ExpressCluster for Linux Ver3.0

Maintenance

2004.10.22
2nd Revision

Revision History

Revision	Revision date	Descriptions
1	2004/06/30	New manual
2	2004/10/22	12.1 “Syslog, Alert, Mail Report Messages” was added. 12.4.5 ”RAW resource” was added. 12.4.6 “VxVM disk group resource” was added. 12.4.7 ”VxVM volume resource“ was added. 12.5.4 “RAW monitor resource“ was added. 12.5.8 “VxVM daemon monitor resource“ was added. 12.5.9 “VxVM volume monitor resource“ was added.

The latest information on system confirmation, system configuration guide, update, and tracking tool is provided in the following URL.
Please obtain the latest version before configuring the system.

Usage on the NEC Internet:
http://soreike.wsd.mt.nec.co.jp/

Usage out of the NEC Internet:
http://www.ace.comp.nec.co.jp/CLUSTERPRO/

1 NOTES ON CLUSTER CONFIGURATION DATA

1.1 Floppy Disk Device Name And Mount Point

The clpcfctrl command uses /dev/fd0 as the floppy disk device, and /mnt/floppy as the mount point. This document assumes the above device and mount point are available.

However, in your environment, the floppy disk device and/or mount point may be different. In this case, you should specify the device and/or mount point with the clpcfctrl command option

In clpcfctrl command samples in this document, substitute the /dev/fd0 and /mnt/floppy with those in your environment.

1.1.1 Upgrading cluster configuration data

Do either (1) or (2) depending on the operating system on which you use Trekking Tool. The following samples assume that floppy disk device is /dev/hda and mount point is /mnt.

(1) To upload data in the floppy disk by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l -d /dev/hda -m /mnt

(2) To upload data in the floppy disk (1.44-MB formatted) by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w -d /dev/hda -m /mnt

For details of clpcfctrl command options, see a separate guide, “Command”.

1.1.2 Backing up cluster configuration data

Do either (1) or (2) depending on the operating system on which you use Trekking Tool. The following samples assume that floppy disk device is /dev/hda and mount point is /mnt.

(1) To back up data in a floppy disk for Trekking Tool working on Linux Web browser, run the following command.
clpcfctrl --pull -l -d /dev/hda -m /mnt

(2) To back up data in a floppy disk for Trekking Tool working on Windows Web browser, run the following command.
clpcfctrl --pull -w -d /dev/hda -m /mnt

For details of clpcfctrl command options, see a separate guide, “Command”.

1.2 Environment Where You Cannot Use Floppy Disks

To upload or back up cluster configuration data, you have to use a floppy disk.
This document assumes you can use floppy disks in your environment.

However, if floppy disks are not available in your environment, you have to use the file system to upload and back up your cluster configuration data.
In clpcfctrl command samples in this document, substitute corresponding parameters with your environment.

1.2.1 Uploading cluster configuration data

You access the cluster configuration data saved on the file system from the server you are uploading data. Access the cluster configuration data from the master server by using FTP or other means.

Do either (1) or (2) depending on the operating system on which you use Trekking Tool. The following samples assume that the cluster configuration data is in /tmp/upload directory.

(1) If you use the cluster configuration data by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l -x /tmp/upload

(2) If you use the cluster configuration data by Trekking Tool on Windows, run the following command.
clpcfctrl --push -w -x /tmp/upload

For details of clpcfctrl command options, see a separate guide, “Command”.

1.2.2 Backing up cluster configuration data

Do either (1) or (2) depending on the operating system on which you use Trekking Tool. The following samples assume that data is backed up in /tmp/backup directory.

(1) To back up cluster configuration data for Trekking Tool working on Linux Web browser, run the following command.
clpcfctrl --pull -l -x /tmp/backup

(2) To back up cluster configuration data for Trekking Tool working on Windows Web browser, run the following command.
clpcfctrl --pull -w -x /tmp/backup

For details of clpcfctrl command options, see a separate guide, “Command”.

2 UNINSTALLATION PROCEDURES

2.1 Uninstalling Server

Log in as a root user for uninstalling ExpressCluster Server. Procedures to uninstall ExpressCluster Server are as follows:

(1) Run the chkconfig --del <name> to deactivate the following services in this order.
- clusterpro_alertsync
- clusterpro_webmgr
- clusterpro
- clusterpro_md (only for LE)
- clusterpro_trn
- clusterpro_evt

(2) Restart the server.

(3) Run the rpm -e expresscls.
* Do not specify other options than the above.

[Troubleshooting]

	Error messages	Cause	Action
1	failed to open //var/lib/rpm/packages.rpm error: cannot open //var/lib/rpm/packages.rpm	You are not a root user.	Log in as a root user.
2	error: ExpressCluster is running	ExpressCluster is running.	Deactivate services with the chkconfig command, restart the server, and try uninstallation again.

2.2 Uninstalling Trekking Tool

2.2.1 Uninstalling from Linux

Log in as a root user for uninstalling Trekking Tool. Procedures to uninstall ExpressCluster Trekking Tool are as follows;

(1) Exit from all Web browsers.

(2) Run the rpm -e expressclstrek.
* Do not specify other options than the above.

(3) Delete settings from the Java user policy file.
Delete ExpressCluster Trekking Tool settings, which were added at installation, from .java.policy file in the home directory. For details of ExpressCluster Trekking Tool settings, see a separate guide, “Trekking Tool”.

[Troubleshooting]

	Error messages	Cause	Action
1	failed to open //var/lib/rpm/packages.rpm error: cannot open //var/lib/rpm/packages.rpm	You are not a root user.	Log in as a root user.
2	error: Trekking Tool for ExpressCluster is running	ExpressCluster Trekking Tool is active.	Exit from Web browser. After a while, try uninstallation again.

2.2.2 Uninstalling from Windows

Procedures to uninstall ExpressCluster Trekking Tool are as follows;

(1) Exit from all Web browsers (confirm that JavaVM icon disappears from the task tray).

(2) Delete the ExpressCluster Trekking Tool installation folder from Windows Explorer.

(3) Delete settings from the Java user policy file.
Delete ExpressCluster Trekking Tool settings, which were added at installation, from .java.policy file in the home directory. For details of ExpressCluster Trekking Tool settings, see a separate guide, “Trekking Tool”.

3 REINSTALLATION

3.1 Reinstalling Server

To reinstall ExpressCluster Server, you have to prepare the cluster configuration data floppy disk.

Prepare the cluster configuration data floppy disk which was made by Trekking Tool when adding a server to the cluster (or the latest floppy disk if you reconfigured the cluster).

If you do not have the latest cluster configuration data floppy disk created (or reconfigured) by Trekking Tool at hand, you can back it up with the clpcfctrl command. For details, see “Cluster Generation and Cluster Configuration Information Backup Command” section in a separate guide, “Command”.

3.1.1 To reinstall on the entire cluster

To reinstall the entire ExpressCluster Server:

(1) Uninstall ExpressCluster Server.
For details, see Section 2.1 in this document.

(2) Install ExpressCluster Server and reform the cluster.
For details, see a separate guide, “Cluster Installation and Configuration Guide”.

3.1.2 To reinstall only on a part of servers in the cluster

To reinstall ExpressCluster Server:

(1) Uninstall ExpressCluster Server.
For details, see Section 2.1 in this document.

(2) Install ExpressCluster Server.
For details, see “Installation of ExpressCluster Server RPM” section and “Post-Installation Settings” section in a separate guide, “Cluster Installation and Configuration Guide”.

(3) Hand-carry the floppy disk.
Insert the floppy disk in the server where you reinstalled ExpressCluster Server.
You have to restart servers on which you reinstalled ExpressCluster Server.

(4) Distribute the configuration data in floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. To use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. To use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or on Linux for using on Windows, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(5) Remove the floppy disk from the drive. Restart the servers on which you reinstalled ExpressCluster Server.

3.2 Reinstalling Trekking Tool

You do not need to back up data before reinstalling ExpressCluster Trekking Tool. To reinstall ExpressCluster Trekking Tool:

(1) Uninstall ExpressCluster Trekking Tool.
For details, see Section 2.2 in this document. However, you do not need to delete its settings from Java user policy file.

(2) Install ExpressCluster Trekking Tool.
For details, see a separate guide, “Cluster Installation and Configuration Guide”. However, you do not need to delete its settings from Java user policy file.

4 TO CHANGE THE LICENSE VERSION FROM TRIAL TO PRODUCT

Steps to change your ExpressCluster license from trial version to product version are as follows;

You can change FastSync Option and Agent licenses in the same manner.

(1) Register each product's license (Product version).
See a separate guide, "Cluster Installation and Configuration Guide (Shared Disk)" for license registration (Product version) of SE/XE.
See a separate guide, "Cluster Installation and Configuration Guide (Data Mirror)" for LE/FastSync Option license registration (Product version).
For Watch Options' (Agents') license registration (Product version), see each Agent's User's Guide.

(2) With the clpstdn command, or from Web Manager, shut down the cluster and restart all servers.

(3) Now, you have changed the trial version license to the product version.
To confirm the new license, run the following command.

clplcnsc -l -p SE30

With the above command, you can confirm the license for SE. Substitute "SE30" with "XE30" for XE, with "LE30" for LE, and with "FSO30" for FastSyncOption.
For details, see each product's user's guide.

5 HOW TO SUSPEND ExpressCluster

There are two ways to stop running ExpressCluster.

5.1 How To Stop ExpressCluster Daemon

If you want to stop only ExpressCluster daemon without shutting down the OS, you can do it with the clpcl command. For details, see “Cluster Operation Command” section in a separate guide “Command”.

To stop ExpressCluster daemon by ExpressCluster Web Manager, see “Stopping and Starting Web Manager” section in a separate guide, “Web Manager”.

5.2 How To Deactivate ExpressCluster Daemon

If you want ExpressCluster daemon not to start at OS bootup, you can deactivate it with the chkconfig command. The followings describe how to deactivate ExpressCluster daemon. To deactivate ExpressCluster daemon, you have to deactivate ExpressCluster Web Manager, too.

(1) Run chkconfig --del <name> in the following order to deactivate services.
- clusterpro_alertsync
- clusterpro_webmgr
- clusterpro
- clusterpro_md (only for LE)

(2) Restart the server.

To activate ExpressCluster daemon:

(1) Run the chkconfig command in the following order to activate services.
For Turbolinux Enterprise Server 8 (UnitedLinux family), run the following command to activate services.
chkconfig --set <name> on

For others than Turbolinux Enterprise Server 8 (UnitedLinux family), run the following command to activate services.
chkconfig --add <name>

- clusterpro_md (only for LE)
- clusterpro
- clusterpro_webmgr
- clusterpro_alertsync

(2) Restart the server.

6 CLUSTER CONFIGURATION DATA

When you add a new server or delete a server to/from the cluster (cluster reconfiguration), do not make any other changes such as adding a new group resource.

6.1 How To Change The Data

Before you reconfigure ExpressCluster Server or change its parameters, you have to back up the cluster configuration data in a floppy disk. You can create the backup FD with the clpcfctrl command. For details, see “Cluster Generation, Cluster Configuration Information Backup Command” section in a separate guide, “Command”.

Next, you change the data in floppy disk by ExpressCluster Trekking Tool. For details of ExpressCluster Trekking Tool, see a separate guide, “Trekking Tool”.

Finally, you reflect the changes in floppy disk on ExpressCluster Server environment. Depending on the type of changes you made, the way to reflect them varies. For details on how to change parameters and reflect new ones, see a separate guide, “Trekking Tool”.

The way you reflect new parameters may affect ExpressCluster Server’s behaviors. Details are listed in the table below.

#	How to reflect	Impact
1	Upload only	Does not affect ExpressCluster Server’s operations. Heartbeat resources, group resources or resource monitor does not stop.
2	ExpressCluster daemon suspend/resume	A part of ExpressCluster Server operations stops. While ExpressCluster daemon is suspended, heartbeat resources and resource monitor stop. Group resources do not stop.
3	ExpressCluster daemon stop/restart Cluster shutdown/restart	All of ExpressCluster Server operations stop. While ExpressCluster daemon is stopped, heartbeat resources, group resources and resource monitor stop.

6.1.1 Upload only

(1) Hand-carry the floppy disk.
Insert the floppy disk in the server which was specified as the master server by Trekking Tool.

(2) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(3) Remove the floppy disk from the drive.

6.1.2 Stop/Restart ExpressCluster Alert Synchronization

For how to stop/restart ExpressCluster Alert Synchronization, see “Stopping and Starting Web Manager” section in a separate guide, “Web Manager”.

6.1.3 Stop/Restart ExpressCluster Web Manager

For how to stop/restart ExpressCluster Web Manager, see “Stopping and Starting Web Manager” section in a separate guide, “Web Manager”.

6.1.4 Suspend/Resume ExpressCluster daemon

If you want to reconfigure the cluster by adding or deleting a server, refer to Section 6.3 "Server Reconfiguration (Add/Delete)" in this document.

(1) Run the clpcl –suspend to suspend ExpressCluster daemon.

(2) Hand-carry the floppy disk.
Insert the floppy disk in the server which was specified as the master server by Trekking Tool.

(3) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

After the command is run, you see the following message. Enter “y” and press the Return key.

Need to suspend cluster and resume
Already suspended? (y/n) :

You see the following message after pressing Return key, if the configuration data has successfully been distributed.

success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(4) Remove the floppy disk from the drive.

(5) Run the clpcl –resume to resume ExpressCluster daemon.

6.1.5 Stop/Restart ExpressCluster daemon

(1) Run the clpcl -t -a to stop ExpressCluster daemon.

(2) Hand-carry the floppy disk.
Insert the floppy disk in the server which was specified as the master server by Trekking Tool.

(3) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

After the command is run, you see the following message. Press the Return key.

Need to stop cluster and restart
Already stopped? (y/n) :

You see the following message after pressing Return key, if the configuration data has successfully been distributed.

success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(4) Remove the floppy disk from the drive.

(5) Run the clpcl -s -a to restart ExpressCluster daemon.

6.1.6 Cluster shutdown/restart

(1) Run the clpcl -t -a to stop ExpressCluster daemon.

(2) Hand-carry the floppy disk.
Insert the floppy disk in the server which was specified as the master server by Trekking Tool.

(3) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

After the command is run, you see the following message. Press the Return key.

Need to shutdown system and reboot
please shutdown system after push. (hit return) :

You see the following message after pressing the Return key, if the configuration data has successfully been distributed.

success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(4) Remove the floppy disk from the drive.

(5) Restart all servers.

6.2 Changing Disk Resources File System

To change of disk resources file system:

(1) Stop ExpressCluster daemon.

clpcl -t -a

(2) Back up the cluster configuration data in a floppy disk.
Do either A or B depending on the type of your operating system where Trekking Tool is used.

A. To back up data in a floppy disk for Trekking Tool working on Linux Web browser, run the following command.
clpcfctrl --pull -l

B. To back up data in a floppy disk for Trekking Tool working on Windows Web browser, run the following command.
clpcfctrl --pull -w

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(3) Run the following command.

Example: if the disk resources partition device is /dev/sdb5,
clproset -w -d /dev/sdb5

This makes disk partitions of disk resources readable/writable no matter how ExpressCluster behaves.

Do not use this command for other purposes than described here.

If you use this command when ExpressCluster daemon is active, the file system may be corrupted.

(4) Make the file system in the partition device.

(5) Run the following command to set the disk resources partition to ReadOnly.

Example: if the disk resources partition device is /dev/sdb5,
clproset -o -d /dev/sdb5

(6) Change the configuration data of disk resources file system by Trekking Tool.

(7) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type created by Trekking Tool.

A. If you use the floppy disk created by Trekking Tool for Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) created by Trekking Tool for Windows, run the following command.
clpcfctrl --push -w

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(8) Remove the floppy disk from the drive.

Changes will be enabled at the next ExpressCluster daemon startup.

6.3 Server Reconfiguration (Add/Delete)

To add a new server or delete a server to/from a cluster, you have to prepare the cluster configuration data floppy disk.

Prepare the cluster configuration data floppy disk created by Trekking Tool when adding a new server to the cluster (or the latest data floppy disk if you reconfigured the cluster).

If you do not have the above-mentioned floppy disk at hand, you can back up the data with clpcfctrl command. For details, see “Cluster Generation and Cluster Configuration Information Backup Command” section in a separate guide, “Command”.

SE, XE and LE have their own steps for each.
See Sections 6.3.1 and 6.3.2 for SE and XE.
See Sections 6.3.3 and 6.3.4 for LE.

6.3.1 Adding a server ~ for SE and XE ~

(1) Set the cluster status to normal.

(2) Install ExpressCluster Server on the new server.
For details, see “Installation of ExpressCluster Server RPM” section and “Post-Installation Settings” section in a separate guide, “Cluster Installation and Configuration Guide”.

(3) Change the cluster configuration (in the prepared floppy disk) by Trekking Tool.

(4) Run the clpcl –suspend to to suspend ExpressCluster daemon on the master server in the cluster where you are adding the new server.

(5) Hand-carry the floppy disk.
Insert the floppy disk into the server in Step (4).

(6) Distribute the configuration data in the floppy disk from the server in Step (4) to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl command, see a separate guide, “Command”.

(7) Run the clpcl –resume on the server in Step (4) to resume ExpressCluster daemon.
The following error message is always displayed for the added server. This is because the added server is not suspended. Just, go to the next step.

Resume ***server*** : Failed invalid server status.
(***server*** : Added server name)

(8) Restart the added server.

(9) Reload Web Manager to confirm the cluster is properly working.

6.3.2 Deleting a server ~ for SE and XE ~

(1) Set the cluster status to normal. If any group is active on the server you are going to delete, move the group to another server.

(2) On a server in the cluster other than the one you are going to delete (or on the master server if any), run the clpcl –suspend to suspend ExpressCluster daemon.

(3) Uninstall ExpressCluster Server from the server you are going to delete.
See Section 2.1 “Uninstall” for details.

(4) Change the cluster configuration (in the prepared floppy disk) by Trekking Tool.

(5) Distribute the configuration data in the floppy disk to servers from the server in Step (2).
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. If you use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. If you use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or Windows-formatted on Linux, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(6) Run the clpcl –resume to resume ExpressCluster daemon on the server in Step (2).

(7) Reload Web Manager to confirm the cluster is properly working.

6.3.3 Adding a server ~ for LE ~

LE cannot work on one-server configuration. Therefore, there is no way to add a new server. Configure the cluster with two servers when you create the cluster configuration data.

6.3.4 Deleting a server ~ for LE ~

LE cannot work on one-server configuration. Therefore, there is no way to delete a server.

6.4 Reuse of Mirror Disks

If you want to reuse a disk which was used as a mirror disk in ExpressCluster, you have to initialize the cluster partition.

Do the followings to initialize cluster partitions.

Steps described here initialize your partitions. Make sure to specify the proper partitions.
If you specify a wrong partition device, you may destroy data in the partition.

(1) Connect the disk you want to reuse with the server.

(2) Run the following command to initialize cluster partitions. Make sure to specify the proper device.

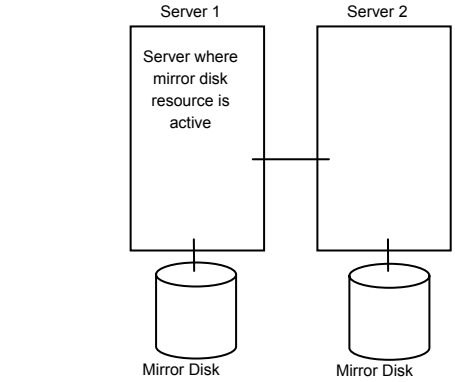
dd if=/dev/zero of=<cluster_partition_device>
(Example) dd if=/dev/zero of=/dev/sdb1

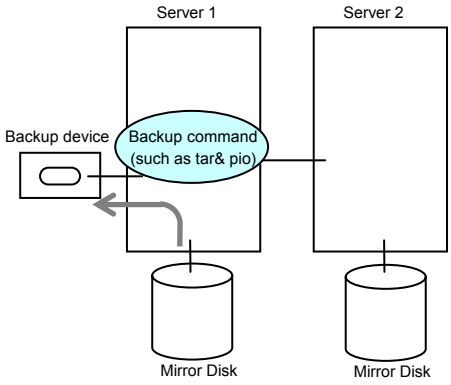
(3) After initializing the cluster partition, form a cluster, add mirror disk resources and do any other necessary steps.

6.5 How To Resize Mirroring Partitions

If you want to resize the mirror partition after you have started the operation, do the followings;

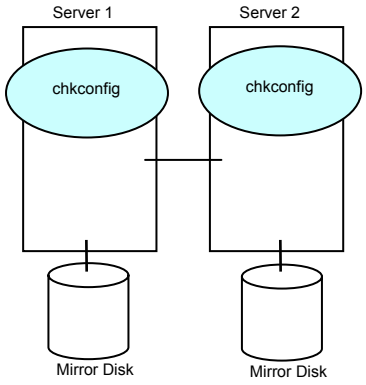
(1) Back up data in the partition in a tape or other media on the server where the active group has the mirror partition you want to resize.
However, a backup command to directly access a partition device is not supported.



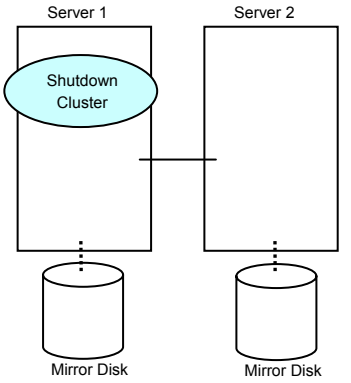


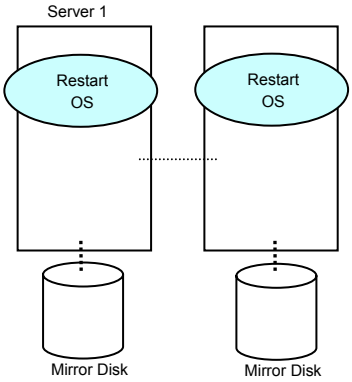
(2) Run the chkconfig command in the following order to set ExpressCluster services not to start.

chkconfig --del clusterpro
chkconfig --del clusterpro_md

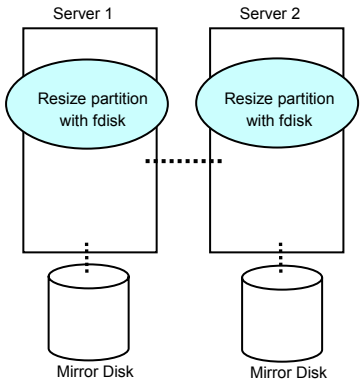


(3) Shut down the cluster, and then restart the operating system.
Shut down the cluster by running the clpstdn command on a server or by Web Manager.

