

EXPRESSCLUSTER[®] X 3.1

for Windows

FileMaker Server 12 Clustering System Configuration Guide

10/04/2013
First Edition



Revision History

Edition	Revised Date	Description
First	10/04/2013	New manual

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Preface

This Guide: Building the cluster system when FileMaker Server 12 is used under EXPRESSCLUSTER.

Who Should Use This Guide

This Guide is intended for administrators who want to build a cluster system, system engineers who want to provide user support, and maintenance personnel.

This Guide introduces software whose operation in an EXPRESSCLUSTER environment has been checked.

The software and setup examples introduced here are for reference only. They are not meant to guarantee the operation of each software product.

Scope of Application

This guide covers the following EXPRESSCLUSTER versions.

- EXPRESSCLUSTER X 3.1 for Windows

Chapter 1	Functional overview: Provides a functional overview.
Chapter 2	Operating environment: Describes the verified operating environment for this function.
Chapter 3	Cautions: Provides cautions on configuration.
Chapter 4	Configuration: Describes the procedure for configuring a cluster.
Chapter 5	Command reference: Describes the commands used in scripts for linkage.
Chapter 6	Scripts for linkage: Describes the scripts used for linkage.
Appendix	Sample scripts: Provides script description examples.

EXPRESSCLUSTER Documentation Set

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

Getting Started Guide

This guide is intended for all users. The guide covers topics such as product overview, system requirements, and known problems.

Installation and Configuration Guide

This guide is intended for system engineers and administrators who want to build, operate, and maintain a cluster system. Instructions for designing, installing, and configuring a cluster system with EXPRESSCLUSTER are covered in this guide. This guide follows the actual sequence of actions performed when introducing a cluster system using EXPRESSCLUSTER to describe how to design the system, install and set up EXPRESSCLUSTER X, check the operation after the setup, and perform evaluation before starting operation.

Reference Guide

This guide is intended for system administrators. The guide covers topics such as how to operate EXPRESSCLUSTER, function of each module, maintenance-related information, and troubleshooting. The guide is supplement to the *Installation and Configuration Guide*

Integrated WebManager Administrator's Guide

This guide is intended for system administrators who manage cluster system using EXPRESSCLUSTER with EXPRESSCLUSTER Integrated WebManager and for system engineers who introduce the Integrated WebManager. In this guide, details on required items for introducing the cluster system using the Integrated WebManager are explained in accordance with the actual procedures.

WebManager Mobile Administrator's Guide

This guide is intended for system administrators who manage cluster system using EXPRESSCLUSTER with EXPRESSCLUSTER WebManager Mobile and for system engineers who introduce the WebManager Mobile. In this guide, details on those items required for introducing the cluster system using the WebManager Mobile are explained in accordance with the actual procedures.

EXPRESSCLUSTER Documentation Set

For details about FileMaker Server, refer to the following FileMaker Server guides.

『FileMaker Server Getting Started Guide』

『FileMaker Server FileMaker Server HELP』

www.filemaker.com/support/product/documentation.html

Contacting NEC

For the latest product information, visit our website below:

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

Conventions

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

Note:

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

Important:

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

Related Information:

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

The following conventions are used in this guide.

Convention	Usage	Example
Bold	Indicates graphical objects, such as fields, list boxes, menu selections, buttons, labels, icons, etc.	In User Name , type your name. On the File menu, click Open Database .
Angled bracket within the command line	Indicates that the value specified inside of the angled bracket can be omitted.	<code>clpstat -s[-h <i>host_name</i>]</code>
Monospace (courier)	Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters.	<code>/Linux/3.0/eng/server/</code>
Monospace bold (courier)	Indicates the value that a user actually enters from a command line.	Enter the following: # clpcl -s -a
<i>Monospace italic</i> (courier)	Indicates that users should replace italicized part with values that they are actually working with.	<code>rpm -i expressclsbuilder -<version_number>- <release_number>.i686.rpm</code>

Chapter 1 Functional overview

This chapter provides a functional overview when FileMaker Server 12 is used under EXPRESSCLUSTER.

The following figures show FileMaker Server operation in an EXPRESSCLUSTER environment. A client connects to server A by using a floating IP address that is assigned by EXPRESSCLUSTER.

If a failure has occurred on server A such that a failover has been performed, the FileMaker Server service starts up on server B and the database data is also switched to server B. A client who had been accessing server A will instead be connected to server B. The floating IP address moves to server B when a failover is performed, so a client can connect to the same IP address without having to be aware of the server switchover.

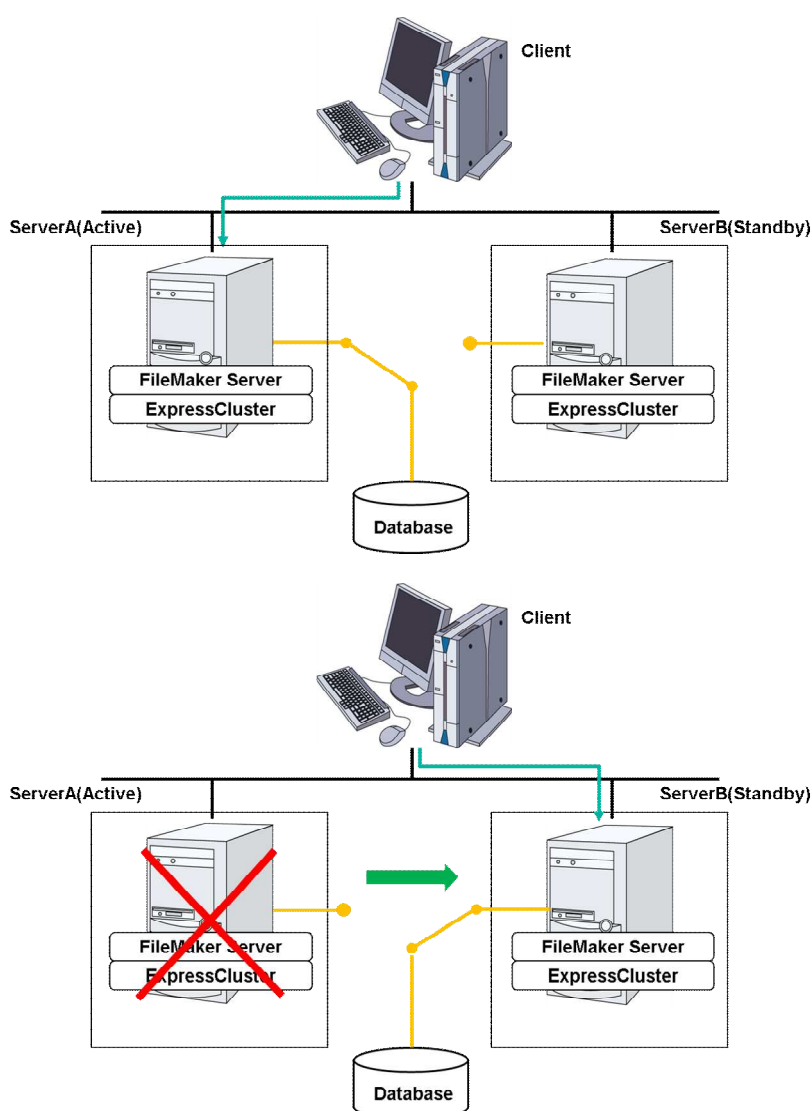


Figure 1-1. Overview of a shared disk type cluster

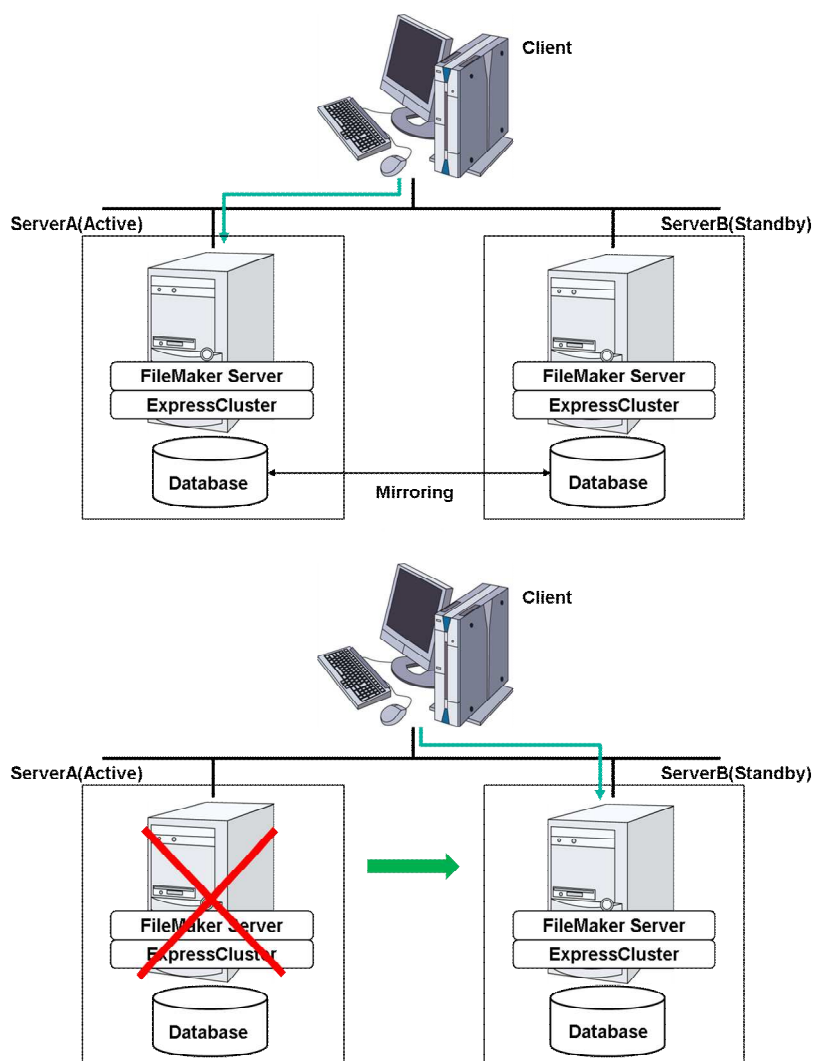


Figure 1-2. Overview of a mirror disk type cluster

This configuration guide assumes that, for a shared disk configuration, the database files are placed in the switchable partition on the shared disk.

For a mirror disk configuration, the database files are assumed to be placed in the data partition on the mirrored disks.

Note that a partition used for data switchover between the servers in a shared disk configuration is referred to as the *switchable partition*, and the partition in which the mirrored data is stored in a mirror disk configuration is referred to as the *data partition*.

For details on the cluster configuration procedures, refer to "Chapter 4 Setup Procedures".

Chapter 2 Operating Environment

The description in this configuration guide has been verified in the following environments.

OS	Microsoft Windows Server 2008 Microsoft Windows Server 2008 R2
EXPRESSCLUSTER	EXPRESSCLUSTER X 3.1 for WIndows
FileMaker	FileMaker Server 12 FileMaker Server 12 Advanced

Chapter 3 Notes

This chapter describes the cautions to be observed when clustering is applied to FileMaker Server using EXPRESSCLUSTER.

- When setting a firewall on a server, Configure to be able to access the port number by using EXPRESSCLUSTER:

For details about the port numbers by using EXPRESSCLUSTER, refer to below.

- EXPRESSCLUSTER X 3.1 for Windows Getting Started Guide
Chapter 5 Notes and Restrictions
 - > Before installing EXPRESSCLUSTER
 - >> Communication port number

- Direct-attached storage must be used to handle FileMaker database files and backups.

- Specify only one additional database folder for database files. Additional database folder to be placed in switchable partitions or data partitions.
Default folder is not placed in switchable partitions or data partitions.

- To use the progressive backup linkage function, you must not use the character string which contains "ing", "error", "closed" regardless of a capital letter and a small letter for a database file name.

ex. Error_LIST.fms12, ERROR_LIST.fms12, error_LIST.fms12

Chapter 4 Setup Procedures

This chapter describes the procedures for setting up clusters having the g configurations.

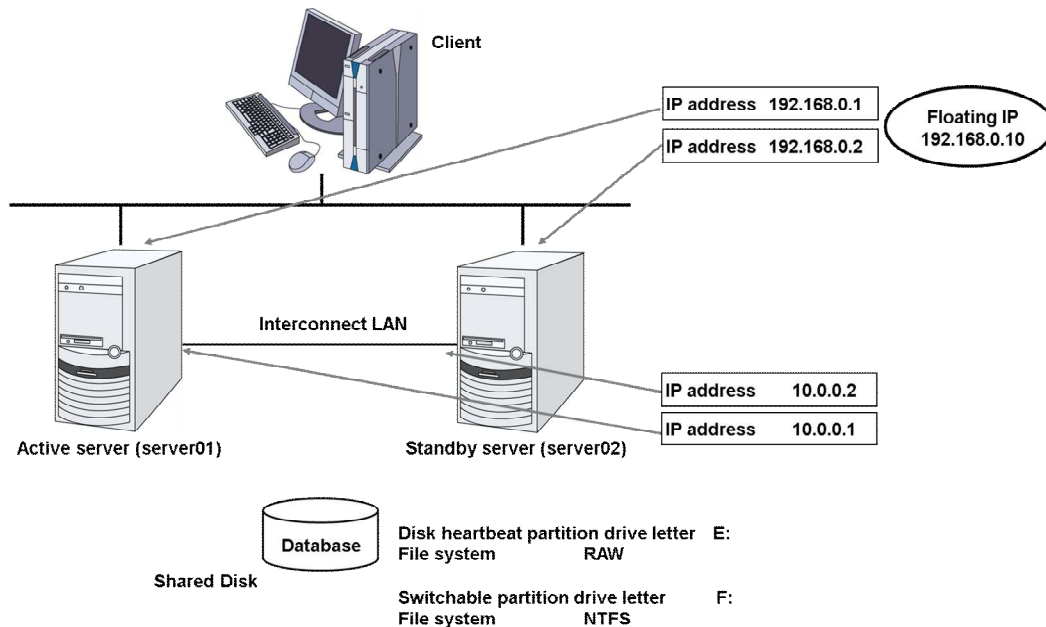


Figure 4-1 Shared disk type cluster configuration

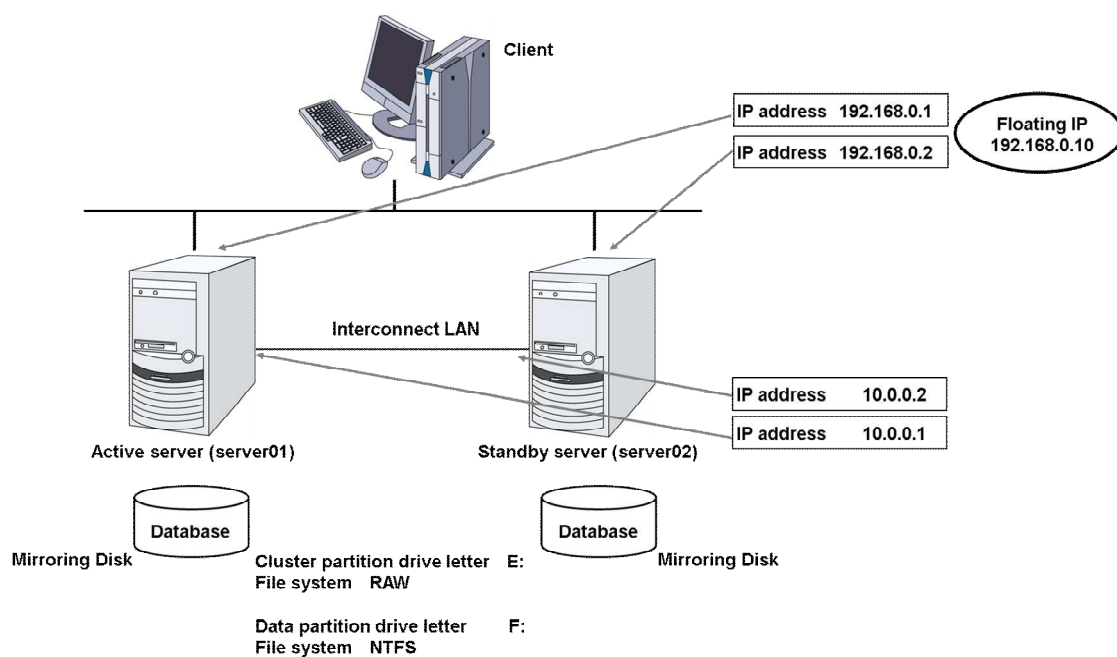


Figure 4-2 Mirror disk type cluster configuration

The following describes Example of cluster configuration

Example of cluster configuration

Target	Parameter	Value (For shared disk)	Value (For mirror disk)
Cluster configuration	Cluster name	cluster	cluster
	Number of servers	2	2
	Number of failover groups	1	1
	Number of failover resources	7	8
Heartbeat resources	Number of kernel mode LAN hertbeats	2	2
First server Information (Master Server)	Server name	server01	server01
	Interconnect IP address	10.0.0.1	10.0.0.1
	Public IP address	192.168.0.1	192.168.0.1
Second server Information	Server name	server02	server02
	Interconnect IP address	10.0.0.2	10.0.0.2
	Public IP address	192.168.0.2	192.168.0.2
First NP resolution resource	Type	Ping	Ping
	Ping target	192.168.0.100	192.168.0.100
	server01	Use	Use
	server02	Use	Use
Second NP resolution resource	Type	DISK	
	Ping target	-	
	server01	E:	
	server02	E:	
Failover group	Type	failover	failover
	Group name	failover01	failover01
	Startup server	All Servers	All Servers
	Number of group resources	6	6
First group resources	Type	floating IP	floating IP
	Group resource name	fip	Fip
	IP address	192.168.0.10	192.168.0.10
Second group resources	Type	disk resource	Mirror disk resource
	Group resource name	sd	Md
	Disk resource drive letter	F:	-
	Mirror disk resource cluster partition drive letter	-	E:

	Mirror disk resource data partition letter letter	-	F:
Third group resources	Type	Service resource	Service resource
	Service resource name	service_fmserver	service_fmserver
	Service name	FileMaker Server	FileMaker Server
Forth group resources	Type	Script resource	Script resource
	Script resource name	script_dbclose	script_dbclose
Fifth group resources	Type	Script resource	Script resource
	Script resource name	script_dbbackup1	script_dbbackup1
Sixth group resources	Type	Script resource	Script resource
	Script resource name	script_dbbackup2	script_dbbackup2
First monitor resources	Type	NIC Link Up/Down monitor	NIC Link Up/Down monitor
	Monitor resource name	miiw1	miiw1
	Monitor Timing	Always	Always
	Recovery target	failover01	failover01
	Recovery Action	failover	failover
Second monitor resources	Type	NIC Link Up/Down monitor	NIC Link Up/Down monitor
	Monitor resource name	miiw2	miiw2
	Monitor Timing	Always	Always
	Recovery target	All Groups	All Groups
	Recovery Action	None	None
Third monitor resources	Type	process name monitor	process name monitor
	Monitor resource name	psw_fmserver	psw_fmserver
	Target resource	fmserver.exe	fmserver.exe
	Recovery target	failover01	failover01
Forth monitor resources	Type	process name monitor	process name monitor
	Monitor resource name	psw_fmsib	psw_fmsib
	Target resource	fmsib.exe	fmsib.exe
	Recovery target	failover01	failover01
Fifth monitor resources (Automatically created after creation of service resource)	Type	Service monitor	Service monitor
	Monitor resource name	servicew1	servicew1
	Target resource	service_fmserver	service_fmserver
	Recovery target	service_fmserver	service_fmserver
Sixth monitor resources	Type	Floating IP monitor	Floating IP monitor
	Monitor resource	fipw1	fipw1

(Automatically created after creation of floating IP resource)	name		
	Target resource	Fip	Fip
	Recovery target	Fip	Fip
Seventh monitor resources (Automatically created after creation of disk resource)	Type	Disk TUR monitor	-
	Monitor resource name	sdw1	-
	Disk resource	sd	-
	Recovery target	sd	-
	Final Action	None	-
Eighth monitor resources (Automatically created after creation of mirror disk resource)	Type	-	mirror connect monitoring
	Monitor resource name	-	mdnw1
	Mirror disk resource	-	md
	Recovery target	-	md
	Final Action	-	None
Ninth monitor resources (Automatically created after creation of mirror disk resource)	Type	-	Mirror disk monitor
	Monitor resource name	-	mdw1
	Mirror disk resource	-	Md
	Recovery target	-	Md
	Final Action	-	None

The following describes Example of FileMaker Server configuration
Specify only one additional database folder for database files. Additional database folder to be placed in switchable partitions or data partitions.
Default folder is not placed in switchable partitions or data partitions.

