)   When an error is notified as a response to the issue of SQL statement.

(3)   When the written data and read data do not match.

The SQL statement to use is: create/drop/insert/update/select.

Displaying and changing the disk DB2 monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.
2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target DB2 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.
3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Database Name　　Within 255 bytes　　SuspendResume

Specify the database to be monitored. You must specify the database.

Default value: None

Instance Name　Within 255 bytes　　SuspendResume

Specify the instance name of the database to be monitored. You must specify the instance name.

Default value: DB2

User Name　Within 255 bytes　　SuspendResume

Specify the user name to log on to the database.

Default value: db2admin

Password　　Within 255 bytes　　SuspendResume

Specify the password to log on to the database. Click **Change** and enter the password in the dialog box.

Default value: None

Monitor Table Name　Within 255 bytes　　SuspendResume

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

Default value: DB2WATCH

Displaying the DB2 monitor resource properties with the WebManager

3. Start the WebManager

(*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

4. Click a DB2 monitor resources object, , in the tree view. The following information is displayed in the list view.

DB2 Monitor Name: db2w1	Details
Properties	Value
Name	db2w1
Comment	
Database Name	Sample
Instance	DB2
Monitor Table	DB2WATCH
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	DB2 monitor resource name
Comment:	Comment of the DB2 monitor resource
Database Name:	The database to be monitored
Instance Name:	The database instance to be monitored
Monitor Table Name:	A table name for monitoring
Status:	Status of the DB2 monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	db2w
Monitor Timing	Activating
Target Resource	db2
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)

Timeout:	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	
	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)

Understanding FTP monitor resources

FTP monitor resources monitor FTP services that run on the server. FTP monitor resources monitor FTP protocol and they are not intended for monitoring specific applications. FTP monitor resources monitor various applications that use FTP protocol.

FTP monitor resources

Note 1 For monitoring target resources, specify service resources or script resources that start FTP monitor resources. Monitoring starts after target resource is activated. However, if FTP monitor resources cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring.**

Note 2 FTP service may produce operation logs for each monitoring. Configure FTP settings if this needs to be adjusted.

Monitoring by FTP monitor resources

FTP monitor resources connect to the FTP server and execute the command for acquiring the file list. As a result of monitoring, the following is considered as an error:

(1) When connection to the FTP service fails.

(2) When an error is notified as a response to the FTP command.

Displaying and changing the FTP monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target FTP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Section II Resource details

IP Address (Within 255 bytes) `SuspendResume`

Specify the IP address of the FTP server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

Port No. (1 – 65535) `SuspendResume`

Specify the FTP port number to be monitored. You must specify a port number.

Default value: 21

User Name Within 255 bytes `SuspendResume`

Specify the user name to log on to FTP.

Default value: None

Password Within 255 bytes `SuspendResume`

Specify the password to log on to FTP. Click **Change** and enter the password in the dialog box.

Default value: None

Displaying the FTP monitor resource properties with the WebManager

1. Start the WebManager (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

2. Click a FTP monitor resources object, , in the tree view. The following information is displayed in the list view.

FTP Monitor Name: ftpw1	Details
Properties	Value
Name	ftpw1
Comment	
IP Address	127.0.0.1
Port	21
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	FTP monitor resource name
Comment:	Comment of the FTP monitor resource
IP Address:	IP address of the FTP server to be monitored
Port No.:	Port number of the FTP to be monitored
Status:	Status of the FTP monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	ftpw
Monitor Timing	Activating
Target Resource	ftp
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error
                                     as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                                     in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                     Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an
                                     error
Failover Target Server   Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Section II Resource details

Understanding HTTP monitor resources

HTTP monitor resources monitor HTTP services that run on the server. HTTP monitor resources monitor HTTP protocol but they are not intended for monitoring specific applications. HTTP monitor resources monitor various applications that implement HTTP protocol.

HTTP monitor resources

Note 1 For monitoring target resources, specify service resources or script resources that start HTTP services. Monitoring starts after a target resource is activated. However, if HTTP service cannot be started immediately after the target resource is activated, adjust the time using **Wait Time to Start Monitoring**.

Note 2 HTTP service may produce operation logs for each monitoring operation. Configure HTTP settings if this needs to be adjusted.

Monitoring by HTTP monitor resources

HTTP monitor resources connect to the HTTP server and execute the command for acquiring HTTP header. As a result of monitoring, the following is considered as an error:

(1)   When connection to the HTTP service fails.

(2)   When an error is notified as a response to the command.

Displaying and changing the HTTP monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target HTTP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Connecting Destination (Within 255 bytes)   SuspendResume

You must specify the IP address of the HTTP server to be monitored and this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

Port Number (1 – 65535)   SuspendResume

You must specify the port number of the HTTP to be monitored.

Default value: 80 (HTTP)
                 443 (HTTPS)

Monitor URI   Within 255 bytes   SuspendResume

Specify the URI of the HTTP to be monitored. If URI is not specified, the document root is monitored. It is not necessary to create a monitoring page. If a URI is specified, that URI is monitored. The specified URI needs to allow anonymous access.

Write the following in URI form from the DocumentRoot.
(Example) When the URI of the web page to be monitored is as follows:
http://WebServer:80/watch/sample.htm

/watch/sample.htm

Default value: None

Protocol   SuspendResume

Configure protocol used for communication with HTTP server. In general, HTTP is selected. If you need to connect with HTTP over SSL, select HTTPS.

Displaying the HTTP 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 an HTTP monitor resources object, , in the tree view. The following information is displayed in the list view.

Properties	Value
Name	httpw
Comment	
Connecting Destination	127.0.0.1
Port	80
URI	
Protocal	HTTP
Status	Normal

Name:	HTTP monitor resource name
Comment:	Comment of the HTTP monitor resource
Connecting Destination:	IP address of the HTTP server to be monitored
Port:	Port number of the HTTP to be monitored
URI:	URI to be monitored
Protocol:	Protocol to be used for monitoring
Status:	Status of the HTTP monitor resource

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

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

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

Properties	Value
Type	httpw
Monitor Timing	Activating
Target Resource	http
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type:	Monitor resource type
Monitor Timing:	Timing to start monitoring
Target Resource:	Resource to be monitored
Interval:	Interval between monitoring (in seconds)
Timeout:	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error

Final Action:	Final action at detection of an error
Execute Script before Final Action:	
	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server	The server to be the failover destination at detection of an error
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)

Section II Resource details

Understanding IMAP4 monitor resources

IMAP4 monitor resources monitor IMAP4 services that run on the server. IMAP4 monitor resources monitor IMAP4 protocol but they are not intended for monitoring specific applications. IMAP4 monitor resources monitor various applications that use IMAP4 protocol.

IMAP4 monitor resources

Note 1 For monitoring target resources, specify service resources or script resources that start IMAP4 services. Monitoring starts after target resource is activated. However, if IMAP4 services cannot be started immediately after a target resource is activated, adjust the time using **Wait Time to Start Monitoring.**

Note 2 IMAP4 services may produce operation logs for each monitoring. Configure IMAP4 settings if this needs to be adjusted.

Monitoring by IMAP4 monitor resources

IMAP4 monitor resources connect to the IMAP4 server and execute the command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When connection to the IMAP4 server fails.

(2)   When an error is notified as a response to the command.

Displaying and changing the IMAP4 monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target IMAP4 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

IP Address (Within 255 bytes) `SuspendResume`

Specify the IP address of the IMAP4 server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

Port Number (1 – 65535) `SuspendResume`

Specify the port number of the IMAP4 to be monitored. You must specify this port number.

Default value: 143

User Name Within 255 bytes `SuspendResume`

Specify the user name to log on to IMAP4.

Default value: None

Password Within 255 bytes `SuspendResume`

Specify the password to log on to IMAP4. Click Change and enter the password in the dialog box.

Default value: None

Authentication Method `SuspendResume`

Select the authentication method to log on to IMAP4. It must follow the settings of IMAP4 being used:

• AUTHENTICATE LOGIN (Default value)

   The encryption authentication method that uses the AUTHENTICATE LOGIN command.

• LOGIN

   The plaintext method that uses the LOGIN command.

Displaying the IMAP4 monitor resource properties with the WebManager

1. Start the WebManager (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

2. Click an IMAP4 monitor resources object, , in the tree view. The following information is displayed in the list view.

IMAP4 Monitor Name: imap4w1	Details
Properties	Value
Name	imap4w1
Comment	
IP Address	127.0.0.1
Port	143
Authentication Method	AUTHENTICATE LOGIN
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: IMAP monitor resource name
Comment: Comment of the IMAP monitor resource
IP Address: IP address of the IMAP server to be monitored
Port No.:   Port number of the IMAP to be monitored
Certification Method   Authentication method to connect to IMAP4.
Status: Status of the IMAP monitor resource

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

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

Properties	Value
Type	imap4w
Monitor Timing	Activating
Target Resource	imap4
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error
                               as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                               in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                               Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an
                               error
Failover Target Server: Determination method of failover destination

ExpressCluster X 2.1 for Windows Reference Guide

Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Section II Resource details

Understanding ODBC monitor resources

ODBC monitor resources monitor ODBC database that runs on the server.

ODBC monitor resources

Note 1 Set the data source using the ODBC data source administrator on Windows because the ODBC driver is used for monitoring. Add the data source to the system data source.

Note 2 For monitoring target resources, specify service resources or script resources that start the database. Monitoring starts after target resource is activated. However, if the database cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring**.

Note 3 A monitor table is created when monitoring is started and it is deleted when monitoring is stopped due to the stop of the failover group. When monitoring is temporarily stopped or when server fails before the failover group stops due to system error, the monitor table will not be deleted. It is not an error even if an alert message saying that "a monitor table exists" is displayed next time when monitoring is started.

Note 4 **ODBC database may produce operation logs for each monitoring. Configure the database settings if this needs to be adjusted.**

Monitoring by ODBC monitor resources

A monitor table is created in the database. Maximum of 10 digits numeric data is read and written by issuing SQL statements. As a result of monitoring, the following is considered as an error:

(1)   When connection to the database fails.

(2)   When an error is notified as a response to the issue of SQL statement.

(3)   When the written data and read data do not match.

The SQL statement to use is: create/drop/insert/update/select.

Displaying and changing the ODBC monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target ODBC monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Data Source Name   Within 255 bytes   `SuspendResume`

Specify the data source name to be monitored. You must specify the name.

Default value: None

User Name   Within 255 bytes   `SuspendResume`

Specify the user name to log on to the database. You do not have to specify if the user name is specified in the data source settings.

Default value: None

Password   Within 255 bytes   `SuspendResume`

Specify the password to log on to the database. Click **Change** and enter the password in the dialog box.

Monitor Table Name   Within 255 bytes   `SuspendResume`

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: ODBCWATCH

Displaying the ODBC 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 the ODBC monitor resources object, , in the tree view. The following
    information is displayed in the list view.

ODBC Monitor Name: odbcw1	Details
Properties	Value
Name	odbcw1
Comment	
Data Source Name	Sample
Monitor Table	ODBCWATCH
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: ODBC monitor resource name
Comment: Comment of the ODBC monitor resource
Data Source Name: Data source name to be monitored
Monitor Table Name: Table name for monitoring
Status: Status of the ODBC monitor resource

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

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

Properties	Value
Type	odbcw
Monitor Timing	Activating
Target Resource	odbc
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error
                            as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                            in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                            Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
                            ExpressCluster X 2.1 for Windows Reference Guide

Reactivation Threshold: The number of reactivations to be made at detection of an error

Failover Target Server: Determination method of Failover Target Server

Failover Threshold: The number of failovers to be made at detection of an error

Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding Oracle monitor resources

Oracle monitor resources monitor Oracle database that runs on the server.

Oracle monitor resources

Note 1   For the supported Oracle versions, refer to the *Getting Started Guide*.

Note 2   Interface DLL (OCI.DLL) needs to be installed on the server where monitoring is performed because Oracle OCI is used for monitoring. For target a monitoring resource, specify a service resource or a script resource that can start Oracle. Monitoring starts after the target resource is activated; however, if the database cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring**.

Note 3   A monitor table is created when monitoring is started and it is deleted when monitoring is stopped due to the stop of the failover group. When monitoring is temporarily stopped or when the server fails before the failover group stops due to system error, the monitor table will not be deleted. It is not an error even if an alert message saying that "a monitor table exists" is displayed next time when monitoring is started.

Note 4   Oracle database may produce operation logs for each monitoring. Configure the Oracle settings if this needs to be adjusted.

Monitoring by Oracle monitor resources

A monitor table is created on the database. Maximum of 10-digits numeric data is read and written by issuing SQL statements. As a result of monitoring, the following is considered as an error:

(1)   When connection to the database fails.

(2)   When an error is notified as a response to the issue of SQL statement.

(3)   When the written data and read data do not match.

The SQL statement to use is: create/drop/insert/update/select.

Displaying and changing the Oracle monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target Oracle monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Monitor Type   SuspendResume

Select the Oracle features to be monitored.

·   Monitor Listener and Instance (default)

   Performance of connection process to database and to refer to/update database are
   monitored.

·   Monitor Listener only

   Only performance of connection process to database is monitored. Select this option when
   you try to recover by restarting the Listener service upon connection error.

·   Monitor Instance only

   Only performance of process to refer to/update database is monitored. If an error occurs on
   the connection process database, the error is ignored. Select this option to configure
   recovery operation for the errors except for connection process in conjunction with Oracle
   monitor resource in **Monitor Listener only**.

Connect String   Within 255 bytes   SuspendResume

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

Default value: None

User Name   Within 255 bytes   SuspendResume

Specify the user name to log on to the database.

Default value: sys

Password   Within 255 bytes   SuspendResume

Specify the password to log on to the database. Click **Change** and enter the password in the
dialog box.

Default value: None

OS Authentication `SuspendResume`

Specify the authentication method to log on to the Oracle monitor. It must follow the Oracle monitor settings.

- When selected:

  Use OS authentication.

- When cleared (default value):

  Use database authentication.

Authentication Method `SuspendResume`

Select the user authority to log on to the Oracle monitor. This must be set according to the authority of the specified user name.

- SYSDBA (Default value)

  Connect with SYSDBA authority.

- DEFAULT

  Connect with general user authority.

Monitor Table Name   Within 255 bytes   `SuspendResume`

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

Default value: ORAWATCH

Character Set   `SuspendResume`

Select the character set for Oracle. When the language for Oracle is not Japanese or English, select AMERICAN_AMERICA.US7ASCII.

- ◆ (Following the setting of the application) (default)

  The Oracle character set installed in the server is used.

- ◆ AMERICAN_AMERICA.US7ASCII

  Connect with general user authority.

Displaying the Oracle 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 the Oracle monitor resources object, , in the tree view. The following information is displayed in the list view.

Oracle monitor Name: oraclew1	Details
Properties	**Value**
Name	oraclew1
Comment	
Connect String	Sample
OS authentication	Off
Authentication Method	SYSDBA
Monitor Table	ORAWATCH
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Oracle monitor resource name
Comment: Comment of the Oracle monitor resource
Connect String: Connect string for the database to be monitored
OS Authentication: Method used to connect to the database to be monitored
Authentication Method: Authentication method for the connection to the database to be
                                  monitored
Monitor Table Name: Table name for monitoring
Status: Status of the Oracle monitor resource

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

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

Properties	Value
Type	oraclew
Monitor Timing	Activating
Target Resource	appli
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Character Set	(Following the setting of the application)
Monitor Method	Listener and Instance Monitor

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error
                                  as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                                  in the monitor target to establish the error as error
Final Action: Final action at detection of an error

Section II Resource details

Execute Script before Final Action:

Whether or not script is executed when a failure is detected

Recovery Target: Target to be recovered when an error is detected

Recovery Target Type: Type of target to be recovered when an error is detected

Reactivation Threshold: The number of reactivations to be made at detection of an error

Failover Target Server: The server to be the failover target at detection of an error

Failover Threshold: The number of failovers to be made at detection of an error

Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Character Set Character set for Oracle

Monitor Method The Oracle features to be monitored.

Understanding OracleAS monitor resources

OracleAS monitor resource monitors Oracle application server that operates on servers.

Note on OracleAS monitor resources

For the supported versions of Oracle application server, see the *Getting Started Guide*.

For monitor target resources, specify service resources or script resources etc. that starts up OracleAS. After the target resource is activated, monitoring is started. When OracleAS cannot start running immediately after the target resource is activated, adjust the time in **Wait Time to Start Monitoring**.

If there is any component which does not start in OracleAS instance when monitor target resources are activated, edit opmn.xml file to change the status of the component to "disabled". For details on opmn.xml file, refer to OracleAS manual.

OracleAS may report operation log etc. for every monitoring operation, which should be controlled by the OracleAS settings.

How OracleAS monitor resources perform monitoring

OracleAS monitor resource monitors the following:

It uses the OracleAS opmnctl command to monitor the application server.

If an error is detected in the application server status acquired, it is regarded as an error:

Displaying and changing the OracleAS monitor resource details

1. Click the **Monitors** icon on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right-click the target OracleAS monitor resource, and click the **Parameter** tab in the **Properties** window.

3. On the **Parameter** tab, you can see and/or change the detailed settings by following the description below.

Instance Name (Within 255bytes)

Specify the instance to be monitored. You must specify the instance.

Default value: None

Install Path (Within 1023 bytes)

Specify the Oracle application install path. You must specify the path.

Default value: C:\product\10.1.3.2\companionCDHome_1

Monitor Type   SuspendResume

Select the OracleAS features to be monitored.

·   **opmn process and component monitor**

    Both opmn process activation/deactivation monitoring and component status monitoring are performed.

·   **opmn process monitor**

    Only opmn process activation/deactivation monitoring is performed.

·   **component monitor**

    Only component status monitoring is performed.

Component Monitor   SuspendResume

Select whether you specify monitor target component individually when **opmn process and component monitor** or **component monitor** is selected as Monitor Type.

·   **All** (default)

    All components are monitored.

·   **Individual**

Only the component specified in **Component List**.

Component List (Within 1023 byte)   SuspendResume

Enter a target component name of **component monitor**. If you want to specify two or more components, separate them by comma ",". Make sure to set this when **Individual** is selected in **Component Monitor**.

Displaying and changing the OracleAS monitor resource properties with the WebManager

1.   Start the WebManager (*http://FIP_address_for_the_WebManager_group*: *port_number* (the default value is 29003)).

2.   When you click an object for Oracle monitor resource 🔍 in the tree view, the following information is displayed in the list view.

OracleAS Monitor Name: oracleasw		Details
Properties	**Value**	
Name	oracleasw	
Comment		
Instance	Sample	
Status	Normal	

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name	OracleAS monitor resource name
Comment	OracleAS monitor resource comment
Instance	Name of the instance to be monitored
Status	Status of the OracleAS monitor resource
Server Name	Server name
Status:	Status of the monitor resource on the server

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

Properties	Value
Type	oracleasw
Monitor Timing	Activating
Target Resource	appli
Interval	60
Timeout	120
Retry Count	1
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Install Path	C:\product\10.1.3.2\companionCDHome_1
Component List	
Monitor Method	component monitor

Type   Monitor resource type
Monitor Timing   Timing to start monitoring
Target Resource   Resource to be monitored
Interval (sec)   Interval between monitoring
Timeout (sec)   Time to elapse from detection of an error to establish
Retry Count   The number of retries to be made from detection of an error in
                                  the monitor target to establish the error as an error
Final Action   Final action at detection of an error
Execute Script before Final Action:
                                  Whether or not script is executed when a failure is detected
Recovery Target   Target to be recovered when an error is detected
Recovery Target Type   Type of target to be recovered when an error is detected
Reactivation Threshold   The number of reactivations to be made at detection of an
                                  error
Failover Target Server   The server to be the failover target 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)
Install Path   Install path of OracleAS
Component List   A target component name of component monitor.
Monitor Method   The OracleAS features to be monitored.

Understanding OfficeScan CL monitor resource

OfficeScan CL monitor resource is a monitor resource that monitors OfficeScan Client operating on servers.

Notes on OfficeScan CL monitor resource

Refer to **Startup Guide** for the operation checked OfficeScan versions.

If OfficeScan CL monitor detects issues, this monitor restarts OfficeScan NT Listener service as described below. Then, OfficeScan CL monitor may detect timeout error if it takes long time to restart the service. Please set sufficient timeout (default: 120 sec) for this monitor resource.

How OfficeScan CL monitor resource performs monitoring

OfficeScan CL monitor resource monitors the following issues.

✧ Monitors whether or not OfficeScan NT Listener service is active.

✧ Monitors the connection status between OfficeScan Client and Server.

If OfficeScan CL monitor detects errors about above issues, this monitor restarts OfficeScan NT Listener service to solve them. If it failed to solve errors, error message will be appeared on WebManager.

In addition, this monitor restarts OfficeScan NT Listener service to refresh the firewall of OfficeScan Client when floating IP and virtual IP resource are activated. Then, it will be possible to access the server via floating IP and virtual IP address.

Displaying and changing OfficeScan CL monitor resource details

There is no detail configuration in OfficeScan CL monitor resource.

Displaying OfficeScan CL monitor resource properties with Web Manager

1. Start up Web Manager. (http://FIP address:portnumber of *Web manager group*(default is 29003)).

2. In the tree view, click OfficeScan CL monitor resource object . The following contents are displayed in the list view.

Properties	Value
Name	oscw
Comment	
Status	Normal

Name   OfficeScan CL monitor resource name
Comment   OfficeScan CL monitor resource comment
Status   OfficeScan CL monitor resource status

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Server name   Server name
Status: Status of monitor resource on each server

Furthermore, if you click the **Details** button, the following information is displayed in the pop-up dialogue.

Properties	Value
Type	oscw
Monitor Timing	Always
Target Resource	
Interval	60
Timeout	120
Retry Count	1
Final Action	No Operation
Execute Script before Final Action	Off
Recovery Target	cluster
Recovery Target Type	Itself
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	0
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitor resource
Target Resource: Resource to be monitored
Interval: Interval between monitoring (Seconds)
Timeout: Timeout period to judge the target monitor resource as an error after detecting the error(Seconds).
Retry Count: The number of retry to judge the target monitor resource as an error after detecting the error.
Final Action: Final action at error detection
Execute Script before Final Action:
                                           Whether or not to execute the scripts at failure detection
Recovery Target: Name of target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivation to be made at error detection
Failover Destination Server: Determination method of Failover Destination Server
Failover Threshold: The number of failover to be made at error detection
Wait Time to Start Monitoring: Time to wait before starting of monitoring (Seconds)

Understanding OfficeScan SV monitor resource

OfficeScan SV monitor resource is a monitor resource that monitors OfficeScan Server operating on servers.

Notes on OfficeScan SV monitor resource

Refer to **Startup Guide** for the operation checked OfficeScan versions.

How OfficeScan SV monitor resource perform monitoring

OfficeScan SV monitor resource monitors following issues.

✧ Stall monitoring of virus checking pattern distribution function.

Displaying and changing OfficeScan SV monitor resource details

There is no detail configuration in OfficeScan SV monitor resource.

Displaying OfficeScan SV monitor resource properties with Web Manager

1. Start up Web Manager (http://FIP address:portnumber of *Web manager group*(default is 29003)).

2. In the tree view, click OfficeScan CL monitor resource object ⬤. The following contents is displayed in the list view.

Properties	Value
Name	ossw
Comment	
Status	Normal

Name	OfficeScan SV monitor resource name
Comment	OfficeScan SV monitor resource comment
Status	OfficeScan SV monitor resource status

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Server name	Server name
Status:	Status of monitor resource on each server

Furthermore, if you click the **Details** button, the following information is displayed in the pop-up dialogue.

Properties	Value
Type	ossw
Monitor Timing	Activating
Target Resource	service_MasterService
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type

Monitor Timing: Timing to start monitoring

Target Resource: Resource to be monitored

Interval: Interval between monitoring (Seconds)

Timeout: Timeout period to judge the target monitor resource as an error after detecting the error(Seconds).

Retry Count: The number of retry to judge the target monitor resource as an error after detecting the error.

Final Action: Final action at detection of an error

Execute Script before Final Action:
     Whether or not script is executed when a failure is detected

Recovery Target: Target to be recovered when an error is detected

Recovery Target Type: Type of target to be recovered when an error is detected

Reactivation Threshold: The number of reactivation to be made at detection of an error

Failover Destination Server: Determination method of Failover Destination Server

Failover Threshold: The number of failover to be made at detection of an error

Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding POP3 monitor resources

POP3 monitor resources monitor POP3 services that run on the server. POP3 monitor resources monitor POP3 protocol but they are not intended for monitoring specific applications. POP3 monitor resources monitor various applications that use POP3 protocol.

POP3 monitor resources

Note 1   For monitoring target resources, specify service resources or script resources that start POP3 services. Monitoring starts after target resource is activated. However, if POP3 services cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring**.

Note 2   POP3 services may produce operation logs for each monitoring. Configure the POP3 settings if this needs to be adjusted.
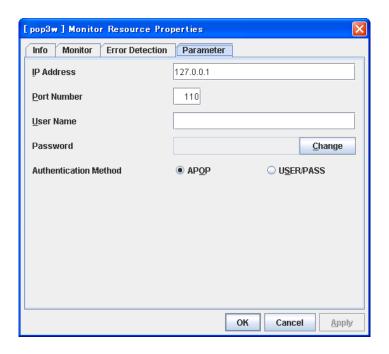
Monitoring by POP3 monitor resources

POP3 monitor resources connect to the POP3 server and execute the command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When connection to the POP3 server fails.

(2)   When an error is notified as a response to the command.

Displaying and changing the POP3 monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target POP3 monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

IP Address (Within 255 bytes)　SuspendResume

Specify the IP address of the POP3 server to be monitored. You must specify this IP address. If it is multi-directional standby server, specify FIP.

Default value: 127.0.0.1

Port Number (1 – 65535)　SuspendResume

Specify the POP3 port number to be monitored. You must specify this port number.

Default value: 110

User Name　Within 255 bytes　SuspendResume

Specify the user name to log on to POP3.

Default value: None

Password　Within 255 bytes　SuspendResume

Specify the password to log on to POP3. Click **Change** and enter the password in the dialog box.

Default value: None

Authentication Method　SuspendResume

Select the authentication method to log on to POP3. It must follow the settings of POP3 being used:

• APOP (Default value)

 The encryption authentication method that uses the APOP command.

• USER/PASS

 The plaintext method that uses the USER/PASS command.

ExpressCluster X 2.1 for Windows Reference Guide

Displaying the POP3 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 the POP3 monitor resources object, 🔍, in the tree view. The following information is displayed in the list view.

POP3 Monitor Name: pop3w1	Details
Properties	**Value**
Name	pop3w1
Comment	
IP Address	127.0.0.1
Port	110
Authentication Method	APOP
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: POP3 monitor resource name
Comment: Comment of the POP3 monitor resource
IP Address: IP address of the POP3 server to be monitored
Port No.:   Port number of the POP3 to be monitored
Authentication Method: Authentication method to connect to POP3
Status: Status of the POP3 monitor resource

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

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

Properties	Value
Type	pop3w
Monitor Timing	Activating
Target Resource	pop3
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)

Section II Resource details

Timeout:	Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count:	The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action:	Final action at detection of an error
Execute Script before Final Action:	
	Whether or not script is executed when a failure is detected
Recovery Target:	Target to be recovered when an error is detected
Recovery Target Type:	Type of target to be recovered when an error is detected
Reactivation Threshold:	The number of reactivations to be made at detection of an error
Failover Target Server:	Determination method of Failover Target Server
Failover Threshold:	The number of failovers to be made at detection of an error
Wait Time to Start Monitoring:	Time to wait before starting of monitoring (in seconds)

Understanding PostgreSQL monitor resources

PostgreSQL monitor resources monitor PostgreSQL database that runs on the server.

PostgreSQL monitor resources

Note 1 For information on the supported PostgreSQL/PowerGres versions, refer to the *Getting Started Guide*.

Note 2 Interface DLL (LIBPQ.DLL) needs to be installed on the server where monitoring is performed because PostgreSQL/PowerGres library is used for monitoring. Specify the path of this DLL to the environmental variable when monitoring PostgreSQL.

Note 3 For a target monitoring resource, specify a service resource that can start PostgreSQL/PowerGres. Monitoring starts after the target resource is activated; however, if the database cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring**.

Note 4 A monitor table is created when monitoring is started and it is deleted when monitoring is stopped due to the stop of the failover group. When monitoring is temporarily stopped or when server fails before the failover group stops due to system error, the monitor table will not be deleted. It is not an error if an alert message saying that "a monitor table exists" is displayed next time when monitoring is started.

Note 5 PostgreSQL/PowerGres may produce operation logs for each monitoring. Configure the PostgreSQL/PowerGres settings if this needs to be adjusted.

Note 6 Because PostgreSQL is open-source software (OSS), its operation is checked but not guaranteed. Make sure to use PostgreSQL after evaluating it by yourself.