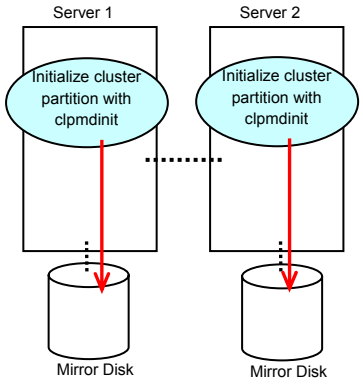


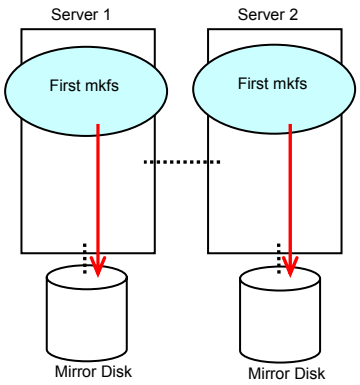


(4) Resize the partitions on both servers with the fdisk command.



(5) Run the following command on both servers.
clpmdinit --create force <mirror_disk_resource_name (Example: md1)>

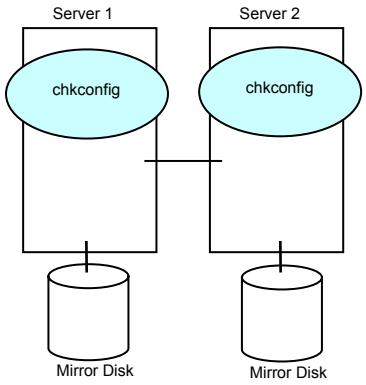




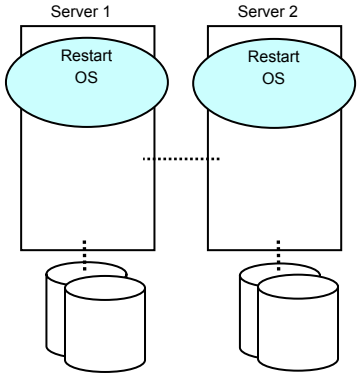
(6) Run the chkconfig command in the following order to start ExpressCluster services.

For Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --set clusterpro_md on
chkconfig --set clusterpro on

For others than Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --add clusterpro_md
chkconfig --add clusterpro



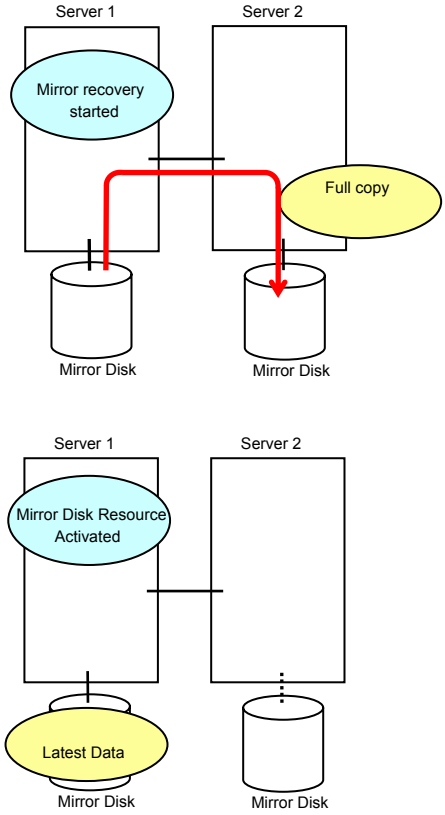
(7) With the reboot command, reboot both servers.



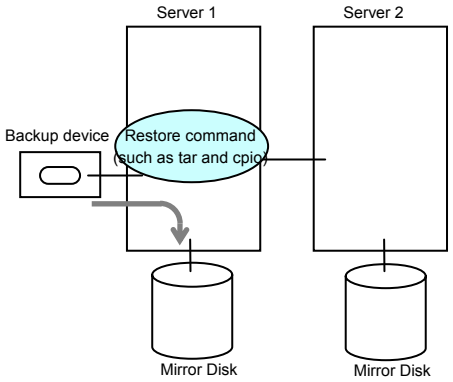
(8) The same process as the initial mirroring construction which is performed after forming a cluster is performed here. Confirm the initial mirroring construction has successfully been completed by run the following command or by Web Manager. For details, see separate guides, “Command” or “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

When the initial mirroring construction is successfully completed, the mirror disk resources become active.



(9) Restore the backup data on the server where the group having the resized mirroring partition is active.
However, a backup command to directly access a partition device is not supported.



6.6 How to Add Mirror Disk Resources

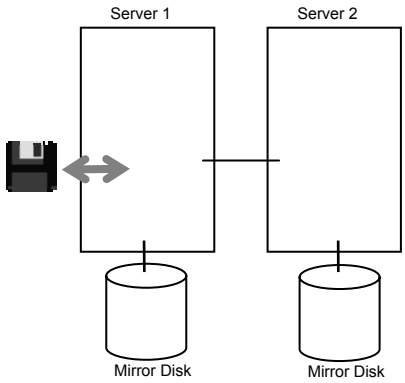
If you want to add a mirror disk resource after you have started the operation, do the followings:

6.6.1 By adding an existing partition

(1) To add a partition which was used as a mirror disk before, you have to initialize the cluster partition. Refer to Section 6.4 “Reuse of Mirror Disks” for details.

(2) Run the following command on a server to save the current cluster configuration in a floppy disk. It is assumed here that Trekking Tool for Windows is used. For details of clpcfctrl command, see a separate guide, “Command”.

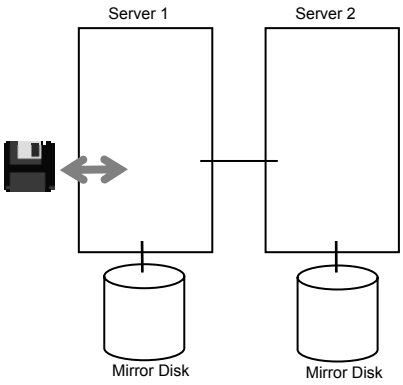
clpcfctrl --pull -w



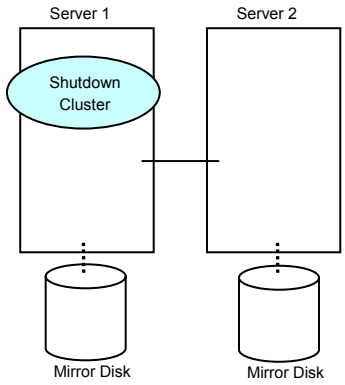
(3) Edit the saved data by Trekking Tool. Add the mirror disk resource and save the data in a floppy disk.
For details, see a separate guide, “Trekking Tool”.

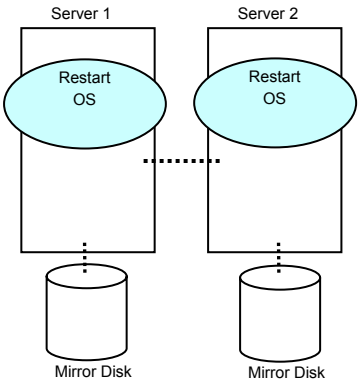
(4) Run the following command on a server to upload the cluster configuration data in a floppy disk.

clpcfctrl --push -w



(5) Shut down the cluster, then restart the operating system.
Shut down the cluster by running the clpstdn command on a server or by Web Manager.

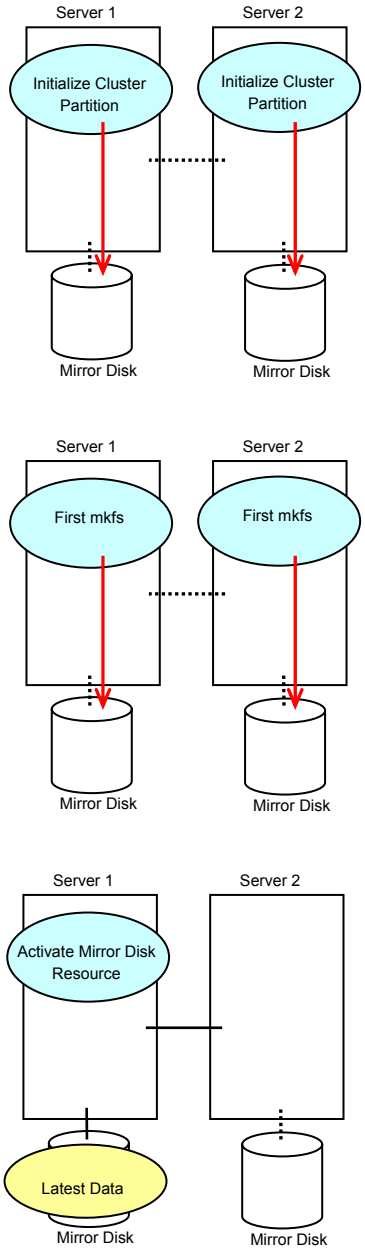




(6) The same process as the initial mirroring construction which is performed after forming a cluster is performed here. Confirm the initial mirroring construction has successfully been completed by run the following command or by Web Manager. For details, see a separate guide, “Command” or “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

When the initial mirror construction has completed, the added mirror disk resource becomes active.

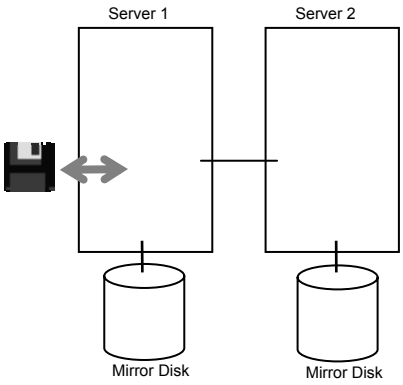


6.6.2 By adding a disk

(1) If you want to add a disk which was used as a mirror disk, see Section 6.4 “Reuse of Mirror Disks” for details on how to initialize the cluster partitions.

(2) Run the following command on a server to save the current cluster configuration in a floppy disk. It is assumed here that Trekking Tool for Windows is used. For details of clpcfctrl command, see a separate guide, “Command”.

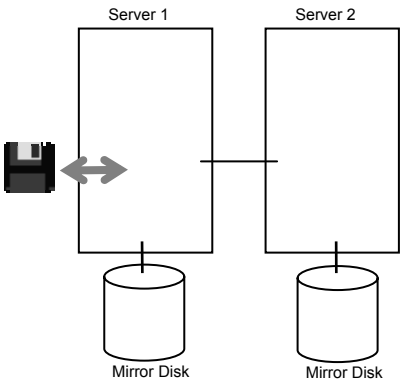
clpcfctrl --pull -w



(3) Edit the saved data by Trekking Tool. Add the mirror disk resource and save the data in a floppy disk.
For details, see a separate guide, “Trekking Tool”.

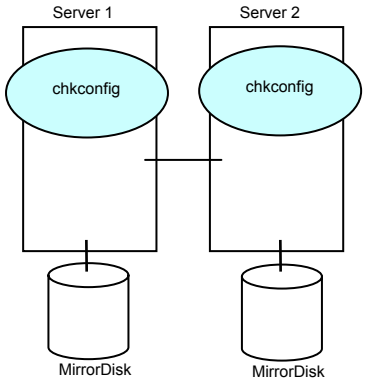
(4) Run the following command on a server to upload the cluster configuration data in the floppy disk.

clpcfctrl --push -w

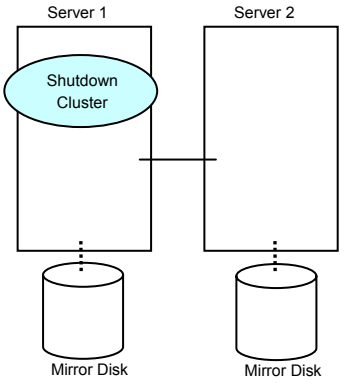


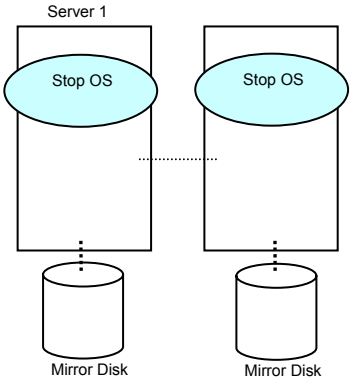
(5) Run the chkconfig command in the following order to set ExpressCluster services not to start.

chkconfig --del clusterpro
chkconfig --del clusterpro_md

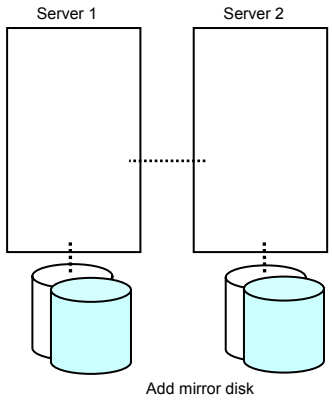


(6) Shut down the cluster.
Shut down the cluster by running the clpstdn command on a server or by Web Manager.

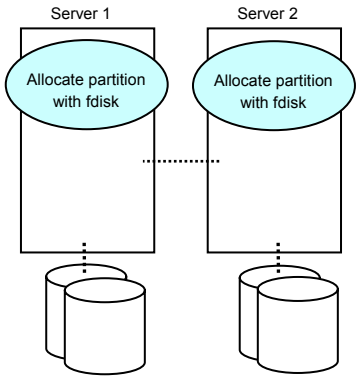




(7) Add the disk.



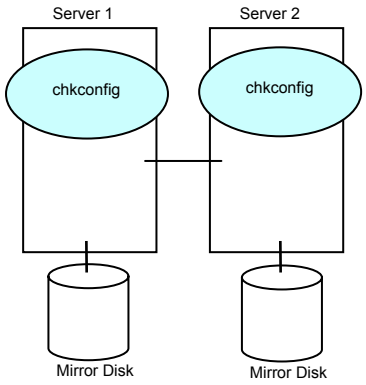
(8) Start the both servers. After they have been started, allocate partitions for the added disk.
Allocate the partition as you set in Step (3).



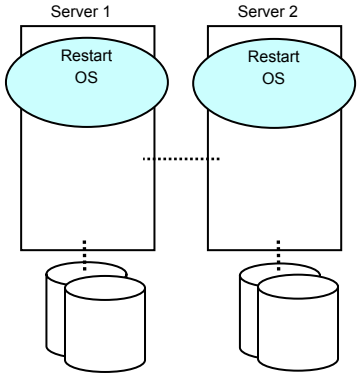
(9) Run the chkconfig command in the following order to start ExpressCluster services.

For Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --set clusterpro_md on
chkconfig --set clusterpro on

For others than Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --add clusterpro_md
chkconfig --add clusterpro



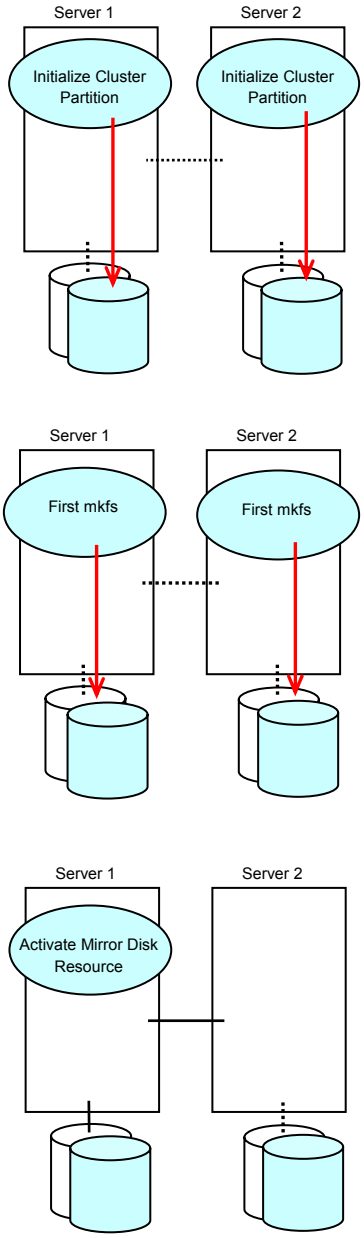
(10) With the reboot command, reboot both servers.



(11) The same process as the initial mirroring construction which is performed after forming a cluster is performed here. Confirm the initial mirroring construction is successfully completed by run the following command or by Web Manager. For details, see a separate guide, “Command” and “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

When the initial mirror construction has been completed, the added mirror disk resource becomes active.

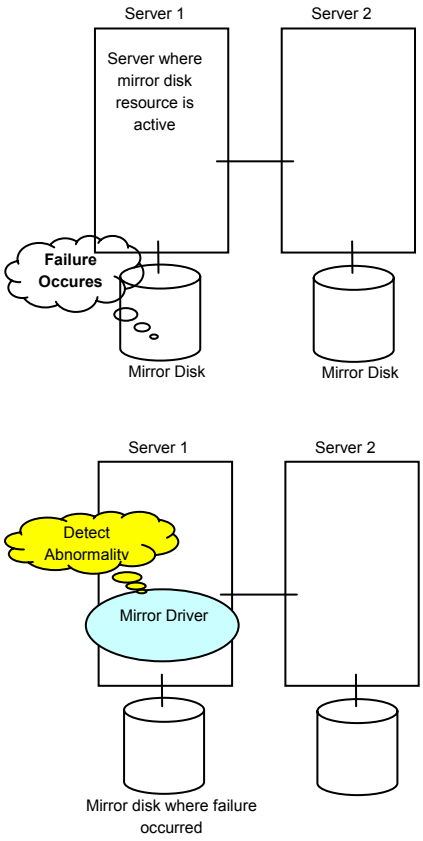


6.7 How to Replace Mirroring Disks

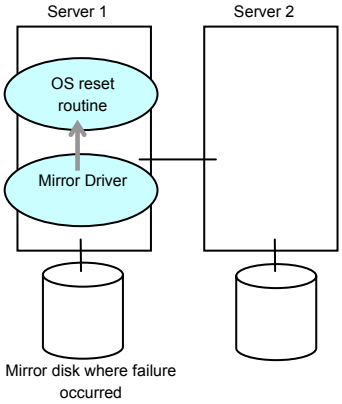
If you want to replace mirror disks after you started the operation, do the followings:

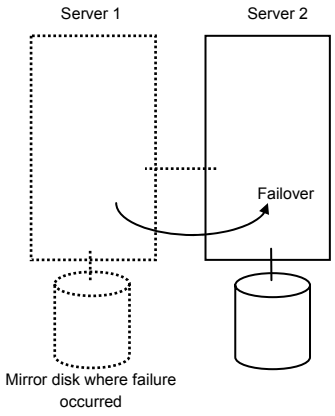
6.7.1 In case of active disk failure

(1) If an abnormality occurs in mirror disks, the mirror driver detects it.



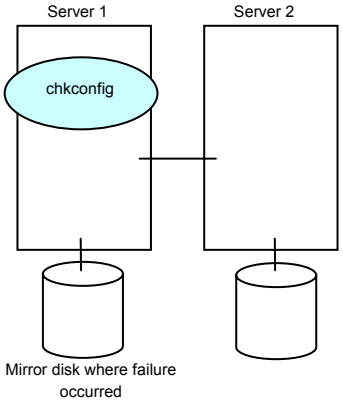
(2) The mirror driver resets the operating system when it detects an abnormality. Reset by the mirror driver causes a failover.





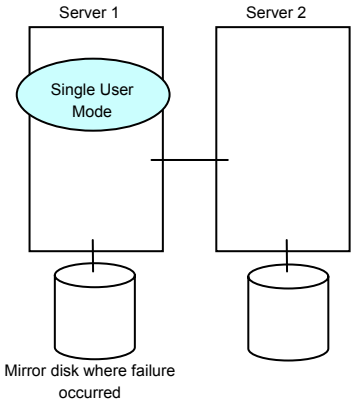
(3) Run the chkconfig command in the following order on the server where the failure occurred to set ExpressCluster services not to start.

chkconfig --del clusterpro
chkconfig --del clusterpro_md

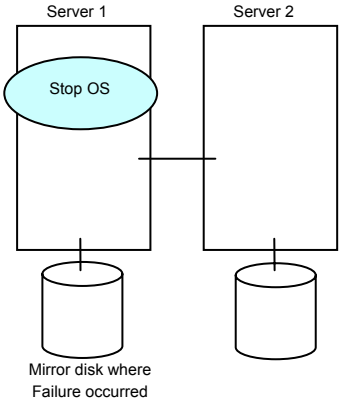


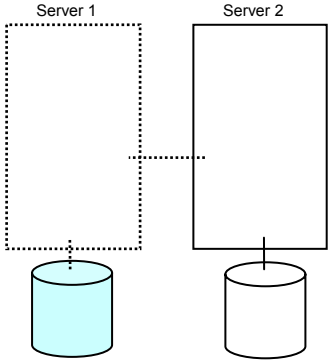
When a disk is defective, the mirror driver may repeatedly reset the operating system. In this case, you start the server in single user mode, then, run the command in the following order to set ExpressCluster services not to start.

chkconfig --del clusterpro
chkconfig --del clusterpro_md

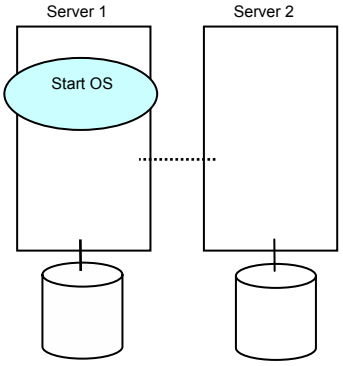


(4) Run the shutdown command to shut down the server whose disk failed. When it has been shut down, replace the defective disk.

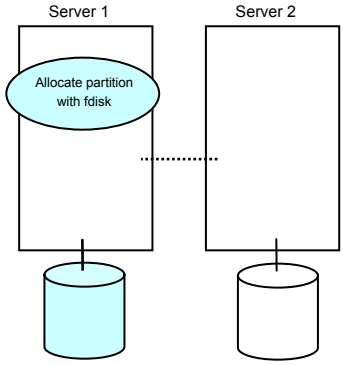




(5) Start the server whose disk was replaced.

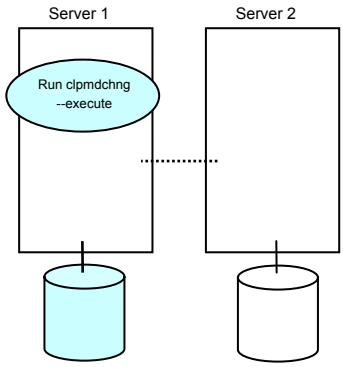


(6) Run the fdisk command on the server whose disk was replaced to allocate the cluster partition and data partition.