Example of FileMaker Server configuration

Installation path	C:\Program Files\FileMaker\FileMaker Server
additional database folders	F:\FileMakerDB
progressive backup folder,	F:\FileMakerPB

Configure a cluster like that shown above by following the procedure below.

4-1. Configuring the system

4-2. Configuring EXPRESSCLUSTER

4-1. Configuring the system

Before installing EXPRESSCLUSTER, perform the following procedure.

Select either a shared disk system or mirror disk system. Also, determine the hardware configuration, and set up the hardware as well as the network.

For details about how to determine a system configuration, refer to “Chapter 1 Determining a system configuration” of the EXPRESSCLUSTER “Installation and Configuration Guide”.

4-2. Configuring EXPRESSCLUSTER

Install EXPRESSCLUSTER, and set up a cluster having a shared disk configuration or mirror disk configuration.

For this configuration, create the resources required to build the cluster, such as setting up a cluster and creating a failover group. Next, install FileMaker Server. Finally, set up individual group resources and monitor the resources.

This procedure allows you to organize all the resources required to sustain the application into a failover group and perform failover on an application basis.

This description assumes that EXPRESSCLUSTER has already been installed.
For how to install EXPRESSCLUSTER, refer to “Chapter 3 Installing EXPRESSCLUSTER” of the “Installation and Configuration Guide”.

Configure EXPRESSCLUSTER by following the procedure below.

4-2-1. Create a cluster

Configure the servers and networks according to the cluster configuration.

4-2-2. Create a failover group

Create a failover group.

4-2-3. Add group resources (1)

Configure the following group resources:

- Disk resources (shared disk resources and mirror disk resources)
- Floating IP resources

4-2-4. Add monitor resources (1)

Configure the following monitor resources:

- NIC Link Up/Down monitor resource (for public LAN)
- NIC Link Up/Down monitor resource (for interconnect LAN)

4-2-5. Install FileMaker Server

Install FileMaker Server on each server.

4-2-6. Add group resources (2)

Configure the following group resources:

- Service resources
- Script resources

4-2-7. Add monitor resources (2)

Configure the following monitor resources:

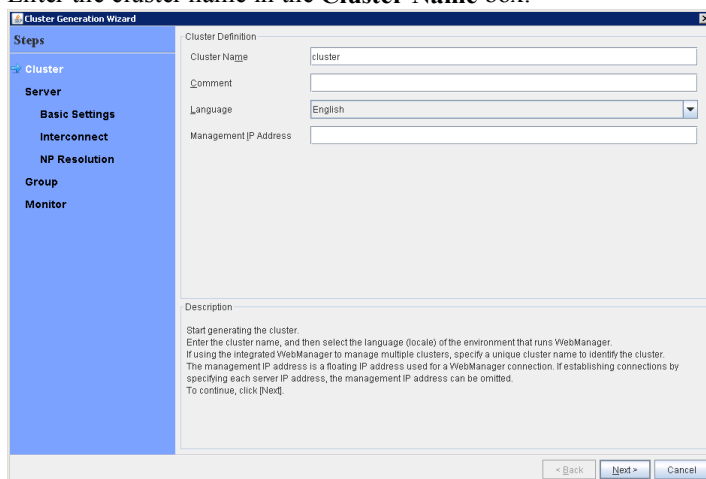
- Process name monitor resources

4-2-1. Create a cluster

This section describes how to create a cluster using EXPRESSCLUSTER Builder (hereinafter referred to as *Builder*).

* Builder represents **Config Mode** of EXPRESSCLUSTER WebManager (hereinafter referred to as *WebManager*).

1. Start WebManager by entering the following address from the browser.
http://<Host name or IP address of the host>:29003/
2. Switch to **Config Mode (Builder)**, select **New** from **File**, and then click **Cluster Generation Wizard**.
3. Enter the cluster name in the **Cluster Name** box.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Cluster Definition' step. On the left, a 'Steps' pane lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution', 'Group', and 'Monitor'. The 'Cluster' step is selected. The main area contains the following fields:

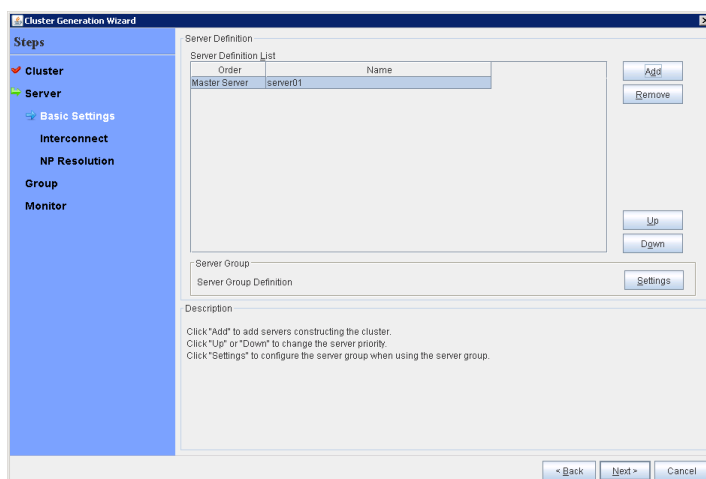
- Cluster Name:** A text box containing the word 'cluster'.
- Comment:** An empty text box.
- Language:** A dropdown menu with 'English' selected.
- Management IP Address:** An empty text box.

Below these fields is a 'Description' section with the following text:

Start generating the cluster.
Enter the cluster name, and then select the language (locale) of the environment that runs WebManager.
If using the integrated WebManager to manage multiple clusters, specify a unique cluster name to identify the cluster.
The management IP address is a floating IP address used for a WebManager connection. If establishing connections by specifying each server IP address, the management IP address can be omitted.
To continue, click [Next].

At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

4. The Server Definition window is displayed. The server (**server01**) for which the IP address was specified as the URL when starting up the WebManager is registered in the list
To add a server to the cluster, click **Add**.



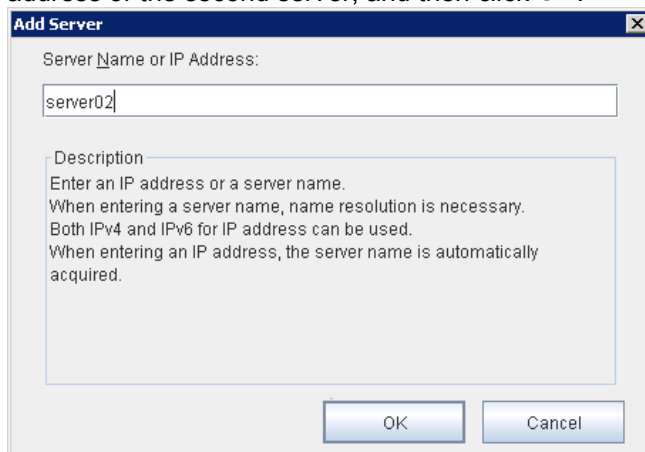
The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Server Definition' step. On the left, the 'Steps' pane shows 'Cluster' selected. The main area contains the following elements:

- Server Definition List:** A table with two columns: 'Order' and 'Name'. It contains one entry: 'Master Server' with 'server01' in the 'Name' column.
- Buttons:** To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons.
- Server Group:** A section with a 'Server Group Definition' text box and a 'Settings' button.
- Description:** A text area with the following text:

Click "Add" to add servers constructing the cluster.
Click "Up" or "Down" to change the server priority.
Click "Settings" to configure the server group when using the server group.

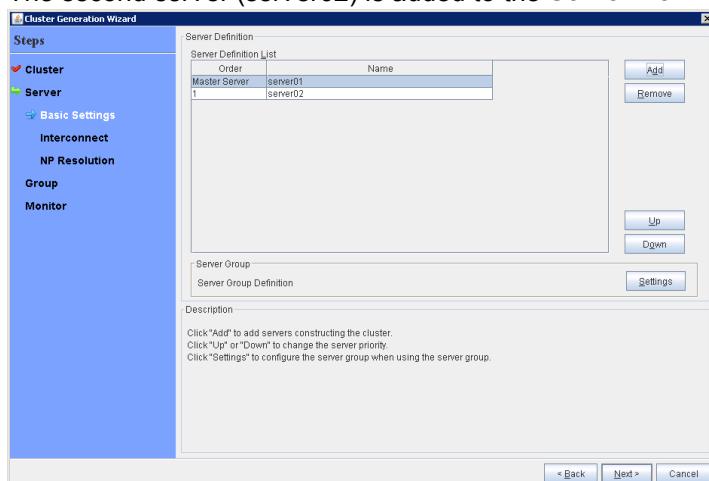
At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

5. The **Add Server** dialog box is displayed. Enter the server name, FQDN name, or IP address of the second server, and then click **OK**.



The **Add Server** dialog box is shown. It has a title bar with a close button. Inside, there is a label "Server Name or IP Address:" followed by a text input field containing "server02". Below this is a larger text area labeled "Description" containing the following text: "Enter an IP address or a server name. When entering a server name, name resolution is necessary. Both IPv4 and IPv6 for IP address can be used. When entering an IP address, the server name is automatically acquired." At the bottom right are two buttons: "OK" and "Cancel".

6. The second server (server02) is added to the **Server Definition List**.



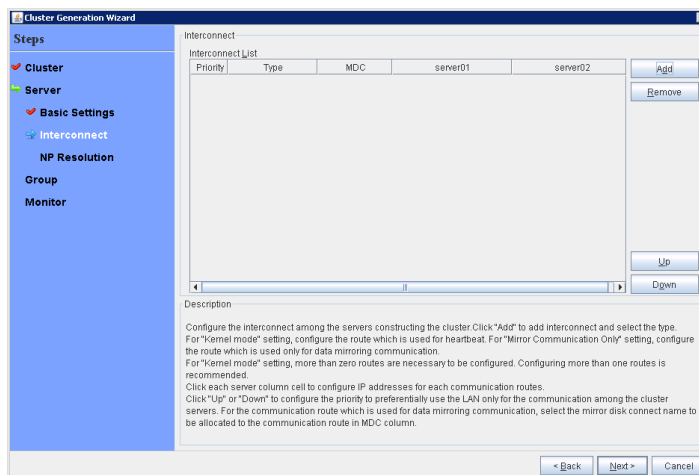
The **Cluster Generation Wizard** is shown at the "Server" step. The left sidebar has "Server" selected. The main area is titled "Server Definition". It contains a "Server Definition List" table with two columns: "Order" and "Name". The table has two rows: "Master Server" with "server01" and "1" with "server02". To the right of the table are "Add" and "Remove" buttons. Below the table are "Up" and "Down" buttons. Further down is a "Server Group" section with a "Server Group Definition" text area and a "Settings" button. At the bottom is a "Description" area with instructions: "Click 'Add' to add servers constructing the cluster. Click 'Up' or 'Down' to change the server priority. Click 'Settings' to configure the server group when using the server group." At the very bottom are "< Back", "Next >", and "Cancel" buttons.

Configuring interconnects

Configure the network between the servers constituting the cluster.

The setting value of an interconnect differs according to the cluster configuration.

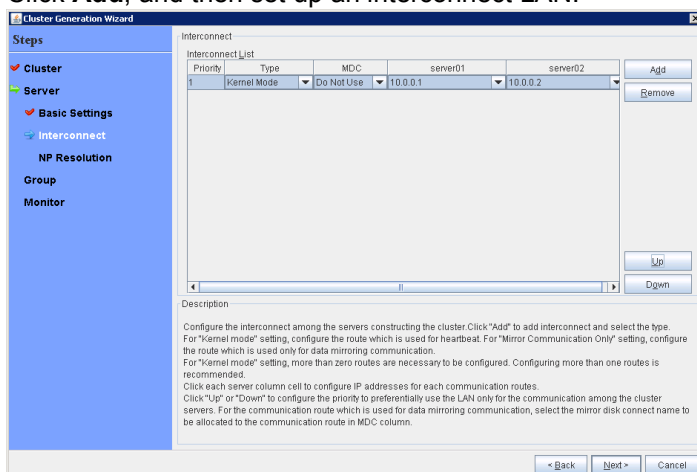
Example settings are shown below for both **Shared disk type cluster** and **Mirror disk type cluster**.



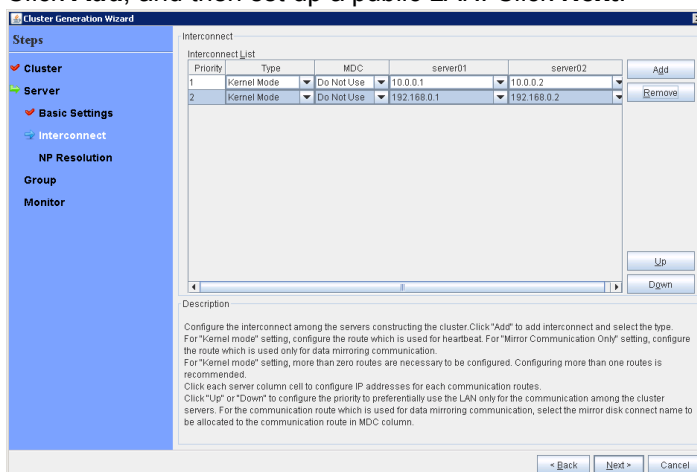
The **Cluster Generation Wizard** is shown at the "Interconnect" step. The left sidebar has "Interconnect" selected. The main area is titled "Interconnect". It contains an "Interconnect List" table with columns: "Priority", "Type", "MDC", "server01", and "server02". There are "Add" and "Remove" buttons to the right. Below the table are "Up" and "Down" buttons. Further down is a "Description" area with instructions: "Configure the interconnect among the servers constructing the cluster. Click 'Add' to add interconnect and select the type. For 'Kernel mode' setting, configure the route which is used for heartbeat. For 'Mirror Communication Only' setting, configure the route which is used only for data mirroring communication. For 'Kernel mode' setting, more than zero routes are necessary to be configured. Configuring more than one routes is recommended. Click each server column cell to configure IP addresses for each communication routes. Click 'Up' or 'Down' to configure the priority to preferentially use the LAN only for the communication among the cluster servers. For the communication route which is used for data mirroring communication, select the mirror disk connect name to be allocated to the communication route in MDC column." At the very bottom are "< Back", "Next >", and "Cancel" buttons.

Shared disk type cluster

7. Configure the interconnects for a shared disk type cluster.
- 7.1. Click **Add**, and then set up an interconnect LAN.



- 7.2. Click **Add**, and then set up a public LAN. Click **Next**.



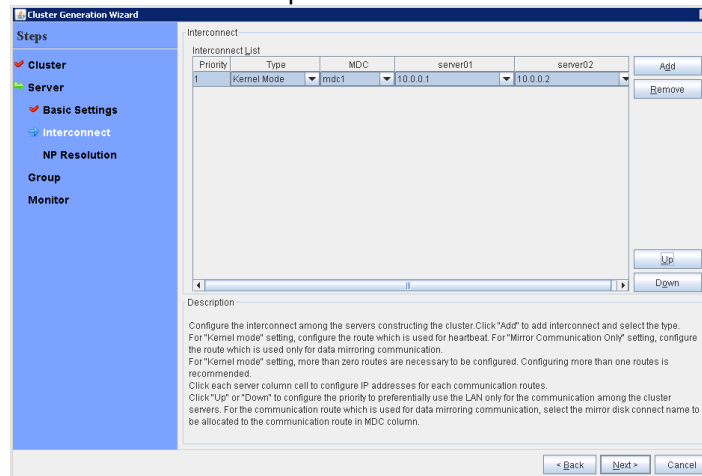
* In the above configuration, two interconnects are prepared by registering the public IP addresses to priority 2.

Mirror disk type cluster

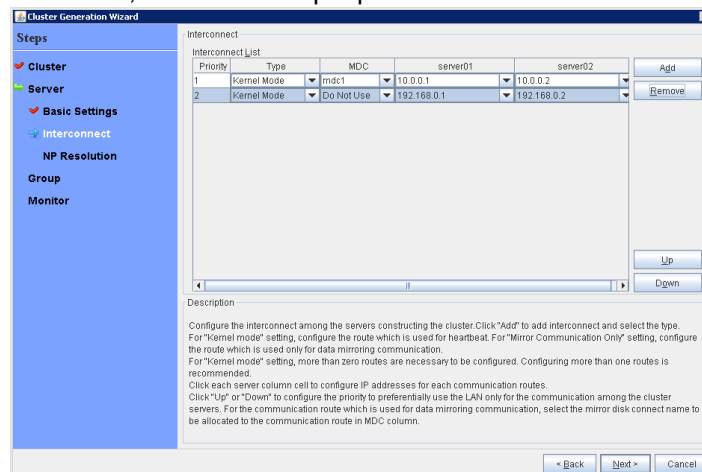
7. Configure the interconnects for a mirror disk type cluster.

7.1. Click **Add**, and then set up an interconnect LAN.

Select "mdc1" from the pull-down list of **MDC**.



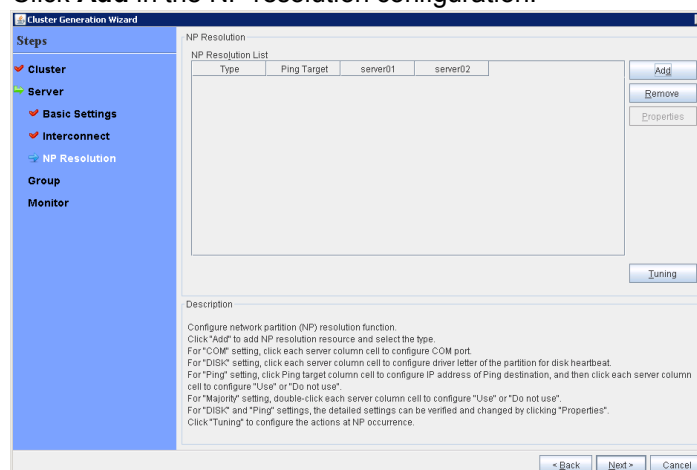
7.2. Click **Add**, and then set up a public LAN. Click **Next**.



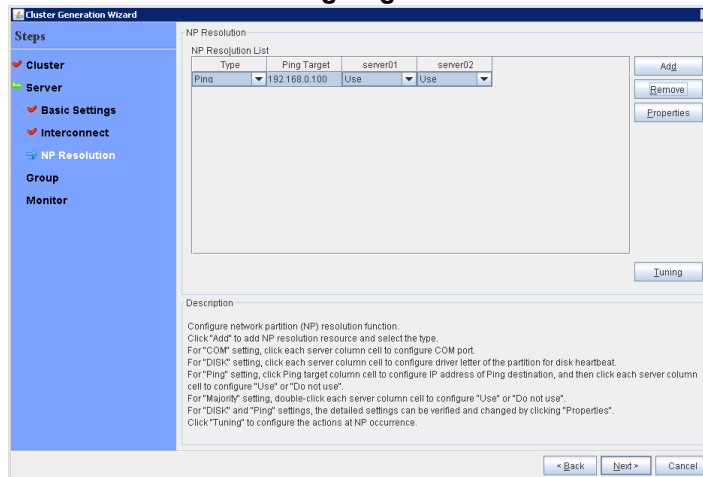
* In the above configuration, two interconnects are prepared by registering the public IP addresses to priority 2.