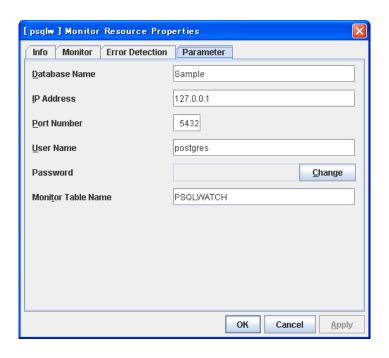## Monitoring by PostgreSQL monitor resources

A monitor table is created on the database. Maximum of 10-digits numeric data is read and written by issuing SQL statements. As a result of monitoring, the following is considered as an error:

(1) When connection to the database fails.

(2) When an error is notified as a response to the issue of SQL statement.

(3) When the written data and read data do not match.

The SQL statement to use is: create/drop/insert/update/select.

Displaying and changing the PostgreSQL monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target PostgreSQL monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Database Name   Within 255 bytes   **SuspendResume**

Specify the database name to be monitored. You must specify the name.

Default value: None

IP Address   **SuspendResume**

Specify the IP address of the database server to be monitored. You must specify this IP address.

Default value: 127.0.0.1

Port No.   **SuspendResume**

Specify the PostgreSQL port number to be monitored. You must specify this port number.

Default value: 5432

User Name   Within 255 bytes   **SuspendResume**

Specify the user name to log on to the database.

Default value: postgres

Password   Within 255 bytes   **SuspendResume**

Specify the password to log on to the database. Click **Change** and enter the password in the dialog box.

Default value: None

Monitor Table Name   Within 255 bytes   **SuspendResume**

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

ExpressCluster X 2.1 for Windows Reference Guide

Default value: PSQLWATCH

Displaying the PostgreSQL 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 the PostgreSQL monitor resources object, in the tree view. The following information is displayed in the list view.

PostgreSQL Monitor Name: psqlw1	Details
Properties	Value
Name	psqlw1
Comment	
Database Name	Sample
IP Address	127.0.0.1
Port	5432
Monitor Table	PSQLWATCH
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name:	PostgreSQL monitor resource name
Comment:	Comment of the PostgreSQL monitor resource
Database name:	Database name to be monitored
IP Address:	IP address of the PostgreSQL server to be monitored
Port No.:	Port number of the PostgreSQL to be monitored
Monitor Table Name:	Table name for monitoring
Status:	Status of the PostgreSQL monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	psqlw
Monitor Timing	Activating
Target Resource	psql
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                             Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding SMTP monitor resources

SMTP monitor resources monitor SMTP services that run on the server. SMTP monitor resources monitor SMTP protocol but hey are not intended for monitoring specific applications. SMTP monitor resources monitor various applications that use SMTP protocol.

SMTP monitor resources

Note 1 For monitoring target resources, specify service resources or script resources that start SMTP. Monitoring starts after target resource is activated. However, if the database cannot be started immediately after target resource is activated, adjust the time using **Wait Time to Start Monitoring.**

Note 2 SMTP services may produce operation logs for each monitoring. Configure the SMTP settings if this needs to be adjusted.

Monitoring by SMTP monitor resources

POP3 monitor resources connect to the POP3 server and execute the command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When connection to the SMTP server fails.

(2)   When an error is notified as a response to the command.

Displaying and changing the SMTP monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target SMTP monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

IP Address SuspendResume

You must specify the IP address of the SMTP server to be monitored. Default value: 127.0.0.1

Port No. SuspendResume

Specify the port number of the SMTP to be monitored. You must specify this port number.

Default value: 25

User Name Within 255 bytes SuspendResume

Specify the user name to log on to SMTP. If no user name is specified, SMTP authentication is not performed.

Default value: None

Password Within 255 bytes SuspendResume

Specify the password to log on to SMTP. Click **Change** and enter the password in the dialog box.

Default value: None

Authentication Method SuspendResume

Select the authentication method to log on to the SMTP. It must follow the settings of SMTP being used:

- CRAM-MD5 (Default value)

  The encryption authentication method that uses the CRAM-MD5 command.

- LOGIN

  The plaintext method that uses the LOGIN command.

E-mail Address Within 255 bytes SuspendResume

Specify the email address used for monitoring. If nothing is specified, monitoring is performed using the command to verify the operation. The command that uses a dummy e-mail address is executed internally. If an email address is specified, monitoring is performed by actually sending e-mails to the specified e-mail address. It is recommended to have an e-mail address dedicated to monitoring.

Default value: None

Displaying the SMTP 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 the SMTP monitor resources object, , in the tree view. The following information is displayed in the list view.

Name:	SMTP monitor resource name
Comment:	Comment of the SMTP monitor resource
IP Address:	IP address of the SMTP server to be monitored
Port No.:	Port number of the SMTP to be monitored
Authentication Method:	Authentication method to connect to SMTP (If user name for SMTP authentication is not set, what is displayed here is not effective)
E-mail Address:	E-mail address for monitoring
Status:	Status of the SMTP monitor resource
Server Name:	Server name
Status:	Status of the monitor resource on the given server

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

Properties	Value
Type	smtpw
Monitor Timing	Activating
Target Resource	smtp
Interval	30
Timeout	60
Retry Count	3
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Understanding SQL Server monitor resources

SQL Server monitor resources monitor SQL Server database that runs on the server.

SQL Server monitor resources

Note 1 For information on the supported SQL Server versions, refer to the *Getting Started Guide*.

Note 2 For target monitoring resource, specify a service resource that can start SQL Server. Monitoring starts after the target resource is activated; however, if the database cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring.**

Note 3 A monitor table is created when monitoring is started and it is deleted when monitoring is stopped due to the stop of the failover group. When monitoring is temporarily stopped or when server fails before the failover group stops due to system error, the monitor table will not be deleted. It is not an error if an alert message saying that "a monitor table exists" is displayed next time when monitoring is started.

Note 4 SQL Server may produce operation logs for each monitoring. Configure the SQL Server settings if this needs to be adjusted.
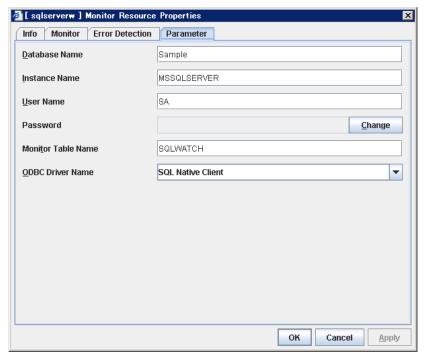
Monitoring by SQL Server monitor resources

A monitor table is created on the database. Maximum of 10-digits numeric data is read and written by issuing SQL statements. As a result of monitoring, the following is considered as an error:

(1)   When connection to the database fails.

(2)   When an error is notified as a response to the issue of SQL statement.

(3)   When the written data and read data do not match.

The SQL statement to use is: create/drop/insert/update/select.

Displaying and changing the SQL Server monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target SQL Server monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Database Name   Within 255 bytes   SuspendResume

Specify the database name to be monitored. You must specify the name.

Default value: None

Instance Name   Within 255 bytes   SuspendResume

Specify the database instance name. You must specify the instance name.

Default value: MSSQLSERVER

User Name   Within 255 bytes   SuspendResume

Specify the user name to log on to the database. If the user name is not specified, Windows authentication is used.

Default value: SA

Password   Within 255 bytes   SuspendResume

Specify the password to log on to the database. Click **Change** and enter the password in the dialog box.

Default value: None

Monitor Table Name   Within 255 bytes   SuspendResume

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: SQLWATCH

ODBC Driver Name (Within 255 bytes)   SuspendResume

Select the driver name of the target database shown in the **ODBC** tab when you click **Start** -> **Administrative Tools** -> **Data Sources (ODBC)**. Select **SQL Native Client** in SQL Server 2005. Select **SQL Server Native Client 10.0** in SQL Server 2008.

Default value: SQL Native Client

Displaying the SQL Server 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 the SQL Server monitor resources object, , in the tree view. The following information is displayed in the list view.

SQL Server Monitor Name: sqlserverw1	Details
Properties	**Value**
Name	sqlserverw1
Comment	
Database Name	Sample
Instance	MSSQLSERVER
Monitor Table	SQLWATCH
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: SQL Server monitor resource name
Comment: Comment of the SQL Server monitor resource
Database name: Database name to be monitored
Instance Name: Instance name of the database to be monitored
Monitor Table Name: Table name for monitoring
Status: Status of the SQL Server monitor resource

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

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

Properties	Value
Type	sqlserverw
Monitor Timing	Activating
Target Resource	appli
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
ODBC Driver Name	SQL Native Client

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                       Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)
ODBC Driver Name: The driver name of the target database

Understanding Tuxedo monitor resources

Tuxedo monitor resources monitor Tuxedo that runs on the server.

Tuxedo monitor resources

Note 1   For the supported versions of Tuxedo application server, see the *Getting Started Guide*.

Note 2   For target monitoring resource, specify a script resource that can start Tuxedo. Monitoring starts after the target resource is activated; however, if Tuxedo cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring.**

Note 3   Tuxedo may produce operation logs for each monitoring. Configure the Tuxedo settings if this needs to be adjusted.

Monitoring by Tuxedo monitor resources

Tuxedo monitor resources connect to the Tuxedo and execute API to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When an error is reported during the connection to the application server and/or the acquisition of the status.

Displaying and changing the Tuxedo monitor resource details

3.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

4.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target Tuxedo monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

5.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Application Server Name   Within 255 bytes   `SuspendResume`

Specify the application server name to be monitored. You must specify the name.

Default value: BBL

Config File   Within 1023 bytes   `SuspendResume`

Specify the placement file name of Tuxedo. You must specify the name.

Default value: None

Displaying the Tuxedo 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 the Tuxedo monitor resources object, , in the tree view. The following information is displayed in the list view.

Tuxedo Monitor Name: tuxw	Details
Properties	Value
Name	tuxw
Comment	
Application Server Name	BBL
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: Tuxedo monitor resource name
Comment: Comment of the Tuxedo monitor resource
Application Server Name: Application server name to be monitored
Status: Status of the Tuxedo monitor resource

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

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

Properties	Value
Type	tuxw
Monitor Timing	Activating
Target Resource	tuxedo
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Config File	E:\tuxedo\tuxconfig

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                         Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)
Config File: Configuration file path of Tuxedo

Understanding Websphere monitor resources

Websphere monitor resources monitor WebSphere that runs on the server.

Websphere monitor resources

Note 1   For the supported versions of WebSphere application server, see the *Getting Started Guide*.

Note 2   For target monitoring resource, specify a service resource that can start WebSphere. Monitoring starts after the target resource is activated; however, if the database cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring.**

Note 3   A Java Runtime Environment is required to start monitoring with this command. The application server system uses Java functions. Therefore if Java stalls, it may be recognized as an error.

Note 4   WebSphere may produce operation logs for each monitoring. Configure the Websphere settings if this needs to be adjusted.

Monitoring by Websphere monitor resources

Websphere monitor resources use the serverStatus.bat command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When an error is reported with the state of the acquired application server.

Displaying and changing the Websphere monitor resource details

1. Click **Monitors** on the tree view displayed on the left side of the Builder window.

2. List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target Websphere monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Application Server Name   Within 255 bytes   SuspendResume

Specify the application server name to be monitored. You must specify the name.

Default value: server1

Profile Name   Within 1023 bytes   SuspendResume

Specify the profile name of WebSphere. You must specify the name.

Default value: default

User Name   Within 255 bytes   SuspendResume

Specify the user name of WebSphere. You must specify the name.

Default value: None

Password   Within 255 bytes   SuspendResume

Specify the password of WebSphere. You must specify the password.

Default value: None

Install Path   Within 1023 bytes   SuspendResume

Specify the installation path of WebSphere. You must specify the path.

Default value: C:\Program Files\IBM\WebSphere\AppServer

Section II Resource details

Displaying the Websphere 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 the Websphere monitor resources object, 🔍, in the tree view. The following information is displayed in the list view.

Websphere Monitor Name: wasw	Details
Properties	**Value**
Name	wasw
Comment	
Application Server Name	server1
Status	Normal

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Websphere monitor resource name
Comment: Comment of the Websphere monitor resource
Application Server Name: Application server name to be monitored
Status: Status of the Websphere monitor resource

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

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

Properties	Value
Type	wasw
Monitor Timing	Activating
Target Resource	websphere
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Profile Name	default
Install Path	C:\Program Files\IBM\WebSphere\AppServer

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error
                                                    as error (in seconds).
Retry Count: The number of retries to be made from detection of an error
                                                    in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                                    Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an
                                                    error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)
Profile Name   Profile name of WebSphere
Install Path   Install path of WebSphere

Understanding Weblogic monitor resources

Weblogic monitor resources monitor WebLogic that runs on the server.

Weblogic monitor resources

Note 1 For the supported versions of WebLogic application server, see the *Getting Started Guide*.

Note 2 For target monitoring resource, specify a script resource that can start Weblogic. Monitoring starts after the target resource is activated; however, if WebLogic cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring.**

Note 3 A Java Runtime Environment is required to start monitoring with this command. The application server system uses Java functions. Therefore if Java stalls, it may be recognized as an error.

Note 4 WebLogic may produce operation logs for each monitoring. Configure the WebLogic settings if this needs to be adjusted.

Monitoring by Weblogic monitor resources

Weblogic monitor resources use the webLogic.Admin (Ping) command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When an error is reported as the response to the Ping.

Displaying and changing the Weblogic monitor resource details

1.   Click **Monitors** on the tree view displayed on the left side of the Builder window.

2.   List of the monitor resources is displayed in the table view on the right side of the screen. Right click the target Weblogic monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3.   On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

IP Address   Within 80 bytes   `SuspendResume`

Specify the IP address of the server to be monitored. You must specify the IP address.

Default value: 127.0.0.1

Port   1024 to 65535)   `SuspendResume`

Specify the port number used to connect to the server. You must specify the number.

Default value: 7002

Account Shadow   `SuspendResume`

When you specify a user name and a password directly, select **Off**. If not, select **On**. You must specify the setting.

Default value: Off

Config File   Within 1023 bytes   `SuspendResume`

Specify the file in which the user information is saved. You must specify the file if **Account Shadow** is **On**.

Default value: None

Key File   Within 1023 bytes   `SuspendResume`

Specify the file in which the password required to access to a config file path is saved. Specify the full path of the file. You must specify the file if **Account Shadow** is **On**.

Default value: None

User Name   Within 255 bytes   `SuspendResume`

Specify the user name of WebLogic. You must specify the file if **Account Shadow** is **Off**.

Default value：weblogic

Password   Within 255 bytes   `SuspendResume`

Specify the password of WebLogic.

Default value: weblogic

Authority Method   `SuspendResume`

Specify the authentication method when connecting to an application server. You must specify the method.

Default value： DemoTrust

Key Store File   Within 1023 bytes   `SuspendResume`

Specify the authentication file when authenticating SSL. You must specify this when the authentication method is **CustomTrust**.

Default value: None

Install Path   Within 1023 bytes   `SuspendResume`

Specify the installation path of WebLogic. You must specify the path.

Default value: C:\bea\weblogic92

Displaying the Weblogic 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 the Weblogic monitor resources object, 🔍, in the tree view. The following information is displayed in the list view.

Weblogic Monitor Name: wlsw	Details
Properties	Value
Name	wlsw
Comment	
IP Address	127.0.0.1
Port	7002
Status	Normal

Resource Status on Each Server	
Server Name	Status
server1	Online
server2	Offline

Name: Weblogic monitor resource name
Comment: Comment of the Weblogic monitor resource
IP Address: IP address of the Weblogic monitor resource
Port: Port number of the Weblogic monitor resource

ExpressCluster X 2.1 for Windows Reference Guide

Status: Status of the Weblogic monitor resource

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

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

Properties	Value
Type	wlsw
Monitor Timing	Activating
Target Resource	weblogic
Interval	60
Timeout	120
Retry Count	2
Final Action	Stop the cluster service and shutdown OS
Recovery Target	failover1
Execute Script before Final Action	Off
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0
Authority Method	DemoTrust
Install Path	C:\bea\weblogic92

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Target Server: Determination method of Failover Target Server
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)
Authority Method Authority method of WebLogic
Install Path Install path of WebLogic

Section II Resource details

Understanding WebOTX monitor resources

WebOTX monitor resources monitor WebOTX that runs on the server.

WebOTX monitor resources

Note 1 For the supported versions of WebOTX application server, see the *Getting Started Guide*.

Note 2 For target monitoring resource, specify a script resource that can start WebOTX. Monitoring starts after the target resource is activated; however, if WebOTX cannot be started right after the target resource is activated, adjust the time by using **Wait Time to Start Monitoring.**

Note 3 A Java environment is required to start monitoring with this command. The application server system uses Java functions. Therefore if Java stalls, it may be recognized as an error.

Note 4 WebOTX may produce operation logs for each monitoring. Configure the WebOTX settings if this needs to be adjusted.

Monitoring by WebOTX monitor resources

WebOTX monitor resources use the serverStatus.bat command to verify the operation. As a result of monitoring, the following is considered as an error:

(1)   When an error is reported with the state of the acquired application server.

Displaying and changing the WebOTX monitor resource details Websphere

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 Weblogic monitor resource, and click the **Parameter** tab in the **Monitor Resource Property** window.

3. On the **Parameter** tab, you can display and/or change the detailed settings by following the description below.

Connecting Destination   Within 255 bytes   SuspendResume

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

Default value: localhost

Port Number   1024 to 65535)   SuspendResume

Specify the port number used to connect to the server. You must specify the number.

Default value: 6212

User Name   Within 255 bytes   SuspendResume

Specify the user name of WebOTX. You must specify the name.

Default value : None

Password   Within 255 bytes   SuspendResume

Specify the password of WebOTX.

Default value: None

Displaying the WebOTX 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 the Weblogic monitor resources object, , in the tree view. The following information is displayed in the list view.

WebOTX Monitor Name: otxw		Details
Properties	**Value**	
Name	otxw	
Comment		
Connecting Destination	localhost	
Port	6212	
Status	Normal	

Resource Status on Each Server	
Server Name	**Status**
server1	Online
server2	Offline

Name: Weblogic monitor resource name
Comment: Comment of the Weblogic monitor resource
Connecting Destination: Server name for connecting of the WebOTX monitor resource
Port: Port number of the WebOTX monitor resource
Status: Status of the WebOTX monitor resource

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

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

Properties	Value
Type	otxw
Monitor Timing	Activating
Target Resource	webotx
Interval	60
Timeout	120
Retry Count	1
Final Action	Stop the cluster service and shutdown OS
Execute Script before Final Action	Off
Recovery Target	failover1
Recovery Target Type	Group
Reactivation Threshold	0
Failover Target Server	Stable Server
Failover Threshold	Number of Servers
Wait Time to Start Monitoring	0

Type: Monitor resource type
Monitor Timing: Timing to start monitoring
Target Resource: Resource to be monitored
Interval: Interval between monitoring (in seconds)
Timeout: Time to elapse from detection of an error to establish the error as error (in seconds).
Retry Count: The number of retries to be made from detection of an error in the monitor target to establish the error as error
Final Action: Final action at detection of an error
Execute Script before Final Action:
                                         Whether or not script is executed when a failure is detected
Recovery Target: Target to be recovered when an error is detected
Recovery Target Type: Type of target to be recovered when an error is detected
Reactivation Threshold: The number of reactivations to be made at detection of an error
Failover Threshold: The number of failovers to be made at detection of an error
Wait Time to Start Monitoring: Time to wait before starting of monitoring (in seconds)

Section II Resource details

Chapter 8   Heartbeat resources

This chapter provides detailed information on heartbeat resources.

This chapter covers:

Heartbeat resources

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

Heartbeat device types are:

(1) LAN heartbeat resource dedicated to interconnect (kernel mode)
(2) Public LAN heartbeat (kernel mode)

Shared Disk

Heartbeat resource name	Abbreviation	Functional overview
Kernel mode LAN heartbeat resource (1)(2)	lankhb	A kernel mode module uses a LAN to monitor if servers are activated. Used for communication within the cluster as well.

◆   You need to set at least one LAN heartbeat resource. It is recommended to set two or more LAN heartbeat resources.
It is recommended to set both interconnect-dedicated LAN heartbeat resource and public LAN heartbeat resource together.

Understanding kernel mode LAN heartbeat resources

Kernel mode LAN heartbeat resources

Kernel mode LAN heartbeat resources achieve heartbeat functions using the kernel mode driver module. Kernel mode LAN heartbeat resources are less burdened and help to reduce misidentification of disconnection of interconnect by using the kernel mode driver.

Settings of the kernel mode LAN heartbeat resources

For details on settings of the kernel mode LAN heartbeat resources, refer to "Heartbeat I/F tab" in Chapter 3, "Functions of the Builder."

Notes on the kernel mode LAN heartbeat resources

◆   It is recommended to specify two or more kernel mode LAN heartbeat resources; the one dedicated to interconnect and the one shared with interconnect and public.

◆   The communication data of alert synchronization is transmitted over the interconnect interface. You should consider network traffic when you make settings.

◆   You can set the same IP address to the interconnect LAN interface and the public LAN interface. If you do this, communication data of alert synchronization is transmitted.

Displaying the properties of kernel mode LAN heartbeat resources with the WebManager

1. Start the WebManager. (*http://FIP_address_for_WebManager_group*: *port_number* (the default value is 29003)).

2. Click the kernel mode LAN heartbeat resources object, , in the tree view. The following information is displayed in the list view.

Kernel Mode LAN Heartbeat Name: lankhb1	Details
Server Name	Status
server1	Online
server2	Online

Server Name: Server name
Status: Status of the heartbeat resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	lankhb1
Type	lankhb
Comment	LAN Heartbeat
Status	Normal
IP Address	10.0.0.1

Name: Kernel mode LAN heartbeat resource name
Type: Kernel mode LAN heartbeat resource type
Comment: Comment of the Kernel mode LAN heartbeat resource
Status: Status of all kernel mode LAN heartbeat resources
IP Address: IP address of the LAN used for kernel mode LAN heartbeat

Chapter 9 Details on network partition resolution resources

This chapter provides detailed information on network partition resolution resources.

This chapter covers:

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 four types of network partition resolution resources are provided.

(1) COM network partition resolution resource
(2) DISK network partition resolution resource
(3) PING network partition resolution resource
(4) Majority network partition resolution resource

Shared disk

Network partition resolution resources	Abbreviation	Function Overview
COM network partition resolution resource (COM method)	comnp	A network partition is solved by connecting two servers with COM cable.
DISK network partition resolution resource (DISK method)	disknp	A network partition is solved by using a dedicated disk partition on the shared disk.
PING network partition resolution resource (PING method)	pingnp	A network partition is solved by determining a server that can communicate using the ping command.
Majority network partition resolution resource (Majority method)	majonp	A network partition is solved by the number of servers that can make connection among three or more servers.

A network partition resolution resource that can be selected is different depending on a server configuration in a cluster. Select one of the following network partition resolution methods:

Cluster server configuration	Network partition resolution method (Listed in the order of our recommendation)
Mirror disk resource exists	**Number of servers: 2** - COM method and DISK method - PING method and DISK method - DISK method **Number of servers: 3 or more servers** - PING method and DISK method - DISK method - Majority method
Mirror disk resource exists but disk resource does not exist	**Number of servers: 2** - PING method - No network partition resolution **Number of servers: 3 or more servers** - PING method - Majority method - No network partition resolution
Neither disk resource nor mirror disk resource does not exist	**Number of servers: 2** - COM method - PING method - No network partition resolution **Number of servers: 3 or more servers** - PING method - Majority method - No network partition resolution

- For example, if both server1 and server2 use disk resource and mirror disk resource, the combination of DISK method and PING method, or a DISK method can be selected as a network partition resolution resource.

Disk resource and mirror disk resource

Mirror disk   Disk   Mirror disk

- When servers that can be started by disk resource and mirror disk resource differ, the network partition resolution resource needs to be set in each server. For example, if server1 and server2 use a shared disk, and server2 and server3 use a mirror disk, the combination of COM method and DISK method, PING method and DISK method, DISK method can be selected as network partition resolution resource for server1 and server2. PING method or COM method can be selected for server2 and server3.

Understanding network partition resolution by COM method

Settings of the COM network partition resolution resources

To use COM network partition resolution resources, prepare a serial cross cable to connect two servers.

The COM network partition resolution resources shut down a server with less priority when a network partition is detected.

For more information, refers to "COM I/F tab" in Chapter 3, "Function of the Builder."

COM network partition resolution resources

Note 1   COM network partition resolution resource can be used between two servers. When mirror disk resources are used, be sure not to use COM network partition resolution resource.

Note 2   Emergent shut down takes places in all servers if all heartbeats are disconnected while the COM channel is having an error (for example COM port or serial cross cable.)

Note 3   If failures occur in all network channels between cluster servers and the COM channel simultaneously, both active and standby servers fail over. This can cause data corruption due to access to the same resource from multiple servers.

Displaying the properties of COM network partition resolution resources with the WebManager

1. Start the WebManager. (*http://FIP_address_for_WebManager_group*: *port_number* (the default value is 29003)).

2. Click the COM network partition resolution resource object, [icon], in the tree view. The following information is displayed in the list view.

COM Network Partition Resolution Resource...	Details
Server Name	**Status**
server1	Online
server2	Online

Server Name: Server name
Status: Status of the network partition resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	comnp1
Type	comnp
Comment	com resolution
Status	Normal
Port Name	COM1

Name: COM network partition resolution resource name
Type: COM network partition resolution resource type
Comment: Comment of the COM network partition resolution resource
Status: Status of all COM network partition resolution resources
Port Name: Port name used for COM network partition resolution

Understanding network partition resolution by DISK method

Settings of the DISK network partition resolution resources

The following settings are required to use DISK network partition resolution resource:

◆ Allocate a dedicated disk partition for disk heartbeat resource on the shared disk. It is not necessary to format the partition.

◆ Allocate driver letters for the disk partition on the shared disk. The drive letters must be the same for all the servers.

DISK network partition resolution resources cause an emergency shutdown in servers that cannot communicate with the first priority server when a network partition is detected.

When a cluster is configured with two or more servers, DISK network partition resolution resources can be used as described below. DISK network partition resolution resources can be set to be used by servers that use the shared disk in a cluster.

For more information, refers to "Disk I/F tab" in Chapter 3, "Function of the Builder."

DISK network partition resolution resources

Note 1 It is recommended to use DISK network partition resolution resources when a shared disk is used.

Note 2 Configure DISK network partition resolution resources considering burden on the disk because they regularly perform read/write operations to the disk.

Note3 For disk heartbeat partitions to be used in DISK network partition resolution resources, use partitions that are configured to be managed in cluster in the HBA settings.

Note 4 If a failure has occurred on all network channels while all disk heartbeat partitions can be accessed normally, a network partition is detected. Then failover takes place in the master server and a server that can communicate with the master server. Emergent shutdown takes place in the rest of servers.

Note 5 If heartbeat from other server is lost while all disk heartbeat partitions cannot be accessed normally, solving the network partition fails and a failover does not take place. In this case, emergency shutdown takes place even in servers working properly.

Note 6 In a cluster configuration with multiple disk heartbeat partitions, if some disk heartbeat partitions have errors and heartbeat from other server is lost, the server status becomes Suspension (Network Partition Unsolved). Better availability is provided by keeping servers alive. However, no group can be started in servers whose status is Suspension (Network Partition Unsolved). Once all disk heartbeat partitions are recovered to be accessed normally, the server status becomes Online.

Note 7 When the I/O time to the shared disk takes longer than I/O Wait Time of DiskNP resource configured in cluster properties, a failover may not be performed due to time-out of solving a network partition.

Note 8 Solving a network partition with this method takes longer compared to other methods because delay in disk I/O needs to be taken into account. The time required to solve a network partition takes twice as long as the longer time of the heartbeat time-out and Disk I/O Wait Time configured in cluster properties.

Displaying the properties of DISK network partition resolution resources with the WebManager

1. Start the WebManager. (*http://FIP_address_for_WebManager_group*: *port_number* (the default value is 29003)).

2. Click the DISK network partition resolution resource object, , in the tree view. The following information is displayed in the list view.

Server Name	Status
server1	Online
server2	Online

DISK Network Partition Resolution Resource... **[Details]**

Server Name: Server name
Status: Status of the network partition resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	disknp1
Type	disknp
Comment	disk resolution
Status	Normal
Volume Mount Point	W:\
Disk I/O Wait Time	80

Name: DISK network partition resolution resource name
Type: DISK network partition resolution resource type
Comment: Comment of the DISK network partition resolution resource
Status: Status of all DISK network partition resolution resources
Volume Mount Point: Drive letters of disk heartbeat partition
Disk I/O Wait Time: Read/Write wait time for DISK network partition resolution

Understanding network partition resolution by PING method

Settings of the PING network partition resolution resources

To use PING network partition resolution resources, a device that is always active to receive and respond to the ping command (hereafter described as ping device) is required.

When the heartbeat from another server is lost but the ping device is responding to the ping command, the remote server is down. Failover starts. If there is no response to the ping command, it is determined that the local server is isolated from the network due to "Split Brain Syndrome," and emergency shutdown takes place.