(7) Run the following command on the server whose disk was replaced.

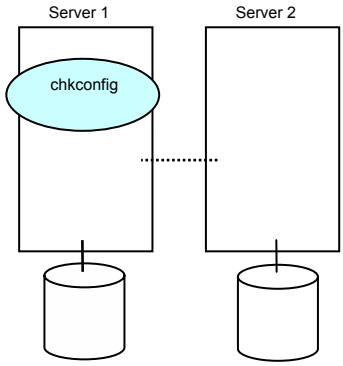
clpmdchng --execcute <disk_device_name (Example: /dev/sdb)>



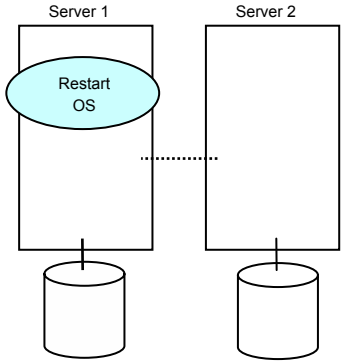
(8) Run the chkconfig command in the following order to start ExpressCluster services.

For Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --set clusterpro_md on
chkconfig --set clusterpro on

For others than Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --add clusterpro_md
chkconfig --add clusterpro



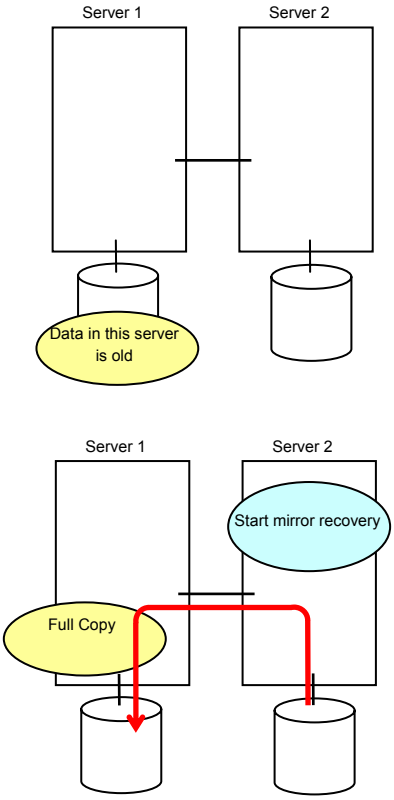
(9) With the reboot command, restart the both servers whose disks were replaced.



(10) Run the clpmdctrl command on the server whose disk was replaced. However, if the auto mirror recovery is enabled, mirrors are automatically recovered. Therefore, you can skip this step. Just go to the next step.

Run the following command to start the mirror recovery.

clpmdctrl --recovery <mirror_disk_resource_name (Example: md1)>

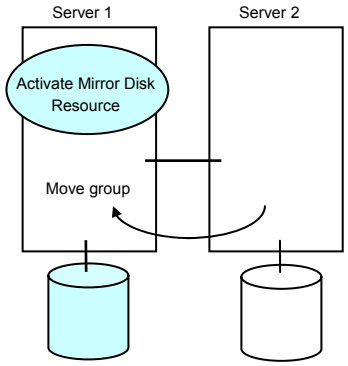


(11) Confirm that the mirrors have been recovered by Web Manager or by running the following command on the server whose disk was replaced. For details, see a separate guide, “Command” and “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

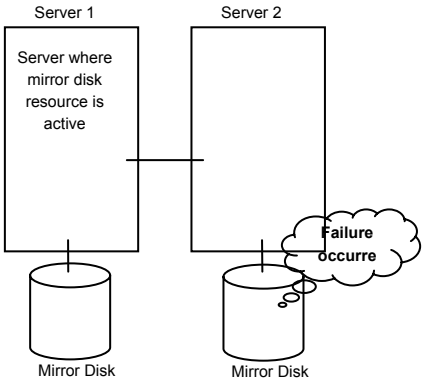
(12) Confirm the mirror recovery completion. Then, move the group which as failed over to the standby server to the active server. Run the following command on the active server.

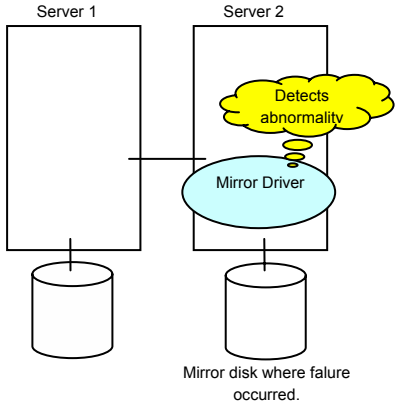
clpgrp -m <group_name> -h <standby_server_name>



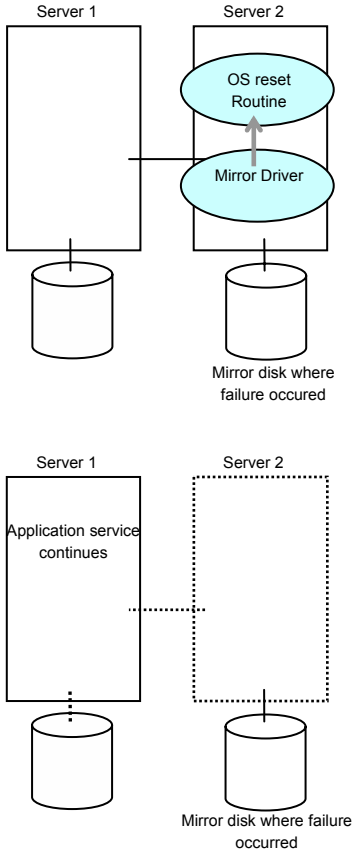
6.7.2 In case of standby disk failure

(1) If an abnormality occurs in mirror disks, the mirror driver detects it.



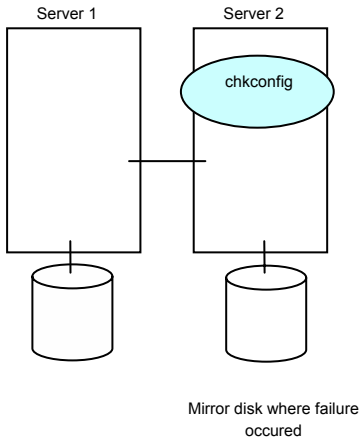


(2) The mirror driver resets the operating system when it detects an abnormality. Business applications continue on the active server.



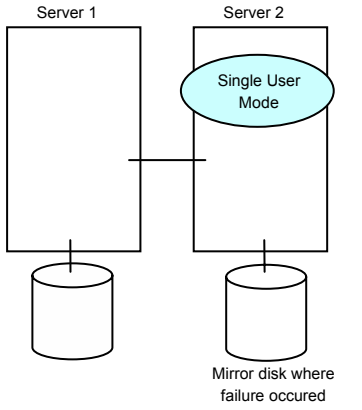
(3) Run the chkconfig command in the following order on the server whose disk failed to set ExpressCluster services not to start.

chkconfig --del clusterpro
chkconfig --del clusterpro_md

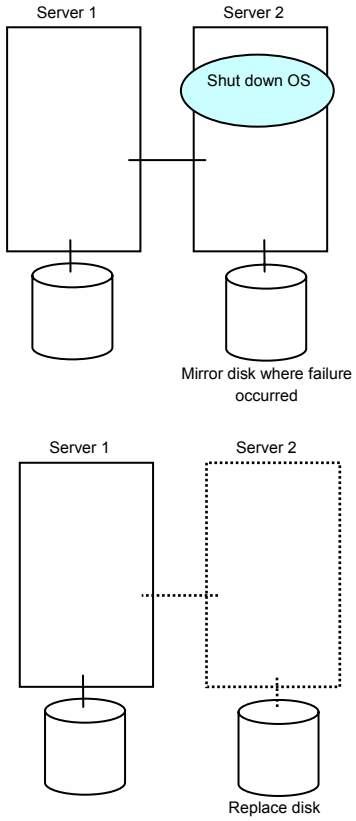


When a disk is defective, the mirror driver may repeatedly reset the operating system. In this case, you start the server in single user mode, then, run the command in the following order to set ExpressCluster services not to start.

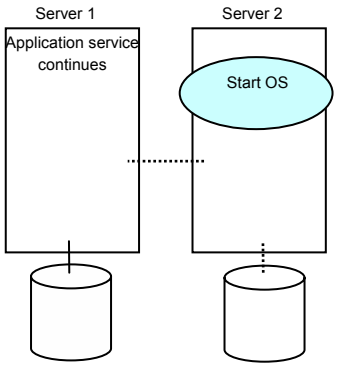
chkconfig --del clusterpro
chkconfig --del clusterpro_md



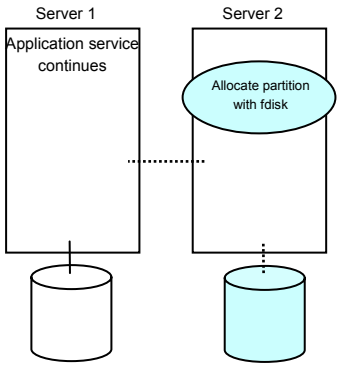
(4) Run the shutdown command to shut down the server whose disk failed. When it has been shut down, replace the defective disk.



(5) Start the server whose disk was replaced.

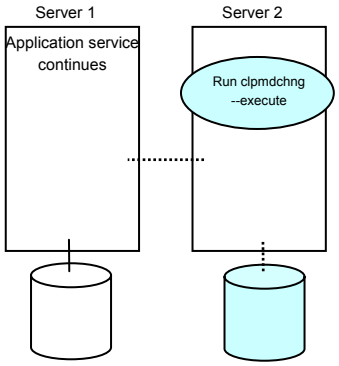


(6) Run the fdisk command on the server whose disk was replaced to allocate the cluster partition and data partition.



(7) Run the following command on the server whose disk was replaced.

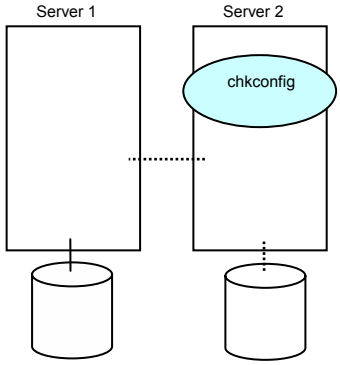
clpmdchng --execcute <disk_device_name (Example: /dev/sdb)>



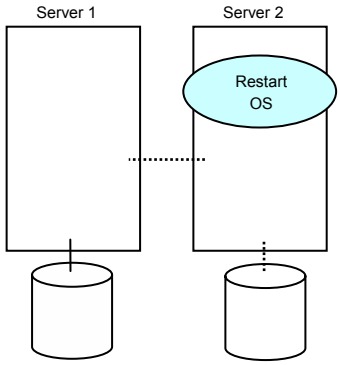
(8) Run the chkconfig command in the following order to start ExpressCluster services.

For Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --set clusterpro_md on
chkconfig --set clusterpro on

For others than Turbolinux Enterprise Server 8 (UnitedLinux family):
chkconfig --add clusterpro_md
chkconfig --add clusterpro



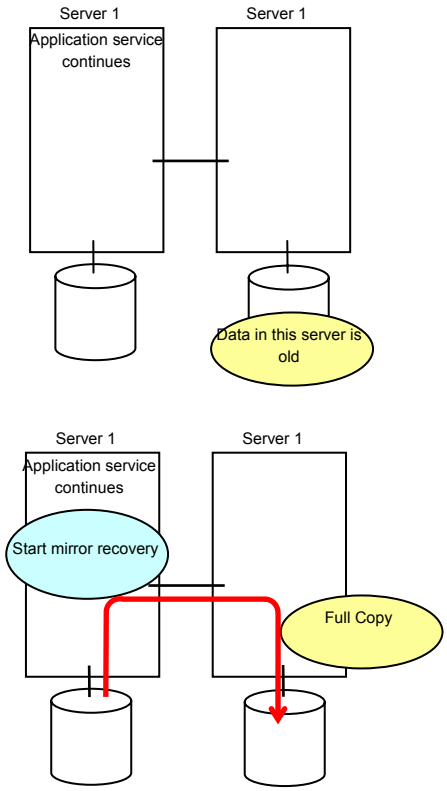
(9) With the reboot command, restart the both servers whose disks were replaced.



(10) Run the clpmdctrl command on the server whose disk was replaced. However, if the auto mirror recovery is enabled, mirrors are automatically recovered. Therefore, you can skip this step. Just go to the next step.

Run the following command to start the mirror recovery.

clpmdctrl --recovery <mirror_disk_resource_name (Example: md1)>

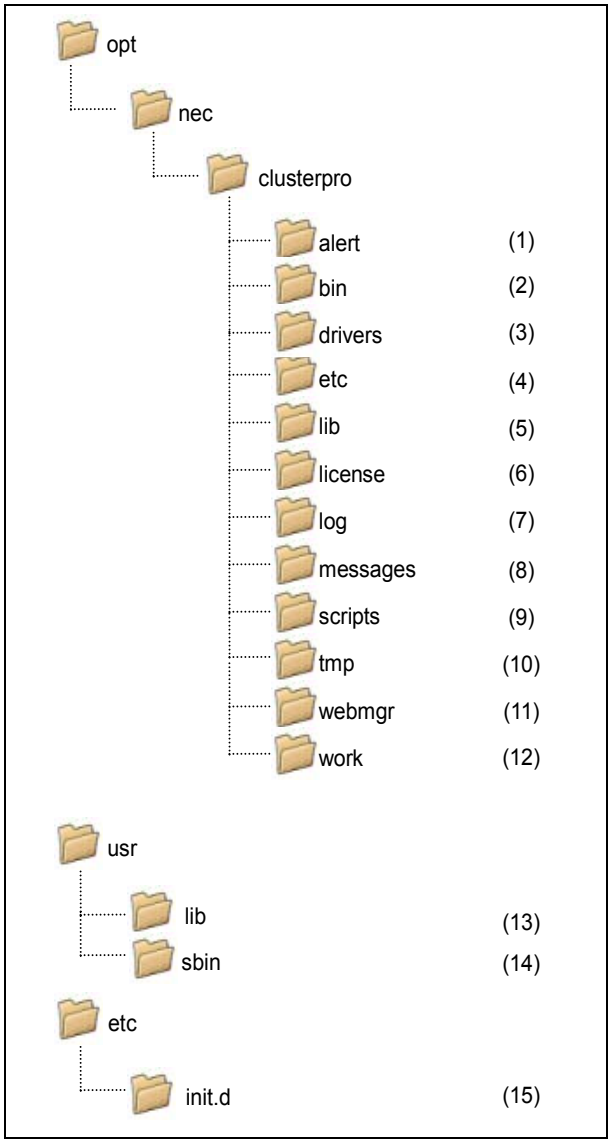


(11) Confirm that the mirrors have been recovered by Web Manager or by running the following command on the server whose disk was replaced. For details, see a separate guide, “Command” and “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

7 DIRECTORY STRUCTURE

ExpressCluster directories are structured as shown below.



(1) Associated with Alert Synchronization
This directory stores ExpressCluster Alert Synchronization's modules and management files.

(2) Associated with cluster modules
This directory stores ExpressCluster Server's run file.

(3) Associated with mirror driver (only for LE)
This directory stores the data mirror driver's run file.

(4) Associated with cluster configurations
This directory stores the cluster configuration file and policy file of each module.

(5) Associated with cluster libraries
This directory stores ExpressCluster Server's libraries.

(6) Associated with licenses
This directory stores licenses for licensed products.

(7) Associated with module logs
This directory stores logs which come from each module.

(8) Associated with Report Message (alert, syslog, mail)
This directory stores alert, syslog and mail messages reported by each module.

(9) Associated with EXEC resource script of group resources
This directory stores EXEC resource script of group resources.

(10) Associated with temporary files
This directory stores archive files created by log collections.

(11) Associated with Web Manager
This directory stores ExpressCluster Web Manager's modules and management files.

(12) Associated with module tasks
This is a work directory for each module.

(13) /usr/lib
This directory stores the symbolic link to ExpressCluster Server's libraries.

(14) /usr/sbin
This directory stores the symbolic link to ExpressCluster Server's run file.

(15) /etc/init.d
This directory stores ExpressCluster Server's Start/Stop scripts.

8 COMMUNICAITON PORT, MIRROR DRIVER MAJOR NUMBER

ExpressCluster uses the following port numbers by default. You can change these port numbers by Trekking Tool.

Make sure that other programs than ExpressCluster do not try to access these port numbers.

~ For SE and XE ~

[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	29002/UDP	Heartbeat
Server	Auto-assignment	→	Server	29003/UDP	Alert synchronization

[Server – Manager]

From			To		Remarks
Manager	Auto-assignment	→	Server	29003/TCP	Server - Manager communications

~ For LE ~

[Server – Server]

From			To		Remarks
Server	Auto-assignment[2]	→	Server	29001/TCP	Internal communication
Server	Auto-assignment	→	Server	29002/TCP	Data transfer
Server	Auto-assignment	→	Server	29002/UDP	Heartbeat
Server	Auto-assignment	→	Server	29003/UDP	Alert synchronization
Server	Auto-assignment	→	Server	29004/TCP	Communications with Mirror Agent
Server	Auto-assignment	→	Server	29005/TCP	Communications with Mirror driver
Server	Auto-assignment	→	Server	XXXX[3]/TCP	Mirror disk resource data synchronization

[Server – Manager]

From			To		Remarks
Manager	Auto-assignment	→	Server	29003/TCP	Server - Manager communications

The mirror driver uses 218 as the major number. Confirm that no other driver uses this number.

[1] This auto-assignment assigns an available port number at the time.

[2] This auto-assignment assigns an available port number at the time.

[3] A port number used for each mirroring disk resource. This is set at mirroring disk resource creation. For details, see Section “Mirroring disk resources” in a separate guide, “ExpressCluster for Linux Ver3.0 Trekking Tool”.

9 BACKUP/RESTORATION

9.1 How To Back Up

The followings are the procedures to back up the file system.

9.1.1 Backup when ExpressCluster is active

To back up the file system when ExpressCluster daemon is active:

(1) Set the cluster status to normal.

(2) To prevent the heartbeat timeout due to heavy loads on user space, change the ExpressCluster's timeout ratio with the timeout temporary adjustment command.

If you want to triple the current timeout and make this temporary setting valid for one hour, run the following command.

```
# clptoratio -r 3 -t 1h
```

(3) Back up shared disk and mirror disks.
Shared disks should be active on the server where you will back up disk resources of the group resources.

Mirroring disks should be active on the server where you will back up mirror disk resources of the group resources. However, a backup command which accesses directly mirror disks and partition devices is not supported.

(4) Set the timeout ratio which was changed with the timeout temporary adjustment command back to the original.

```
# clptoratio -i
```

For details of timeout temporary adjustment command, see a separate guide, "Command".

9.1.2 Backup when ExpressCluster is inactive ~ for SE and XE ~

To back up the file system when ExpressCluster daemon is inactive:

(1) Set the cluster status to normal.

(2) Stop ExpressCluster daemon.
```
# clpcl -t -a
```

(3) Back up the file system and shared disks.
As for shared disks, manually mount the file system on the shared disk you want to back up.
Make sure to umount the file system after you have backed it up.

(4) Start ExpressCluster daemon.
```
# clpcl -s -a
```

9.1.3 Backup when ExpressCluster is inactive ~ for LE ~

It is not recommended to back up the file system when ExpressCluster daemon is inactive.
For details on emergency backup, see Section 11.8 “How To Manually Mount Mirror Disks”.

9.2 How to Restore

The followings are the procedures to restore the file system.

9.2.1 To restore the file system containing /opt/nec/clusterpro directory

(1) Insert a floppy disk in the drive of a normal server in the cluster. Then, back up the cluster configuration.

```
# clpcfctrl --pull -l
```

After the backup completed, remove the cluster configuration data floppy disk from the drive.

Do the followings on the server where you are going to restore.

(2) Run chkconfig --del <name> in the following order to deactivate services.
- clusterpro_alertsync
- clusterpro_webmgr
- clusterpro
- clusterpro_md (only for LE)
- clusterpro_trn
- clusterpro_evt

(3) Restart the server.

(4) Restore the file system on the server to be recovered (there is no cluster-dependent works).

(5) Confirm with the following command that ExpressCluster Server is installed on the restored file system.

```
rpm -qi expresscls
```

When ExpressCluster Server is installed, go to Step (6).
When ExpressCluster Server is not installed, go to Step (7).

(6) When ExpressCluster Server is installed, run the following command to uninstall it.

```
rpm -e expresscls
```

* Do not specify other options than the above.
* For troubleshooting when uninstalling ExpressCluster Server, see Section 2.1 “Uninstall”.

(7) Install ExpressCluster Server.
For details, see “Installation of ExpressCluster Server RPM and Post-installation settings” section in a separate guide, “Cluster Installation and Configuration Guide”.
In this step, if there is any server in the cluster on which an update of ExpressCluster Server is applied, apply the same update to this server to even out their versions.

(8) Hand-carry the floppy disk.
Insert the cluster configuration data floppy disk in the server where ExpressCluster Server was reinstalled.
You have to restart the server where ExpressCluster Server was reinstalled in advance after reinstallation.

(9) Register the cluster configuration which was backed up in Step (1) in the server with the cluster generation command.

```
# clpcfctrl --push -l

    success.(code:0)
```

Confirm that you see the above command completion message. If you see it, the command was successfully completed.

For details of the cluster generation command, see a separate guide, “Command”.

(10) Remove the cluster configuration data floppy disk from the drive. Then, restart the server.

9.2.2 How to restore shared disks

9.2.2.1 How to restore when ExpressCluster is active

(1) Set the cluster status to normal.

(2) To prevent the heartbeat timeout due to heavy loads on user space, change the ExpressCluster's timeout ratio with the timeout temporary adjustment command.

If you want to triple the current timeout and make this temporary setting valid for one hour, run the following command.

```
# clptoratio -r 3 -t 1h
```

(3) Restore shared disks.
Disk resources of the group resources should be active on the server where you are going to restore.

(4) Set the timeout ratio which was changed with the timeout temporary adjustment command back to the original.

```
# clptoratio -i
```

For details of timeout temporary adjustment command, see a separate guide, "Command".

9.2.2.2 How to restore when ExpressCluster is inactive

(1) Set the cluster status to normal.

(2) Stop ExpressCluster daemon.
```
# clpcl -t -a
```

(3) Run the following command to set the disk resource partition to ReadWrite.

Example: if the disk resources partition device is /dev/sdb5,
```
# clproset -w -d /dev/sdb5
```

(4) Manually mount the file system on the shared disk to be restored. Then, restore the shared disk. Make sure to umount the file system when you have restored it.