Configuring the NP resolution

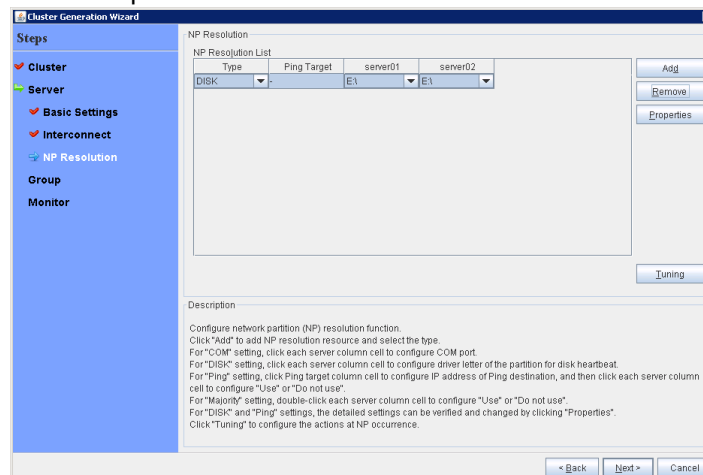
8.1 Click **Add** in the NP resolution configuration.



- 8.2 For a mirror disk type cluster, select the Ping method, and then specify "192.168.0.100" in the **Ping target** field.



- 8.3 For a shared disk type cluster, select DISK method, and then set the E: drive as the heartbeat partition. Click **Next**.



Without NP resolution, if a failure occurs on all the network communication channels between the clustered servers, all of the servers will fail over. Also, if no NP resolution is configured for the shared disk configuration, this can lead to data corruption. For details, refer to the "EXPRESSCLUSTER Installation Guide".

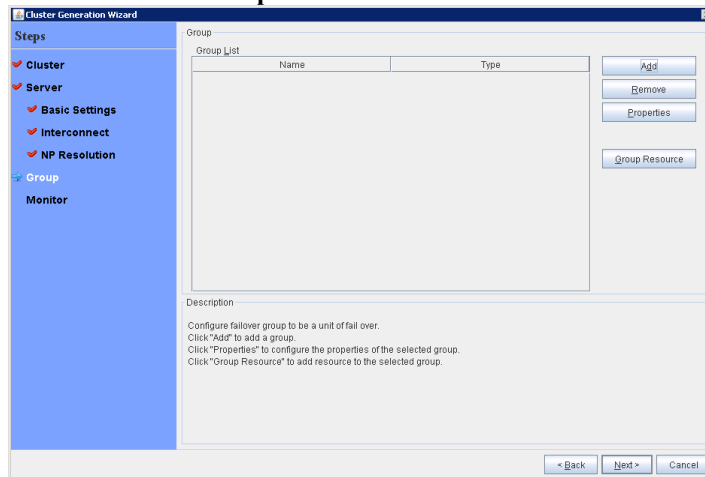
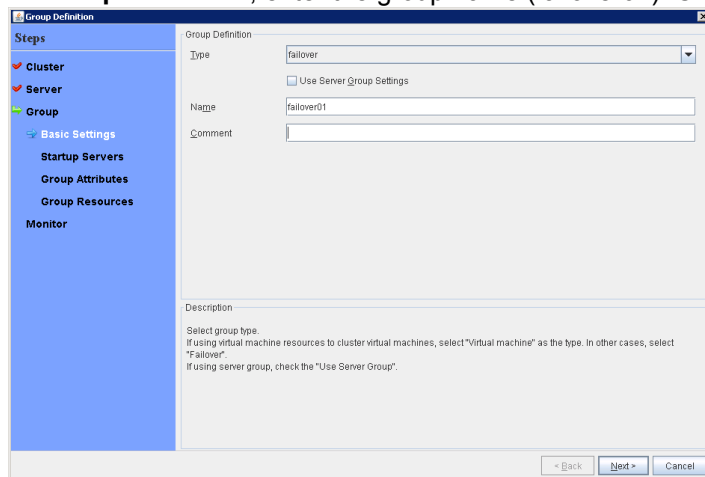
To configure an NP resolution resource to be used with the Ping method, a device that is always able to receive and respond to the ping command (a ping device) is required.

If a ping device is available, click **Add** and set it on the above screen.

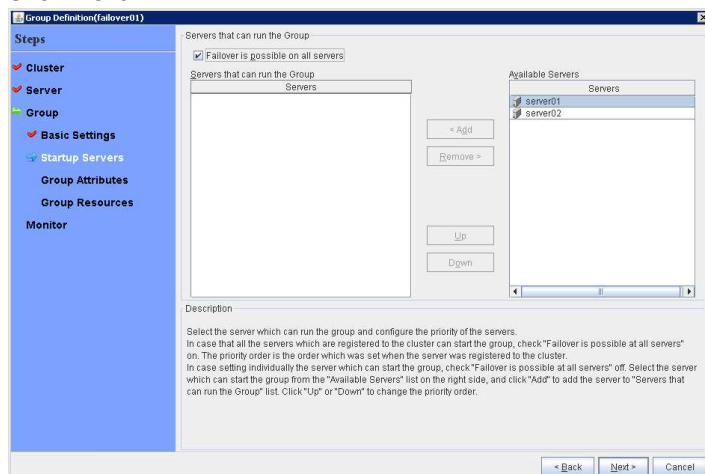
4-2-2. Create a failover group

Create and add, to the cluster, a failover group that executes FileMaker Server.

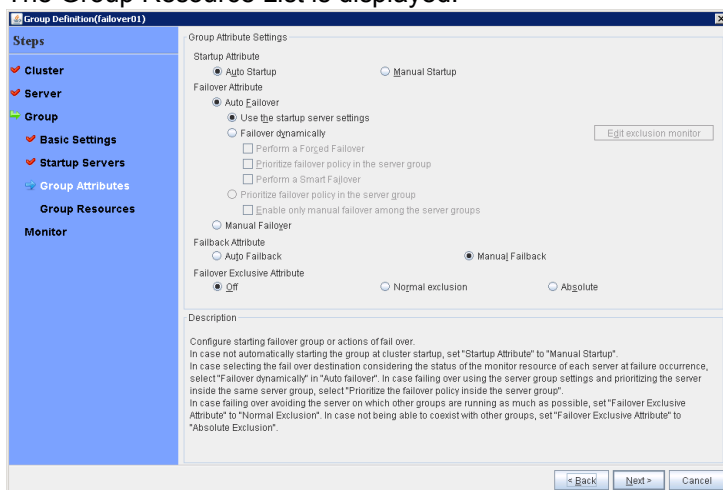
If a failure occurs on server01, failover is performed by switching those resources that are required for the execution of application and registered in this failover group, to server02.

1. Click **Add** in the **Group List**.2. In **Group Definition**, enter the group name (failover01). Click **Next**.3. In **Servers that can run the Group**, set the servers on which the failover group can be started.

Make sure that **Failover is possible for all servers** is selected.
Click **Next**.



4. Specify each attribute value of the failover group. Because all the default values are used for the setup example in this chapter, click Next. The Group Resource List is displayed.



4-2-3. Adding group resources (1)

Configure the following group resources:
 disk resource / mirror disk resource
 floating IP resource

Adding a disk resource or mirror disk resource

Add a disk resource or mirror disk resource as a group resource.

By storing the data required by the application in either a switchable or data partition, this data can be automatically inherited upon failover, failover group migration, or the like.

A partition that is used for data switchover between the servers in a shared disk configuration is referred to as a *switchable partition* while a partition in which the mirrored data is stored in a mirror disk configuration is referred to as the *data partition*.

The group resource to be created differs depending on the cluster configuration.

Example settings are shown below for both **Shared disk type cluster** and **Mirror disk type cluster**.

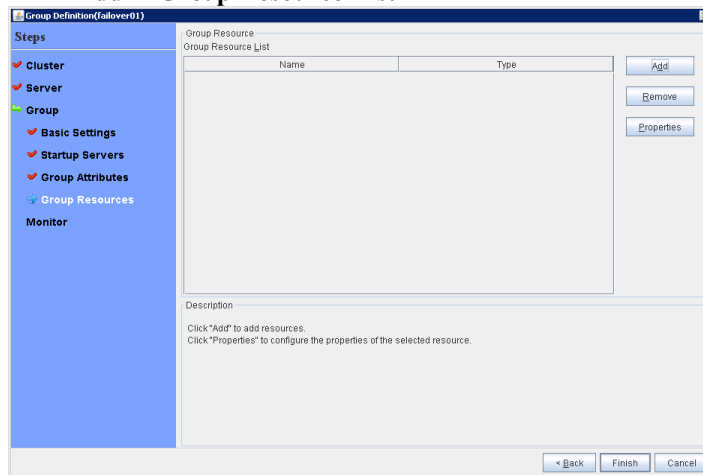
Add a disk resource for a shared disk type cluster.

Add a mirror disk resource for a mirror disk type cluster.

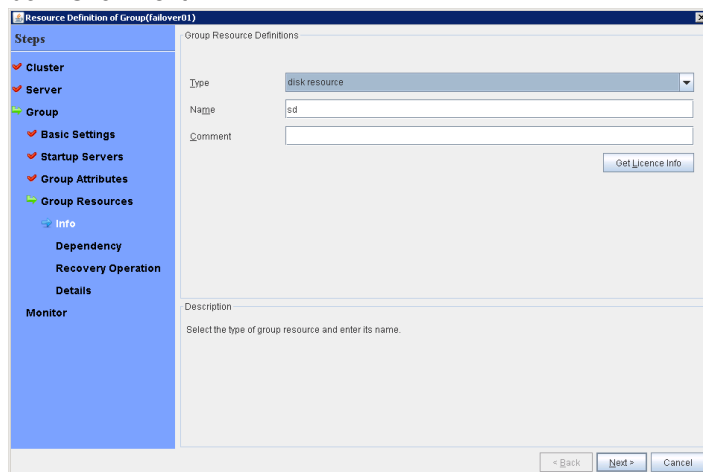
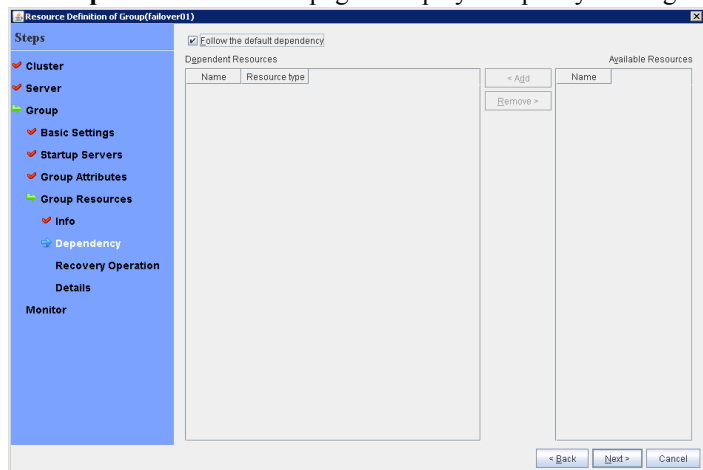
Shared disk type cluster

Add a shared disk as a group resource.

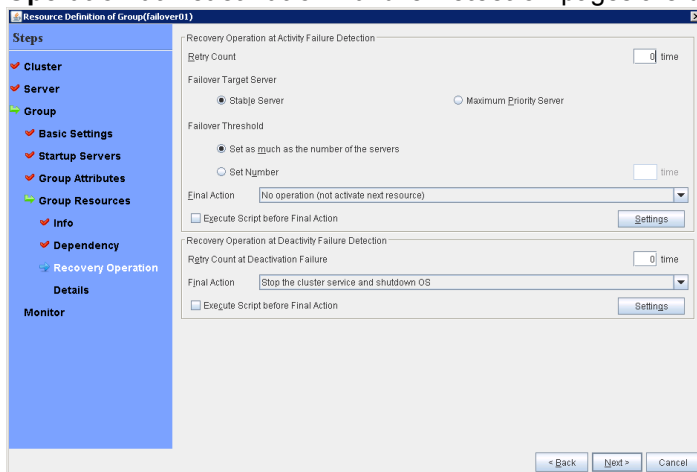
For details, refer to “Understanding disk resources” of the “Reference Guide”.

1. Click **Add** in Group Resource List.

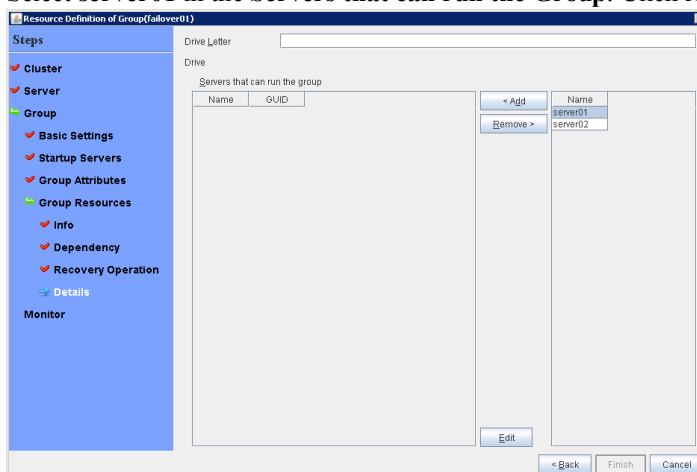
2. The Resource Definition of Group(failover01) dialog box is displayed. In the Resource Definition of Group(failover01) dialog box, select the group resource type disk resource in the Type box, and enter the group resource name sd in the Name box. Click Next.

3. The **Dependent Resources** page is displayed. Specify nothing. Click Next.

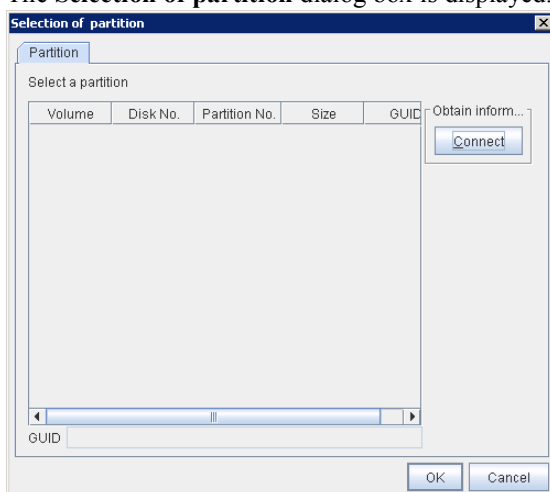
4. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.

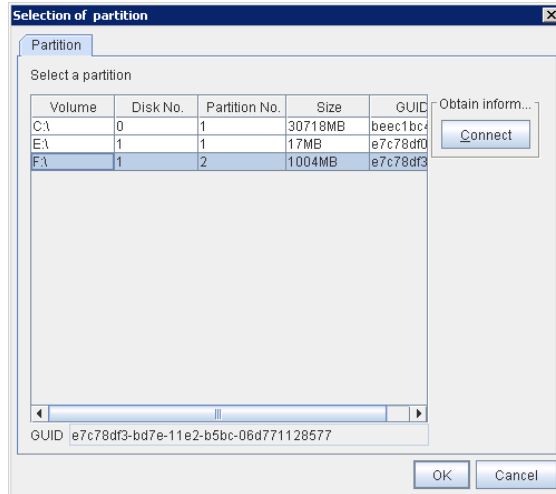


5. Select **server01** in the **Servers that can run the Group**. Click **Add**.

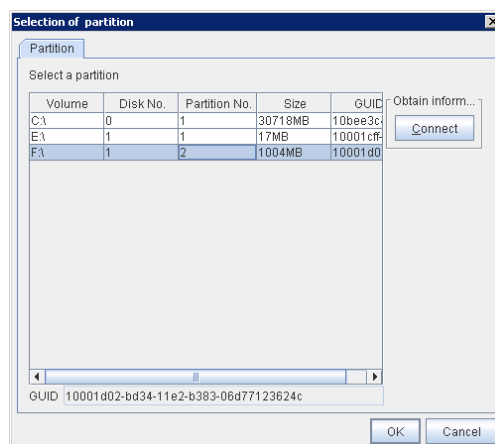
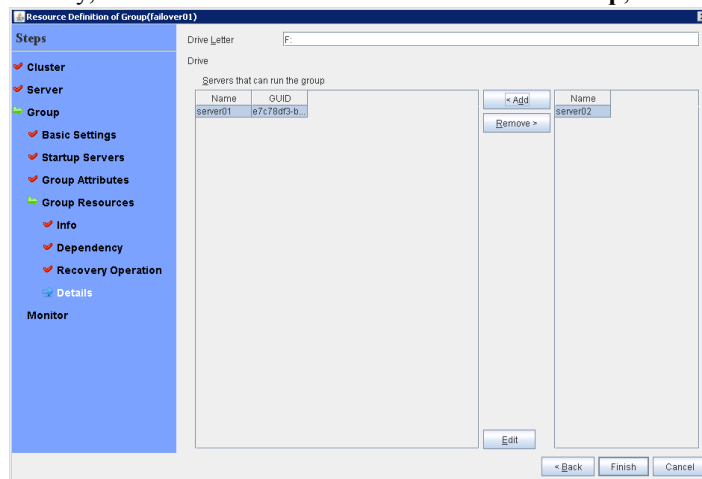


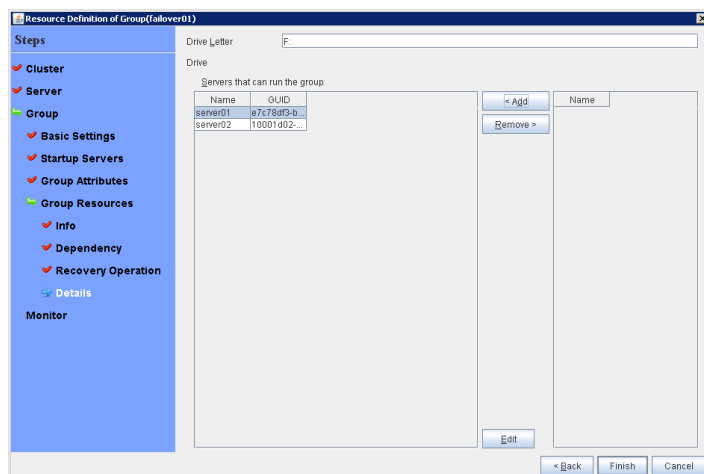
6. The **Selection of partition** dialog box is displayed. Select the partition **F:**. Click **OK**.



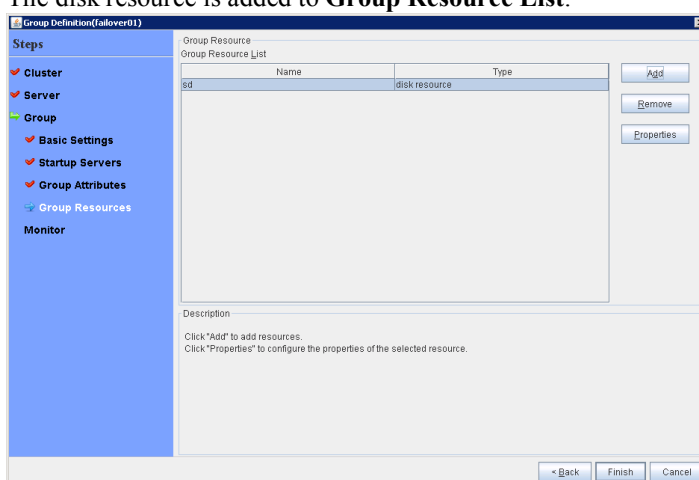


7. Similarly, add **server2** to **Servers that can run the Group**, and click **Finish**.





8. The disk resource is added to **Group Resource List**.

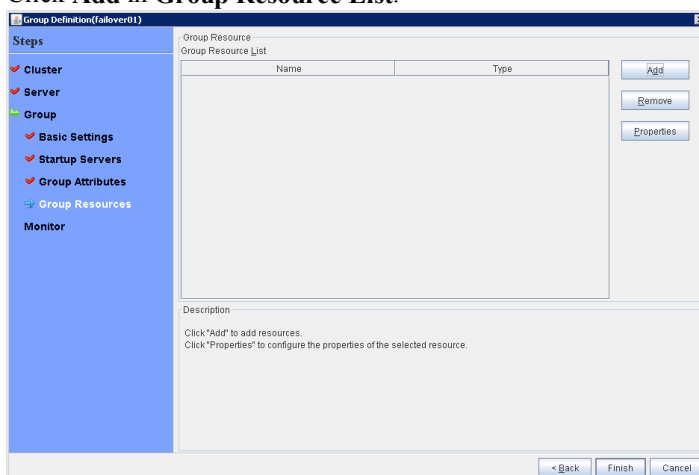


Mirror disk type cluster

Add a mirror disk as a group resource.