For more information, refers to "Ping I/F tab" in Chapter 3, "Function for the Builder."

PING network partition resolution resource

Note 1   When the status where no response returns from the ping command continues before heartbeat is lost, which is caused by a failure in the ping device, the network partitions cannot be solved.

If heartbeat is lost in this status, a failover takes place in all servers. Because of this, using this method in a cluster with a shared disk can cause data corruption due to access to a resource from multiple servers. Make sure to use both PING network partition resolution resources and DISK network partition resolution resources when a shared disk is used. When you use Ping network partition resource, specify transmittable and receivable addresses through interconnect LAN that is registered to the configuration data.

Displaying the properties of PING network partition resolution resources with the WebManager

1. Start the WebManager. (*http://FIP_address_for_WebManager_group*: *port_number* (the default value is 29003)).

2. Click the PING network partition resolution resource object, , in the tree view. The following information is displayed in the list view.

Server Name	Status
server1	Online
server2	Online

PING Network Partition Resolution Resourc...   Details

Server Name: Server name
Status: Status of the network partition resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	pingnp1
Type	pingnp
Comment	ping resolution
Status	Normal
IP Addresses	192.168.0.254
Ping Interval	5
Ping Timeout	3
Ping Retry Threshold	3

Name: PING network partition resolution resource name
Type: PING network partition resolution resource type
Comment: Comment of the PING network partition resolution resource
Status: Status of all PING network partition resolution resources
IP Addresses: List of IP addresses of the ping device
Ping Interval: Interval for PING network partition resolution resource
Ping Timeout: Timeout for PING network partition resolution resource
Ping Retry Threshold: Threshold value for retrying PING network partition resolution resource

Understanding network partition resolution by majority method

Settings of the majority network partition resolution resources

This method prevents data corruption caused by "Split Brain Syndrome" by shutting down a server that can no longer communicate with the majority of the servers in the entire cluster because of network failure.

For more information, refers to "Majority I/F tab" in Chapter 3, "Function of the Builder."

Majority network partition resolution resources

Note 1   This method can be used in a cluster with three or more nodes.

Note 2   If majority of the servers are down, emergency shutdown takes place in rest of the servers working properly. When communication with exactly half of the servers in the entire cluster is failing, emergency shutdown takes place in a server that cannot communicate with the top priority server.

Note 3   If all servers are isolated form the network due to a hub error, emergency shutdown takes place in all servers.

Displaying the properties of majority network partition resolution resources with the WebManager

1. Start the WebManager. (*http://FIP_address_for_WebManager_group*: *port_number* (the default value is 29003)).

2. Click the majority network partition resolution resource object, , in the tree view. The following information is displayed in the list view.

Majority Network Partition Resolution Resour...	Details
Server Name	Status
server1	Online
server2	Online

Server Name: Server name
Status: Status of the network partition resource on the given server

If you click the **Details** button, the following information is displayed in the dialog box.

Properties	Value
Name	majonp1
Type	majonp
Comment	majo resolution
Status	Normal

Name: Majority network partition resolution resource name
Type: Majority network partition resolution resource type
Comment: Comment of the majority network partition resolution resource
Status: Status of all majority network partition resolution resources

Understanding network partition resolution by COM method and DISK method

A network partition is solved by combining COM network partition resolution resources and DISK network partition resolution resources.

When the COM channel (such as a COM port and serial cross cable) is working properly, this method works in the same way as the COM method. When an error occurs on the COM channel, this method switches to the shared disk method. This mechanism allows for higher availability than using only the COM method. The method also resolves achieves network partition faster than using the disk method alone.

Understanding network partition resolution by PING method and DISK method

A network partition is solved by combining PING network partition resolution resources and DISK network partition resolution resources.

When communication with ping device is working properly, this method works in the same way as the PING method. This mechanism allows for higher availability than using the PING method alone. The method also solves network partition faster than using only the disk method.

This method works as PING + DISK method when the server which uses PING network partition resolution resources and the server which uses DISK network partition resolution resources are identical. For example, in the clusters of hybrid disk configuration, when DISK network partition resolution resources used by a particular server group and PING network resolution resources used by the whole clusters are configured, these resources work independently. In such a case, to configure the resources to work in PING+DISK method, it is required to add PING network resolution resources to be used only by the same server group as DISK network partition resolution resources.

Not resolving network partition

- This method can be selected in a cluster that does not use a shared disk.

- If a failure occurs on all network channels between servers in a cluster, all servers failover.

Chapter 10   Other monitor settings

This chapter provides information on other monitor settings.

This chapter covers:

The forced stop function

What is the forced stop function?

The forced stop function forcibly stops the failing server from one of the rest of servers working normally by using the IPMI function when it is recognized that the server is failing.

Conditions for performing forced stop

◆ Forced stop is not performed when:

· The failover group successfully stops before the server fails

· The server is shut down by the clpdown command, the OS shutdown command or WebManager and the failover group successfully stops

· The cluster is stopped by the clpcl command or WebManager and the failover group successfully stops

· 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 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 hwreset command in IPMI Management Utilities (ipmiutil) is used to forcible stop a server. When the hwreset command cannot be used, this function cannot be used either.

Specify the following option values for the hwreset command execution in the **BMC** tab of **Server Properties**.

The hwreset command option	Configured in the BMC tab of the server properties
-N [target IP address]	IP address
-U [user name]	User name
-P [password]	Password

Displaying and changing the details of forced stop

For the forced stop settings, refer to "Recovery tab" in "Chapter 3 Function of the Builder". For parameters for when the hwreset is executed, refer to "BMC tab".

Notes on the forced stop

◆ About ipmiutil
When you use this function, it is necessary to install ipmiutil 2.0.0 or later in each cluster server. For information on how to get ipmiutil and how to install it, refer to "Setup of BMC

ExpressCluster X 2.1 for Windows Reference Guide

and ipmiutil" in "Chapter 1 Determining a system configuration" in the *ExpressCluster X Installation and Configuration Guide*.

◆ Impacts on 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 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 when BMC is not installed in the server, or in the environment where the network for the BMC management is blocked.
Configure the same IP address that is configured for 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.

◆ Power Options settings of the OS
When power off or power cycle is executed by BMC, operation specified in **Power Options** of the OS (e.g. sleep, hibernation and shutdown) may be executed.
These settings can be referred to and configured by the following instruction:
Windows 2003: Open **Power Options** in **Control Panel** and select **Advanced** tab,
Power buttons and **When I press the power button on my computer**
Windows 2008: Open **Power Options** in **Control Panel** and select **Choose what the power button does**, **Power button settings** and **When I press the power button:**.

When Forced stop is used in ExpressCluster, it is recommended that this setting is configured as **No Operation**.

Chassis Identify

What is chassis identify?

This function allows another normal server to report the server failure by blinking the chassis ID lamp 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 when:

· Statuses other than server status becomes abnormal

· The cluster shuts down

· All the servers in the cluster fail
If the servers do not fail simultaneously, they blink for 250 seconds at the maximum, and eventually the chassis ID lamps of all servers go off.

· BMC of the failing server cannot communicate with a normal server

· There is a normal server in the cluster but ExpressCluster is stopped

◆ The chassis ID lamp blinks when (the above conditions for not blinking are given priority over these conditions when they overlap):

· When some servers in the cluster fail due to some abnormality

· When some servers in the cluster are shut down by the shutdown command of the OS.

· When some servers in the cluster are made to shut down by the clpdown command or WebManager

· When ExpressCluster is stopped by the clpcl command or WebManager in some servers in the cluster

· When some servers in the cluster are started while ExpressCluster Server service is configured as manual start

◆ Chassis ID lamp stops blinking and goes off 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 blinking when the cluster stops, the chassis ID lamp may keep blinking for 250 seconds at the maximum.

Commands to be used for chassis identify

The alarms command of IPMI Management Utilities (ipmiutil) is used to control the chassis ID lamp. When the alarms command cannot be executed, this function cannot be used.

Specify the following option values for the alarms command execution in the **BMC** tab of **Server Properties**.

The alarms command option	Configured in the BMC tab of the server properties
-N [target IP address]	IP address
-U [user name]	Use name
-P [password]	Password

Displaying and changing the chassis identify details

For the chassis identify settings, refer to "Alert service tab" in "Chapter 3 Functions of the Builder". For the parameters for executing the alarms command, refer to "BMC tab".

Notes on chassis identify

◆ About ipmiutil
To use this function, it is necessary to install ipmiutil 2.0.0 or later in each cluster server. For how to obtain ipmiutil and how to install it, see "Setup of BMC and ipmiutil" in "Chapter 1 Determining a system configuration" in the *ExpressCluster X Installation and Configuration 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 when BMC is not installed in the server, or in the environment where the network for the BMC management is blocked.
Configure the same IP address that is configured for the LAN port for the BMC management to the BMC tab of the server properties.
See the server's manuals etc. for how to configure the IP address of the LAN port for the BMC management etc.

Alert Service

What is Alert Service?

ExpressCluster Alert Service is a function to report failures found in operations on ExpressCluster to system administrators in remote locations.

Failures are reported in two ways, each serving a different purpose.

(1) E-mail report

Alert messages in the WebManager are sent by e-mail to administrators.

(2) Warning light

The warning light is a visual display of the status of the server. When the server shuts down successfully, the warning light goes off.

The e-mail report and the warning light function work independently of each other.

Alert Service allows you to:

◆ Receive information about failures while not physically located in the place where management PC is. This is achieved via e-mail reporting function.

◆ Receive e-mail messages on your mobile phone.

◆ Visually be alerted of failures by viewing a light.

Notes on Alert Service

◆ To use this function, ExpressCluster X Alert Service 2.0/2.1 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.

◆ When the warning light function is used in Windows Server 2008, it is necessary to set up the subsystem for UNIX base application (SUA).

ExpressCluster X 2.1 for Windows Reference Guide

Mail report actions

◆ Alert Service sends the same messages as the WebManager. For the alert messages to be reported by e-mail, see "Messages reported by event log and alert" in "Chapter 13 Error messages".

◆ You can change the alerts that are reported by e-mail. For more information, see "Alert service tab" in "Chapter 3 Functions of the Builder".

Warning Light status

A warning light changes its status when:

(1) the server is started

When the server starts up successfully, warning light changes to green.

(2) when the server shuts down

When the server shuts down successfully, warning light goes off.

(3) when 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 warning light is controlled by a normal server that monitors other servers.

Once a lamp is lit or starts flashing, it will not go off until the cluster shuts down. Run the clpdn1000s command introduced in the following section to put the light out. For more information on the clpdn1000s command, see "ExpressCluster command reference" in the *Reference Guide*.

Behavior of reporting icon

The icons indicate the server status. Depending on the server status, the icon displayed may change or blink.

When you point the cursor to the icon, a chip is displayed.

When the server status changes, a balloon is displayed.

Icons, chips and balloons are displayed as the following:

Icons	Title of chips / balloons	Description in balloons
	ExpressCluster(*)	None
	⊗Service is stopped	The ExpressCluster Server service is stopped.
	⚠Service is starting	The ExpressCluster Server service is starting.
	⊗Service is terminating	The ExpressCluster Server service is about to terminate.
⇔	ⓘExpressCluster is starting	ExpressCluster is starting up. Wait until all nodes are started.
	ⓘOperating normally	ExpressCluster is running normally.
	⚠Abnormal resource	Check the resource marked as abnormal on the WebManager.
	⊗Isolated	Recover the server to the cluster.
	⊗Stopped	ExpressCluster is stopped.
	⊗Cluster suspended	The cluster is being suspended.
	⚠Cluster resumed	The cluster is being resumed.

(*) Before ExpressCluster is started, the "ExpressCluster" chip may be displayed for a while.

Section III Maintenance information

This section provides information on operation and maintenance of the ExpressCluster system.

- Chapter 11 The system maintenance information
- Chapter 12 Troubleshooting
- Chapter 13 Error messages

Chapter 11   The system maintenance information

This chapter provides information you need for maintenance of your ExpressCluster system. Resources to be managed are described in detail.

This chapter covers:

Directory structure of ExpressCluster

Note:
You will find executable files and script files that are not described in Chapter 4, "ExpressCluster command reference" under the installation directory. Run these files only with ExpressCluster. Any failures or trouble caused by executing them by applications other than ExpressCluster are 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 and libraries.

3. **Directory for cluster configuration data**

   This directory stores the cluster configuration files and policy file of each module.

4. **Directory for event logs**

   This directory stores libraries that are related to the ExpressCluster event logs.

5. **Directory related to Help**

   This directory stores the ExpressCluster help information.

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, event log)**

   This directory stores alert and event log messages reported by each module.

9. **Directory for the registry**

10. **Directory for script resource scripts of group resources**

    This directory stores script resource scripts of group resources.

11. **Directory for the string table**

    This directory stores string tables used in ExpressCluster.

12. **Directory for the WebManager**

    This directory stores the ExpressCluster X WebManager's modules and management files.

13. **Directory for module tasks**

    This is a work directory for modules.

14. **Directory for cluster drivers**

    This directory stores drivers for kernel mode LAN heartbeat and disk filter.

Communication ports

ExpressCluster uses the following port numbers by default. You can change these port numbers by using the Builder. Make sure that the programs other than ExpressCluster do not access these port numbers.

To set up a firewall for the server, make sure that the following port numbers can be accessed.

Server – Server					
From			**To**		**Remarks**
Server	Auto-assignment[1]	→	Server	29001/TCP	Internal communication
Server	Auto-assignment	→	Server	29002/TCP	Data transfer
Server	Auto-assignment	→	Server	29003/UDP	Alert synchronization
Server	Auto-assignment	→	Server	29004/TCP	Communication between disk agents
Server	Auto-assignment	→	Server	29005/TCP	Communication between mirror drivers
Server	29106/UDP	→	Server	29106/UDP	Heartbeat (kernel mode)

Server – Client					
From			**To**		**Remark**
Server	Auto-assignment	→	Server	29007/TCP 29007/UDP	Client-server communication

Server - WebManager					
From			**To**		**Remarks**
WebManager	Auto-assignment	→	Server	29003/TCP	http communication

Integrated WebManager connected server-Server to be managed					
From			**To**		**Remarks**
Integrated WebManager connected server	Auto-assignment	→	Server	29003/TCP	http communication

If mirror connect monitor resources are going to be used, you need to let icmp packets through because EXPRESSCLUSTER checks if ping reaches between servers. If mirror connect monitor resources are going to be used, modify firewall settings so that ping reaches between servers.

---

[1] An available port number at the time is automatically assigned.

What causes ExpressCluster to shut down servers

When any one of the following errors occurs, ExpressCluster shuts down or resets servers to protect resources.

Final action for an error in group resource activation or deactivation

When the final action for errors in resource activation/inactivation 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.
An intentional stop error is generated	Causes a stop error (Panic) intentionally 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.
An intentional stop error is generated	Causes a stop error (Panic) intentionally upon monitor resource error detection.

Forced stop action

When the setting is configured as "Use Forced Stop":

Forced stop action	Result
BMC reset	Causes reset in the failing server where the failover group existed.
BMC power off	Causes power off in the failing server where the failover group existed.
BMC power cycle	Causes power cycle in the failing server where the failover group existed.
BMC NMI	Causes NMI in the failing server where the failover group existed.

Emergency cluster shutdown

When an abnormal termination is detected in the following process, ExpressCluster causes the normal shutdown after the group resources stopped.

- clprc

When an abnormal termination is detected in the following process, ExpressCluster causes the emergency shutdown after the group resources stopped

● clpnm

Resource deactivation error in stopping the ExpressCluster Server service

When deactivating a resource by running clpcl –t, which stops the ExpressCluster Server service fails, ExpressCluster causes a shutdown.

Recovery from network partitioning

If all heartbeats are disrupted, network partitioning resolution takes place which results in one or all of the servers to shut down. When the server(s) is started after the shutdown, it is in the restarted status and is not clustered. When you resolve the problem that caused the disruption of heartbeats, recover the cluster.

For details of network partitioning, see Chapter 9, "Details on network partition resolution resources." For information on the suspended status (restart following the shutdown) and cluster recovery, see Chapter 1, "Functions of the WebManager."

Emergency server restart

When an abnormal termination is detected in the following process, ExpressCluster causes the OS restart after the group resources stopped.

- `clpdiskagent`

Configuring the settings to temporarily prevent execution of failover

Follow the steps below to temporarily prevent failover caused by a failed server or detection of an error during monitoring from occurring.

1. Temporarily adjust time-out

    By temporarily adjusting time-out, you can prevent a failover caused by a failed server from occurring.
    The clptoratio command is used to temporarily adjust time-out. Run the clptoratio command on one of the servers in the cluster.

    (Example) To prevent a failover for an hour when the heartbeat time-out is set to 90 seconds:

    `clptoratio -r 40 -t 1h`

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`

    Follow the steps below to cancel the settings that prevent a failover when such settings are no longer necessary.

3. Cancel the temporarily adjusted time-out

    Cancel temporary adjustment of time-out. Run the clptoratio command on one of the servers in the cluster.

    `clptoratio –i`

4. 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`

How to replace a server with a new one

When you replace a server in a cluster environment, follow the instructions below:

1. Set up a new server in the same way as the failed server.

   - When using a shared disk, do not connect the new server to the shared disk yet.

   - Set the same computer name and IP address as the failed server.

   - Register the ExpressCluster license and apply updates as they have been registered and applied before.

   - If there were cluster partition and/or data partition of a mirror disk or hybrid disk on the local disk of the failing server, allocate these partitions and assign drive letters for them as they were configured in the failing server. When you use the disk of the failing server, configure drive letters for the partitions, though allocating partitions is not necessary.

   - When using a shared disk, set the SCSI controller or the HBA that is connected to the shared disk to be filtered in **Filter Settings of Shared Disk** upon installing the ExpressCluster Server.

   - After the setup, shut it down and power it off.

   Important:
   In **Filter Settings of Shared Disk**, set the SCSI controller or the HBA that is connected to the shared disk to be filtered. If the new server is connected to the shared disk when it has not been set to be filtered, data on the shared disk may be corrupted.

2. If the failed server is still running, shut it down and remove it from the shared disk and the LAN, and make sure other servers in the cluster are working properly. (Ignore errors caused by the failed server being stopped.)

3. Start the new server while it is connected to the LAN. When using a shared disk, start the server while it is also connected to the shared disk.

4. When using the shared disk, on the new server, use Disk Management (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.) to confirm that the shared disk is visible, and set the same drive letter as the failed server.

   - At this point, access to the shared disk is controlled, so the disk data cannot be referred.

5. Connect to a server in normal operation in the cluster by using the Web browser to start the Builder. When using a shared disk, click **Properties, HBA** tab and **Connect** on the new server to check or modify the information on HBA and partitions.

   Important:
   On the **HBA** tab of **Properties** of the new server, set the SCSI controller or the HBA that is connected to the shared disk to be filtered. If the shared disk is connected when it has not been set to be filtered, data on the shared disk may be corrupted.

6. When there is any mirror disk resource or hybrid disk resource in the resources used in the new server, stop the failover group containing these resources from the WebManager.

7. Run "clpcl --suspend --force" from the command prompt on the server in normal operation in the cluster and suspend the cluster.

   - A server is recognized to have stopped, so the cluster cannot be suspended from the WebManager.

8. Upload the updated cluster configuration data from the Builder.
When the message "There is difference between the disk information in the configuration information and the disk information in the server. Are you sure you want automatic moification?" appears, select **Yes**.

9. Resume the cluster from the WebManager. If you stopped any group in step 6, start it.

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.

---

10. Right-click the new server on the WebManager, and select **Service** and then **Start.**

11. When **Off** is selected for **Auto Return** in **Cluster Properties**, right-click the server where ExpressCluster has been reinstalled by using the WebManager and select **Recover**.

12. When a mirror disk resource or hybrid disk resource exists in the resources used in the new server and the **Auto mirror recovery** check box is not selected in **Properties** of the cluster, copy the mirror disk or hybrid disk fully from Mirror Disk Helper.

13. Move group as necessary. When mirror disk or hybrid disk is being fully copied, complete copying before moving.

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, one server 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 the **Timeout** tab, and select **Synchronize Wait Time**.

For more information, see the description for the "Timeout tab" in Chapter 3, "Function of Builder" of this guide.

Changing the server configuration (add/delete)

Adding a server

To add a server, follow the steps below:

1. Make sure that the cluster is working properly.

2. Start the server to add. For using the shared disk, make sure the server to add is not connected to the shared disk and then start the server to add.

Important:

To use the shared disk, do not connect the server to the shared disk before setting it up and powering it off. Data on the shared disk may be corrupted.

3. Configure the settings that should be done before setting up the ExpressCluster Server on the server to add. However, to use the shared disk, do not configure the settings for the disk in this step.

Related Information:

As for the settings to be configured before the setup, see "Settings after configuring hardware" of Chapter 1, "Determining a system configuration" in *Installation and Configuration Guide*.

4. Set up the ExpressCluster Server to the server to add. Enter the port numbers of the WebManager and the disk agent. Configure the same settings for the port number as the server that has been already set up. To use the shared disk, set the HBA that is connected to the shared disk to be filtered. Register the license as necessary. After the setup, shut down the server to add and power it off.

Important:

If the shared disk is not set to be filtered in **Filter Settings of Shared Disk** when setting up the ExpressCluster Server, do not connect to the shared disk even after the setup completes. Data on the shared disk may be corrupted. Reinstall ExpressCluster and set the shared disk to be filtered.

5. Start the server to add. To use the shared disk, connect the disk to the server to add at first, and then start the server.

6. To use the shared disk, configure the settings for the disk on the server to add.

   - Use Disk Management (On the **start** menu**,** point to **Settings,** and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.) to confirm that the shared disk is visible.

   - Set the switchable partitions for disk resources and the partitions used as the cluster partition or data partition for hybrid disk resources so that they can be accessed from all the servers by using the same drive letters.

   - On all the servers, set the same drive letter to the disk heartbeat partitions to be used for the disk network partition resolution resources.

   - At this point, access to the shared disk is controlled, so the disk data cannot be referred.

7. Access to other server in the cluster via the Web browser and start the Builder. Right-click **Servers** on the tree in the left pane of the Builder, and select the server to add. Enter the required information and add the server. To use the shared disk, set the SCSI controller or the HBA that is connected to the shared disk to be filtered.

Important:

If the settings are not configured for the shared disk, data on the shared disk may be corrupted. Set the SCSI controller or the HBA that is connected to the shared disk to be filtered.

8. When using a hybrid disk resource in the added server, right-click the server group on the tree in the left pane of the Builder, and select **Properties**. Add the server to **Servers that can run the Group** on the **Server Groups** tab. Do this for required servers only.

9. Right-click the failover group on the tree in the left pane of the Builder, and select the properties. Add the server that can be started on the **Startup Server** tab. Add the server that can be started only to the required failover group.

10. By using the Builder, configure the following settings of the server to add.

   - Information on the HBA and the partition on the **HBA** tab of **Properties** of the server to add (when using the shared disk).

   - Information on the disk heartbeat partition on the **Disk I/F** tab of **Properties** of the server to add (when using the shared disk).

   - Information on the source IP address of the server to add on the **Details** tab of **Properties** of the virtual IP resource (when using the virtual IP resource).

ExpressCluster X 2.1 for Windows Reference Guide

- Information on the switchable partition of the server to add which is displayed on the **Details** tab of **Properties** of the disk resource.

- IP address of the server to add on the **Parameter** tab of **Properties** of the Nic Link Up/Down monitor resource (when using the Nic Link Up/Down monitor resource).

Important:
On the **HBA** tab of **Properties** of the server to add, set the SCSI controller and the HBA connected to the shared disk to be filtered. If the shared disk is connected when it has not been set to be filtered, data on the shared disk may be corrupted.

11. Connect to another server in the cluster via the Web browser to start the WebManager, and suspend the cluster. When the server group configuration has been changed, stop the cluster.

12. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

- When the message "There is the disk information that is not configured. Are you sure you want automatic configuration?" appears, select **Yes**.

13. Resume the cluster after restarting the Manager with the WebManager. If the cluster has been stopped, start it.

Note:
If the cluster is resumed by using the WebManager, the message "Failed to resume the cluster. Click the Reload button, or try again later." is displayed, but ignore it. This message is displayed because the server to add is not suspended.

14. Restart the service of the added server with the WebManager. When **Off** is selected for **Auto Return** in Cluster **Properties**, recover the cluster by using the WebManager manually.

15. Return the added server with the WebManager to the cluster.

16. Move group as necessary.

Deleting a server

To delete a server, follow the steps below:

1. From the WebManager, stop the server to delete, close all the connections including LANs, SCSIs and COMs.

   Important:
   When the shared disk is used, take the following steps after closing all the connections to the shared disk completely. If a connection to the shared disk is kept after uninstalling ExpressCluster, data on the shared disk may be corrupted.

2. Make sure that the cluster is working properly. (However, ignore errors in the server to be deleted.)

3. Run the "clpcl --suspend --force" command at the command prompt, and suspend only the server that has been started.

4. When the server to be deleted is registered in a server group, right-click the server group in the tree in the left pane of the Builder, and then select **Properties**. Delete the target server from **Servers that can run the Group** in the **Server Groups** tab.

5. Right-click the server to delete on the tree in the left pane of the Builder, and select **Remove the server**.

6. Execute "clpcl --suspend --force" from command prompt on the server in normal operation in the cluster to suspend only the servers in operation. When the server group configuration has been changed, stop the cluster from the WebManager.

7. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

8. Resume the cluster by using the WebManager.

9. Uninstall ExpressCluster from the server you have deleted.

10. Shut down the deleted server.

Changing the server IP address

To change the server IP address after you have started the cluster system operation, follow the instructions below.

When changing the mirror connect IP address is not required

1. Make sure that the cluster is working properly.

2. Suspend the cluster by using the WebManager.

3. Change the OS network configuration in the **Properties** of **My Network Places**.

4. Change the IP address on the **Interconnect LAN I/F** tab and the **Public LAN I/F** tab of the server properties by using the Builder.

5. If the changed IP address is used for the NIC Link Up/Down monitor resource, change the IP address on the **Parameter** tab of the monitor resource properties.

6. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

7. Resume the cluster by using the WebManager.

When changing the mirror connect IP address is required

1. Make sure that the cluster is working properly.

2. Stop the cluster by using the WebManager.

3. Change the OS network configuration in the **Properties** of **My Network Places**.

4. Change the IP address on the **Interconnect LAN I/F** tab, the **Public LAN I/F** tab and the **Mirror Connect I/F** tab of the server properties by using the Builder.

5. If the changed IP address is used for the NIC Link Up/Down monitor resource, change the IP address on the **Parameter** tab of the monitor resource properties.

6. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

7. Reboot the OS on all the servers.

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.

Environment where the mirror disk / hybrid disk does not exist

1. Make sure that the cluster is working properly.

2. If the group is started on the server whose host name is to be changed, move the group.

3. Suspend the cluster by using the WebManager.

4. Change the host name in the properties of **My Computer**.

Note:
Do not restart the OS at this stage. The cluster configuration data will not be able to be reflected until the OS is completely restarted.

---

5. Right-click the server name on the tree in the left pane of the Builder, and select **Rename Server**.

6. Select **Upload the Configuration File** from the **File** menu of the Builder, reflect the cluster configuration data to the cluster.

7. Restart the OS on the server you have changed the host name.

8. Resume the cluster from the WebManager.
   Note:
   If the cluster is resumed 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 message is displayed because the server whose host name was changed is not suspended.

---

9. Right-click the server whose server name has been changed on the tree in the left pane of the WebManager, and select **Start** of **Service** to start the cluster. When **Off** is selected for **Auto Return** in **Cluster Properties**, recover the cluster by using the WebManager manually.

Environment where the mirror disk / hybrid disk exists

1. Make sure that the cluster is working properly.

2. Stop the cluster by using the WebManager.

3. Change the host name in the properties of **My Computer**.

Note:
Do not restart the OS at this stage. The cluster configuration data will not be able to be reflected until the OS is completely restarted.

---

4. Right-click the server name on the tree in the left pane of the Builder, and select **Rename Server**.

5. Select **Upload the Configuration File** from the **File** menu of the Builder, reflect the cluster configuration data to the cluster.

6. Reboot the OS on all the servers.

Replacing the network card

To replace the network card, follow the steps below. To replace the network card used for the mirror connect, follow the same steps as well.

1. Make sure that the cluster is working properly. (However, ignore errors in the network card to be replaced.)

2. If a group is running on the server whose network card is to be replaced, move the group. If the network card has been used for the mirror connect, no groups can be moved until the mirror disk recovers after the replacement. Because of this, stop the group by WebManager.

3. Open Services on the server whose network is to be changed (On the **start** menu**,** point to **Settings,** and click **Control Panel**. Double-click **Administrative Tools** and then **Services**.) set **Startup Type** to **Manual** from **Properties** of the ExpressCluster Server service and the ExpressCluster X Disk Agent service.

4. Right-click the server whose network card is to be replaced on the tree in the left pane of the WebManager, and select **Shut Down**.

