

ExpressCluster for Linux

Version 3

Environment Setup Guide

Revision 8us



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1. ExpressCluster Versions Discussed in this Manual

This manual is written for the following ExpressCluster versions.

Keep in mind that some items, such as support function and kernel versions, are version-dependent.

Edition	Version
SAN/SE	3.1-7or newer
WAN/LAN/LE	3.1-7or newer

2. Server Operational Environment

2.1. Hardware

2.1.1. For SAN/SE

The minimum spec requirements of servers are:

- RS-232C Port 1 (not necessary when configuring a cluster of 3 or more nodes)
- Ethernet Port 2 or more
- Shared Disk
- FD Drive
- CD-ROM Drive

Configure and connect the peripheral devices and network as shown in the following pages.

2.1.2. For WAN/LAN/LE

The minimum spec requirements of servers are:

- RS-232C Port 1 (not necessary when configuring a cluster of 3 or more nodes)
- Ethernet Port 2 or more
- Mirror Disk or empty partition for mirror
- FD Drive
- CD-ROM Drive

Configure and connect the peripheral devices and network as shown in the following pages.

❖ Operation Verified Disk Interface

The following disk types have been verified to run as WAN/LAN/LE (mirror data model) mirror disks.

Disk Type	Host side Driver name	Remarks
IDE	ide	Operation verified up to 120GB
SCSI	aic7xxx	
SCSI	aic79xx	
SCSI	sym53c8xx	
RAID	megaraid(SCSI)	
RAID	megaraid(IDE)	Operation verified up to 275GB
S-ATA	sata-nv	Operation verified up to 80GB
S-ATA	ata-piix	Operation verified up to 120GB

❖ Operation Verified Network Interface

The following disk boards have been verified to run as mirror disk connect (systems

for mirror communication) of data mirroring disks for WAN/LAN/LE (mirror data model).

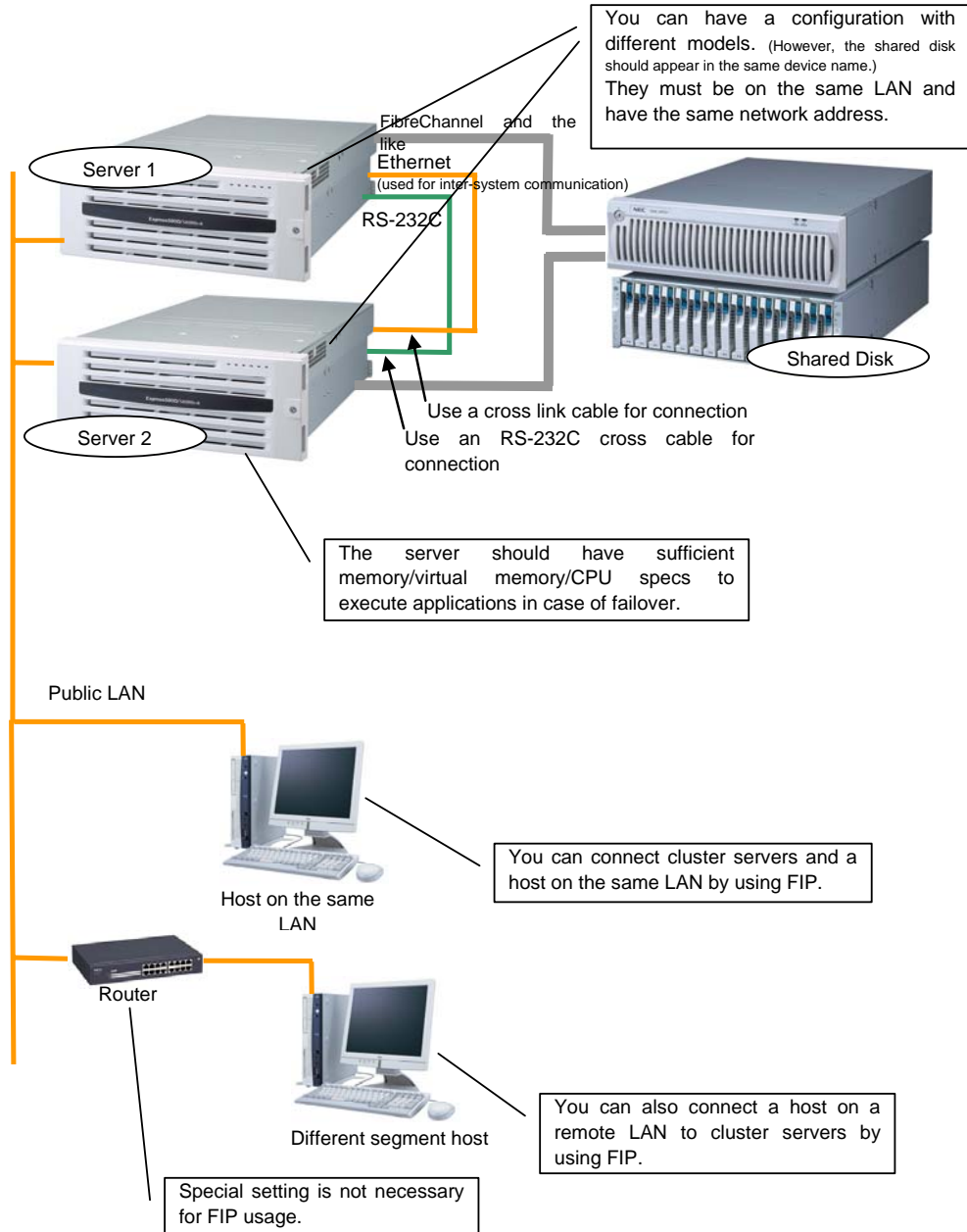
Chip Name	Driver Name	Distribution ¹
	e100	RedHat ES3/AS3
Intel 82540EM	e1000	RedHat ES3/AS3
Intel 82544EI	e1000	RedHat ES3/AS3
Intel 82546GB	e1000	RedHat ES3/AS3

Configure and connect the peripheral devices and network as shown in the following pages.

