Guide for using Cluster function

JobCenter

R15.2

Precautions on exporting

This product (software) falls under a category of technology where establishment specified in the foreign exchange currency law is regulated. Please file necessary applications, such as permission for trade, with the Japanese government prior to exporting this product. Contact the dealer where you purchased the product or our nearest sales office for information on documents necessary for filing such applications.

Introduction

This manual describes the cluster-related functions of JobCenter and how to operate them. Note that the screens contained in this manual may differ from the actual screens.

Note that this document is subject to change without prior notice.

1. Legend

The legend used in this manual is explained below.

	Information that you should pay attention to.
	Supplementary information about a description in the text.
	Supplementary tip about a description in the text.
Note	Explanation of a note that appears in the text.
__	The underlined parts in the descriptions for the installation window for UNIX mean inputs from a keyboard.

2. Related manuals

The following are manuals related to JobCenter. They are contained in JobCenter Media.

For information on the latest manuals, refer to the download page of the JobCenter product site.

https://www.nec.com/en/global/prod/masterscope/jobcenter/en/support.html

Document title	Overview
JobCenter Installation Guide	Describes how to newly install JobCenter or upgrade it.
JobCenter Quick Start Guide (Japanese only)	Describes the basic functions of JobCenter, as well as a complete set of operations, for first-time users of JobCenter.
JobCenter Basic Guide	Describes the basic functions of JobCenter, as well as how to operate it.
JobCenter Environment Guide	Describes various setting methods on the construction of environments required for using JobCenter, transferring of environment, linkage with other products, etc.
JobCenter Guide for using NQS function (Japanese only)	Describes methods of using NQS functions, the basis of JobCenter, from JobCenter.
JobCenter Guide for using operation logs and execution logs	Describes the functions for acquiring operation logs and job network execution logs from JobCenter CL/Win, as well as how to set the functions.
JobCenter Command Reference	Describes JobCenter commands for performing job network entry and execution state referencing, etc. from the command line like a GUI.
JobCenter Guide for using Cluster function	Describes linkage methods for operating JobCenter in the cluster system.
JobCenter Guide for using Helper function (Japanese only)	Describes the following three functions that enable efficient operation of JobCenter using Excel: JobCenter Definition Helper (definition information maintenance), JobCenter Report Helper (business report creation), and JobCenter Analysis Helper (performance analysis).
JobCenter Guide for using SAP function (Japanese only)	Describes how to link JobCenter and SAP.
JobCenter Guide for using WebOTX Batch Server linkage function (Japanese only)	Describes how to link JobCenter and WebOTX Batch Server.
JobCenter Guide for Using the Web Function	Describes JobCenter CL/Web that is a function to monitor jobs by using a web browser.
JobCenter Guide for using the text definition function (Japanese only)	Describes how to define a job network, schedule, calendar, custom job template by using a text file.
JobCenter Guide for upgrading the version and applying the patches in a cluster environment (Japanese only)	Describes how to upgrade the version of JobCenter and apply the patches in a cluster environment.
JobCenter R15.2 Release Notes	Provides the information specific to JobCenter R15.2.

3. Revision History

Edition	Date of revision	Item	Format	Contents of revision
1	July 20, 2018	New	-	First Edition

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1 Overview

This chapter provides an operational overview of a JobCenter cluster system.

1.1. Functional Range

The JobCenter cluster system operates like an ordinary single server.

By using the host name (virtual host name) set to the failover group as the site name, you can establish a connection using a single JobCenter server name without having to manually switch CL/Win (client) connection destinations or consider whether the system is the active or standby server during failover and failback.

However, note that the CL/Win connection information retained at the cluster site is cleared at failover because the server-side process restarts.

Therefore, it is necessary to terminate the CL/Win connection and then reconnect it to the same connection destination after failover occurs. Note that the tracker display and other operations cannot be normally performed without reestablishing a connection.

2 Overview of Building the JobCenter Cluster Environment

This chapter provides an operational overview of JobCenter in cluster environments and shows how to build a cluster environment.

2.1. Operational Overview of JobCenter in a Cluster Environment

This section describes how JobCenter operates in a cluster environment.

2.1.1. Site

Even if a failure occurs on the active server and the JobCenter system is restored using failover, JobCenter can continue the operation that was being executed before the failover by using the JobCenter execution environment called "site."

Each site is uniquely identified by the following three types of parameters.