(5) Run the following command to set the disk resource partition to ReadOnly.

Example: if the disk resources partition device is /dev/sdb5,
```
# clproset -o -d /dev/sdb5
```

(6) Start ExpressCluster daemon.
```
# clpcl -s -a
```

For details of cluster operation commands, see a separate guide, “Command”.

9.2.3 How to restore mirror disks

9.2.3.1 Restoration when ExpressCluster is active

(1) Set the cluster status to normal.

(2) To prevent the heartbeat timeout due to heavy loads on user space, change the ExpressCluster's timeout ratio with the timeout temporary adjustment command.

If you want to triple the current timeout and make this temporary setting valid for one hour, run the following command.

```
# clptoratio -r 3 -t 1h
```

(3) Restore mirror disks.
Mirror disk resources of group resources should be active on the server where you want to restore them.

(4) Set the timeout ratio which was changed with the timeout temporary adjustment command back to the original.

```
# clptoratio -i
```

For details of timeout temporary adjustment command, see a separate guide, "Command".

9.2.3.2 Restoration when ExpreessCluster is inactive

Restoration is not recommended if ExpressCluster is inactive.

10 WHAT CAUSES SERVER TO GO DOWN

When any of the following abnormalities occurs, ExpressCluster shuts down or resets servers for the purpose of resource protection.

10.1 The Last Behaviors For Resources Activeness Abnormalities

If the last behaviors are specified for resource activeness abnormalities as follows;

The last operation	Action
Cluster daemon stoppage and OS shutdown	Causes normal shutdown after the group resources stopped.
Cluster daemon stoppage and OS reboot	Causes normal reboot after the group resources stopped.

10.2 The Last Behaviors For Monitor Resource Monitoring Abnormalities

If the last behaviors are specified for monitor resource monitoring abnormalities as follows;

The last operation	Action
Cluster daemon stoppage and OS shutdown	Causes normal shutdown after the group resources stopped.
Cluster daemon stoppage and OS reboot	Causes normal reboot after the group resources stopped.

10.3 Emergency Cluster Shutdown

When an abnormal termination is detected in any of the following processes, ExpressCluster causes the normal shutdown after the group resources stopped.

+ clprc
+ clprm
+ clpnm

10.4 Resource Inactiveness Abnormalities When ExpressCluster Daemon is Deactivated

When you run the clpcl -t to deactivate ExpressCluster daemon, if resources do not become inactive, ExpressCluster causes shutdown.

10.5 Stall Detection in User Space

When a server stalls longer than the heartbeat timeout, ExpressCluster causes reset.

10.6 Stall Detection During Shutdown Process

When a server comes to stall in the process of OS shutdown, ExpressCluster causes reset.

10.7 Recovery From Network Partitioning

If all heartbeats are disrupted (Network partitioning), both servers fail over each other. As a result, groups are activated on both servers.

If interconnection is recovered from this condition, ExpressCluster causes shutdown on both servers or on a server.

For details of network partitioning, see Section 11.5 “Network Partitioning”.

However, ExpressCluster causes shutdown for SE only when its version is 3.0-3 or newer. If the version is 3.0-2 or earlier, it does not cause shutdown.

10.8 Mirror Disks Abnormalities

When an abnormality occurs in mirror disks, the mirror driver causes reset.

10.9 Emergency Server Restart

When an abnormal termination is detected in the following process, ExpressCluster causes the OS restart after the group resources stopped.

+ clpmdagent

11 TROUBLESHOOTING

11.1 ExpressCluster Does Not Start Or Exits

A cluster system starts working by restarting servers after installing ExpressCluster. However, if your cluster system does not behave properly, confirm the followings;

(1) Registration of cluster configuration data
The cluster configuration data should be registered on all servers (which will form a cluster system) when you cluster them. If the cluster configuration data does not exist in the following path, the data may not be registered yet. Confirm if it is registered.

/opt/nec/clusterpro/etc/clp.conf

If the cluster configuration data does not exist in the above path, see “Clustering” section in a separate guide, “Cluster Installation and Configuration Guide” for registering the data.

(2) Confirm the server name and IP address in cluster configuration.
Confirm the server name and IP address are proper.
(# hostname, # ifconfig....)

(3) License registration.
The license may not be registered yet. Run the following command on all servers in the cluster to confirm the license is registered.

```
# clplcnsc -l -p PRODUCT-ID
```

For ***PRODUCT-ID*** in -p option, specify “SE30” for SE, “XE30” for XE and “LE30” for LE.

If your license is the trial version, confirm if it is not expired yet.

(4) ExpressCluster run level
Run the following command to confirm the run level of ExpressCluster.

```
# chkconfig --list clusterpro
  clusterpro        0:off   1: off    2: off    3: on    4: off    5:on   6: off
```

(5) Cluster process activeness check with the ps command ~ For SE and XE ~
Run the following command to check if ExpressCluster is working properly.

```
# ps –ef | grep clp
root1669     1   0  00:00  ?  00:00:00   clpmonp --event -a 2 -r 0 -w 0
root1670  1669   0  00:00  ?  00:00:00   clpevent
root1684     1   0  00:00  ?  00:00:00   clpmonp --trnsv -a 2 -r 0 -w 0
root1685  1684   0  00:00  ?  00:00:00   clptrnsv
root1784     1   0  00:00  ?  00:00:00   /opt/nec/clusterpro/bin/clppm
root1796  1795   0  00:00  ?  00:00:00   clprc
root1809  1808   0  00:00  ?  00:00:00   clprm
root1813  1812   0  00:00  ?  00:00:00   clpnm
root1818  1817   0  00:00  ?  00:00:00   clplanhb
root1820  1819   0  00:00  ?  00:00:00   clpdiskhb
root1822  1821   0  00:00  ?  00:00:00   clpcomhb
root1935     1   0  00:00  ?  00:00:00   clpwebmgr –start
root1948     1   0  00:00  ?  00:00:00   clpwebalt
```

If the result of ps command shows the following process run statuses, ExpressCluster is working properly.

- Event process and Data transfer process

```
root1669     1   0  00:00  ?  00:00:00   clpmonp –event
root1670  1669   0  00:00  ?  00:00:00   clpevent
root1684     1   0  00:00  ?  00:00:00   clpmonp –trnsv
root1685  1684   0  00:00  ?  00:00:00   clptrnsv
```

  If the Event process is not started yet, the following Process Manager will not start.

- Process Manager

```
root1784     1   0  00:00  ?  00:00:00   /opt/nec/clusterpro/bin/clppm
```

  By starting up this process, the following processes are generated. Therefore, if any abnormality such as cluster configuration file error is detected, ExpressCluster will not start.

  clprc
  clprm
  clpnm

- Resources control process check

```
root1796    1795    0    00:00    ?    00:00:00          clprc
```

  * This process can start up even if the group resources are not registered yet.

- Resource monitor process check

```
root1809    1808    0    00:00    ?    00:00:00          clprm
```

  * This process can start up even if the monitor resources are not registered yet.

- Server management process check

```
root1813    1812    0    00:00    ?    00:00:00          clpnm
```

- Heartbeat process check

```
root1818    1817    0    00:00    ?    00:00:00          clplanhb
root1820    1819    0    00:00    ?    00:00:00          clpdiskhb
root1822    1821    0    00:00    ?    00:00:00          clpcomhb
```

  If a disk interface is added to the heartbeat resources in the cluster configuration, clpdiskhb is started. If a COM interface is added, clpcomhb is started. You cannot add COM interface for XE.

- Web Manager process check

```
root1935       1    0    00:00    ?    00:00:00          clpwebmgr –start
```

- Alert process check

```
root1948       1    0    00:00    ?    00:00:00          clpwebalt
```

* Depending on your distribution, your view of ps command may be different from the above.

(6) Cluster process activeness check with the ps command ~ For LE ~
Run the following command to check if ExpressCluster is working properly.

```
# ps –ef | grep clp
root1669     1   0   00:00   ?   00:00:00     clpmonp --event -a 2 -r 0 -w 0
root1670  1669   0   00:00   ?   00:00:00     clpevent
root1684     1   0   00:00   ?   00:00:00     clpmonp --trnsv -a 2 -r 0 -w 0
root1685  1684   0   00:00   ?   00:00:00     clptrnsv
root1696     1   0   00:00   ?   00:00:00     clpmonp --mdagent -a 5 -r 0 -w 30
root1697  1696   0   00:00   ?   00:00:00     clpmdagent
root1784     1   0   00:00   ?   00:00:00     /opt/nec/clusterpro/bin/clppm
root1796  1795   0   00:00   ?   00:00:00     clprc
root1809  1808   0   00:00   ?   00:00:00     clprm
root1813  1812   0   00:00   ?   00:00:00     clpnm
root1818  1817   0   00:00   ?   00:00:00     clplanhb
root1822  1821   0   00:00   ?   00:00:00     clpcomhb
root1935     1   0   00:00   ?   00:00:00     clpwebmgr –start
root1948     1   0   00:00   ?   00:00:00     clpwebalt
```

If the result of ps command shows the following process run statuses, ExpressCluster is working properly.

- Event process, Data transfer process and Mirror Agent

```
root1669     1   0   00:00   ?   00:00:00     clpmonp –event
root1670  1669   0   00:00   ?   00:00:00     clpevent
root1684     1   0   00:00   ?   00:00:00     clpmonp –trnsv
root1685  1684   0   00:00   ?   00:00:00     clptrnsv
root1696     1   0   00:00   ?   00:00:00     clpmonp --mdagent -a 5 -r 0 -w 30
root1697  1696   0   00:00   ?   00:00:00     clpmdagent
```

If the Event process is not started yet, the following Process Manager will not start.

- Process Manager

```
root1784     1   0   00:00   ?   00:00:00     /opt/nec/clusterpro/bin/clppm
```

By starting up this process, the following processes are generated. Therefore, if any abnormality such as cluster configuration file error is detected, ExpressCluster will not start.

clprc
clprm
clpnm

- Resources control process check
  root1796 1795 0 00:00 ? 00:00:00 clprc

  * This process can start up even if the group resources are not registered yet.

- Resource monitor process check
  root1809 1808 0 00:00 ? 00:00:00 clprm

  * This process can start up even if the monitor resources are not registered yet.

- Server management process check
  root1813 1812 0 00:00 ? 00:00:00 clpnm

- Heartbeat process check
  root1818 1817 0 00:00 ? 00:00:00 clplanhb
  root1822 1821 0 00:00 ? 00:00:00 clpcomhb

  If a COM interface is added to the heartbeat resources in the cluster configuration, clpcomhb is started.

- Web Manager process check
  root1935 1 0 00:00 ? 00:00:00 clpwebmgr –start

- Alert process check
  root1948 1 0 00:00 ? 00:00:00 clpwebalt

* Depending on your distribution, your view of ps command may be different from the above.

(7) Mirror driver load check with the lsmod command ~ For LE ~
Run the lsmod command. Confirm the result of lsmod contains the following loadable module.

liscal

(8) syslog examination to confirm the cluster's successful startup ~ For SE and XE ~

You can confirm in syslog that ExpressCluster processes are working properly by looking into the following messages.

- Event process's startup check

  Sep 10 05:47:50 server1 clusterpro_evt: Starting clusterpro event:
  Sep 10 05:47:56 server1 clusterpro_evt:
  Sep 10 05:47:56 server1 rc: Starting clusterpro_evt: succeeded

- Data transfer process's startup check

  Sep 10 05:47:56 server1 clusterpro_trn: Starting clusterpro trnsv:
  Sep 10 05:47:56 server1 clusterpro_trn:
  Sep 10 05:47:56 server1 rc: Starting clusterpro_trn: succeeded

- Process Manager's startup check

  Sep 10 05:47:58 server1 clusterpro: Starting clusterpro daemon:
  Sep 10 05:47:58 server1 clusterpro:
  Sep 10 05:47:58 server1 rc: Starting clusterpro: succeeded
  Sep 10 05:47:58 server1 CLUSTERPRO: <type: pm><event: 1> Cluster daemon has started properly...

- Heartbeat resource's activeness check

  Sep 10 05:48:00 server1 CLUSTERPRO: <type: nm><event: 3> Resource lanhb1 of server server1 up.
  Sep 10 05:48:01 server1 CLUSTERPRO: <type: nm><event: 3> Resource diskhb1 of server server1 up.
  Sep 10 05:48:01 server1 CLUSTERPRO: <type: nm><event: 1> Server server1 up.
  Sep 10 05:48:01 server1 CLUSTERPRO: <type: nm><event: 3> Resource diskhb1 of server server2 up.
  Sep 10 05:48:01 server1 CLUSTERPRO: <type: nm><event: 1> Server server2 up.
  Sep 10 05:48:02 server1 CLUSTERPRO: <type: nm><event: 3> Resource lanhb1 of server server2 up.

  You will see the above messages when the followings are specified for heartbeat resources in a 2-node configuration.

lanhb1	LAN heartbeat resources
diskhb1	Disk heartbeat resources

- Group resources' activeness check

  Sep 10 05:48:09 server1 CLUSTERPRO: <type: rc><event: 10> The start processing of a group grp1 started.
  Sep 10 05:48:09 server1 CLUSTERPRO: <type: rc><event: 30> The start processing of a resource fip1 started.
  Sep 10 05:48:12 server1 CLUSTERPRO: <type: rc><event: 31> The start processing of a resource fip1 ended.
  Sep 10 05:48:12 server1 CLUSTERPRO: <type: rc><event: 30> The start processing of a resource disk1 started.
  Sep 10 05:48:19 server1 CLUSTERPRO: <type: rc><event: 31> The start processing of a resource disk1 ended.
  Sep 10 05:48:19 server1 CLUSTERPRO: <type: rc><event: 11> The start processing of a group grp1 ended.

  You will see the above messages when the group resource, grp1, is activated on server1. The group resources' configuration data is as follows;

fip1	Floating IP addresses resources
disk1	Shared disk resources

- Monitor resources monitor startup check

  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor userw start.
  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor ipw1 start.

  You will see the above when the monitor resources are specified as follows;

userw	User space monitor resources
ipw1	IP monitor resources

- License conformity check

  SE 3.0 Product version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 50> The number of license is 2. (SE30)

  You will see the above message when 2-CPU license is registered.

  SE 3.0 Trial version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 51> Period of trial is till 2003/09/30. (SE30)

  XE 3.0 Product version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 50> The number of license is 4. (XE30)

  You will see the above message when 4-CPU license is registered.

  XE 3.0 Trial version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 51> Period of trial is till 2003/09/30. (XE30)

- Web Manager's startup check

  Sep 10 05:48:00 server1 clusterpro_webmgr: Starting Web Manager server:
  Sep 10 05:48:00 server1 clusterpro_webmgr:
  Sep 10 05:48:00 server1 rc: Starting clusterpro_webmgr: succeeded

- Alert process's startup check

  Sep 10 05:48:00 server1 clusterpro_alertsync: Starting webalert deamon:
  Sep 10 05:48:00 server1 clusterpro_alertsync:
  Sep 10 05:48:00 server1 rc: Starting clusterpro_alertsync: succeeded

(9) syslog examination to confirm the cluster's successful startup ~ for LE ~

You can confirm in syslog that ExpressCluster processes are working properly by looking into the following messages.

- Event process's startup check

  Sep 10 05:47:50 server1 clusterpro_evt: Starting clusterpro event:
  Sep 10 05:47:56 server1 clusterpro_evt:
  Sep 10 05:47:56 server1 rc: Starting clusterpro_evt: succeeded

- Data transfer process's startup check

  Sep 10 05:47:56 server1 clusterpro_trn: Starting clusterpro trnsv:
  Sep 10 05:47:56 server1 clusterpro_trn:
  Sep 10 05:47:56 server1 rc: Starting clusterpro_trn: succeeded

- Mirror Agent's startup check

  Sep 10 05:47:57 server1 CLUSTERPRO: <type: mdagent><event: 1> Agent has started successfully.

- Mirror driver's startup check

  Sep 10 05:47:57 server1 kernel: liscal: <init_module> registerd device at major 218, nmp count is 4

- Process Manager's startup check

  Sep 10 05:47:58 server1 clusterpro: Starting clusterpro daemon:
  Sep 10 05:47:58 server1 clusterpro:
  Sep 10 05:47:58 server1 rc: Starting clusterpro: succeeded
  Sep 10 05:47:58 server1 CLUSTERPRO: <type: pm><event: 1> Cluster daemon has started properly...

- Heartbeat resources's activeness check

  Sep 10 05:48:00 server1 CLUSTERPRO: <type: nm><event: 3> Resource lanhb1 of server server1 up.
  Sep 10 05:48:01 server1 CLUSTERPRO: <type: nm><event: 1> Server server1 up.
  Sep 10 05:48:02 server1 CLUSTERPRO: <type: nm><event: 3> Resource lanhb1 of server server2 up.
  Sep 10 05:48:03 server1 CLUSTERPRO: <type: nm><event: 1> Server server2 up.

  The above messages appear when the followings are specified for heartbeat resources in a 2-node configuration.

  lanhb1 LANheartbeat resources

- Group resources' activeness check

  Sep 10 05:48:09 server1 CLUSTERPRO: <type: rc><event: 10> The start processing of a group grp1 started.
  Sep 10 05:48:09 server1 CLUSTERPRO: <type: rc><event: 30> The start processing of a resource fip1 started.
  Sep 10 05:48:12 server1 CLUSTERPRO: <type: rc><event: 31> The start processing of a resource fip1 ended.
  Sep 10 05:48:12 server1 CLUSTERPRO: <type: rc><event: 30> The start processing of a resource md1 started.
  Sep 10 05:48:19 server1 CLUSTERPRO: <type: rc><event: 31> The start processing of a resource md1 ended.
  Sep 10 05:48:19 server1 CLUSTERPRO: <type: rc><event: 11> The start processing of a group grp1 ended.

  You will see the above messages when the group resource, grp1, is activated on server1. The group resources' configuration data is as follows;

fip1	Floating IP addresses resources
md1	Mirror disk resources

- Monitor resources monitor startup check

  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor userw start.
  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor ipw1 start.
  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor ipw1 start.
  Sep 10 05:48:05 server1 CLUSTERPRO: <type: rm><event: 1> Monitor ipw1 start.

  You will see the above when the monitor resources are specified as follows;

userw	User space monitor resources
ipw1	IP monitor resources
mdw1	Mirror disk monitor resources
mdnw1	Mirror disks connect monitor resources

- License conformity check

  LE 3.0 Product version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 50> The number of license is 2. (LE30)

  You will see the above message when 2-CPU license is registered.

  LE 3.0 Trial version

  Sep 10 05:48:08 server1 CLUSTERPRO: <type: rm><event: 51> Period of trial is till 2003/09/30. (LE30)

- Web Manager's startup check

  Sep 10 05:48:00 server1 clusterpro_webmgr: Starting Web Manager server:
  Sep 10 05:48:00 server1 clusterpro_webmgr:
  Sep 10 05:48:00 server1 rc: Starting clusterpro_webmgr: succeeded

- Alert process's startup check

  Sep 10 05:48:00 server1 clusterpro_alertsync: Starting webalert deamon:
  Sep 10 05:48:00 server1 clusterpro_alertsync:
  Sep 10 05:48:00 server1 rc: Starting clusterpro_alertsync: succeeded

(10) Free disk space
Run the df command to confirm the free disk space in file system which contains /opt/nec/clusterpro. For the disk space to be used by ExpressCluster Server, see “Necessary Memory Capacity/Disk Capacity” section in a separate guide, “Operational Environment”.

(11) Shortage of memory or OS resources
Run the top or free command to confirm the OS memory usage and CPU utilization.

11.2 Failure of Group Resources Activation/ Deactivation

If any abnormality is detected when the group resources are activated/deactivated, detailed error information is logged in the alert and syslog. Examine the logs to know the cause of abnormality for countermeasures.

(1) Floating IP addresses resources
Confirm that the specified IP address is not used on the network or you do not specify a IP address of wrong network segment.
For details of other abnormalities, see Section 12.4.1 “Floating IP addresses resources”.

(2) Disk resources ~ For SE and XE ~
Confirm that the devices and mount point exist, and the file system is configured.
For details of other abnormalities, see Section 12.4.1 “Floating IP addresses resources”.

(3) EXEC resources
Confirm that the script path is correct and the script contents are proper.
For details of other abnormalities, see Section 12.4.3 “EXEC resources”.

(4) Mirror disk resources ~ for LE ~
Confirm that the devices and mount point exist, and the cluster partitions and data partitions are allocated. Also, confirm the file system specified as mirror disk resources is available.
For details of other abnormalities, see Section 12.4.4 “ Mirror disk resources”.

11.3 Monitor Resource Error

If the resource monitor detects any abnormality, detailed error information is logged in the alert and syslog. Examine the logs to know the cause of abnormality for countermeasures.

(1) IP monitor resources
Confirm that you can send packets with the ping command, and different network segments are routed if any.
For details of other abnormalities, see Section 12.5.1 “IP monitor resources”.

(2) Disk monitor resources
Confirm that the disk device exists, or SCSI cable or Fibre cable are not disconnected for shared disks.
For details of other abnormalities, see Section 12.5.2 “Disk monitor resources”.

(3) PID monitor resources
Confirm with ps command that the process to be monitored exists.
For details of other abnormalities, see Section 12.5.3 “PID monitor resources”.

(4) User space monitor resources
Confirm that you can load the softdog.o driver with the insmod command, and the load is not heavy on the user space.
For details of other abnormalities, see Section 12.5.5 “User space monitor resources”.

(5) Mirror disks monitor resources ~ for LE ~
Confirm that the disk devices exist, and the cluster partitions and data partitions are allocated. Also, confirm that Mirror Agent is active.
For details of other abnormalities, see Section 12.5.6 “Mirror disk monitor resources”.

(6) Mirror disks connect monitor resources ~ for LE ~
Confirm that mirror disk connect is connected. Also, confirm that Mirror Agent is active.
For details of other abnormalities, see Section 12.5.7 “Mirror disk connect monitor resources”.

11.4 Heartbeat Timeout

Possible causes of heartbeat timeout between servers are:

Cause	Countermeasures
Disconnection of LAN/Disk/COM cables	For disks and COM, confirm the cables are connected properly. For LAN, confirm that you can send packets with the ping command.
Misinterpretation of heavy loads on user space	Run the following command in advance to extend the heartbeat timeout when you run an application which gives heavy loads on the operating system for a long time. # clptoratio -r 3 -t 1d The above command triples the heartbeat timeout for one day.