¹ This does not mean a network interface does not operate on a board-driver combination with a distribution that is not listed here.

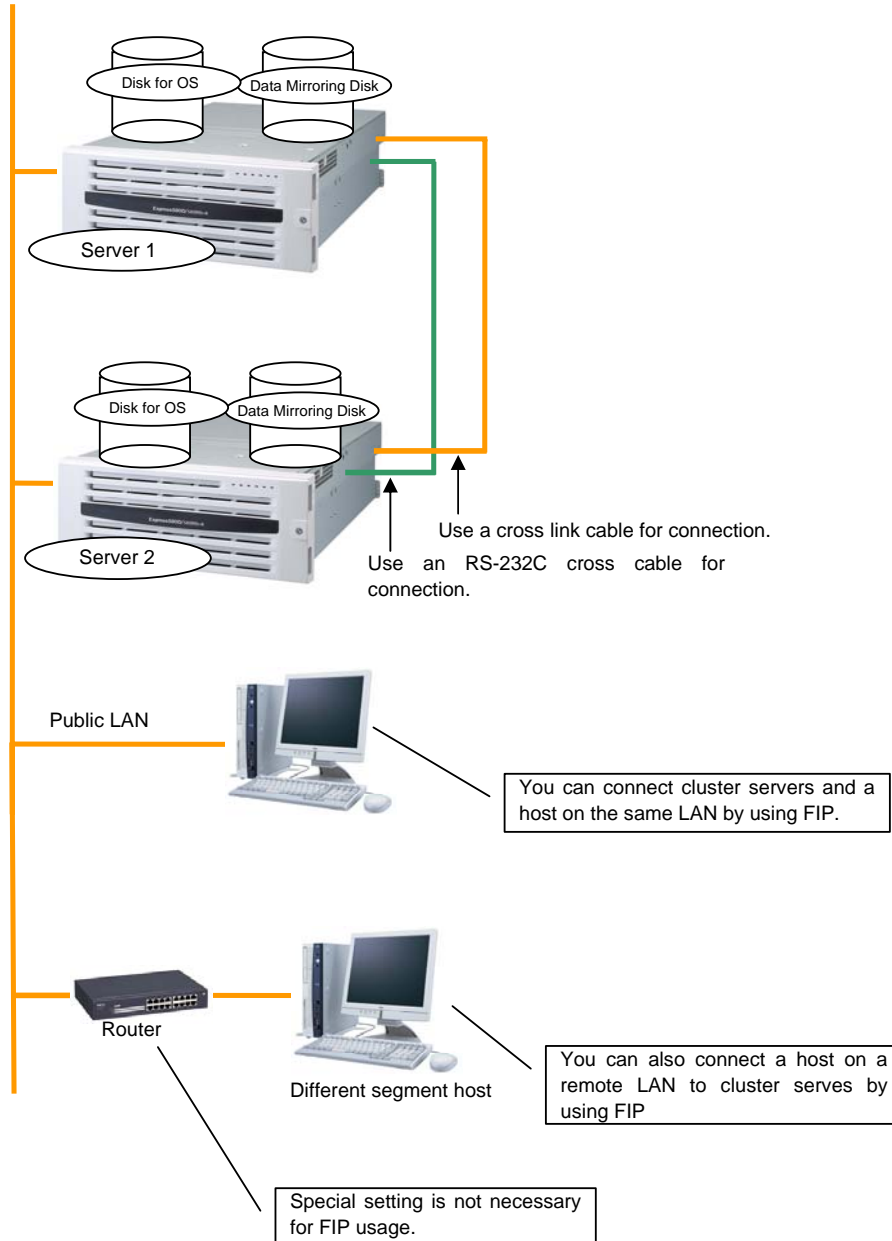
2.1.3. Example of SAN/SE Configuration with 2 Nodes

- ❖ You can use different models for servers. However, the shared disk should appear in the same device name in all servers.
- ❖ Connect the shared disk.
- ❖ Use cross cables for the interconnect connectivity. (You can use a dedicated HUB for connection just as the case of 4 Nodes.)
- ❖ Connect COM (RS-232C) ports using cross cables.