■Site name

A name (host name) used to uniquely identify the JobCenter site on the network. This is equivalent to the virtual host name in the general cluster software.

JobCenter requires an environment that supports lookup and reverse lookup of this site name and IP address.

■Machine ID

An ID used to uniquely identify each JobCenter site. The machine ID does not have to be unique across the network but must be unique among machines that perform job linkage such as job transfer.

■Site database path

An area to save information such as the job network and schedule of JobCenter, queue definitions, and trackers containing job execution results.

When JobCenter is installed, a site called a local site is created by default. The parameters of this local site are shown below.

■Site name

The host name of the machine on which JobCenter is installed

■Machine ID

The machine ID specified during installation

■Site database path

Windows version	<JobCenter installation directory>\
UNIX version	/usr/spool/nqs/

In an environment in which no cluster software is used, operation is possible only by using the above local site. However, it is necessary to create a new site for the cluster in addition to the default local site to cluster the JobCenter site.

This site for the cluster is called a cluster site to differentiate it from the local site.

The local site and cluster site separately manage job networks, trackers, queue settings and other items and can be independently started and stopped.

2.1.2. Creating the Cluster Site

You must create a cluster site with the following parameters to cluster the JobCenter site.

■Site name

A virtual host name assigned to each machine from which the cluster environment is built

■Machine ID

A machine ID unique within the existing JobCenter linkage environment

■Site database path

A path on the shared disk accessible from each machine from which the cluster environment is built or a path to the disk area mirrored on each machine from which the cluster environment is built

By creating the cluster site in this way, you can build an environment in which the JobCenter installed on the standby server machine continues job operation even if a failure occurs in the operation machine and, therefore, the JobCenter on that machine can no longer continue job operation.

2.1.3. Operational Overview of Failover at the JobCenter Site

This section describes how the standby server takes over operations if a failure occurs on the active server in the clustered JobCenter site environment.

It is assumed that the JobCenter cluster site has been created in an environment similar to that shown in the figure below. The following are characteristics of the environment shown in Figure 2.1, "Example of a Cluster Environment":

■A cluster configuration consisting of active and standby servers. While JobCenter starts up and operates normally on the active server, JobCenter starts up and continues operation in the case of failure on the standby server.

■A cluster site that can be handled by the active and standby servers is created.

■The site database exists in the shared disk accessible from both the active and standby servers.

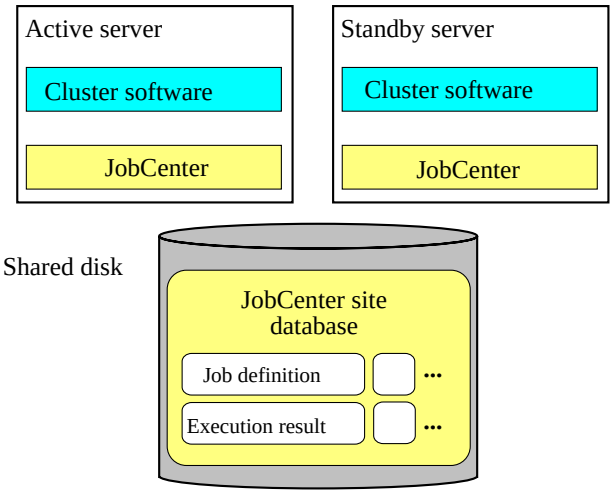

Figure 2.1. Example of a Cluster Environment

1. Jobs are normally operated by the JobCenter cluster site in the active server. While JobCenter on the active server is active, JobCenter on the standby server is inactive. JobCenter on the active server operates jobs using the site database on the shared disk.