For details, refer to “Understanding mirror disk resources” of the “Reference Guide”.

1. Click **Add** in **Group Resource List**.



- The **Resource Definition of Group(failover01)** dialog box is displayed. In the **Resource Definition of Group(failover01)** dialog box, select the group resource type **mirror disk resource** in the **Type** box, and enter the group resource name **md1** in the **Name** box. Click **Next**.

Resource Definition of Group(failover01)

Group Resource Definitions

Type: mirror disk resource

Name: md1

Comment:

Get Licence Info

Description: Select the type of group resource and enter its name.

Back Next Cancel

- The **Dependent Resources** page is displayed. Specify nothing. Click **Next**.

Resource Definition of Group(failover01)

Follow the default dependency

Dependent Resources

Name	Resource type
------	---------------

Add Remove

Available Resources

Name

Back Next Cancel

- The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.

Resource Definition of Group(failover01)

Recovery Operation at Activation Failure Detection

Retry Count: 0 time

Failover Target Server: Stable Server Maximum Priority Server

Failover Threshold: Set as much as the number of the servers Set Number

Final Action: No operation (not activate next resource)

Execute Script before Final Action Settings

Recovery Operation at Deactivation Failure Detection

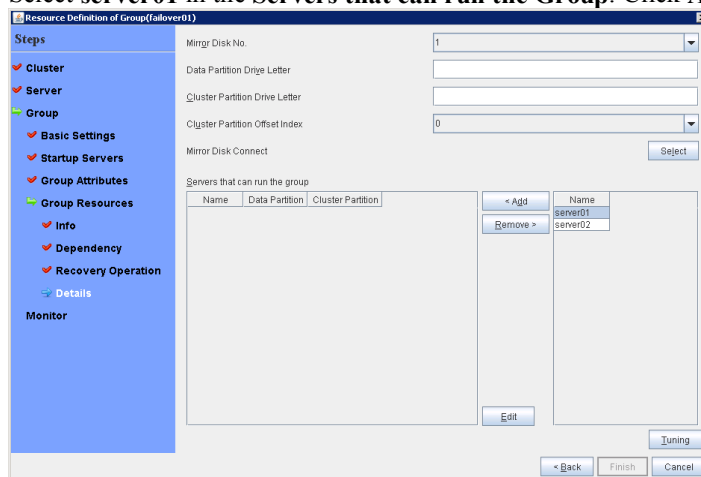
Retry Count at Deactivation Failure: 0 time

Final Action: Stop the cluster service and shutdown OS

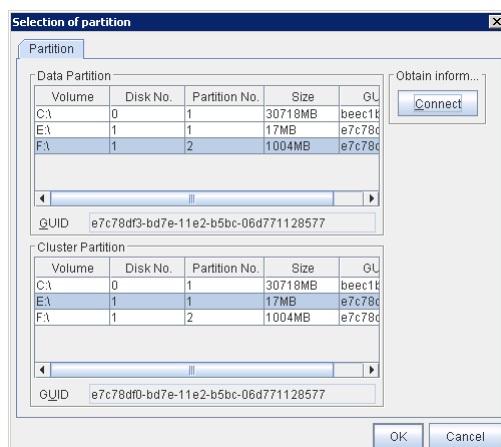
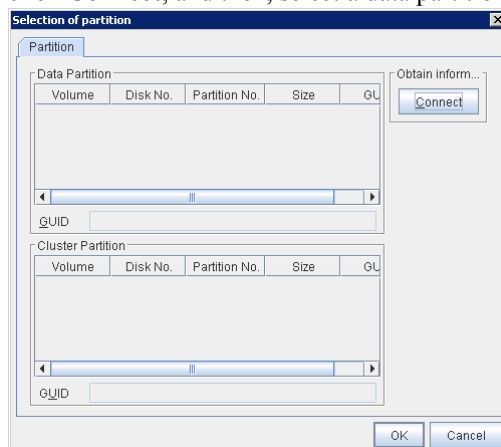
Execute Script before Final Action Settings

Back Next Cancel

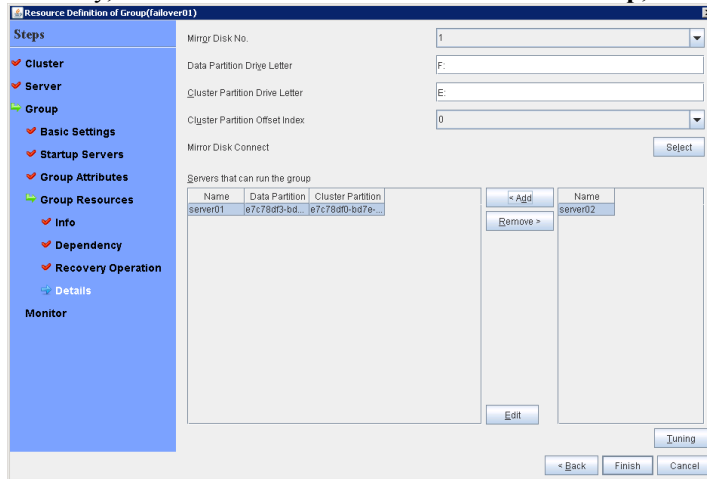
5. Select **server01** in the **Servers that can run the Group**. Click **Add**.



6. The **Selection of partition** dialog box is displayed. In the **Selection of Partition** dialog box, click **Connect**, and then, select a data partition **F:** and cluster partition **E:**. Click **OK**.



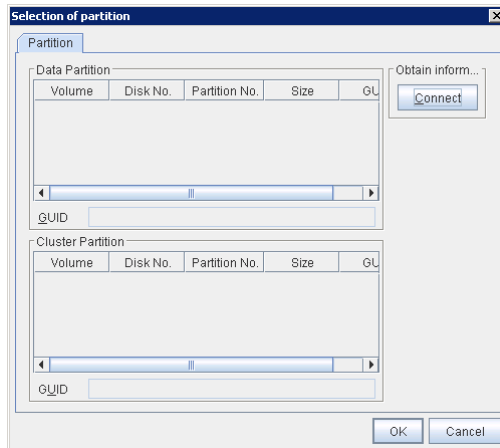
7. Similarly, add **server2** to **Servers that can run the Group**, and click **Finish**.



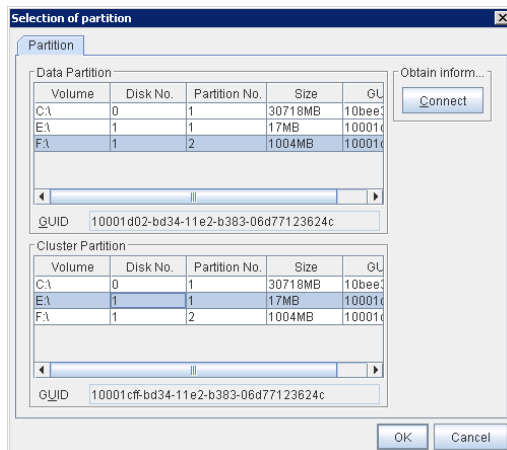
The dialog box shows the configuration for a resource group. The left sidebar lists steps: Steps, Cluster, Server, Group, Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The main area has fields for Mirror Disk No. (1), Data Partition Drive Letter (F), Cluster Partition Drive Letter (E), and Cluster Partition Offset Index (0). There is a 'Select' button for Mirror Disk Connect. Below, a table lists servers that can run the group:

Name	Data Partition	Cluster Partition
server01	e7c78d3-bd...	e7c78d0-ba7e...

Buttons for '< Add', 'Remove >', and 'Edit' are present. A 'Name' field contains 'server02'. At the bottom are 'Back', 'Finish', 'Cancel', and 'Tuning' buttons.



The dialog box shows the 'Partition' tab. It has two sections: 'Data Partition' and 'Cluster Partition'. Each section has a table with columns: Volume, Disk No., Partition No., Size, and GUID. The 'Data Partition' table is empty. The 'Cluster Partition' table is also empty. There are 'Obtain inform...' and 'Connect' buttons. At the bottom are 'OK' and 'Cancel' buttons.



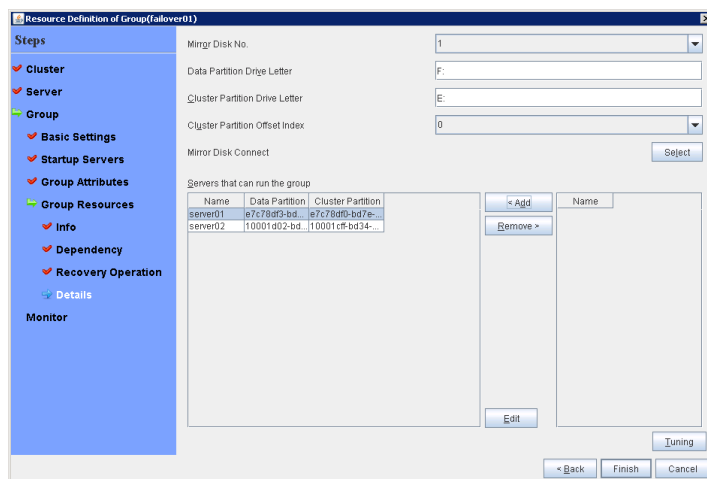
The dialog box shows the 'Partition' tab. It has two sections: 'Data Partition' and 'Cluster Partition'. Each section has a table with columns: Volume, Disk No., Partition No., Size, and GUID. The 'Data Partition' table is populated with the following data:

Volume	Disk No.	Partition No.	Size	GUID
C:\	0	1	30718MB	10bee...
E:\	1	1	17MB	10001...
F:\	1	2	1004MB	10001...

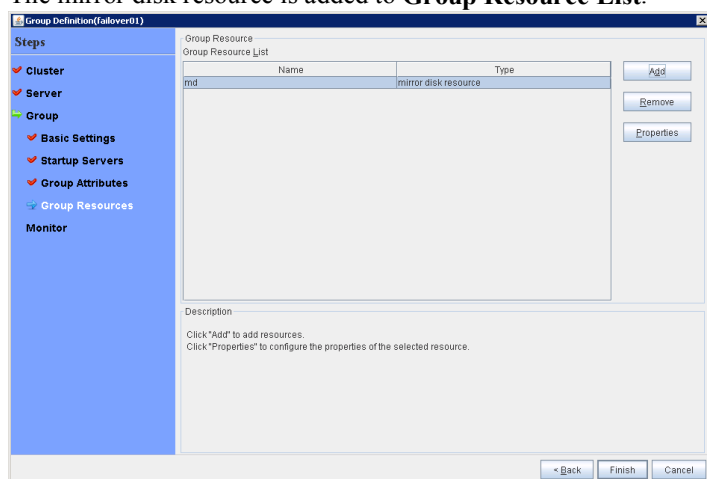
The 'Cluster Partition' table is also populated with the following data:

Volume	Disk No.	Partition No.	Size	GUID
C:\	0	1	30718MB	10bee...
E:\	1	1	17MB	10001...
F:\	1	2	1004MB	10001...

There are 'Obtain inform...' and 'Connect' buttons. At the bottom are 'OK' and 'Cancel' buttons.



8. The mirror disk resource is added to **Group Resource List**.



Add a group resource (floating IP resource)

Add a floating IP resource to be used for connecting the clients to a cluster server. By using the floating IP resource, clients need not be aware of the switching of the access destination server even when EXPRESSCLUSTER executes a failover or group migration. For details, refer to “Understanding floating IP resources” of the “Reference Guide”.

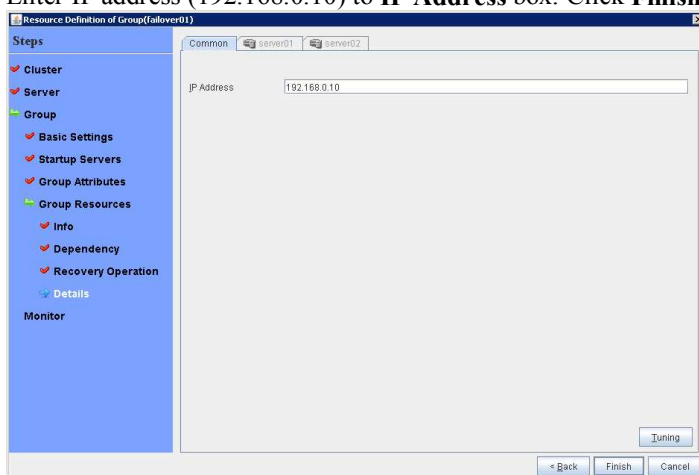
1. Click **Add** in the **Group Resource List**.

- The **Resource Definition of Group(failover01)** dialog box is displayed. In the **Resource Definition of Group(failover01)** dialog box, select the group resource type **floating ip resource** in the **Type** box, and enter the group resource name **fip1** in the **Name** box. Click **Next**.

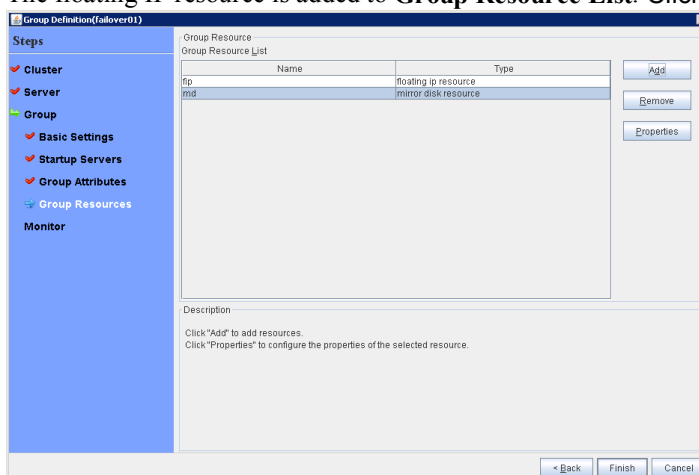
- The **Dependent Resources** page is displayed. Specify nothing. Click **Next**.

- The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.

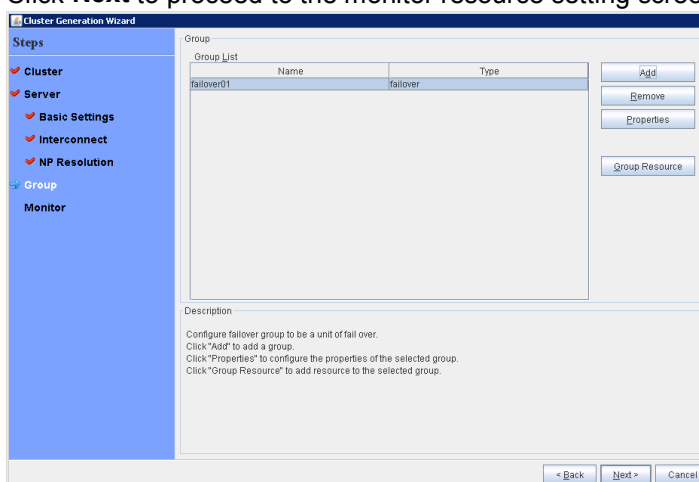
5. Enter IP address (192.168.0.10) to **IP Address** box. Click **Finish**



6. The floating IP resource is added to **Group Resource List**. Click **Finish**.



Click **Next** to proceed to the monitor resource setting screen.



4-2-4. Adding a monitor resource (NIC Link Up/Down monitor)

Add a monitor resource that monitors a specified target to the cluster.

Configure the following monitor resources:

NIC Link Up/Down monitor resource (for public LAN)

NIC Link Up/Down monitor resource (for interconnect LAN)

Add monitor resources that obtain information defining how the specified NIC is linked and monitor whether the linkage is up or down.

By monitoring the NIC link status, failover or other recovery action is performed automatically if the link goes down.

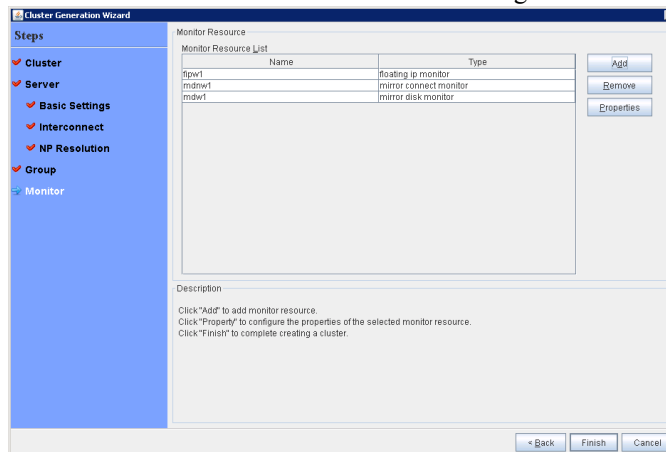
By means of this configuration procedure, create an NIC Link Up/Down monitor resource for both the public LAN and interconnect LAN.

Adding an NIC Link Up/Down monitor resource (public LAN)

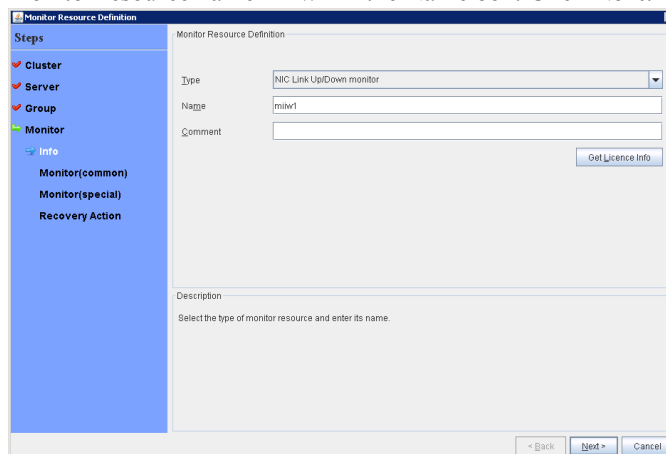
Add an NIC Link Up/Down monitor resource for the public LAN.

For details, refer to “Understanding NIC Link Up/Down monitor resources” of the “Reference Guide”.

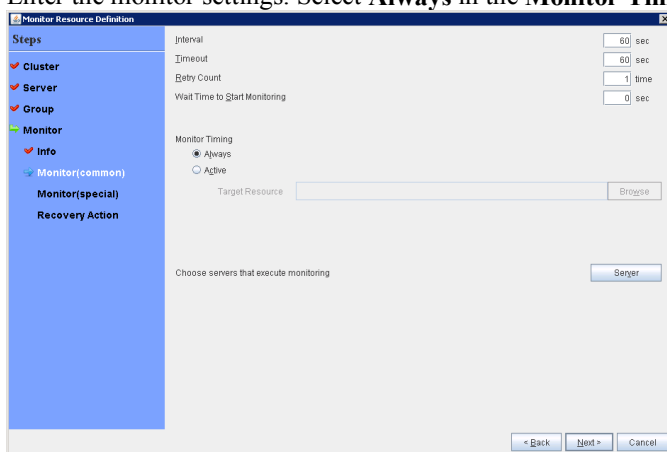
1. Click **Add** in the **Monitor Resource List** dialog box.