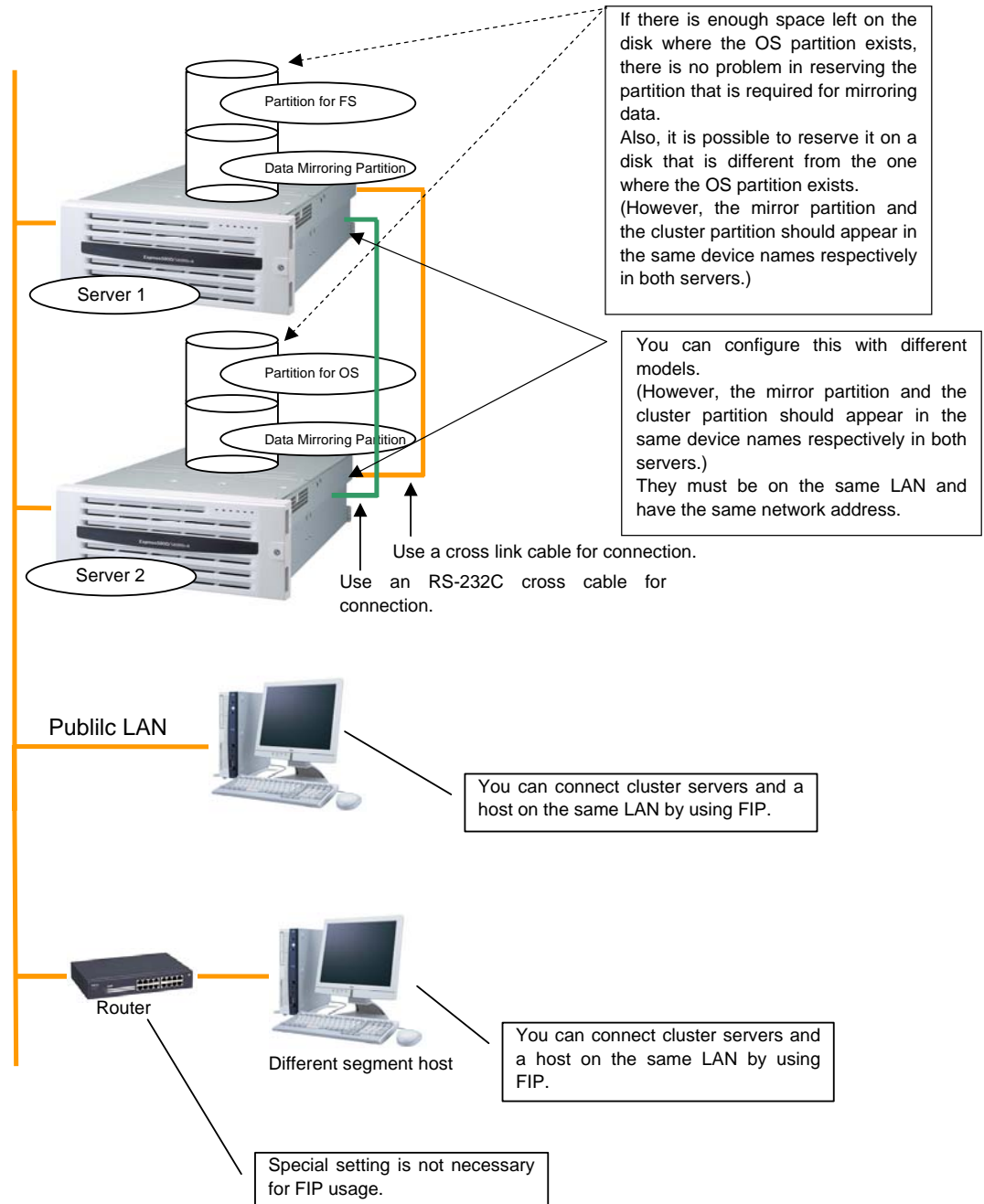


2.1.4. Example of WAN/LAN/LE Configuration with 2 Nodes

- ❖ You can use different models for servers. However, a mirroring disk should appear in the same device name in all servers.
- ❖ Use cross cables for the interconnect connectivity. Directly connect the interconnects for mirror (mirror disk connect) using cross cables. Do not connect a HUB or the like.
- ❖ Connect COM (RS-232C) ports using cross cables

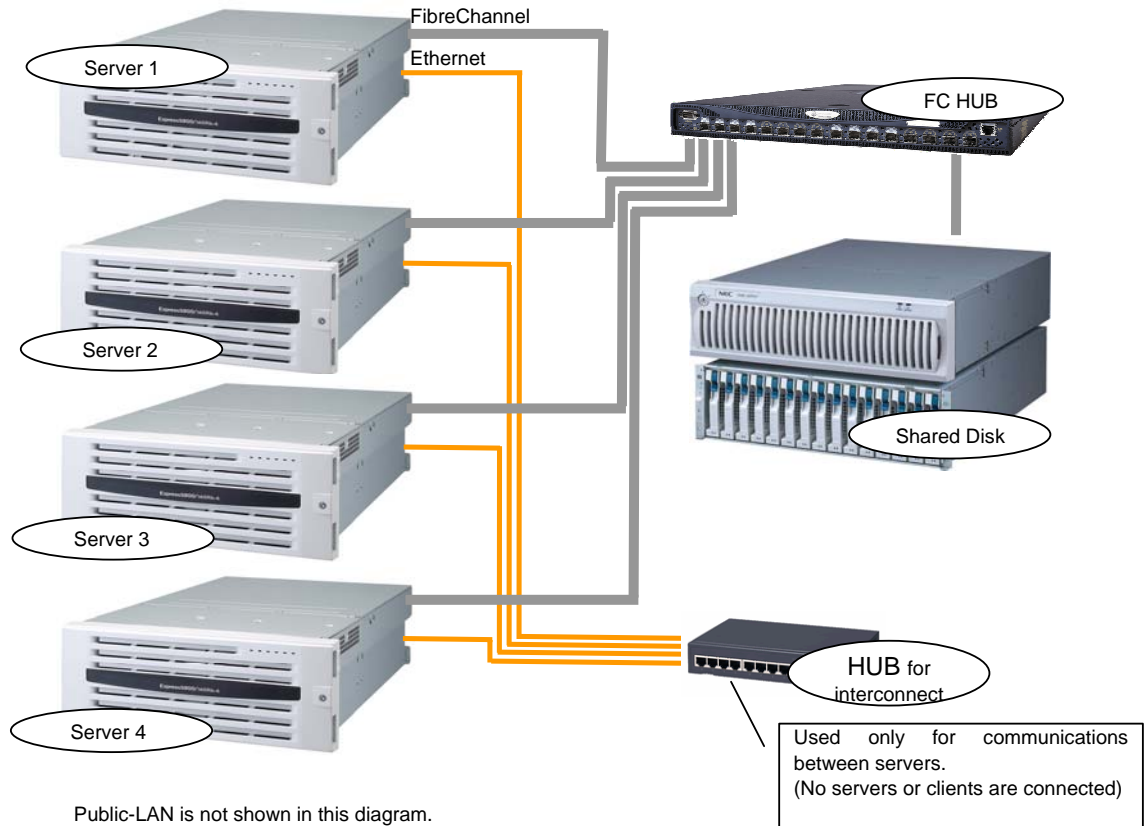


- ❖ As shown below, the mirror partition can be set on the OS disk. The mirror partition should appear in the same device name in all servers.
- ❖ For the mirror partition settings, refer to “Resource Details”.



