ExpressCluster for Linux Ver3.0

Cluster Installation and Configuration Guide
(Shared Disk)

2004.06.30
1st Revision

Revision History

Revision	Revision date	Descriptions
1	2004/06/30	New manual

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 OVERVIEW OF CLUSTERING PROCEDURE

To cluster servers:

(1) Setting up Trekking Tool
Set up Trekking Tool.

(2) Setting up ExpressCluster Servers
Set up ExpressCluster Server on all servers that form a cluster.

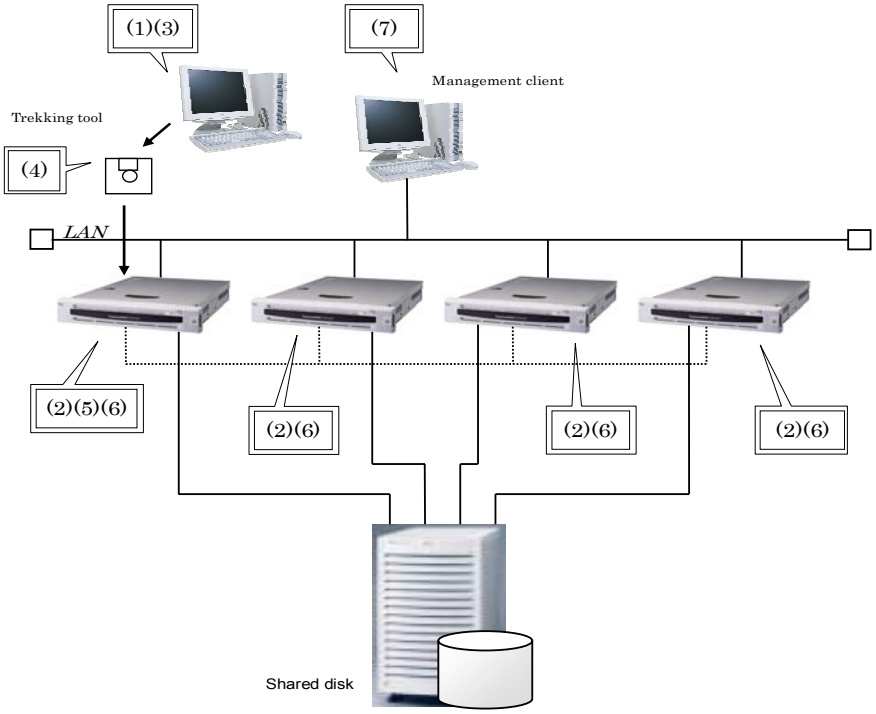
(3) Creating Cluster Configuration data
Create Cluster Configuration data by using Trekking Tool and store it in floppy disk.

(4) Hand-carrying the floppy disk
Insert the floppy disk created by Trekking Tool in the master server.

(5) Executing a cluster generation command
Run the cluster generation command on the server where the floppy disk was inserted.

(6) Rebooting Server
Restart servers that form a cluster.

(7) Accessing ExpressCluster Web Manager
Access ExpressCluster Server through your browser.



Installing ExpressCluster Trekking Tool. → See 2.

You install ExpressCluster Trekking Tool.

Installing ExpressCluster Server. → See 3.

You install ExpressCluster Server.

Restarting the operating system. → See 3.

You reboot Linux.

Post-installation setup. → See 3.2.

You allocate partitions, make the file system, and create the mount point.

You tune the time from power-on until the OS startup.

You confirm the interconnection and Public-LAN.

You make settings for the clock synchronization.

You make settings for the root file system.

You change settings for your firewall.

Creating the cluster configuration data. → See 4.

You create a cluster configuration data floppy disk by Trekking Tool.

Creating the cluster → See 5.

You cluster servers with the clpcfctrl command.

Registering the license. → See 6.

You register the license with the clplcnsc command.

Restarting the operating system. → See 5.

You reboot Linux.

Accessing ExpressCluster Web Manager. → See 7.

You access ExpressCluster Web Manager from your server.

2 SETTING UP TREKKING TOOL

2.1 Before Installation

Confirm the followings before installing Trekking Tool on the management client.

* Is the operating environment in place?

Trekking Tool can work on the following environment. It only creates information. It can work on clients which cannot communicate with clustered servers, if installed.

Hardware	Models where Java virtual machine (hereinafter referred to as Java VM) can work
OS	Linux Windows®
Java VM	Sun Microsystems Java™ 2 Runtime Environment, Standard Edition Version 1.4.1_02 or newer
Web browser	Java 2 supporting browser

For details about operating systems and browsers where behaviors have been confirmed, see a separate guide, “Operational Environment”.

+ To use Trekking Tool on Linux, see Section 2.2 “Installation on Linux”.
+ To use Trekking Tool on Windows, see Section 2.3 “Installation on Windows”.

2.2 Installation on Linux

To install ExpressCluster Trekking Tool on Linux, do as a root user.

(1) Mount the installation CD-ROM.

(2) Run the rpm command to install the package file.
Move to the folder, /Linux/3.0/en/trek, in the CD-ROM.
Run the following;

rpm -i expressclstrek-[version #]-[release #].i386.rpm

Then, installation starts.

The Trekking Tool will be installed in the following place. Note that if you change this directory, you will not be able to uninstall this tool.

Installation directory: /opt/nec/clptrek

(3) When you have installed the package, umount the CD-ROM.

(4) Set the Java user policy file.
Give Trekking Tool (Java applet) the right to access the platform OS (outside of Java VM).

See a separate guide, “Trekking Tool” for how to set the Java user policy file.

[Troubleshooting]

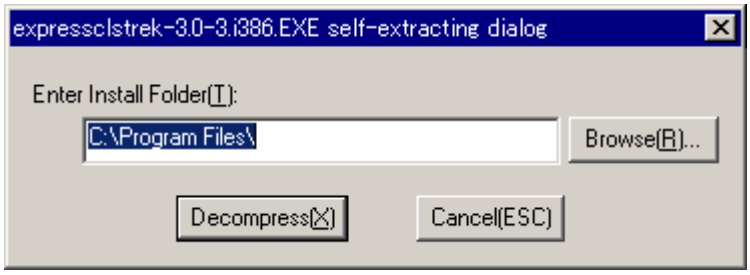
	Error messages	Cause	Action
1	failed to open //var/lib/rpm/packages.rpm error: cannot open //var/lib/rpm/packages.rpm	You are not a root user.	Log in as a root user.
2	error: package expressclstrek-* is already installed	ExpressCluster Trekking Tool is already installed.	First, uninstall. Then install it again.

2.3 Installation on Windows

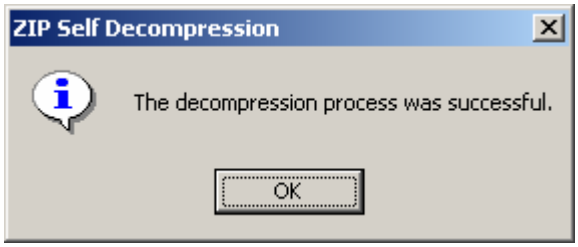
To install ExpressCluster Trekking Tool on Windows, install it in a place where you can access (read/write) with the security right given to you.

The Trekking Tool setup menu you see on the installation menu which is run by autorun when you insert ExpressCluster CD-ROM in a Windows machine is for ExpressCluster for Linux 2.x.
Do not use this Trekking Tool for ExpressCluster for Linux 3.x.

(1) Run the exe file to install the package file.
Run the ¥Linux¥3.0¥en¥trek¥expressclstrek-[version #]-[release #].i386.exe in the CD-ROM. You will see the following dialog.
Specify the Installation folder, and click [Decompress] button.
The default installation folder is “Program Files”. In the folder specified here, “nec¥clptrek” directory is created for installation.



(2) When the installation is successfully completed, you will see the following dialog.
If you want to change the installation folder, do not change the folder structure in “clptrek” folder. Move all files in your installation folder.



(3) Set Java user policy file.
Give Trekking Tool (Java applet) the right to access the platform OS (outside of Java VM).

See a separate guide, “Trekking Tool” for how to set the Java user policy file.

3 SETTING UP ExpressCluster SERVER

ExpressCluster Server consists of the following system services;
You can set it up by installing ExpressCluster Server RPM.

System service name	Description
clusterpro	ExpressCluster daemon A service of ExpressCluster itself
clusterpro_evt	ExpressCluster event A service to control syslog and logs which come form ExpressCluster
clusterpro_trn	ExpressCluster data transfer A service to control license synchronization and configuration data transfer in a cluster
clusterpro_alertsync	ExpressCluster alert synchronization A service to synchronize alerts among servers in a cluster
clusterpro_webmgr	ExpressCluster Web Manager Web Manager service

3.1 Installation of ExpressCluster Server RPM

To install ExpressCluster Server RPM, you should be a root user.
Install Server RPM on all servers as follows;

(1) Mount the installation CD-ROM.

(2) Run the rpm command to install the package file.
The Installation RPM varies depending on the products.

For SE:
Move to the folder, /Linux/3.0/en/server/SE, in the CD-ROM.
Run the following;

rpm –i expresscls-[version #]-[release #].i386.rpm

Then, installation starts.

For XE:
Move to the folder, /Linux/3.0/en/server/XE, in the CD-ROM.
Run the following;

rpm –i expresscls-xe[version #]-[release #].ia64.rpm

Then, installation starts.

ExpressCluster will be installed in the following place. Note that if you change this directory, you will not be able to uninstall ExpressCluster.
Installation directory: /opt/nec/clusterpro

(3) When you have installed, umount the Installation CD-ROM.

(4) Remove the Installation CD-ROM. Then, reboot servers.

[Trouble shooting]

	Error messages	Cause	Countermeasures
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: package expresscls-* is already installed	ExpressCluster have been installed.	First, uninstall. Then install it again.

3.2 Post-Installation Settings

After installation steps, you need to do the followings;

	Disk resources to be used	
	With shared disk	No shared disk
Setup of shared disks	Required	Not Required
Tuning the OS Boot Time	Required	Required
Network Settings	Required	Required
Clock synchronization settings	Required	Required
Root file system settings	Required	Required
Firewall settings	Required	Required

If you want to retain data on shared disks, for example, after reinstallation on a server, do not allocate partitions or make the file system in course of shared disk setup.

If you make settings for partitions or make the file system, data on shared disks will be deleted.

3.2.1 Setup of shared disks

Steps to set up shared disks are as follows;

If you want to retain data on shared disk, for example, after reinstallation on a server, do not allocate partitions or make the file system in course of shared disk setup.

If you set up partitions or make the file system, data on shared disks will be deleted.

(1) Allocating partitions for DISK heartbeat.
Create partitions to be used by ExpressCluster on shared disks. Create them on a server in the cluster which uses shared disks.
Allocate partitions with the fdisk command. The partition ID should be 83 (Linux).

Allocate a partition for each disk (LUN) to be used for DISK heartbeat resources.
Allocate at least 10 MB (10*1024*1024 bytes) for a partition for DISK heartbeat. Depending on disk geometry, it may be more than 10 MB. However, it is not a problem.

(2) Allocating partitions for DISK resources.
Create partitions to be used for DISK resources on shared disks. Create them on a server in the cluster which uses shared disks.
Allocate partitions with the fdisk command. The partition ID should be 83 (Linux).

(3) Making the file system.
Make the file system for partitions for DISK resources on shared disks.
As you usually do on Linux, make the file system with the mkfs command on a server in the cluster which uses shared disks.

You do not need to make the file system for partitions for DISK heartbeat.

(4) Creating the mount point.
Create a directory to mount partitions for DISK resources.
Create it on all servers in the cluster which use DISK resources.

Note:

File system on shared disks are controlled by ExpressCluster.
Do not add the file system on shared disks into /etc/fstab of operating system.

3.2.2 Tuning the OS startup time

Tune the OS startup time (from power-on until the OS startup). It should take longer than the followings.

+ The time from power-on of disks until they become available if you use shared disks.
+ Heartbeat timeout time

If the lilo or GRUB is used for the OS loader, tune the OS startup time as follows; Otherwise, see the setup manuals of your OS loader.

A. If the lilo is used.

1. Edit /etc/lilo.conf.
   Specify the prompt option and timeout=<Startup time (in 1/10 seconds)> option. Or, specify delay=<Startup time (in 1/10 seconds)> option without specifying the prompt option. Change only the italic lines in the following sample;

```
---(Sample 1: You will be prompted. Startup time: 30 seconds)---
boot=/dev/sda
map=/boot/map
install=/boot/boot.b
prompt
linear
timeout=300
image=/boot/vmlinuz-2.4.22
        label=linux
        root=/dev/sda1
        initrd=/boot/initrd-2.4.22.img
        read-only

---(Sample 2: You will not be prompted. Startup time: 30 seconds)---
boot=/dev/sda
map=/boot/map
install=/boot/boot.b
#prompt
linear
delay=300
image=/boot/vmlinuz-2.4.22
        label=linux
        root=/dev/sda1
        initrd=/boot/initrd-2.4.22.img
        read-only
```

2. Run the /sbin/lilo command, and reflect the changes of settings.

B. If GRUB is used.

1. Edit the /boot/grub/menu.lst.
   Specify the timeout <Startup time (in seconds)> option. Change only the italic lines in the following sample;

```
---(Sample: Startup time: 30 seconds)---
default 0
timeout 30

title linux
    kernel (hd0,1)/boot/vmlinuz
    root=/dev/sda2     vga=785
    initrd (hd0,1)/boot/initrd

title floppy
    root (fd0)
    chainloader +1
```

3.2.3 Verifying the network.

Verify the network to be used for interconnects on all servers in the cluster. Use the ifconfig or ping command to check the network.

- public-LAN (to be used for communications with other machines)
- Interconnect dedicated LAN (to be used for communications between ExpressCluster servers)
- Host name

Note:
You do not need to specify the IP address on the OS side for FIP Resources to be used in a cluster.

3.2.4 Clock synchronization

It is recommended for cluster systems to synchronize clocks of servers on regular basis with ntp or by other means.

3.2.5 Root file system

The file system which is capable of journaling is recommended for the OS root file system.

3.2.6 Firewall

ExpressCluster uses several port numbers. You need to change your firewall settings so that ExpressCluster can use some port numbers.

For details of port numbers to be used by ExpressCluster, see “COMMUNICATION PORT, MIRROR DRIVER MAJOR NUMBER” section in a separate guide, “Maintenance”.

4 HOW TO CREATE CLUSTER CONFIGURATION DATA

4.1 Cluster Environment Sample

The table below shows typical settings to create a 2-node cluster environment. This section describes how to create a cluster configuration data on this condition step by step.

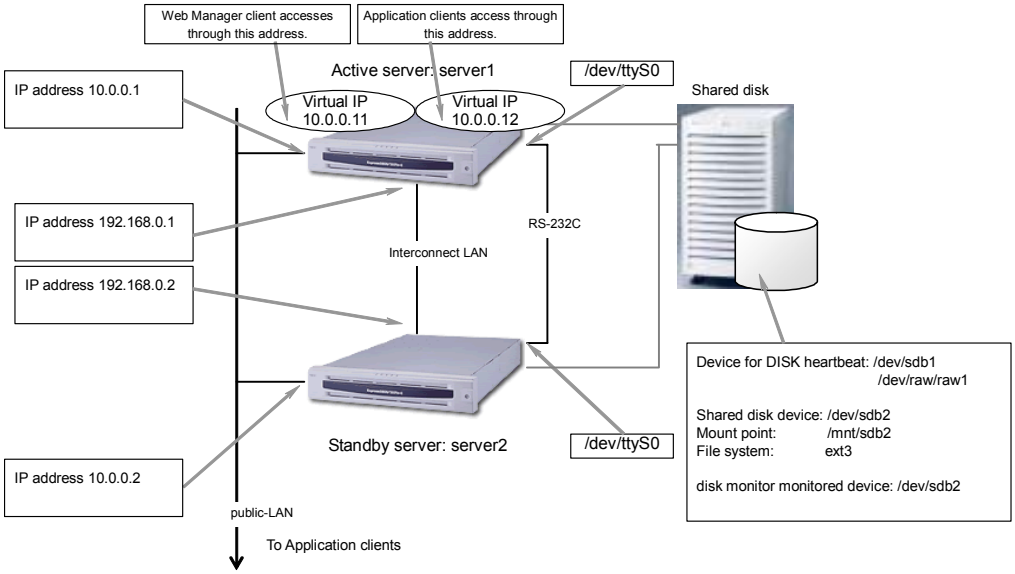
	Parameters	Values
Cluster configuration	Cluster name	cluster
	# of servers	2
	# of failover groups	2
	# of monitor resources	4
Heartbeat resources	# of LAN heartbeats	2
	# of COM heartbeats (Only for SE)	1 (Only for SE)
	# of DISK heartbeats	1
1st Server information (Master server)	Server name	server1
	Interconnect IP address (Dedicated)	192.168.0.1
	Interconnect IP address (Backup)	10.0.0.1
	Public IP address	10.0.0.1
	COM heartbeat device (Only for SE)	/dev/ttyS0 (Only for SE)
	DISK heartbeat device	/dev/sdb1 /dev/raw/raw1
2nd Server information	Server name	server2
	Interconnect IP address (Dedicated)	192.168.0.2
	Interconnect IP address (Backup)	10.0.0.2
	Public IP address	10.0.0.2
	COM heartbeat device (Only for SE)	/dev/ttyS0 (Only for SE)
	DISK heartbeat device	/dev/sdb1 /dev/raw/raw1
1st group (For Web Manager)	Type	Failover
	Group name	WebManager
	Startup server	server1 → server2
	# of group resources	1
1st group resources *1	Type	floating ip resource
	Group resource name	WebManagerFIP1
	IP address	10.0.0.11
2nd group (For business services)	Type	Failover
	Group name	failover1
	Startup server	server1 → server2
	# of group resources	3
1st group resources	Type	floating ip resource
	Group resource name	fip1
	IP address	10.0.0.12
2nd group resources	Type	disk resource
	Group resource name	disk1
	Device name	/dev/sdb2

		Parameters	Values
		Mount point	/mnt/sdb2
		File system	ext3
		Disk type	disk
	3rd group resources	Type	execute resource
		Group resource name	exec1
		Script	Standard Script
1st monitor resources (Created by default)		Type	user mode monitor
		Monitor resource name	userw
2nd monitor resources		Type	disk monitor
		Monitor resource name	diskw1
		Monitored device	/dev/sdb2
		Monitoring method	Dummy Read
		When abnormality detected	Stop Cluster Daemon And OS Shutdown
3rd monitor resources		Type	ip monitor
		Monitor resource name	ipw1
		Monitored IP address	10.0.0.254 (Gateway)
		When abnormality detected	"WebManager" group's failover *2
4th monitor resources		Type	ip monitor
		Monitor resource name	ipw2
		Monitored IP address	10.0.0.254 (Gateway)
		When abnormality detected	"failover1" group's Failover *2

= *1: Prepare a floating IP address for starting Web Manager. Add it to the dedicated group. Unless Web Manager dedicated group does not stop, you can access it from Web browser without being aware of the server's real IP.

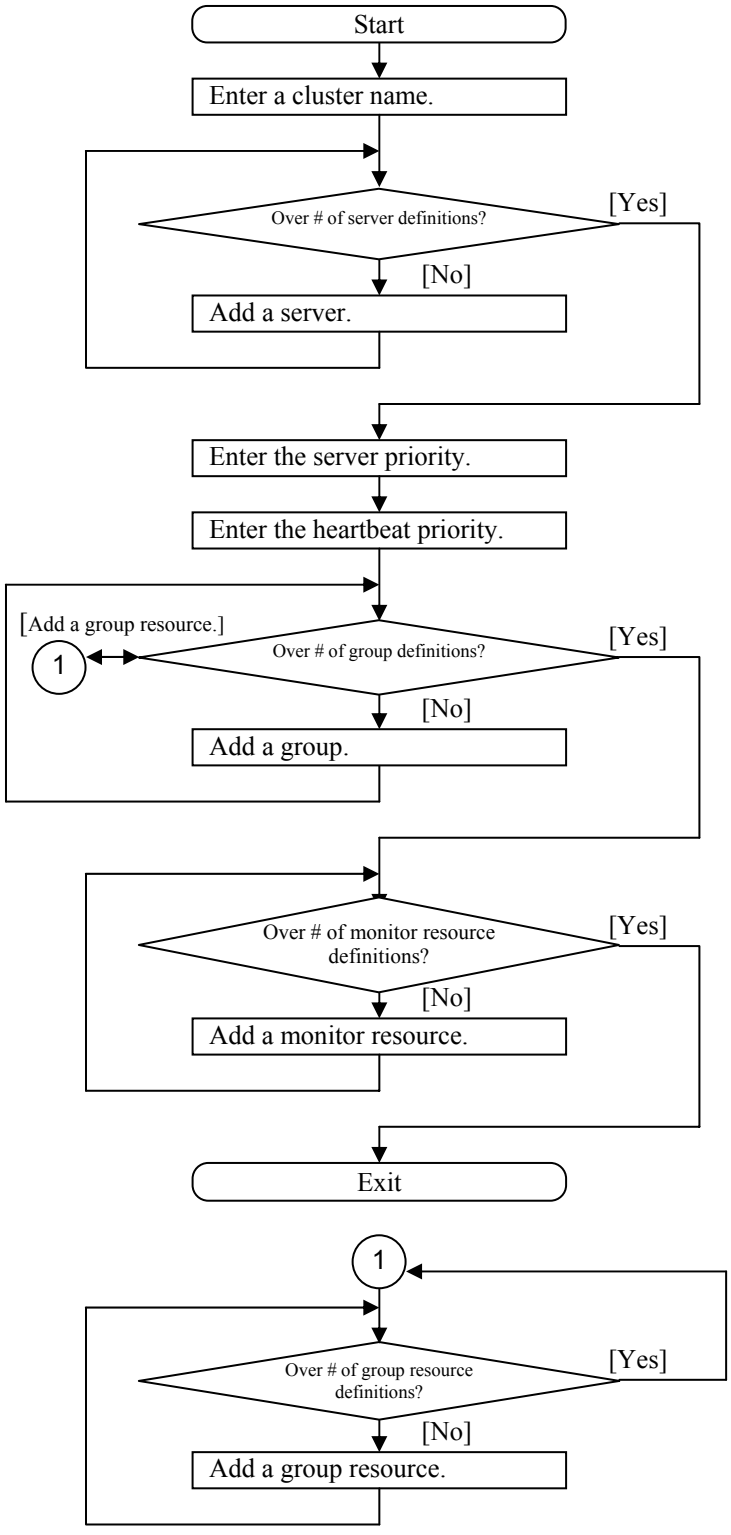
= *2: For detailed settings for trying failover when all Interconnect LANs are disconnected, see "Monitor Resources" section in a separate guide, "Trekking Tool".