2. Select the monitor resource type **NIC Link Up/Down monitor** in the **Type** box, and enter the monitor resource name **miw1** in the **Name** box. Click **Next**.

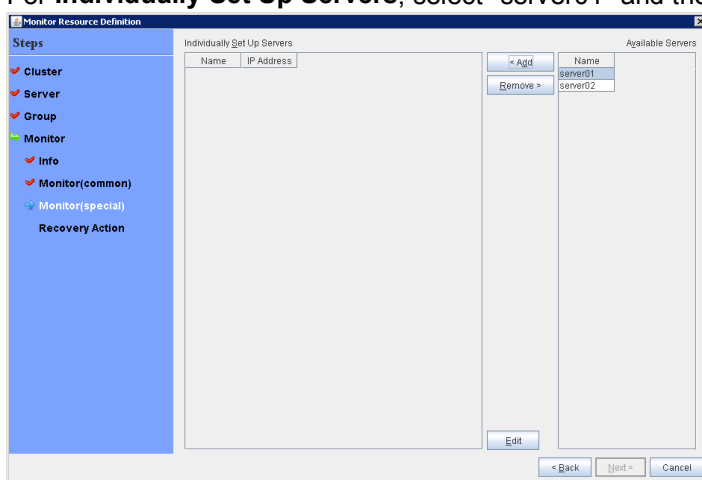


3. Enter the monitor settings. Select **Always** in the **Monitor Timing** box. Click **Next**.



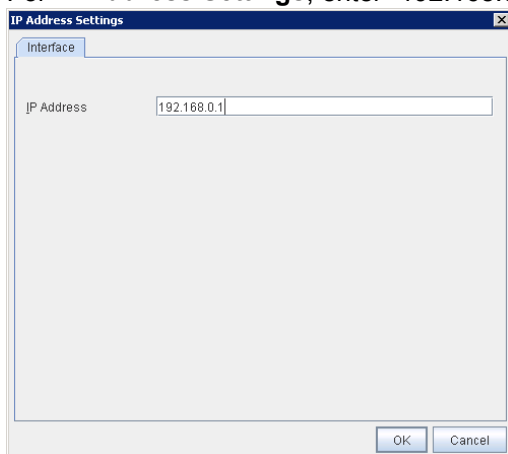
The **Monitor Resource Definition** dialog box is shown. The **Steps** pane on the left has **Monitor** selected. The **Monitor Timing** section has **Always** selected. The **Interval** is set to 60 sec, **Timeout** to 60 sec, **Retry Count** to 1 time, and **Wait Time to Start Monitoring** to 0 sec. The **Monitor** section has **Info** selected. The **Target Resource** field is empty with a **Browse** button. The **Choose servers that execute monitoring** section has a **Server** button. At the bottom are **Back**, **Next >**, and **Cancel** buttons.

4. For **Individually Set Up Servers**, select "server01" and then click **Add**.



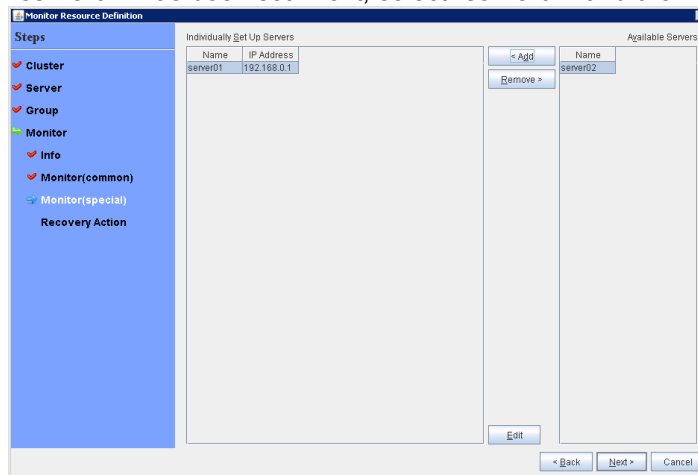
The **Monitor Resource Definition** dialog box is shown with the **Individually Set Up Servers** tab selected. The **Available Servers** list on the right contains **server01** and **server02**. The **Add** button is highlighted. The **Steps** pane on the left has **Monitor** selected. At the bottom are **Back**, **Next >**, and **Cancel** buttons.

5. For **IP Address Settings**, enter "192.168.0.1".

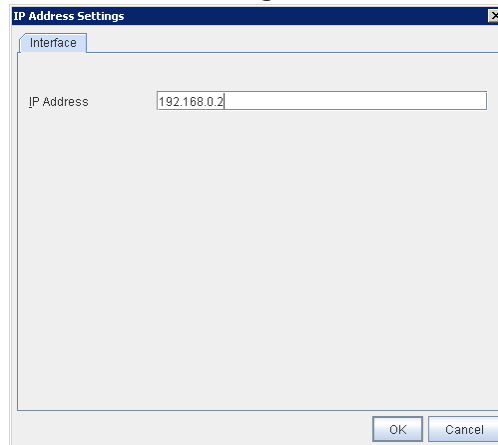


The **IP Address Settings** dialog box is shown with the **Interface** tab selected. The **IP Address** field contains the text "192.168.0.1". At the bottom are **OK** and **Cancel** buttons.

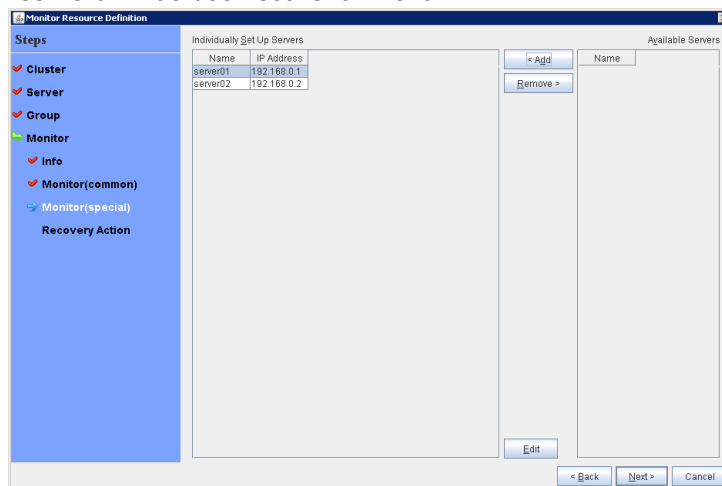
6. "server01" has been set. Next, select "server02" and then click **Add**.



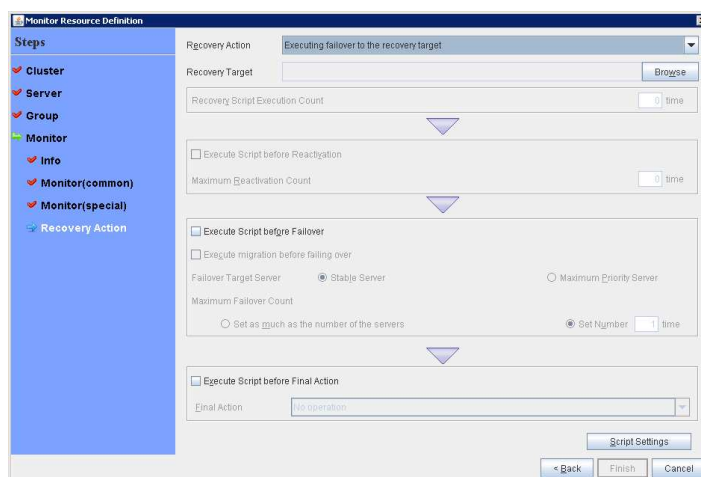
7. For **IP Address Settings**, enter "192.168.0.2".



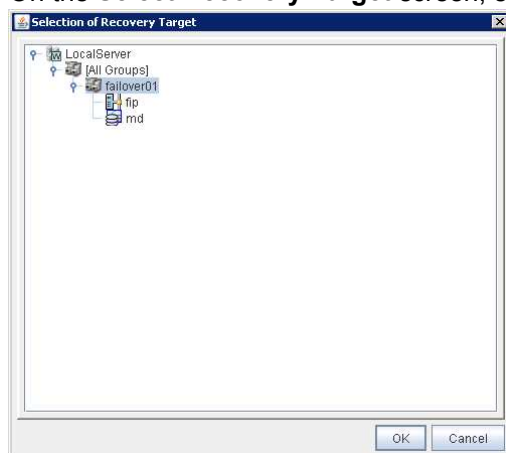
8. "server02" has been set. Click **Next**.



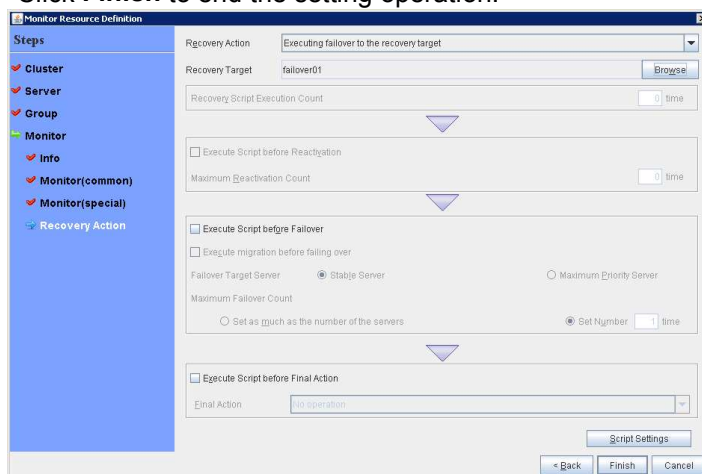
9. On the recovery action screen, select **Executing failover to the recovery target** for **Recovery Action**.
Click **Browse** for **Recovery Target**.



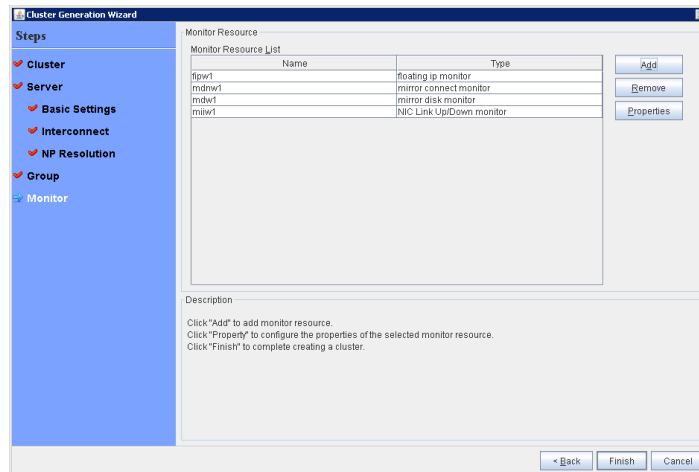
10. On the **Select Recovery Target** screen, select "failover01" and then click **OK**.



11. Click **Finish** to end the setting operation.



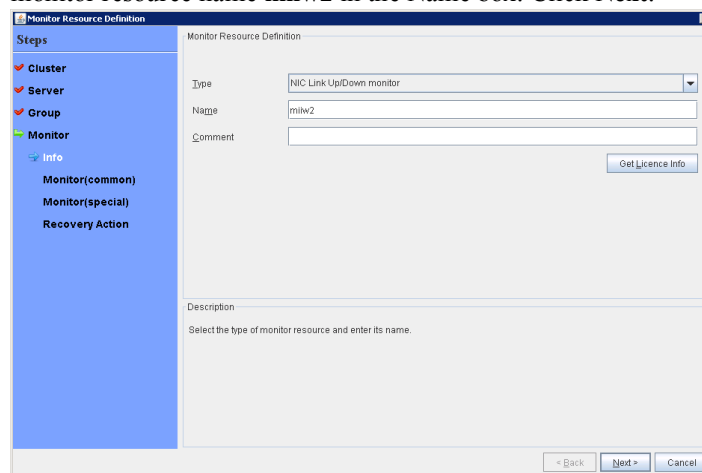
12. "miiw1" has been added to the Monitor Resources.

**Adding an NIC Link Up/Down monitor resource (interconnect LAN)**

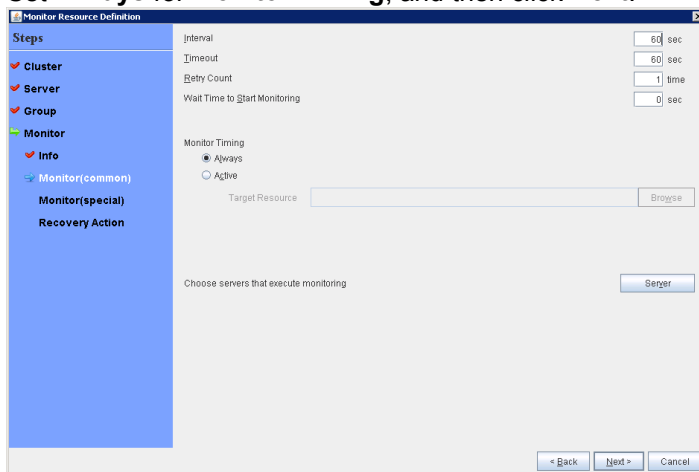
Add an NIC Link Up/Down monitor resource for the interconnect LAN.

For details, refer to “Understanding NIC Link Up/Down monitor resources” of the “Reference Guide”.

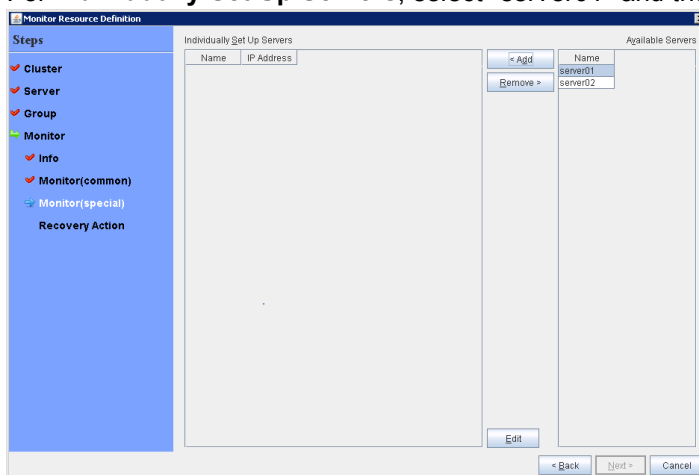
1. In the **Monitor Resource List**, click **Add**.
2. Select the monitor resource type **NIC Link Up/Down monitor** in the **Type** box, and enter the monitor resource name **miiw2** in the **Name** box. Click **Next**.



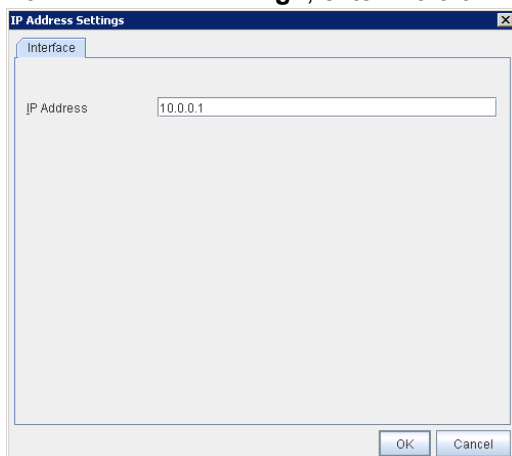
3. Set **Always** for **Monitor Timing**, and then click **Next**.



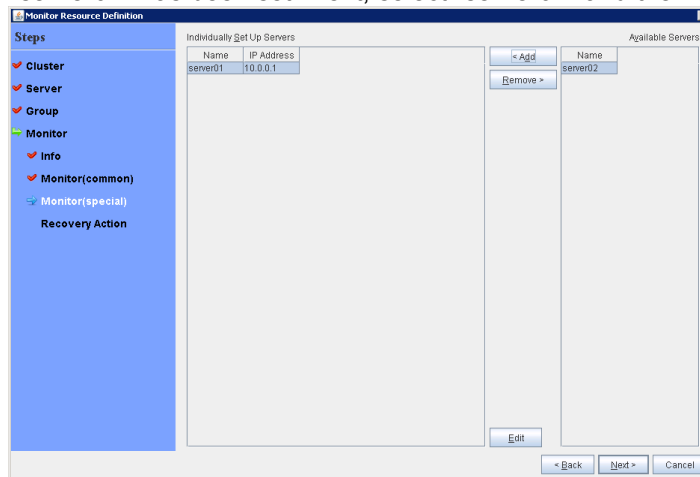
4. For **Individually Set Up Servers**, select "server01" and then click **Add**.



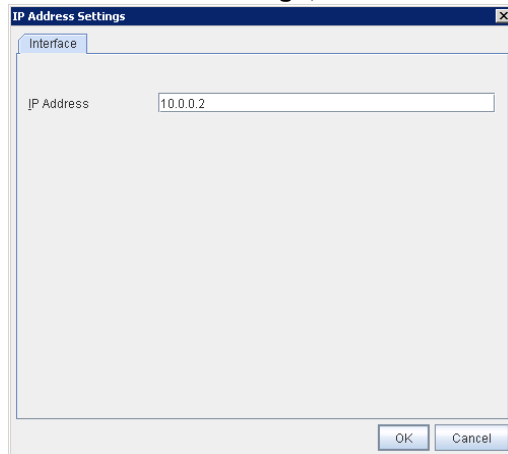
5. For **IP Address Settings**, enter "10.0.0.1".



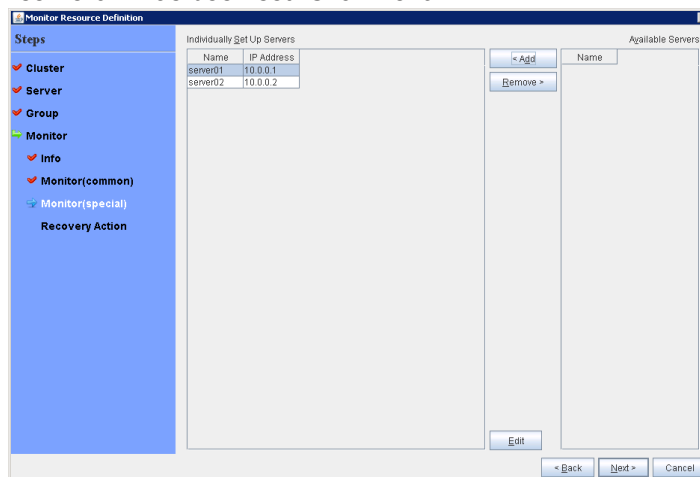
6. "server01" has been set. Next, select "server02" and then click **Add**.



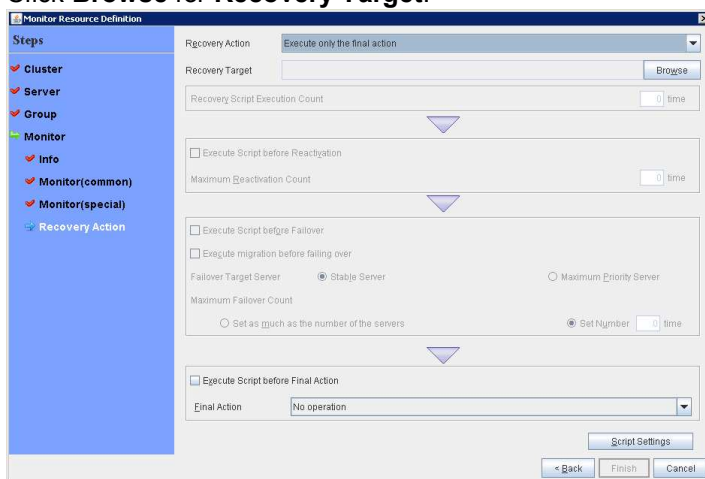
7. For **IP Address Settings**, enter "10.0.0.2".