2.1.5. Example of SAN/SE Configuration with 4 Nodes

- ❖ As with the case of 2 nodes, the shared disk is connected. (The shared disk should appear in the same name in all servers.)
- ❖ Install a dedicated HUB for interconnect connectivity.
- ❖ You don't need to establish connectivity between servers using an RS-232C.



2.2. Software

2.2.1. Common to each editions

Notes in Red Hat Enterprise Linux AS/ES3, AS/ES4

In following Red Hat software Enterprise Linux, the ExpressCluster version 3.1-5 or later is required.

- ❖ Red Hat Enterprise Linux AS/ES3 Update5
(rpm version of chkconfig 1.3.13.2-0.3)
- ❖ Red Hat Enterprise Linux AS/ES4 Update1²
(rpm version of chkconfig 1.3.13.2-1)

Supported NIC device names

Due to the specification of ifconfig command, the length of string for a NIC device name you can use is restricted. It depends on the number of FIP resources.

The same restriction is applied to the device names for bonding.
Name the device names within the length listed in the following table.

The number of FIP resources	Maximum length of string for a NIC device name
0~10	Up to seven
11~100	Up to six
100~	Up to five

2.2.2. SAN/SE – Shared Disk Model – Operation Verified Distribution and Kernel

Since SAN/SE does not have its own kernel module, in principle, it does not depend on any kernel version. It has been verified SAN/SE runs with the following versions of kernels.

With versions other than those listed below, SAN/SE may not operate properly.

The latest information is available on the ExpressCluster website.



Whether or not kernel mode LAN heartbeat resource can be used depends on the distribution and kernel version. Refer to “2.2.4”.

–ia32 SAN/SE–

² WAN/LAN/LE is a unsupported in Red Hat Enterprise Linux AS/ES 4.

Distribution	Kernel Version ³	Binary RPM name of kernel	ExpressCluster Version
Red Hat Linux 7.2	2.4.20-18.7	kernel-2.4.20-18.7.i686.rpm	3.0-1~
	2.4.20-18.7smp	kernel-smp-2.4.20-18.7.i686.rpm	
	2.4.20-18.7bigmem	kernel-bigmem-2.4.20-18.7.i686.rpm	
Red Hat Linux 7.3	2.4.20-18.7	kernel-2.4.20-18.7.i686.rpm	3.0-1~
	2.4.20-18.7smp	kernel-smp-2.4.20-18.7.i686.rpm	
	2.4.20-18.7bigmem	kernel-bigmem-2.4.20-18.7.i686.rpm	
Red Hat Linux 7.3	2.4.20-20.7	kernel-2.4.20-20.7.i686.rpm	3.0-1~
	2.4.20-20.7smp	kernel-smp-2.4.20-20.7.i686.rpm	
	2.4.20-20.7bigmem	kernel-bigmem-2.4.20-20.7.i686.rpm	
Red Hat Linux 8.0	2.4.20-18.8	kernel-2.4.20-18.8.i686.rpm	3.0-1~
	2.4.20-18.8smp	kernel-smp-2.4.20-18.8.i686.rpm	
	2.4.20-18.8bigmem	kernel-bigmem-2.4.20-18.8.i686.rpm	
Red Hat Linux 8.0	2.4.20-20.8	kernel-2.4.20-20.8.i686.rpm	3.0-1~
	2.4.20-20.8smp	kernel-smp-2.4.20-20.8.i686.rpm	
	2.4.20-20.8bigmem	kernel-bigmem-2.4.20-20.8.i686.rpm	
Red Hat Linux 9	2.4.20-6	kernel-2.4.20-6.i686.rpm	3.0-1~
	2.4.20-6smp	kernel-smp-2.4.20-6.i686.rpm	
	2.4.20-6bigmem	kernel-bigmem-2.4.20-6.i686.rpm	
Red Hat Linux 9	2.4.20-9	kernel-2.4.20-9.i686.rpm	3.0-1~
	2.4.20-9smp	kernel-smp-2.4.20-9.i686.rpm	
	2.4.20-9bigmem	kernel-bigmem-2.4.20-9.i686.rpm	
Red Hat Advanced Server 2.1	2.4.9-e.10	kernel-2.4.9-e.10.i686.rpm	3.0-1~
	2.4.9-e.10smp	kernel-smp-2.4.9-e.10.i686.rpm	
	2.4.9-e.10enterprise	kernel-enterprise-2.4.9-e.10.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.16	kernel-2.4.9-e.16.i686.rpm	3.0-1~
	2.4.9-e.16smp	kernel-smp-2.4.9-e.16.i686.rpm	
	2.4.9-e.16enterprise	kernel-enterprise-2.4.9-e.16.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.27	kernel-2.4.9-e.27.i686.rpm	3.0-1~
	2.4.9-e.27smp	kernel-smp-2.4.9-e.27.i686.rpm	
	2.4.9-e.27enterprise	kernel-enterprise-2.4.9-e.27.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.38	kernel-2.4.9-e.38.i686.rpm	3.0-1~
	2.4.9-e.38smp	kernel-smp-2.4.9-e.38.i686.rpm	
	2.4.9-e.38enterprise	kernel-enterprise-2.4.9-e.38.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.43	kernel-2.4.9-e.43.i686.rpm	3.0-1~
	2.4.9-e.43smp	kernel-smp-2.4.9-e.43.i686.rpm	
	2.4.9-e.43enterprise	kernel-enterprise-2.4.9-e.43.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.49	kernel-2.4.9-e.49.i686.rpm	3.0-1~
	2.4.9-e.49smp	kernel-smp-2.4.9-e.49.i686.rpm	
	2.4.9-e.49enterprise	kernel-enterprise-2.4.9-e.49.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.57	kernel-2.4.9-e.57.i686.rpm	3.1-5~
	2.4.9-e.57smp	kernel-smp-2.4.9-e.57.i686.rpm	
	2.4.9-e.57enterprise	kernel-enterprise-2.4.9-e.57.i686.rpm	
Red Hat Enterprise Linux AS/ES 2.1 (up to update7)	2.4.9-e.62	kernel-2.4.9-e.62.i686.rpm	3.1-5~
	2.4.9-e.62smp	kernel-smp-2.4.9-e.62.i686.rpm	
	2.4.9-e.62enterprise	kernel-enterprise-2.4.9-e.62.i686.rpm	
Red Hat Enterprise Linux AS/ES 3 (up to update6)	2.4.21-4EL	kernel-2.4.21-4.EL.i686.rpm	3.0-1~
	2.4.21-4ELsmp	kernel-smp-2.4.21-4.EL.i686.rpm	
	2.4.21-4ELhugemem	kernel-hugemem-2.4.21-4.EL.i686.rpm	
Red Hat Enterprise Linux AS/ES 3 (up to update6)	2.4.21-9.0.1EL	kernel-2.4.21-9.0.1.EL.i686.rpm	3.0-1~
	2.4.21-9.0.1ELsmp	kernel-smp-2.4.21-9.0.1.EL.i686.rpm	
	2.4.21-9.0.1ELhugemem	kernel-hugemem-2.4.21-9.0.1.EL.i686.rpm	
Red Hat Enterprise Linux AS/ES 3 (up to update6)	2.4.21-15EL	kernel-2.4.21-15.EL.i686.rpm	3.0-1~
	2.4.21-15ELsmp	kernel-smp-2.4.21-15.EL.i686.rpm	
	2.4.21-15ELhugemem	kernel-hugemem-2.4.21-15.EL.i686.rpm	
Red Hat Enterprise Linux AS/ES 3 (up to update6)	2.4.21-15.0.3EL	kernel-2.4.21-15.0.3.EL.i686.rpm	3.0-1~
	2.4.21-15.0.3ELsmp	kernel-smp-2.4.21-15.0.3.EL.i686.rpm	
	2.4.21-15.0.3ELhugemem	kernel-hugemem-2.4.21-15.0.3.EL.i686.rpm	