5. After the shutdown completes, replace the network card.

6. Start the server that the network card is replaced.

7. Configure the settings for the OS network in the **Properties** of **My Network Places**. Configure the same settings for the network as before replacing the network card.

8. Open Services on the server whose network card has been replaced (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Services**.), and set **Startup Type** to **Automatic** from **Properties** of the ExpressCluster Server service and the ExpressCluster X Disk Agent service.

9. When **Off** is selected for **Auto Return** in **Cluster Properties**, recover the cluster by using the WebManager manually.

10. Move group as necessary.

Changing the disk configuration ~For a shared disk~

Replacing the disk

To replace the shared disk, see "Replacing the shared disk."

Adding a disk

The following shows the procedures to add a disk resource. When you add a hybrid disk, consider "disk resource" as "hybrid disk resource", and "partition used for disk resource" as "data partition". Note that it is necessary to add the disk to both of two server groups when you add a hybrid disk resource. As for cluster partition, an existing cluster partition can be used, but it is necessary to configure it so that the offset index of the cluster partition does not overlap the existing hybrid disk.

1. Make sure that the cluster is working properly.

2. Stop the cluster by using the WebManager.

3. Change **Startup Attribute** to manual on the **Attribute** tab of **Properties** of the group to which the disk resource is added.

4. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

5. Shut down all the servers and power them off.

6. Power off the shared disk and add a disk.

7. Power on the share disk and configure its settings.

   • If it is required to build a RAID again or to change the LUN configuration, use the setup tool provided with the shared disk. For details, see the manual attached to the shared disk.

8. Start only one server, and create a partition used for the disk resource using Disk Management (On the **Start** menu**,** point to **Settings,** and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.) and set its drive letter.

   Note:
   Controlling the access to the created partition is started upon its creation, so it cannot be formatted. Set only the drive letter.

9. To create a disk heartbeat partition, create it in the same way as the disk resource, and set the drive letter. Do not format the partition.

10. Start other servers in the cluster, and by using Disk Management (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.), confirm that the partition created by the first server is visible.

11. Set the drive letter of the partition used as the disk resource in the same way as the first server.

12. If the disk heartbeat partition has been created, set its drive letter in the same way as the first server.

13. Start the WebManager, and stop the cluster.

14. Start the Builder, and right-click the group to add a disk resource, and add a disk resource from **Add Resource**. Change **Startup Attribute** to manual on the **Attribute** tab of **Properties** of the group.

15. If the disk heartbeat partition has been added, in all the servers in the cluster, add a disk network partition resolution resource on the **Disk I/F** tab of **Server Properties**.

16. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

17. Start the cluster by using the WebManager.

18. Format the partition used by the disk resource by using the server whose disk resource has been started.

Deleting a disk

1. Make sure that the cluster is working properly.

2. Stop the cluster by using the WebManager.

3. Start the Builder and select the group whose disk resource is to be deleted. Right-click the disk resource from **Resources**, and select **Remove**. When there is a hybrid disk resource using the partition of the disk to be deleted, delete it as well.

4. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

5. Shut down all the servers, and power them off.

6. Power off the shared disk and remove it.

7. Power on the shared disk, and configure its settings.

   • If it is required to build a RAID again or to change the LUN configuration, use the setup tool provided with the shared disk. For details, see the manual attached to the shared disk.

8. Start all the servers.

Changing the disk configuration ~For a mirror disk~

Replacing the disk

To replace the mirror disk, see "Replacing the mirror disk."

Adding a disk

To add a disk used for the mirror disk, follow the steps below:

1. Make sure that the cluster is working properly.
2. If the group is running on the server to which a disk is added, move the group.
3. Shut down only one server by using the WebManager, and power it off.
4. Expand the disk, and start the server.
5. Return the server to the cluster, and rebuild the mirror again.
6. Configure the settings for the disk by the server on which the disk is added.
   - Reserve a data partition and a cluster partition for mirror disk using Disk Management (On the **Start** menu, point to **Settings,** and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.). Set their drive letters so that they will be the same on both of the servers.
7. Perform the steps 2 to 6 on other server.
8. Suspend the cluster by using the WebManager.
9. Start the Builder, and right-click the group to which the mirror disk resource is added, and add the mirror disk resource from **Add Resource**.
10. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.
11. Resume the cluster by using the WebManager.
12. Start the added mirror disk resource or the group that added the mirror disk resource. If **Auto Mirror Initial Construction** is set to be performed in **Cluster Properties**, the initial mirror construction is started. If **Auto Mirror Initial Construction** is set not to be performed, perform the initial mirror construction manually.
13. Move group as necessary.

Deleting a disk

Follow the steps below to delete the disk used for the mirror disk.

1. Make sure that the cluster is working properly.

2. Stop the group with the mirror disk resource to be deleted by using the WebManager.

3. Suspend the cluster by using the WebManager.

4. Start the Builder and select the group from which the mirror disk resource is deleted. Right-click the mirror disk from **Resources** and select **Remove**.

5. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

6. Resume the cluster by using the WebManager.

7. Start the group with the WebManager.

8. Shut down the server on which the group has not been started with the WebManager, and power it off.

9. Remove the disk, and start the server.

10. Move the group, and perform the steps 8 and 9 on other server.

11. Move group as necessary.

Backing up/restoring data

Data is backed up and restored, as shown in the following image. For details on how to back up data, see the manuals of the backup software.

Performing a snapshot backup

When a mirror disk or a hybrid disk is used, it is possible to suspend mirroring to back up the stand-by data partition as a snapshot image. This is referred to as snapshot backup.

During executing snapshot backup, failover cannot be performed to the stand-by server or server group of the copying destination since mirroring is temporarily cancelled. While in this state, cancel the access restriction to the data partition of the standby server to collect the backup.

To return from the snapshot status, control the disk access and build the mirror again.

For details for how to collect the backup, see the manuals of the backup software.

Performing a snapshot backup

To execute the snapshot backup for a mirror disk, follow the steps below:

1. Stop the mirror disk monitor resource that monitors the mirror disk that will be backed up on the server to be backed up.

   clpmonctrl -s -m *<mdw(mirror_disk_monitor_resource_name)>*

2. Disconnect the mirror disk.

   clpmdctrl --break *<md(mirror_disk_resource_name)>*

3. Allow accesses to the mirror disk.

   mdopen *<md(mirror_disk_resource_name)>*

4. Back up necessary files.

5. Forbid accesses to the mirror disk.

   mdclose *<md(mirror_disk_resource_name)>*

6. Recover the mirror disk.

   clpmdctrl --recovery *<md(mirror_disk_resource_name)>*

7. Start the mirror disk monitor resource that monitors the mirror disk.

   clpmonctrl -r -m *<mdw(mirror_disk_resource_monitor_resource_name)>*

To execute the snapshot backup for a hybrid disk, collect the backup by following the steps below in a server in the standby server group of the copying destination.

1. Run the following command in the server where the backup is collected.

   Clphdsnapshot –open *<hybrid_disk_resource_name>*

2. When the access restriction in the data partition is cancelled, back up the required files.

3. Run the following command in the server where the backup has been collected to restart mirroring.

   Clphdsnapshot --close *<hybrid_disk_resource_name>*

4. When the automatic mirror recovery is disabled, perform mirror recovery manually from Mirror Disk Helper.

For the commands, see Chapter 4, "ExpressCluster command reference" of this guide.

ExpressCluster X 2.1 for Windows Reference Guide

Linking to ESMPRO Agent

By linking to ESMPRO Agent, ExpressCluster can fail over by the event logs indicating the system error. To monitor the event logs, it is required to set up ESMPRO Agent on the cluster server.

Environment settings

In the report settings from ESMPRO Agent to the event log to be monitored, register the execution of the failover command to all the servers that configure the cluster.

For example, if an error is detected, register the ARMDOWN command.

For details on setting ESMPRO Agent, see the manual of ESMPRO Agent.

Setting the UPS

To power on a server when the multifunction UPS is connected to, set the AUTO/LOCAL switch on the rear side of the UPS that is connected to the server to LOCAL, and return the AUTO/LOCAL switch to AUTO after it is powered on by the ON/OFF switch on the front side of the UPS.

In case of the shared disk system, it is not required to operate the Auto/Local switch of the UPS that is connected to the shared disk.

Also, power on all the servers within the delay time of startup synchronization (default value: 5 minutes) that is set by the ExpressCluster X Builder. If they are not powered on during this time, a failover occurs.

Also, the shared disk system performs the initialization process for a few minutes after it is turned on the power. During the initialization process, if a server (OS) has been started, the shared disk cannot be recognized. Make sure that the server will not be started during this time.

Restoring the system disk

If an error occurs in the system disk of the server, change the disk following the steps below, and restore the backup data. If ExpressCluster has been updated or changes have been made on the configuration after the backup was created, make sure to uninstall ExpressCluster after restoration and set this server as a new server by following the steps for server replacement.

1. If any group is running on the server where a system disk is restored (hereafter referred to as target server), move the group. When a mirror disk resource or hybrid disk resource is used, make sure that these resources are running properly after the group is moved.

    Important:
    If the mirror disk resource or hybrid disk resource is not in the latest status, and if the system disk is restored on the server that is not to be restored, the data on the data partition may be corrupted.

2. If the mirror disk resource or hybrid disk resource is used, execute the following procedure.

    2-1. Start up the Builder and right click on the cluster. In the **Properties**, select **Mirror Disk** tab and uncheck **Auto Mirror Recovery**.

    2-2. In **File** menu of the Builder, select **Upload the Configuration File** and reflect the cluster configuration data to the cluster.

3. If the target server is running, shut down the server by selecting **Shut Down** from **Start** menu.

4. When the shared disk is connected to the target server, remove the cable connecting the target server and the shared disk. Remove the cable carefully by following the instructions shown below:

    •   When a SCSI disk array is used, remove the cable from the base of the two-way cable.

    •   When a Fibre Channel disk array device, remove the cable between the failing server and the Fibre Channel-HUB or the Fibre Channel-Switch.

5. Change the system disk of the server to be restored. For details on how to change the system disk, see the user's guide provided with the device.

6. Follow the normal installation procedure and install the OS.

    •   To install the OS, see the user's guide provided with the server.

ExpressCluster X 2.1 for Windows Reference Guide

- • Make sure to configure the network settings when installing the OS. Apply the same OS service pack as the removed disk.

7. Make sure that the OS is running normally, and install the backup software. (For details, see the manual of the backup software.)

8. Use the backup software to restore the system disk from the backup.

   - • There is no note cluster dependent note. Restore the system disk with the settings that allow the registry to be recovered and files with the same file names to be overwritten. For details, see the manual of the backup software.

9. When the ExpressCluster Server service of the target server is configured as Auto Startup, change the settings to Manual Startup.

10. Reset its drive letter if it has been changed. Make sure that the date and time are the same as those of other servers in the same cluster.

11. When the driver of SCSI controller or FC-HBA (Host Bus Adapter) cannot be restored, re-install the above driver. For details, refer to the instruction manual of backup software.

12. Restart the target server. When the shared disk is not connected to the target server, the following steps up to 16 are not required.

13. Connect to the server that has not been restored via the Web browser to start the Builder. Open the **Properties** of the target server to configure the filter settings of the HBA connected to the shared disk.

   - • Click the connect button of the HBA tab to acquire the disk configuration information of the target server, and select the checkbox of the HBA connected to the shared disk.

   - • Do not change any settings other than above.

14. Use Builder to save the cluster configuration information in which HBA filter settings have been configured in a disk area accessible from a cluster server.

   - • When the Builder is used on a cluster server, save the information in the local disk. When the Builder is used in another PC, save the information in the shared disk that can be accessed from the cluster server or save it in a floppy disk or the like and then copy it to the local disk of a cluster server.

15. Run the following command on one of the cluster servers to upload the saved cluster configuration information.

   clpcfctrl --push -x *<path_of_the_cluster_configuration_information>* --nocheck

16. Shut down the target server and connect the disk cable, and then reboot the server.

17. Start the target server and check the drive letter of the shared disk and the mirror disk (data partition and cluster partition) in **Disk Management** of the target server. If the drive letter has been changed, re-configure it as it was, restart the server and check that the drive letter is configured correctly.

18. Connect to the server which has not been restored via the Web browser to start the Builder. When the shared disk is connected to the target server and the shared disk has a volume that is not for filitering, update the information on the partition that is not for filtering in the **HBA** tab of **Properties** in the target server.

19. Perform the procedures in steps 14 and 15 above to save the cluster configuration information and then upload the information by using the clpcfctrl command from the server.

   - • If the message "There is difference between the disk information in the configuration information and the disk information in the server. Are you sure you want automatic moification?" appears upon saving the configuration information, select **Yes**.

20. Restore the setting of the ExpressCluster Server service to Auto Startup and reboot the target server.

21. When the Auto Recovery is configured as **Off** in **Properties** of the cluster, right-click the target server and select **Recover** in the WebManager. If mirror disk resource or hybrid disk resource is not used on the target server, the following procedure is not required.

22. Execute the mirror recovery (full copy) from the Mirror Disk Helper of WebManager to all the mirror disk resources and hybrid disk resources.

・A server where restoring is not performed must be the source of the copy.

・Recover the mirror by fully copying, not partially copying because the data difference may be invalid in the process of restoring.

23. Start up the Builder and right click on the cluster. In the **Properties**, select **Mirror disk** tab and check **Auto Mirror Recovery.**

24. In **File** menu of the Builder, select **Upload the Configuration File** to upload the cluster configuration data to the cluster.

Replacing the shared disk

Important: Before step 14, it is not possible to access to the partitions under HBAs to be managed by cluster, even if the partition is not access restricted.

1. Make sure that the cluster is working properly. (However, ignore errors in the disk to be replaced.)

2. Stop the cluster by using the WebManager. When the shared disk to be replaced is connected to some of the servers but not all, stop those servers only.

3. On all servers connected to the shared disk to be replaced, set **Startup Type** to **Manual** from **Properties** of the **EXPRESSCLUSTER Server** service.

4. Shut down all the servers connected to the shared disk to be replaced, and power them off.

5. Power off the shared disk, and change the disk.

6. Power on the shared disk, and configure its settings.

    -   If it is required to build a RAID again or to change the LAN configuration, use the setup tool provided with the shared disk. For details, see the manual provided with the shared disk.

7. Start only one server, create a partition by using Disk Management (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.), and set the drive letter as before replacing the disk.

    Note:
    Controlling the access to the created partition is started upon its creation, so it cannot be formatted. Set only the drive letter.

    Note:
    The size of the switchable partition used for disk resource can be changed in this occasion. The size of the data partitions of hybrid disk resource need to be the same in both server groups. Because of this, to change the size it is necessary to delete the resource, change the partition size in both server groups and then create the resource again.

8. Start other servers connected to the replaced shared disk in the cluster, by using Disk Management (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.), and check that the partition created by the first server is visible.

9. Set the drive letter of the partition used for the disk resource in the same way as the first server.

10. Start the Builder online.

11. When there are partitions with no access restriction on the replaced shared disk, add these partitions in **Partition excluded from cluster management** by selecting **Properties**, the **HBA** tab and **Connect** in each server connected to the shared disk.

12. When some servers are operating as cluster, stop the cluster from the WebManager.

13. Select **Upload the Configuration File** from the **File** menu of the Builder, and reflect the cluster configuration data to the cluster.

    •   When the message "There is difference between the disk information in the configuration information and the disk information in the server. Are you sure you want automatic modification?" appears, select **Yes**.

14. On all servers connected to the replaced shared disk, re-configure **Startup Type** to **Automatic** from **Properties** of the **EXPRESSCLUSTER Server** service.

15. Start the WebManager, and start the cluster.

16. Format the partition used for the disk resource from the server on which the disk resource is running. In case the group with the disk resource is stopped, format the partition after starting the disk resource as necessary.

17. When there is a partition of the hybrid disk resource on the replaced shared disk, rebuilding of mirroring (full copy) is automatically performed if the **Auto mirror recovery** is configured in the **Mirror disk** tab of **Cluster Properties**. If the settings are configured not to perform **Auto mirror recovery**, reconfigure mirror manually.

Replacing the mirror disk

If an error occurs in a disk that forms a mirror set, follow the steps below to replace the disk. When disks are arrayed, following procedure is required if the array is rebuilt.

You can replace a local disk mirrored by a hybrid disk resource by following the steps below. In that case, consider "mirror disk resource" in the description below as "hybrid disk resource".

1. Make sure that the cluster is working properly. (However, ignore errors in the disk to be replaced.)

2. If the group is running on the server, which contains the disk to be replaced, move the group.

3. When the **Auto Mirror Recovery** checkbox is selected in **Properties** of the cluster, start the Builder on line, select **Properties** of the cluster and the **Mirror disk** tab, clear the **Auto Mirror Recovery** checkbox, select **Upload the Configuration File** in the **File** menu to reflect the cluster configuration data to the cluster.

4. Shutdown the server whose disk is to be replaced from the WebManager and power it off.

5. Replace the disk and start the server.

6. Configure the settings for the disk by the server with the replaced disk.

   - Reserve the data partition and the cluster partition for the mirror disk by using Disk Management (On the **Start** menu, point to **Settings**, and click **Control Panel**. Double-click **Administrative Tools** and then **Computer Management**, and click **Disk Management**.) Set the drive letters of the data partition and the cluster partition so that the drive letters of data partition and cluster partition and the size of data partitions are the same in both servers.

7. When the **Auto Mirror Recovery** is configured as **Off** in the **Auto Recovery** tab in **Cluster properties**, return the replaced server to the cluster from the WebManager.

8. Stop group with mirror disk resource by using WebManager and suspend the cluster.

9. Start the Builder on line. If you have unchecked the **Auto Mirror Recovery** checkbox in procedure 3, check the the **Auto Mirror Recovery** checkbox again.

10. Select **Upload the Configuration File** from the **File** menu of the Builder to upload the cluster configuration data to the cluster.

11. Resume the cluster by using the WebManager.and start the group which has been stopped in step 8 with the server which has not been replaced disks.

12. If the **Auto Mirror Recovery** checkbox is selected in cluster properties, full reconstruction of mirror will be performed. If not, it is required to perform the reconstruction manually.

13. Move the group as necessary.

Replacing FibreChannel HBA / SCSI controller

Follow the procedures below to replace HBA connecting the shared disk.

1. If the group is operating in the server where HBA is to be replaced (hereafter referred to as target server), move the group to another server.

2. Change the settings for the ExpressCluster Server service of the target server to manual start.

3. Shut down the target server to replace HBA.

4. Start the target server with the disk cable disconnected.

5. Start the Builder online, open the properties of the target server and configure filter settings on the replaced HBA.

    ・ Click the **Connect** button in the HBA tab to acquire the disk configuration data of the target server and select the replaced HBA.

    ・ Do not change the settings other than above.

6. Save the cluster configuration data in which HBA filter setting has been configured in Builder temporarily in the disk area accessible from the cluster server.

    ・ If the Builder is used on the cluster server, save the cluster configuration data in the local disk. Also, if the Builder is used on another PC, save it in the shared folder accessible from the cluster server, or save it temporarily in a floppy disk etc. and then copy it to the local disk of the cluster server.

7. Execute the following command on one of the cluster servers to upload the saved cluster configuration data.

    clpcfctrl --push -x < *path_of_the_cluster_configuration_information* > --nocheck

8. Shut down the target server and connect the disk cable.

9. Start the target server to check the drive letter in **Disk Management**.
    If the drive letter has been changed, set it as it was before. Restart the server to check that the drive letter is correctly configured.

10. Start the Builder online and open the properties of the target server to check the settings for the **HBA** tab. If there is a partition which does not restrict access on the shared disk, check that the partition data is registered in **Partition excluded from cluster management**.

11. As with the steps 6 and 7 above, save the cluster configuration data temporarily and upload it from the cluster server with the following command:

    clpcfctrl --push -x < *path_of_the_cluster_configuration_information* > --nocheck

12. Set the configuration for the ExpressCluster Server service of the target server back to automatic start, and reboot the target server.

13. When **Auto Recovery** is configured as **Off** in **Properties** of the cluster, right-click the target server in WebManager to select **Recover**.

14. Migrate the group if necessary.

Information required for inquiry

The following information is required for inquiring about the failure.

1. Failure
    Describe the failure.
    Example) Failover group (failover1) failed to fail over from server1 to server2.

2. Time that the failure occurred
        Example) 2006/01/01 00:00

3. Name of the server with the failure
    Example) server2

4. Version of ExpressCluster
    Example) ExpressCluster X 2.0

5. ExpressCluster log and event log of when the failure occurred
    Logs can be collected by using the WebManager or by running the log collection command.
    To use the WebManager, see Chapter 1, "Functions of the WebManager." To use the log
    collection command, see Chapter 4, "ExpressCluster command reference."

Chapter 12   Troubleshooting

This chapter provides instructions for troubleshooting problems with ExpressCluster.
This chapter covers:

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. Make sure that the cluster configuration data is uploaded on all the servers.

   For details, 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,>ipconfig....)

3. License registration

   The license may not be registered yet. Run the license manager on all servers in the cluster to confirm that the license is registered:

   If you are using the trial version license, confirm if it is not expired yet.

   To run the license manager, select **ExpressCluster Server** from the **Start** menu, and then **License Manager**.

4. EXPRESSCLUSTER service

   Start the service control manager of the OS, and make sure that the following ExpressCluster services have been started. If all of them have been started, ExpressCluster is running normally. To run the service control manager, from **Control Panel,** select **Administrative Tools** and select **Services**.

   ExpressCluster
   ExpressCluster Disk Agent
   ExpressCluster Event
   ExpressCluster Manager
   ExpressCluster Old API Support
   ExpressCluster Server
   ExpressCluster Transaction
   ExpressCluster Web Alert

5. Free disk space

   Run [Disk Management] to check the size of the free disk space in the drive that contains <*ExpressCluster_installation_path*>. For details on the disk space to be used by ExpressCluster, see Chapter 3, "Installation requirements for ExpressCluster" in *Getting Started Guide*. To run Disk Management, select **Control Panel**, select **Administrative Tools**, and select **Computer Management**. Then from the icon tree, select **Services** under **Services and Applications**.

6. Usage of memory or OS resource

   Run Task Manager of the OS to check the OS memory usage and CPU usage rate.

When activating or deactivating network partition resolution resource fails

1. Majority method

   Memory or OS resources may not be sufficient. Check them.

2. COM method

   The cause may be one of the following:

   - The specified device name (such as COM1 and COM2) may not exist in the system. Confirm that the device name specified by the Builder exists in the system.

   - Other application may be using the device name specified by the Builder (such as COM1 and COM2). Check the device name.

3. PING method

   Memory or OS resources may not be sufficient. Check them.

4. DISK method

   The settings of the Builder are invalid. Check that the disk heartbeat partition is set to be filtered on the **HBA** tab of **Server Properties** of the server that failed to be activated or deactivated. Check that the disk heartbeat partition is not used by other resource (disk resource, mirror disk resource).

When a network partition resolution resource error is detected

1. Majority method

   Memory or OS resources may not be sufficient. Check them.

2. COM method

   Communication between the servers by the COM method cannot be performed. Confirm that the serial cable is connected to the device specified by the Builder properly.

3. PING method

   There is no PING command response from the PING destination device. Check that there is no problem in the communication path from the cluster server to the PING destination device.

4. DISK method

   Time-out occurred in accessing the disk heartbeat partition, or disconnection of the cable to the shared disk was detected.

   If a time-out has occurred, select **Tuning** on the **Network Partition Resolution I/F** tab of **Tuning**. Select the disk network partition resolution resource with an error on the **Disk** tab of the **NP Resolution Tuning Properties** dialog, and adjust **IO Wait Time** from **Edit**.

   If cable disconnection is detected, check the cable connection status.

Network partition resolution resource becomes unavailable

A combination of network partition resolution resources is invalid. Refer to Chapter 9, "Details on network partition resolution resources" and change the settings by using the Builder.

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 event log. See "Detailed information in activating and deactivating group resources" and examine the logs to find the cause of the error and take appropriate action for it.

When a monitor resource error occurs

If a monitor resource detects any error, detailed information on error is logged in the alert and event logs. See "Detailed info of monitor resource errors" and examine the logs to find the cause of the error and take appropriate action for it.

When a heartbeat time-out occurs

Possible causes of heartbeat time-out between servers are listed below:

Cause	Solution
Disconnection of LAN cables	Check that you can send packets with the ping command.

Recovering from failure of one server

If the automatic recovery mode is not set in **Cluster Properties**, the server that you have removed errors and restarted is in the **Suspension (Isolated)** status. To recover the server to the normally functioning cluster from this status, use the WebManager or the clpcl command.

If the Replicator is used, data between the disks that form a mirror set becomes inconsistent. However, by recovering the server, the mirror will be automatically rebuilt, and the data will become consistent.

To recover the server by the WebManager, see "Operating a cluster by using the WebManager" of Chapter 1, "Functions of the WebManager" of Section I of this guide.

To recover the server by the clpcl command, see "Operating the cluster" of Chapter 4, "ExpressCluster command reference" of Section I of this guide.

Recovering from failure of both servers

When **Off** is selected for **Auto Return** on the **Auto Recovery** tab in **Cluster Properties**, when all the servers shut down by failures such as a hardware failure, after starting them up, they are removed from the cluster. Recover all the servers by using the WebManager or the clpcl command.

Right after recovering the servers, all the groups are stopped. Start all the groups. If the Replicator is used, the mirror will be automatically built again by starting the groups, and the data will become consistent.

Recovering a suspended server (with unresolved network partition)

Since activating the same group is prevented on multiple servers, the group cannot be started. A server is suspended (with unresolved network partition) when all the conditions below are met.

- There are two or more network partition resolution resources of the DISK method.

- An error has occurred in the network partition resolution resource of the DISK method, and network partitioning cannot be resolved.

- Network partitioning or failure of a server occurred.

Perform the following steps to recover the suspended server.

1. If network partitioning occurred, recover all the heartbeat resources to the normal status. To check if the network partition has occurred, refer to "When network partitioning occurs."

2. Shut down the whole cluster by using the WebManager or the clpstdn command.

3. Start all the cluster servers.

4. Recover the network partition resolution resource of the DISK method with an error. For how to recover, refer to "When a network partition resolution resource error is detected."

5. If a suspended server (rebooted after shutdown) exists, recover the server by using the WebManager and the clpcl command.