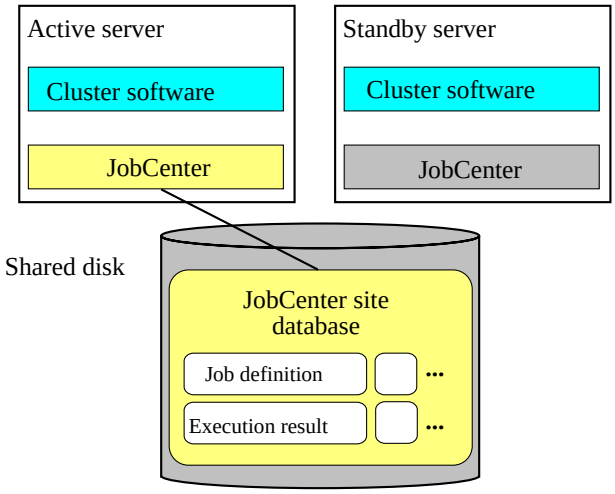

Figure 2.2. Site Operation in Cluster Environment, Diagram 1

2. A failure has occurred on the active server, stopping the JobCenter running on it.

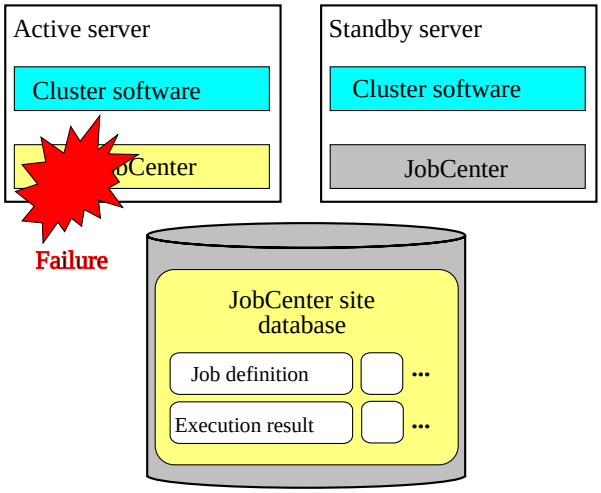

Figure 2.3. Site Operation in Cluster Environment, Diagram 2

3. The cluster software detects a failure on the active server and starts JobCenter on the standby server.

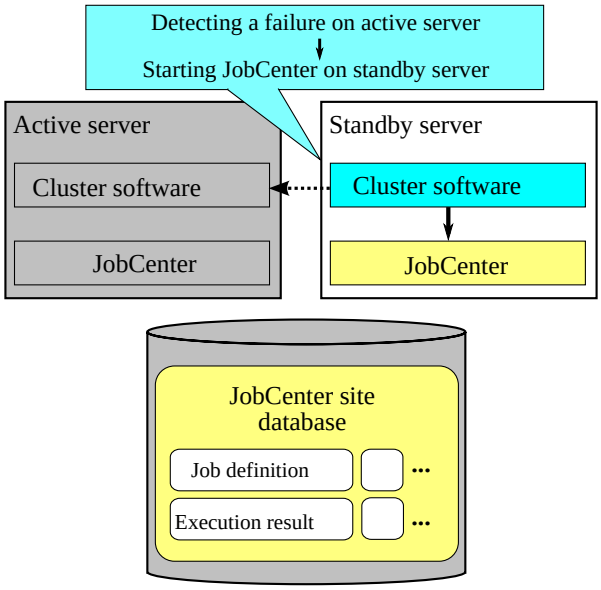

Figure 2.4. Site Operation in Cluster Environment, Diagram 3

4. JobCenter started on the standby server refers to the site database on the shared disk and sequentially executes the jobs that were being executed before the failover again according to the settings.

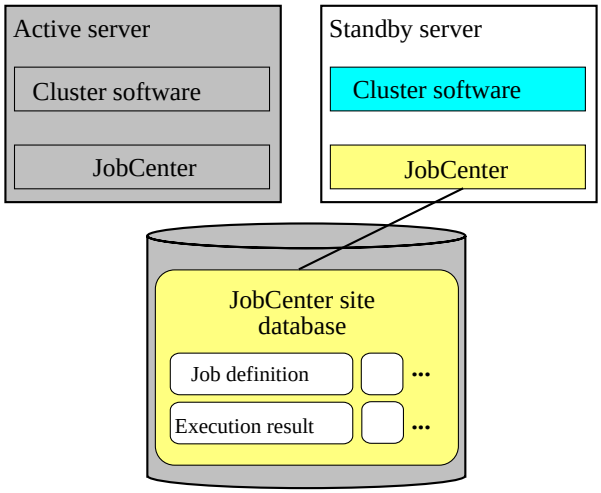

Figure 2.5. Site Operation in Cluster Environment, Diagram 4

2.1.4. cjcpw

cjcpw is the command used to start and stop a site. When a site is started, cjcpw starts up as a resident process, sequentially starts the processes necessary for JobCenter to operate, and monitors each started process.

If a failure such as the suspension of a JobCenter process occurs, this command detects it, stops other monitored processes, and stops the site. (However, if cjcpw has been started with the -c option, cjcpw immediately terminates without monitoring processes.)