³ Operations for standard configurations (kernel binary in the binary RPM name column) with each kernel installed have been verified. With kernels you built, SAN/SE may not operate.

Distribution	Kernel Version ³	Binary RPM name of kernel	ExpressCluster Version
	2.4.21-20EL	kernel-2.4.21-20.EL.i686.rpm	3.0-1~
	2.4.21-20ELsmp	kernel-smp-2.4.21-20.EL.i686.rpm	
	2.4.21-20ELhugemem	kernel-hugemem-2.4.21-20.EL.i686.rpm	
	2.4.21-27EL	kernel-2.4.21-27.EL.i686.rpm	3.1-4~
	2.4.21-27ELsmp	kernel-smp-2.4.21-27.EL.i686.rpm	
	2.4.21-27ELhugemem	kernel-hugemem-2.4.21-27.EL.i686.rpm	
	2.4.21-32EL	kernel-2.4.21-32.EL.i686.rpm	3.1-5~
	2.4.21-32ELsmp	kernel-smp-2.4.21-32.EL.i686.rpm	
	2.4.21-32ELhugemem	kernel-hugemem-2.4.21-32.EL.i686.rpm	
	2.4.21-37EL	kernel-2.4.21-37.EL.i686.rpm	3.1-7~
	2.4.21-37ELsmp	kernel-smp-2.4.21-37.EL.i686.rpm	
	2.4.21-37ELhugemem	kernel-hugemem-2.4.21-37.EL.i686.rpm	
Red Hat Enterprise Linux AS/ES 4 (up to update2)	2.6.9-5EL	kernel-2.6.9-5.EL.i686.rpm	3.1-5~
	2.6.9-5ELsmp	kernel-smp-2.6.9-5.EL.i686.rpm	
	2.6.9-5ELhugemem	kernel-hugemem-2.6.9-5.EL.i686.rpm	
	2.6.9-11EL	kernel-2.6.9-11.EL.i686.rpm	3.1-5~
	2.6.9-11ELsmp	kernel-smp-2.6.9-11.EL.i686.rpm	
	2.6.9-11ELhugemem	kernel-hugemem-2.6.9-11.EL.i686.rpm	
2.6.9-22EL	kernel-2.6.9-22.EL.i686.rpm	3.1-7~	
2.6.9-22ELsmp	kernel-smp-2.6.9-22.EL.i686.rpm		
2.6.9-22ELhugemem	kernel-hugemem-2.6.9-22.EL.i686.rpm		
Novell SUSE LINUX Enterprise Server 8	2.4.21-138-default	k_deflt-2.4.21-138.i586.rpm	3.0-1~
	2.4.21-138-smp	k_smp-2.4.21-138.i586.rpm	
Novell SUSE LINUX Enterprise Server 9 (up to SP2)	2.6.5-7.97-default	kernel-deflt-2.6.5-7.97.i586.rpm	3.1-2~
	2.6.5-7.97-smp	kernel-smp-2.6.5-7.97.i586.rpm	
	2.6.5-7.97-bigsm	kernel-bigsm-2.6.5-7.97.i586.rpm	
	2.6.5-7.139-default	kernel-deflt-2.6.5-7.139.i586.rpm	3.1-5~
	2.6.5-7.139-smp	kernel-smp-2.6.5-7.139.i586.rpm	
	2.6.5-7.139-bigsm	kernel-bigsm-2.6.5-7.139.i586.rpm	
	2.6.5-7.191-default	kernel-deflt-2.6.5-7.191.i586.rpm	
2.6.5-7.191-smp	kernel-smp-2.6.5-7.191.i586.rpm	3.1-6~	
2.6.5-7.191-bigsm	kernel-bigsm-2.6.5-7.191.i586.rpm		

Depended Library

libxml2

- ❖ Please install libxml2 when you install an OS.

Depended Driver

softdog

- ❖ Required when softdog is used for monitoring user space monitor resource.
- ❖ For SAN/SE and WAN/LAN/LE, loadable module configuration is required. This does not work with a static driver.