This cluster configuration is illustrated below.



4.2 Steps To Create Cluster Configuration Data

Cluster configuration data is created as follows;



See (1)-(2).

See (3)-(4).

See (5)-(6).

See (7).

See (8) and (10).

See (14)-(16).

See (9), and (11)-(13).

(1) Start Trekking Tool.
Load Trekking Tool's html file on your Web browser.

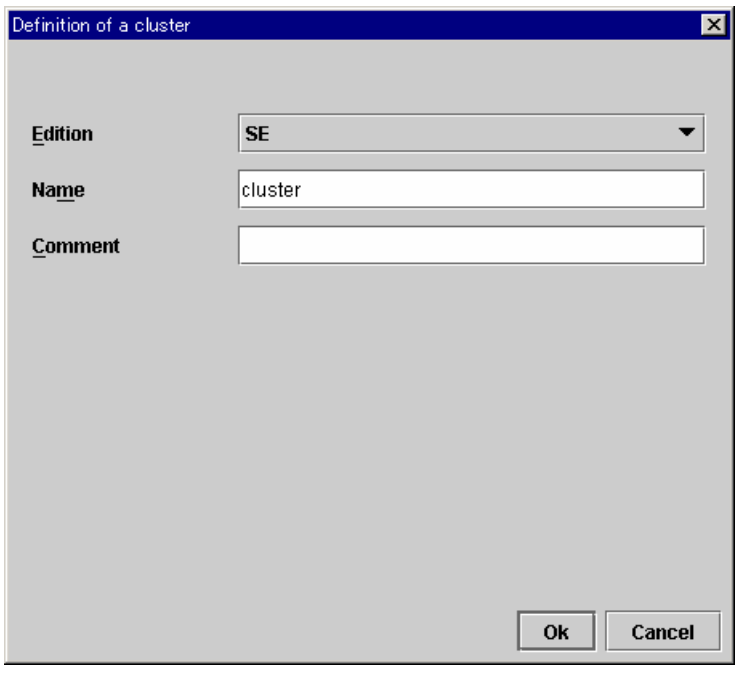
For Linux:
file:///opt/nec/clptrek/clptrek.html

For Windows:
file:///Installation path/clptrek.html

Menu bar means Trekking Tool's menu bar in the following explanations.
You can repeat the following steps as many times as you need. You can change almost all settings you specify here by the rename function or properties view function. Dialog boxes in the following explanation are the same as corresponding tab pages of properties view function.
See a separate guide, "Trekking Tool" for details.

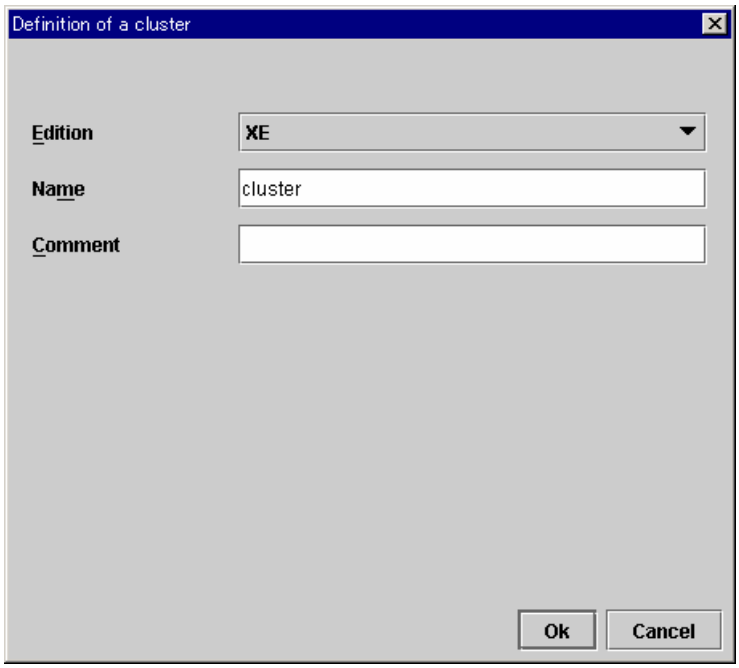
(2) Select [Edit | Add] from the menu bar.
Depending on the product, the edition you select varies.

A. **For SE**
Select "SE" for the Edition in the dialog box below. Enter the cluster name. Click [Ok].
Cluster name: cluster

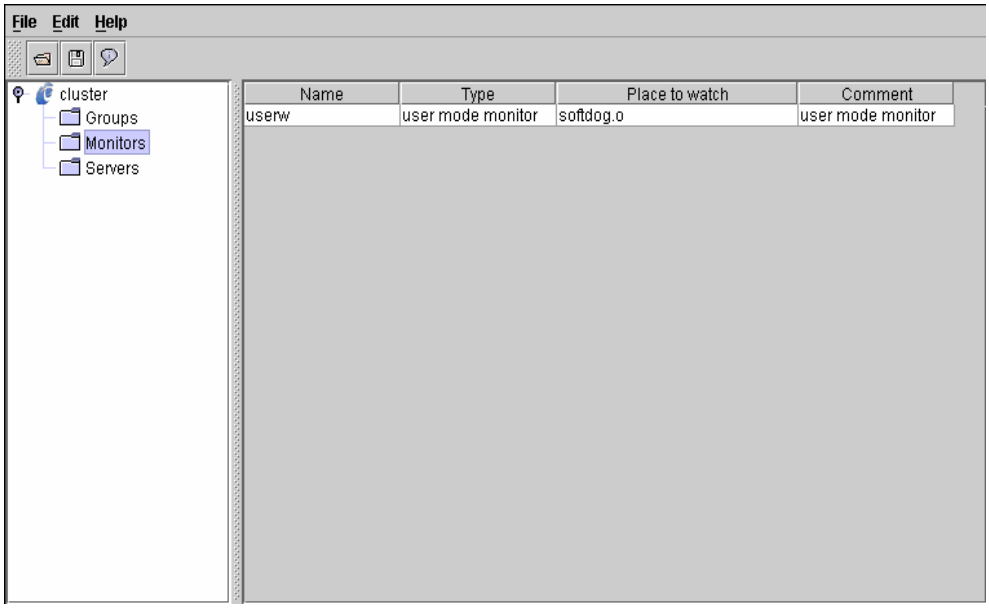


B. **For XE**

Select “XE” for the Edition in the dialog box below. Enter the cluster name. Click [Ok].
Cluster name: cluster



The tree view looks like as follows;

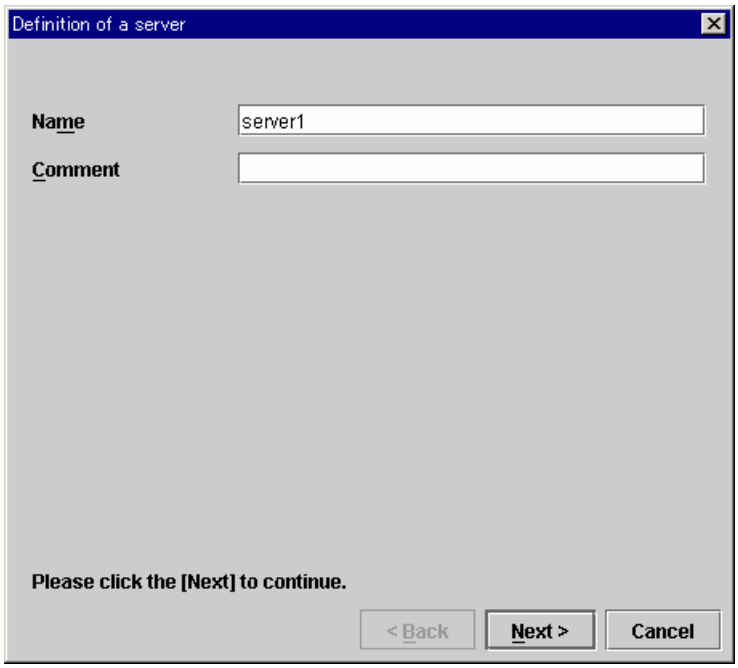


When the cluster name is defined, “user mode monitor” is defined.

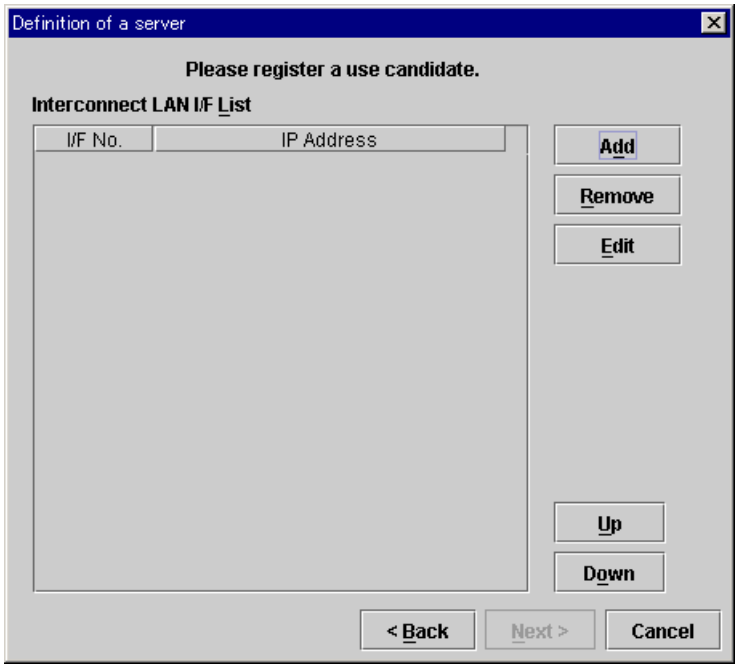
(3) Select “Servers” on the tree view.
Select [Edit | Add] from the menu bar.
The server’s definition dialog box is displayed. Enter data for the 1st server.

Server name	server1
LAN heartbeat IP address (Dedicated)	192.168.0.1
LAN heartbeat IP address (Backup)	10.0.0.1
Public IP address	10.0.0.1
COM heartbeat device (Only for SE)	/dev/ttyS0 (Only for SE)
DISK heartbeat device	/dev/sdb1 /dev/raw/raw1

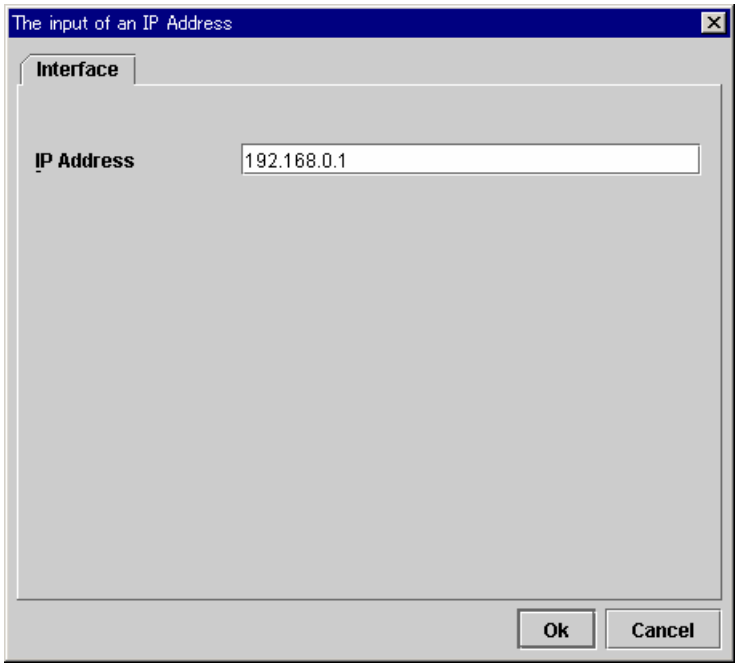
A. Enter the server name in the following dialog box. Click [Next].



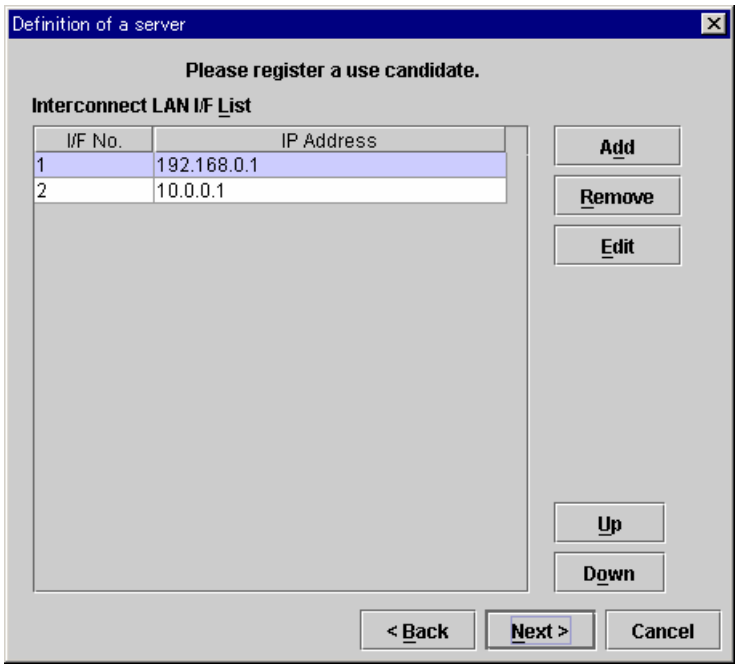
B. Click [Add] in the following dialog box to set the LAN heartbeat IP address.



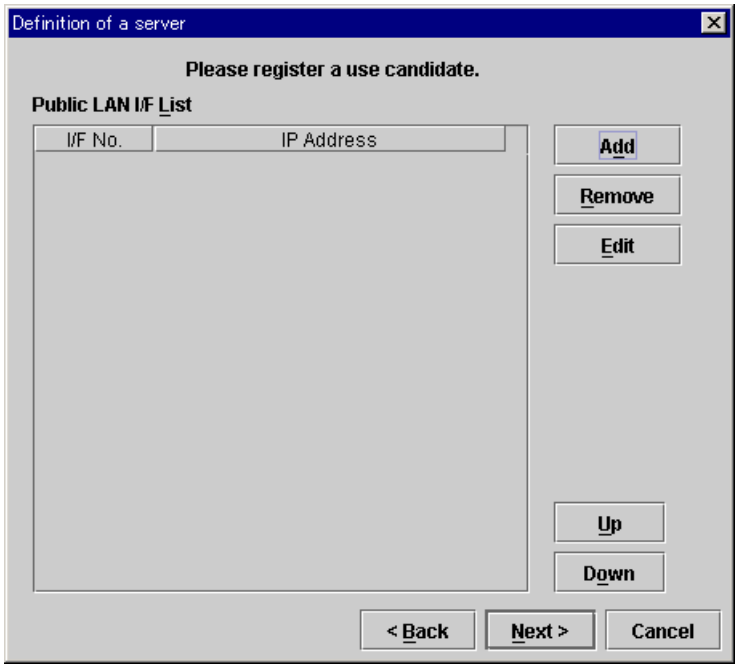
Enter the LAN heartbeat IP address (Dedicated) in the following dialog box and click [Ok]. Then, it will be added in “Interconnect LAN I/F List”.



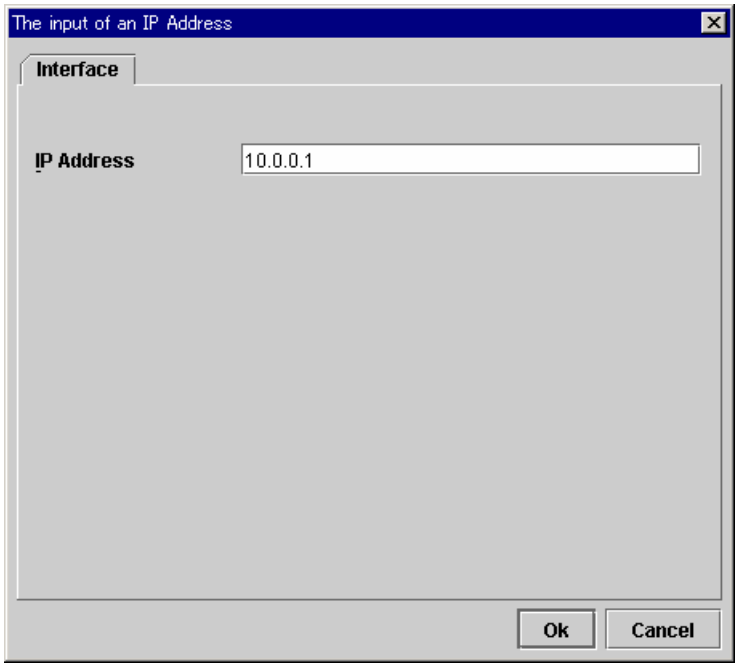
Likewise, enter the LAN heartbeat IP address (Backup). When you have set both LAN heartbeat IP addresses, click [Next].



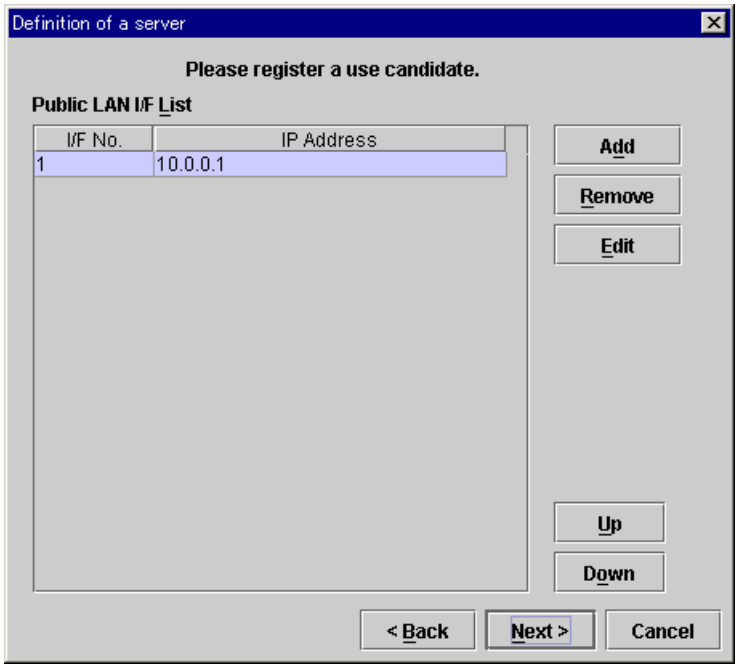
C. Click [Add] in the following dialog box to set the public IP address.