The cluster software can detect a failure in JobCenter and start the JobCenter site on the standby server if you include this cjcpw command in the service start/termination command of cluster software to have the cluster software monitor the cjcpw process.

Check the details of the cjcpw command in <Command Reference>Section 4.2, “cjcpw (Starting, Monitoring, or Stopping a Daemon Process)”. Check the details of how to monitor the JobCenter process in <Environment Guide>Chapter 18, 「Monitoring the JobCenter Process」 .

cjcpw monitors the JobCenter processes listed in the table below.

HP-UX	Linux and AIX	Windows
nqsdaemon (when parent's PID is 1)	NQS nqsdaemon (when parent's PID is 1)	nqsdaemon.exe
netdaemon (when parent's PID is nqsdaemon)	NQS netdaemon (when parent's PID is NQS nqsdaemon)	netdaemon.exe
NQS logdaemon	NQSlogdaemon	logdaemon.exe
jnwengine	jnwengine	jnwengine.exe
jnwengine-qwb	jnwengine-qwb	qwb.exe
jnwengine-trkrdr	jnwengine-trkrdr	trkrdr.exe
jnwengine-spawn	jnwengine-spawn	-
(only for HP-UX)		
sclaunchd	sclaunchd	sclaunchd.exe
jnwcaster (the parent process of two started processes)	jnwcaster (the parent process of two started processes)	-
comagent	comagent	comagent.exe
jcdbs	jcdbs	jcdbs.exe
jnwlauncher	jnwlauncher	jnwlauncher.exe
jl_logmonitor	jl_logmonitor	jl_logmonitor.exe
jl_submit	jl_submit	jl_submit.exe

2.1.5. Controlling Start and Stop of Site Using site.conf (Windows Only)

By using site.conf, you can control how long it takes to start or stop JobCenter.

For details about site.conf, refer to in <Environment Guide>Section 5.6.3, “Creating a site configuration file (site.conf)”.

2.2. Before Building the Cluster Environment

This section describes the items that must be confirmed before building the JobCenter cluster environment.

2.2.1. Using the Same User ID

JobCenter unit jobs are executed with the execution authority of each OS user. Which user authority is used to execute each unit job is determined by the user ID, not by the user name. It is, therefore, necessary to use the same user ID for the users who execute each JobCenter job on the active and standby servers when building the JobCenter cluster environment.

If different user IDs are used on the active server and the standby server, the following problems occur, preventing normal operation.

■Inconsistent user mapping information

JobCenter transfers jobs using the mapping information (user mapping) between the user ID of the user who executes jobs on the source and that of the user who executes jobs on the destination. Which job execution user's authority is used to execute a job on the destination is determined during job transfer using this mapping information.

If user IDs differ between the active server and the standby server, this user mapping information becomes inconsistent, making it impossible to normally transfer jobs.

■Inconsistent user IDs before and after failover

If a failover occurs in an environment in which user IDs differ between the active server and the standby server, jobs cannot be continued because the job execution user's user ID would differ before and after the failover.

Adopt the same user ID for all the users used as the job execution users on the active and standby servers before building the JobCenter cluster environment. Otherwise, the above problems will occur.

To change the user ID, follow the steps below.

■To change a user ID in a UNIX environment

The user ID can be changed with the OS command. For details, refer to the man page and the OS manual.

■To change a user ID in a Windows environment

The user ID can be changed on the Server Environment Setup screen in JobCenter. For details, refer to in <Environment Guide>Section 12.4.1, “Specifying properties of a user”. Note that changing the user ID in this way only changes the user information managed by JobCenter. The OS user information is not changed.

2.2.2. Enabling the Relocatable IP Address

It is necessary to set a relocatable IP address that can be used both on the active and standby servers when building a general cluster software. When creating a JobCenter site, set the host name corresponding to the relocatable IP address as a parameter.

For this purpose, make sure that the relocatable IP address is enabled before building the JobCenter cluster environment. Also make sure that lookup and reverse lookup of the relocatable IP address and the corresponding host name are properly performed.

For information on how to set the relocatable IP address, refer to each OS manual and other documentation.

2.2.3. Accessing the Shared (Mirror) Disk

As described in the previous section, JobCenter provides the function to continue job execution even if a failover occurs by creating and using the site database on the disk area accessible both from the active and standby servers.

Make sure that the disk area where the site database will be created is accessible before creating the site database.