Required Memory Capacity and Disk Size

Required Memory Capacity
40MB(for the IA32 environment)

Disk Size

Immediately after Installation: 13MB(for the IA32 environment)
 Maximum space during operation: 450MB*

- ❖ When you collect logs from all servers in the entire cluster using the `clplogcc` command, the maximum of 450 MB x the number of servers of free space will be necessary in a server that runs the command.

About a File System on a Shared Disk

The file system used on a shared disk is not dependant, but depending on the specification of the file system's `fsck`, problem may occur.

- ❖ The operation capability of the following file systems is currently confirmed.
 - ext2
 - ext3
 - xf
 - reiserfs
 - jfs
 - vxfs

To decrease the chances of failure, it is recommended to use a file system with journal function.

2.2.3. WAN/LAN/LE – Data Mirror Model – Operational Distribution and Kernel

Since WAN/LAN/LE has its own kernel module, it is dependent on kernel versions. The following are versions of kernels having modules (drivers) with which WAN/LAN/LE operates.

WAN/LAN/LE does not operate properly with versions other than those listed below.

The latest information is available on the ExpressCluster website.



Whether or not kernel mode LAN heartbeat resource can be used depends on the distribution and kernel version. Refer to “2.2.4”.

-IA32 WAN/LAN/LE -

Distribution	Kernel Version ⁴	Binary RPM name for kernel	ExpressCluster Version	Remarks
Red Hat Enterprise Linux AS/ES 2.1 (~update7)	2.4.9-e.27	kernel-2.4.9-e.27.i686.rpm	3.0-2~	Error! Bookmark not
	2.4.9-e.27smp	kernel-smp-2.4.9-e.27.i686.rpm		
	2.4.9-e.27enterprise	kernel-enterprise-2.4.9-e.27.i686.rpm		
	2.4.9-e.38	kernel-2.4.9-e.38.i686.rpm	3.0-2~	Error! Bookmark not
	2.4.9-e.38smp	kernel-smp-2.4.9-e.38.i686.rpm		
	2.4.9-e.38enterprise	kernel-enterprise-2.4.9-e.38.i686.rpm		
	2.4.9-e.43	kernel-2.4.9-e.43.i686.rpm	3.0-4~	Error! Bookmark not
	2.4.9-e.43smp	kernel-smp-2.4.9-e.43.i686.rpm		
	2.4.9-e.43enterprise	kernel-enterprise-2.4.9-e.43.i686.rpm		
	2.4.9-e.49	kernel-2.4.9-e.49.i686.rpm	3.1-1~	
	2.4.9-e.49smp	kernel-smp-2.4.9-e.49.i686.rpm		
	2.4.9-e.49enterprise	kernel-enterprise-2.4.9-e.49.i686.rpm		

⁴ Operations for standard configurations (kernel binary in the binary RPM name column) with each kernel installed have been verified. With kernels you built, WAN/LAN/LE may not operate.

Distribution	Kernel Version ⁴	Binary RPM name for kernel	ExpressCluster Version	Remarks
	2.4.9-e.57 2.4.9-e.57smp 2.4.9-e.57enterprise	kernel-2.4.9-e.57.i686.rpm kernel-smp-2.4.9-e.57.i686.rpm kernel-enterprise-2.4.9-e.57.i686.rpm	3.1-5~	
	2.4.9-e.62 2.4.9-e.62smp 2.4.9-e.62enterprise	kernel-2.4.9-e.62.i686.rpm kernel-smp-2.4.9-e.62.i686.rpm kernel-enterprise-2.4.9-e.62.i686.rpm	3.1-5~	
Red Hat Enterprise Linux AS/ES 3 (~update6)	2.4.21-4EL 2.4.21-4ELsmp 2.4.21-4ELhugemem	kernel-2.4.21-4.EL.i686.rpm kernel-smp-2.4.21-4.EL.i686.rpm kernel-hugemem-2.4.21-4.EL.i686.rpm	3.0-1~	Error! Bookmark not
	2.4.21-9.0.1EL 2.4.21-9.0.1ELsmp 2.4.21-9.0.1ELhugemem	kernel-2.4.21-9.0.1.EL.i686.rpm kernel-smp-2.4.21-9.0.1.EL.i686.rpm kernel-hugemem-2.4.21-9.0.1.EL.i686.rpm	3.0-2~	Error! Bookmark not
	2.4.21-15.EL 2.4.21-15.ELsmp 2.4.21-15.ELhugemem	kernel-2.4.21-15.EL.i686.rpm kernel-smp-2.4.21-15.EL.i686.rpm kernel-hugemem-2.4.21-15.EL.i686.rpm	3.0-4~	Error! Bookmark not
	2.4.21-15.0.3.EL 2.4.21-15.0.3.ELsmp 2.4.21-15.0.3.ELhugemem	kernel-2.4.21-15.0.3.EL.i686.rpm kernel-smp-2.4.21-15.0.3.EL.i686.rpm kernel-hugemem-2.4.21-15.0.3.EL.i686.rpm	3.0-4~	Error! Bookmark not
	2.4.21-20EL 2.4.21-20ELsmp 2.4.21-20ELhugemem	kernel-2.4.21-20EL.i686.rpm kernel-smp-2.4.21-20EL.i686.rpm kernel-hugemem-2.4.21-20EL.i686.rpm	3.1-1~	Error! Bookmark not
	2.4.21-27EL 2.4.21-27ELsmp 2.4.21-27ELhugemem	kernel-2.4.21-27.EL.i686.rpm kernel-smp-2.4.21-27.EL.i686.rpm kernel-hugemem-2.4.21-27.EL.i686.rpm	3.1-4~	
	2.4.21-32EL 2.4.21-32ELsmp 2.4.21-32ELhugemem	kernel-2.4.21-32.EL.i686.rpm kernel-smp-2.4.21-32.EL.i686.rpm kernel-hugemem-2.4.21-32.EL.i686.rpm	3.1-5~	
	2.4.21-37EL 2.4.21-37ELsmp 2.4.21-37ELhugemem	kernel-2.4.21-37.EL.i686.rpm kernel-smp-2.4.21-37.EL.i686.rpm kernel-hugemem-2.4.21-37.EL.i686.rpm	3.1-7~	
Red Hat Enterprise Linux AS/ES 4 (update2)	2.6.9-22EL 2.6.9-22ELsmp 2.6.9-22ELhugemem	kernel-2.6.9-22.EL.i686.rpm kernel-smp-2.6.9-22.EL.i686.rpm kernel-hugemem-2.6.9-22.EL.i686.rpm	3.1-7~	
Novell SUSE LINUX Enterprise Server 8	2.4.21-138-default 2.4.21-138-smp	k_deflt-2.4.21-138.i586.rpm k_smp-2.4.21-138.i586.rpm	3.1-2~	Error! Bookmark not defined.
Novell SUSE LINUX Enterprise Server 9 (~SP2)	2.6.5-7.97-default 2.6.5-7.97-smp 2.6.5-7.97-biasmp	kernel-deflt-2.6.5-7.97.i586.rpm kernel-smp-2.6.5-7.97.i586.rpm kernel-biasmp-2.6.5-7.97.i586.rpm	3.1-2~	Error! Bookmark not
	2.6.5-7.139-default 2.6.5-7.139-smp 2.6.5-7.139-biasmp	kernel-deflt-2.6.5-7.139.i586.rpm kernel-smp-2.6.5-7.139.i586.rpm kernel-biasmp-2.6.5-7.139.i586.rpm	3.1-5~	
	2.6.5-7.191-default 2.6.5-7.191-smp 2.6.5-7.191-bigsmp	kernel-deflt-2.6.5-7.191.i586.rpm kernel-smp-2.6.5-7.191.i586.rpm kernel-bigsmp-2.6.5-7.191.i586.rpm	3.1-6~	