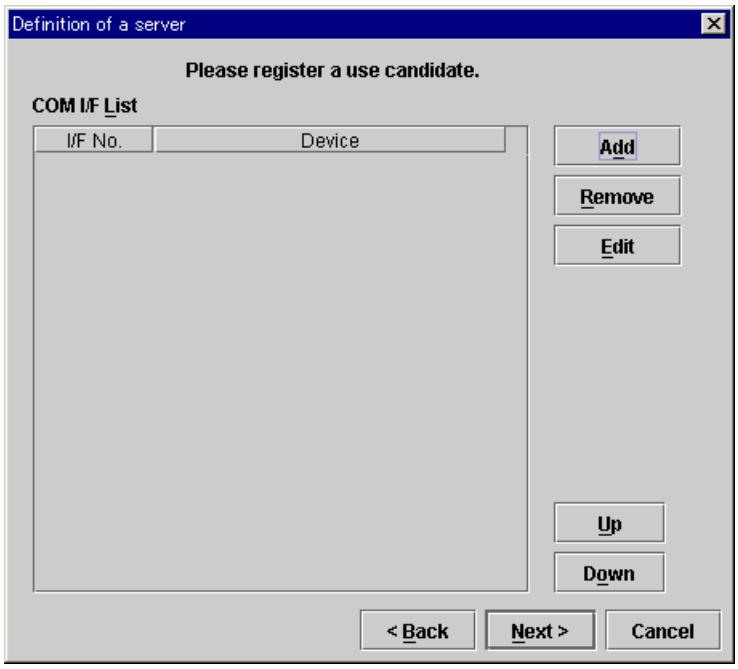
Enter the public IP address in the following dialog box. Click [Ok].



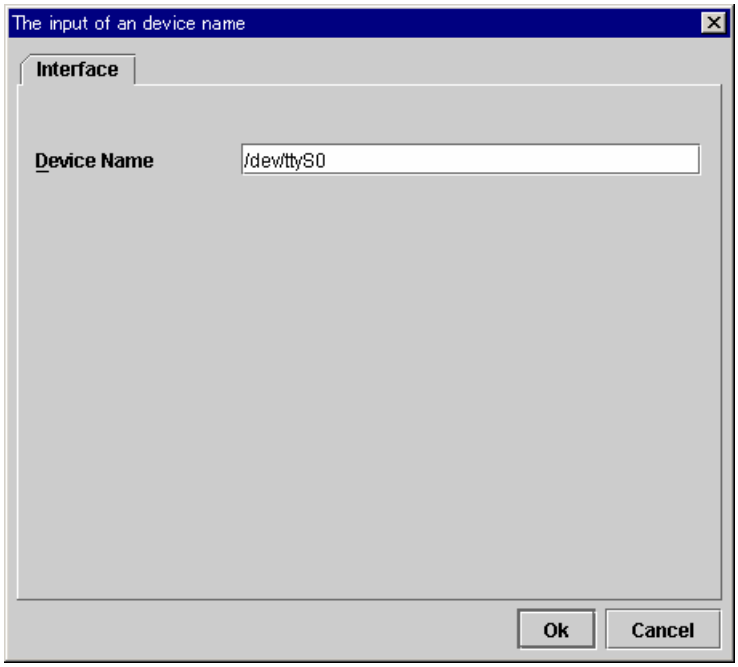
Confirm the address is in “Public LAN I/F List”. Click [Next].



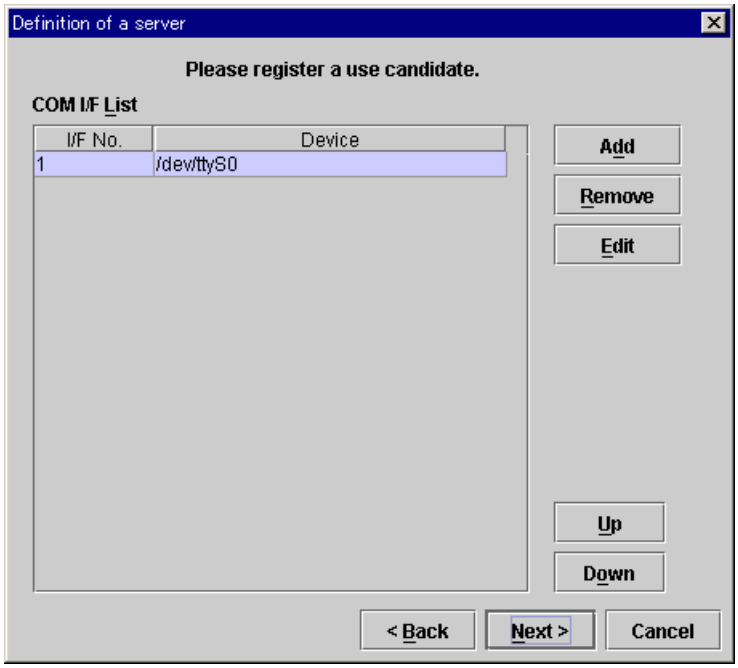
D. Click [Add] in the following dialog box to set the COM heartbeat device. This is required only for SE. For XE, skip this step and go to the next step by clicking [Next] in the following dialog box.



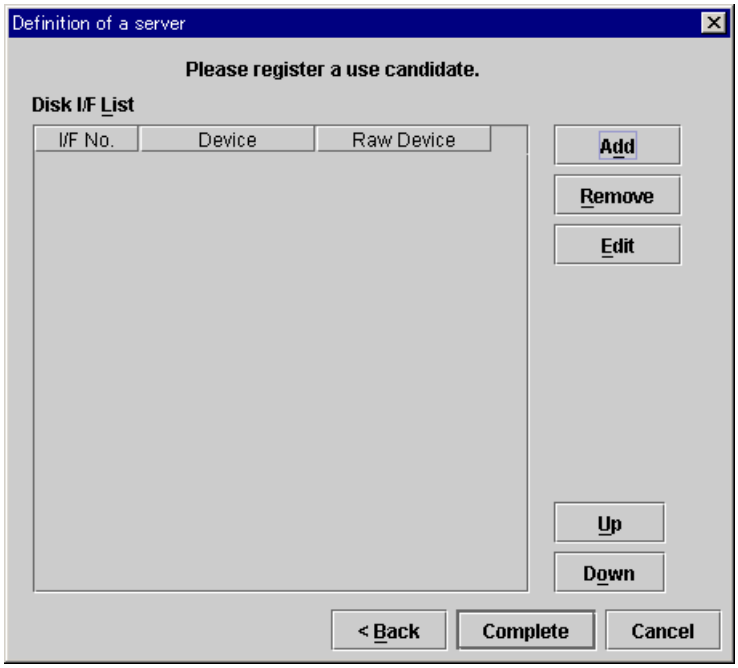
The default COM heartbeat device name is set in the following dialog box. In this sample, you can keep the default value. Click [Ok].



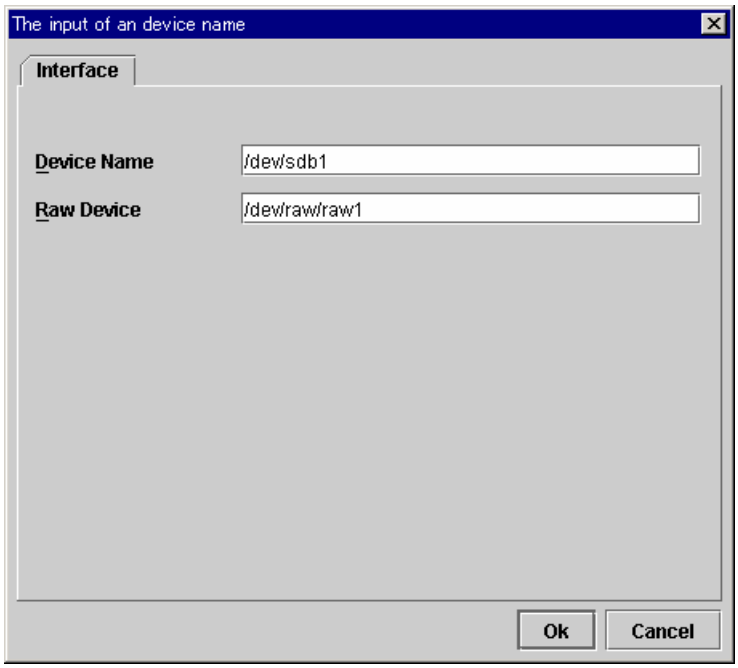
Confirm the device is in “COM I/F List”. Click [Next].



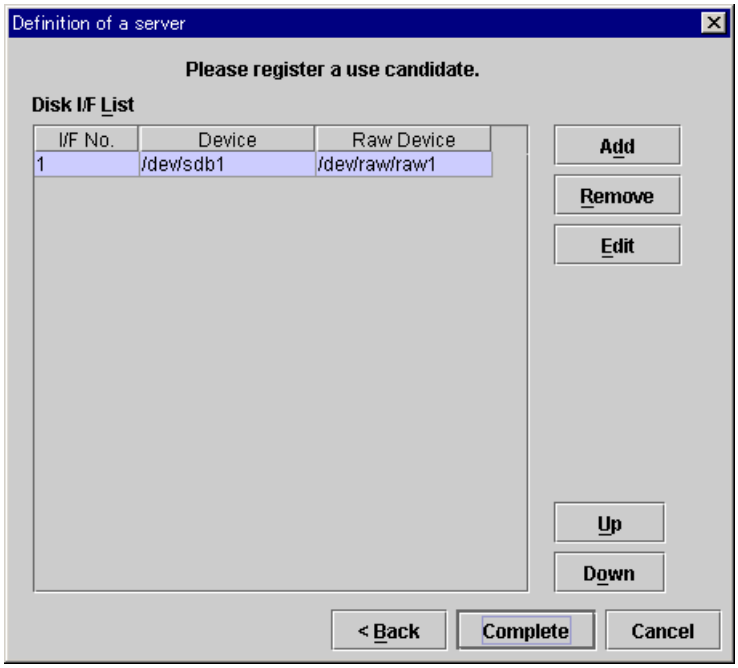
E. Click [Add] in the following dialog box to set the DISK heartbeat device.



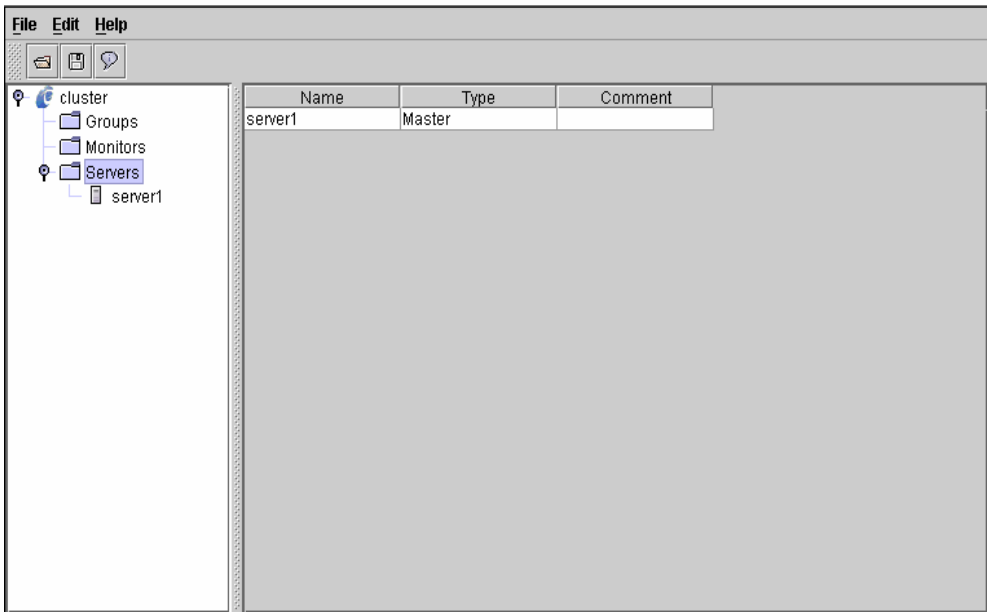
Enter a real device name in the Device Name text box in the following dialog box. The default raw device name is set in the Raw Device field. In this sample, you can keep the default value. Click [Ok].



Confirm the device is in “Disk I/F List”. Click [Complete].



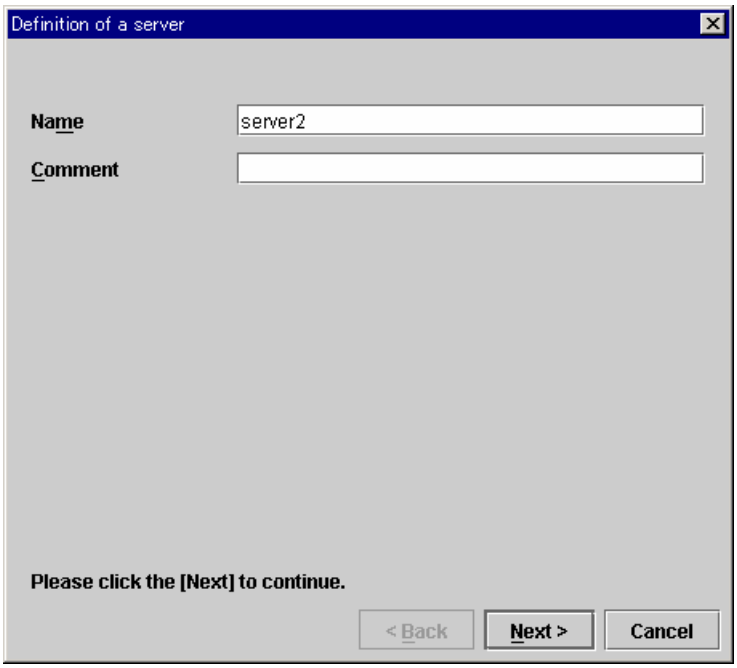
The tree view looks like as follows. The first defined server becomes the master server by default.



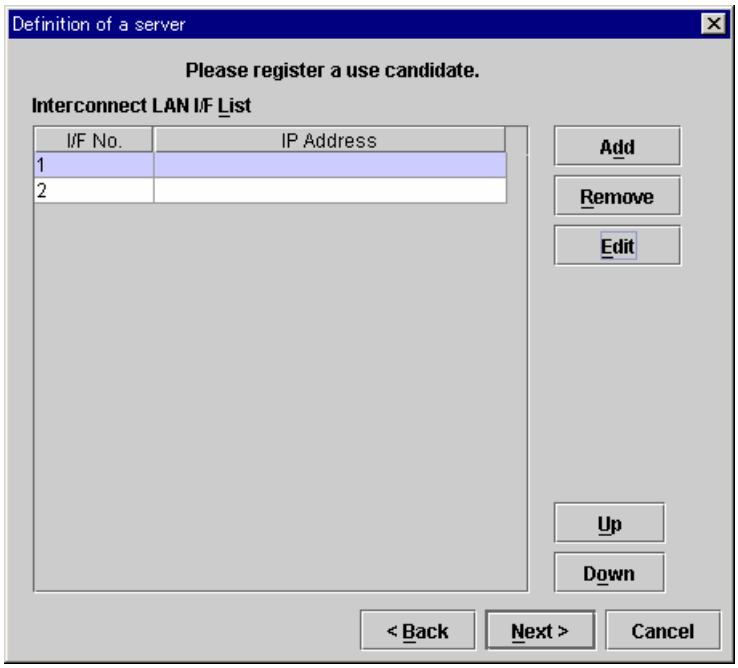
(4) Select “Servers” on the tree view. Select [Edit | Add] from the menu bar. Enter data for the second server.

Server name	server2
Interconnect IP address (Dedicated)	192.168.0.2
Interconnect IP address (Backup)	10.0.0.2
Public IP address	10.0.0.2
COM heartbeat device (Only for SE)	/dev/ttyS0 (Only for SE)
DISK heartbeat device	/dev/sdb1 /dev/raw/raw1

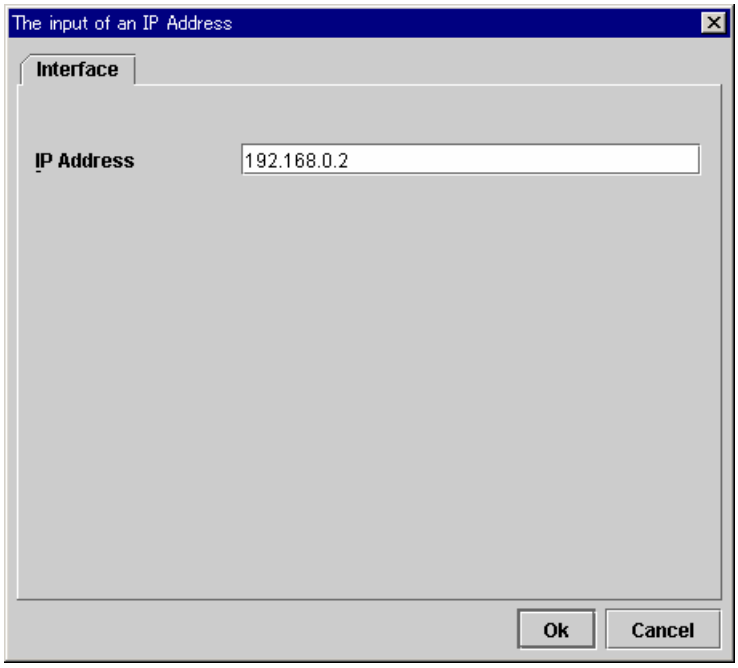
A. Enter the server name in the following dialog box. Click [Next].



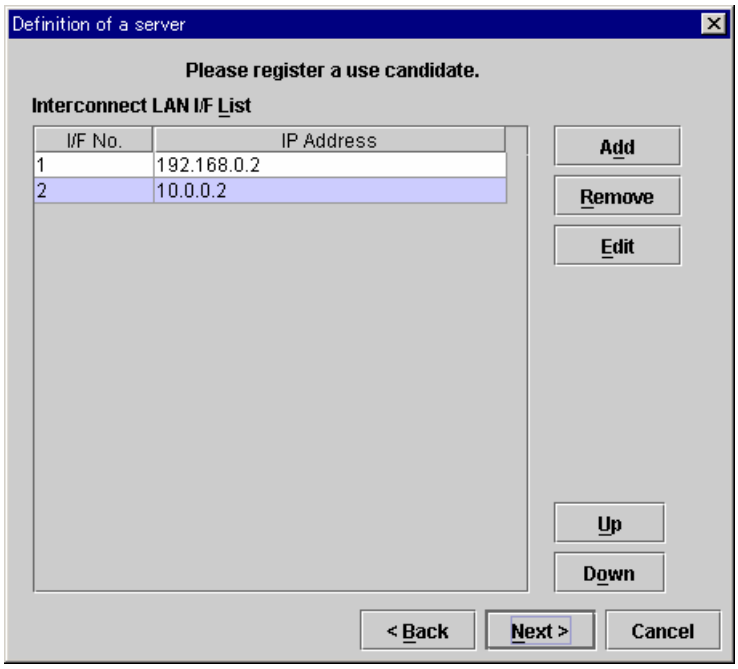
B. Click [Edit] in the following dialog box to set the LAN heartbeat IP address. For the second and further server definitions, as many interfaces as the master server has are provided. The initial values are blank for IP address. Enter corresponding IP addresses to the interface numbers registered on other servers.



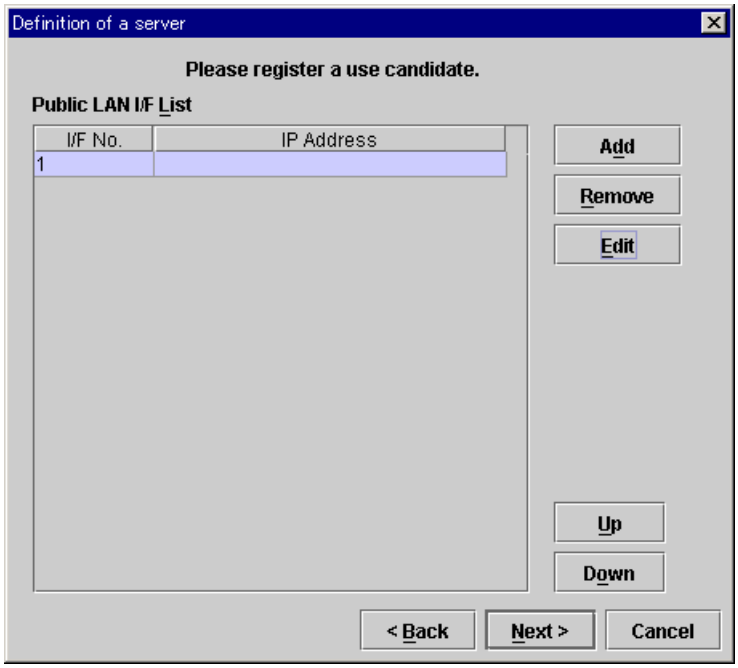
Enter the LAN heartbeat IP address (Dedicated) in the following dialog box. Click [Ok]. Then, it will be added in “Interconnect LAN I/F List”.