11.5 Network Partitioning

Network partitioning indicates that all communication routes are blocked between servers. This section describes how to confirm the network partitioning. The following examples assume that you have registered LAN, disks and COM for heartbeat resources in a 2-node cluster configuration. (You cannot register disks for LE, or COM for XE.)

When all heartbeat resources are normal (i.e., the network is not partitioning), the clpstat command will show the following result.

[If you run the command on server1]

```
# clpstat -n

 ====================  HEARTBEAT RESOURCE STATUS  ====================
  Cluster : cluster
   *server0 : server1
    server1 : server2

    HB0 : lanhb1
    HB1 : lanhb2
    HB2 : diskhb1
    HB3 : comhb1

  [on server0 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : o  o  o  o
    server1 : o  o  o  o

  [on server1 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : o  o  o  o
    server1 : o  o  o  o
 ========================================================================
```

[If you run the command on server2]

```
# clpstat -n

 ====================  HEARTBEAT RESOURCE STATUS  ====================
  Cluster : cluster
    server0 : server1
   *server1 : server2

    HB0 : lanhb1
    HB1 : lanhb2
    HB2 : diskhb1
    HB3 : comhb1

  [on server0 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : o  o  o  o
    server1 : o  o  o  o

  [on server1 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : o  o  o  o
    server1 : o  o  o  o
 ========================================================================
```

If the network is partitioning, the clpstat command will show the following result. In short, both servers recognize each other that the counterpart went down.

[If you run the command on server1]

```
# clpstat -n

 ====================  HEARTBEAT RESOURCE STATUS  ====================
  Cluster : cluster
   *server0 : server1
    server1 : server2

    HB0 : lanhb1
    HB1 : lanhb2
    HB2 : diskhb1
    HB3 : comhb1

  [on server0 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : o  o  o  o
    server1 : x  x  x  x

  [on server1 : Offline]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : -  -  -  -
    server1 : -  -  -  -
 ========================================================================
```

[If you run the command on server2]

```
# clpstat -n

 ====================  HEARTBEAT RESOURCE STATUS  ====================
  Cluster : cluster
    server0 : server1
   *server1 : server2

    HB0 : lanhb1
    HB1 : lanhb2
    HB2 : diskhb1
    HB3 : comhb1

  [on server0 : Offline]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : -  -  -  -
    server1 : -  -  -  -

  [on server1 : Online]
        HB   0  1  2  3
  ------------------------------------------------------------------------
    server0 : x  x  x  x
    server1 : o  o  o  o
 ========================================================================
```

Shut down both servers immediately if the network is partitioning. Then, confirm the followings for each heartbeat resource.

(1) LAN heartbeat resources

- LAN cable
- Network interface

(2) Disk heartbeat resources ~ For SE and XE ~

- Disk cable
- Disk device

(3) COM heartbeat resources ~ For SE and LE ~

- COM cable

If Interconnection is recovered from the network partitioning, ExpressCluster causes the server to shut down.

However, ExpressCluster causes the server to shut down for SE if its version is 3.0-3 or newer. If the version is 3.0-2 or earlier, it does not cause shutdown.

If ExpressCluster detect that the same groups are active on multiple servers, it causes a server or the servers to shut down. Depending on the detection timing, it may shut down all servers where the same groups are active, or shut down all servers but one.

For LE, depending on the server shutdown timing, the status of mirror disk resources may vary after server restart.

Depending on the server shutdown timing, the status of mirror disk resources may be “normal”, or “requires the forcible mirror recovery” or “requires the mirror recovery”.

11.6 How To Replace Server ~ For SE and XE ~

To replace a server in the cluster, you have to prepare the cluster configuration data floppy disk.

Prepare the cluster configuration data floppy disk created by Trekking Tool when adding a new server to the cluster (or the latest data floppy disk if you reconfigured the cluster).

If you do not have the above-mentioned floppy disk at hand, you can back up the data with clpcfctrl command. For details, see “Cluster Generation and Cluster Configuration Information Backup Command” section in a separate guide, “Command”.

(1) Install ExpressCluster Server.
For details, see “Installation of ExpressCluster Server RPM and Post-installation Settings” section in “Cluster Installation and Configuration Guide”.

(2) Hand-carry the floppy disk.
Insert the cluster configuration data floppy disk in the server where you installed ExpressCluster Server.
After reinstallation, you have to restart in advance the server where you installed ExpressCluster Server.

(3) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. To use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. To use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or on Linux for using on Windows, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(4) Remove the cluster configuration data floppy disk from the drive. Then, restart the reinstalled server.

11.7 How To Replace Server ~ For LE ~

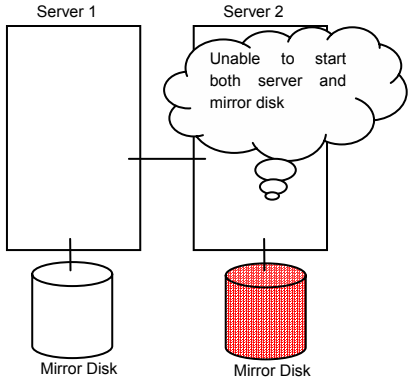
To replace a server in the cluster, you have to prepare the cluster configuration data floppy disk.

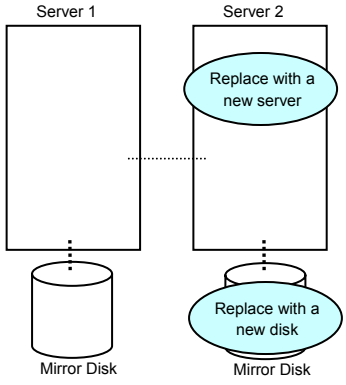
Prepare the cluster configuration data floppy disk created by Trekking Tool when adding a new server to the cluster (or the latest data floppy disk if you reconfigured the cluster).

If you do not have the above-mentioned floppy disk at hand, you can back up the data with clpcfctrl command. For details, see “Custer Generation and Cluster Configuration Information Backup Command” section in a separate guide, “Command”.

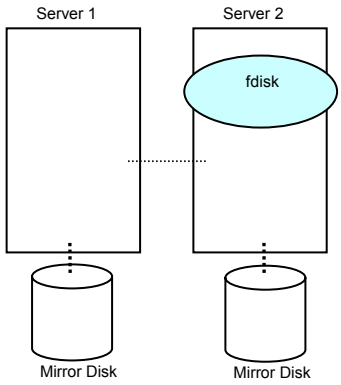
11.7.1 When you replace mirror disks also

(1) You replace the failed server machine and disks.
Set the same IP address and host name in the new server as before.





(2) Allocate disk partitions with the fdisk command.



(3) Install ExpressCluster Server on the replaced server.
For details, see “Installation of ExpressCluster Server RPM” section and “Post-Installation Settings” section in a separate guide, “Cluster Installation and Configuration Guide”.

(4) Hand-carry the floppy disk.
Insert the cluster configuration data floppy disk in the server where you installed ExpressCluster Server.
After reinstallation, you have to restart in advance the server where you installed ExpressCluster Server.

(5) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. To use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. To use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or on Linux for using on Windows, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(6) If you reuse disks which were used as mirror disks before, refer to Section 6.4 “Reuse of Mirror Disks” for initializing cluster partitions.

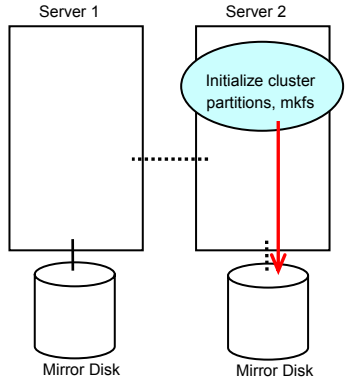
(7) Remove the cluster configuration data floppy disk from the drive. Then, restart the reinstalled server.

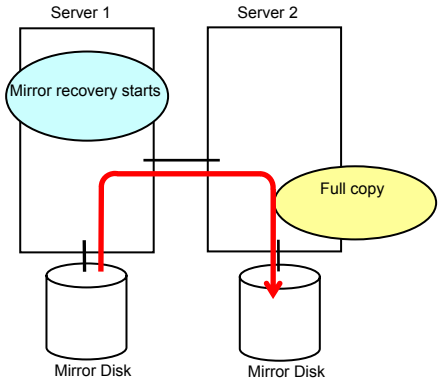
(8) After the server is started, the cluster partition in the new disk will be initialized and the file system in data partition will be created.
Then, the mirroring disks are automatically recovered if the auto-mirror recovery is enabled. If not, you have to manually recover mirroring disks. For how to recover mirroring disks, refer to Sections 11.10.4 “How to recover mirrors with a command” and 11.10.9 “How to recover mirrors by Web Manager”.

For the mirror recovery, data is fully copied. Even if FastSync Option is enabled, data is fully copied, instead of difference copy, because you have replaced the disk.

Confirm that mirrors have successfully been recovered by Web Manager or by running the following command. For details, see a separate guide, “Command” and “Web Manager”.

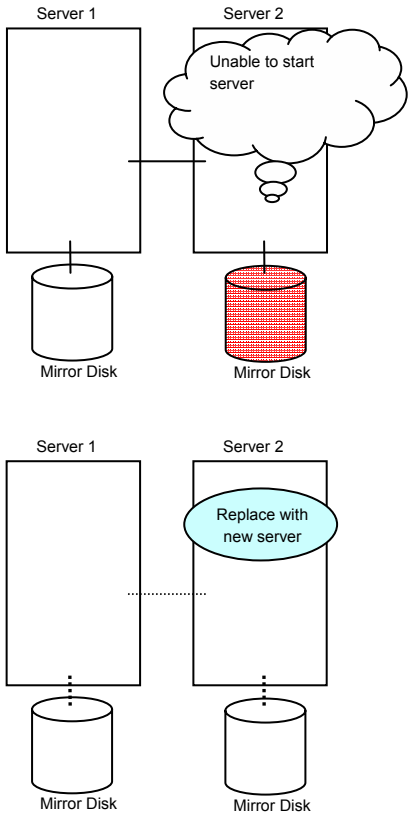
clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>





11.7.2 When reusing mirror disks

(1) You replace the failed server machine and reuse mirror disks.
Set the same IP address and host name in the new server as before.



(2) Install ExpressCluster Server on the replaced server.
For details, see “Installation of ExpressCluster Server RPM” section and “Post-Installation Settings” section in a separate guide, “Cluster Installation and Configuration Guide”.

(3) Hand-carry the floppy disk.
Insert the cluster configuration data floppy disk in the server where you installed ExpressCluster Server.
After reinstallation, you have to restart in advance the server where you installed ExpressCluster Server.

(4) Distribute the configuration data in the floppy disk to servers.
Do either A or B depending on the floppy disk type you used to save data by Trekking Tool.

A. To use the floppy disk saved by Trekking Tool on Linux, run the following command.
clpcfctrl --push -l

B. To use the floppy disk (1.44-MB formatted) saved by Trekking Tool on Windows, or on Linux for using on Windows, run the following command.
clpcfctrl --push -w

You see the following message if the data has successfully been distributed.
success.(code:0)

For troubleshooting of clpcfctrl, see a separate guide, “Command”.

(5) Remove the cluster configuration data floppy disk from the drive. Then, restart the reinstalled server.

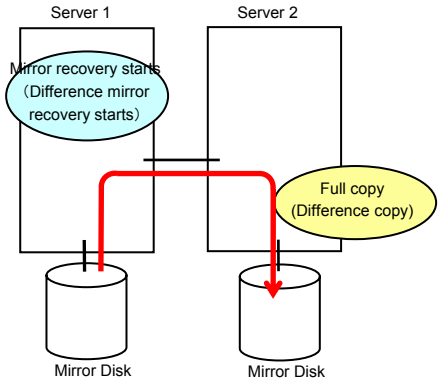
(6) If there is no difference in mirror disks after restarting the server, you can immediately start the operation.

If there is any difference in mirror disks after restarting the server, you have to recover the mirroring data.
If the auto-mirror recovery is enabled, the mirroring disks are automatically recovered. If not, you have to manually recover mirroring disks. For how to recover mirroring disks, refer to Sections 11.10.4 “How to recover mirrors with a command” and 11.10.9 “How to recover mirrors by Web Manager”.

For the mirror recovery, data is fully copied. If FastSync Option is enabled, only the differences are copied.

Confirm that mirrors have successfully been recovered by Web Manager or by running the following command. For details, see a separate guide, “Command” and “Web Manager”.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>



11.8 How To Manually Mount Mirror Disks

This section describes how to manually mount mirror disks when you cannot start ExpressCluster due to some failure.

11.8.1 To normally mount when mirroring is available

Do the followings when ExpressCluster data mirror daemon can be activated while ExpressCluster daemon cannot be.

(1) Run the following command on the server where you want to mount disks.

clpmdctrl --active <mirror_disk_resource_name (Example: md1)>

(2) Mirror disk resources' mount point becomes accessible. Written data is mirrored in the other server.

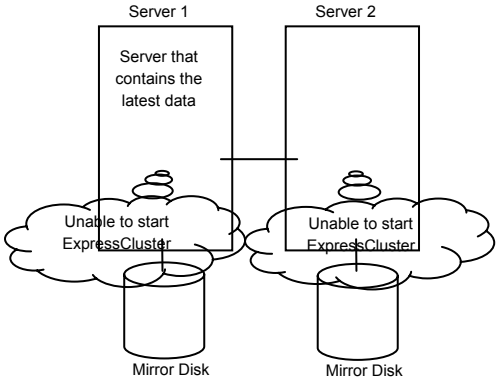
11.8.2 To forcibly mount when mirroring is not available

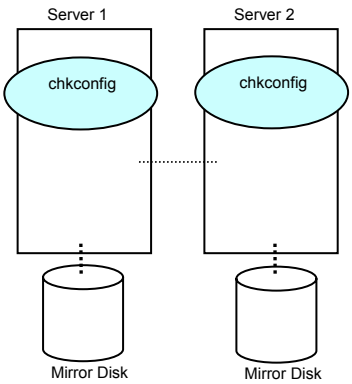
Do the followings to save data on mirror disks when neither of ExpressCluster daemon or ExpressCluster data mirror daemon cannot be activated.

However, you can do this on condition that the mirror was working normally until the right before, or you should know which server had the latest data.

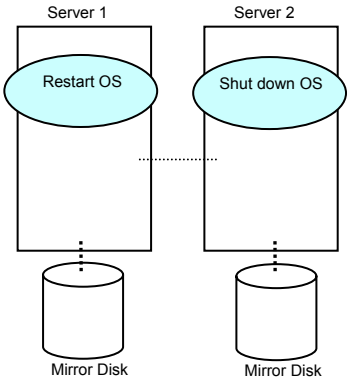
(1) Run the chkconfig command in the following order to set ExpressCluster services not to start.

chkconfig --del clusterpro_alertsync
chkconfig --del clusterpro_webmgr
chkconfig --del clusterpro
chkconfig --del clusterpro_md
chkconfig --del clusterpro_trn
chkconfig --del clusterpro_evt



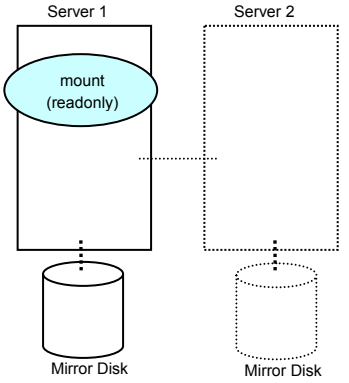


(2) Run the reboot command to restart the server which contains the latest data or which activated the mirror disk resources for the last time. Shut down the other server with the shutdown command.

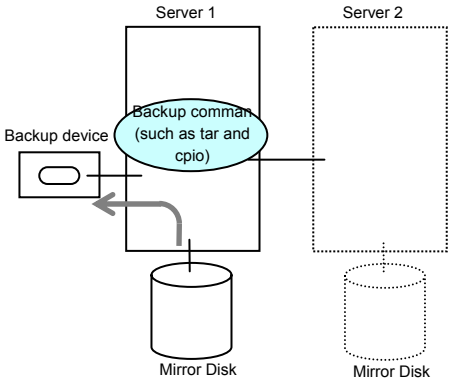


(3) Run the mount command to mount data partitions on mirror disks in read-only.

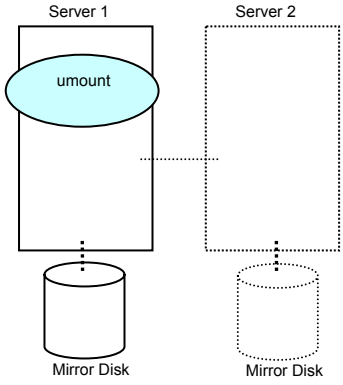
(Example) mount -r -t ext3 /dev/sdb5 /mnt



(4) Back up data in the data partition in a tape or other media.



(5) Unmount the mounted data partitions.



11.9 How To Manually mkfs Mirror Disks

If you want to make the file system in mirror partition again without reconfiguring the cluster or mirrors, do the followings;

(1) Confirm the cluster is normal.

(2) If you need to back up the data, see Chapter 9 “BACKUP/RESTORATION” for how to back up.

(3) Stop the group which has the mirror disk resources you want to mkfs.

(4) Run the following command on the server where you will run mkfs.

clpmdctrl --active -nomount <mirror_disk_resource_name (Example: md1)>

(5) Run the mkfs command to make the file system.
Because this is mirrored in the other server, this also mkfs its disk.

(Example) mkfs -t ext3 <mirror_partition_device_name (Example: /dev/NMP1)>

(6) If you need to restore the backup data, see Chapter 9 “BACKUP/RESTORATION” for how to restore the data.

(7) When the file system has successfully been made, run the following command.

clpmdctrl --deactive <mirror_disk_resource_name (Example: md1)>

11.10 How To Recover Mirror Breaks

If the auto-mirror recovery is enabled, you do not need special steps for mirror recovery. Mirrors are automatically recovered.

However, if the mirror data should forcibly be recovered, your have to do it with a command or by Web Manager.

FastSync Option's difference mirror recovery function is disabled in the forcible mirror recover. Data is fully copied.

If the auto-mirror recovery is disabled, you have to recover mirrors with a command or by Web Manager.

11.10.1 Auto-mirror recovery

When the auto-mirror recovery is enabled, it will be performed if the following conditions are all satisfied.

(1) Mirror disk resources are active.

(2) The server where mirror disk resources are active contains the latest data.

(3) Servers in the cluster are normal, and you can confirm their mirroring statuses.

(4) There are difference data between servers.

The auto-mirror recovery will not be performed if any of the followings is met.

(1) Any of the servers is not started.

(2) You cannot confirm the mirroring status in the other server.

(3) No server's mirroring status is normal.

For how to confirm the mirror recovery progress, see Sections 11.10.3 "How to confirm the mirror recovery progress with a command" and 11.10.8 "How to confirm the mirror recovery progress by Web Manager".

11.10.2 How to confirm mirror break status with a command

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) If the mirror recovery is required:

Mirror Status: Abnormal
Total Difference: 1%

md1	server1	server2
Mirror Color	GREEN	RED
Lastupdate Time	2004/03/04 17:30:05	--
Break Time	2004/03/04 17:30:05	--
Disk Error	OK	OK
Difference Percent	1%	--

(3) If the forcible mirror recovery is required:

Mirror Status: Abnormal
Total Difference: 1%

md1	server1	server2
Mirror Color	RED	RED
Lastupdate Time	2004/03/09 14:07:10	2004/03/09 13:41:34
Break Time	2004/03/09 14:06:21	2004/03/09 13:41:34
Disk Error	OK	OK
Difference Percent	1%	1%

(4) While the mirror recovery is in process:
See Section 11.10.3 “How to confirm the mirror recovery progress with a command”.

11.10.3 How to confirm the mirror recovery progress with a command

Run the following command to view the mirror recovery progress.

clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>

You will see the following data while the mirror recovery is in process.

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 data when the mirror recovery has successfully been completed.

Mirror Status: Normal

md1	server1	server2
Mirror Color	GREEN	GREEN

11.10.4 How to recover mirrors with a command

Run the following command to start the mirror recovery.

clpmdctrl --recovery <mirror_disk_resource_name (Example: md1)>

When FastSync Option is enabled, the mirror recovery recovers only the difference data. Therefore, the mirror recovery takes a less time than when FastSync Option is disabled.

This command returns the control immediately if the mirror recovery starts. For how to confirm the mirror recovery progress, see Sections 11.10.3 “How to confirm the mirror recovery progress with a command” and 11.10.8 “How to confirm the mirror recovery progress by Web Manager”.

11.10.5 How to perform the forcible mirror recovery with a command

If ExpressCluster cannot judge which server contains the latest data, you have to perform the forcible mirror recovery.

In this case, you have to manually identify the server which retains the latest data, and perform the forcible mirror recovery.

FastSync Option's difference mirror recovery function is disabled in the forcible mirror recover. Data is fully copied.

Identify the server which contains the latest data by any of the following means;

(1) By Mirror Disk Helper of Web Manager

1. Right-click Servers in Web Manager tree to start Mirror Disk Helper.
2. On the main screen of Mirror Disk Helper, display the detailed data of the mirror disk resources you want to see.
3. Click [Detail <<] button.
4. See the last update time stamp (Last Data Update Time) to identify the server which contains the latest data.
   However, this Last Data Update Time depends on the operating system's clock.

(2) With the clpmdstat command

How to confirm is all the same as Mirror Disk Helper of Web Manager but you use a command.

1. Run the following command.
   clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
2. See the last update time stamp (Lastupdate Time) to identify the server which contains the latest data.
   However, this Lastupdate Time depends on the operating system's clock.

(3) By data on mirror disks

This is not recommended because data may be destroyed if anything goes wrong.

Do the followings on both servers to identify which has the latest data if there is no other way.

1. Confirm all groups are inactive.
2. See Section 11.8.2 "To forcibly mount when mirroring is not available", and mount the data partition in read only.
3. Logically examine the data on the mount point.
4. Unmount the data partition.

If you can identify the server containing the latest data, run the following command to start the forcible mirror recovery.

clpmdctrl --force <server_containing_the_latest_data> <mirror_disk_resource_name (Example: md1)>

The clpmdctrl command returns the control immediately if the forcible mirror recovery starts. For how to confirm the forcible mirror recovery progress, see Sections 11.10.3 “How to confirm the mirror recovery progress with a command” and 11.10.8 “How to confirm the mirror recovery progress by Web Manager”.

When the forcible mirror recovery has successfully been completed, activate the groups. Then, the mirror disks become available.

11.10.6 How to perform the forcible mirror recovery with a command only on one server

In some cases, you cannot start a server due to hardware or OS failure, and even worse, you are not sure if the other server contains the latest data.