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 when the network partition resolution resource is not registered. The following examples assume that you have registered kernel mode LAN heartbeat resources 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

[on server0 : Online]
      HB   0  1

 -------------------------------------------------------------------
  server0 : o o
  server1 : o o

[on server1 : Online]
      HB   0  1

 -------------------------------------------------------------------
  server0 : o o
  server1 : o o
```

When you run the command on server2
```
# clpstat -n

 ===================  HEARTBEAT RESOURCE STATUS   =================
 Cluster : cluster
   server0 : server1
  *server1 : server2

  HB0 : lanhb1
  HB1 : lanhb2

 [on server0 : Online]
      HB   0  1

 -------------------------------------------------------------------
   server0 : o  o
   server1 : o  o

 [on server1 : Online]
      HB   0  1

 -------------------------------------------------------------------
   server0 : o  o
   server1 : o  o

 ===================================================================
```

When the network is partitioned, the result of executing the clpstat command is what is described below. Both servers recognize each other that the counterpart is down.

When you run the command on server1
```
# clpstat -n

 =================== HEARTBEAT RESOURCE STATUS  ================
 Cluster : cluster
  *server0 : server1
   server1 : server2

   HB0 : lanhb1
   HB1 : lanhb2

  [on server0 : Online]
        HB   0  1

--------------------------------------------------------------------
     server0 : o  o
     server1 : x  x

  [on server1 : Offline]
        HB   0  1

--------------------------------------------------------------------
     server0 : -  -
     server1 : -  -

====================================================================
```

When you run the command on server2
```
# clpstat -n

 =================== HEARTBEAT RESOURCE STATUS  ================
 Cluster : cluster
   server0 : server1
  *server1 : server2

   HB0 : lanhb1
   HB1 : lanhb2

  [on server0 : Offline]
        HB   0  1

--------------------------------------------------------------------
     server0 : -  -
     server1 : -  -

  [on server1 : Online]
        HB   0  1  2

--------------------------------------------------------------------
     server0 : x  x
     server1 : o  o

====================================================================
```

Shut down both servers immediately if the network is partitioned. Check the following for heartbeat resources.

1. Kernel mode LAN heartbeat resource

- LAN cable status

- Network interface status

If interconnection LAN is recovered from the network partitioning, ExpressCluster causes the servers to shut down.

If ExpressCluster detects that the same group is active on multiple servers, it causes the servers to shut down.

For the Replicator, depending on the server shutdown timing, the statuses of mirror disk resources may not be the same after rebooting the server.

Depending on the timing of server shutdown, the status of mirror disk resources may be the one requiring forced mirror recovery, mirror recovery, or normal.

ExpressCluster X 2.1 for Windows Reference Guide

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.

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 Server service.	Other servers cannot be operated, suspended or resumed.
clpdown	Stops the ExpressCluster service and shuts down a server registered in the configuration information.	Other servers cannot be operated.
clpstdn	Stops the ExpressCluster service in the entire cluster, and shuts down all servers.	Other servers cannot be operated.
clpgrp	Starts, stops and moves groups.	Only groups on the local server can be stopped.
clptoratio	Extends and displays time-out values of all servers in the cluster.	Time-out ratios of other servers cannot be set.

Commands for logs		
Command	**Description**	**Remarks**
clplogcc	Collects logs and OS information.	Logs of other servers cannot be collected.

Commands for mirror (only for the Replicator / Replicator DR)		
Command	**Description**	**Remarks**
clpmdstat	Displays the status and settings information of mirroring	The mirror status of the remote server cannot be retrieved.
clpmdctrl	Activates/inactivates mirror disk resources and recovers mirroring.	Do not use this command since mirror disk resources of both servers may be activated.
clphdsnapshot	Controls snapshot backup of hybrid disk resource.	This command cannot be used unless mirroring is successfully performed.

Section III Maintenance information

Connecting mirror disks/hybrid disks manually

This section describes how to cancel the access restriction for the data partition of mirror disk resource or hybrid disk resource when you cannot start ExpressCluster due to some sort of failure.

Normally connecting mirror disk when mirroring is available

When the ExpressCluster Server service can be activated while the ExpressCluster X Disk Agent service cannot be, access restriction can be cancelled by following the steps below.

1. Run the following command on the server where you want to connect disks.

    For mirror disks:
    ```
    clpmdctrl --active <mirror_disk_resource_name (Example: md1)>
    ```

    For hybrid disks:
    ```
    clphdctrl --active <hybrid_disk_resource_name (Example: hd1)>
    ```
2. The mirror disk resource or hybrid disk resource becomes accessible. Written data is mirrored to the other server.

Forcibly connecting mirror disk when mirroring is not available

Follow the steps below to save data on mirror disks when both the ExpressCluster Server service and the ExpressCluster X Disk Agent service cannot be activated.

However, the mirroring status up to the moment just before both the ExpressCluster Server service and the ExpressCluster X Disk Agent service became unable to be activated must be normal, or you must know which server has the latest data.

1. Uninstall ExpressCluster from the server with the latest data, and restart the server.

2. Back up the data in the data partition on a DAT tape or other media.

As for hybrid disk resources, if the above is performed while another server in the same server group is using the shared disk, the data on the shared disk may be destroyed. Make sure to stop the other server or disconnect the disk cable of the other server when you perform the above.

Recovering from mirror breaks

When the auto-mirror recovery is enabled, no special operation is required. Mirroring is automatically recovered. However, if mirroring needs to be recovered forcibly, execution of a command or operations for forcible mirror recovery using the WebManager are required.

If the auto-mirror recovery is disabled, you have to recover mirroring by executing a command or using the WebManager.

The difference mirror recovery function is disabled and full copy is performed in the following cases:

- When the partition configuration for mirror disk resource or hybrid disk has been changed due to disk replacement etc.

- When both servers fail at the same time while mirror disk resource is normally activated

- When the current servers (servers updating and managing the disk in the server group) in the both server groups fail at the same time when the hybrid disk resource is normally activated

- When difference information could not be written successfully due to disk failure etc.

Automatically recovering from mirroring

When the auto-mirror recovery is enabled, mirroring is automatically recovered under the following conditions:

1. Mirror disk resource or hybrid disk resource is active.

2. The server where mirror disk resource or hybrid disk resource is activated contains the latest data.

3. Servers in the cluster are in the normal status, and you can verify their mirroring statuses.

4. The data among the servers is not the same.

5. In case of mirror disk, both the mirror disk monitor resource and the mirror disk connect monitor resource must operate normally on all the registered servers.

In case of hybrid disk, hybrid disk monitor resource must operate normally on a server that monitor target resource is activated.

6. Resource is not activated on a server/server group that does not store the latest data.

7. **Auto Mirror Recovery Setting** in the cluster's properties must be checked.
   However, if the initial mirror configuration is yet to be set, the initial mirror configuration must be checked in accordance with the above indicated.

8. Failures such as disk errors on the target disk of the mirror disk or hybrid disk are not occurring

The auto-mirror recovery is not performed if any of the following applies.

1. One of the servers (for hybrid disk resource, all servers in one of the server groups) is not started.

2. You cannot confirm the mirroring status of the other server.

3. There is no server whose mirror status is normal.

4. Mirror disk monitor resource or hybrid disk monitor resource is not registered.

5. Monitor resource is suspended or stopped in a server or server group that stores the latest data.

6. Resource is forcibly activated in other server or server group, including when snap shot backup is being executed.

For information on how to verify the progress of recovering mirroring, see "Checking the mirror recovery progress with a command" on page 800 and "Checking the mirror recovery progress from the WebManager" on page 805.

Checking the mirror break status with a command

For mirror disk resources, run the following command to view the mirror break statuses.

`clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>`

You can view the mirror disk resource statuses by running the clpmdstat command.

1. When normal:

```
Mirror Status: Normal


md1              server1         server2
------------------------------------------------------------
Mirror Color   GREEN           GREEN
```

2. When the mirror recovery is required:

```
Mirror Status: Error


md1                  server1                 server2
------------------------------------------------------------
Mirror Color         GREEN                   RED
Lastupdate Time      2004/03/04 17:30:05     --
Break Time           2004/03/04 17:30:05     --
Disk Error           OK                      OK
Difference Percent   1%                      --
```

3. When the forcible mirror recovery is required:

```
Mirror Status: Error


md1                  server1                 server2
-----------------------------------------------------------------
Mirror Color         RED                     RED
Lastupdate Time      2004/03/09 14:07:10     2004/03/09 13:41:34
Break Time           2004/03/09 14:06:21     2004/03/09 13:41:34
Disk Error           OK                      OK

Difference Percent   1%                      1%
```

4. While the mirroring is being recovered:

See "Checking the mirror recovery progress with a command" on page 800.
For hybrid disk, execute the following command to check the mirror break status.

`clphdstat --mirror <hybrid_disk_resource_name (Example:hd1)>`

For details, see "Hybrid disk status display command" in Chapter 4 ExpressCluster command reference.

Checking the mirror recovery progress with a command

For mirror disk resources, run the following command to view the progress of recovering mirroring.

clpmdstat --mirror <*mirror_disk_resource_name* (Example: md1)>

You will see the following data while mirroring is being recovered.

```
Mirror Status: Recovering


md1                 server1                    server2
----------------------------------------------------------------
Mirror Color     YELLOW                    YELLOW


Recovery Status  Value
----------------------------------------------------------
Status:          Recovering
Direction:       server1 -> server2
Percent:         7%
Used Time:       00:00:09
Remain Time:     00:01:59
```

You will see the following information when the mirror recovery is successfully completed.

```
Mirror Status: Normal


md1                 server1                    server2
-----------------------------------------------------------------------
--------------------
Mirror Color     GREEN                    GREEN
```

For hybrid disks, execute the following command to check the mirror break status.

clphdstat --mirror<*hybrid_disk_resource_name* (Example: hd1)>

For details, see "Hybrid disk status display command" in Chapter 4 ExpressCluster command reference.

Recovering mirror with a command

Run the following command to start the mirror recovery.

For mirror disk:

clpmdctrl --recovery <*mirror_disk_resource_name* (Example: md1)>

When the mirror recovery can be performed, the difference data is used to recover the mirror.

This command immediately returns the control once the mirror recovery starts. For information on how to verify the mirror recovery progress, see "Checking the mirror recovery progress with a command" on page 800 and "Checking the mirror recovery progress from the WebManager" on page 805.

Running the forcible mirror recovery with a command

If ExpressCluster cannot determine which server contains the latest data, you have to run the forcible mirror recovery.

In this case, you have to manually identify the server that holds the latest data, and perform the forcible mirror recovery.

The difference mirror recovery function is disabled in the forcible mirror recover, and the data may be fully copied.

Identify the server that holds the latest data by any of the following means:

● Using Mirror Disk Helper of the WebManager

1. Right-click the mirror disk resource or hybrid disk resource you want to check and select **Detail information** in the WebManager tree to start Mirror Disk Helper.

2. Click **Details**.

3. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.

● Using the clpmdstat / clphdstat command

Confirmation method is the same as Mirror Disk Helper of the WebManager except that you use a command.

1. Run the following command.
For mirror disks:

    ```
    clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
    ```

    For hybrid disks:
    ```
    clphdstat --mirror <hybrid_disk_resource_name(Example:hd1)>
    ```

2. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.

● Using data on disks

This method is not recommended because the data may be corrupted if anything goes wrong in the procedure. Perform the following steps on both servers to identify which has the latest data.

For mirror disks:

1. Confirm all groups are stopped.

2. Run the following command to connect the mirror disk resource.

    ```
    clpmdopen <mirror_disk_resource_name (Example: md1)>
    ```

3. Logically examine the data on the connection destination.

4. Run the following command to disconnect the mirror disk resource.

    ```
    clpmdclose <mirror_disk_resource_name (Example: md1)>
    ```

For hybrid disks:

1. Confirm all groups are stopped.

2. Run the following command to connect the hybrid disk resource.

    ```
    clphdctrl –active <hybrid_disk_resource_name (Example:hd1)> -f
    ```

3. Logically examine the data on the connection destination.

4. Run the following command to disconnect the hybrid disk resource.

```
clphdctrl –deactive <hybrid_disk_resource_name (Example:hd1)>
```

When you have identified the server holding the latest data, run the following command to start the forcible mirror recovery.

For mirror disks:

```
clpmdctrl --force <server_containing_the_latest_data>
<mirror_disk_resource_name (Example: md1)>
```

For hybrid disks (conducted on the server having the latest data):
```
clphdctrl --force <hybrid_disk_resource_name (Example:hd1)>
```

The clpmdctrl / clphdctrl command immediately returns the control once the forcible mirror recovery starts. For information on how to check the forcible mirror recovery progress, see "Checking the mirror recovery progress with a command" on page 800 and "Checking the mirror recovery progress from the WebManager" on page 805.

When the forcible mirror recovery is successfully completed, activate the groups. The mirror disks become available.

Running the forcible mirror recovery with a command only on one server

In some cases, you cannot start one of the servers due to a hardware or OS failure, and the server that can be started may not have the latest data. If you want to start applications at least on the server that can be started, you can perform the forcible mirror recovery on that server.

However, remember that if you do this, the data on the server where you run this command becomes the latest data no matter which server actually has it. Therefore, even if you are able to start the other server later, you cannot handle the data in that server as the latest one. Make sure you understand the consequence before running the following command.

For mirror disk resources, run the following command to start the forcible mirror recovery:

```
clpmdctrl --force <server_name> <mirror_disk_resource_name (Example:
md1)>
```

After running the command, you can activate the groups and use the mirror disks.

For hybrid disk resources, execute the following command on the target server to start forcible mirror recovery.