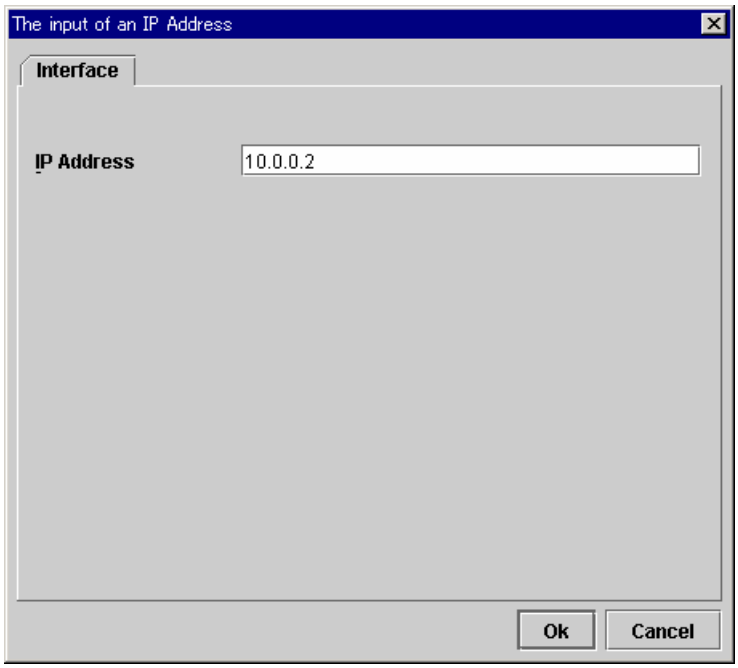
Select “2” in I/F No. As you did in the previous step, enter the LAN heartbeat IP address (Backup), too. When you have entered two LAN heartbeat IP addresses, click [Next].



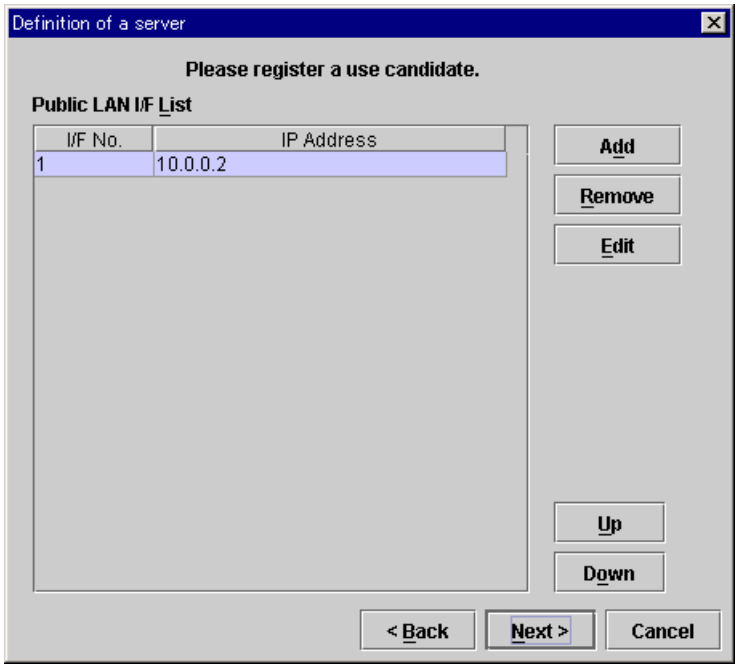
C. Click [Edit] in the following dialog box to set the Public IP address.



Enter the public IP address in the following dialog box. Click [Ok].

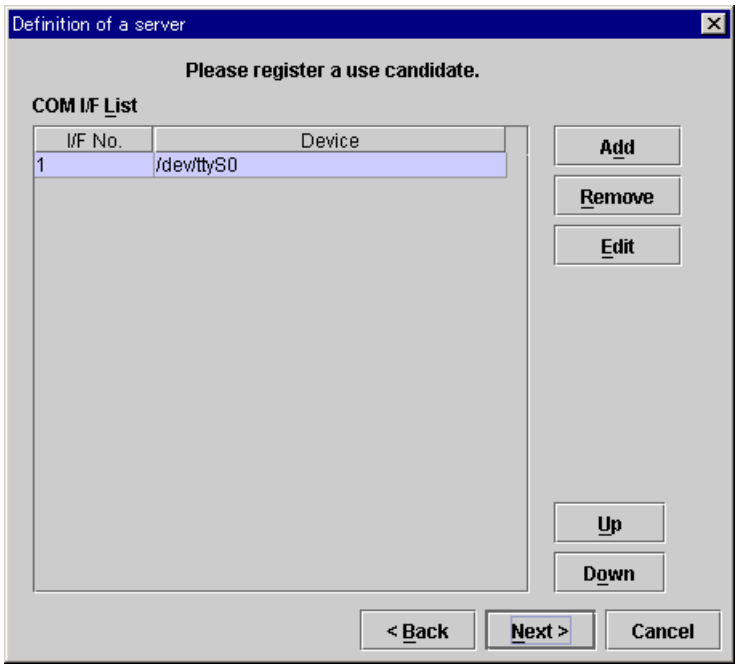


Confirm that the IP address was added to “Public LAN I/F List”. Click [Next].

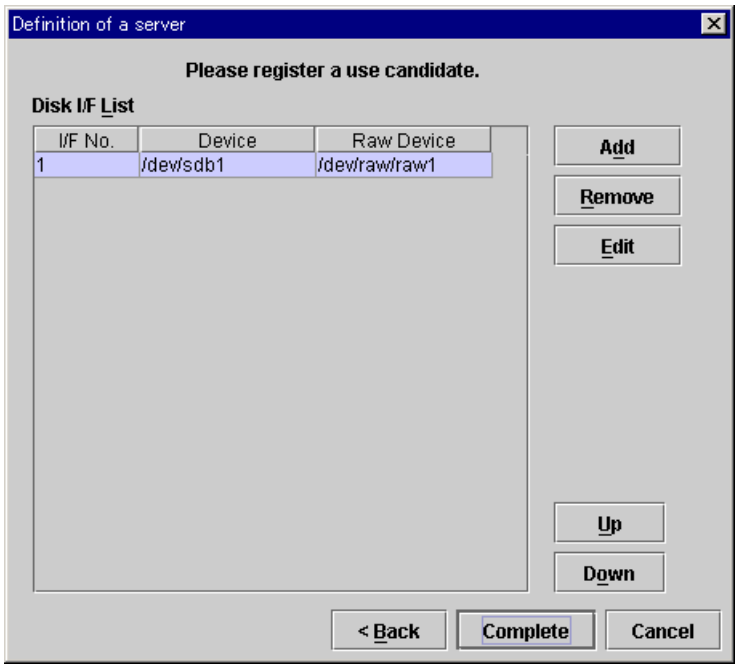


D. For SE, the following screen appears. Just, click [Next].
Like you saw in the previous step, as many interfaces as the master server has are provided. The COM heartbeat device name of the master server is set by default.

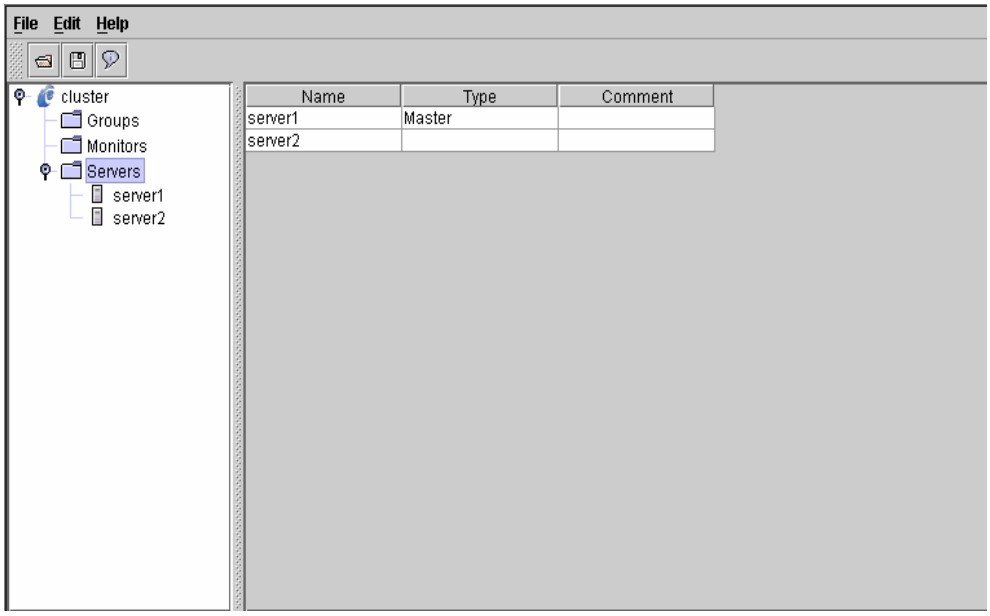
For XE, nothing is displayed in “COM I/F List”. Just, click [Next].



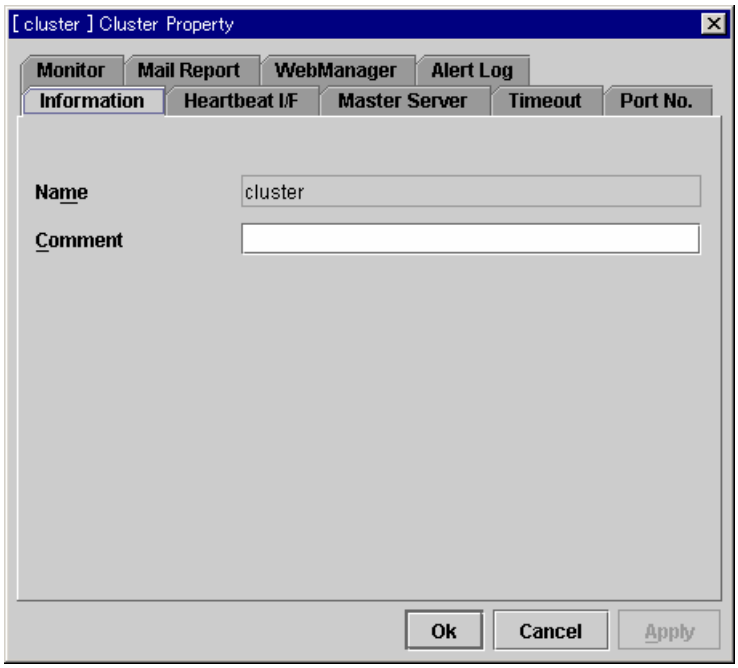
E. Just, click [Complete] in the following dialog box.
Here also, as many interfaces as the master server has are provided. The disk device and raw device names of the master server are set by default.



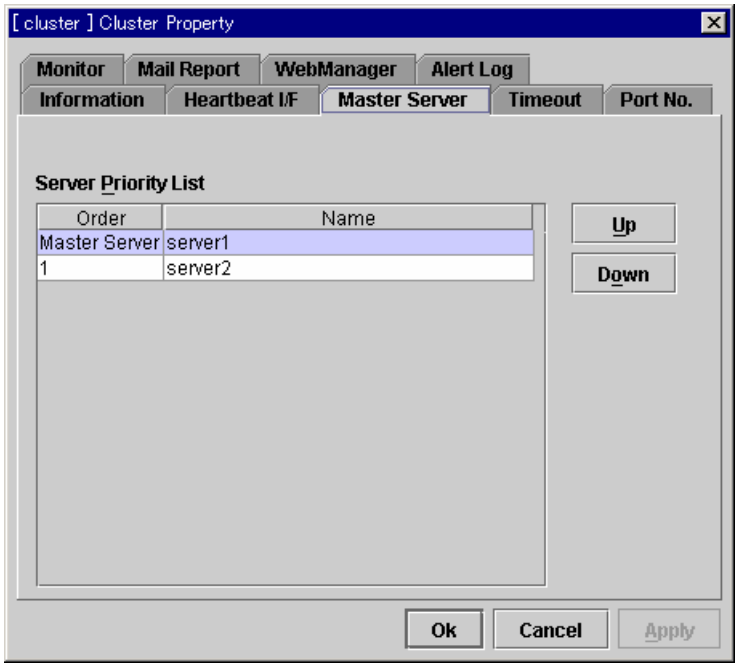
The tree view looks like as follows;



(5) Select “Cluster name” in the tree view. Select [Edit | Property] from the menu bar.
Select [Master Server] tab on the following dialog box.



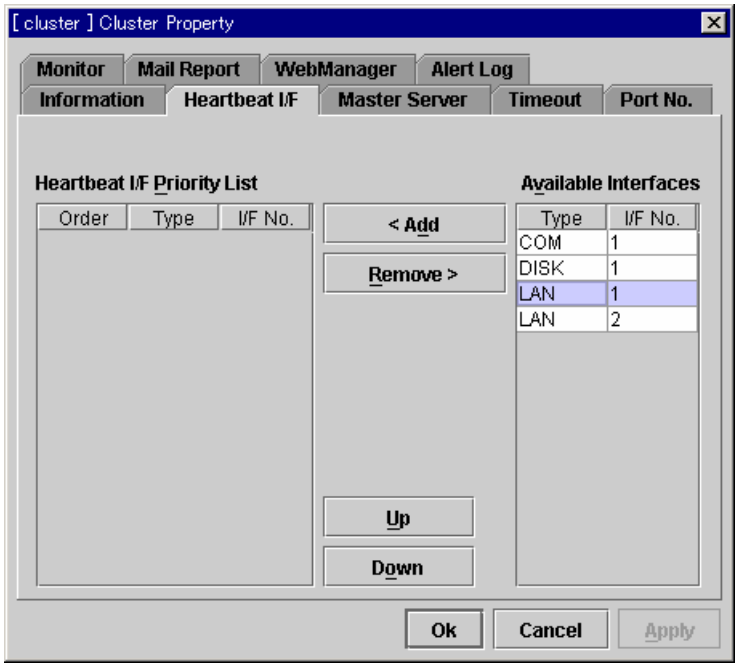
(6) Confirm you see the followings in the [Master Server] tab.
If the master server setting is correct, select [Heartbeat I/F] tab.
If not, click [Up] or [Down] button to set the master server to“server1”.



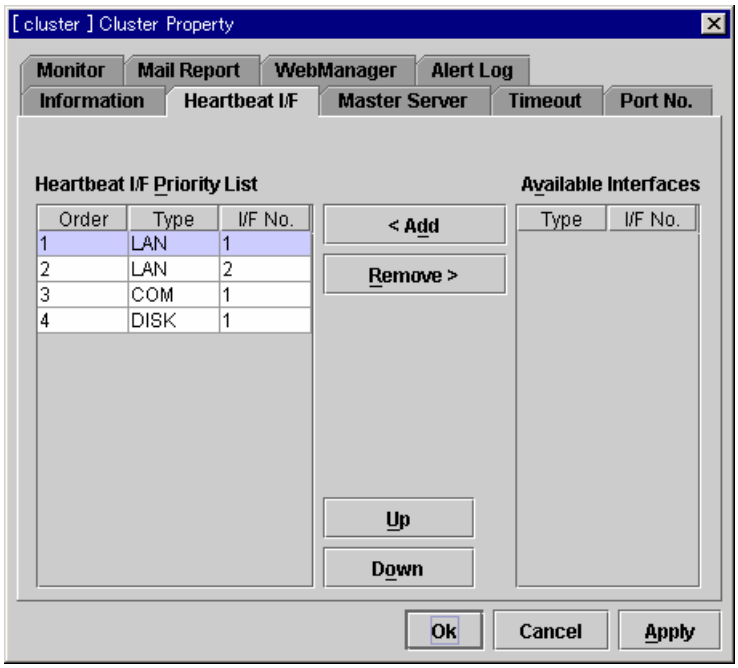
(7) Make settings in [Heartbeat I/F] tab for interfaces which servers in the cluster use for heartbeat.

# of LAN heartbeats	2
# of COM heartbeats (Only for SE)	1 (Only for SE)
# of DISK heartbeats	1

A. Select “LAN 1” in “Available Interfaces”. Then click [Add].
For XE, no COM is shown in “Available Interfaces”.



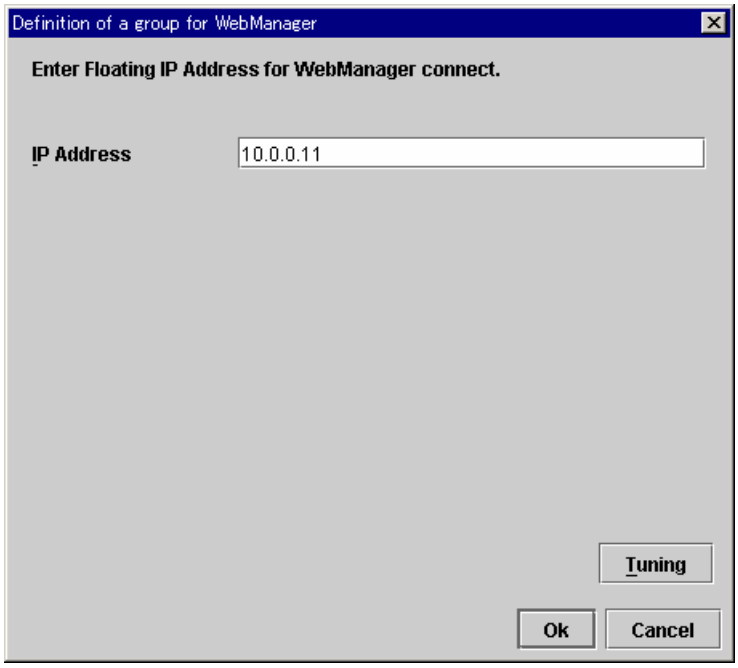
Likewise, add “LAN 2”, “COM 1” and “DISK 1” in this order.
Confirm the heartbeat interface priorities are set as follows. Click [Ok].
For XE, “COM 1” does not appear.



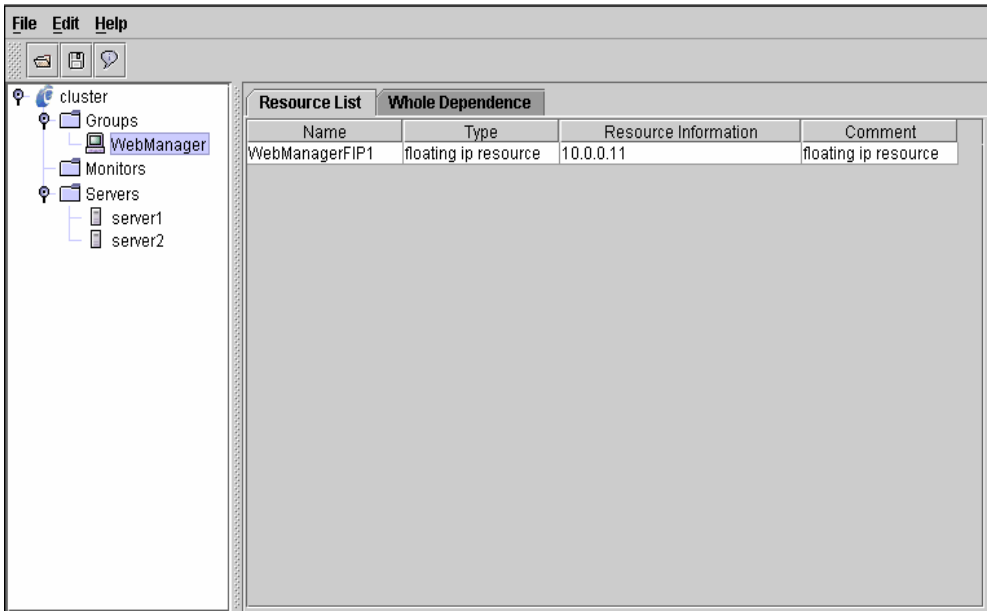
(8) Select “Groups” in the tree view. Select [Edit | Add group for WebManager] from the menu bar.
Enter data for Web Manager group.

Floating IP address	10.0.0.11

A. Enter the IP address in the following dialog box. Click [Ok].



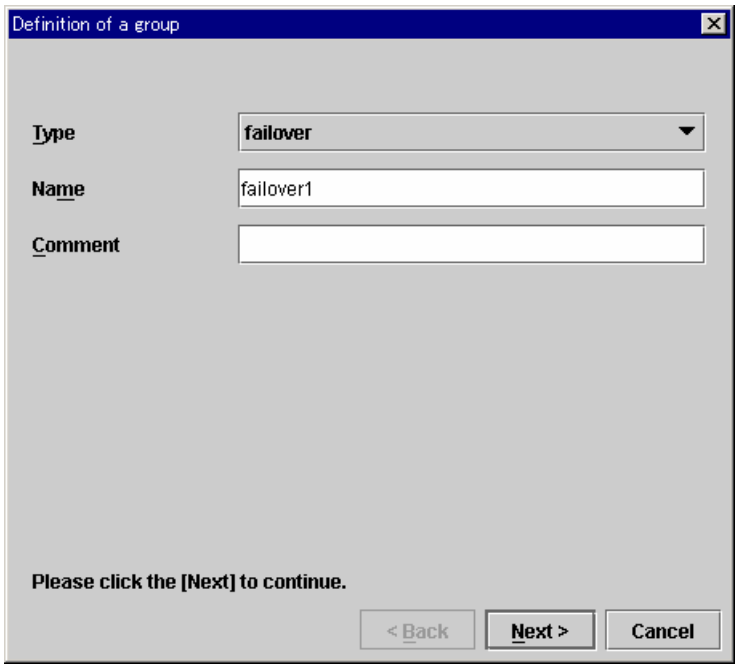
The tree view looks like as follows;



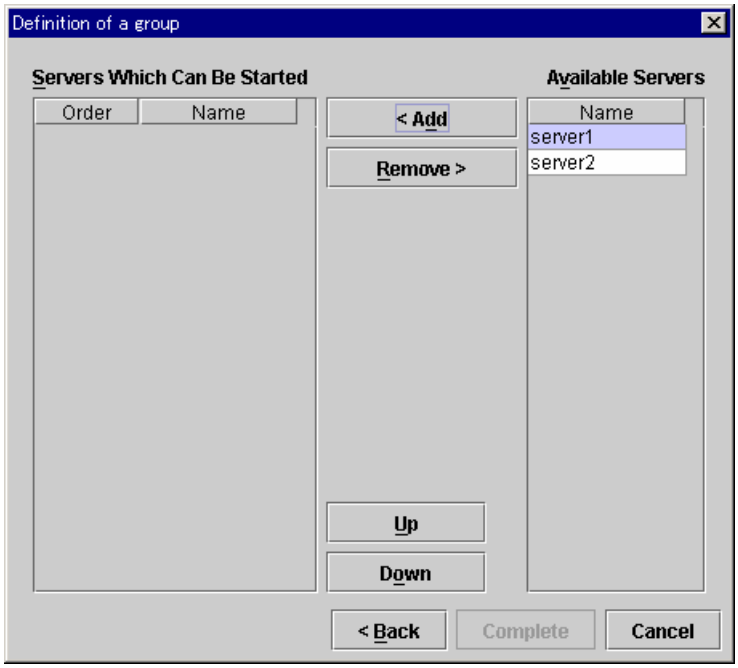
(9) Select “Groups” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the second group.