In such a case, if you want to start business applications at least on the server you can start, you perform the forcible mirror recovery on that server.

However, remember that if you do this, the data contained on the server where you run this command will be the latest data no matter which server actually contained it. Therefore, even if you become able to start the other server at a later time, you cannot handle data in that server as the latest one.

Before running the following command, make sure that you can discard the unrecoverable data.

Run the following command to start the forcible mirror recovery.

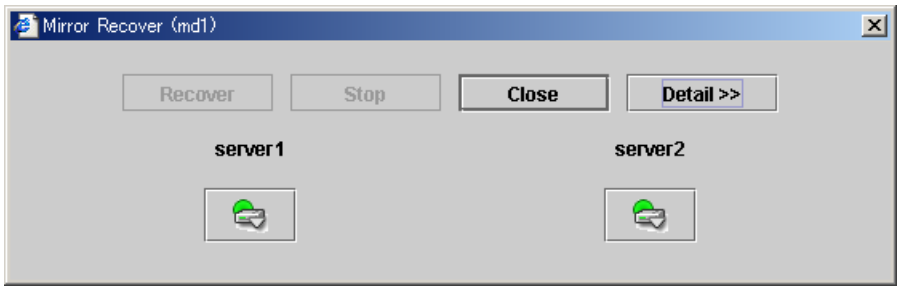
clpmdctrl --force <server_name> <mirror_disk_resource_name (Example: md1)>

After running the command, activate the groups. Then, the mirror disks become available.

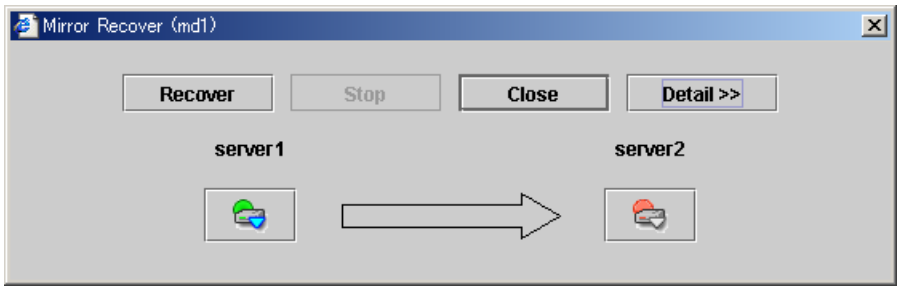
11.10.7 How to confirm the mirror break status by Web Manager

You can see the mirror break statuses by starting Mirror Disk Helper from Web Manager.

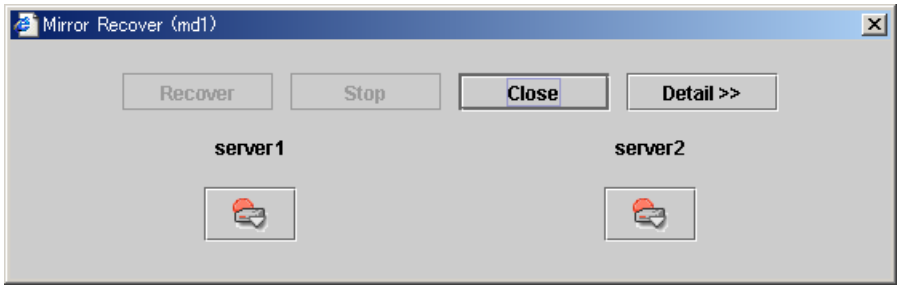
(1) When normal:



(2) If the mirror recovery is required:



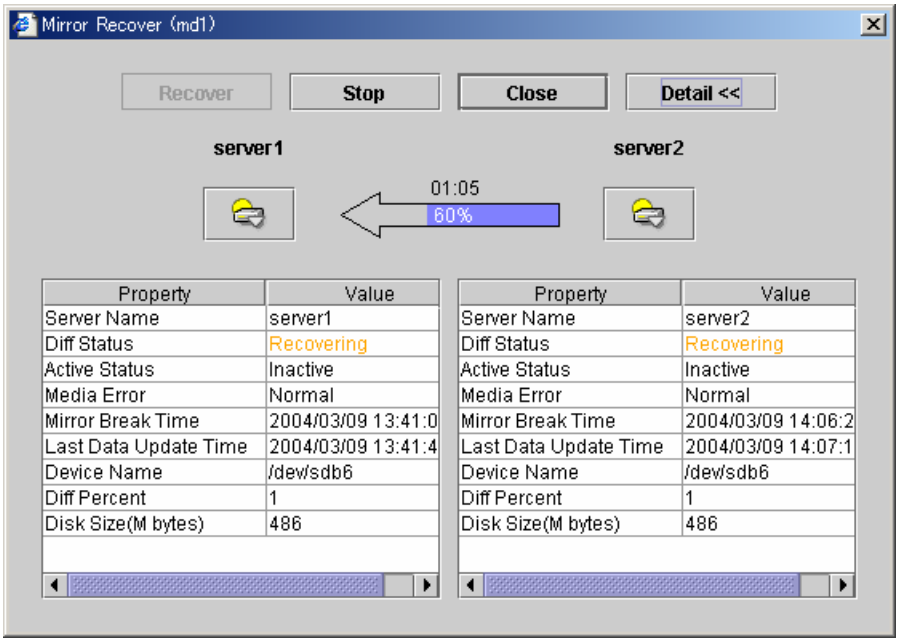
(3) If the forcible mirror recovery is required:



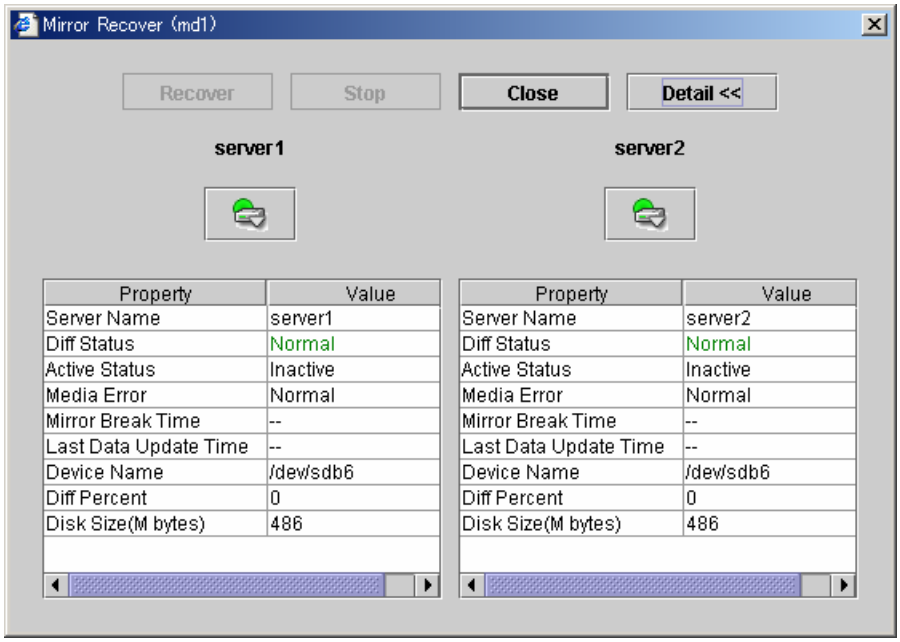
(4) While the mirror recovery is in progress:
See Section 11.10.8 “How to confirm the mirror recovery progress by Web Manager” for details.

11.10.8 How to confirm the mirror recovery progress by Web Manager

Start Mirror Disk Helper from Web Manager to view the mirror recovery progress. You will see the following screen while the mirror recovery is in process.

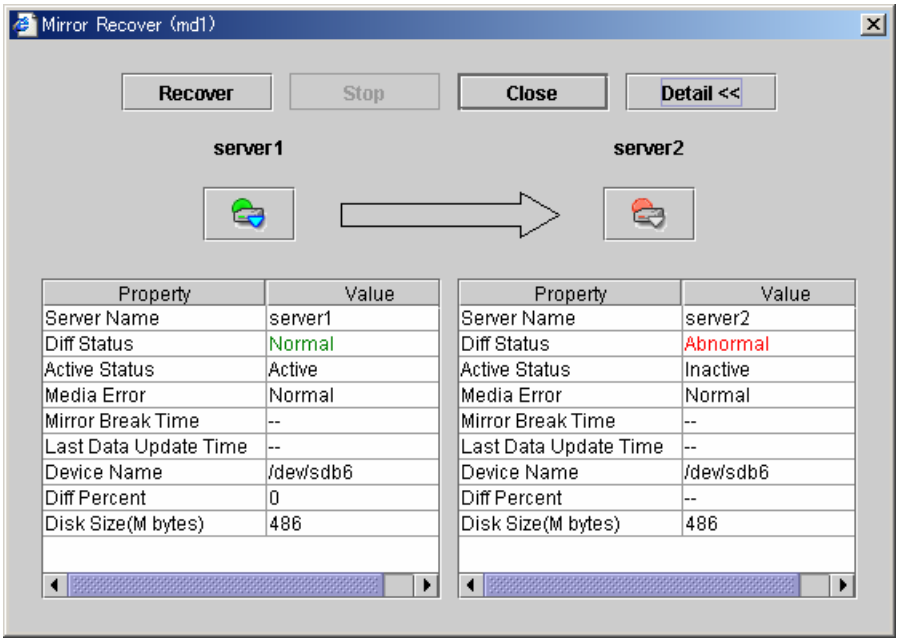


You will see the following screen when the mirror recovery has successfully been completed.



11.10.9 How to recover mirrors by Web Manager

Start Mirror Disk Helper from Web Manager to start the mirror recovery.
Click [Recover]. Then, the mirror recovery starts.



When FastSync Option is enabled, the mirror recovery recovers only the difference data. Therefore, the mirror recovery takes a less time than when FastSync Option is disabled.

For how to confirm the mirror recovery progress, see Sections 11.10.3 “How to confirm the mirror recovery progress with a command” and 11.10.8 “How to confirm the mirror recovery progress by Web Manager”.

11.10.10 How to perform the forcible mirror recovery by Web Manager

If ExpressCluster cannot judge which server contains the latest data, you have to perform the forcible mirror recovery.

In this case, you have to manually identify the server which retains the latest data, and perform the forcible mirror recovery.

FastSync Option's difference mirror recovery function is disabled in the forcible mirror recover. Data is fully copied.

Identify the server which contains the latest data by any of the following means;

(1) By Mirror Disk Helper of Web Manager

1. Right-click Servers in Web Manager tree to start Mirror Disk Helper.
2. On the main screen of Mirror Disk Helper, display the detailed data of the mirror disk resources you want to see.
3. Click [Detail <<] button.
4. See the last update time stamp (Last Data Update Time) to identify the server which contains the latest data.
   However, this Last Data Update Time depends on the operating system's clock.

(2) With the clpmdstat command

How to confirm is all the same as Mirror Disk Helper of Web Manager but you use a command.

1. Run the following command.
   clpmdstat --mirror <mirror_disk_resource_name (Example: md1)>
2. See the last update time stamp (Lastupdate Time) to identify the server which contains the latest data.
   However, this Lastupdate Time depends on the operating system's clock.

(3) By data on mirror disks

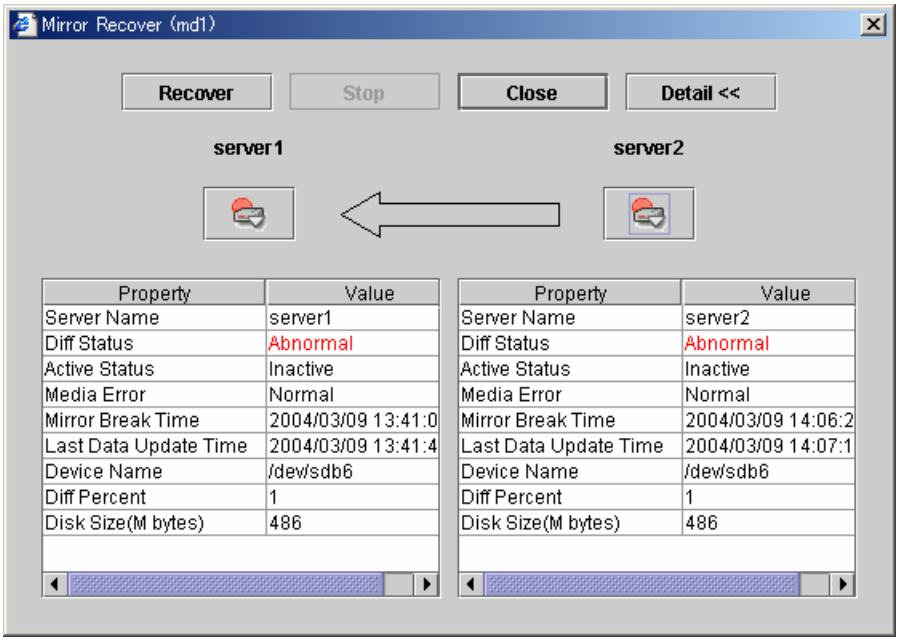
This is not recommended because data may be destroyed if anything goes wrong.

Do the followings on both servers to identify which has the latest data if there is no other way.

1. Confirm all groups are inactive.
2. See Section 11.8.2 "To forcibly mount when mirroring is not available", and mount the data partition in read only.
3. Logically examine the data on the mount point.
4. Unmount the data partition.

If you can identify the server containing the latest data, start Mirror Disk Helper from Web Manager to start the forcible mirror recovery.

Select the icon of server containing the latest data. Click [Recover]. Then, the forcible mirror recovery starts.



For how to confirm the forcible mirror recovery progress, see Sections 11.10.3 “How to confirm the mirror recovery progress with a command” and 11.10.8 “How to confirm the mirror recovery progress by Web Manager”.

When the forcible mirror recovery has successfully been completed, activate the groups. Then, the mirror disks become available.

11.10.11 How to perform the forcible mirror recovery by Web Manager only on one server

In some cases, you cannot start a server due to hardware or OS failure, and even worse, you are not sure if the other server contains the latest data.

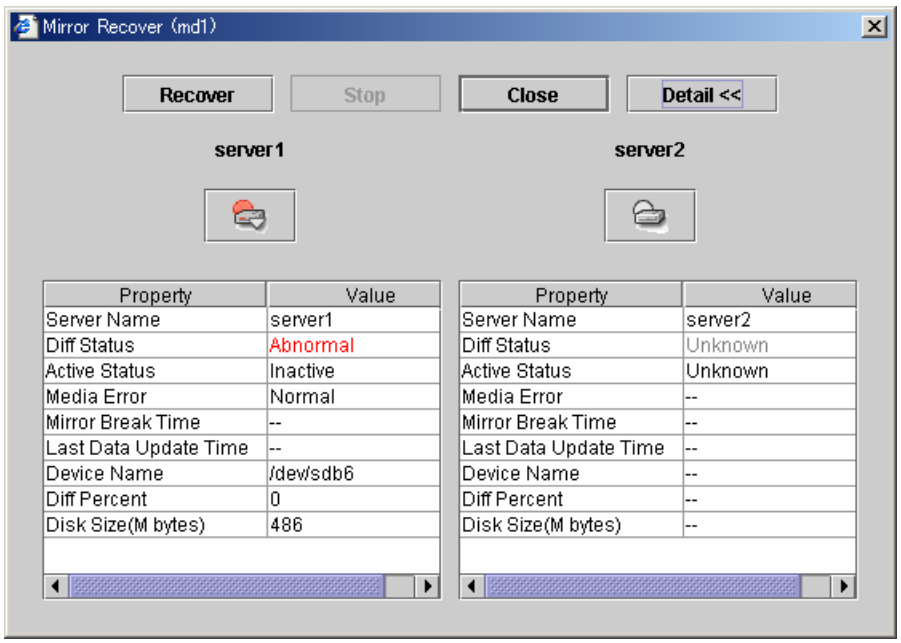
In such a case, if you want to start business applications at least on the server you can start, you perform the forcible mirror recovery on that server.

However, remember that if you do this, the data contained on the server where you run this command will be the latest data no matter which server actually contained it. Therefore, even if you become able to start the other server at a later time, you cannot handle data in that server as the latest one.

Before you do the followings, make sure that you can discard the unrecoverable data.

Start Mirror Disk Helper from Web Manager to start the forcible mirror recovery.

Select the icon of the server which you want to perform the forcible mirror recovery for. Click [Recover]. Then, the forcible mirror recovery starts.



When the forcible mirror recovery has successfully been completed, activate the groups. Then, the mirror disks become available.

12 MESSAGE LIST

12.1 Syslog, Alert, Mail Report Messages

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
pm	Info	1	Cluster daemon has started properly...	ExpressCluster daemon has started properly.	-	●	●	
pm	Info	2	Cluster daemon is shutting down...	Shutting down ExpressCluster daemon…	-	●	●	
pm	Info	3	Shutdown stall monitor has started...	The shutdown monitoring started.	-	●	●	
pm	Error	10	Cluster daemon has already started.	ExpressCluster daemon is active.	Check the status of ExpressCluster daemon.	●	●	
pm	Error	11	Cluster daemon critical error has occurred.	A fatal error occurred in ExpressCluster daemon.	Possibly, the run user is not a root user, or there are not enough memory or OS resources. Check them all.	●	●	●
pm	Error	12	A problem is detected in xml library.	A problem was detected in XML library.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
pm	Error	13	A problem is detected in configuration file.	A problem was detected in configuration file.	Confirm the cluster configuration data by Trekking Tool.	●	●	●
pm	Error	14	Configuration file is not exist.	The cluster configuration data does not exist.	Create the cluster configuration data by Trekking Tool, and upload it on all servers in the cluster.	●	●	
pm	Error	15	My host name is not found in configuration file.	The cluster configuration data does not contain your server.	Confirm the cluster configuration data by Trekking Tool.	●	●	
pm	Error	20	%1 process exit abnormally.	%1 process was abnormally terminated.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	●