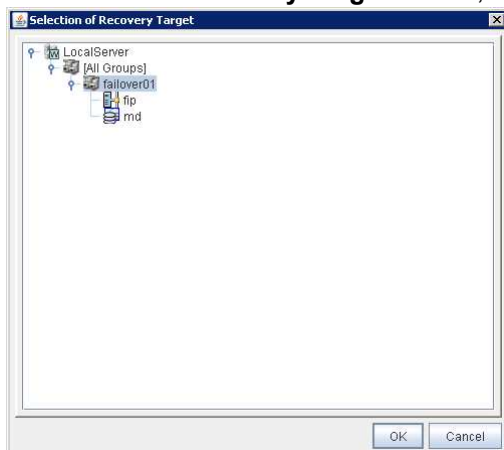
8. "server02" has been set. Click **Next**.



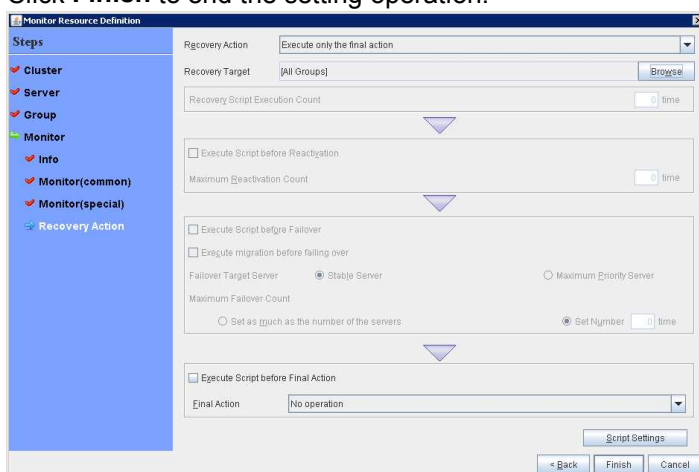
9. On the recovery action screen, select **Execute only the final action** for **Recovery Action**.
Click **Browse** for **Recovery Target**.



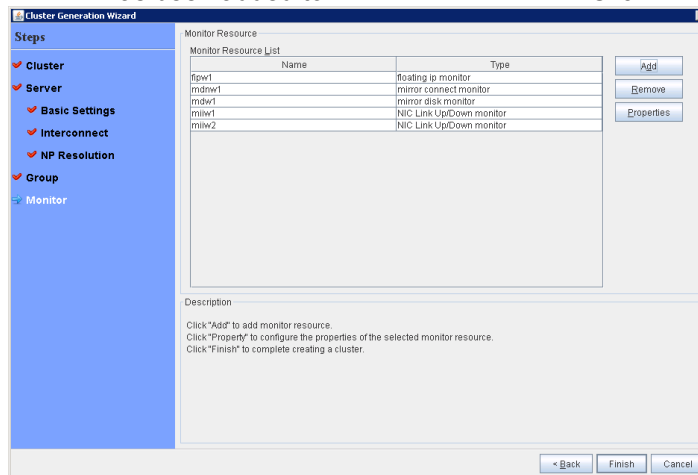
10. On the **Select Recovery Target** screen, select **All Groups** and then click **OK**.



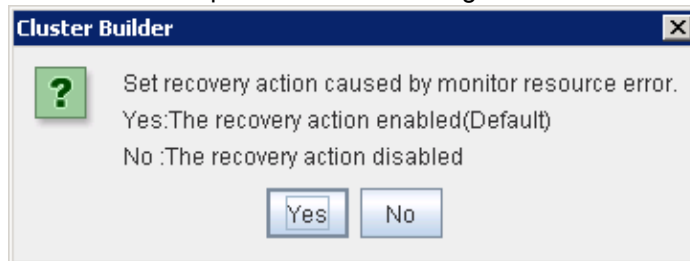
11. Click **Finish** to end the setting operation.



12. "miiw2" has been added to **Monitor Resources**. Click **Finish**.



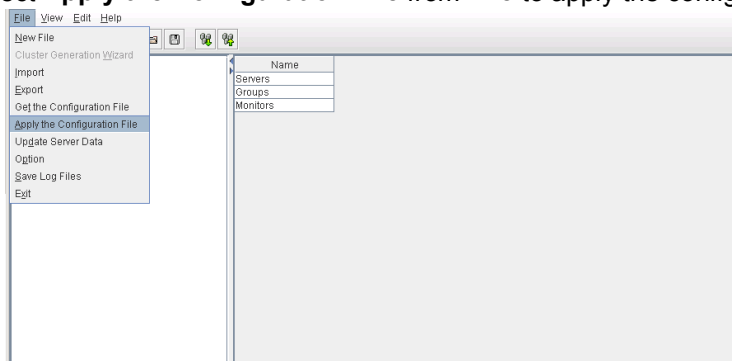
13. Click **Yes** to complete the cluster configuration.



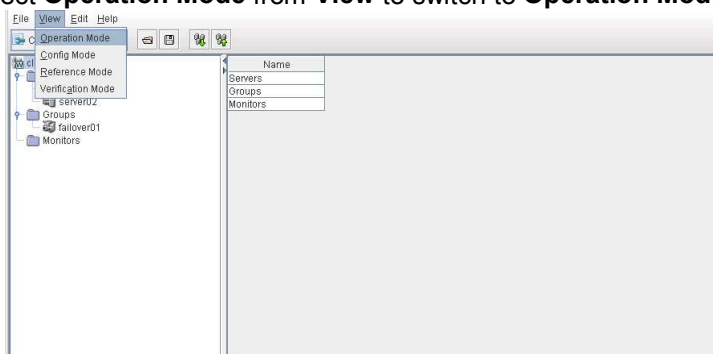
Apply the settings, and then start the cluster.

For details, refer to "1 Create a cluster" in "Chapter 5 Creating the cluster configuration data" of the EXPRESSCLUSTER "Installation and Configuration Guide"

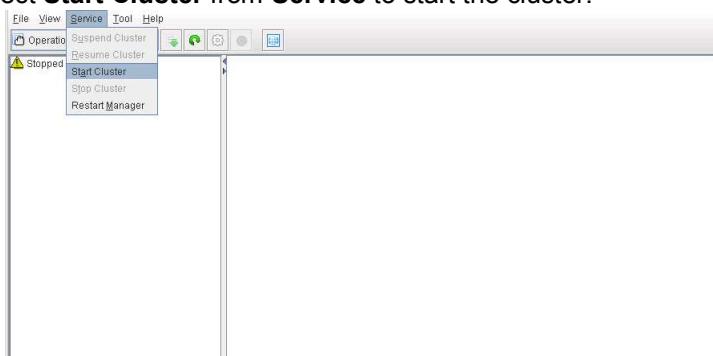
Select **Apply the Configuration File** from **File** to apply the configuration information.



Select **Operation Mode** from **View** to switch to **Operation Mode**.



Select **Start Cluster** from **Service** to start the cluster.



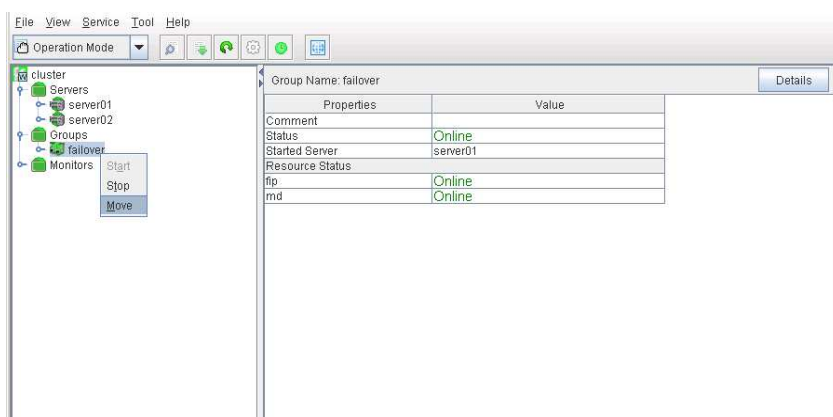
4-2-5. Install FileMaker Server

Install FileMaker Server on each server.

For details about how to install FileMaker Server, refer to the “FileMaker Server 12 Getting Started Guide”.

After installing FileMaker Server, perform the following configuration operations.

In **Operation Mode** of ClusterManager, right-click the failover group (failover01). Click **Move**, and then select the server01 to which to fail over the group.



Creating an additional database folder

From Admin Console of FileMaker Server, create an additional database folder (database storage folder) in the switchable partition or data partition area.

ex. F:¥FileMakerDB

Using the progressive backup feature

FileMaker Server 12 offers a progressive backup feature that periodically backs up the database data.

For details about progressive backup, refer to the “FileMaker Server 12 Getting Started Guide”.

EXPRESSCLUSTER checks the status of the database data when FileMaker Server is started. If the status of the data is abnormal, the backup can be applied by using the progressive backup feature. (This is called the progressive backup linkage function, below.)

To use the progressive backup linkage function, create a progressive backup folder in the switchable partition or data partition area, from Admin Console of FileMaker Server, ex. F:¥FileMakerPB

※If the progressive backup linkage function is used, you must not use the character string which contains **ing,error,closed** regardless of a capital letter and a small letter for a database name.

Setting the startup type of the service

Starting/stopping of the FileMaker Server service is controlled by EXPRESSCLUSTER.

To prevent the FileMaker Server service from starting automatically at OS startup, set the startup type of the service to **Manual** on each server constituting the cluster.

After move failover group(failover01) to the server02, setting server02 in the same way as above.

4-2-6. Adding group resources (2)

Configure the following group resources:

Service resources

Script resources

Using Builder, add the FileMaker Server service as a service resource.

In addition, create scripts for executing the progressive backup linkage function, as well as a script which closes the FileMaker Server databases, and then add these scripts as script resources.

The group resources to be created are as follows:

The group resource names in parentheses () are set in EXPRESSCLUSTER.

1. Service resource (service_fmserver)
Starts/stops the FileMaker Server service.
2. Script resource (script_backup1)
Backs up the progressive backup data when the failover group is started.
3. Script resource (script_backup2)
Checks the database status when the failover group is started and, upon the detection of an error, applies the backup using the progressive backup feature.
4. Script resource (script_dbclose)
Closes the FileMaker Server databases when the failover group is stopped.

If the progressive backup linkage function is not used, there is no need to add the related script resources (script_backup1/ script_backup2).

The steps performed when the failover group is started/stopped are shown below.

Steps performed when the failover group is started

1. Script resource (script_backup1)
Backs up the progressive backup data.
2. Service resource (service_fmserver)
Starts the FileMaker Server service.
3. Script resource (script_backup2)
Checks the database status and, upon the detection of an error, applies progressive backup.

Steps performed when the failover group is stopped

1. Script resource (script_dbclose)
Closes the FileMaker Server databases.
2. Service resource (service_fmserver)
Stops the FileMaker Server service.

The dependencies between the group resources must be set in the following order:

1. Script resource (backs up the progressive backup data)
2. Service resource (starts/stops FileMaker Server)
3. Script resource (applies the progressive backup)
4. Script resource (closes the databases)

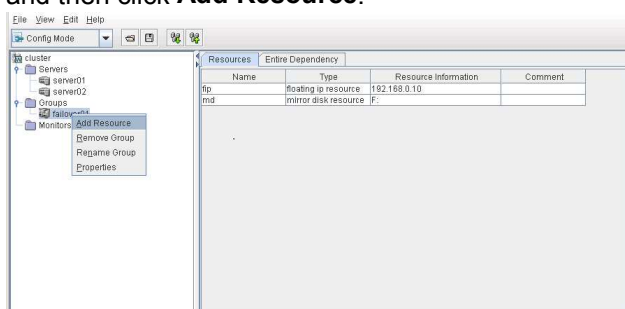
By following the procedure below, first add the individual group resources, and then set the dependencies.

Adding a service resource

Add the FileMaker Server service as a service resource.

For details, refer to “Understanding service resources” of the “Reference Guide”.

1. In **Config Mode** of WebManager, right-click the failover group (failover01) in the list, and then click **Add Resource**.



- The **Resource Definition of Group(failover01)** dialog box is displayed. Select the group resource type **service resource** in the **Type** box, and enter the group resource name **service_fmserver1** in the **Name** box. Click **Next**.

Resource Definition of Group(failover01)

Group Resource Definitions

Steps

- Info
- Dependency
- Recovery Operation
- Details

Type: service resource

Name: service_fmserver1

Comment:

Get Licence Info

Description:

Select the type of group resource and enter its name.

< Back Next > Cancel

- The **Dependent Resources** page is displayed. Specify nothing. Click **Next**.

Resource Definition of Group(failover01)

Follow the default dependency

Dependent Resources

Name	Resource type
...	cifs resource
...	disk resource
...	floating ip res...
...	hybrid disk re...
...	mirror disk re...
...	nas resource
...	print spooler r...
...	registry synchr...
...	virtual comput...
...	virtual ip reso...

Available Resources

< Add Remove >

< Back Next > Cancel

- The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.

Resource Definition of Group(failover01)

Recovery Operation at Activation Failure Detection

Retry Count: 0 time

Failover Target Server: ☒ Stable Server ☐ Maximum Priority Server

Failover Threshold: ☒ Set as much as the number of the servers ☐ Set Nymber

Final Action: No operation (not activate next resource)

Execute Script before Final Action: ☐ Settings

Recovery Operation at Deactivation Failure Detection

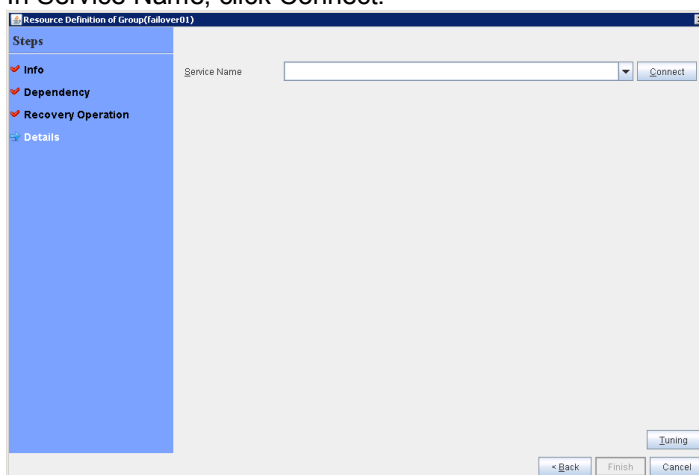
Retry Count at Deactivation Failure: 0 time

Final Action: Stop the cluster service and shutdown OS

Execute Script before Final Action: ☐ Settings

< Back Next > Cancel

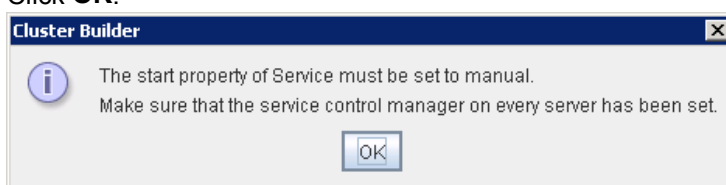
5. In Service Name, click Connect.



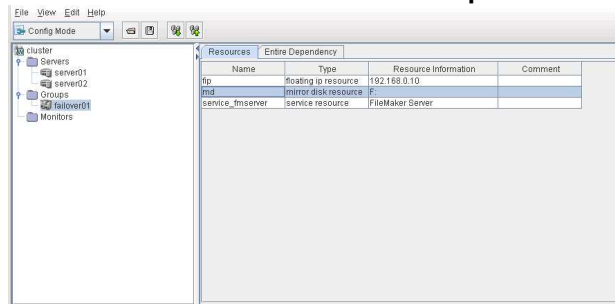
6. Select target service "FileMaker Server" from the pull-down list. Click **Finish**.



7. Click **OK**.



8. The service resource is added to **Group Resource List**.

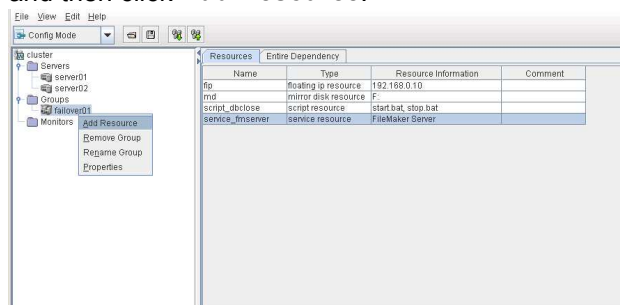


Adding a script resource (script for closing the databases)

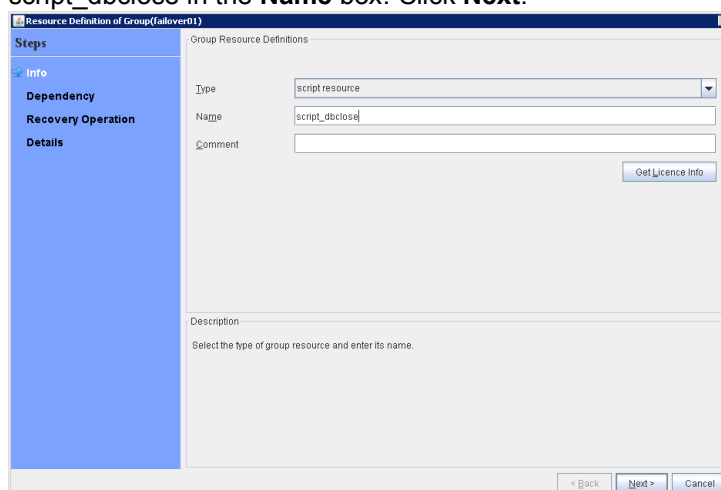
Create a script to close the FileMaker Server databases when the failover group is stopped, and then add this script as a script resource.

For details about script resources, refer to “Understanding script resources” of the “Reference Guide”.

1. In **Config Mode** of WebManager, right-click the failover group (failover01) in the list, and then click **Add Resource**.



2. The **Resource Definition of Group(failover01)** dialog box is displayed. In the **Resource Definition of Group(failover01)** dialog box, select the group resource type **script resource** in the **Type** box, and enter the group resource name **script_dbclose** in the **Name** box. Click **Next**.



3. The **Dependent Resources** page is displayed. Specify nothing. Click **Next**.

Resource Definition of Group(failover01)

Steps

- Info
- Dependent Resources
- Recovery Operation
- Details

☒ Follow the default dependency

Dependent Resources

Name	Resource type

Available Resources

Name

< Back Next > Cancel

4. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.

Resource Definition of Group(failover01)

Steps

- Info
- Dependent Resources
- Recovery Operation
- Details

Recovery Operation at Activation Failure Detection

Retry Count: 0 time

Failover Target Server: ☒ Stable Server ☐ Maximum Priority Server

Failover Threshold: ☒ Set as much as the number of the servers ☐ Set Number

Final Action: No operation (not activate next resource)

☐ Execute Script before Final Action

Recovery Operation at Deactivation Failure Detection

Retry Count at Deactivation Failure: 0 time

Final Action: Stop the cluster service and shutdown OS

☐ Execute Script before Final Action

< Back Next > Cancel

5. In the **Scripts** list, select stop.bat and then click **Edit**. Edit stop.bat. Refer to "Appendix Sample scripts" to determine how to edit the sample script. Note that there is no need to edit start.bat.

Resource Definition of Group(failover01)

Steps

- Info
- Dependent Resources
- Recovery Operation
- Scripts

Scripts

Type	Name
Start script	start.bat
Stop script	stop.bat

Add Replace

Remove View

Edit

Template

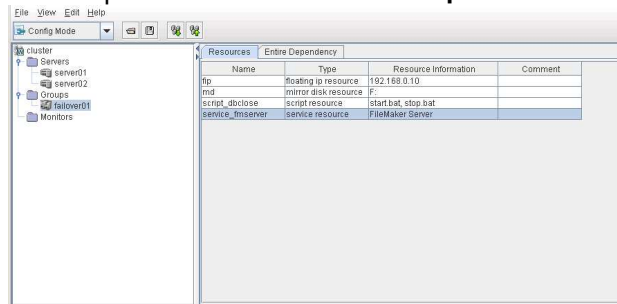
Viewer/Editor tool can be changed

Change Tuning

< Back Finish Cancel

6. Click **Finish**.

The script resource is added to **Group Resource List**.