Type	Failover
Group name	failover1
Startup server	server1→server2

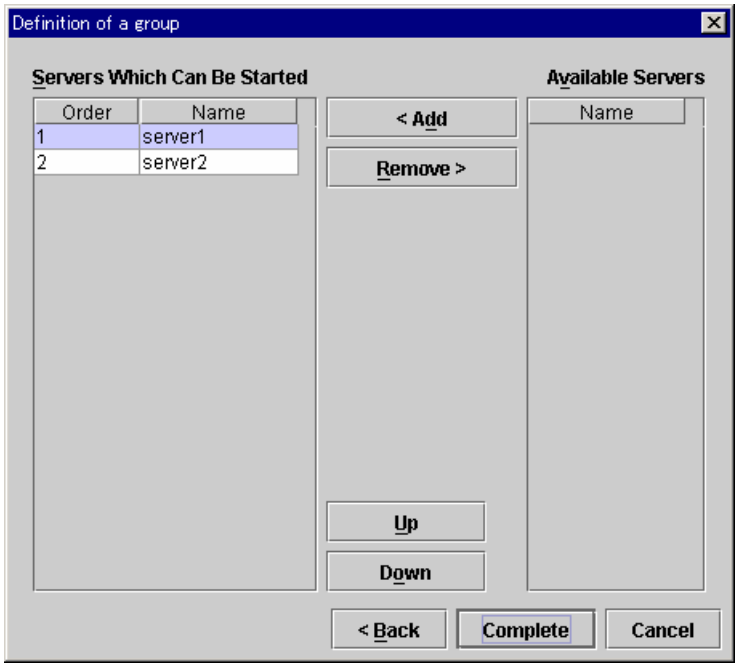
A. Enter the group name in the following dialog box. Click [Next].



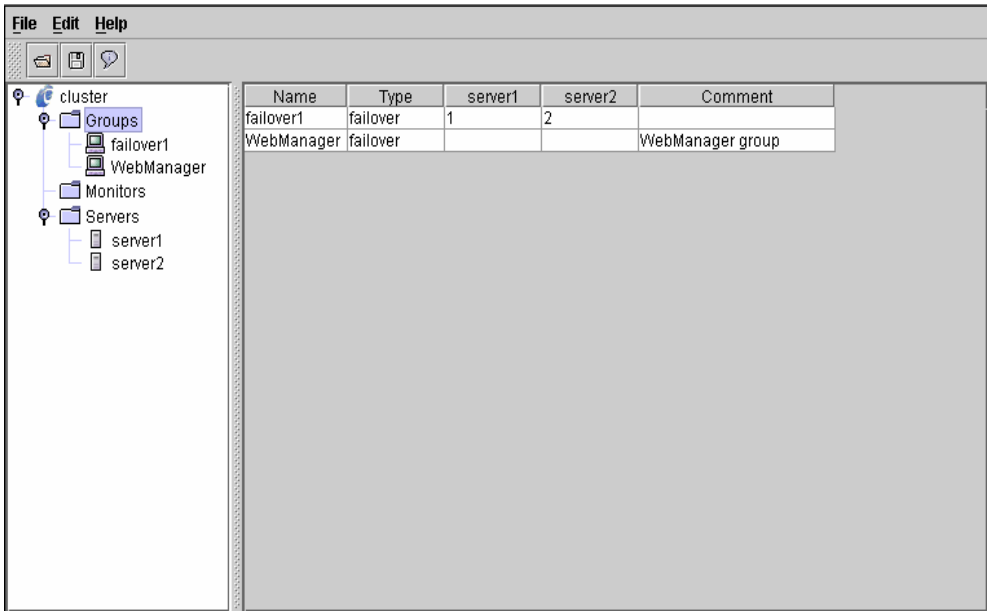
B. Select “server1” from “Available Servers”. Click [Add].



Likewise, add “server2”.
Confirm the priorities are set as follows. Click [Complete].



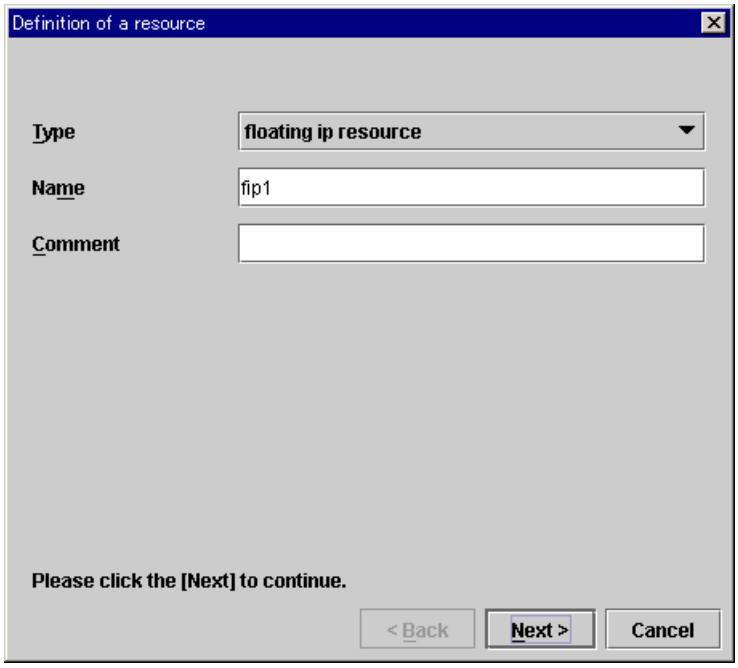
The tree view looks like as follows;



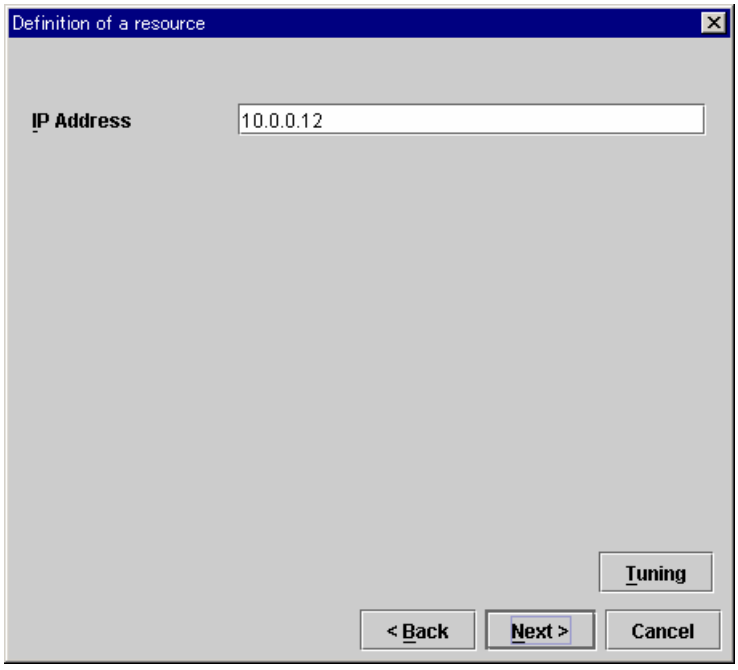
(10) Select “failover1” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the first group resource.

Type	floating ip resource
Group resource name	fip1
IP address	10.0.0.12

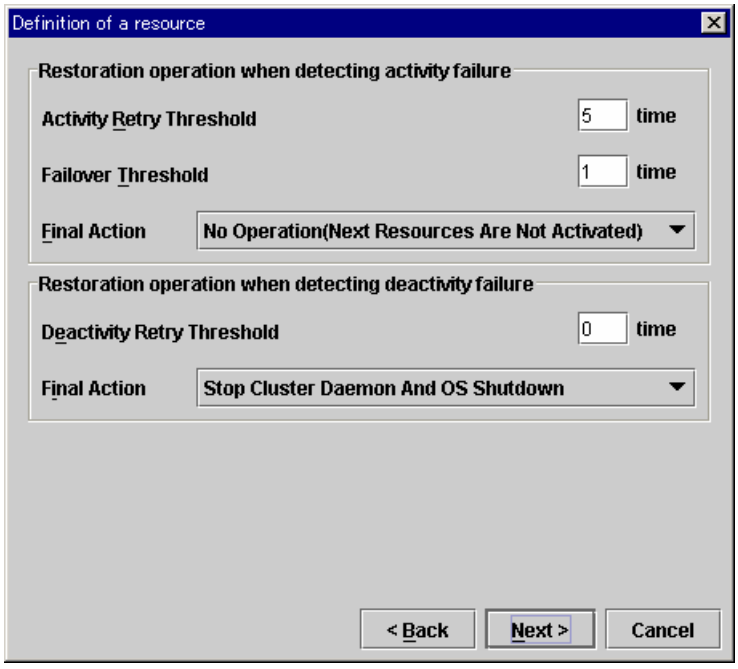
A. Enter the type and group resource name in respective fields in the following dialog box. Click [Next].



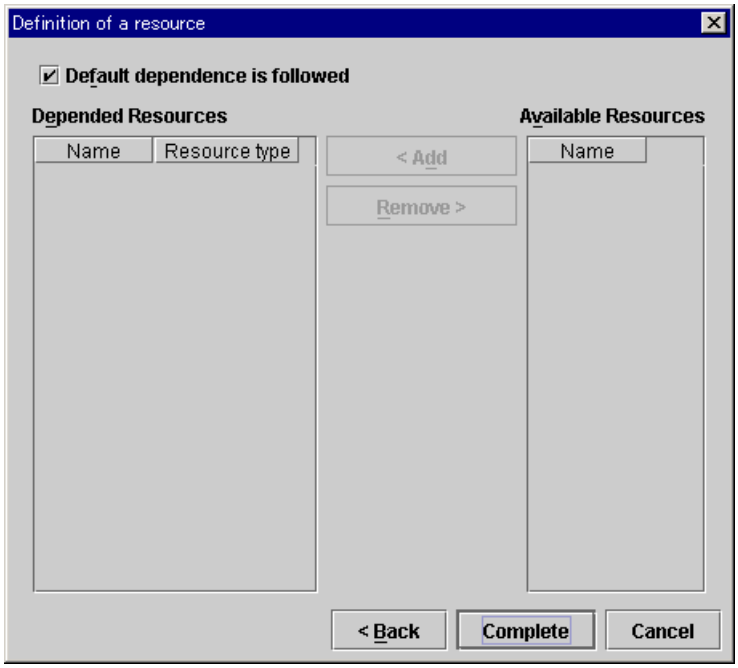
B. Enter “IP Address” in the following dialog box. Click [Next].



C. Click [Next] in the following dialog box.



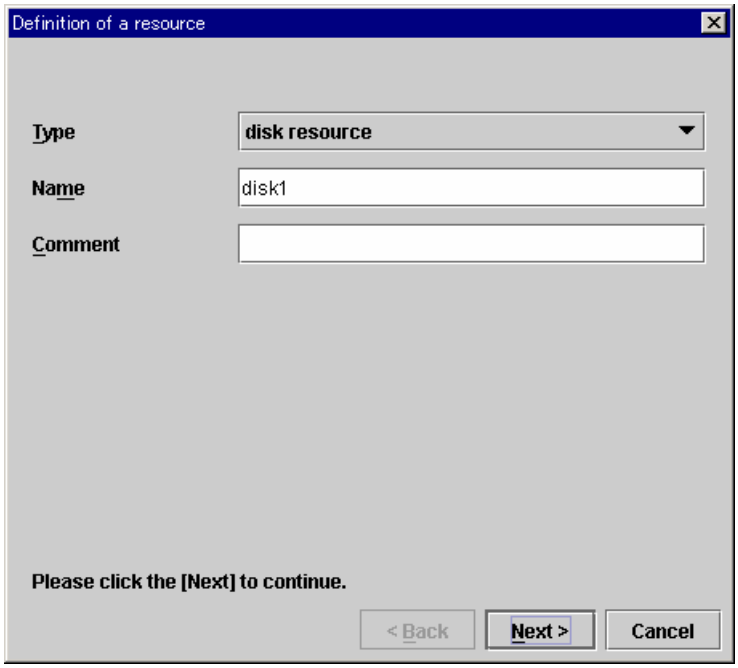
D. Click [Complete] in the following dialog box.



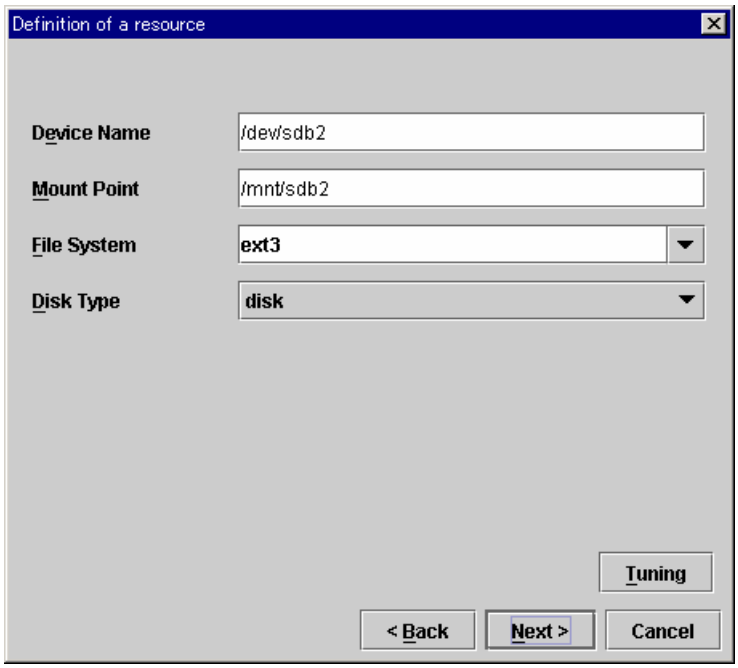
(11) Select “failover1” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the second group resources.

Type	disk resource
Group resource name	disk1
Device name	/dev/sdb2
Mount point	/mnt/sdb2
File system	ext3
Disk type	disk

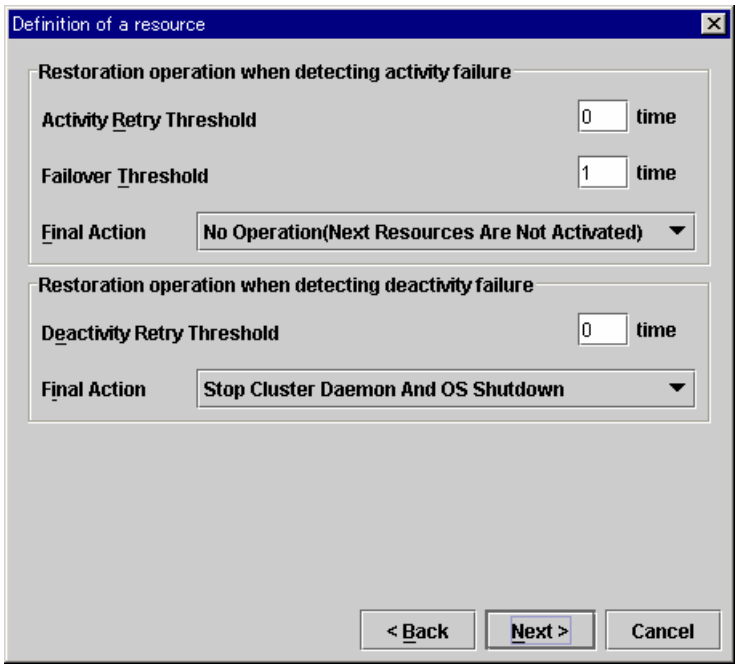
A. Enter the type and group resource name in respective fields in the following dialog box. Click [Next].



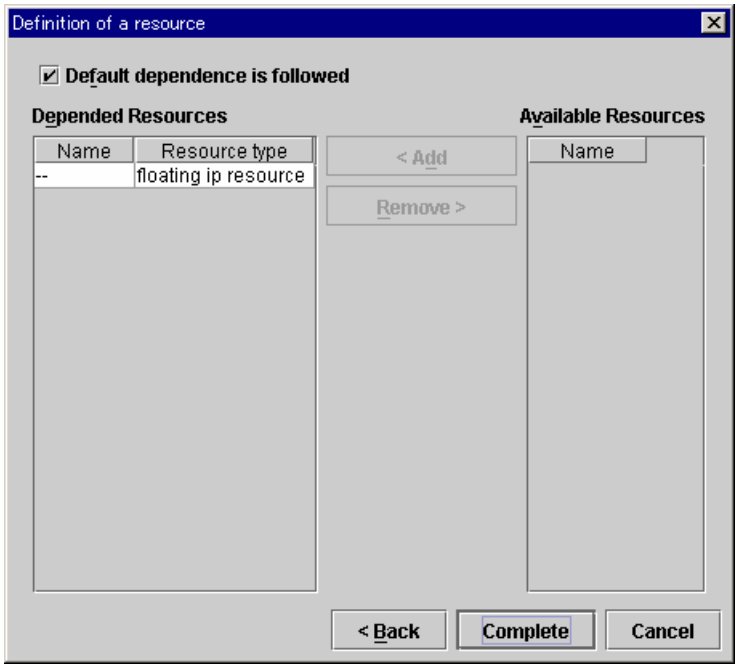
B. Enter “Device Name”, “Mount Point”, “File System” and “Disk Type” in the following dialog box. Click [Next].



C. Click [Next] in the following dialog box.



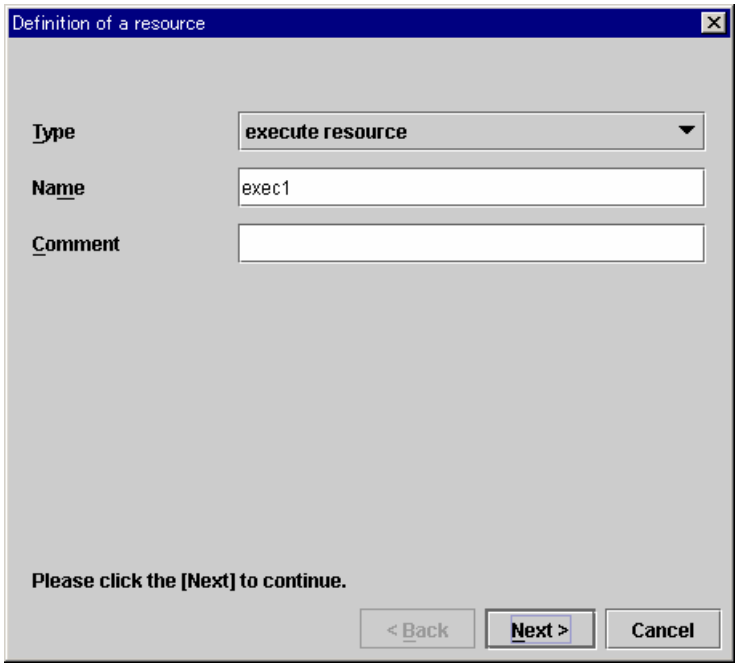
D. Click [Complete] in the following dialog box.