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
pm	Error	21	Rc process exit with error status.(halting system)	ExpressCluster daemon process was abnormally terminated. The system will be shut down.	Possibly, failed to deactivate group resources. Follow the group resource messages.	●	●	
pm	Error	22	%1 process initialize error has occurred(return code:%2).	%1 process initialization error	Possibly, the event process is not activated. See Section 11.1.	●	●	●
pm	Info	23	system will be halted.	The system will be shut down.	-	●	●	
pm	Info	24	Cluster daemon will be stopped.	ExpressCluster daemon will be deactivated.	-	●	●	
pm	Info	25	system will be rebooted.	The system will be restarted.	-	●	●	
pm	Info	26	%1 process will be restarted.	Process %1 will be restarted.	-	●	●	
pm	Info	30	There was a request to halt system from the %1.	Has received a system shutdown request from %1	-	●	●	
pm	Info	31	There was a request to stop cluster daemon from the %1	Has received an ExpressCluster daemon stoppage request from %1.	-	●	●	
pm	Info	32	There was a request to reboot system from the %1.	Has received a system restart request from %1.	-	●	●	
pm	Info	33	There was a request to restart cluster daemon from the %1.	Has received an ExpressCluster daemon restart request from %1.	-	●	●	
pm	Info	34	There was a request to resume cluster daemon from the %1.	Has received a cluster resume request from %1.	-	●	●	
pm	Info	35	There was a request to suspend cluster daemon from the %1.	Has received a cluster suspension request from %1.	-	●	●	
nm	Info	1	Server %1 up.	Server %1 has started.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
nm	Info	2	Server %1 down.	Server %1 has stopped.	-	●	●	●
nm	Info	3	Resource %1 of server %2 up.	Resource %1 has started on Server %2.	-	●	●	
nm	Info	4	Resource %1 of server %2 down.	Resource %1 has stopped on Server %2.	-	●	●	
nm	Error	10	Resource %1 of server %2 unknown.	Resources %1 status is unknown on Server %2.	Check if cable or network settings are proper on %1 Resources.	●	●	●
nm	Error	20	%1 process exit abnormally.	Process %1 was abnormally terminated...	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	●
nm	Info	21	system will be halted.	The system will be shut down.	-	●	●	
nm	Info	22	Cluster daemon will be stopped.	ExpressCluster daemon will be deactivated.	-	●	●	
nm	Info	23	system will be rebooted.	The system will be restarted.	-	●	●	
nm	Info	24	%1 process will be restarted.	Process %1 will be restarted.	-	●	●	
rc	Info	10	The start processing of a group %1 started.	Group %1 startup process has started.	-	●	●	
rc	Info	11	The start processing of a group %1 ended.	Group %1 startup process has completed.	-	●	●	
rc	Error	12	The start processing of a group %1 failed.	Group %1 startup process has failed.	Follow the group resource messages.	●	●	
rc	Info	20	The stop processing of a group %1 started.	Group %1 stop process has started.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rc	Info	21	The stop processing of a group %1 ended.	Group %1 stop process has completed.	-	●	●	
rc	Error	22	The stop processing of a group %1 failed.	Group %1 stop process has failed.	Follow the group resource messages.	●	●	
rc	Info	30	The start processing of a resource %1 started.	Resource %1 startup process has started.	-		●	
rc	Info	31	The start processing of a resource %1 ended.	Resource %1 startup process has completed.	-		●	
rc	Error	32	The start processing of a resource %1 failed. (%2 : %3)	Resource %1 startup process has failed.	See Section 12.4 in this document.	●	●	●
rc	Info	40	The stop processing of a resource %1 started.	Resource %1 stop process has started.	-		●	
rc	Info	41	The stop processing of a resource %1 ended.	Resource %1 stop process has completed.	-		●	
rc	Error	42	The stop processing of a resource %1 failed. (%2 : %3)	Resource %1 stop process has failed.	See Section 12.4 in this document.	●	●	●
rc	Info	50	The move processing of a group %1 started.	Group %1 migration process has started.	-	●	●	
rc	Info	51	The move processing of a group %1 ended.	Group %1 migration process has completed.	-	●	●	
rc	Error	52	The move processing of a group %1 failed.	Group %1 migration process has failed.	Follow the group resource messages.	●	●	
rc	Info	60	The failover processing of a group %1 started.	Group %1 failover process has started.	-	●	●	
rc	Info	61	The failover processing of a group %1 ended.	Group %1 failover process has completed.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rc	Error	62	The failover processing of a group %1 failed.	Group %1 failover process has failed.	Follow the group resource messages.	●	●	
rc	Info	70	The restart processing of a group %1 started.	Group %1 restart process has started.	-	●	●	
rc	Info	71	The restart processing of a group %1 ended.	Group %1 restart process has completed.	-	●	●	
rc	Error	72	The restart processing of a group %1 failed.	Group %1 restart process has failed.	Follow the group resource messages.	●	●	
rc	Info	80	The restart processing of a resource %1 started.	Resource %1 restart process has started.	-	●	●	
rc	Info	81	The restart processing of a resource %1 ended.	Resource %1 restart process has completed.	-	●	●	
rc	Error	82	The restart processing of a resource %1 failed.	Resource %1 restart process has failed.	Follow the group resource messages.	●	●	
rc	Info	90	Shutdown the cluster.	The cluster was shut down.	-	●	●	
rc	Info	91	Shutdown the server.	The server was shut down.	-	●	●	
rc	Error	92	group %1 is started on more than one server.	Group %1 is active on more than one server.	Server will automatically be shut down. See Section 10.7 in this document.	●	●	●
rm	Info	1	Monitor %1 start.	Started monitoring %1.	-	●	●	
rm	Info	2	Monitor %1 stop.	Stopped monitoring %1.	-	●	●	
rm	Info	3	Monitor %1 is not monitored in this server.	%1 is not monitored on this server.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rm	Warning	4	Monitor %1 warn. (%2 : %3)	%1 monitor resource warnings.	See Section 12.5 in this document.	●	●	
rm	Warning	5	Monitor resource is over maximum. (registered resource is %1.)	Exceeding the maximum number of monitor resources.	Confirm the cluster configuration data by Trekking Tool.	●	●	
rm	Warning	6	Configuration of %1 is invalid. (%2 : %3)	The monitor configuration is improper in %1.	Confirm the cluster configuration data by Trekking Tool.	●	●	
rm	Error	7	Monitor %1 failed in starting.	Failed to start monitoring %1.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	●
rm	Error	8	Monitor %1 failed in stopping.	Failed to stop monitoring %1.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Error	9	Monitor %1 failed. (%2 : %3)	An abnormality was detected by monitoring in %1.	See Section 12.5 in this document.	●	●	●
rm	Info	10	Monitor %1 dose not monitored.	%1 is not monitored.	-	●	●	
rm	Info	12	%1 was stopped for failure in %2.	Because an abnormality was detected by monitoring in %2, the recovery object %1 was stopped.	-	●	●	
rm	Info	13	%1 was restarted for failure in %2.	Because an abnormality was detected by monitoring in %2, the recovery object %1 was restarted.	-	●	●	
rm	Info	14	%1 was failover for failure in %2.	Because an abnormality was detected by monitoring in %2, the recovery object %1 was failed over.	-	●	●	
rm	Info	15	Stop of cluster was required for failure in %1.	Because an abnormality was detected by monitoring in %1, a cluster shutdown was requested.	-	●	●	
rm	Info	16	Halt of system was required for failure in %1.	Because an abnormality was detected by monitoring in %1, a system shutdown was requested.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rm	Info	17	Reboot of system was required for failure in %1.	Because an abnormality was detected by monitoring in %1, a system restart was requested.	-	●	●	
rm	Error	18	Stop of %1 by the failure in %2 was not completed.	Tried to stop the recovery object %1 due to abnormality in %2 monitoring, but failed.	Check the status of %1 resources.	●	●	
rm	Error	19	Restart of %1 by the failure in %2 was not completed.	Tried to restart the recovery object %1due to abnormality in %2 monitoring, but failed.	Check the status of %1 resources.	●	●	
rm	Error	20	Failover of %1 by the failure in %2 was not completed.	Tried to fail over the recovery object %1due to abnormality in %2 monitoring, but failed.	Check the status of %1 resources.	●	●	
rm	Error	21	Stop of cluster by the failure in %1 was not completed.	Tried to shut down the cluster due to abnormality in %1 monitoring, but failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Error	22	Halt of system by the failure in %1 was not completed.	Tried to shut down the system due to abnormality in %1 monitoring, but failed	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Error	23	Reboot of system by the failure in %1 was not completed.	Tried to restart the system due to abnormality in %1 monitoring, but failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Error	24	The group of %1 is unknown.	The group which contains %1 resource is unknown.	Possibly, the cluster configuration data is inconsistent. Check the data.	●	●	
rm	Warning	25	Not action because %1 is not online.	Because the recovery object %1 is inactive, it will not be recovered.	-	●	●	
rm	Info	26	Status of %1 changed normally.	%1 monitoring returned to normal from abnormal.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rm	Info	27	Status of %1 changed unknown.	%1 monitoring turned to unknown from abnormal or normal.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Error	28	Initialization error of monitor process. (%1 : %2)	Monitor process initialization error	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
rm	Info	50	The number of license is %1. (%2)	The number of cluster licenses is %1.	-	●	●	
rm	Info	51	Period of trial is till %1. (%2)	The trial version license will expire on %1.	-	●	●	
rm	Warning	52	The license is insufficient. The number of insufficient is %1. (%2)	You do not have enough licenses.	Purchase and register the license as many as you need.	●	●	
rm	Error	53	The license is not registered. (%1)	The license is not registered.	Purchase and register the license.	●	●	
rm	Error	54	The license of trial expired by %1. (%2)	Your trial version license expired.	Register the valid license.	●	●	
rm	Error	55	The license is invalid. (%1)	The registered license is invalid.	Register the valid license.	●	●	
rm	Error	56	The license is unknown. (%1)	The registered license is unknown.	Register the valid license.	●	●	
rm	Error	57	Stop of cluster was required because license (%1) was invalid.	A cluster shutdown was requested due to illicit license.	Register the valid license.	●	●	●
rm	Error	58	Stop of cluster by the license (%1) failure was not completed.	Failed to shut down the cluster due to illicit license.	Register the valid license.	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
rm	Error	59	The license of trial is valid from %1. (%2)	The trial version license is not yet effective.	Register the valid license.	●	●	
diskhb	Error	10	Device(%1) of resource(%2) is not exist.	Device does not exist.	Check the cluster configuration data.	●	●	
diskhb	Error	11	Device(%1) of resource(%2) is not block device.	Device does not exist.	Check the cluster configuration data.	●	●	
diskhb	Error	12	Raw device(%1) of resource(%2) is not exist.	Device does not exist.	Check the cluster configuration data.	●	●	
diskhb	Error	13	Bind device(%1) of resource(%2) to raw device(%3) failed.	Device does not exist.	Check the cluster configuration data.	●	●	
comhb	Info	1	Device(%1) is not exist.	Device does not exist.	Check the cluster configuration data.	●	●	
comhb	Info	2	open(%1) failed.	Failed to open the device.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
monp	Error	1	%1 process initialize error has occurred. (status=%2)	Initialization error in the process %1 to be monitored.	Possibly, ran out of memory or OS resources, or the cluster configuration data is inconsistent. Check them all.	●	●	
monp	Error	2	%1 process exit abnormally. (status=%2)	The process %1 to be monitored was abnormally terminated.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
monp	Info	3	%1 process will be restarted.	The process %1 to be monitored will be restarted.	-	●	●	
monp	Info	4	Cluster daemon will be stopped for %1 process exit abnormally.	Because the process %1 to be monitored was abnormally terminated, the cluster will be shut down.	-	●	●	
monp	Error	5	The stop of cluster daemon failed. (status=%1)	Tried to shut down the cluster, but failed.	Possibly, the cluster is not active, or there are not enough memory or OS resources. Check them all	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
monp	Info	6	System will be halted for %1 process exit abnormally.	Because the process %1 to be monitored was abnormally terminated, the system will be shut down.	-	●	●	
monp	Error	7	The halt of system failed. (status=%1)	Tried to shut down the system, but failed.	Possibly, the cluster is not active, or there are not enough memory or OS resources. Check them all.	●	●	
monp	Info	8	System will be rebooted for %1 process exit abnormally.	Because the process %1 to be monitored was abnormally terminated, the system will be restarted.	-	●	●	
monp	Error	9	The reboot of system failed. (status=%1)	Tried to restart the system, but failed.	Possibly, the cluster is not active, or there are not enough memory or OS resources. Check them all.	●	●	
mdagent	Info	1	Agent has started successfully.	Mirror Agent has started properly.	-	●	●	
mdagent	Error	2	Failed to start agent.%1	Failed to start Mirror Agent. The following messages are logged in %1. 1) Agent is running. 2) Command clpmdinit is running. 3) Command clpmdchng is running. 4) IP address in config file is wrong. 5) Server name in config file is wrong. 6) There is an error in config file. 7) Failed to initialize socket server.	Depending on the message displayed in %1, the countermeasures vary. 1) Agent has been active. 2,3) clpmdinit or clpmdchng command is running. Confirm the command has completed, then try again. 4,5,6) Check the cluster configuration data. 7) Possibly, there are not enough memory or OS resources. Check if there are enough of them.	●	●	
mdagent	Info	3	Stop agent successfully.	Mirror Agent was successfully terminated.	-	●	●	
mdagent	Error	4	Stop agent abnormally.	Failed to stop Mirror Agent.	Possibly, the cluster is not active, or there are not enough memory or OS resources. Check them all.	●	●	
mdadmn	Error	1	Failed to activate mirror disk.%1(Device:%2)	Failed to activate %2. The following messages are logged in %1.	Depending on the message displayed in %1, the	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
				1) Failed to open I/O port. 2) The local server hasn't the latest data. 3) Communication to the remote server failed. 4) The remote server is active. 5) The local server was already active. 6) Mount operation failed.	countermeasures vary. 1) Failed to open the port. Check the cluster configuration data. 2) Your server does not have the latest data. You have to perform the mirror recovery. 3) Failed to communicate with the other server. Check the connection status of mirror disk connect. 4) Has been on the other server. Check the mirror disk resource statuses. 5) Has been on your server. Check the mirror disk resource statuses. 6) Failed to mount. Check if there is any mount point, or mount option or other data is correct in the cluster configuration data.			
mdadmn	Info	2	Fsck has been started.(Device: %1)	fsck has started in %1.	-	●	●	
mdadmn	Info	3	Disk has cleaned by fsck.(Device: %1)	fsck has successfully completed in %1.	-	●	●	
mdadmn	Error	4	Failed to deactivate mirror disk.%1(Device:%2)	Failed to deactivate %2. The following messages are logged in %1. 1) The mirror disk was already deactivated. 2) Umount operation failed.	Depending on the message displayed in %1, the countermeasures vary. 1) Has been inactive. Check the mirror disk resource statuses. 2) Failed to umount. Confirm that the file system of mirror disk resources is not busy.	●	●	
mdadmn	Error	5	Building of switch mirror disk finished abnormally.%1(Device:%2)	The mirror recovery failed in %2. The following messages are logged in %1. 1) The recovery is in progress.	Depending on the message displayed in %1, the countermeasures vary.	●	●	●

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
				2) The destination server is active. 3) Can not judge the recovery direction. 4) The source server is abnormal.	1) The mirror recovery is in progress. When the mirror recovery has completed, try again. 2) The mirror disk resources have been active on the copied-to server. Check the mirror disk resource statuses. 3) Cannot identify the mirror recovery direction. You have to perform the forcible mirror recovery. 4) The copied-from server status is abnormal. Check the Mirror Agent status.			
mdadmn	Info	6	Building of switch mirror disk has finished successfully.(Device: %1)	The mirror recovery has successfully completed in %1.	-	●	●	
mdadmn	Info	7	Recovery mode is %1.	The mirror recovery mode is %1.	-	●	●	
mdadmn	Info	8	The number of license is %1. (%2)	The number of FastSync Option licenses is %1.	-	●	●	
mdadmn	Info	9	Period of trial is till %1. (%2)	The trial version license will expire on %1.	-	●	●	
mdadmn	Error	10	The license is unknown. (%1)	The registered license is unknown.	Register the valid license.	●	●	
mdadmn	Error	11	The license is invalid. (%1)	The registered license is invalid.	Register the valid license.	●	●	
mdadmn	Error	12	The license is not registered. (%1)	The license is not registered.	Purchase and register the license.	●	●	
mdadmn	Warning	13	The license is insufficient. The number of insufficient is %1. (%2)	You do not have enough licenses.	Purchase and register the license as many as you need.	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
mdadmn	Error	14	The license of trial expired by %1. (%2)	Your trial version license expired.	Register the valid license.	●	●	
mdadmn	Error	15	The license of trial is valid from %1. (%2)	The trial version license is not yet effective.	Register the valid license.	●	●	
mdadmn	Info	16	Initial recovery of mirror disk started.(Device:%1)	Initial mirror building has started in %1.	-	●	●	
mdadmn	Info	17	Recovery started.(Device: %1)	The mirror recovery has started in %1.	-	●	●	
mdadmn	Info	18	Initial recovery of mirror disk has finished successfully.(Device:%1)	The initial mirror building has successfully completed in %1.	-	●	●	
mdadmn	Error	19	Initial recovery of mirror disk finished abnormally.%1(Device:%2)	The initial mirror building has failed in %2. The following messages are logged in %1. 1) The recovery is in progress. 2) The destination server is active. 3) Can not judge the recovery direction. 4) The source server is abnormal.	Depending on the message displayed in %1, the countermeasures vary. 1) The mirror recovery is in progress. When the mirror recovery has completed, try again. 2) Resources have been active on the copied-to server. Check the mirror disk resource statuses. 3) Cannot identify the mirroring direction. You have to perform the forcible mirror recovery. 4) The copied-from server status is abnormal. Check the Mirror Agent status.	●	●	●
disk	Info	10	Fsck has been started.(Device: %1)	Fsck of %1 has been started.	-	●	●	
disk	Info	11	Disk has been cleaned by fsck.(Device: %1)	Fsck of %1 was successful.	-	●	●	

Module Type	Event type	Event ID	Message	Description	Countermeasures	Reported to		
						alert	syslog	mail
vxdg	Info	10	Execute vxdg import with clear host ID.(DiskGroup: %1)	Disk group %1 with -C option was imported.	-	●	●	
vxdg	Warning	11	Execute vxdg import with force.(DiskGroup: %1)	Disk group %1 with -f option was imported.	-	●	●	
vxvol	Info	10	Fsck has been started.(Device: %1)	Fsck of %1 has been started.	-	●	●	
vxvol	Info	11	Disk has been cleaned by fsck.(Device: %1)	Fsck of %1 was successful.	-	●	●	

12.2 Mirror Driver syslog Message

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	registered device at major %1, nmp count is %2	Successfully loaded the mirror driver.	-
liscal	Info	unregister blkdev successfully.	Successfully unloaded the mirror driver.	-
liscal	Info	NMP(%1) no memory for writing bitmap queue.	Low physical memory	Ran out of physical memory. Add physical memories, or terminate unnecessary applications. The maximum number of allowed request queues may be too great. Specify a smaller number. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Info	malloc wait_queue head failed.	ditto	ditto
liscal	Info	NMP%1 malloc buffer failed.	ditto	ditto
liscal	Info	malloc write_bmp_queue failed.	ditto	ditto
liscal	Info	malloc buffer failed.	ditto	ditto
liscal	Info	NMP%1 malloc wq failed, to abort.	ditto	ditto
liscal	Info	NMP%1 malloc buffer failed, to abort.	ditto	ditto
liscal	Info	NMP%1 malloc liscal_trans_request failed, to abort.	ditto	ditto
liscal	Info	NMP%1 malloc req->var failed, to abort.	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	NMP%1 malloc buffer head failed.	ditto	ditto
liscal	Info	NMP%1 malloc tmp_buf failed, start(%2) end(%3), to abort.	ditto	ditto
liscal	Info	NMP%1 malloc liscal_trans_request failed, start(%2) end(%3), to abort.	ditto	ditto
liscal	Info	NMP%1 malloc req->var failed, start(%2) end(%3), to abort.	ditto	ditto
liscal	Info	NMP%1 malloc buf_head failed, start(%2) end(%3), to abort.	ditto	ditto
liscal	Info	malloc luread_bh failed.	ditto	ditto
liscal	Info	malloc disread_bh failed.	ditto	ditto
liscal	Info	malloc bh failed.	ditto	ditto
liscal	Info	malloc dis_bh failed.	ditto	ditto
liscal	Info	malloc last_bh failed.	ditto	ditto
liscal	Info	malloc mirr_bh failed.	ditto	ditto
liscal	Info	malloc liscal_sned_ack2_queue failed.	ditto	ditto
liscal	Info	malloc page failed.	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	malloc b_page failed.	ditto	ditto
liscal	Info	malloc request failed.	ditto	ditto
liscal	Info	NMP%1 local_bh alloc failed.	ditto	ditto
liscal	Info	NMP%1 read bitmap from CP error(%2).	Disk I/O failure	If this message is displayed in operation, a physical abnormality is occurring in mirror disks. Replace the mirroring disks, then, perform the mirror recovery. If this message is displayed when building a cluster, check the cluster partition settings in cluster configuration data.
liscal	Info	liscal_bitmap_readwrite return error(%1).	ditto	ditto
liscal	Info	NMP%1 I/O incomplete.	ditto	ditto
liscal	Info	NMP%1 disk I/O error .	ditto	ditto
liscal	Info	write disk error flag I/O error.	ditto	ditto
liscal	Info	read disk error flag I/O error.	ditto	ditto
liscal	Info	NMP%1 read error.	ditto	ditto
liscal	Info	NMP%1 disk I/O error when write sector(%2).	ditto	ditto
liscal	Info	NMP%1 com port is closed, exit.	The mirror recovery failure	Check the connection status of mirror disk connect. Or, the load may be too heavy.

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	NMP(%1) com port has already closed, to abort recovery.	ditto	ditto
liscal	Info	NMP(%1):mirror break occurred, recovery failed.	ditto	ditto
liscal	Info	NMP%1 data received, but com port is closed, can not send ack1.	ditto	ditto
liscal	Info	NMP%1 socket binding failed(%2).	Failed to establish connection between servers, or communication between servers failed.	Check the mirror disk connect settings in the cluster configuration. Check the connection status of mirror disk connect.
liscal	Info	NMP%1 socket listening failed(%2).	ditto	ditto
liscal	Info	creating socket failed(%1).	ditto	ditto
liscal	Info	NMP%1 receiving failed(%2).	ditto	ditto
liscal	Info	NMP%1 connection failed(%2).	ditto	Check the mirror disk connect settings in the cluster configuration. Check the connection status of mirror disk connect. The connection timeout value may be too small. Specify a greater value. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Info	create send ack2 socket failed(%1)	ditto	Check the mirror disk connect settings in the cluster configuration. Check the connection status of mirror disk connect.
liscal	Info	create hb client socket failed(%1)	ditto	ditto
liscal	Info	NMP%1 accept failed(%2).	ditto	ditto
liscal	Info	NMP%1 deciding connection type failed(%2)	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	send ack2 connection failed(%1)	ditto	ditto
liscal	Info	send ack2 failed (%1).	ditto	ditto
liscal	Info	ack2 packet receive failed(%1).	ditto	ditto
liscal	Info	NMP%1 data part receive failed(%2).	ditto	ditto
liscal	Info	NMP%1 send head part failed(%2), start(%3) end(%4), to abort.	ditto	ditto
liscal	Info	NMP%1 send head part(secnr=%2) failed(%3), close com_port and exit.	ditto	ditto
liscal	Info	NMP%1 2nd send data part(secnr=%2) failed(%3), close com_port and exit.	ditto	ditto
liscal	Info	NMP%1 send data failed. (secnr=%2 length=%3)	ditto	ditto
liscal	Info	NMP%1 send data part failed again(%2), start(%3) end(%4), to abort.	ditto	ditto
liscal	Info	NMP%1 send data part failed(%2), start(%3) end(%4), to abort.	ditto	ditto
liscal	Info	NMP%1 recv ack time out again, start(%2) end(%3), to abort.	ditto	ditto
liscal	Info	NMP%1 send RawWriteAck failed(%2).	ditto	ditto
liscal	Info	NMP%1 head part recv failed(%2).	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	NMP%1 send ack1 failed(%2).	ditto	ditto
liscal	Info	send icmp_packet error(%1).	ditto	ditto
liscal	Info	recv icmp_packet error(%1).	ditto	ditto
liscal	Info	send hb failed (%1).	ditto	ditto
liscal	Info	packet receive failed(%1).	ditto	ditto
liscal	Info	send hb reply failed (%1).	ditto	ditto
liscal	Info	NMP%1 second send data failed(%2), to release socket.	ditto	ditto
liscal	Info	NMP%1 wrong command received(%2).	Unexpected data was received in communications between servers.	An abnormality may have occurred on mirror disks. Check the connection status of mirror disk connect. Mirror disk connect may be used by an application other than ExpressCluster. Disallow other applications than ExpressCluster to access mirror disk connect. See Chapter 8 “COMMUNICAITON PORT, MIRROR DRIVER MAJOR NUMBER” for the port that ExpressCluster uses.
liscal	Info	wrong package received.<magic = %1>	ditto	ditto
liscal	Info	wrong section received.<magic = %1>	ditto	ditto
liscal	Info	recv msg error(%1).	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	NMP%1 head part received is wrong. (magic=%2, cmd=%3)	ditto	ditto
liscal	Info	NMP%1 receive wrong magic data.	ditto	ditto
liscal	Info	NMP%1 to exec second send(%2).	A communication retry occurred between servers.	Check that neither mirror disk connect nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run.
liscal	Info	NMP%1 1st send data part(secnr=%2) failed(%3), try again.	ditto	Check that neither mirror disk connect nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run. The receive acknowledge timeout value may be too small. Specify a greater value. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Info	NMP%1 send data part failed(%2), start(%3) end(%4), try again.	ditto	Check that neither mirror disk connect nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run. The send timeout value may be too small. Specify a greater value. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Info	NMP%1 recv ack time out, try again, start(%2) end(%3).	ditto	Check that neither mirror disk connect nor the operating system is loaded heavily. This will not cause a problem on the operation immediately, however, may be a cause of mirror break in the long run. The receive acknowledge timeout value may be too small. Specify a greater value. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Info	NMP%1 sendForceComClose: sending failed(%2).	The mirror disk connect was temporarily disconnected.	This is not an immediate problem on operation, however, the mirror disk connect may be disconnected due to a problem on the other server. Check messages on the other server, then, take countermeasures.
liscal	Info	NMP%1 open I/O port OK	I/O to the mirror partition device was freed.	-
liscal	Info	NMP%1 close I/O port OK.	I/O to the mirror partition device was closed.	-

Module Type	Event type	Message	Description	Countermeasures
liscal	Info	NMP%1 I/O port was closed, mount(%2), io(%3)	Data synchronization in data partitions is canceled.	The mirror partition device is not mounted. Check the mirror disk resource statuses.
liscal	Info	NMP%1 data received, but mount port is closed, skip write to disk	Data synchronization in data partitions is canceled.	The mirror partition device is not mounted. Check the mirror disk resource statuses.
liscal	Info	can not find a using network.	No network is available for mirror disk connect.	Check the cluster configuration data. Check the connection status of mirror disk connect.
liscal	Error	Unable to set liscalstat proc entry.	Failed to create /proc/liscalstat file.	Ran out of physical memory. Add physical memories, or terminate unnecessary applications. The maximum number of allowed request queues may be too great. Specify a smaller number. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Error	Unable to set liscalinner proc entry.	Failed to create /proc/liscalinner file.	Ran out of physical memory. Add physical memories, or terminate unnecessary applications. The maximum number of allowed request queues may be too great. Specify a smaller number. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Error	NMP%1 liscal_wait_ack2_queuet failed.	Low physical memory	Ran out of physical memory. Add physical memories, or terminate unnecessary applications. The maximum number of allowed request queues may be too great. Specify a smaller number. For how to change the number, see a separate guide, “Trekking Tool”.
liscal	Error	NMP%1 malloc buffer_head failed. send ack1 with fail at once.	ditto	ditto
liscal	Error	NMP%1 malloc end_io_para failed. send ack1 with fail at once.	ditto	ditto
liscal	Error	malloc send_ack1_queue failed.	ditto	ditto
liscal	Error	No memory for kernel nmp_info remote_write_head sys_variable.	ditto	ditto

Module Type	Event type	Message	Description	Countermeasures
liscal	Error	malloc buffer failed.	ditto	ditto
liscal	Error	bitmap data write error, so set disk_err TRUE.	Disk I/O failure	If this message is displayed in operation, a physical abnormality is occurring in mirror disks. Replace the mirroring disks, then, perform the mirror recovery. If this message is displayed when building a cluster, check the c luster configuration data.
liscal	Error	warning!! NMP%1 disk I/O error, system will reboot.	ditto	ditto
liscal	Error	ERROR:MOUNT PORT is opened	There is an active mirror disk resource when unloading the mirror driver.	Check the mirror disk resource statuses.
liscal	Error	ERROR:NMP%1 is busy.	The mirror partition device is busy now.	Check the mirror disk resources are not accessed.
liscal	Error	unable to create major number %1	The major number is in use already.	Check if any driver other than the mirror driver uses the same major number. For the major number used by the mirror driver, see Chapter 8 “COMMUNICAITON PORT, MIRROR DRIVER MAJOR NUMBER”.
liscal	Error	unable to init own_device_blksize %1.	Failed to load the driver.	Check if any driver other than the mirror driver uses the same major number. For the major number used by the mirror driver, see Chapter 8 “COMMUNICAITON PORT, MIRROR DRIVER MAJOR NUMBER”.