Depended Library

libxml2

❖ Please install libxml2 at the time of OS installation.

Depended Driver

softdog

- ❖ Required when softdog is used for monitoring user space monitor resource.
- ❖ For SAN/SE and WAN/LAN/LE, loadable module configuration is required. This does not work with a static driver.

Required Memory Capacity and Disk Size

Required Memory Capacity

Total of the following is necessary:

32MB (User Mode Process: in IA32 environment)

32MB + 2MB x Number of mirror resources(Area of improper kernel mode swap out)

Make sure to see a separate guide, "Configuration Tool" since parameters may require tuning, depending on the physical size of the memory, performance of CPU, and performance of the disk installed on the server, and the results of their operation.

Disk Size

Immediately after Installation: 40MB (in IA32 environment)

Maximum space during operation: 600MB*

- ❖ When you collect logs from all servers in the entire cluster using the clplogcc command, the maximum of 600MB x the number of servers of free space will be necessary in a server that runs the command.

About a File System on a Mirror Disk

The file system used on a mirror disk is not dependant, but depending on the specification of the file system's fsck, problem may occur.

- ❖ The operation capability of the following file systems are currently confirmed.
 - ext2
 - ext3
 - xf
 - jfs
 - reiserfs
 - vxfs

To decrease the chances of failure, it is recommended to use a file system with journal function.

About hotplug service

The following logs are entered by the messages file when hotplug service searches a device.

```
kernel: <liscal liscal_make_request> NMP0 I/O port is close, mount(0), io(0).
kernel: Buffer I/O error on device NMP1, logical block 0
```


Since the mirror resource has not started when hotplug service starts, this phenomenon is generated. This phenomenon is not unusual.

It does not generate this phenomenon, in changing into a setup which does not use hotplug and applying by coldplug.

About the message when the driver is loaded

When the mirror driver is done in load, the following messages might be displayed in the console and syslog.

```
kernel: liscal: no version for "struct_module" found: kernel tainted.
kernel: liscal: module license 'unspecified' taints kernel.
```

This phenomenon is not error.

2.2.4. clpkhb Driver and clpka Driver Operation Verified Distribution and Kernel

Since the clpkhb and the clpka drivers are specific to ExpressCluster, they are dependent on kernel versions. The below tables show the kernel versions that provide the modules (drivers) compatible with the clpkhb and the clpka drivers.

The clpkhb and the clpka drivers do not work properly if their versions are other than those listed below.

❖ The latest information is available on the ExpressCluster website.

- ia32 Version -

Distribution	Kernel Version ⁵	Binary PRM name of kernel	ExpressCluster Version
Red Hat Enterprise Linux AS/ES 3 (update5,update6)	2.4.21-32.EL	kernel-2.4.21-32.EL.i686.rpm	3.1-6~
	2.4.21-32.ELsmp	kernel-smp-2.4.21-32.EL.i686.rpm	
	2.4.21-32.ELhugemem	kernel-hugemem-2.4.21-32.EL.i686.rpm	3.1-7~
	2.4.21-37.EL	kernel-2.4.21-37.EL.i686.rpm	
Red Hat Enterprise Linux AS/ES 4 (update2)	2.4.21-37.ELsmp	kernel-smp-2.4.21-37.EL.i686.rpm	3.1-7~
	2.4.21-37.ELhugemem	kernel-hugemem-2.4.21-37.EL.i686.rpm	
	2.6.9-22.EL	kernel-2.6.9-22.EL.i686.rpm	3.1-7~
	2.6.9-22.ELsmp	kernel-smp-2.6.9-22.EL.i686.rpm	
	2.6.9-22.ELhugemem	kernel-hugemem-2.6.9-22.EL.i686.rpm	

⁵ Drivers' behaviors have been verified for each kernel installation standard configuration (the kernel binary in the binary PRM name column). With kernels you have built by yourself, drivers may not work properly or at all.