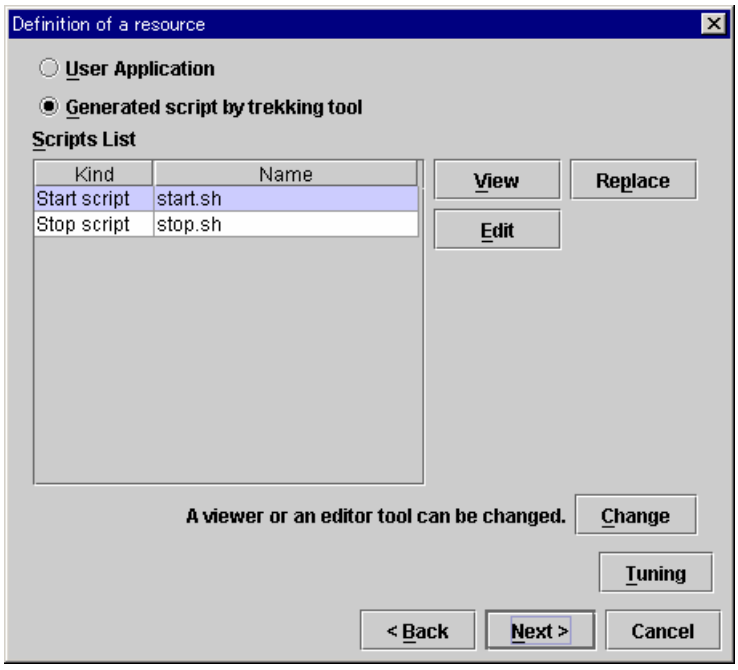
(12) Select “failover1” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the third group resources.

Type	execute resource
Group resource name	exec1
Script	Standard script

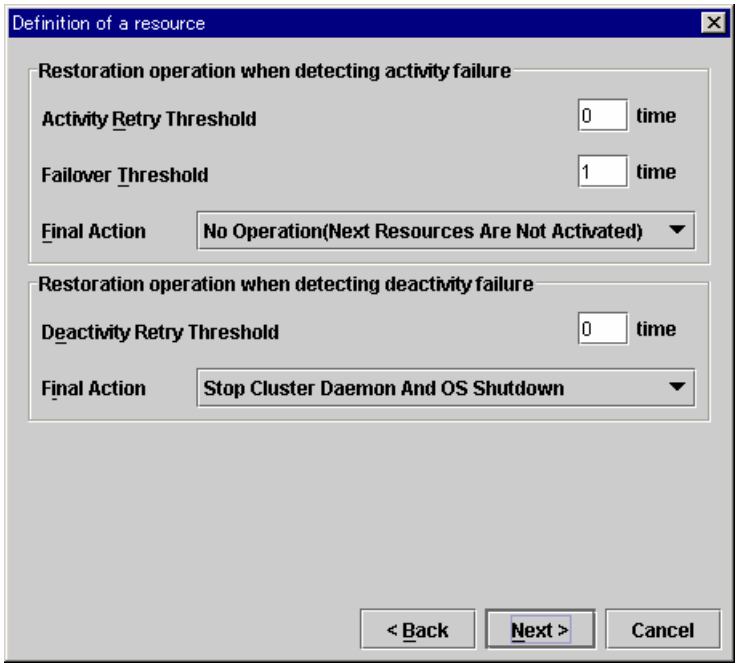
A. Enter the type and group resource name in respective fields in the following dialog box. Click [Next].



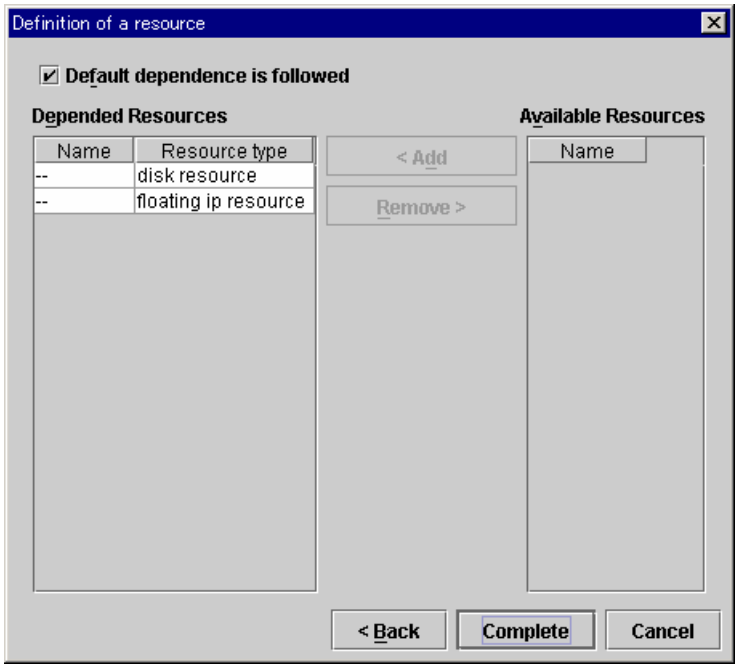
B. Select [Generated script by trekking tool] in the following dialog box. Click [Next].
You can write codes to start or stop service applications by editing these scripts.



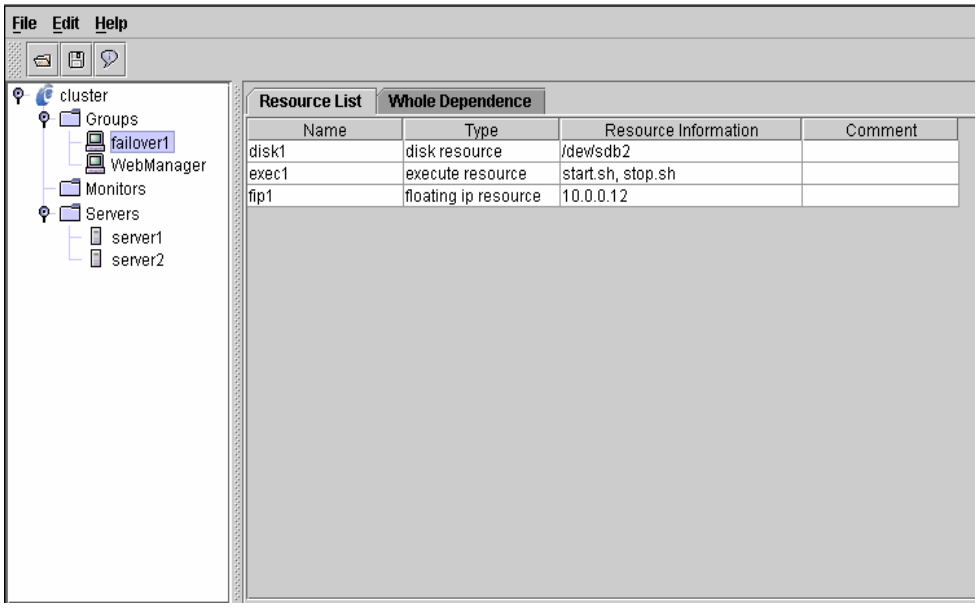
C. Click [Next] in the following dialog box.



D. Click [Complete] in the following dialog box.



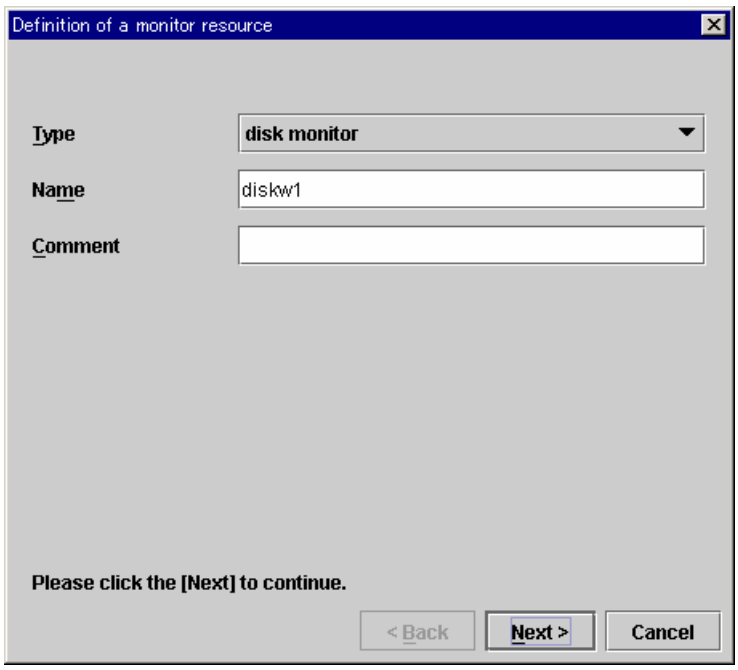
The table view of failover1 looks like:



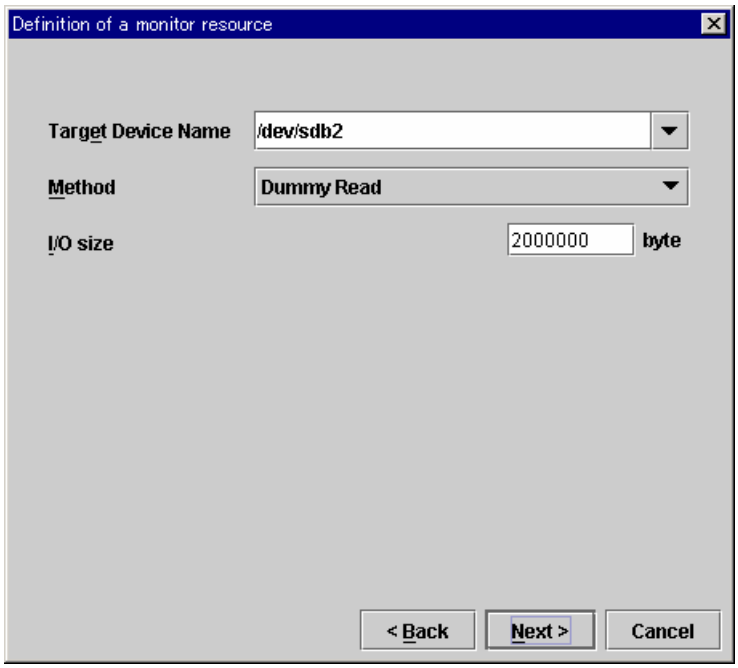
(13) Select “Monitors” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the second monitor resources. The first monitor resources have been created by default when you defined the cluster name.

Type	disk monitor
Monitor resource name	diskw1
Monitored device	/dev/sdb2
Monitoring method	Dummy Read
When abnormality detected	Stop Cluster Daemon And OS Shutdown

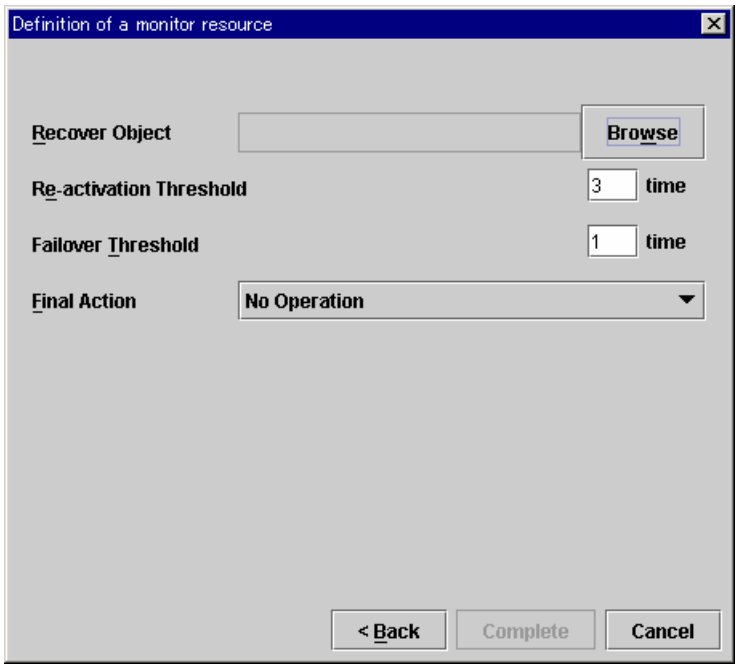
A. Enter the type and monitor resource name in respective fields in the following dialog box. Click [Next].



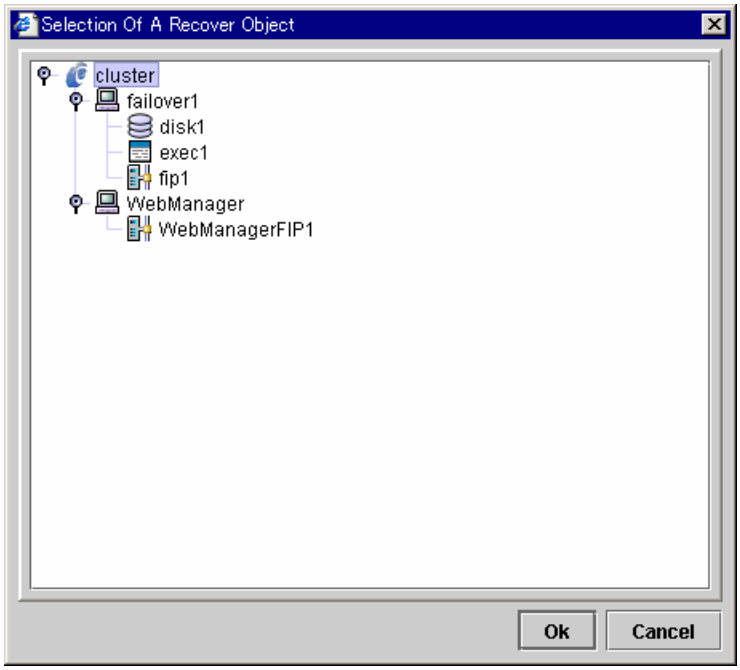
B. Enter “Target Device Name” and “Method” in the following dialog box. Click [Next].



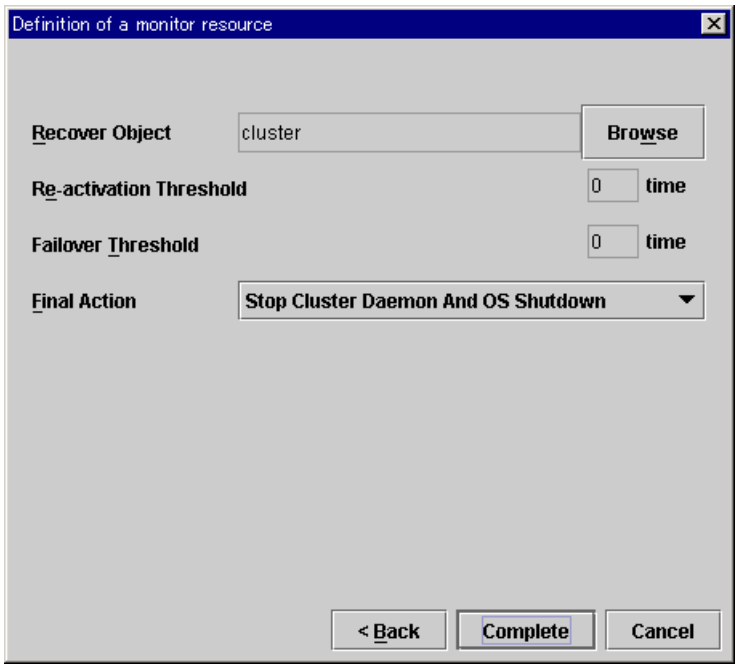
C. Specify an action to be taken at abnormality detection in the following dialog box. Click [Browse].



Select “cluster” in the following dialog box. Click [Ok].



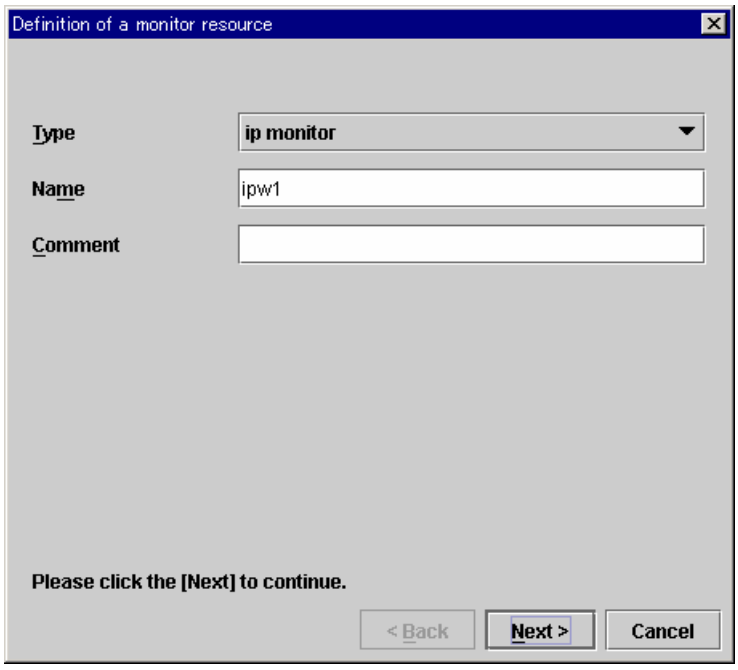
D. Confirm that “cluster” is selected in “Recover Object”. Select “Stop Cluster Daemon And OS Shutdown” in “Final Action”. Click [Complete].



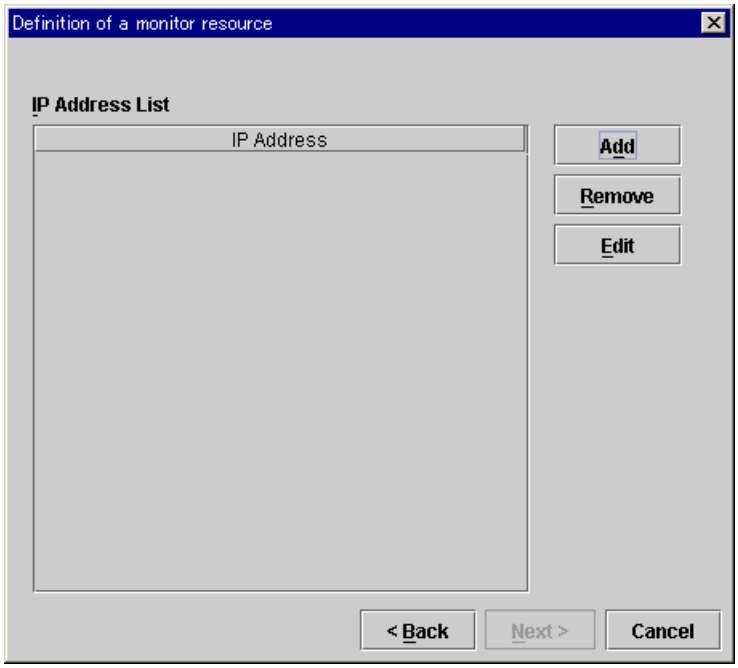
(14) Select “Monitors” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the third monitor resources.

Type	ip monitor
Monitor resource name	ipw1
Monitored IP address	10.0.0.254 (Gateway)
When abnormality detected	“WebManager” group failover

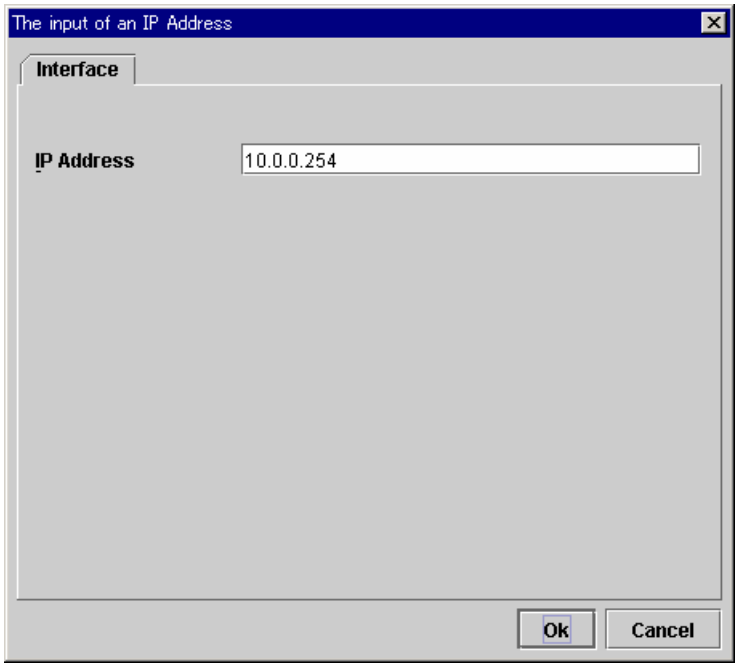
A. Enter the type and monitor resource name in respective fields in the following dialog box. Click [Next].