12.3 How To Start/Stop Receiving Mail Report

Do the followings if you want to start or stop receiving the mail report.
You have to edit message files on all servers in the cluster.

(1) Stop the cluster with the clpcl -t -a (run this command on one of the servers in the cluster).

(2) Log in each server in the cluster and navigate to /opt/nec/clusterpro/messages.

(3) Edit the following eight message files by vi or by other means.
- pm.msg.us (Process Manager related)
- nm.msg.us (Heartbeat resources related)
- rc.msg.us (Group resources related)
- rm.msg.us (Monitor resources related)
- diskhb.msg.us (Disk heartbeat resources related / for SE and XE)
- comhb.msg.us (COM heartbeat resources related / for SE and LE)
- mdagent.msg.us (Mirror Agent related / for LE)
- mdadmn.msg.us (Mirror disk resources related / for LE)

1. If you want to stop receiving the mail report of pm's event ID13:

Before changes	Changed to
ID=13 SEND=syslog,alert,mail MSG=A problem is detected in configuration file. LVL=ERR	ID=13 SEND=syslog,alert MSG=A problem is detected in configuration file. LVL=ERR

2. If you want to receive the mail report of pm's event ID13:

Before changes	Changed to
ID=13 SEND=syslog,alert MSG=A problem is detected in configuration file. LVL=ERR	ID=13 SEND=syslog,alert,mail MSG=A problem is detected in configuration file. LVL=ERR

(4) Start the cluster with the clpcl -s -a (run this command on one of the servers in the cluster).

If you changed any of mdagent.msg.us or mdadmn.msg.us, you have to reboot the servers. Therefore, restart all servers in the cluster with the reboot command, instead of the clpcl command.

12.4 Detailed Info When Group Resources Are Active/Inactive

12.4.1 Floating IP addresses resources

Module Type	type	Return value	Message	Description	Countermeasures
fip	Error	14	IP address did not exist.	Failed to get the IP address list.	Confirm that the OS can use TCP/IP protocol.
fip	Error	15	This ip address was already used. IP=%1	The specified IP address exists on the same network.	Check if the specified IP address is used on the network.
fip	Error	17	Fip interface was not found.	Floating IP address interface was not found.	Check if the FIP address's network is the same as the server's real IP address.
fip	Error	others	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.4.2 Disk resources

Module Type	type	Return value	Message	Description	Countermeasures
disk	Error	1	Resource name was invalid. (%1)	Resource name was improper.	Check if it is consistent with the cluster configuration data.
disk	Error	1	Group name was invalid. (%1)	Group resource name was improper.	Check if it is consistent with the cluster configuration data.
disk	Error	1	Resource was not in config. (%1)	Resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
disk	Error	1	Group was not in config. (%1)	Group resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
disk	Error	1	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration exists.
disk	Error	1	Mount point was already mounted. (%1)	The device has been mounted.	Check if the specified device has been unmounted.
disk	Error	1	Mount point was not mounted. (%1)	The mount point was not mounted.	The active resource may manually be unmounted. Check its status.
disk	Error	1	Mount point was invalid. (%1)	Mount point is improper.	Check if the mount point exists.
disk	Error	1	Creating of mount point was failed. (%1)	Failed to create the mount point.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
disk	Error	1	Max recover retry over. (%1, retry=%2)	Exceeding the maximum retry times when activating the device.	Check if the cluster configuration data is correct.
disk	Error	1	Command path was invalid. (%1)	The execution path is improper.	Check the command execution path.
disk	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
disk	Error	1	Command failed. (%1, ret=%2)	The device operation failed.	Troubleshoot this based on the return value from the command.

Module Type	type	Return value	Message	Description	Countermeasures
disk	Error	1	Command failed. (%1(%2), errno=%3)	The device operation failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
disk	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.4.3 EXEC resources

Module Type	type	Return value	Message	Description	Countermeasures
exec	Error	1	Termination code %1 was returned.	An exit code other than 0 (zero) was returned as the result of synchronous script or application.	Script: There may be a problem in the content of the script. Check the script is correct. Application: The application may abnormally be terminated. Check if the application is working properly.
exec	Error	1	Command was not completed within %1 seconds.	A synchronous script or application did not successfully completed within the specified time.	Script: There may be a problem in the content of the script. Check the script is correct. Application: The application may be stalling. Check if the application is working properly. You may be able to identify the cause from the logs in both cases. For details about logging settings, see “Parameters Details” in a separate guide, “Trekking Tool”.
exec	Error	1	Command was aborted.	A synchronous script or application failed.	Application: The application may abnormally be terminated. Check if the application is working properly. Possibly, there are not enough memory or OS resources. Check if there are enough of them.
exec	Error	1	Command was not found. (error=%1)	The application does not exist.	The path to the application may be incorrect. Check it in the cluster configuration data
exec	Error	1	Command string was invalid.	The application path is incorrect.	Check the application path in the cluster configuration data.
exec	Error	1	Log string was invalid.	The log output path is incorrect.	Check the log output path in the cluster configuration data.
exec	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.4.4 Mirror disk resources

Module Type	type	Return value	Message	Description	Countermeasures
md	Error	1	Need to start mirror agent at first.	Mirror Agent is not active.	Check if Mirror Agent is active.
md	Error	2	Options or parameters are invalid.	Parameters are incorrect.	Check if the cluster configuration data is correct.
md	Error	4	Getting of config was failed.	Failed to get the cluster configuration.	Check if the cluster configuration data exists.
md	Error	30	Internal error[status=%1]	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
md	Error	77	Mirror disk was not in config.(%1)	Configuration data of mirror disk resources is incorrect.	Check if the cluster configuration data is correct.
md	Error	79	Failed to get cluster partition information.	Failed to get the cluster partition data.	Check if the partition is allocated, and the operating system can recognize the disk.
md	Error	80	Mount point was already mounted.(%1)	The mount point has been mounted.	Check if the mount point of the mirror disk resources has been mounted manually.
md	Error	81	The local server has not the latest data.(%1)	Your server does not have the latest data.	You have to perform the mirror recovery.
md	Error	82	Failed to set cluster partition information.	Failed to access the cluster partition.	Check if the partition is allocated, and the operating system can recognize the disk.
md	Error	83	Command timeout(%1, timeout=%2)	The system command timed out.	It took longer than expected to run the system command. Tune the mount timeout, unmount timeout, and fsck timeout values. For details, see a separate guide, “Trekking Tool”.
md	Error	84	Mount point was not mounted. (%1)	The mirror disk resource is not mounted.	Check if it has manually been unmounted. Check the memory. ExpressCluster controls mounting and unmounting. Never mount or unmount it manually.

Module Type	type	Return value	Message	Description	Countermeasures
md	Error	87	Creating of mount point was failed. (%1)	Failed to create the mount point.	Check if the mount point is specified in the cluster configuration data. Confirm that the mount point exists.
md	Error	89	Command failed. (%1)	Failed to run the system command.	Check if mount, umount and fsck commands exist.

12.4.5 RAW resource

Module Type	type	Return value	Message	Description	Countermeasures
raw	Error	1	Resource name was invalid. (%1)	Resource name was improper.	Check if it is consistent with the cluster configuration data.
raw	Error	1	Group name was invalid. (%1)	Group resource name was improper.	Check if it is consistent with the cluster configuration data.
raw	Error	1	Resource was not in config. (%1)	Resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
raw	Error	1	Group was not in config. (%1)	Group resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
raw	Error	1	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration exists.
raw	Error	1	Command path was invalid. (%1)	The execution path is improper.	Check the command execution path.
raw	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
raw	Error	1	Command failed. (%1, ret=%2)	Command %1 failed. The return value of the command is %2.	Troubleshoot this based on the return value from the command.
raw	Error	1	Command failed. (%1(%2), errno=%3)	The device operation failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
raw	Error	1	Raw device was already bound. (%1)	A raw device is already bound by another device.	Check if a unique raw device is set within the cluster.
raw	Error	1	Device was invalid. (%1)	The device name is invalid.	Check if a block device is set correctly.
raw	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.4.6 VxVM disk group resource

Module Type	type	Return value	Message	Description	Countermeasures
vxdg	Error	1	Resource name was invalid. (%1)	Resource name was improper.	Check if it is consistent with the cluster configuration data.
vxdg	Error	1	Group name was invalid. (%1)	Group resource name was improper.	Check if it is consistent with the cluster configuration data.
vxdg	Error	1	Resource was not in config. (%1)	Resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
vxdg	Error	1	Group was not in config. (%1)	Group resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
vxdg	Error	1	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration exists.
vxdg	Error	1	Command path was invalid. (%1)	The execution path is improper.	Check the command execution path.
vxdg	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
vxdg	Error	1	Command failed. (%1, ret=%2)	Command %1 of VxVM failed. The return value of the command is %2.	Analyze the failure using the return value of the command.
vxdg	Error	1	Command failed. (%1(%2), errno=%3)	The device operation failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
vxdg	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.4.7 VxVM volume resource

Module Type	type	Return value	Message	Description	Countermeasures
vxvol	Error	1	Resource name was invalid. (%1)	Resource name was improper.	Check if it is consistent with the cluster configuration data.
vxvol	Error	1	Group name was invalid. (%1)	Group resource name was improper.	Check if it is consistent with the cluster configuration data.
vxvol	Error	1	Resource was not in config. (%1)	Resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
vxvol	Error	1	Group was not in config. (%1)	Group resource name does not exist in the cluster configuration data.	Check if it is consistent with the cluster configuration data.
vxvol	Error	1	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration exists.
vxvol	Error	1	Mount point was already mounted. (%1)	The device has been mounted.	Check if the specified device has been unmounted.
vxvol	Error	1	Mount point was not mounted. (%1)	The mount point was not mounted.	The active resource may manually be unmounted. Check its status.
vxvol	Error	1	Mount point was invalid. (%1)	Mount point is improper.	Check if the mount point exists.
vxvol	Error	1	Creating of mount point was failed. (%1)	Failed to create the mount point.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
vxvol	Error	1	Max recover retry over. (%1, retry=%2)	Exceeding the maximum retry times when activating the device.	Check if the cluster configuration data is correct.
vxvol	Error	1	Command path was invalid. (%1)	The execution path is improper.	Check the command execution path.
vxvol	Error	1	Command timeout. (%1, timeout=%2)	Detected an internal timeout.	The OS may be heavily loaded. Check its status.
vxvol	Error	1	Command failed. (%1, ret=%2)	The device operation failed.	Troubleshoot this based on the return value from the command.

Module Type	type	Return value	Message	Description	Countermeasures
vxvol	Error	1	Command failed. (%1(%2), errno=%3)	The device operation failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
vxvol	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.5 Detailed Info At Monitor Resource Error

12.5.1 IP monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
ipw	Error	1	Ping cannot reach. (ret=%1) IP=%2...	Did not receive the packet with the ping command.	Check if you can ping the IP address. If you fail, check the device that has the IP address or the network interface.
ipw	Error	2	Ping was failed. (ret=%1) IP=%2...	Ping command failed.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
ipw	Error	5	Ping was failed by timeout. IP=%s...	Ping command failed due to timeout.	Possibly, the system is heavily loaded, or there are not enough memory or OS resources. Check them all.
ipw	Error	6	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.5.2 Disk monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
diskw	Error	12	Ioctl was failed. (err=%1) Device=%2	Failed to control the device.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there.
diskw	Error	13	Ioctl was failed by timeout. Device=%1	The device control failed due to timeout.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, the system is heavily loaded, or there are not enough memory or OS resources. Check them all.
diskw	Error	14	Open was failed. (err=%1) Device=%2	Failed to open the device.	Check if the device driver for the disk to be monitored has been loaded, or the disk device to be monitored exists. Also, check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, there are not enough memory or OS resources. Check if there are enough of them.
diskw	Error	15	Open was failed by timeout. Device=%1	Failed to open the device due to timeout.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, the system is heavily loaded, or there are not enough memory or OS resources. Check them all.
diskw	Error	16	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, there are not enough memory or OS resources. Check if there are enough of them.
diskw	Error	17	Read was failed by timeout. Device=%1	Failed to read from the device due to timeout.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, the system is heavily loaded, or there are not enough memory or OS resources. Check them all.

Module Type	type	Return value	Message	Description	Countermeasures
diskw	Error	18	Write was failed. (err=%1) Device=%2	Failed to write in file descriptor.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, there are not enough memory or OS resources. Check if there are enough of them.
diskw	Error	19	Write was failed by timeout. Device=%1	Failed to write in the device due to timeout.	Check if the disk to be monitored is properly connected, or it is powered on, or no abnormality is occurring there. Possibly, the system is heavily loaded, or there are not enough memory or OS resources. Check them all.
diskw	Error	22	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.5.3 PID monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
pidw	Error	1	Resource %1 was not found.	The resource was not found.	Confirm the cluster configuration data by Trekking Tool.
pidw	Error	1	Process does not exist. (pid=%1)	The process does not exist.	Somehow, the process to be monitored disappeared.
pidw	Error	1	Internal error. (status=%1)	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.

12.5.4 RAW monitor resource

Module Type	type	Return value	Message	Description	Countermeasures
raww	Error	12	Device was invalid. Device=%1	The specified real device is invalid.	Check the device name of the RAW monitor resource using a trekking tool.
raww	Error	14	Open was failed. (err=%1) Device=%2	Failed to open the device.	Check if: Disk driver of target disk is loaded, Target disk device is present, Target disk is properly connected, Target disk is turned on, or other failures have occurred on target disk. Check if there is enough memory and OS resource.
raww	Error	15	Open was failed by timeout. Device=%2	Device open failed due to a timeout.	Check if Target disk is properly connected, Target disk is turned on, Or other failures have occurred on target disk. Check if the system is high loaded, and there is enough memory and OS resource.
raww	Error	16	Read was failed. (err=%1) Device=%2	Failed to read from device.	Check if Target disk is properly connected, Target disk is turned on, Or other failures have occurred on target disk. Check if there is enough memory and OS resource.
raww	Error	17	Read was failed by timeout. Device=%1	Failed to read from device due to a timeout.	Check if Target disk is properly connected, Target disk is turned on, Or other failures have occurred on target disk. Check if the system is high loaded, and there is enough memory and OS resource.
raww	Error	33	Already bound for other. Rawdevice=%1 Device=%2	The RAW device is already bound by another real device.	The specified RAW device is already bound by another real device. Change the RAW device name using trekking tool.
raww	Error	34	popen was failed. (err=%1)	popen was failed.	popen was failed. Check if there is enough memory and OS resource.

Module Type	type	Return value	Message	Description	Countermeasures
raww	Error	36	Bind was failed. Rawdevice=%1 Device=%2	Bind was failed.	Bind was failed. Change the RAW device name using trekking tool.
raww	Error	37	stat wad failed. (err=%1) Device=%2	stat was failed.	stat was failed. Change the real device name using trekking tool.
raww	Error		Internal error. (status=%1)	Other internal error occurred.	-

12.5.5 User space monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
userw	Error	1	Initialize error. (%1)	Detected an abnormality when initializing the process.	Check if softdog.o and /dev/watchdog exist.

12.5.6 Mirror disk monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
mdw	Error	1	Need to start mirror agent at first.	Mirror Agent is not active	Check if Mirror Agent is active.
mdw	Error	2	Options or parameters are invalid.	Parameters are incorrect.	Check if the cluster configuration data is correct.
mdw	Error	4	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration data exists.
mdw	Error	5	Monitor config error.(%1)	The configuration data of mirror disk monitor resources is incorrect.	Check if the cluster configuration data is correct.
mdw	Error	30	Internal error[status=%1]	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
mdw	Error	51	Remote driver status is unknown.	Failed to get the other server's status.	Check if Mirror Agent is active on the other server. Check the connection status of mirror disk connect. Check if the IP address in the cluster configuration data is correct.
mdw	Error	52	Remote driver is abnormal.	The mirror driver is abnormal on the other server.	Restart the other server.
mdw	Error	53	Local driver is abnormal.	The mirror driver is abnormal on your server.	Restart your server.
mdw	Error	54	Both drivers are abnormal.	The mirror driver is abnormal on your server and the other server.	After cluster shutdown, restart the both servers.
mdw	Error	58	Local mirror disk status is unknown or not constructed.(%1)	The mirroring disk status is unknown on your server, or the initial mirror construction is not performed yet.	You have to perform the initial mirror construction.
mdw	Error	63	Local mirror disk is abnormal. (%1)	Mirror disk is abnormal on your server.	Your server does not have the latest data. You have to perform the mirror recovery.

Module Type	type	Return value	Message	Description	Countermeasures
mdw	Error	64	Remote mirror disk is abnormal.(%1)	Mirror disk is abnormal on the other server.	The other server does not have the latest data. You have to perform the mirror recovery.
mdw	Error	65	Both mirror disks are abnormal.(%1)	Mirror disks are abnormal on your server and the other server.	You have to perform the forcible mirror recovery.
mdw	Error	66	Mirror disk was activated on both servers.(%1)	Mirror disk resources have been activated on both servers.	If it is detected that mirror disk resources are active on both servers, the servers will be automatically shut down. Restart the server. See the line where the module type is rc and event ID is 92 in Section 12.1 “Syslog, Alert, Mail Report Message” and Section 10.7 “Recovery From Network Partitioning” for details.
mdw	Error	100	The recovery is in progress. (%1)	The mirror recovery is in progress.	Please wait until the mirror recovery is successfully completed.

12.5.7 Mirror disk connect monitor resources

Module Type	type	Return value	Message	Description	Countermeasures
mdnw	Error	1	Need to start mirror agent at first.	Mirror Agent is not active.	Check if Mirror Agent is active.
mdnw	Error	2	Options or parameters are invalid.	Parameters are incorrect.	Check if the cluster configuration data is correct.
mdnw	Error	4	Getting of config was failed.	Failed to get the cluster configuration data.	Check if the cluster configuration data exists.
mdnw	Error	5	Monitor config error.(%1)	Configuration data in mirror disk connect monitor resource is incorrect.	Check if the cluster configuration data is correct.
mdnw	Error	30	Internal error[status=%1]	Other internal error occurred.	Possibly, there are not enough memory or OS resources. Check if there are enough of them.
mdnw	Error	31	Network was interrupted	Mirror disk connect is disconnected.	Check the connection status of mirror disk connect.

12.5.8 VxVM daemon monitor resource

Module Type	type	Return value	Message	Description	Countermeasures
vxdw	Error	10	Command was failed. Command=%1	Command %1 failed.	Command %1 failed. Check the operation status of VxVM config daemon.
vxdw	Error	11	Option was invalid.	The option is invalid.	Check the cluster configuration information using a trekking tool.
vxdw	Error	23	Thread timeout. Command=%1 Timeout=%2	Timeout has occurred with thread which executes command.	Check the cause of monitoring process timeout.
vxdw	Error	27	popen was failed. (err=%1)	popen was failed.	popen was failed. Check if there is enough memory and OS resource.
vxdw	Error		Internal error. (status=%d)	Other internal error occurred.	-

12.5.9 VxVM volume monitor resource

Module Type	type	Return value	Message	Description	Countermeasures
vxvolw	Error	11	Option was invalid.	Option is invalid.	Check the cluster configuration information using a trekking tool.
vxvolw	Error	12	Open was failed. (err=%1) Device=%2	Failed to open the device.	Check if VxVM is operating properly. Check if there is enough memory and OS resource.
vxvolw	Error	13	Open was failed by timeout. Device=%!	Failed to open the device due to timeout.	Check if VxVM is operating properly. Check if the system is high loaded, and there is enough memory and OS resource.
vxvolw	Error	14	Read was failed. (err=%1) Device=%2	Failed to read from the device.	Check if VxVM is operating properly. Check if there is enough memory and OS resource.
vxvolw	Error	15	Read was failed by timeout. Device=%1	Failed to read from the device due to timeout.	Check if VxVM is operating properly. Check if the system is high loaded, and there is enough memory and OS resource.
vxvolw	Error	32	stat was failed. (err=%1) Device=%2	stat was failed.	stat was failed. Check the RAW device name of VxVM monitor resource using a trekking tool.
vxvolw	Error		Internal error. (status=%d)	Other internal error has occurred.	-