```
clphdctrl --force <hybrid_disk_resource_name (Example:hd1)>
```

After executing the command, it becomes possible to start the group to use the hybrid disk.

Checking the mirror break status from the WebManager

You can see the mirror break status by starting Mirror Disk Helper from the WebManager.

- When normal:

- When mirror recovery is required:
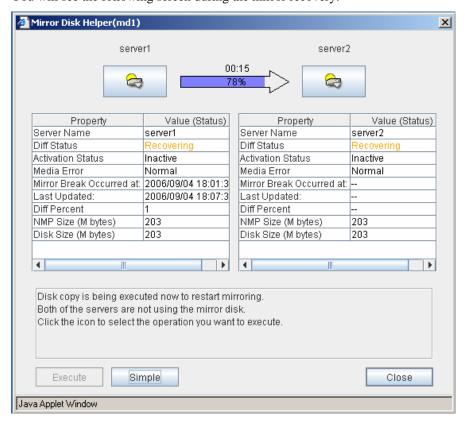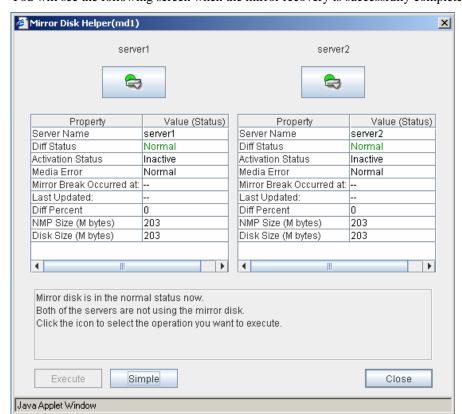

- When forcible mirror recovery is required:

● While mirror recovery is in progress:

See "Checking the mirror recovery progress from the WebManager" on page 804.

Checking the mirror recovery progress from the WebManager

Start Mirror Disk Helper from the WebManager to view the mirror recovery progress.

You will see the following screen during the mirror recovery.

You will see the following screen when the mirror recovery is successfully completed.

Recovering mirror using the WebManager

Start Mirror Disk Helper from the WebManager to start mirror recovery. Click the icon of the server that needs to be recovered. The icon will be changed as in the window below. Click **Execute** to start the mirror recovery processing.

When the difference mirror recovery can be performed, the recovery is done using the difference data. The difference mirror recovery takes less time than the forcible mirror recovery.

For information on how to check the mirror recovery progress, see "Checking the mirror recovery progress with a command" on page 800 and "Checking the mirror recovery progress from the WebManager" on page 805.
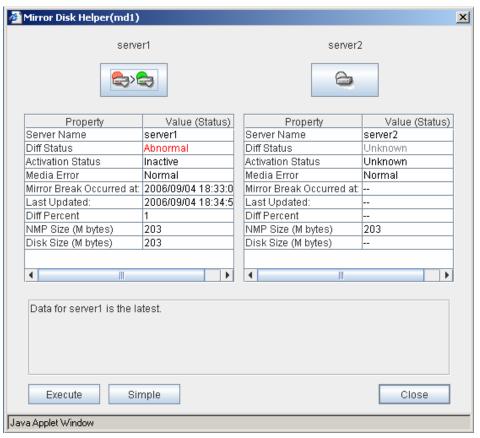
Running the forcible mirror recovery using the WebManager

When ExpressCluster cannot determine which server has the latest data, you have to perform the forcible mirror recovery. In this case, you have to manually identify the server which holds the latest data, and perform the forcible mirror recovery.

The difference mirror recovery function is disabled in the forcible mirror recovery and the data may be fully copied.

Identify the server that has the latest data by any of the following methods:

- Using Mirror Disk Helper of the WebManager

    1. Right-click **Servers** in the WebManager tree to start the Mirror Disk Helper.

    2. On the main screen of Mirror Disk Helper, display the detailed data of the mirror disk resources you want to see.

    3. Click the **Details** button.

4. See the last update time stamp (Last Data Updated Time) to identify the server which has the latest data. However, this Last Data Updated Time depends on the operating system's clock.

Select the icon of server containing the latest data. The icon will be changed as in the window below. Click **Execute** to start the mirror recovery processing.

For information on how to check the forcible mirror recovery progress, see "Checking the mirror recovery progress with a command" on page 800 and "Checking the mirror recovery progress from the WebManager" on page 805.

When the forcible mirror recovery is successfully completed, you can activate the groups and use the mirror disks.

Running the forcible mirror recovery from the WebManager only on one server

In some cases, you cannot start one of the servers due to a hardware or OS failure, and the server that can be started may not have the latest data. If you want to start applications at least on the server that can be started, you can perform the forcible mirror recovery on that server.

However, remember that if you do this, the data on the server where you run this command becomes the latest data no matter which server actually has it. Therefore, even if the other server becomes available later, you cannot handle the data in that server as the latest one. Make sure you understand the consequence before running the following command.

Start the Mirror Disk Helper from the WebManager to start the forcible mirror recovery. Select the icon of the server, which you want to perform the forcible mirror recovery. The icon will be changed as follows. Click **Execute** to perform the forcible mirror recovery processing.

When the forcible mirror recovery is successfully completed, you can activate the groups and use the mirror disks.

Media sense function becomes invalid

Media sense function is the OS function that detects disconnection of network cable. When disconnection is detected, TCP/IP receives a notification from the media sense function and renders the information such as an IP address assigned to the disconnected network card unavailable while it is disconnected. ExpressCluster cannot be operated properly if the information such as IP address becomes invalid during its operation, so the media sense function is rendered invalid when installing ExpressCluster.

Chapter 13   Error messages

This chapter provides information on error messages you might encounter in operating ExpressCluster.
This chapter covers:

Messages

Messages during setup

Module Type	Error Message	Solution
setup	Previous version of ExpressCluster is installed. Upgrading from this version is not supported. Install after uninstalling the previous version of ExpressCluster.	Uninstall the previous version of ExpressCluster, and then try installing again.
setup	The SNMP service is running. You need to stop the SNMP service before you perform uninstallation. Do you want to stop the SNMP service now?	Select **Yes** to stop the SNMP service automatically and continue the installation. Or, select **No** to cancel the installation, manually stop the SNMP service and then perform installation again.
setup	Setup has failed. Error code : xxx	- Check the system requirements, setup procedures and notes described in the manual, and make sure they are followed. - If other application is running, terminate it. - Install again after restarting the OS.
setup	Setup has failed(xxx). Error code : xxx Please reboot the system and try again.	- Check the system requirements, setup procedures and notes described in the manual, and make sure these requirements are followed. - If other application is running, terminate it. - Install again after starting the OS again.
setup	Unsupported environment.	Install in the environment where the system requirements are met.
setup	Cannot perform uninstallation because there is one or more ExpressCluster services still running. Stop all ExpressCluster services before you restart uninstallation.	Stop all ExpressCluster services, and then perform uninstallation.
setup	Failed to start the installer. (errcode: xxx)	- Check the system requirements, setup procedures and notes described in the manual, and make sure they are followed. - If other application is running, terminate it. - The installer file may be corrupted or missing. Check it.
setup	Internal error. (xxx)	- Check the system requirements, setup procedures and notes described in the manual, and make sure they are followed. - If other application is running, terminate it.

Messages reported by event log and alert

These are the messages reported by applications, event logs, and alert viewer of the WebManager. Messages with ● in the columns of Alert, Eventlog and Userlog are recorded in each log. The following shows how to refer the logs:

Log Name	How to refer	File Name
Alert	Output to the Alert Viewer of the WebManager. Logs can be collected by using the log collection tool.	alertlog.alt
Event log	Output to the Event Viewer (application log) of the OS. Collect logs by using the log collection tool. The source of the event is "ExpressCluster X." Logs can be collected by using the log collection tool. Note because they are collected in the binary format with the file names in the right column, it is necessary to open the files using Event Viewer in the environment where ExpressCluster is set up to refer to the information.	AppEvent.Evt SysEvent.Evt
User log	These are the logs with text format, in which detail information is recorded. They are output in the "userlog.00.log" file in the log folder of the logs collected by using the log collection tool.	userlog.00.log

Messages with ● in the Mailr Report column are reported when mail reporting of the alert service is configured.

"Report Settings" are settings of when linking to the ESMPRO Agent. In "Alive," the ESMPRO Agent performs the Alert report. In "Manager," alerts are output to the ESMPRO Agent. For details, see the manual of the ESMPRO Agent.

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Alive	Manager
nm	Information	1	The server %1 has been started.	Server up	-	●	●				
nm	Information	2	The server %1 has been stopped.	Server down	Server down was detected. Remove the failures of the server and then return the server to the cluster.	●	●			●	●
nm	Information	3	The resource %2 of the server %1 has been started.	Resource up	-			●			
nm	Error	4	The resource %2 of the server %1 has an error.	Resource abnormally	An error of the resource was detected. Refer to the event logs of the appropriate resource.			●			
nm	Information	5	The resource %2 of the server %1 has been recovered to the normal status.	Resource recover	-			●			

Section III Maintenance information

813

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Report setting Manager
nm	Error	6	The resource %2 of the server %1 is unknown.	Resource unknown	Check the cluster configuration data.	●	●				●
nm	Error	7	Network partition was detected. Shut down the server %1 to protect data.	Network partition	All heartbeat resources cannot be used. Check if an error has occurred in network adapter and the network is properly connected.	●	●			●	●
nm	Error	8	An error occurred while confirming the network partition. Shut down the server %1.	Can not network partition resolution	Refer to the event logs and check if an error has occurred in resource.	●	●			●	●
nm	Error	9	An error occurred in confirming the network partition. To avoid failover on multiple servers, the server %1 suspended failover.	Failover hold	Refer to the event logs and check if an error has occurred in resource.	●	●			●	●
nm	Information	10	The server %1 cancelled the pending failover.	Failover hold cancel	-	●	●				
nm	Error	11	Shut down the server %1. (reason:%2)	Server shutdown	All heartbeat resources cannot be used. Check if an error has occurred in network adapter and the network is properly connected.	●	●			●	●
nm	Error	12	Cluster service will be stopped. (reason:%1)	Cluster service stopping	Check the cause following the message.	●	●				●
nm	Warning	13	The combination of the network partition resources is invalid. (server name:%1)	NP resource combination error	Check the cluster configuration data.	●	●				●
nm	Error	14	The status of heartbeat %1 is abnormal.	Heartbeat abnormally	Check if an error has occurred in network adapter and the network is properly connected.	●	●			●	●
nm	Information	15	The heartbeat %1 has been recovered to the normal status.	Heartbeat recovered	-	●	●				
nm	Error	16	The network partition %2 of the server %1 has an error.	Network partition abnormally	Refer to the event logs and check if an error has occurred in resource.	●	●			●	●
nm	Information	17	The network partition %2 of the server %1 has been recovered to the normal status.	Network partition recovered	-	●	●				
nm	Error	18	Failed to start the resource %1. Server name:%2	Resource start failed	Refer to the event logs and check if an error has occurred in resource.	●	●			●	●
pm	Information	501	Cluster service has been started properly.	Cluster service started	-	●	●	●			
pm	Information	502	Cluster service is shutting down.	Cluster service shutting down	-	●	●	●			
pm	Information	503	Shutdown stall monitor has been started.	Shutting down stall monitor	-	●	●	●			
pm	Error	510	Cluster service has already been started.	Cluster service already started	Check the status of cluster service.	●	●	●			●
pm	Error	511	Fatal error has occurred in the cluster service.	Critical error in cluster service	The service is not run by a user with required privilege or the system may not be able to operate properly.	●	●	●	●		●

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
pm	Error	512	An error is detected in xml library.	problem detected in xml library	The system may not be able to operate properly.	●	●	●			●
pm	Error	513	An error is detected in configuration file.	problem detected in configuration file	Check the cluster configuration data.	●	●	●	●		●
pm	Error	514	Configuration file does not exist.	Configuration file not exists	Upload the cluster configuration data.	●	●	●			●
pm	Error	515	My host name is not found in configuration file.	my name not found in configuration file	Check the cluster configuration data.	●	●	●			●
pm	Error	520	%1 process terminated abnormally.	process exit abnormally	The system may not be able to operate properly.	●	●	●	●		●
pm	Error	521	The cluster service process returned an error. (halting system)	Rc process exit with error	Deactivation of group resources may be failed. Troubleshoot by following the group resource message.	●	●	●			●
pm	Error	522	An error has occurred while initializing %1 process. (return code:%2)	process init error	Check the cause of an initialization error and troubleshoot it.	●	●	●	●		●
pm	Information	523	The system will be shut down.	system halting	-		●	●	●		
pm	Information	524	Cluster service will be stopped.	Cluster service stopping	-		●	●	●		
pm	Information	525	System will be rebooted.	System rebooting	-		●	●	●		
pm	Information	526	%1 process will be restarted.	Process restarting	-		●	●	●		
pm	Information	527	Emergency shutdown is in progress.	Emergency shutdown	-		●	●	●		
pm	Information	528	Generating STOP error.	Stop Error	-		●	●	●		
pm	Information	529	Generating hardware reset.	HW reset	-		●	●	●		
pm	Information	530	There was a request to shut down the system from the %1.	request of system halt	-		●	●	●		
pm	Information	531	There was a request to stop cluster service from the %1.	request of cluster service stop	-		●	●	●		
pm	Information	532	There was a request to reboot system from the %1.	request of system reboot	-		●	●	●		
pm	Information	533	There was a request to restart cluster service from the %1.	request of cluster service restart	-		●	●	●		
pm	Information	534	There was a request to resume cluster service from the %1.	request of cluster service resume	-		●	●	●		
pm	Information	535	There was a request to suspend cluster service from the %1.	request of cluster service suspend	-		●	●	●		
pm	Information	536	There was a request of emergency shutdown from the %1.	request of emergency shutdown	-		●	●	●		
pm	Information	537	There was a request to generate STOP error from the %1.	request of STOP error	-		●	●	●		
pm	Information	538	There was a request to generate hardware reset from ther %1.	request of HW reset	-		●	●	●		

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
pm	Information	540	Requesting shutdown to the automatic running control software.	shutdown request to the automatic running control software start	-	●	●	●			
pm	Information	541	Requesting shutdown (reboot) to the automatic running control software.	shutdown (reboot) request to the automatic running control software	-	●	●	●			
pm	Information	542	Shutdown request to the automatic running control software is completed.	shutdown request to the automatic running control software complete	-	●	●	●			
pm	Error	543	The automatic running control software returned an error to the shutdown request.	shutdown by ESMPRO/AC fail	The automatic operating settings may be incorrect. Check the settings.	●	●	●			●
pm	Error	544	Communications with the automatic running control software failed.	Communications with ESMPRO/AC fail	The system may not be able to operate properly.	●	●	●			●
rc	Information	1010	The group %1 is starting.	group-start started	-	●	●	●			
rc	Information	1011	The group %1 has been started.	group-start ended	-	●	●	●			
rc	Error	1012	Failed to start the group %1.	group-start failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Error	1019	Server %1 is not in a condition to start group %2.	cannot-start-group	Perform server recovery if the target server is suspended (Isolated). If it is suspended (Network Partition Unsolved), recover network partition resources to normal status.	●					
rc	Information	1020	The group %1 is stopping.	group-stop started	-	●	●	●			
rc	Information	1021	The group %1 has been stopped.	group-stop ended	-	●	●	●			
rc	Error	1022	Failed to stop the group %1.	group-stop failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Information	1030	The resource %1 is starting.	resource-start started	-		●	●			
rc	Information	1031	The resource %1 has been started.	resource-start ended	-		●	●			
rc	Error	1032	Failed to start the resource %1. (%2 : %3)	resource-start failed	Check the cause for failing to start the resource.	●	●	●	●		●
rc	Error	1033	Failed to start the recovery script of resource %1. (%2 : %3)	recoverscript-start failed	Check the cause for failing to start the recovery script.	●	●	●			●
rc	Information	1040	The resource %1 is stopping.	resource-stop started	-		●	●			
rc	Information	1041	The resource %1 has been stopped.	resource-stop ended	-		●	●			
rc	Error	1042	Failed to stop the resource %1. (%2 : %3)	resource-stop failed	Check the cause for failing to stop the resource.	●	●	●	●		●
rc	Information	1050	Moving the group %1.	group-move started	-	●	●	●			
rc	Information	1051	The group %1 has been moved.	group-move ended	-	●	●	●			
rc	Error	1052	Failed to move the group %1.	group-move failed	Troubleshoot according to the group resource message.	●	●	●			●

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Alive	Manager
rc	Error	1059	Server %1 is not in a condition to move group %2.	cannot-move-group	Perform server recovery if the target server is suspended (Isolated). If it is suspended (Network Partition Unsolved), recover network partition resources to normal status.	●					
rc	Information	1060	Failing over the group %1.	group-failover started	-	●	●	●			
rc	Information	1061	The group %1 has been failed over.	group-failover ended	-	●	●	●			
rc	Error	1062	Failed to fail over the group %1.	group-failover failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Information	1070	Restarting the group %1.	group-restart started	-	●	●	●			
rc	Information	1071	The group %1 has been restarted.	group-restart ended	-	●	●	●			
rc	Error	1072	Failed to restart the group %1.	group-restart failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Information	1080	Restarting the resource %1.	resource-restart started	-	●	●	●			
rc	Information	1081	The resource %1 has been restarted.	resource-restart ended	-	●	●	●			
rc	Error	1082	Failed to restart the resource %1.	resource-restart failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Information	1090	Shutting down the cluster.	cluster shutdown	-	●	●	●			
rc	Information	1091	Shutting down the server.	server shutdown	-	●	●	●			
rc	Error	1092	Group %1 is started on more than one server.	group double start	Server will automatically be shut down. Check the cause for the group to be started in more than one server.	●	●	●	●		●
rc	Error	1093	The system shutdown was performed by other than the cluster service.	system shutdown by other than cluster service	It is considered as an error if the system shuts down by other than cluster service. Follow the appropriate steps to shut down the system.	●	●	●			●
rc	Warning	1100	Shutdown count is reached the maximum number (%1). Final action of resource %2 was ignored.	shutdown count reached the limit	-	●	●	●	●		●
rc	Information	1110	Server %1 is returned to the cluster.	server returned	-	●	●	●			
rc	Information	1111	Server %1 is isolated from the cluster.	server isolated	-	●	●	●			
rc	Information	1112	Server %1 started to return to the cluster.	server return start	-	●	●	●			
rc	Error	1113	Server %1 failed to return to the cluster.	server return fail	The system may not be able to operate properly.	●	●	●			●
rc	Information	1120	Server %1 will notify the automatic running control software of shutdown start.	shutdown notification start	-	●	●	●			
rc	Error	1121	The automatic running control software returned an error to the shutdown start notification in server %1.	shutdown notification fail	The automatic operating settings may be incorrect. Check the settings.	●	●	●			●

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rc	Information	1122	Server %1 notified the automatic running control software of shutdown start.	shutdown notification finish	-	●	●	●			
rc	Information	1123	The automatic running control software is checking the power status of shared disks. A server will be restarted after the power status is checked.	waiting for disk power-on	-	●	●	●			
rc	Error	1124	An error was returned from the automatic running control software. Failed to check the power status of shared disks.	disk power-on confirmation failed	The automatic operating settings may be incorrect. Check the settings. An error may have occurred in the automatic power control unit. Check the automatic power control unit.	●	●	●			●
rc	Error	1125	Server %1 failed to communicate with the automatic running control software.	communications with the automatic running control software failed	The system may not be able to operate properly.	●	●	●			●
rc	Information	1130	Starting a single resource %1.	single-resource-start started	-	●	●	●			
rc	Information	1131	A single resource %1 has been started.	single-resource-start ended	-	●	●	●			
rc	Error	1132	Failed to start a single resource %1.	single-resource-start failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Error	1139	Server %1 is not in a condition to start a single resource %2.	cannot-start-single-resource	Perform server recovery if the target server is suspended (Isolated). If it is suspended (Network Partition Unsolved), recover network partition resources to normal status.	●					
rc	Information	1140	Stopping a single resource %1.	single-resource-stop started	-	●	●	●			
rc	Information	1141	A single resource %1 has been stopped.	single-resource-stop ended	-	●	●	●			
rc	Error	1142	Failed to stop a single resource %1.	single-resource-stop failed	Troubleshoot according to the group resource message.	●	●	●			●
rc	Information	1200	The resource %1 will be restarted since starting the resource %2 failed.	resource-restart by resource-acterr	-	●	●	●			
rc	Information	1201	The group %1 will be failed over to server %2 since starting the resource %3 failed.	group-failover by resource-acterr	-	●	●	●			
rc	Information	1202	The group %1 will be stopped since starting the resource %2 failed.	group-stop by resource-acterr	-	●	●	●			
rc	Information	1203	The cluster service will be stopped since starting the resource %1 failed.	service-stop by resource-acterr	-	●	●	●			
rc	Information	1204	The system will be shut down since starting the resource %1 failed.	shutdown-system by resource-acterr	-	●	●	●			

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rc	Information	1205	The system will be rebooted since starting the resource %1 failed.	reboot-system by resource-acterr	-	●	●	●			
rc	Information	1220	The resource %1 will be stopped again since stopping the resource %2 failed.	resource-stop retry by resource-deacterr	-	●	●	●			
rc	Information	1223	The cluster service will be stopped since stopping the resource %1 failed.	service-stop by resource-deacterr	-	●	●	●			
rc	Information	1224	The system will be shut down since stopping the resource %1 failed.	shutdown-system by resource-deacterr	-	●	●	●			
rc	Information	1225	The system will be rebooted since stopping the resource %1 failed.	reboot-system by resource-deacterr	-	●	●	●			
rc	Information	1241	Hardware reset will be generated since starting the resource %1 failed.	hw-reset by resource-acterr	-	●	●	●			
rc	Information	1242	STOP error will be generated since starting the resource %1 failed.	stop-error by resource-acterr	-	●	●	●			
rc	Information	1281	Hardware reset will be generated since stopping the resource %1 failed.	hw-reset by resource-deacterr	-	●	●	●			
rc	Information	1282	STOP error will be generated since stopping the resource %1 failed.	stop-error by resource-deacterr	-	●	●	●			
rc	Information	1300	Script before final action upon activation failure in resource %1 started.	Script before final action upon resource activation failure started.	-	●	●	●			
rc	Information	1301	Script before final action upon activation failure in resource %1 completed.	Script before final action upon resource activation failure completed.	-	●	●	●			
rc	Information	1302	Script before final action upon deactivation failure in resource %1 started.	Script before final action upon resource deactivation failure started.	-	●	●	●			
rc	Information	1303	Script before final action upon deactivation failure in resource %1 completed.	Script before final action upon resource deactivation failure completed.	-	●	●	●			
rc	Information	1304	Script before activation in resource %1 started.	Script before resource activation started.	-	●	●	●			
rc	Information	1305	Script before activation in resource %1 completed.	Script before resource activation completed.	-	●	●	●			
rc	Information	1306	Script after activation in resource %1 started.	Script after resource activation started.	-	●	●	●			
rc	Information	1307	Script after activation in resource %1 completed.	Script after resource activation completed.	-	●	●	●			
rc	Information	1308	Script before deactivation in resource %1 started.	Script before resource deactivation started.	-	●	●	●			

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rc	Information	1309	Script before deactivation in resource %1 completed.	Script before resource deactivation completed.	-	●	●	●			
rc	Information	1310	Script after deactivation in resource %1 started.	Script after resource deactivation started.	-	●	●	●			
rc	Information	1311	Script after deactivation in resource %1 completed.	Script after resource deactivation completed.	-	●	●	●			
rc	Error	1340	Script before final action upon activation failure in resource %1 failed.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Error	1341	Script before final action upon deactivation failure in resource %1 failed.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Error	1342	Failed to execute script before activation in resource %1.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Error	1343	Failed to execute script after activation in resource %1.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Error	1344	Failed to execute script before deactivation in resource %1.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Error	1345	Failed to execute script after deactivation in resource %1.	Check the cause of the script failure and take measures.	Check the cause of the script failure and take measures.	●	●	●			●
rc	Information	1400	Forced stop (BMC Power Off) of server %1 has been requested.	forced-stop (bmc-poweroff) requested	-			●			
rc	Information	1401	Forced stop (BMC Power Cycle) of server %1 has been requested.	forced-stop (bmc-powercycle) requested	-			●			
rc	Information	1402	Forced stop (BMC Reset) of server %1 has been requested.	forced-stop (bmc-reset) requested	-			●			
rc	Information	1403	Forced stop (BMC NMI) of server %1 has been requested.	forced-stop (bmc-nmi) requested	-			●			
rc	Error	1420	Forced stop (BMC Power Off) of server %1 failed.	forced-stop (bmc-poweroff) failed	The system may not be able to operate properly.	●	●	●			●
rc	Error	1421	Forced stop (BMC Power Cycle) of server %1 failed.	forced-stop (bmc-powercycle) failed	The system may not be able to operate properly.	●	●	●			●
rc	Error	1422	Forced stop (BMC Reset) of server %1 failed.	forced-stop (bmc-reset) failed	The system may not be able to operate properly.	●	●	●			●
rc	Error	1423	Forced stop (BMC NMI) of server %1 failed.	forced-stop (bmc-nmi) failed	The system may not be able to operate properly.	●	●	●			●
rc	Information	1440	The CPU frequency has been set to high.	The CPU frequency has been set to high.	-	●	●	●			
rc	Information	1441	The CPU frequency has been set to low.	The CPU frequency has been set to low.	-	●	●	●			
rc	Information	1442	The CPU frequency has been set to %1.	The CPU frequency has been set.	-	●	●	●			
rc	Information	1443	CPU frequency setting has been switched to automatic control by cluster.	CPU frequency setting has been switched to automatic control by cluster.	-	●	●	●			

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rc	Error	1460	CPU frequency control cannot be used.	CPU frequency control cannot be used.	Check BIOS settings and kernel settings.	●	●	●			●
rc	Error	1461	Failed to set the CPU frequency to high.	Setting the CPU frequency to high has failed.	Check BIOS settings and kernel settings. Check if the cluster service is started. Check if the configuration is set so that CPU frequency control is used.	●	●	●			●
rc	Error	1462	Failed to set the CPU frequency to low.	Setting the CPU frequency to low has failed.	Check BIOS settings and kernel settings. Check if the cluster service is started. Check if the configuration is set so that CPU frequency control is used.	●	●	●			●
rc	Error	1463	Failed to set the CPU frequency to %1.	Setting the CPU frequency has failed.	Check BIOS settings and kernel settings. Check if the cluster service is started. Check if the configuration is set so that CPU frequency control is used.	●	●	●			●
rc	Error	1464	Failed to switch the CPU frequency setting to automatic control by cluster.	Switching the CPU frequency setting to automatic control by cluster has failed.	Check if the cluster service is started. Check if the configuration is set so that CPU frequency control is used.	●	●	●			●
rm	Information	1501	Monitor %1 has been started.	Monitor start	-		●	●	●		
rm	Information	1502	Monitor %1 has been stopped.	Monitor stop	-		●	●	●		
rm	Information	1503	Monitor %1 does not monitor in this server.	Not target server	-		●	●	●		
rm	Warning	1504	Monitor %1 is in the warning status. (%2 : %3)	Monitor warn	Check the cause of Warning.	●	●	●			●
rm	Warning	1505	The number of monitor resources reached the maximum number. (registered resource: %1)	invalid number of monitor resource	Check the cluster configuration data.	●	●	●			●
rm	Warning	1506	Configuration of %1 is invalid. (%2 : %3)	invalid monitor resource	Check the cluster configuration data.	●	●	●			●
rm	Error	1507	Failed to start monitor %1.	monitor starting failed	The system may not be able to operate properly.	●	●	●	●		●
rm	Error	1508	Failed to stop monitor %1.	monitor stopping failed	The system may not be able to operate properly.	●	●	●			●
rm	Error	1509	Monitor %1 detected an error. (%2 : %3)	monitor failed	Check the cause for monitor error.	●	●	●	●		●
rm	Information	1510	Monitor %1 is not monitored.	not monitored	-		●	●	●		
rm	Information	1511	Monitor resource has not been registered.	unregistered monitor resource	-		●	●	●		
rm	Information	1512	%1 was stopped for failure in monitor %2.	relation stop	-		●	●	●		
rm	Information	1513	%1 was restarted for failure in monitor %2.	relation restart	-		●	●	●		
rm	Information	1514	%1 was failed over for failure in monitor %2.	relation group failover	-		●	●	●		
rm	Information	1515	There was a request to stop cluster for failure in monitor %1.	cluster stop	-		●	●	●		

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rm	Information	1516	There was a request to shut down the system for failure in monitor %1.	system shutdown	-	●	●	●			
rm	Information	1517	There was a request to restart the system for failure in monitor %1.	system reboot	-	●	●	●			
rm	Error	1518	Failed to stop %1 due to error detection of %2.	relation stop failure	Check the status of resources.	●	●	●			●
rm	Error	1519	Failed to restart %1 due to error detection of %2.	relation restart failure	Check the status of resources.	●	●	●			●
rm	Error	1520	Failed to fail over %1 due to error detection of %2.	relation group failover failure	Check the status of resources.	●	●	●			●
rm	Error	1521	Failed to stop the cluster due to error detection of %1.	cluster stop failure	The system may not be able to operate properly.	●	●	●			●
rm	Error	1522	Failed to shut down the system due to error detection of %1.	os shutdown failure	The system may not be able to operate properly.	●	●	●			●
rm	Error	1523	Failed to restart the system due to error detection of %1.	os reboot failure	The system may not be able to operate properly.	●	●	●			●
rm	Error	1524	The group of monitor %1 is unknown.	unknown group	Check the cluster configuration data.	●	●	●			●
rm	Warning	1525	No action is taken because %1 is not online.	not perform failure action	-	●	●	●			●
rm	Information	1526	Status of monitor %1 was returned to normal.	status changed into normal	-	●	●	●			
rm	Information	1527	Status of monitor %1 was changed into unknown.	status changed into unknown	The system may not be able to operate properly.	●	●	●			
rm	Error	1528	Initialization error has occurred (%1 : %2)	process initialize error	The system may not be able to operate properly.	●	●	●			●
rm	Information	1529	Monitor %1 was suspended.	suspend (single monitor)	-	●	●	●			
rm	Information	1530	Monitor %1 was resumed.	resume (single monitor)	-	●	●	●			
rm	Information	1531	All monitors were suspended.	suspend (all monitors)	-	●	●	●			
rm	Information	1532	All monitors were resumed.	resume (all monitors)	-	●	●	●			
rm	Information	1533	The polling interval of monitor %1 was changed into %2*%3.	change polling interval (single monitor)	-	●	●	●			
rm	Information	1534	The polling interval ratio of all monitors were changed into %1.	change polling interval (all monitors)	-	●	●	●			
rm	Information	1535	Causing intentional stop error was required because an error is detected by %1.	intentional panic	-	●	●	●			
rm	Error	1536	Causing intentional stop error has failed because an error is detected by %1.	intentional panic failure	The system may not be able to operate properly.	●	●	●			●

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
rm	Warning	1537	Recovery will not be executed since server is suspending.	not recovery(server suspending)	Monitor resource is not recovered if the server is suspended (Network Partition Unsolved). Check the cause for being suspended (Network Partition Unsolved) and recover network partition resources to normal status.	●	●	●			●
rm	Warning	1571	Monitor %1 was delayed. (timeout=%2, response time=%3, rate=%4)	monitor delayed	Check the load on the server where monitoring delay was detected and reduce the load. Set longer time-out if the monitoring time-out is detected.	●	●	●			●
rm	Warning	1600	Shutdown count reached the maximum number (%1). Final action of monitor %2 was ignored.	reached OS shutdown limit	-		●	●	●	●	●
rm	Information	1700	Script before final action upon failure in %1 monitor resource started.	Script before final action upon monitor resource failure started.	-		●	●	●		
rm	Information	1701	Script before final action upon failure in %1 monitor resource completed.	Script before final action upon monitor resource failure completed.	-		●	●	●		
rm	Information	1720	Script before final action upon failure in %1 monitor resource failed.	Script before final action upon monitor resource failure has failed.	-		●	●	●		
diskagent	Information	2001	%1 service was started.	Start service	-			●	●		
diskagent	Information	2002	%1 service was stopped.	Stop service	-			●	●		
diskagent	Warning	2030	%1 service was not stopped successfully due to stop time-out or other errors of the internal threads.	Fail to stop service	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2050	%1 service was not started successfully because the specified parameter was invalid. Confirm the cluster configuration data.	Fail to start service	Check the cluster configuration data.	●	●	●			●
diskagent	Error	2051	%1 service was not started because obtaining the policy data failed. Check the data.	Fail to start service	Check the policy file.	●	●	●			●
diskagent	Error	2052	%1 service was not started successfully because dispatching to service manager failed. System may be unable to operate correctly.	Fail to start service	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2053	%1 service was not started successfully because creating and loading internal resources failed. System may be unable to operate correctly.	Fail to start service	System may be unable to operate correctly.	●	●	●			●

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
diskagent	Error	2054	%1 service was not started successfully because initialization of shared disk or mirror disk library failed at termination code %2. System may be unable to operate correctly.	Fail to start service	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2055	%1 service was not started successfully because creating communication socket failed. System may be unable to operate correctly.	Fail to start service	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2056	%1 service was not started successfully because creating internal threads failed. System may be unable to operate successfully.	Fail to start service	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2057	%1 service was not started because it may be stopped or forcibly stopped last time when it was started. Reboot the server.	Fail to start service	Reboot the server.	●	●	●			●
diskagent	Error	2090	%1 service failed to reload cluster configuration data. System may be unable to operate correctly. The own server will be shut down.	Server shutdown	The system may not be able to operate properly.	●	●	●			●
diskagent	Error	2099	%1 service was not started successfully because the other internal error occurred. System may be unable to operate correctly.	Fail to start service	The system may not be able to operate properly.	●	●	●			●
event	Information	2101	%1 service has been started.	Start service	-		●				
event	Information	2102	%1 service has been stopped.	Stop service	-		●				
event	Warning	2130	Time-out or other error has occurred while waiting for internal threads to stop. Detected internal error %1.	Threads were timeout	The system may not be able to operate properly.	●	●				●
event	Error	2150	The specified parameters are invalid. Check the cluster configuration data.	Invalid configuration	Check the cluster configuration data.	●	●				●
event	Error	2151	Failed to obtain the policy data. Check the data.	Invalid configuration	Check the policy file.	●	●				●

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting / Alive	Manager
event	Error	2152	Failed to obtain the registry data. System may be unable to operate correctly.	Failed to read registry	The system may not be able to operate properly.	●	●				●
event	Error	2153	Failed to dispatch to the service manager. System may be unable to operate correctly.	Dispatch failed	The system may not be able to operate properly.	●	●				●
event	Error	2154	Failed to create an internal resource. System may be unable to operate correctly.	failed to resource creation	The system may not be able to operate properly.	●	●				●
event	Error	2155	Failed to create communication sockets. System may be unable to operate correctly.	failed to socket creation	The system may not be able to operate properly.	●	●				●
event	Error	2156	Failed to control the shared memory. System may be unable to operate correctly.	failed to shared memory control	The system may not be able to operate properly.	●	●				●
event	Error	2157	Failed to generate internal threads. System may be unable to operate correctly.	failed to thread creation	The system may not be able to operate properly.	●	●				●
event	Error	2199	Other internal error has occurred. System may be unable to operate correctly.	Internal Error	The system may not be able to operate properly.	●	●				●
mdadmn	Information	2401	Full Recovery of mirror disk %1 started.	Full Recovery of mirror disk started	-		●	●	●		
mdadmn	Information	2402	Full Recovery of mirror disk %1 finished successfully.	Full Recovery of mirror disk succeeded	-		●	●	●		
mdadmn	Information	2403	Full Recovery of mirror disk %1 was canceled.	Full Recovery of mirror disk was canceled.	-		●	●	●		
mdadmn	Error	2404	Full Recovery of mirror disk %1 failed.	Full Recovery of mirror disk failed.	Check that there is no error in the disk and network adapter and the network is correctly connected.	●	●	●		●	●
mdadmn	Information	2405	Fast Recovery of mirror disk %1 started.	Fast Recovery of mirror disk started	-		●	●	●		
mdadmn	Information	2406	Fast Recovery of mirror disk %1 finished successfully.	Fast Recovery of mirror disk succeeded	-		●	●	●		
mdadmn	Information	2407	Fast Recovery of mirror disk %1 was canceled.	Fast Recovery of mirror disk was canceled	-		●	●	●		
mdadmn	Error	2408	Fast Recovery of mirror disk %1 failed.	Fast Recovery of mirror disk failed	Check that there is no error in the disk and network adapter and the network is correctly connected.	●	●	●		●	●
mdadmn	Warning	2411	Trying again to disconnect mirror disk %1. Check if the mirror disk is being used.	Disconnection of mirror disk is being retried.	Check if the mirror disk is being used.		●	●	●		●
mdadmn	Information	2412	Mirror disk %1 was forcibly disconnected.	mirror disk was forcibly disconnected.	-		●	●	●		

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Report setting Manager
mdadmn	Error	2421	The mirror connect of the mirror disk %1 has been disconnected.	Mirror connect error.	Check that there is no error in the network adapter and the network is correctly connected.	●	●	●			●
mdadmn	Error	2422	A data partition error occurred in the mirror disk %1.	mirror disk abnormal	Replace the server disk.	●	●	●		●	●
mdadmn	Error	2423	A cluster partition error occurred in the mirror disk %1.	Disk error	Replace the server disk.	●	●	●		●	●
mdadmn	Error	2431	Failed to initialize the mirror connect.	Mirror connection initialization failed.	Check that there is no error in the network adapter and the network is correctly connected.	●	●	●		●	●
mdadmn	Error	2432	Failed to initialize the mirror disk %1.	Mirror disk initialization failed.	Check the partition exists and the disk is recognized by the operating system.	●	●	●		●	●
mdadmn	Error	2433	Failed to initialize the mirror disk %1. The cluster partition and the data partition must be different partitions.	Mirror disk initialization failed.	Check the cluster configuration data.	●	●	●			●