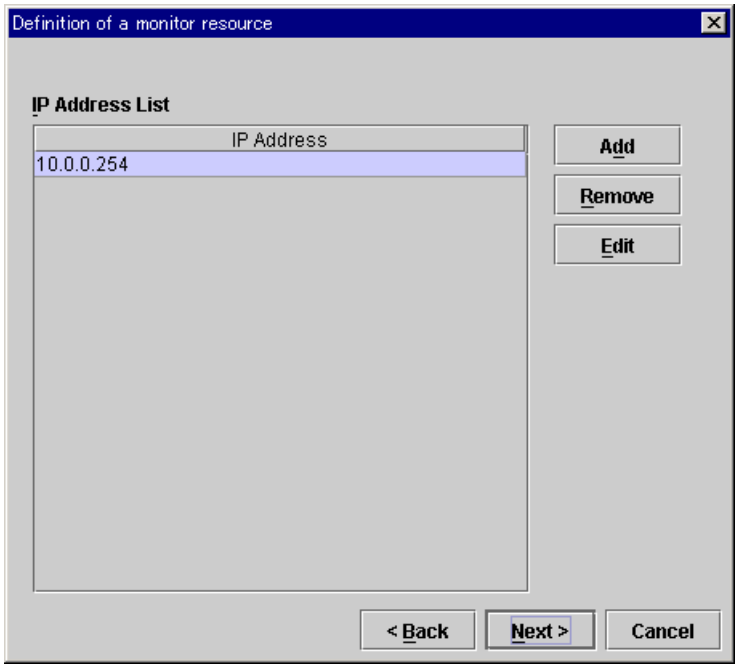
B. Click [Add] in the following dialog box to add an IP address to be monitored.



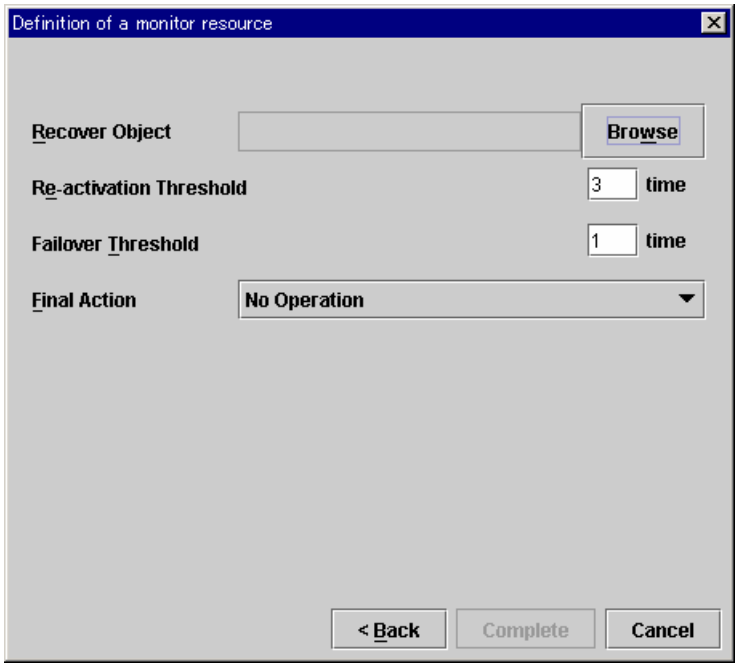
Enter the IP address to be monitored in the following dialog box. Click [Ok].



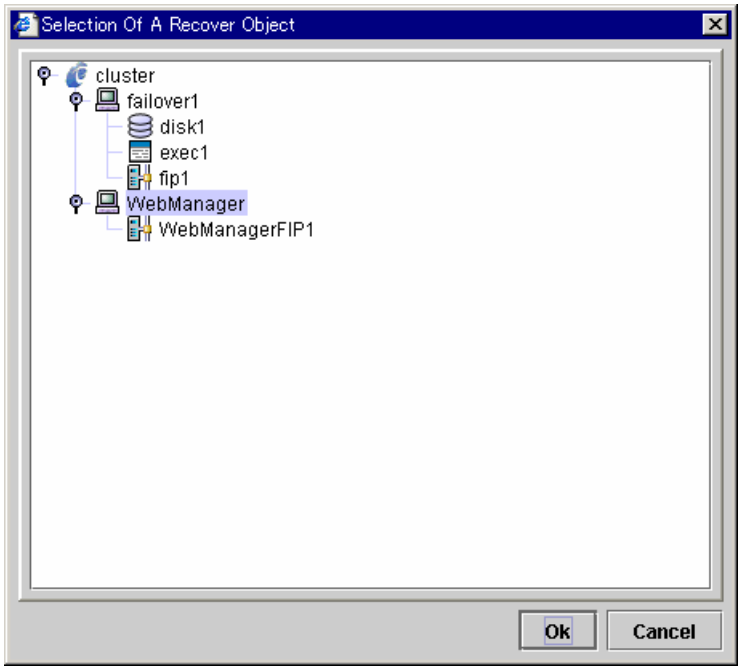
Confirm the address is added in “IP Address List”. Click [Next].



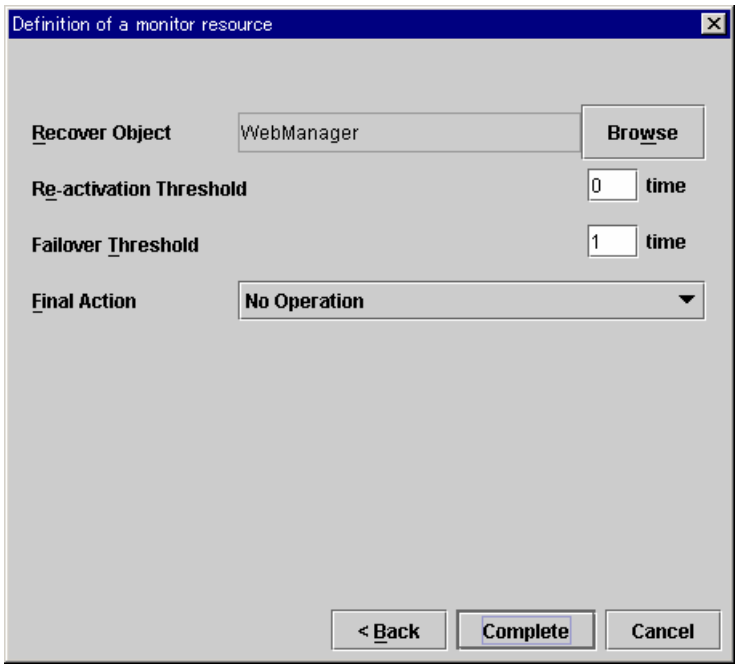
C. Enter an action to be taken at abnormality detection in the following dialog box. Select [Browse].



Select “WebManager” in the following dialog box. Click [Ok].



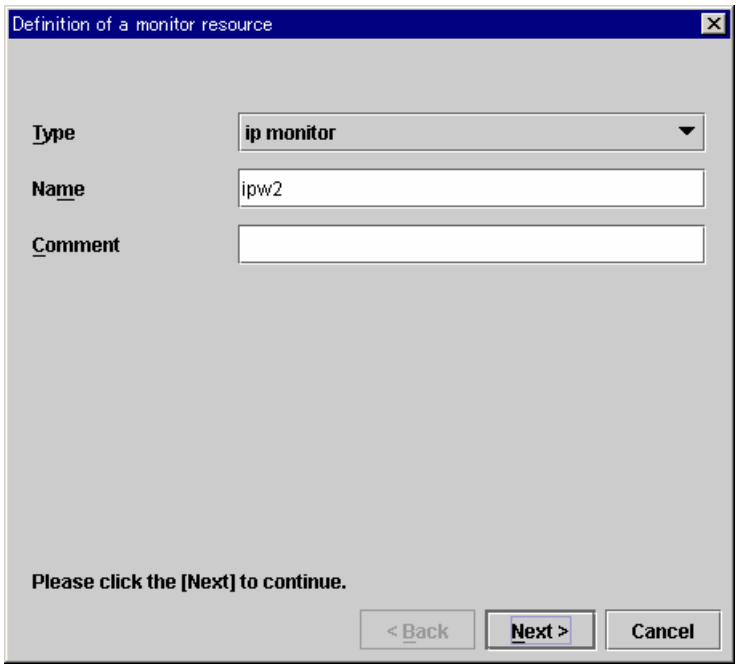
D. Confirm that “WebManager” is selected in “Recover Object”. Set “Re-activation Threshold” to 0. Click [Complete].



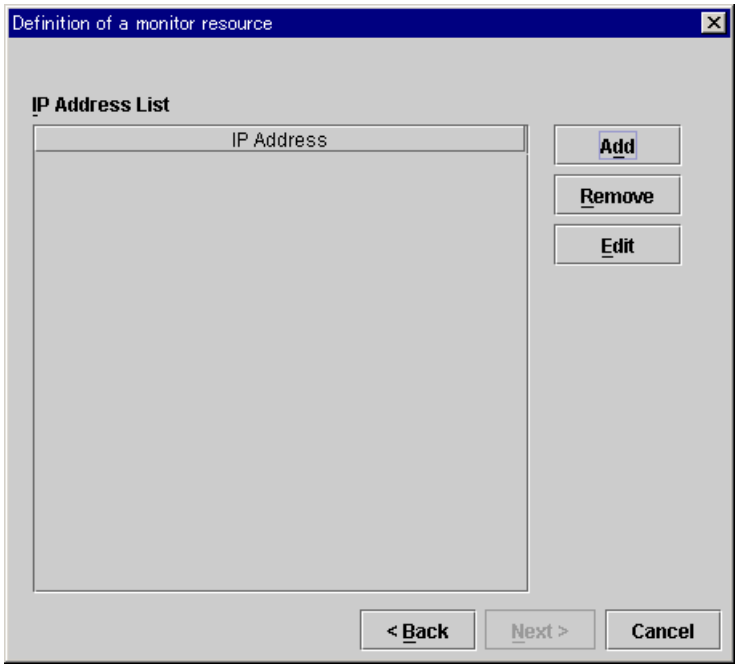
(15) Select “Monitors” in the tree view. Select [Edit | Add] from the menu bar. Enter data for the fourth monitor resources.

Type	ip monitor
Monitor resource name	ipw2
Monitored IP address	10.0.0.254 (Gateway)
When abnormality detected	“failover1” group failover

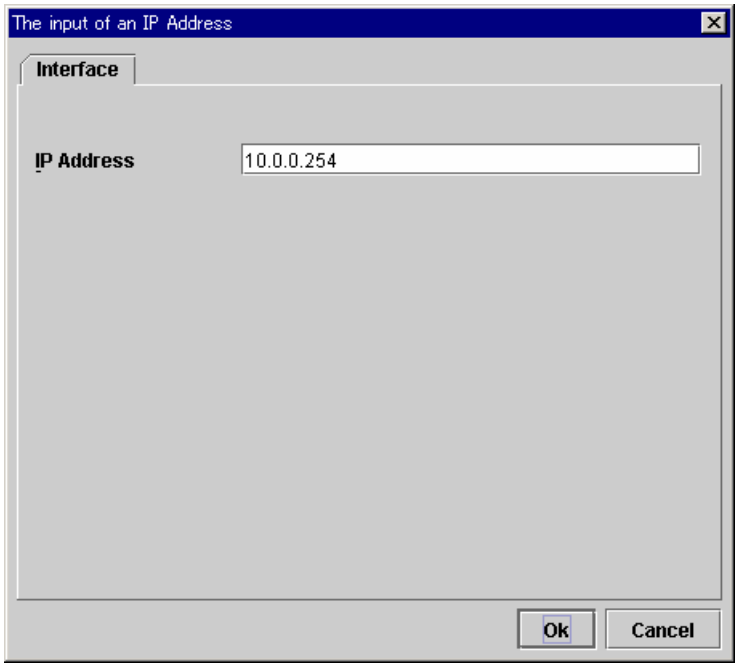
A. Enter the type and monitor resource name in respective fields in the following dialog box. Click [Next].



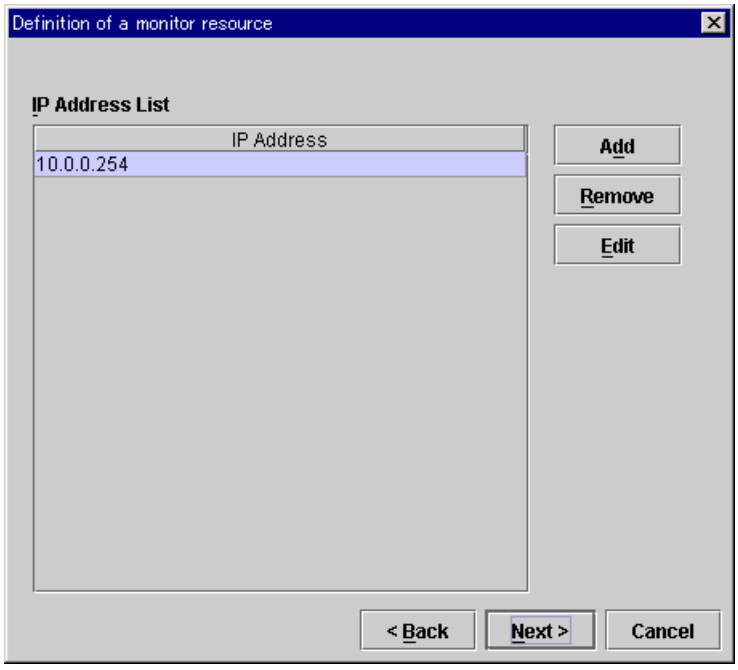
B. Click [Add] in the following dialog box to add an IP address to be monitored.



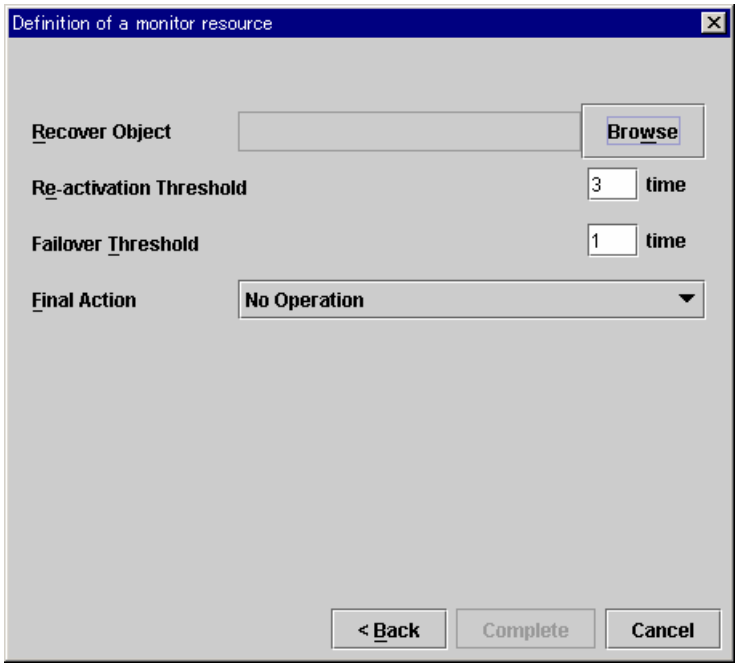
Enter the IP address to be monitored in the following dialog box. Click [Ok].



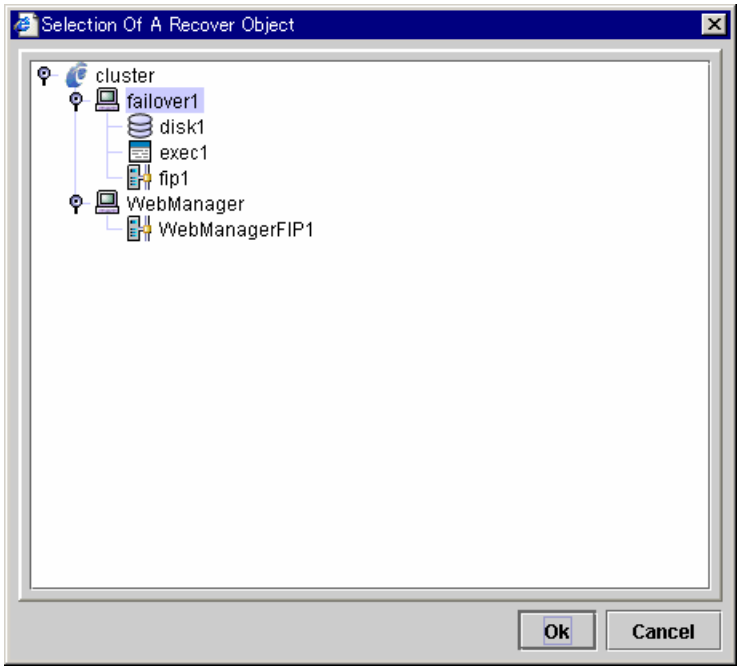
Confirm the address is added in “IP address List”. Click [Next].



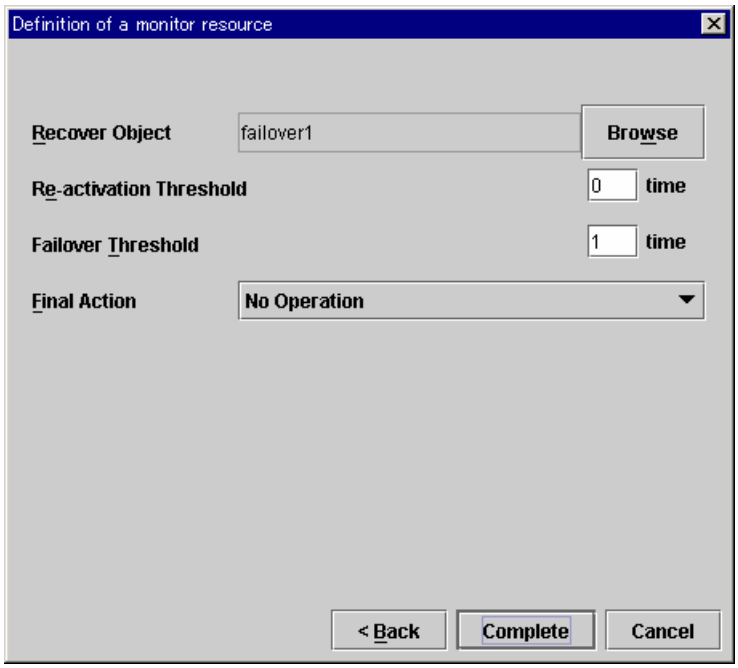
C. Specify an action to be taken at abnormality detection in the following dialog box. Select [Browse].



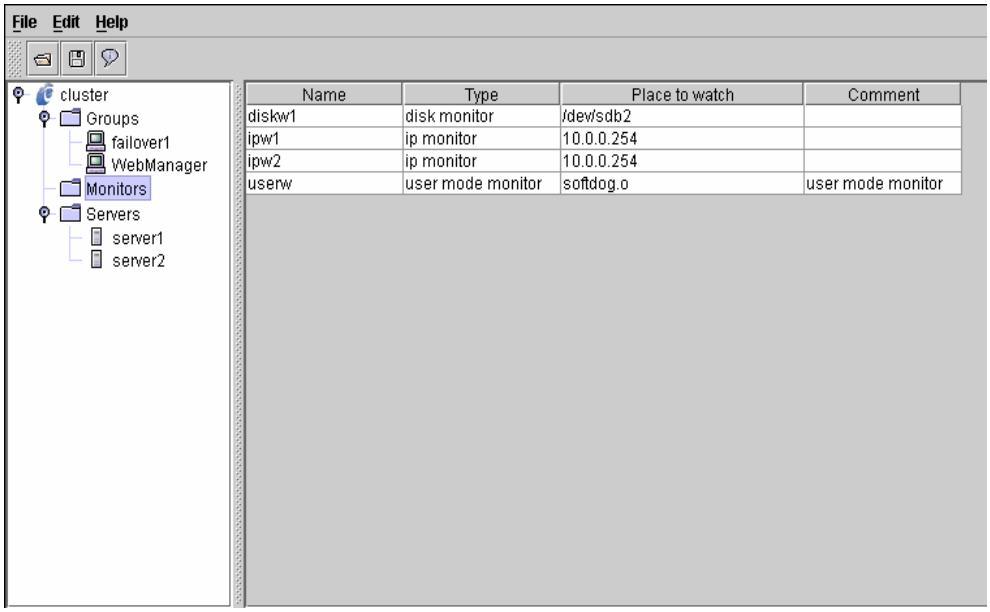
Select “failover1” in the following dialog box. Click [Ok].



D. Confirm that “failover1” is selected in “Recover Object”. Set “Re-activation Threshold” to 0. Click [Complete].



The table view of Monitors looks like:



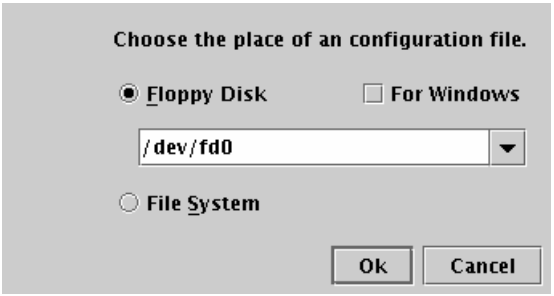
You have made the cluster configuration data now. In environments where you can use floppy disks, go to Section 4.3 “How to Save Cluster Configuration Data in FD”. In environments where you cannot use floppy disks, go to Section 4.4 “How to Save Cluster Configuration Data in File System”.