Adding script resources (scripts for progressive backup linkage)

Create a script that checks the status of the database data at the startup of FileMaker Server and applies the backup in collaboration with the progressive backup feature in the event of an error, and then add this script as a script resource.

For details, refer to "Understanding script resources" in the "Reference Guide".

If the progressive backup linkage function is not used, this script is not required.

Create the following two script resources:

-script_dbbackup1

Backs up the progressive backup data.

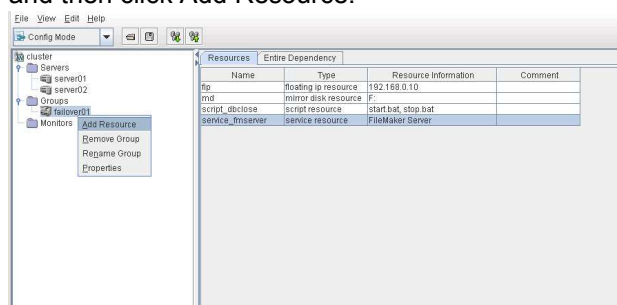
-script_dbbackup2

Checks the status of the database data, and then applies the backup if an error is found.

This script calls the PowerShell script, which performs the database status check and applies the backup if an error is found.

For details about the PowerShell script, refer to "Chapter 6 Scripts for linkage".

1. In Config Mode of WebManager, right-click the failover group (failover01) in the list, and then click Add Resource.



- The Resource Definition of Group(failover01) dialog box is displayed. Select the group resource type script resource in the Type box, and enter the group resource name script_backup1 in the Name box. Click Next.

Resource Definition of Group(failover01)

Group Resource Definitions

Type: script resource

Name: script_backup1

Comment:

Get Licence Info

Description: Select the type of group resource and enter its name.

< Back Next > Cancel

- The Dependent Resources page is displayed. Specify nothing. Click Next

Resource Definition of Group(failover01)

Follow the default dependency

Dependent Resources

Name	Resource type
--	cifs resource
--	disk resource
--	floating ip res...
--	hybrid disk re...
--	mirror disk re...
--	nas resource
--	print spooler r...
--	registry synchr...
--	virtual comput...
--	virtual ip reso...

Available Resources

< Add Remove >

< Back Next > Cancel

- The Recovery Operation at Activation Failure Detection and Recovery Operation at Deactivation Failure Detection pages are displayed. Click Next.

Resource Definition of Group(failover01)

Recovery Operation at Activation Failure Detection

Retry Count: 0 time

Failover Target Server: ☒ Stable Server ☐ Maximum Priority Server

Failover Threshold: ☒ Set as much as the number of the servers ☐ Set Number

Final Action: No operation (not activate next resource)

Execute Script before Final Action: ☐ Settings

Recovery Operation at Deactivation Failure Detection

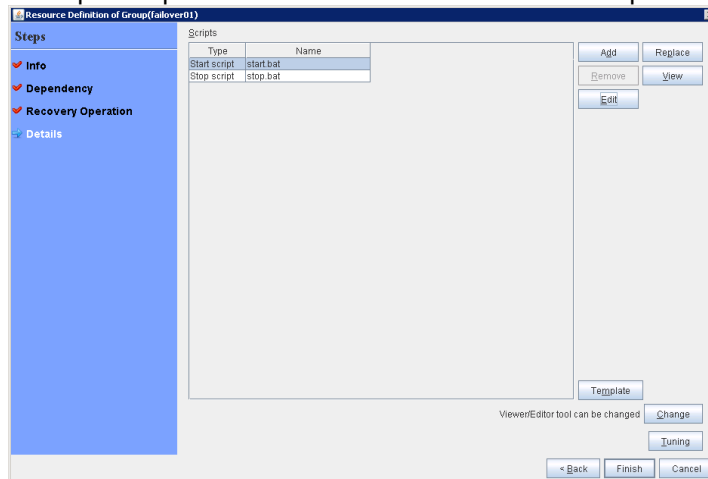
Retry Count at Deactivation Failure Detection: 0 time

Final Action: Stop the cluster service and shutdown OS

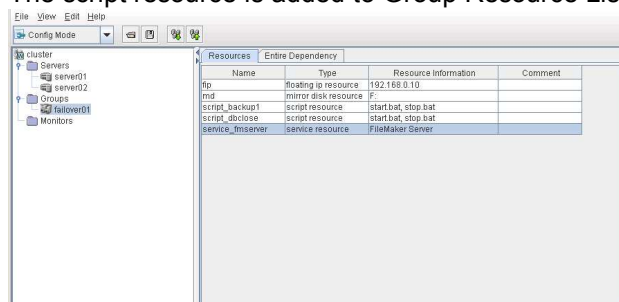
Execute Script before Final Action: ☐ Settings

< Back Next > Cancel

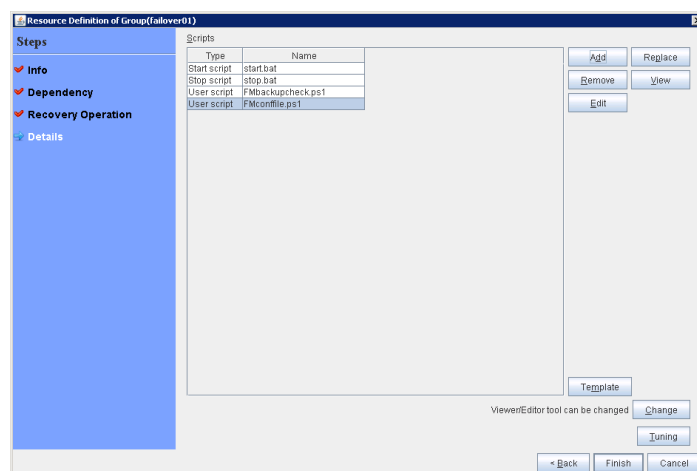
5. In the Scripts list, select start.bat and then click Edit.
Edit start.bat. Refer to "Appendix Sample scripts" to determine how to edit the sample script. Note that there is no need to edit stop.bat.



6. Click Finish.
The script resource is added to Group Resource List.



In the same way as above, add the script_backup2 script resource.
After edit start.bat, add PowerShell script "FMbackupcheck.ps1" "FMconffile.ps1"
Refer to "Appendix Sample scripts" to determine how to edit the sample script.



Setting the dependencies

Set the dependencies between the group resources in the following order.

1. script resource (script_backup1)
2. service resource (service_fmserver)

3. script resource (script_backup2)
4. script resource (script_dbclose)

The dependencies are as follows.

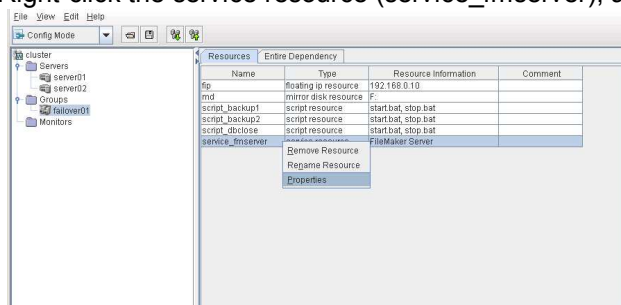
Depth	Name	Dependent resource name	Type
0	fip	None	
0	sd	None	
1	script_backup1	--	*
2	service_fmserver	script_backup1	Script resource
3	script_backup2	service_fmserver	Service resource
4	script_dbclose	script_backup2	Script resource

* For script_backup1, the information set according to **Follow the default dependency** is displayed.

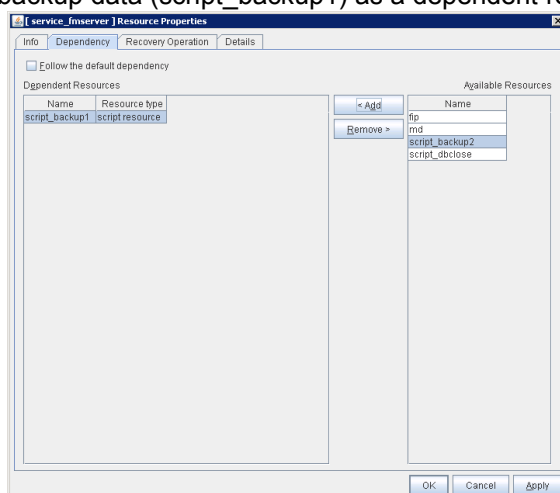
If the progressive backup linkage function is not used, set the dependency only for the script_dbclose script resource.

Specify the dependency for the service resource.

Right-click the service resource (service_fmserver), and then select **Property**.

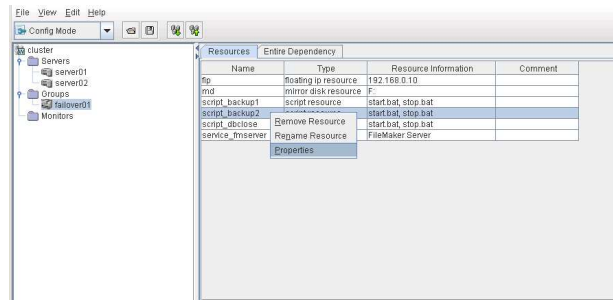


In the **Resource Properties** dialog box, select the **Dependency** tab. Clear **Follow the default dependency**, and then add the script resource that will back up the progressive backup data (script_backup1) as a dependent resource.

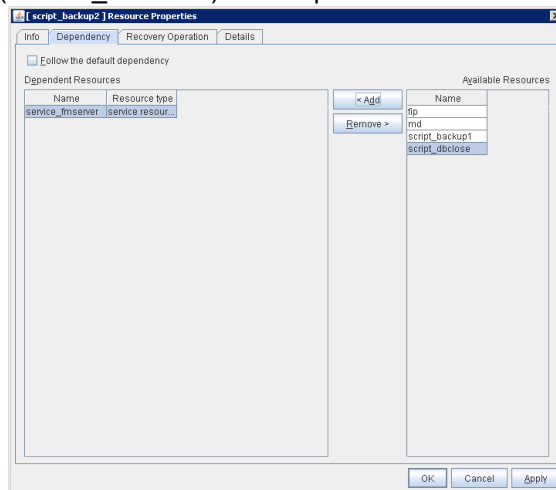


Specify the dependency for the script_backup2 script resource.

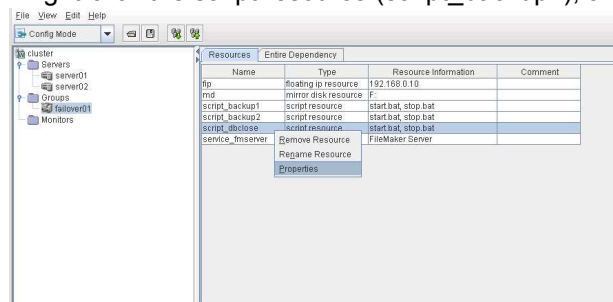
Right-click the script resource (script_backup2), and then select **Property**.



In the **Resource Properties** dialog box, select the **Dependency** tab. Clear **Follow the default dependency**, and then add the FileMaker Server service resource (service_fmserver) as a dependent resource.

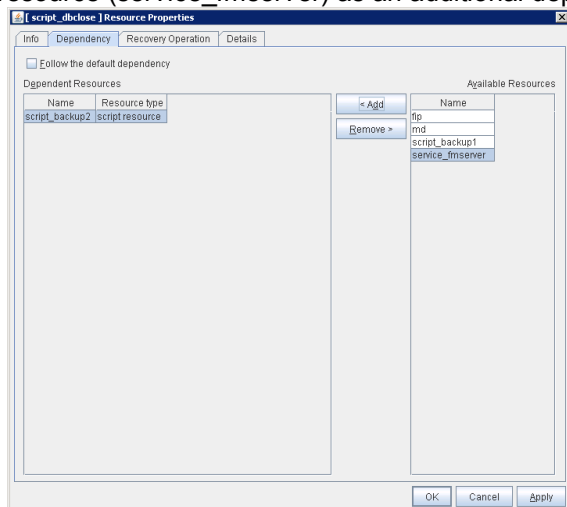


Specify the dependency for the script_dbclose script resource.
Right-click the script resource (script_backup2), and then select **Property**.

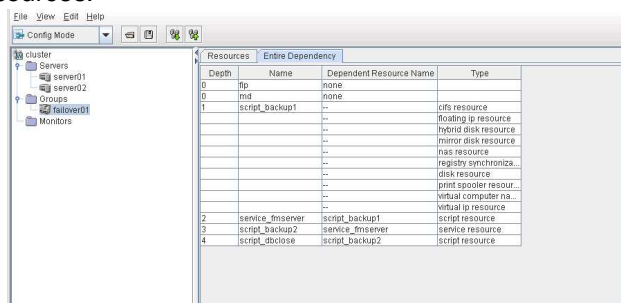


In the **Resource Properties** dialog box, select the **Dependency** tab. Clear **Follow the default dependency**, and then add the script resource that applies the backup (script_dbbackup2) as a dependent resource.

If the progressive backup linkage function is not used, add the FileMaker Server service resource (service_fmserver) as an additional dependent resource.



In the **Entire Dependency** tab, check the dependencies between the registered resources.



4-2-7. Adding monitor resources (2)

Configure the following type of monitor resource.

Process name monitor resource

Adding a process name monitor resource

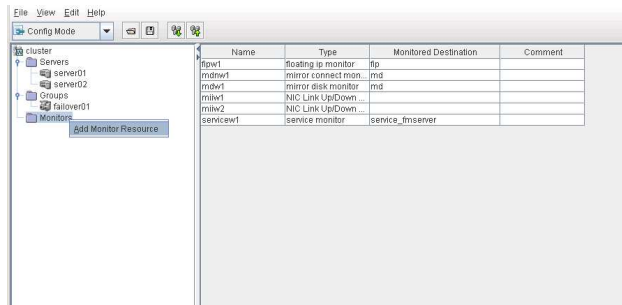
In EXPRESSCLUSTER, configure monitoring for the following processes that are used for the FileMaker Server service. By monitoring these processes, a failover or some other recovery action can be performed automatically if a process stops.

For details about process name monitor resources, refer to “Understanding process name monitor resources” of the “Reference Guide”.

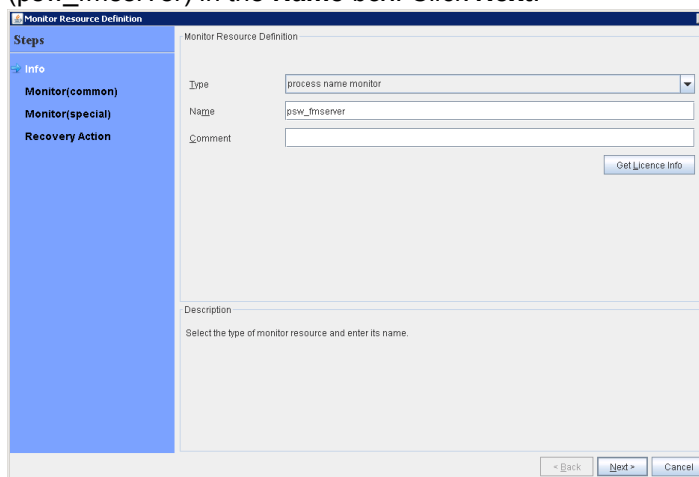
fmserver.exe: Process for database management

fmsib.exe: Process for backup

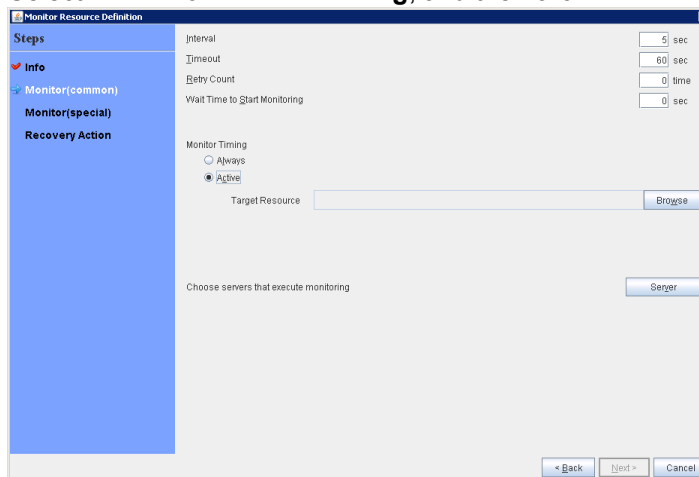
1. Select **Config Mode** in WebMnager. Right-click **Monitor** in the list and then click **Add Monitor Resource**.



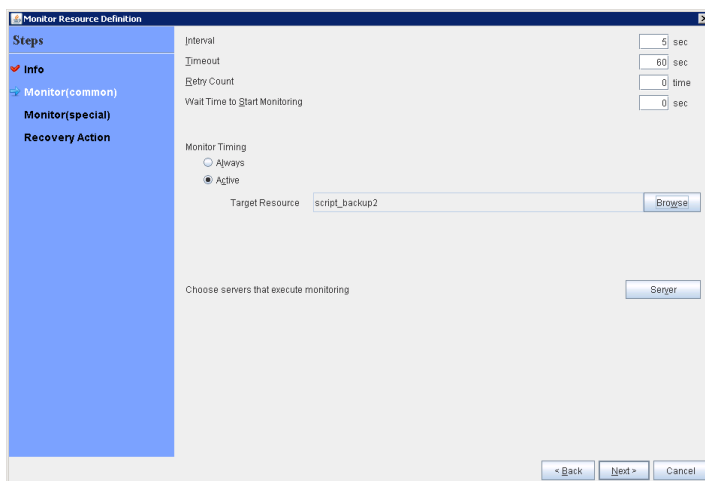
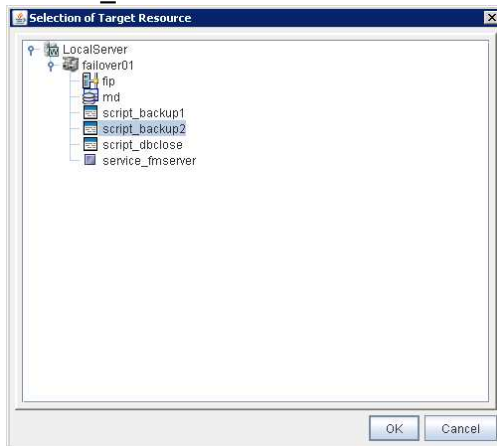
2. The **Monitor Resource Definition** screen opens. Select the monitor resource type (process name monitor) in the **Type** box, and then enter the monitor resource name (psw_fmserver) in the **Name** box. Click **Next**.



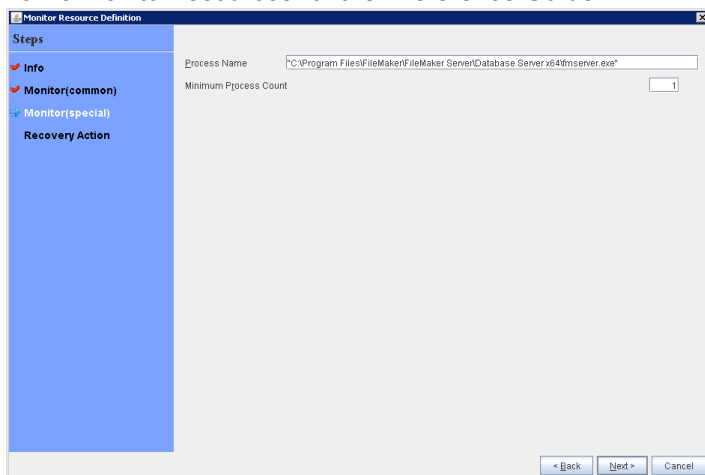
3. The **Monitor Settings** page is displayed. Select **Active** for **Monitor Timing**, and then click **Browse** for **Target Resource**.