mdadmn	Error	2434	Failed to initialize the mirror disk %1. The area in the cluster partition has been used by another mirror disk.	Mirror disk initialization failed.	Check the cluster configuration data.	●	●	●			●
mdadmn	Error	2435	Failed to initialize the mirror disk %1. The partition specified for the cluster partition has been used as the data partition of another mirror disk.	Mirror disk initialization failed.	Check the cluster configuration data.	●	●	●			●
mdadmn	Error	2436	Failed to initialize the mirror disk %1. The partition specified for the data partition has been used by another mirror disk.	Mirror disk initialization failed.	Check the cluster configuration data.	●	●	●			●
mdadmn	Error	2440	Connecting mirror disk %1 has failed.	Connecting mirror disk failed.	Check the partition exists and the disk is recognized by the operating system.		●			●	●
mdadmn	Error	2441	Disconnecting mirror disk %1 has failed.	Disconnecting mirror disk failed.	Check if the mirror disk is being used.		●				●
lankhb	Error	2851	Keep-alive timeout was detected on the server %1.	Keep-alive timeout	There is a server where keep-alive timeout is detected. Check the server error.	●	●				●
fip	Error	2901	IP address already exists. (IP=%1)	address duplication	-		●	●	●		
fip	Information	2902	IP address will be activated forcibly. (IP=%1)	address force activation	-		●	●	●		
vip	Error	3051	IP address already exists. (IP=%1)	address duplication	-		●	●	●		
vip	Information	3052	IP address will be activated forcibly. (IP=%1)	address force activation	-		●	●	●		

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
sdfunc	Warning	3201	Trying again to disconnect disk %1. Check if the disk is being used.	Retry disk disconnection	Check if the disk is being used.	●	●	●			●
sdfunc	Information	3202	Disk %1 was forcibly disconnected.	Disconnect disk forcibly	-	●	●	●			
sdfunc	Warning	3203	Updated configuration data was not reflected properly. Update the configuration data again after modifying the configuration settings.	Fail to update configuration	Check the cluster configuration data.	●	●	●			●
sdfunc	Warning	3204	The server %1 is not found in the configuration data. Check the server name of the configuration data.	Fail to detect server name	Check the cluster configuration data.	●	●	●			●
sdfunc	Information	3205	Detected disk resources that have not been identified.　Disk reidentification will be executed.	Execute disk reconfirmation	-	●	●	●			
sdfunc	Information	3206	Reidentification of the disk has finished.	Finish disk reconfirmation	-	●	●	●			
sdfunc	Error	3207	Connecting disk %1 has failed.	Fail to connect disk	Check if the partition is allocated and the disk is being recognized by operating system.		●			●	●
sdfunc	Error	3208	Disconnecting disk %1 has failed.	Fail to disconnect disk	Check if the disk is being used.		●				●
disknp	Warning	3251	Timeout has occurred in read/write to the partition for disk heartbeat. Check the connection status of partition for disk heartbeat.	Disk heart beat timeout	Check if an error has occurred in the disk and it is properly connected.	●	●	●		●	●
disknp	Information	3252	Recovered from the timeout occurred in read/write to the partition for disk heartbeat.	Recover from disk heartbeat timeout	-	●	●	●			
disknp	Error	3257	Disconnection monitoring(%1) among the shared disk and the servers could not be started. The system may not be able to operate properly.	Fail to start monitoring	The system may not be able to operate properly.	●	●	●			●
ptun	Warning	3301	The parameter (%1) exceeded the threshold (%2 p.c.).　Timeout value=%3(sec) Data=%4(sec)	Delay warning	The parameter exceeded the threshold. Set an appropriate value to the parameter.	●	●	●			●

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
armcmd	Error	3501	ARMLOAD detected that the application (watchID=%2) of the group %1 has stopped. The number of failovers has reached the maximum count. Check what has caused the application to stop.	Application stopped	Check the cause for application to be stopped.	●	●				●
armcmd	Error	3502	ARMLOAD detected that the application (watchID=%2) of the group %1 has stopped. Script will be restarted. Check what has caused the application to stop.	Application stopped	Check the cause for application to be stopped.	●	●				●
armcmd	Error	3503	ARMLOAD detected that the application (watchID=%2) of the group %1 has stopped. The application will be restarted. Check what has caused the application to stop.	Application stopped	Check the cause for application to be stopped.	●	●				●
armcmd	Error	3504	ARMLOAD detected that the application (watchID=%2) of the group %1 has stopped. Group will be failed over. Check what has caused the application to stop.	Application stopped	Check the cause for application to be stopped.	●	●				●
armcmd	Error	3505	ARMLOAD detected that the application (watchID=%2) of the group %1has stopped. The server will shut down. Check what has caused the application to stop.	Application stopped	Check the cause for application to be stopped.	●	●				●
armcmd	Error	3506	ARMLOAD detected that the service (watchID=%2) of the group %1 has stopped. The number of failovers has reached the maximum count. Check what has caused the application to stop.	Service stopped	Check the cause for service to be stopped.	●	●				●
armcmd	Error	3507	ARMLOAD detected that the service (watchID=%2) of the group %1 has stopped. Script will be restarted. Check what has caused the application to stop.	Service stopped	Check the cause for service to be stopped.	●	●				●

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
armcmd	Error	3508	ARMLOAD detected that the service (watchID=%2) of the group %1 has stopped. The service will be restarted. Check what has caused the application to stop.	Service stopped	Check the cause for service to be stopped.	●	●				●
armcmd	Error	3509	ARMLOAD detected that the service (watchID=%2) of the group %1 has stopped. The group will be failed over. Check what has caused the application to stop.	Service stopped	Check the cause for service to be stopped.	●	●				●
armcmd	Error	3510	ARMLOAD detected that the service (watchID=%2) of the group %1 has stopped. The server will shut down. Check what has caused the application to stop.	Service stopped	Check the cause for service to be stopped.	●	●				●
armcmd	Error	3513	An error occurred in command %1. Shut down the server.	Command error	The system may not be able to operate properly.	●	●				●
armcmd	Warning	3514	An abnormal connection to the shared name (%1) has been detected.	Share-name abnormally	The shared name cannot be used. Recover the devices that correspond to the shared name. (1) OS is unstable. Check the OS status. (2) Check if the power is supplied to the appropriate devices. (3) Check if the appropriate devices and the servers are connected properly.	●	●				●
armcmd	Information	3515	Connection to the shared name (%1) has been recovered.	Share-name recovered	-	●	●				
armcmd	Warning	3516	Failed to start the application (WID=%2) of the group %1.	Application failed	Check the cause for failing to start the application.	●	●				●
armcmd	Information	3517	The application (WID=%2) of the group %1 has restarted.	Application restarted	-	●	●				
armcmd	Warning	3518	Failed to start the service (WID=%2) of the group %1.	Service failed	Check the cause for failing to start the service.	●	●				●
armcmd	Information	3519	The service (WID=%2) of the group %1 has restarted.	Service restarted	-	●	●				
armcmd	Error	3520	Failed to fail over the group %1. Check whether the server where the group can fail over exists.	Fail over failed	There may not be a server where the group can fail over.	●	●				●

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
lcns	Information	3551	The trial version is valid till %1/%2/%3. Product name:%4	trial version(normal)	-	●	●				
lcns	Error	3552	The trial version has expired(%1/%2/%3). Product name:%4	trial version(expired)	Register the license.	●	●	●			●
lcns	Warning	3553	Licenses are insufficient. The number of registered licenses is %1. The number of insufficient licenses is %2. Product name:%3	insufficient	Register the license.	●	●				●
lcns	Error	3554	The license is not registered. Product name:%1	not registered	Register the license.	●	●	●			●
lcns	Error	3555	The same license is registered with other servers. Product name:%1	repetition registered	Delete the overlapping license.	●	●	●			●
lcns	Error	3556	Manufacturer or model of this server is invalid.	Invalid manufacturer or model	Confirm the manufacturer or model.	●	●	●			●
logcmd	Information	3601		log command	-						
sdw	Warning	3651	Monitor %1 was delayed. (timeout=%2 response time=%3 rate=%4)	Monitoring is delayed		●	●	●			●
sdw	Error	3652	Cannot access the disk (%1).	Disconnection is detected.	Check that there is no error in the disk and the shared disk is correctly connected.		●			●	●
sdw	Information	3653	Recovered the status where access to the disk (%1) is possible.	Recovery from disconnection has been done.	-		●				
diskw	Warning	3701	Monitor %1 was delayed. (timeout=%2 response time=%3 rate=%4)	monitor delayed	-	●	●	●			●
vcom	Error	3751	Failed to register the virtual computer name (%1) to the DNS server.	Failed to register the virtual computer name	Check if an error has occurred on the DNS server, or a trouble occurred in communicating with the DNS server.	●	●				
vcom	Error	3752	Failed to delete the virtual computer name (%1) from the DNS server.	Failed to delete the virtual computer name	Check if an error has occurred on the DNS server, or a trouble occurred in communicating with the DNS server.	●	●				
hdadmn	Information	3851	Full Recovery of hybrid disk %1 started.	Full Recovery of hybrid disk started	-		●	●	●		
hdadmn	Information	3852	Full Recovery of hybrid disk %1 finished successfully.	Full Recovery of hybrid disk succeeded	-		●	●	●		
hdadmn	Information	3853	Full Recovery of hybrid disk %1 was canceled.	Full Recovery of hybrid disk was canceled	-		●	●	●		
hdadmn	Error	3854	Full Recovery of hybrid disk %1 failed.	Full Recovery of hybrid disk failed	Check that there is no error in the disk and network adapter and the network is correctly connected.	●	●	●		●	●

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting Alive	Manager
hdadmn	Information	3855	Fast Recovery of hybrid disk %1 started.	Fast Recovery of hybrid disk started	-	●	●	●			
hdadmn	Information	3856	Fast Recovery of hybrid disk %1 finished successfully.	Fast Recovery of hybrid disk succeeded	-	●	●	●			
hdadmn	Information	3857	Fast Recovery of hybrid disk %1 was canceled.	Fast Recovery of hybrid disk was canceled	-	●	●	●			
hdadmn	Error	3858	Fast Recovery of hybrid disk %1 failed.	Fast Recovery of hybrid disk failed	Check that there is no error in the disk and network adapter and the network is correctly connected.	●	●	●		●	●
hdadmn	Warning	3859	Trying again to disconnect hybrid disk %1. Check if the hybrid disk is being used.	Disconnection of hybrid disk is being retried	Check if the hybrid disk is being used.	●	●	●			●
hdadmn	Information	3860	Hybrid disk %1 was forcibly disconnected.	Hybrid disk was forcibly disconnected.	-	●	●	●			
hdadmn	Error	3861	The mirror connect of the hybrid disk %1 has been disconnected.	mirror connect error	Check that there is no error in the network adapter and the network is correctly connected.	●	●	●			●
hdadmn	Error	3862	A data partition error occurred in the hybrid disk %1.	disk error	Replace the server disk.	●	●	●		●	●
hdadmn	Error	3863	A cluster partition error occurred in the hybrid disk %1.	disk error	Replace the server disk.	●	●	●		●	●
hdadmn	Error	3864	Failed to initialize the mirror connect.	Mirror connection initialization failed	Check that there is no error in the network adapter and the network is correctly connected.	●	●	●		●	●
hdadmn	Error	3865	Failed to initialize the hybrid disk %1.	Hybrid disk initialization failed	Check the partition exists and the disk is recognized by the operating system.	●	●	●		●	●
hdadmn	Error	3866	Failed to initialize the hybrid disk %1. The cluster partition and the data partition must be different partitions.	Hybrid disk initialization failed	Check the cluster configuration data.	●	●	●			●
hdadmn	Error	3867	Failed to initialize the hybrid disk %1. The area in the cluster partition has been used by another hybrid disk.	Hybrid disk initialization failed	Check the cluster configuration data.	●	●	●			●
hdadmn	Error	3868	Failed to initialize the hybrid disk %1. The partition specified for the cluster partition has been used as the data partition of another hybrid disk.	Hybrid disk initialization failed	Check the cluster configuration data.	●	●	●			●
hdadmn	Error	3869	Failed to initialize the hybrid disk %1. The partition specified for the data partition has been used by another hybrid disk.	Hybrid disk initialization failed	Check the cluster configuration data.	●	●	●			●

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting / Alive	Manager
hdadmn	Error	3870	Connecting hybrid disk %1 has failed.	Connecting hybrid disk failed	Check the partition exists and the disk is recognized by the operating system.		●			●	●
hdadmn	Error	3871	Disconnecting hybrid disk %1 has failed.	Disconnecting hybrid disk failed	Check if the hybrid disk is being used.		●				●
hdadmn	Information	3872	Detected a disk resource that has not been identified. Disk reidentification will be executed.	Disk reidentification starts	-	●	●	●			
hdadmn	Information	3873	Reidentification of the disk has finished.	Disk reidentifcaiton finished.	-	●	●	●			
hdadmn	Error	3874	A fatal error has occurred during control hybrid disk %1. Shutdown the server.	Fatal error has occurred	Check that there is no error in disk and network adapter and the network is correctly connected.	●	●	●		●	●
hdtw	Warning	4001	Monitor %1 was delayed. (timeout=%2 response time=%3 rate=%4)	Monitoring is delayed	-	●	●	●			●
hdtw	Error	4002	Cannot access the disk (%1).	Disconnection is detected.	Check that there is no error in the disk and the shared disk is correctly connected.		●			●	●
hdtw	Information	4003	Recovered the status where access to the disk (%1) is possible.	Recovery from disconnection has been done.	-		●				
mail	Error	4101	mail failed(%1).(SMTP server: %2)	Mail failed	Check if an error has occurred on the SMTP server, or a trouble occurred in communicating with the SMTP server.	●	●	●			●
mail	Information	4102	mail succeed.(SMTP server: %1)	Mail succeeded	-		●	●			
dn1000s	Information	4151	Notice by the network warming light succeeded.	Network warning light succeeded	-	●	●	●			
dn1000s	Error	4152	Error in network warning light notice command.(%1)	Network warning light failed	Troubleshoot according to the error code.	●	●	●			●
dn1000s	Error	4153	Failed to execute warning light command.(%1)	Network warning light failed	The system may not be able to operate properly.	●	●	●			●
cifs	Information	4201	Created new shared configuration file.	Created new shared configuration file.	—	●	●	●			
cifs	Information	4202	Failed to read in shared configuration file. File may be corrupted.	Reading shared configuration file failed.	Check if the shared configuration file is corrupted.	●	●	●			
cifs	Information	4203	Recovered shared configuration file from backup file.	Shared configuration file is restored.	—	●	●	●			
cifs	Information	4204	Recreated shared configuration file since it cannot be found.	Shared configuration file is created again.	This is an normal action at first activation. In other cases, check if the shared configuration file is not deleted.	●	●	●			

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting / Alive	Manager
cifs	Information	4205	There are differences between share settings stored in shared configuration file and the current configuration settings.	Sharing target folder is lost.	Check if the shared folder is not deleted while CIFS resource is deactivated.	●	●	●			
db2 ftp http imap4 odbc oracle oracleas oss otx pop3 psql smtp sqlserver tux was wls	Warning	10001	%1	Error message for each monitored application.	Troubleshoot the application failure according to the error message.	●					
db2w ftpw httpw imap4w odbcw oraclew oracleasw ossw otxw pop3w psqlw smtpw sqlserverw tuxw wasw wlsw db2 ftp http imap4 odbc oracle oracleas oss otx pop3 psql smtp sqlserver tux was wls	Warning	10002	The API Error of Windows occurred.%1	API error of Windows has occurred. %1 is API error code.	Troubleshoot the OS failure according to the error code.	●					

Section III Maintenance information

Module Type	Event Type	Event ID	Messages	Description	Solution	Alert	Event log	User log	Mail report	Report setting / Alive	Manager
tuxw	Warning	10004	The API Error of Application occurred.%1	API error of application has occurred. %1 is API error code.	Troubleshoot the application failure according to the error code.	●					

ExpressCluster X 2.1 for Windows Reference Guide

Driver event log messages

Disk filter driver

The following events are recorded in system event log as the source "clpdiskfltr".

Module Type	Event Type	Event ID	Message	Description	Solution
diskfltr	Info	1001	Mirror disk resource activated without mirroring achieved.(%1)	Mirror disk resource has been activated without connecting to the mirror connect. %1: mirror disk number	Mirror disk resource has been activated while the other server is not in normal state such as in failover or access restriction release. Check that there is no error in the other server.
diskfltr	Error	2001	Mirror disk connect error.(%1)	Disconnected: Disconnection has been detected in the mirror connect.	Check that there is no error in the network.
				Timeout - HealthCheck: There was no response from the other server.	Same as above.
				Timeout - 1stAck: There was no response from the other server.	Check that there is no error in the network or the other server.
				Timeout - 2ndAck: There was no response from the other server.	Same as above.
				Mirror DP Not Found: The data partition of the other server cannot be found.	Check that there is no error in the data partition of the other server.
diskfltr	Error	2002	Asynchronized transfer error.(%1)	Timeout - Get KernelQueue: Timeout occurred in ansynchronized transfer.	An error occurred in the user process of asynchronized transfer. Check that the Clpdiskageent process is running normally, and that there is no error in I/O to the local disk.
				History Overflow: The number of the items to be recorded as history was exceeded, so mirroring was interrupted.	Consider to decrease the process to write asynchronized transfer or improve the speed of circuit.
diskfltr	Error	2003	Mirror disk access error(DP).(%1)	Accessing the mirror disk failed. %1: mirror disk number	Check that there is no error in the data partition of the mirror disk. In case of an error, exchange the disk for the one without an error.

Module Type	Event Type	Event ID	Message	Description	Solution
diskfltr	Error	2004	Mirror disk access error(CP).(%1)	Failed to record the difference information on the cluster partition. %1: mirror disk number	Check that there is no error in the cluster partition of the mirror disk. In case of an error, exchange the disk for the one without an error.
diskfltr	Error	2005	Cluster partition access error.	Accessing the cluster portion failed.	Check that there is no error in the cluster partition of the mirror disk. In case of an error, exchange the disk for the one without an error.
diskfltr	Error	2006	Mirror disk activation error.(%1)	Standby: Mirror disk is already being operated as the standby system.	An error in operation is considered to have caused this error. Check the cause of this error.
				Already opened: Mirror disk is already being operated as the active system.	Same as above.
				Refused by other: The status of the other server is wrong. (It is being activated now.)	Same as above.
diskfltr	Error	2099	Internal error.	An internal error occurred.	Insufficient kernel memory or OS resource is considered to have caused this error. Check this error with the performance monitor.
diskfltr	Error	5001	Connection error on mirror disk connect.(%1)	Connecting to the mirror connect failed.	Check that there is no error in the network or the mirror connect settings.
diskfltr	Error	5002	Communication error on mirror disk connect.(%1)	Since the network has an error or is highly loaded, the mirror connect is disconnected.	Check that there is no error in the network.
diskfltr	Error	5003	History file access error.(%1)	Failed to write or read the history file.	Check that there is no error in the hard disk. In case of an error, exchange the disk for the one without an error.
diskfltr	Error	5004	Mirror disk virtual device access error.(%1)	Failed to obtain the data from the mirror disk virtual driver.	The mirror disk virtual driver is not running normally or has an error. Check that ExpressCluster has been set up correctly.
diskfltr	Error	5005	Mirror disk connect timeout.(%1)	The network has an error or is highly loaded, the mirror connect is disconnected.	Check that there is no error in the network or the other server.
diskfltr	Error	5006	History file disk overflow.(%1)	Failed to output the history file because of insufficient disk capacity.	The folder to store the history file does not have enough. Set the folder with enough capacity.

Module Type	Event Type	Event ID	Message	Description	Solution
diskfltr	Error	5007	Queue buffer allocation error.(%1)	Failed to allocate the buffer for ansynchronized transfer.	Insufficient memory or OS resource is considered to have caused this error. Check the cause.
diskfltr	Error	5099	Internal error.(%1)	An internal error occurred.	Insufficient memory or OS resource is considered to have caused this error. Check the cause.

Kernel mode LAN heartbeat driver

The following events are recorded in system event log as the source "clphb".

Module Type	Event Type	Event ID	Message	Description	Solution
clphb	Error	3001	Fatal error occurred in the driver.	Fatal error occurred in the driver.	Kernel memory or OS resource may not be sufficient. Check with performance monitor.
clphb	Info	1001	Signal has been set to the shutdown event due to the keep alive timeout.	User mode is stalled.	Kernel memory or OS resource may not be sufficient. Check with performance monitor.
clphb	Info	1002	Signal has been set to the shutdown event due to the FILTER closing action.	Received FILTER closing action.	Kernel memory or OS resource may not be sufficient. Check with performance monitor.

Detailed information in activating and deactivating group resources

The following information is displayed in the messages recorded in event logs or alert viewer as detail information when the resource activation / deactivation fails.

Application resource

Module Type	Type	Return Value	Message	Description	Solution
appli	Error	5	The application path is invalid.	The application path is invalid.	Check if the application path is correct.
appli	Error	7	Failed to start application.	Failed to start application.	Memory or OS resources may not be sufficient. Check them.
appli	Error	8	Failed to stop application.	Failed to stop application.	Memory or OS resources may not be sufficient. Check them.
appli	Error	10	Timeout occurred.	Timeout occurred.	Check if the application terminates within the time-out period.
appli	Error	11	Failed to log on as a user.	Failed to log on as a user.	Check if a domain, an account and a password of the logon user are set properly.
appli	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

CIFS Resource

Module Type	Type	Return Value	Message	Description	Solution
cifs	Error	2	The specified path is invalid.	The specified path is invalid.	Correct the setting of target folder.
cifs	Error	3	Access denied.	Access denied.	Check if local system account has the appropriate access right to the target folder.
cifs	Error	4	The share name is already in use on this server.	The specified name of the shared folder is already in use on this server.	Correct the setting of shared name.
cifs	Error	5	The specified path does not exist.	The specified path does not exist.	Correct the setting of target folder.
cifs	Error	6	Insufficient memory is available.	Insufficient memory is available.	Memory or OS resources may not be sufficient. Check them.
cifs	Error	7	The specified folder can not be found.	The specified folder can not be found.	Correct the setting of target folder.

Module Type	Type	Return Value	Message	Description	Solution
cifs	Error	10	Failed to set the caching.	Failed to set the caching.	Check if local system account has the appropriate access right to the target folder.
cifs	Error	11	Failed to set security information.	Failed to set security information.	Check if local system account has the appropriate access right to the target folder.
cifs	Error	15	The shared configuration file path is wrong.	Specified path does not exist, or invalid character strings are used in the absolute path.	Correct the configuration value.
cifs	Error	17	Failed to write the shared configuration file.	Failed to save the shared configuration in the file.	Check if the writing to the shared configuration file is available with the local system account.
cifs	Error	18	Failed to read the shared configuration file.	Failed to read the shared configuration form the file.	Check if the reading from the shared configuration file is available with the local system account.
cifs	Error	20	Failed to start up CIFS control process.	Failed to start up the process (clpcifsp.exe) that monitors the change of shared configuration	There may be corruption of the execution file, lack of memory capacity or lack of OS resource. Check these issues.
cifs	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Floating IP resource

Module Type	Type	Return Value	Message	Description	Solution
fip	Error	5	IP address already exists.	IP address already exists.	Check if the IP address is already used on the network. Set the IP address that is not used.
fip	Error	8	Available adapter does not exist.	Available adapter does not exist.	Check if the FIP address network is the same as the server's real IP address.
fip	Error	9	Failed to add IP address.	Failed to add IP address.	Check the result of the ipconfig command. If 0.0.0.0 address exists, restart NIC.
fip	Error	10	Failed to delete IP address.	Failed to delete IP address.	Memory or OS resources may not be sufficient. Check them.
fip	Error	99	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Section III Maintenance information

Mirror disk resource / hybrid disk resource

Module Type	Type	Return Value	Message	Description	Solution
md/hd	Error	2	An internal error occurred.	An internal error occurred.	Memory or OS resources may not be sufficient. Check them.
md/hd	Error	2	The resource is busy.	The resource is busy.	Wait for a while, and retry the operation.
md/hd	Error	2	A network error occurred.	A network error occurred.	Check the status of the interconnect connection.
md/hd	Error	2	Cannot establish the mirror disk connection.	Cannot establish the mirror disk connection.	Check if the cluster configuration data is correct.
md/hd	Error	2	The resource name is invalid.	The resource name is invalid.	Check if the cluster configuration data is correct.
md/hd	Error	2	The status is invalid.	The status is invalid.	You need to perform the mirror recovery.
md/hd	Error	2	The resource is not initialized.	The resource is not initialized.	Check if the partition is allocated and OS recognizes the disk. Check if the cluster configuration data is correct.
md/hd	Error	2	The resource is not performed first mirror construction.	The resource is not performed first mirror construction.	You need to perform the initial mirror construction.
md/hd	Error	2	Cannot lock the mirror disk.	Cannot lock the mirror disk.	Memory or OS resources may not be sufficient. Check them.
md/hd	Error	2	The license is not registered.	The license is not registered.	Register the license.
md/hd	Error	2	The trial version has expired.	The trial version has expired.	Register the license.
md/hd	Error	2	The license authentication failed.	The license authentication failed.	Register the license.
md/hd	Error	2	Cannot find the history folder.	Cannot find the history folder.	Check if the cluster configuration data is correct.
md/hd	Error	2	The mirror connect is not initialized.	The mirror connect is not initialized.	Check the status of the mirror connect. Check if the cluster configuration data is correct.
md/hd	Error	2	Cannot find the partition specified for the cluster partition.	Cannot find the partition specified for the cluster partition.	Check if the partition is allocated and the OS recognizes the disk.
md/hd	Error	2	Cannot find the partition specified for the data partition.	Cannot find the partition specified for the data partition.	Check if the partition is allocated and the OS recognizes the disk.

Module Type	Type	Return Value	Message	Description	Solution
md/hd	Error	2	Cannot change the drive letter for the cluster partition.	Cannot change the drive letter for the cluster partition.	Check if the drive letter for the cluster configuration data is specified. Check if the drive letter is not used for another partition.
md/hd	Error	2	Cannot change the drive letter for the data partition.	Cannot change the drive letter for the data partition.	Check if the drive letter for the cluster configuration data is specified. Check if the drive letter is not used for another partition.
md/hd	Error	2	The server name is invalid.	The server name is invalid.	Check if the cluster configuration data is correct.

Registry synchronization resource

Module Type	Type	Return Value	Message	Description	Solution
regsync	Error	2	Timeout has occurred while waiting for completion of synchronization processing at startup.	The resource cannot be activated since synchronization of registry files between servers has not been completed.	Activate the resource again after a while. If the error persists, OS may have errors. Check the status of the system.
regsync	Error	2	Timeout occurred when waiting for completing initialization of resource thread.	Activating the resource failed since initialization process of the thread has not been completed.	OS may have errors. Check the status of the system.
regsync	Error	2	Timeout occurred when waiting for completing termination of resource thread.	Deactivating the resource failed since termination process of the thread has not been completed.	OS may have errors. Check the status of the system.
regsync	Error	4	Specified resource does not exist in cluster configuration data.	Activating or deactivating the resource failed since it does not exist on the cluster configuration data.	Check if the resource name is consistent with the information in the cluster configuration data.
regsync	Error	5	Failed to allocate memory.	Activating the resource failed since the memory cannot be allocated.	Memory or OS resources may not be sufficient. Check the status of the system.
regsync	Error	6	Failed to get OS resource.	Activating the resource failed since OS resource cannot be obtained.	Memory or OS resources may not be sufficient. Check the status of the system.
regsync	Error	6	Failed to create thread.	Activating the resource failed since the thread cannot be created.	Memory or OS resources may not be sufficient. Check the status of the system.
regsync	Error	7	Failed to open registry.	Opening the registry failed since invalid	Check the value set on the Builder (**Details** on

Section III Maintenance information

Module Type	Type	Return Value	Message	Description	Solution
				registry key is registered to the resource.	**Resource Properties**), and change to a correct registry key.
regsync	Error	7	Failed to restore registry.	Restoring the registry failed since invalid registry key is registered to the resource.	Check the value set on the Builder (**Details** on **Resource Properties**), and change to a correct registry key.
regsync	Error	8	Failed to open registry.	Opening the registry failed since the registry key registered to the resource does not exist on the registry, or Win32 API error occurred.	Check if the registry key exists on the registry. If it does not exist, create it. If it exists, OS may have errors. Check the status of the system.
regsync	Error	8	Failed to restore registry.	Opening the registry failed since the registry key registered to the resource does not exist on the registry, other process opens the registry key, or the system call for registry operation returned an error.	Check if the registry key exists on the registry. If it does not exist, create it. If it exists, check if a process other than ExpressCluster opens the registry key. If the registry key exists and no other process opens it, OS may have errors. Check the status of the system.
regsync	Error	9	Failed to lock file.	Locking a file failed when operating the registry storage file.	Check if the process other than ExpressCluster opens the registry storage file.
regsync	Error	9	Failed to input/output the file.	The input/output process of the file failed when operating the registry storage file.	Check if the process other than ExpressCluster opens the registry storage file. OS may have errors. Check the status of the system.
regsync	Error	12	Synchronization processing at startup has failed.	The resource cannot be activated since synchronization process of the registry storage file between servers failed.	OS may have errors. Check the status of the system.

ExpressCluster X 2.1 for Windows Reference Guide

Script resource

Module Type	Type	Return Value	Message	Description	Solution
script	Error	6	Failed to execute start script.	Failed to execute start script.	Memory or OS resources may not be sufficient. Check them.
script	Error	7	Failed to execute stop script.	Failed to execute stop script.	Memory or OS resources may not be sufficient. Check them.
script	Error	9	Timeout occurred.	Timeout occurred.	Check if the script terminates within the time-out period.
script	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Disk resource

Module Type	Type	Return Value	Message	Description	Solution
sd	Error	-1	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.
sd	Error	-1	Failed to load cluster configuration data.	Failed to load cluster configuration data.	Check if the cluster configuration data is stored on a proper location.
sd	Error	-1	Failed to unload cluster configuration data.	Failed to unload cluster configuration data.	Check if the cluster configuration data is stored on a proper location.
sd	Error	-1	Failed to get cluster configuration data.	Failed to get cluster configuration data.	Check if the cluster configuration data is correct.
sd	Error	-1	Failed to allocate memory.	Failed to allocate memory.	Memory or OS resources may not be sufficient. Check them.
sd	Error	-1	Failed to activate resource.	Failed to activate resource.	Check if the HBA settings are correct.
sd	Error	-1	Failed to create thread.	Failed to create thread.	Memory or OS resources may not be sufficient. Check them.
sd	Error	-1	Timeout occurred on thread.	Timeout occurred on thread.	Memory or OS resources may not be sufficient. Check them.
sd	Error	-1	Failed to dismount the partition specified by the resource.	Failed to dismount the partition specified by the resource.	The partition may be in use. Check it.
sd	Error	-1	Failed to lock the partition specified by the resource.	Failed to lock the partition specified by the resource.	The partition may be in use. Check it.

Module Type	Type	Return Value	Message	Description	Solution
sd	Error	-1	Failed to deactivate resource.	Failed to deactivate resource.	Check if the HBA settings are correct.
sd	Error	-1	Server does not exist in cluster configuration data.	Server does not exist in cluster configuration data.	Check if the server exists in the cluster configuration data.
sd	Error	-1	Resource does not exist in cluster configuration data.	Resource does not exist in cluster configuration data.	Check if the resource exists in the cluster configuration data.
sd	Error	-1	Cannot find the specified partition.	Cannot find the specified partition.	Check if OS recognizes the specified partition.
sd	Error	-1	Cannot change the drive letter.	Cannot change the drive letter.	Check if the specified drive letter is used for another partition.

Service resource

Module Type	Type	Return Value	Message	Description	Solution
service	Error	5	Failed to get service control right.	Failed to get service control right.	Check if the service name is correct.
service	Error	6	Failed to start service.	Failed to start service.	Check the status of the service.
service	Error	7	Failed to stop service.	Failed to stop service.	Check the status of the service.
service	Error	8	Service has already been running.	Service has already been running.	Check the status of the service. It is possible to configure settings not to make it an error when the service is already running.
service	Error	10	Timeout occurred.	Timeout occurred.	Check if the service starts or stops within the time-out period.
service	Error	13	Computer name related to service that is running is different from virtual computer name of target VCOM resource.	Computer name related to service that is running is different from virtual computer name of target VCOM resource.	When you set the same service to more than one service, do not set the target VCOM resource name.
service	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Print spooler resource

Module Type	Type	Return Value	Message	Description	Solution
spool	Error	5	Failed to stop service.	Failed to stop service.	Stopping the spooler service failed. Check if the printer setting is correct.
spool	Error	4	Failed to start service.	Failed to start service.	Starting the spooler service failed. Check if the printer setting is correct.
spool	Error	Other	Internal error occurred.(status:%1!d!)	Internal error occurred.(status:%1!d!)	The disk capacity or the memory of the server where ExpressCluster is installed may not be sufficient. Check them.
spool	Error	1	Failed to create a specified spool directory.	Failed to create a specified spool directory.	Check if activating the disk resource or the mirror disk resource fails. Check if characters that cannot be used in a directory name are included.
spool	Error	1	Failed to change a spool directory.	Failed to change a spool directory.	Check if activating the disk resource or the mirror disk resource fails. Check if characters that cannot be used in a directory name are included.
spool	Error	2	Config value(printer name) is invalid. resource:%1!s! value:%2!s!	Config value(printer name) is invalid. resource:%1!s! value:%2!s!	Check if the printer name exists on the server.
spool	Error	2	Config value(partition) is invalid. resource:%1!s! value:%2!s!	Config value(partition) is invalid. resource:%1!s! value:%2!s!	Check if the drive letter is the one on the disk resource or the mirror disk resource.
spool	Error	2	Config value(directory) is invalid. resource:%1!s! value:%2!s!	Config value(directory) is invalid. resource:%1!s! value:%2!s!	Check if characters that cannot be used in a directory name are included.

Virtual computer name resource

Module Type	Type	Return Value	Message	Description	Solution
vcom	Error	5	VCOM control process has already been started.	VCOM control process has already been started.	Memory or OS resources may not be sufficient. Check them. Restart the OS.
vcom	Error	6	VCOM control process has not been started.	VCOM control process has not been started.	Memory or OS resources may not be sufficient. Check them. Restart the OS.
vcom	Error	8	VCOM control process does not exist.	VCOM control process does not exist.	Memory or OS resources may not be sufficient. Check them. Restart the OS.
vcom	Error	9	Failed to get IP address table.	Failed to get IP address table.	Memory or OS resources may not be sufficient. Check them.
vcom	Error	10	Target FIP address does not exist.	Target FIP address does not exist.	Check if the IP address of the target FIP resource exists.
vcom	Error	11	Virtual computer name is the same as local hostname.	Virtual computer name is the same as local hostname.	Do not set existing host names for a virtual computer name.
vcom	Error	12	Failed to start VCOM control process.	Failed to start VCOM control process.	Check if all conditions for using a virtual computer are met.
vcom	Error	13	Failed to stop VCOM control process.	Failed to stop VCOM control process.	An error occurred when stopping the virtual computer. Restart the OS.
vcom	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Virtual IP resource

Module Type	Type	Return Value	Message	Description	Solution
vip	Error	5	IP address already exists.	IP address already exists.	Check if the IP address is already used on the network. Set the IP address that is not used.
vip	Error	8	Available adapter does not exist.	Available adapter does not exist.	Check if the IP address set on the interconnect exists on the server. Set a proper IP address.
vip	Error	9	Failed to add IP address.	Failed to add IP address.	Check the result of the ipconfig command. If 0.0.0.0 address exists, restart NIC.
vip	Error	10	Failed to delete IP address.	Failed to delete IP address.	Memory or OS resources may not be sufficient. Check them.
vip	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

NAS Resource

Module Type	Type	Return Value	Message	Description	Solution
nas	Error	1	The drive has already been used.	The specified drive letter has already been used for another network drive.	Change the drive letter.
nas	Error	3	Invalid nas drive.	The specified drive letter has already been used for another drive.	Change the drive letter.
nas	Error	4	Failed to redirect the network resource .	Failed to mount the network drive.	Check if the specified network resource is accessible with the specified account and password.
nas	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Detailed info of monitor resource errors

The following information is displayed in the message recorded in event log or alert viewer as detail information when monitor resource detects an error.