4.3 How to Save Cluster Configuration Data in FD

4.3.1 Linux

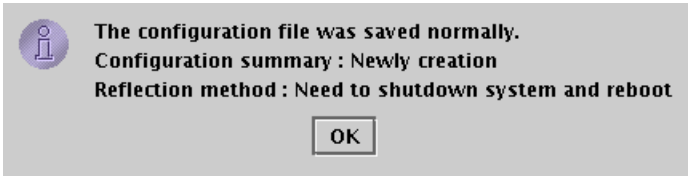
(1) Insert a floppy disk into the floppy disk device. Select [File | Save the configuration file] from the menu bar.

(2) Select the floppy disk device name in the following dialog box. Click [Ok].



When you select “For Windows”, prepare a Windows FAT(VFAT) formatted 1.44-MB floppy disk.
For other additional functions, see a separate guide, “Trekking Tool”.

(3) When the cluster configuration data is saved, you see the following message box.



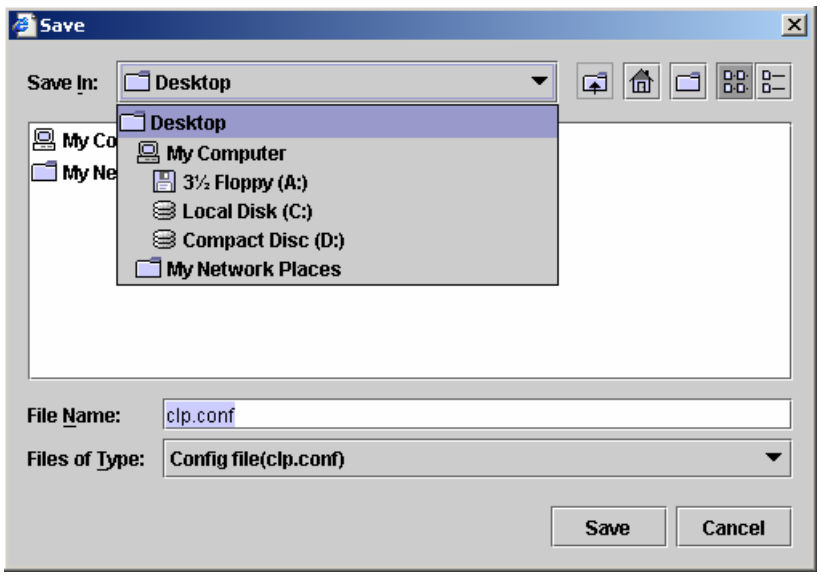
(4) Use this floppy disk for clustering.

4.3.2 Windows

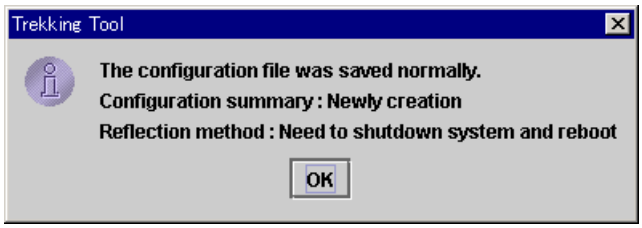
(1) Prepare a formatted 1.44-MB floppy disk.

(2) Insert the floppy disk into the floppy disk device. Select [File | Save the configuration file] from the menu bar.

(3) Select the floppy disk drive in the following dialog box. Click [Save].



(4) When the cluster configuration data is saved, you see the following message box.



(5) Use this floppy disk for clustering servers.

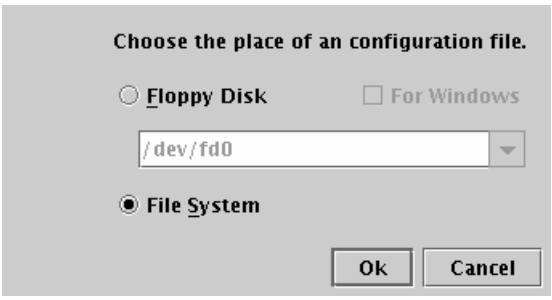
4.4 How to Save Cluster Configuration Data in File System

In environments where you cannot use floppy disks, save cluster configuration data in file system.

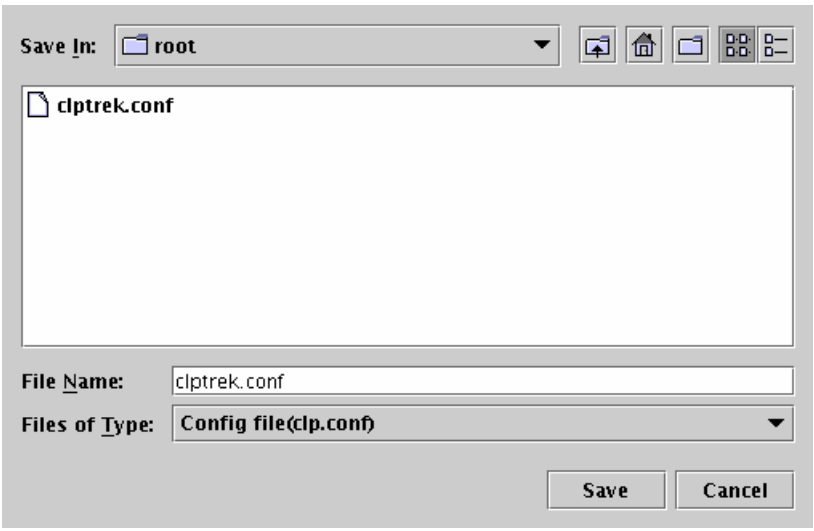
4.4.1 Linux

(1) Select [File | Save the configuration file] from the menu bar.

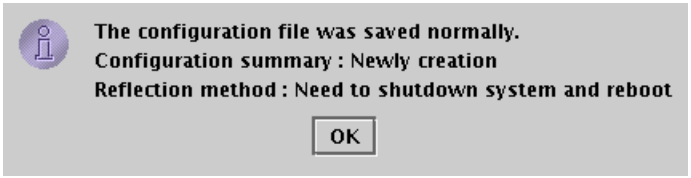
(2) Select “File System” in the following dialog box. Click [Ok].



(3) Select a place to save the data in the following dialog box. Click [Save].



(4) When the cluster configuration data is saved, you see the following message box.

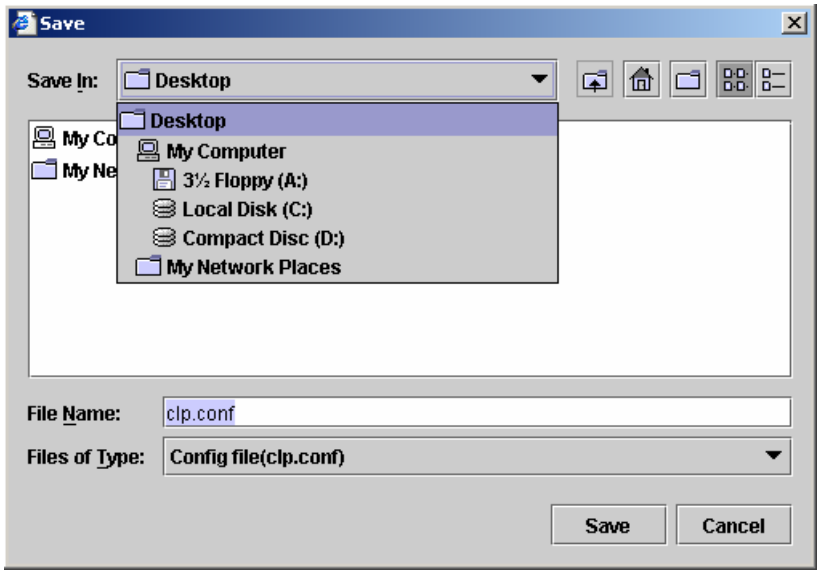


(5) Use the saved cluster configuration data fro clustering.

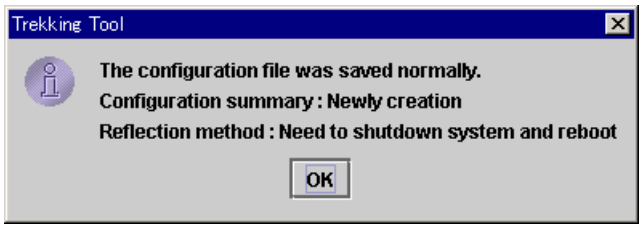
4.4.2 Windows

(1) Select [File | Save the configuration file] from the menu bar.

(2) Select a place to save data in the following dialog box. Click [Save].



(3) When the cluster configuration data is saved, you see the following message box.



(4) Use the saved cluster configuration data for clustering servers.

5 HOW TO CREATE CLUSTER

5.1 In Environment Where You Can Use Floppy Disks

To cluster servers with the floppy disk created by Trekking Tool:

(1) Hand-carrying the floppy disk
Insert the floppy disk in the server which was specified as the master server by Trekking Tool.
You have to restart all servers after installing the Server RPM.

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

A. If you use the floppy disk whose data was saved by Trekking Tool on Linux, run the following command.

clpcfctrl --push –l

B. If you use the floppy disk (1.44-MB formatted) whose data was saved by Trekking Tool on Windows, or the floppy disk whose data was saved by Trekking Tool on Linux but Windows-formatted, run the following command.

clpcfctrl --push –w

After running the command, you see the following message. Press the return key.

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

After pressing the return key, if you see the following message, servers are successfully clustered.

success.(code:0)

clpcfctrl command uses by default /dev/fd0 as the floppy disk device, and /mnt/floppy as the mount point. If your environment is different from these default values, specify them in options. For details of options, see a separate guide, “Command”.

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

(3) Registering license
According to Chapter 6 “LICENSE REGISTRATION”, register the license.

(4) Restarting servers
Remove the floppy disk. Restart all servers.

5.2 In Environment Where You Can Not Use Floppy Disks

To cluster servers with the floppy disk created by Trekking Tool or data saved in the file system:

(1) Viewing cluster configuration data
By using FTP or other means, view the cluster configuration data saved in the file system or floppy disk from the server which was specified as the master server by Trekking Tool.
You have to restart all servers after installing the server RPM.

(2) Clustering
Distribute the cluster configuration data in the file system to servers. Do either A or B depending on the type of cluster configuration data saved by Trekking Tool.
Specify the full path to the cluster configuration data for the directory path.

A. If you use the cluster configuration data saved by Trekking Tool on Linux, run the following command.

clpcfctrl --push –l -x <Directory path>

B. If you use the cluster configuration data saved by Trekking Tool on Windows, or the cluster configuration data saved by Trekking Tool on Linux but Windows-formatted, run the following command.

clpcfctrl --push –w -x < Directory path >

After running the command, you see the following message. Press the return key.

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

After pressing the return key, if you see the following message, servers are successfully clustered.

success.(code:0)

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

(3) Registering license
According to Chapter 6 “LICENSE REGISTRATION”, register the license.

(4) Restarting servers
Restart all servers.

6 LICENSE REGISTRATION

6.1 CPU License Registration

To run this product as a cluster system, you have to first register the CPU license.

Register the CPU license on the master server where you intend to cluster servers. There are two types of license registration as follows;

A. Product version
   - Run the license management command. Enter the license information attached to your licensed product interactively for license registration (see Section 6.2).
   - Specify a license file as the parameter of license management command for license registration (see Section 6.4).

B. Trial version
   - Run the license management command. Enter the license information attached to your licensed product interactively for license registration (see Section 6.3).
   - Specify a license file as the parameter of license management command for license registration (see Section 6.4).

Before you start registering the license, confirm again that Chapter 5 “HOW TO CREATE CLUSTER” is performed on all servers that form a cluster.

6.2 Interactive License Registration (Product Version)

See the license sheet attached to your licensed product for values to be entered in each field as license information.

If your license sheet is as follows (SE);

```
Product name:          EXPRESSCLUSTER SE for Linux Ver 3.0

License information:
   Type                        Product Version
   License Key                 A1234567- B1234567- C1234567- D1234567
   Serial Number               AA000000
   Number Of Licensed CPUs     2
```

(1) Run the following command on the master server where you intend to cluster servers.

```
# clplcnsc –i –p SE30
```

+ To run the command, you should be a root user.
+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”. The above sample is for SE. For XE, you specify XE30.

(2) Enter the product division.

```
Selection of product division
1. Product
2. Trial
Select product division [ 1 or 2 ] ... 1
```

+ Enter “1” for the product version.

(3) Enter the number of licenses.

```
Enter the number of license [ 1 to 99 (default:2) ] ... 2
```

+ If you press Enter key without entering a number, the default value “2” will be set. If the number of your licenses is other than “2”, enter the number you see on your license sheet.

(4) Enter the serial number.

```
Enter serial number [ Ex. XX000000] ... AA000000
```

+ Enter the number you see on your license sheet correctly. This is case-sensitive.

(5) Enter the license key.

```
Enter license key
  [XXXXXXXX- XXXXXXXX- XXXXXXXX- XXXXXXXX] ...
A1234567- B1234567- C1234567- D1234567
```

+ Enter the key you see on your license sheet correctly.
  This is case-sensitive.
+ Confirm if the command is successfully completed. If you see a message, “command was success..”, when the command is completed, it is successful. See a separate guide, “Command” for other completion messages.
  You can confirm the registered license with the command below.

```
# clplcnsc –l –p SE30
```

+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”.
  The above sample is for SE. For XE, you specify XE30.

6.3 Interactive License Registration (Trial Version)

See the license sheet you received for values to be entered in each field as license information.

If your license sheet is as follows (SE);

Product name:	**EXPRESSCLUSTER SE for Linux Ver 3.0**
License information:	
Type	Trial Version
License Key	A1234567- B1234567- C1234567- D1234567
User Name	NEC
Trial Start Date	2003/01/01
Trial End Date	2003/12/31

(1) Run the following command on the master server where you intend to cluster servers.

```
# clplcnsc –i –p SE30
```

+ To run the command, you should be a root user.
+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”. The above sample is for SE. For XE, you specify XE30.

(2) Enter the product division.

```
Selection of product division
1. Product
2. Trial
Select product division [ 1 or 2 ] ... 2
```

+ Enter “2” for the trial version.

(3) Enter the user name.

```
Enter user name [ 1 to 64 byte] ... NEC
```

+ Enter the user name you see on your license sheet correctly.

(4) Enter the trial start date.

```
Enter trial start date [ Ex. yyyy/mm/dd ] ... 2003/01/01
```

+ Enter the trial start date you see on your license sheet correctly.

(5) Enter the trial end date.

```
Enter trial end date [ Ex. yyyy/mm/dd ] ... 2003/12/31
```

+ Enter the trial end date you see on your license sheet correctly.

(6) Enter the license key.

```
Enter license key
[XXXXXXXX- XXXXXXXX- XXXXXXXX- XXXXXXXX] ...
A1234567- B1234567- C1234567- D1234567
```

+ Enter the key you see on your license sheet correctly.
  This is case-sensitive.
+ Confirm if the command is successfully completed. If you see a message, “command was success..”, when the command is completed, it is successful. See a separate guide, “Command” for other completion messages.
  You can confirm the registered license with the command below.

```
# clplcnsc –l –p SE30
```

+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”.
  The above sample is for SE. For XE, you specify XE30.

6.4 License Registration by File

Run the following command on the master server where you intend to cluster servers.

```
# clplcnsc –i filepath –p SE30
```

+ For ***filepath*** you specify with -i option, specify the file path to the distributed license file.
+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”.
  The above sample is for SE. For XE, you specify XE30.
+ To run the command, you should be a root user.
+ Confirm if the command is successfully completed. If you see a message, “command was success..”, when the command is completed, it is successful. See a separate guide, “Command” for other completion messages.
  You can confirm the registered license with the command below.

```
# clplcnsc –l –p SE30
```

+ The product ID which you specify with -p option varies depending on the product version and edition. For details, see a separate guide, “Command”.
  The above sample is for SE. For XE, you specify XE30.

6.5 License-related Troubleshooting

#	Behaviors and Message	Cause	Possible countermeasures
1	After the command was run, you saw the message below on the console. “permission denied.”	You tried to run the command as a general user.	Log in as a root user. Or change to a root user with su -. Then, try again.
2	After the license registration command was run, you saw the message below on the console. “command success, but not sync license in cluster.”	The transaction server may not be active yet, or the cluster configuration data may not be distributed yet.	Confirm again on all servers that the transaction server is active and cluster configuration data is distributed. If either of them is not yet done on any server, do it and register the license again.
3	When you have distributed the cluster configuration data created by Trekking Tool to all servers, and then tried shutting down and rebooting the cluster, you saw the message below on Web Manager’s alert, and the cluster stopped. “The license is not registered. (%1)” %1: Product ID	This is because you have shut down and rebooted the cluster without registering its license.	Register the license on a server in the cluster.
4	When you have distributed the cluster configuration data created by Trekking Tool to all servers, and then tried shutting down and rebooting the cluster, you saw the message below on Web Manager’s alert, but the cluster is working properly. “The license is insufficient. The number of insufficient is %1. (%2)” %1: The number of lacking licenses %2: Product ID	The number of licenses is insufficient.	Obtain a due license from your sales agent and register it.
5	You saw the message below while the cluster was working on the trial license, and the cluster stopped. “The license of trial expired by %1. (%2)” %1: Trial end date %2: Product ID	The license expired.	Ask your sales agent for extension of the trial version license, or obtain and register the product version license.

For details of command completion messages, see a separate guide, “Command”.

7 ACCESSING WEB MANAGER

Access the Web Manager in an environment where Java Runtime is installed as follows;

See a separate guide, “Web Manager” for details.

(1) Start up your browser.

(2) Enter the IP address and port number of the server in the URL of the browser.

http://10.0.0.1:29003/

* Make sure to enter the same port number as Web Manager HTTP port number of Trekking Tool.

8 BEHAVIORS CHECK BY WEB MANAGER

After forming a cluster and accessing Web Manager, you do the followings step by step to confirm if your cluster works well. For details on how to use Web Manager, see a separate guide, “Web Manager”.

If you find an error at behaviors check, see a separate guide, “Maintenance” to remove it.

(1) Heartbeat resources
Confirm the status of each server is ONLINE on Web Manager.
Confirm the heartbeat resources status of each server is NORMAL.

(2) Monitor resources
Confirm the status of each monitor resources is NORMAL on Web Manager.

(3) Group startup
Start the group.
Confirm the group status is ONLINE on Web Manager.

(4) Group stoppage
Stop the group.
Confirm the group status is OFFLINE on Web Manager.

(5) DISK resources
Confirm you can access the disk mount point on the server where the group having DISK resources is active.

(6) FIP resources
Confirm that while the group having FIP resources is active, you can ping the FIP address.

(7) EXEC resources
Confirm that applications are working on the server where the group having EXEC resources is active.

(8) Group migration
Move the group to another server.
Confirm the group status is ONLINE on Web Manager.
Move the group to all servers in the failover policy one after another, and confirm the status changes to ONLINE on each server.

(9) Failover

Shut down the server where the group is active.
After the heartbeat timeout, confirm the group is failed over. Also, confirm by Web Manager that the group status becomes ONLINE on the failover destination server.

(10) Failback

If you made settings for the automatic failback, start the server which you have shut down in the previous step, “Failover”. Confirm that the group fails back to the original server after it is started. Also, confirm by Web Manager that the group status becomes ONLINE on the failback destination server.

(11) Mail report

If you made settings for Mail report, confirm that you receive the report mail at failover.

9 BEHAVIORS CHECK WITH COMMANDS

After forming a cluster, you do the followings step by step to confirm if your cluster works well. For details on how to use commands, see a separate guide, “Command”.

If you find an error at behaviors check, see a separate guide, “Maintenance” to remove it.

(1) Heartbeat resources
Confirm the status of each server is ONLINE with the clpstat command.
Confirm the heartbeat resources status of each server is NORMAL.

(2) Monitor resources
Confirm the status of each monitor resources is NORMAL with the clpstat command.

(3) Group startup
Start the group with the clpgrp command.
Confirm the group status is ONLINE with the clpstat command.

(4) Group stoppage
Stop the group with the clpgrp command.
Confirm the group status is OFFLINE with the clpstat command.

(5) DISK resources
Confirm you can access the disk mount point on the server where the group having DISK resources is active.

(6) FIP resources
Confirm that while the group having FIP resources is active, you can ping the FIP address.

(7) EXEC resources
Confirm that applications are working on the server where the group having EXEC resources is active.

(8) Group migration
Move the group to another server with the clpgrp command.
Confirm the group status is ONLINE with the clpstat command.
Move the group to all servers in the failover policy one after another, and confirm the status changes to ONLINE on each server.

(9) Failover

Shut down the server where the group is active.

After the heartbeat timeout, confirm the group is failed over with the clpstat command. Also, confirm with the clpstat command that the group status becomes ONLINE on the failover destination server.

(10) Failback

If you made settings for the automatic failback, start the server which you have shut down in the previous step, “Failover”. Confirm with the clpstat command that the group fails back to the original server after it is started. Also, confirm with the clpstat command that the group status becomes ONLINE on the failback destination server.

(11) Mail report

If you made settings for Mail report, confirm that you receive the report mail at failover.