Distribution	Kernel Version ⁵	Binary PRM name of kernel	ExpressCluster Version
Novell SUSE LINUX Enterprise Server 9 (SP2)	2.6.5-7.139-default 2.6.5-7.139-smp 2.6.5-7.139-bigsmpt	kernel-deflt-2.6.5-7.139.i586.rpm kernel-smp-2.6.5-7.139.i586.rpm kernel-bigsmpt-2.6.5-7.139.i586.rpm	3.1-6~

About the message when the driver is loaded

When the mirror driver is done in load, the following messages might be displayed in the console and syslog.

```
kernel: clpkhb: no version for "struct_module" found: kernel tainted.
kernel: clpkhb: module license 'unspecified' taints kernel.
```

```
kernel: clpka: no version for "struct_module" found: kernel tainted.
kernel: clpka: module license 'unspecified' taints kernel.
```

This phenomenon is not unusual.

2.3. /opt/nec/clusterpro File Systems

❖ The operations of the following file systems have been verified:

```
ext2
ext3
```

To improve fault-tolerance of the system, it is recommended to use a file system with a journal function.

3. Configuration Tool Operational Environment

3.1. Operation Verified OS

Linux (see 1.2.1 and 1.2.2. Configuration Tool does not operate on 64bit Linux)
Microsoft Windows® XP
Microsoft Windows® 2000



“Configuration tool” does not run on 64bit Linux and/or x86_64.

You need to have a 32bit Linux machine or a Windows machine for configuration and operation.

3.2. Operation Verified Browsers

- ❖ Browsers supporting Java 2

Mozilla 1.1 or later
FireFox 1.0.6 or later
Netscape® 7.1 or later
Microsoft® Internet Explorer 6.0 SP1 or later

3.3. Java Running Environments

- ❖ To use Configuration Tool, an environment where Java runs is necessary.

Sun Microsystems
Java(TM) 2 Runtime Environment, Standard Edition
Version 1.4.1_02 or later (Does not work with Version 1.5.x)



“Configuration tool” does not work on JRE Version 1.5.x. if its version is 3.1-4 or earlier
In this case, use JRE Version 1.4.x.

3.4. Required Memory Capacity and Disk Size

Required Memory Capacity: Minimum of 32MB
Required Disk Space: 2MB (excluding Java running environment)

3.5. Combinations of OS and Browser Whose Operations Have Been Verified

The latest information is available on the ExpressCluster website.
At the time the product was released, the following environments had been verified to support Configuration Tool.

OS	Browser	Language
----	---------	----------

Windows® 2000 Professional	IE6 SP1	Japanese
Windows® 2000 Professional	IE6 SP1	English
Windows® 2000 Professional	Netscape 7.1	Japanese
Windows® 2000 Advanced Server	IE6 SP1	English
Windows® XP Professional	IE6 SP1	Japanese
Windows® XP Professional	IE6 SP1	English
Windows® XP Professional	Netscape 7.1	Japanese
Windows® XP Professional	Netscape 7.1	English
Windows® XP Professional SP2	IE6 SP2	Japanese
Red Hat Linux 9.0	Mozilla 1.2	English
Red Hat Enterprise Linux ES 3.0	Mozilla 1.4	English
Red Hat Enterprise Linux AS 3.0	Mozilla 1.4	Japanese
Red Hat Enterprise Linux AS 3.0 (Update5)	Mozilla 1.7.7	English
Novell SUSE LINUX Enterprise Server 9	! Mozilla 1.7.3	Japanese
Novell SUSE LINUX Enterprise Server 9 SP2	FireFox 1.0.6	Japanese

3.6. Supported ExpressCluster Versions

–For SAN/SE–

Configuration Tool Version	ExpressCluster rpm Version
3.0-1	3.0-1 3.0-2
3.0-2 3.0-3	3.0-3
3.0-4	3.0-4
3.1-1	3.1-1
3.1-2	3.1-2
3.1-4	3.1-4 3.1-5
3.1-6	3.1-6 3.1-7 3.1-8

–For WAN/LAN/LE–

Configuration Tool Version	ExpressCluster rpm Version
3.0-2	3.0-1
3.0-3	3.0-2 3.0-3
3.0-4	3.0-4
3.1-1	3.1-1
3.1-2	3.1-2
3.1-4	3.1-4 3.1-5

3.1-6	3.1-6 3.1-7 3.1-8
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Configuration Tool may not operate successfully in other combinations.

Use Configuration Tool and EXPRESSCLUSTER in one of the version combinations shown above.

4. Web Manager Operational Environment

4.1. Operation Verified OS

Linux (see 1.2.1 and 1.2.2. Web Manager does not operate on 64bit Linux)
Microsoft Windows® XP
Microsoft Windows® 2000



“Web Manager” does not operate on 64bit Linux and x86_64.

You need to have a 32bit Linux machine or a Windows machine for configuration and operation.

4.2. Operation Verified Browsers

- ❖ Browsers supporting Java 2

Mozilla 1.1 or later
Netscape® 7.1 or later
Microsoft® Internet Explorer 6.0 SP1 or later

4.3. Java Running Environments

- ❖ To use Web manager, an environment where Java runs is necessary.

Sun Microsystems
Java(TM) 2 Runtime Environment, Standard Edition
Version 1.4.1_02 or later

4.4. Required Memory Capacity and Disk Space

Required Memory Capacity: Minimum of 40MB
Required Disk Capacity: 300KB (excluding Java running environment)

4.5. Combinations of OS and Browser Whose Operations Have Been Verified

The latest information is available on the ExpressCluster website.
At the time the product was released, the following environments had been verified to support Web Manager.

OS	Browser	Language
Windows® 2000 Professional	IE6 SP1	Japanese
Windows® 2000 Professional	Netscape 7.1	Japanese
Windows® XP Professional	IE6 SP1	Japanese
Windows® XP Professional	Netscape 7.1	English

Windows® XP Professional	IE6 SP1	English
Windows® 2000 Advanced Server	IE6 SP1	English
Red Hat Linux 9.0	Mozilla 1.2	English
Windows® 2000 Professional	Netscape 7.1	Japanese
Red Hat Enterprise Linux ES 3.0	Mozilla 1.4	English