Application monitor resource

Module Type	Type	Return Value	Message	Description	Solution
appliw	Error	9	Process did not exist.	Process did not exist.	Process of the monitoring target application resource was cleared due to some error. Check it.
appliw	Error	11	Failed to log on as a user.	Failed to log on as a user.	Check if a domain, an account and a password of the logon user are set properly.
appliw	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

CIFS monitor resource

Module e Type	Type	Return Value	Message	Description	Solution
cifsw	Error	3	Access denied.	Local system account doesn't have the appropriate access right to the shared folder.	Correct the access right setting of target folder.
cifsw	Error	6	Insufficient memory is available.	Insufficient memory is available.	Memory or OS resources may not be sufficient. Check them.
cifsw	Error	8	The specified share name can not be found.	The specified share name can not be found.	Check if the setting of file sharing has been canceled.
cifsw	Error	13	Error occurred while doing file check.	Error occurred while doing file check.	Check if local system account has the appropriate access right for executing specified method of monitoring.
cifsw	Error	14	Error occurred while doing folder check.	Error occurred while doing folder check.	Check if local system account has the appropriate access right for executing specified method of monitoring.
cifsw	Error	19	Failed to check the shared configuration file.	Failed to execute checking the configuration data saved in the shared configuration file.	Check if the shared configuration file is corrupted.
cifsw	Error	21	CIFS control process does not exist.	Failed to start up the process (clpcifsp.exe) that monitors the change of shared configuration.	Activate CIFS resource again.

ExpressCluster X 2.1 for Windows Reference Guide

Modul e Type	Type	Return Value	Message	Description	Solution
cifsw	Error	99	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.
cifsw	Warning	101	Setting has been changed.	Setting of file sharing has been changed.	Check if the user limit setting or the target folder of file sharing has been changed.

DB2 monitor resource

Module Type	Type	Return Value	Message	Description	Solution
db2w	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
db2w	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since they may not be correct.
db2w	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
db2w	Error	11	An error was detected in accessing the monitor target.	Accessing the database failed.	Check configured values on the Builder (such as a database name). If there is no error, check the database has errors.
db2w	Error	12	An error was detected in user authentication.	Accessing the database failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check the database has errors.
db2w	Error	13	An application error was detected.	A database error was detected.	Refer to error messages for database described separately to fix errors.
db2w	Error	14	An error was detected in executing SQL statement [%1].	Executing SQL statement failed. The executed SQL statement is displayed on %1.	Refer to error messages for database described separately to fix errors.
db2w	Error	15	A data error was detected.	A value on the table of database has an error.	Database may be corrupt. Stop the database operation and investigate it. This error may occur when more than one monitoring is performed with the same monitor table name concurrently. Check if the values set in

Module Type	Type	Return Value	Message	Description	Solution
					the multi-directional environment are appropriate.
db2w	Error	40	No license is registered.	The license has not been registered.	Register the license.
db2w	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

Disk RW monitor resource

Module Type	Type	Return Value	Message	Description	Solution
diskw	Error	1	Initialization error has occurred in internal resource.	Initialization error has occurred in internal resource.	Memory or OS resources may not be sufficient. Check them.
diskw	Error	2	Failed to add keep alive drive when initializing keep alive driver.	Failed to add keep alive drive when initializing keep alive driver.	Memory or OS resources may not be sufficient. Check them.
diskw	Error	3	Initialization has not been done.	Initialization has not been done.	Memory or OS resources may not be sufficient. Check them.
diskw	Error	4	Failed to obtain the cluster configuration data.	Failed to obtain the cluster configuration data.	The cluster configuration data is invalid. Check the disk RW monitor resource on the Builder.
diskw	Error	5	Failed to open the file.	Failed to open the file.	Check if the disk driver of the monitoring target disk is loaded, the disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be sufficient. Check them.
diskw	Error	6	Failed to write in the file.	Failed to write in the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be sufficient. Check them.
diskw	Error	7	Failed to synchronize the disk of the file.	Failed to synchronize the disk of the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be

Module Type	Type	Return Value	Message	Description	Solution
					sufficient. Check them.
diskw	Error	8	Failed to close the file.	Failed to close the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be sufficient. Check them.
diskw	Error	9	Timeout has occurred when initializing internal resources.	Timeout has occurred when initializing internal resources.	Check if an error is occurred on the monitoring target disk. If there is no error, memory or OS resources may not be sufficient. Check them.
diskw	Error	10	Failed to allocate memory.	Failed to allocate memory.	Memory or OS resources may not be sufficient. Check them.
diskw	Error	70	Timeout has occurred when initializing internal resources.	Timeout has occurred when initializing internal resources.	Memory or OS resources may not be sufficient. Check them.
diskw	Error	71	Timeout has occurred when opening the file.	Timeout has occurred when opening the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
diskw	Error	72	Timeout has occurred when writing in the file.	Timeout has occurred when writing in the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
diskw	Error	73	Timeout has occurred when synchronizing the disk of the file.	Timeout has occurred when synchronizing the disk of the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
diskw	Error	74	Timeout has occurred when closing the file.	Timeout has occurred when closing the file.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other

Module Type	Type	Return Value	Message	Description	Solution
					errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
diskw	Error	90	Internal error occurred.	Internal error occurred.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
diskw	Error	99	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Floating IP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
fipw	Error	6	IP address does not exist.	IP address does not exist.	NIC may have been disabled. Check if the FIP address exists by the ipconfig command.
fipw	Error	11	Adapter Index is different.	Adapter Index is different.	NIC may have been disabled. Check if the FIP address exists by the ipconfig command.
fipw	Error	12	Failed to obtain IP address table.	Failed to obtain IP address table.	Memory or OS resources may not be sufficient. Check them.
fipw	Error	13	Failed to get NIC interface name.	Failed to get NIC interface name.	Memory or OS resources may not be sufficient. Check them.
fipw	Error	14	Failed to get NIC status.	Failed to get NIC status.	Check if the NIC device is supported by the device I/O controller.
fipw	Error	15	Detected NIC Link Down.	Detected NIC Link Down.	Check if the LAN cable is connected properly.
fipw	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

FTP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
ftpw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation	OS itself may have errors. Restart the server or take other

Module Type	Type	Return Value	Message	Description	Solution
				failure. Information on the initialization may be displayed on %1.	actions
ftpw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
ftpw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
ftpw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
ftpw	Error	12	An error was detected in user authentication.	The user authentication failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors
ftpw	Error	13	An application error was detected.	A monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
ftpw	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
ftpw	Error	40	No license is registered.	The license has not been registered.	Register the license.
ftpw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions

Custom monitor resource

Module Type	Type	Return Value	Message	Description	Solution
genw	Error	1	Parameter is invalid.	The configured value of the monitoring is not correct.	Check the configured value on the Builder.
genw	Error	2	Resource does not exist in cluster configuration data.	The cluster configuration data is not correct.	Check the cluster configuration data on the Builder.
genw	Error	3	Failed to get the value from cluster configuration data.	The cluster configuration data is not correct.	Check the cluster configuration data on the Builder.

Module Type	Type	Return Value	Message	Description	Solution
genw	Error	4	Script path is invalid.	The configured value of the script path is not correct.	Check the configured value on the Builder.
genw	Error	5	Failed to start script.	Failed to start script.	Check if the script can be executed.
genw	Error	6	Script did not exist.	The asynchronous type script terminated abnormally.	Check the cause of the termination of the script.
genw	Error	7	Timeout occurred.	The synchronous type script did not terminate within the time-out period.	Check the cause of the delay of the script.
genw	Error	8	Returned termination code %1.	The synchronous type script returned abnormal error code.	Check the cause for the abnormal error code.
genw	Error	99	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Hybrid disk TUR monitor resource

Module Type	Type	Return Value	Message	Description	Solution
hdtw	Error	1	Initialization has failed. Check the cluster configuration data or system resources.	Initialization has failed. Check the cluster configuration data or system resources.	Memory or OS resources may not be sufficient. Check them.
hdtw	Error	2	Initialization has not been done.	Initialization has not been done.	Memory or OS resources may not be sufficient. Check them.
hdtw	Error	3	The cluster configuration data is invalid.	The cluster configuration data is invalid.	The cluster configuration data is invalid. Check the disk TUR monitor resource on the Builder
hdtw	Error	4	Failed to open device. Check the disk status of monitor destination volume.	Failed to open device. Check the disk status of monitor destination volume.	Check if the disk driver of the monitoring target disk is loaded, the device exists, the disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be sufficient. Check them.
hdtw	Error	5	Failed to control device. Check the disk status of monitor destination volume.	Failed to control device. Check the disk status of monitor destination volume.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk.
hdtw	Error	6	Internal resources are busy.	Internal resources are busy.	Memory or OS resources may not be sufficient. Check them.

Module Type	Type	Return Value	Message	Description	Solution
hdtw	Error	7	Failed to allocate memory. Check the system resource.	Failed to allocate memory. Check the system resource.	Memory or OS resources may not be sufficient. Check them.
hdtw	Error	90	Polling timeout. Check the disk load of the monitor target and extend the monitor timeout time.	Polling timeout. Check the disk load of the monitor target and extend the monitor timeout time.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
hdtw	Error	99	Other internal error has occurred. Check the system resource.	Other internal error has occurred. Check the system resource.	Memory or OS resources may not be sufficient. Check them.

Hybrid disk monitor resource

Module Type	Type	Return Value	Message	Description	Solution
hdw	Error	2	Internal error.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.
hdw	Error	3	HDR %1 has old data.	The information in the activated hybrid disk %1 is not updated.	Check the status of the hybrid disk with Mirror Disk Helper.
hdw	Error	4	A disk error is detected in HDR %1.	A disk error has been detected in hybrid disk %1.	Check that there is no HW failure in the disk or disk path where cluster partition or data partition exists.
hdw	Error	5	The status of HDR %1 is invalid.	The status of the hybrid disk %1 is invalid.	Restart the cluster.
hdw	Warning	101	HDR %1 recovery is in progress.	Hybrid disk %1 is being copied.	Wait for a while until mirror recovery completes.
hdw	Warning	102	HDR %1 is not being mirrored.	Hybrid disk %1 has not been mirrored.	Check the status of the hybrid disk with Mirror Disk Helper.
hdw	Warning	103	HDR %1 is activated on more than one server.	Hybrid disk %1 is activated on both server groups.	Deactivate the hybrid disk on one of the server groups.
hdw	Warning	104	The status of HDR %1 is unknown.	Hybrid disk to be monitored is stopped.	Stop the monitor resource or start the hybrid disk to be monitored.
hdw	Warning	105	Whether HDR %1 data is old/new is not determined.	Whether the data in hybrid disk %1 is old or new has not been determined.	Activate the hybrid disk on one of the servers.

HTTP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
httpw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
httpw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
httpw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
httpw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
httpw	Error	13	An application error was detected.	A monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
httpw	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
httpw	Error	40	No license is registered.	The license has not been registered.	Register the license.
httpw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

ExpressCluster X 2.1 for Windows Reference Guide

IMAP4 monitor resource

Module Type	Type	Return Value	Message	Description	Solution
imap4w	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions
imap4w	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
imap4w	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
imap4w	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
imap4w	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
imap4w	Error	13	An application error was detected.	A monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
imap4w	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
imap4w	Error	40	No license is registered.	The license has not been registered.	Register the license.
imap4w	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

IP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
ipw	Error	4	Ping could not reach.	Ping could not reach.	Check if the ping command to the corresponding IP address succeeds. When the command fails, check the status of the device that has the IP address and the network interface.
ipw	Error	5	Timeout occurred.	Timeout occurred.	Memory or OS resources may not be sufficient. Check them.
ipw	Error	Others	Internal error occurred.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Mirror disk monitor resource

Module Type	Type	Return Value	Message	Description	Solution
mdw	Error	2	Internal error.	Internal error.	Memory or OS resources may not be sufficient. Check them.
mdw	Error	3	Mirror disk %1 is abnormal.	Mirror disk %1 is abnormal.	The mirror disk of the local server has errors. Check it on the mirror disk helper.
mdw	Warning	101	Mirror disk %1 recovery is in progress.	Mirror disk %1 recovery is in progress.	Wait for a while until the mirror recovery completes.
mdw	Warning	102	Mirror disk %1 is not being mirrored.	Mirror disk %1 is not being mirrored.	Check the mirror disk on the mirror disk helper.
mdw	Warning	103	Mirror disk %1 is uncertain status.	Mirror disk %1 is uncertain status.	Check the mirror disk on the mirror disk helper.
mdw	Warning	104	Mirror disk %1 is activated on more than one server.	Mirror disk %1 is activated on more than one server.	When activation of the mirror disk resources on both servers is detected, the server is automatically shut down. Restart the server.
mdw	Warning	105	Mirror disk %1 is unknown status.	Mirror disk %1 is unknown status.	Memory or OS resources may not be sufficient. Check them.

Mirror connect monitor resource

Module Type	Type	Return Value	Message	Description	Solution
mdnw	Error	2	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.
mdnw	Warning	100	Network was interrupted.	Network was interrupted.	Check the connection status of the mirror connect.

Multi target monitor resource

Module Type	Type	Return Value	Message	Description	Solution
mtw	Error	Other	Internal error occurred.(status:%1!d!)	Internal error occurred.(status:%1!d!)	Memory or OS resources may not be sufficient. Check them.
mtw	Error	5	Status of resources is abnormal.	Status of resources is abnormal.	Check the status of the monitor resources listed on the monitor resources list.
mtw	Error	1	This option is invalid.	This option is invalid.	Memory or OS resources may not be sufficient. Check them.

NAS monitor resource

Module Type	Type	Return Value	Message	Description	Solution
nasw	Error	3	Invalid nas drive. drv:%1	The target drive is not the network drive.	Check if the drive letters have been changed
nasw	Error	4	Failed to get the network resource mapped by the specified drive. drv:%1 errcode:%2	The target drive is not being mounted.	Check if the network drive has been unmounted.
nasw	Error	4	The network resource is not connected. path:%1	The target drive is not being mounted.	Check if the network drive has been unmounted.
nasw	Error	4	The network resource is different from that of the configuration value. drv:%1	The network resource is different from that of the configuration value.	Check if the setting of the network drive has been changed.
nasw	Error	99	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

NIC Link Up/Down monitor resource

Module Type	Type	Return Value	Message	Description	Solution
miiw	Error	4	IP address does not exist.	IP address does not exist.	NIC may have been disabled. Check if the IP address of the specified NIC exists by the ipconfig command.
miiw	Error	5	Failed to get IP address table.	Failed to get IP address table.	Memory or OS resources may not be sufficient. Check them.
miiw	Error	6	Failed to get NIC interface name.	Failed to get NIC interface name.	Memory or OS resources may not be sufficient. Check them.
miiw	Error	7	Failed to get NIC status.	Failed to get NIC status.	Check if the NIC device is supported by the device I/O controller.
miiw	Error	8	Detected NIC Link Down.	Detected NIC Link Down.	Check if the LAN cable is connected properly.
miiw	Error	Others	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

ODBC monitor resource

Module Type	Type	Return Value	Message	Description	Solution
odbcw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
odbcw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
odbcw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
odbcw	Error	11	An error was detected in accessing the monitor target.	The access to the database failed.	Check configured values on the Builder (such as a database name). If there is no error, check the database has errors.
odbcw	Error	12	An error was detected in user authentication.	The access to the database failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the

Module Type	Type	Return Value	Message	Description	Solution
					database has errors.
odbcw	Error	13	An application error was detected.	The database error was detected.	Refer to error messages for database described separately to fix errors.
odbcw	Error	14	An error was detected in executing SQL statement [%1!s!].	Executing SQL statement failed. The executed SQL statement is displayed on %1.	Refer to error messages for database described separately to fix errors.
odbcw	Error	15	A data error was detected.	A value on the table of database has an error.	Database may be corrupt. Stop the database operation and investigate it. This error may occur when more than one monitoring is performed with the same monitor table name concurrently. Check if the values set in the multi-directional environment are appropriate.
odbcw	Error	40	No license is registered.	The license has not been registered.	Register the license.
odbcw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions

Oracle monitor resource

Module Type	Type	Return Value	Message	Description	Solution
oraclew	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions
oraclew	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
oraclew	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.

Module Type	Type	Return Value	Message	Description	Solution
oraclew	Error	11	An error was detected in accessing the monitor target.	The access to the database failed.	Check configured values on the Builder (such as a database name). If there is no error, check the database has errors.
oraclew	Error	12	An error was detected in user authentication.	The access to the database failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the database has errors.
oraclew	Error	13	An application error was detected.	The database error was detected.	Refer to error messages for database described separately to fix errors.
oraclew	Error	14	An error was detected in executing SQL statement [%1!s!].	Executing SQL statement failed. The executed SQL statement is displayed on %1.	Refer to error messages for database described separately to fix errors.
oraclew	Error	15	A data error was detected.	A value on the table of database has an error.	Database may be corrupt. Stop the database operation and investigate it. This error may occur when more than one monitoring is performed with the same monitor table name concurrently. Check if the values set in the multi-directional environment are appropriate.
oraclew	Error	40	No license is registered.	The license has not been registered.	Register the license.
oraclew	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

OracleAS monitor resource

Module Type	Type	Return Value	Message	Description	Solution
oracleasw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
oracleasw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Type	Return Value	Message	Description	Solution
oracleasw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
oracleasw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check if the monitor application has errors.
oracleasw	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
oracleasw	Error	13	An application error was detected.	The monitor application error was detected.	Check configured values on the Builder (such as an instance name). If there is no error, refer to error messages for monitor applications described separately to fix errors.
oracleasw	Error	40	No license is registered.	The license has not been registered.	Register the license.
oracleasw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.
oracleasw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

OfficeScan CL monitor resource

Module Type	Type	Return Value	Message	Description	Solution
oscw	Error	2	Failed to get the value from cluster configuration data.	Failed to get the value from cluster configuration data.	Cluster configuration file (clp.conf) or policy file (oscw.pol) may be corrupted.
oscw	Error	10	Failed to get service control right.	Failed to get service control right.	Check if OfficeScan Client is installed correctly.
oscw	Error	11	Service status is abnormal.	Service status is abnormal.	Check the statu of OfficeScan NT Listener with Service Control Manager.
oscw	Error	12	Failed to start service.	Failed to start service.	Check the statu of OfficeScan NT Listener with Service Control Manager.
oscw	Error	13	Failed to stop service.	Failed to stop service.	Check the statu of OfficeScan NT Listener with Service Control Manager.

Module Type	Type	Return Value	Message	Description	Solution
oscw	Error	50	License is invalid or not regisered.	License is invalid or not regisered.	Check the Anti-Virus Agent license is registered and valid.

OfficeScan SV monitor resource

Module Type	Type	Return Value	Message	Description	Solution
ossw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
ossw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check if OfficeScan Server is installed correctly.
ossw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
ossw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check if OfficeScan Server has errors.
ossw	Error	13	An application error was detected.	The access to the monitor application failed.	Refer to error messages for monitor applications described separately to fix errors.
ossw	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
ossw	Error	40	No license is registered.	The license has not been registered.	Register Anti-Virus Agent license.
ossw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors.Restart the server or take other actions.
ossw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

POP3 monitor resource

Module Type	Type	Return Value	Message	Description	Solution

Module Type	Type	Return Value	Message	Description	Solution
pop3w	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
pop3w	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
pop3w	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
pop3w	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
pop3w	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
pop3w	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
pop3w	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
pop3w	Error	40	No license is registered.	The license has not been registered.	Register the license.
pop3w	Error	60	Failed to obtain the configuration data	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

PostgreSQL monitor resource

Module Type	Type	Return Value	Message	Description	Solution
psqlw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.

Section III Maintenance information

Module Type	Type	Return Value	Message	Description	Solution
psqlw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
psqlw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
psqlw	Error	11	An error was detected in accessing the monitor target.	The access to the database failed.	Check configured values on the Builder (such as a database name). If there is no error, check the database has errors.
psqlw	Error	12	An error was detected in user authentication.	The access to the database failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the database has errors.
psqlw	Error	13	An application error was detected.	The database error was detected.	Refer to error messages for database described separately to fix errors.
psqlw	Error	14	An error was detected in executing SQL statement [%1!s!].	Executing SQL statement failed. The executed SQL statement is displayed on %1.	Refer to error messages for database described separately to fix errors.
psqlw	Error	15	A data error was detected.	A value on the table of database has an error.	Database may be corrupt. Stop the database operation and investigate it. This error may occur when more than one monitoring is performed with the same monitor table name concurrently. Check if the values set in the multi-directional environment are appropriate.
psqlw	Error	40	No license is registered.	The license has not been registered.	Register the license.
psqlw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

Registry synchronization monitor resource

Module Type	Type	Return Value	Message	Description	Solution

ExpressCluster X 2.1 for Windows Reference Guide

Module Type	Type	Return Value	Message	Description	Solution
regsyncw	Error	50	Failed to save registry.	The process of storing to a file at detection of registry update failed.	Check if the process other than ExpressCluster opens the registry storage file. Memory or OS resources may not be sufficient. Check the status of the system.
regsyncw	Warning	101	Setting of registry keys is invalid.	An invalid registry key is registered to the resource.	Check the value set on the Builder (**Details** on **Resource Properties**), and change to a correct registry key.
regsyncw	Warning	100	Delivery processing to other nodes has failed.	Registry storage files cannot be delivered to other nodes.	There may be an error on the connection to the other node. Check the status of the network. OS of the local or other server may have an error. Check the status of the system.

Disk TUR monitor resource

Module Type	Type	Return Value	Message	Description	Solution
sdw	Error	1	Initialization has failed. Check the cluster configuration data or system resources.	Initialization has failed. Check the cluster configuration data or system resources.	Memory or OS resources may not be sufficient. Check them.
sdw	Error	2	Initialization has not been done.	Initialization has not been done.	Memory or OS resources may not be sufficient. Check them.
sdw	Error	3	The cluster configuration data is invalid.	The cluster configuration data is invalid.	The cluster configuration data is invalid. Check the disk TUR monitor resource on the Builder
sdw	Error	4	Failed to open device. Check the disk status of monitor destination volume.	Failed to open device. Check the disk status of monitor destination volume.	Check if the disk driver of the monitoring target disk is loaded, the device exists, the disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. Memory or OS resources may not be sufficient. Check them.
sdw	Error	5	Failed to control device. Check the disk status of monitor destination volume.	Failed to control device. Check the disk status of monitor destination volume.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk.

Module Type	Type	Return Value	Message	Description	Solution
sdw	Error	6	Internal resources are busy.	Internal resources are busy.	Memory or OS resources may not be sufficient. Check them.
sdw	Error	7	Failed to allocate memory. Check the system resource.	Failed to allocate memory. Check the system resource.	Memory or OS resources may not be sufficient. Check them.
sdw	Error	90	Polling timeout. Check the disk load of the monitor target and extend the monitor timeout time.	Polling timeout. Check the disk load of the monitor target and extend the monitor timeout time.	Check if the monitoring target disk is connected properly, the disk is powered on, or no other errors are occurred on the disk. The system may be under high load, or memory or OS resources may not be sufficient. Check them.
sdw	Error	99	Other internal error has occurred. Check the system resource.	Other internal error has occurred. Check the system resource.	Memory or OS resources may not be sufficient. Check them.

Service monitor resource

Module Type	Type	Return Value	Message	Description	Solution
servicew	Error	5	Failed to obtain the service control right.	Failed to obtain the service control right.	Check if the service name is correct.
servicew	Error	9	Service has been stopped.	Service has been stopped.	Check the status of the service.
servicew	Error	Others	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

Print spooler monitor resource

Module Type	Type	Return Value	Message	Description	Solution
spoolw	Error	3	Print spooler service has not been started.(%1!d!)	Print spooler service has not been started.(%1!d!)	Start the print spooler service.
spoolw	Error	4	Failed to get status of print spooler service.(errcode:%1!d!)	Failed to get status of print spooler service.(errcode:%1!d!)	Check the status of the print spooler service.
spoolw	Warning	100	Print spooler service is being started.	Print spooler service is being started.	Check the status of the print spooler service.

SMTP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
smtpw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
smtpw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
smtpw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
smtpw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
smtpw	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
smtpw	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
smtpw	Error	15	A data error was detected.	A value of the response data has an error.	Refer to error messages for monitor applications described separately to fix errors.
smtpw	Error	40	No license is registered.	The license has not been registered.	Register the license.
smtpw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

SQL Server monitor resource

Module Type	Type	Return Value	Message	Description	Solution
sqlserverw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
sqlserverw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
sqlserverw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
sqlserverw	Error	11	An error was detected in accessing the monitor target.	The access to the database failed.	Check configured values on the Builder (such as a database name). If there is no error, check the database has errors.
sqlserverw	Error	12	An error was detected in user authentication.	The access to the database failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the database has errors.
sqlserverw	Error	13	An application error was detected.	The database error was detected.	Refer to error messages for database described separately to fix errors.
sqlserverw	Error	14	An error was detected in executing SQL statement [%1!s!].	Executing SQL statement failed. The executed SQL statement is displayed on %1.	Refer to error messages for database described separately to fix errors.
sqlserverw	Error	15	A data error was detected.	A value on the table of database has an error.	Database may be corrupt. Stop the database operation and investigate it. This error may occur when more than one monitoring is performed with the same monitor table name concurrently. Check if the values set in the multi-directional environment are appropriate.
sqlserverw	Error	40	No license is registered.	The license has not been registered.	Register the license.

Module Type	Type	Return Value	Message	Description	Solution
sqlserve rw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.

Tuxedo monitor resource

Module Type	Type	Return Value	Message	Description	Solution
tuxw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
tuxw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
tuxw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
tuxw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an application config file). If there is no error, check if the monitor application has errors.
tuxw	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
tuxw	Error	40	No license is registered.	The license has not been registered.	Register the license.
tuxw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.
tuxw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Virtual computer name monitor resource

Module Type	Type	Return Value	Message	Description	Solution
vcomw	Error	5	VCOM control process has already been started.	VCOM control process has already been started.	Memory or OS resources may not be sufficient. Check them. Restart the OS.

Module Type	Type	Return Value	Message	Description	Solution
vcomw	Error	6	VCOM control process has not been started.	VCOM control process has not been started.	Memory or OS resources may not be sufficient. Check them. Restart the OS.
vcomw	Error	8	VCOM control process does not exist.	VCOM control process does not exist.	The VCOM control process ID does not exist. Restart the OS.
vcomw	Error	Others	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

Virtual IP monitor resource

Module Type	Type	Return Value	Message	Description	Solution
vipw	Error	6	IP address does not exist.	IP address does not exist.	NIC may have been disabled. Check if the VIP address exists by the ipconfig command.
vipw	Error	11	Adapter Index is different.	Adapter Index is different.	NIC may have been disabled. Check if the VIP address exists by the ipconfig command.
vipw	Error	Others	An internal error has occurred.	An internal error has occurred.	Memory or OS resources may not be sufficient. Check them.

Websphere monitor resource

Module Type	Type	Return Value	Message	Description	Solution
wasw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
wasw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
wasw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.

Module Type	Type	Return Value	Message	Description	Solution
wasw	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
wasw	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
wasw	Error	40	No license is registered.	The license has not been registered.	Register the license.
wasw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.
wasw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Weblogic monitor resource

Module Type	Type	Return Value	Message	Description	Solution
wlsw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
wlsw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
wlsw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
wlsw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address). If there is no error, check if the monitor application has errors.
wlsw	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.

Module Type	Type	Return Value	Message	Description	Solution
wlsw	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
wlsw	Error	40	No license is registered.	The license has not been registered.	Register the license.
wlsw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.
wlsw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

WebOTX monitor resource

Module Type	Type	Return Value	Message	Description	Solution
otxw	Error	1	Initialization has failed[%1!s!].	Initialization process has failed. It may be due to memory allocation failure. Information on the initialization may be displayed on %1.	OS itself may have errors. Restart the server or take other actions.
otxw	Error	2	The configured value is not correct.	The configured value of the monitoring is not correct.	Check the configured value on the Builder since it may not be correct.
otxw	Error	10	A function error was detected.	A function error occurred.	Monitor applications or OS may have errors. Check the status of the system.
otxw	Error	11	An error was detected in accessing the monitor target.	The access to the monitor application failed.	Check configured values on the Builder (such as an IP address or an application server name). If there is no error, check if the monitor application has errors.
otxw	Error	12	An error was detected in user authentication.	The access to the monitor application failed.	Check configured values on the Builder (such as a user name or a password). If there is no error, check if the monitor application has errors.
otxw	Error	13	An application error was detected.	The monitor application error was detected.	Refer to error messages for monitor applications described separately to fix errors.
otxw	Error	40	No license is registered.	The license has not been registered.	Register the license.

Module Type	Type	Return Value	Message	Description	Solution
otxw	Error	60	Failed to obtain the configuration data.	The configured value could not be obtained.	OS may have errors. Restart the server or take other actions.
otxw	Error	98	Internal error.	Internal error occurred.	Memory or OS resources may not be sufficient. Check them.

Appendix

This section covers:

- Appendix A   Glossary
- Appendix B   Index

Appendix A Glossary

Active server A server that is running for an application set.
(Related term: Standby server)

Cluster partition A partition on a mirror disk. Used for managing mirror disks.
(Related term: Disk heartbeat partition)

Cluster shutdown To shut down an entire cluster system (all servers that configure a cluster system).

Cluster system Multiple computers are connected via a LAN (or other network) and behave as if it were a single system.

Data partition A local disk that can be used as a shared disk for switchable partition. Data partition for mirror disks.
(Related term: Cluster partition)

Disk heartbeat partition A partition used for heartbeat communication in a shared disk type cluster.

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.

Failover policy A priority list of servers that a group can fail over to.

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.

Heartbeat Signals that servers in a cluster send to each other to detect a failure in a cluster.
(Related terms: Interconnect, Network partition)

Interconnect A dedicated communication path for server-to-server communication in a cluster.
(Related terms: Private LAN, Public LAN)

Management client Any machine that uses the WebManager to access and manage a cluster system.

Master server The server displayed on top of the **Master Server** in **Cluster Properties** in the Builder.

Mirror connect	LAN used for data mirroring in a data mirror type cluster. Mirror connect can be used with primary interconnect.
Mirror disk type cluster	A cluster system that does not use a shared disk. Local disks of the servers are mirrored.
Moving failover group	Moving an application from an active server to a standby server by a user.
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.
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)
Public LAN	A communication channel between clients and servers. (Related terms: Interconnect, Private LAN)
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)
Secondary server	A destination server where a failover group fails over to during normal operations. (Related term: Primary server)
Server Group	A group of servers connected to the same network or the shared disk device
Standby server	A server that is not an active server. (Related term: Active server)
Virtual IP address	IP address used to configure a remote cluster.

Appendix B Index