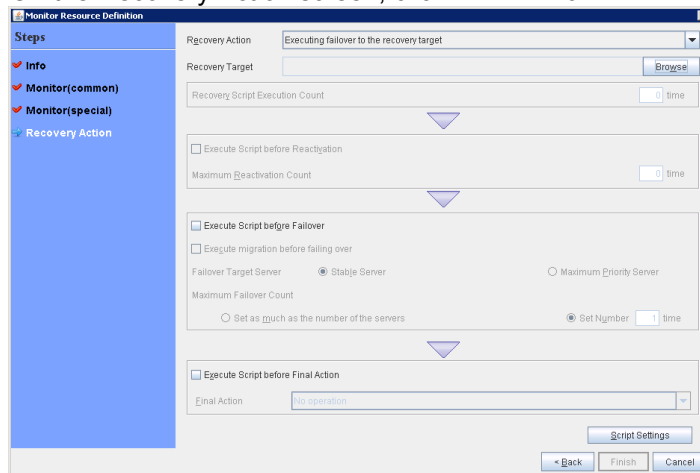
4. On the **Target Resource** screen, select "script_backup2" and then click **OK**. If the progressive backup linkage function is not being used, select "service_fmserver".



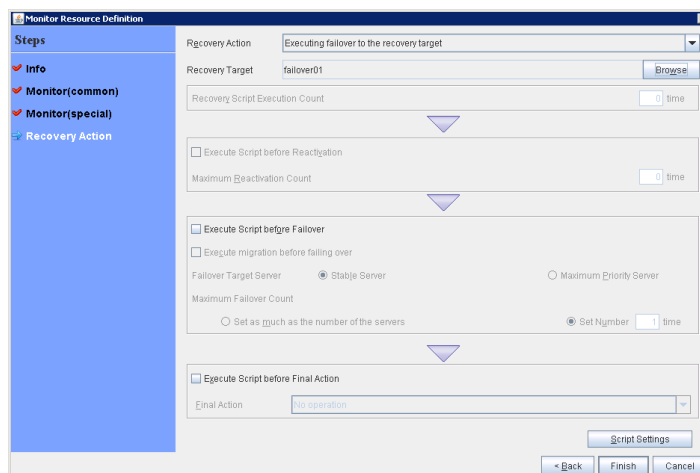
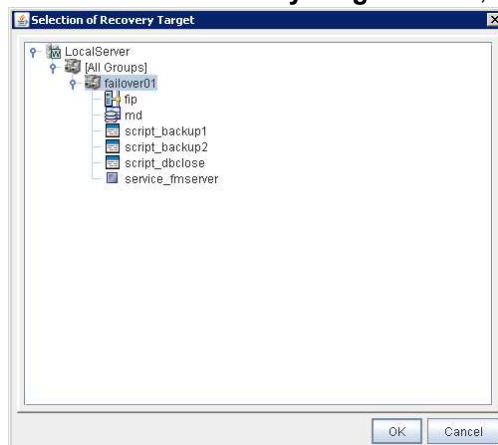
5. Specify "fmserver.exe" for **Process Name**. For **Process Name**, specify the process name of the process that is actually running. For details about how to confirm the process name, refer to "Understanding process name monitor resources" of the "Reference Guide".

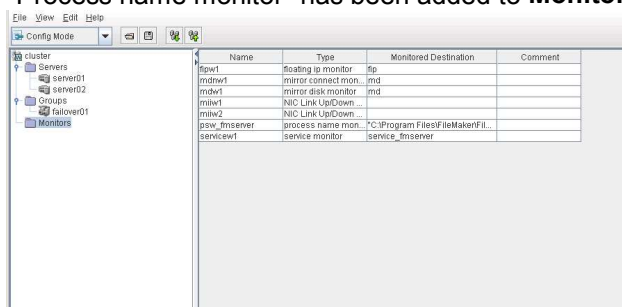


6. On the Recovery Action screen, click **Browse** for **Recovery Target**.



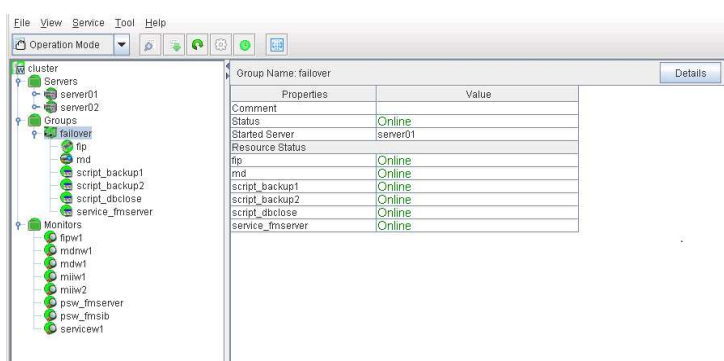
7. On the **Select Recovery Target** screen, select "failover01" and then click **OK**.



8. "Process name monitor" has been added to **Monitor Resources**.

In the same way as above, add a process name monitor resource for `fmsib.exe`.

Apply the configuration information, and then start the cluster.
The cluster with the following configuration will be created.



Chapter 5 Command reference

This chapter describes the command that FileMaker Server uses.

For details, refer to “Command line reference” of the “FileMaker Server 12 FileMaker Server Help”.

Command line: `fmsadmin command [options]`

Description: This command manages FileMaker Server by specifying an option.

Execution example:

For a user name and password, `admin` and `pword` are specified, respectively.

Close all hosted databases.

```
fsadmin close -f -y -u admin -p pword
```

Stop a database.

```
fsadmin stop server -y -u admin -p pword
```

Displays a list of hosted files.

```
fsadmin list files -s -y -u admin -p pword
```

Opens all databases in the host area.

```
fsadmin open -y -u admin -p pword
```

Chapter 6 Scripts for linkage

This chapter describes the scripts used for linkage between the FileMaker Server progressive backup feature and EXPRESSCLUSTER.

PowerShell scripts are used as scripts for linkage. To execute these scripts for linkage, first change the Windows PowerShell script execution policy to RemoteSigned by using the Set-ExecutionPolicy cmdlet. After making the change, check that RemoteSigned has been set by using the Get-ExecutionPolicy cmdlet.

The following sample scripts for linkage are provided:

- | | |
|-------------------|---|
| FM_conf.ps1 | Configuration file containing parameters, including the progressive backup storage folder |
| FMbackupcheck.ps1 | Script that checks the status of the database data and which applies the backup |

Store these scripts on each server according to the script set by the script_dbbackup2 script resource used to apply the backup.

For the script sample to be edited, refer to “Appendix Sample Scripts”.

The FMbackupcheck.ps1 processing flow is as follows:

1. The number of progressive backups is checked.
(Progressive backups are stored in `Incrementalbackup_YYYY-MM-DD-HHMM` format.)
2. If no progressive backup has been created, the script ends without a backup having been applied. Also, if only one progressive backup has been created, the acquisition of that backup may not yet have been completed, so the script ends without the backup having been applied.
3. If two or more progressive backups have been created, the file name of the second newest file is obtained.
(The newest file may currently be being used for backup creation. If backup application is required, the second newest file is used to apply that backup.)
4. Database status check is performed by using the `fmsadmin -LIST FILES` command of FileMaker Server. Loops are used to enable waiting until all the databases have been opened.
5. Database verification is performed by using the `fmsadmin VERIFY` command of FileMaker Server. If a file in the closed state is found while checking the database status, the database is judged as being abnormal and is subject to backup application.
6. Before the backup is applied, all the databases are closed by using the `fmsadmin CLOSE` command of FileMaker Server.
7. The backup is applied. (The current database is backed up, and is replaced with the progressive backup file.)
8. The `fmsadmin OPEN` command of FileMaker Server is used to open all databases.

Appendix. Sample scripts

This appendix describes the files that are set for the following scripts.

The following sample scripts are used for establishing linkage between FileMaker Server and EXPRESSCLUSTER:

FMconffile.ps1	Configuration file containing parameters, including the progressive backup storage folder
FMbackupcheck.ps1	Script that checks the status of the database data and which applies the backup

The following sample scripts are specified as script resources for EXPRESSCLUSTER:

start_backup1_sample.bat	Sample script that backs up progressive backup data. Set as a script resource (script_backup1).
start_backup2_sample.bat	Sample script that checks the status of the database data and which applies the backup. Set as a script resource (script_backup2). (Sample script that calls FMbackupcheck.ps1.)
stop_dbclose_sample.bat	Sample script that closes the databases. Set as a script resource (script_dbclose).

•FMconffile.ps1

Configuration file containing parameters, including the progressive backup storage folder.
Modify the shaded portions according to your environment. Create files and folders as well.

```
#*****
#* FMconffile.ps1 *
#* *
#* title : FMconffile *
#* date : 2013/09/02 *
#* version : 11.1.3-1 *
#*****
#Configuration file
#set drive and folder name

#DBDrive :switchable partition/data partition drive
#DBFOLDER :additional database folder
#DBBAKFOLDER :additional database temp folder

$DBDrive = "F:"
$DBFOLDER = "FileMakerDB"
$DBBAKFOLDER = "FileMakerDBTMP"

$DBBAKPATH = "$DBDrive¥$DBBAKFOLDER"
$DBPATH = "$DBDrive¥$DBFOLDER"

#progressive backup temp folder
#PBBAKPATH1 :progressive backup temp folder
#PBBAKPATH2 :'progressive backup temp folder' temp folder
$PBBAKPATH1 = "F:¥FileMakerPBTMP"
$PBBAKPATH2 = "F:¥FileMakerPBTMP2"

#file to check database state
$checklogfile = "C:¥Program Files¥EXPRESSCLUSTER¥log¥FMCheckLog.txt"

#FileMaker Server Installation path
$FMS_Path = "C:¥Program Files¥FileMaker¥FileMaker Server¥Database Server"

#logfile
$FMbackupcheck_log = "C:¥Program Files¥EXPRESSCLUSTER¥log¥FMbackupcheck.log"

#wait and loop time to be until all the databases have been opened.
$waitsec = 5
$waitcount = 10

#FileMaker Server ID/PASS
$ID_FM = "XXXXXX"
$PASS_FM = "XXXXXX"
```

•FMbackupcheck.ps1

Script that checks the status of the database data and which applies the backup.

Modify the shaded portions according to your environment.

```
#####
#* FMbackupcheck.ps1 *
#* *
#* title : FMbackupcheck.ps1 *
#* date : 2013/09/02 *
#* version : 11.1.3-1 *
#####
#applies the backup script
#call configuration file
. .\FMconffile.ps1

echo "-----" >> $FMbackupcheck_log
(Get-Date).ToString("yyyyMMddhhmmss") >> $FMbackupcheck_log
get-process -name fmserver >> $FMbackupcheck_log
echo "backupcheck start" >> $FMbackupcheck_log

#check the number of progressive backup
$BackupFoldername=Get-ChildItem $PBBAKPATH1 | Where-Object {$_.Attributes -eq
"Directory"} | Sort-Object name | select-string Incrementalbackup_[0-9]

#no progressive backup :no action
if( $BackupFoldername -eq $null ){
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) no backup" >> $FMbackupcheck_log
    Remove-Item $PBBAKPATH1\¥* -Force -Recurse
    exit 0
}

$FolderCount=($BackupFoldername | Measure-Object).count
echo "FolderCount=$FolderCount" >> $FMbackupcheck_log
echo "$((Get-Date).ToString("yyyyMMddhhmmss")) check PB count" >> $FMbackupcheck_log

#one progressive backup :no action
#two or more progressive backup :check database state
if( $FolderCount -eq 1 ){
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) one backup" >> $FMbackupcheck_log
    Remove-Item $PBBAKPATH1\¥* -Force -Recurse
    exit 0
}
elseif( $FolderCount -ge 2 ){
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) backup start" >> $FMbackupcheck_log

#check closed database
$FMwait=0

while (1)
{
    $FMwait++
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) check DB ing" >> $FMbackupcheck_log
```

```
. $FMS_Path%fmsadmin.exe LIST FILES -s -yu $ID_FM -p $PASS_FM > $checklogfile
echo ". $FMS_Path%fmsadmin.exe LIST FILES -s -yu $ID_FM -p $PASS_FM" >>
$FMbackupcheck_log
Get-Content $checklogfile >> $FMbackupcheck_log

$testlog = Select-String ing $checklogfile
$testlog2 = Select-String Error $checklogfile
if( $testlog -eq $null -and $testlog2 -eq $null ){
    echo "FMwait = $FMwait" >> $FMbackupcheck_log
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) no ings or Errors" >>
$FMbackupcheck_log
    break
}
echo "sleep FMwait = $FMwait" >> $FMbackupcheck_log
sleep $waitsec

if( $FMwait -eq $waitcount ){
    echo "DB_OPEN_FAIL" >> $FMbackupcheck_log
    Move-Item $PBBACKPATH1¥* $PBBACKPATH2 >> $FMbackupcheck_log
    exit 1
}
}
echo "before check closed FMwait = $FMwait" >> $FMbackupcheck_log

#verify database
. $FMS_Path%fmsadmin.exe VERIFY -s -yu $ID_FM -p $PASS_FM
echo ". $FMS_Path%fmsadmin.exe VERIFY -s -yu $ID_FM -p $PASS_FM" >> $FMbackupcheck_log

. $FMS_Path%fmsadmin.exe LIST FILES -s -yu $ID_FM -p $PASS_FM > $checklogfile
echo ". $FMS_Path%fmsadmin.exe LIST FILES -s -yu $ID_FM -p $PASS_FM" >> $FMbackupcheck_log
Get-Content $checklogfile >> $FMbackupcheck_log

#no database closed state :No action
$testlog = Select-String closed $checklogfile
echo "testlog = $testlog" >> $FMbackupcheck_log
if( $testlog -eq $null ){
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) NO closed DB" >> $FMbackupcheck_log
    Remove-Item $PBBACKPATH1¥* -Force -Recurse
    exit 0
}
else
{
    echo "$((Get-Date).ToString("yyyyMMddhhmmss")) there are closed file(s). start to apply
PB backup." >> $FMbackupcheck_log
#close database
. $FMS_Path%fmsadmin CLOSE -f -yu $ID_FM -p $PASS_FM >> $FMbackupcheck_log

#file name of the second newest file is obtained
$PBFile=$BackupFoldername[-2]
echo $PBBACKPATH1¥$PBFile >> $FMbackupcheck_log
```

```
#apply backup
echo "$((Get-Date).ToString("yyyyMMddhhmmss")) Change FOLDER" >> $FMbackupcheck_log
$DBHIST=$((Get-Date).ToString("yyyyMMddhhmmss"))
New-Item $DBBAKPATH¥$DBHIST -itemType dir -Force >> $FMbackupcheck_log
Move-Item $DBPATH $DBBAKPATH¥$DBHIST >> $FMbackupcheck_log

#copy database
echo "$((Get-Date).ToString("yyyyMMddhhmmss")) Copy FOLDER" >> $FMbackupcheck_log
Copy-Item $PBBACKPATH1¥$PBFile¥$DBFOLDER $DBDrive -Recurse >> $FMbackupcheck_log
Move-Item $PBBACKPATH1¥* $PBBACKPATH2 >> $FMbackupcheck_log

#open database
.$FMS_Path¥fmsadmin OPEN -yu $ID_FM -p $PASS_FM >> $FMbackupcheck_log
(Get-Date).ToString("yyyyMMddhhmmss") >> $FMbackupcheck_log
}
echo "END1" >> $FMbackupcheck_log
}
echo "END2" >> $FMbackupcheck_log
exit
```

•start_backup1_sample.bat

Sample script that backs up progressive backup data.

Modify the shaded portions according to your environment.

```
rem *****
rem * start_backup1_sample.bat          *
rem *                                  *
rem * title : start backup1 sample      *
rem * date  : 2013/09/02                *
rem * version : 11.1.3-1                *
rem *****

rem *****
rem Check startup attributes
rem *****
IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER
IF "%CLP_EVENT%" == "RECOVER" GOTO RECOVER

rem Cluster Server is not started
GOTO no_arm

rem *****
rem Startup process
rem *****
:NORMAL
:FAILOVER

rem set drive and folder name
rem DBDrive : switchable partition/data partition drive
rem PBFOLDER : 'progressive backup' folder
rem PBBAKFOLDER : 'progressive backup' backup folder

set DBDrive=F:¥
set PBFOLDER=FileMakerPB
set PBBAKFOLDER=FileMakerPBTMP

echo script_backup1_start >> "C:¥Program Files¥EXPRESSCLUSTER¥log¥FMcheckbat. log"
dir "%DBDrive%%PBFOLDER%" >> "C:¥Program Files¥EXPRESSCLUSTER¥log¥FMcheckbat. log"

rem delete unnecessary files
rmdir "%DBDrive%%PBFOLDER%¥Changes_FMS" /S /Q
rmdir "%DBDrive%%PBFOLDER%¥Copies_FMS" /S /Q
rmdir "%DBDrive%%PBFOLDER%¥InProgress_FMS" /S /Q
rmdir "%DBDrive%%PBFOLDER%¥Removed_by_FMS" /S /Q

rem backup incrementalbackup folder
for /F %a in ('dir "%DBDrive%%PBFOLDER%¥Incremental*" /b /ad') do move
"%DBDrive%%PBFOLDER%¥%a" "%DBDrive%%PBBAKFOLDER%"

dir "%DBDrive%%PBBAKFOLDER%" >> "C:¥Program Files¥EXPRESSCLUSTER¥log¥FMcheckbat. log"
```

```
rem recreate progressive backup folder
rmdir "%DBDrive%%PBFOLDER%" /S /Q
mkdir "%DBDrive%%PBFOLDER%"

:RECOVER
rem No Action

GOTO EXIT

rem Cluster Server is not started
:no_arm
ARMBCAST /MSG "Cluster Server is offline" /A

:EXIT
```

•start_backup2_sample.bat
 Sample script that calls FMbackupcheck.ps1.
 Modify the shaded portions according to your environment.

```
rem *****
rem * start_backup2_sample.bat          *
rem *                                  *
rem * title : start backup2 sample      *
rem * date  : 2013/09/02                *
rem * version : 11.1.3-1                *
rem *****

rem *****
rem Check startup attributes
rem *****
IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER
IF "%CLP_EVENT%" == "RECOVER" GOTO RECOVER

rem Cluster Server is not started
GOTO no_arm

rem *****
rem Startup process
rem *****
:NORMAL
:FAILOVER

echo script_backup2_start >> "C:\Program Files\EXPRESSCLUSTER\log\FMcheckbat.log"
cd %CLP_SCRIPT_PATH%

rem Calls FMbackupcheck.ps1
powershell -command ".\FMbackupcheck.ps1"

:RECOVER
rem No Action

GOTO EXIT

rem Cluster Server is not started
:no_arm
ARMBCAST /MSG "Cluster Server is offline" /A

:EXIT
```

•stop_dbclose_sample.bat
Sample script that closes the databases.
Modify the shaded portions according to your environment.

```
rem *****
rem * stop_dbclose_sample.bat          *
rem *                                 *
rem * title : stop_dbclose sample      *
rem * date : 2013/09/02                *
rem * version : 11.1.3-1               *
rem *****

rem *****
rem Check startup attributes
rem *****
IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER

rem Cluster Server is not started
GOTO no_arm

rem *****
rem Process for normal quitting program
rem Process for failover
rem *****
:NORMAL
:FAILOVER
echo script_dbclose_stop >> "C:\Program Files\FM\EXPRESSCLUSTERR\log\FMcheckbat.log"

rem Close Database
rem Set FileMaker Server installation path, ID/PASS
"C:\Program Files\FileMaker\FileMaker Server\Database Server\FMadmin.exe" close -f -u ID -p
Password -y

GOTO EXIT

rem Cluster Server is not started
:no_arm
ARMBCAST /MSG "Cluster Server is offline" /A

:EXIT
```