2.3. Procedure for Building the Cluster Environment (UNIX)

This section describes how to build a cluster environment in JobCenter for UNIX. To build the JobCenter cluster environment, follow the steps below.

2.3.1. Setting Up the Cluster Software (Active and Standby Servers)

For information on how to set up and build the cluster software, refer to your cluster software manual.

2.3.2. Installing JobCenter to the Active and Standby Servers (Active and Standby Servers)

Install JobCenter to the active and standby servers. For details, refer to <Installation Guide>.

2.3.3. Determining the Site Parameters (Active and Standby Servers)

Determine the parameters required to create a JobCenter site. The following parameters are required.

■Site name

The host name corresponding to the relocatable IP address from which the site operates. Lookup and reverse lookup of the site name and the relocatable IP address must be possible on the network.

■Machine ID

An ID used to uniquely identify each JobCenter site. Because local and cluster sites are recognized as different sites, different machine IDs must be specified. This ID must be unique among the systems JobCenter links with.

■JobCenter site database path

A disk area in which job network definitions and schedules as well as job execution results are saved for each site.

This section uses as an example the following settings for the above parameters.

Table 2.1. Example of Site Parameters

Parameter	Value
Site name	testsite
Machine ID	200
JobCenter site database path	/mnt/jobdb

2.3.4. Stopping JobCenter (Active and Standby Servers)

Stop the JobCenter local sites on the active and standby servers before building the cluster site. Execute the following command to stop the JobCenter local site.

```
# /usr/lib/nqs/nqsstop ↵
```

2.3.5. Creating the JobCenter Site Database (Active Server)

Create the JobCenter site database with the cjcmksite command. Confirm the following points before executing the cjcmksite command.

■The mount point of the shared disk is valid.

■JobCenter is stopped on the local site.

■The relocatable IP address corresponding to the site name is valid.

■The database path of the site to be added is not identical to the database path of any other existing site.

The format of the cjcmksite command is as shown below.

```
/usr/lib/nqs/cluster/cjcmksite <Site name> <Machine ID> <JobCenter site database path>
```

An execution example of this command is shown below.

```
# /usr/lib/nqs/cluster/cjcmksite testsite 200 /mnt/jobdb ↵
```

If the information shown in the example below appears after this command is executed, the site database has been created successfully.

```
# /usr/lib/nqs/cluster/cjcmksite testsite 200 /mnt/jobdb ↵

Phase 1: Make NQS spool directories.
 :
 :
cjcmksite Complete
(stop temporary daemon)
```

Make sure that the site database has been created. Specifically, move to the site database creation directory and execute the ls command to make sure that the directory shown below has been created.

```
# ls ↵
nqs
```

If the relocatable IP address corresponding to the site name is invalid or inaccessible on the machine, database creation fails. Specify the full domain name as the site name. Note that an alias name is not allowed.

Create the site database again referring to Section 2.6.1, “Procedures for Deleting the Site Database and Creating the Site Database Again” if an error occurs or as needed.

2.3.6. Building the Site (Active and Standby Servers)

Specify the settings common to JobCenter site environments. Specify here the following two types of settings:

■Local site startup setting

Once a cluster site is created on the server using JobCenter, the two types of execution environments (local site and cluster site) exist on a single server. Specify here a setting that allows the local and cluster sites to start up at the same time.

For this setting, edit "/usr/lib/nqs/rc/daemon.conf," the site configuration file common to the local and cluster sites.

Specify one of the following settings according to whether the local site and the cluster site coexist.

- The local site and the cluster site can coexist (they can start up at the same time).

  ```
  local_daemon=SITE
  ```

- The JobCenter local site is not automatically started when the OS starts.

```
local_daemon=OFF
```

This setting is read when the local site starts up. Note that the setting is not immediately enabled if it is set while the local site operates.

■Setting the JobCenter IP address to wait for communication

If there are multiple sites in the environment, a single machine uses multiple IP addresses to wait for communication. It is, therefore, necessary to set IP addresses to wait for communication to the local and cluster sites. Use the following files for the setting.

Local site	/usr/spool/nqs/daemon.conf
Cluster site	<Site database path>/nqs/daemon.conf

In the setting example below, "192.168.1.100" is used to wait for communication. For the cluster site, set a relocatable IP address.

```
ipaddress=192.168.1.100
```

For how to set ipaddress, refer to in <Environment Guide>Chapter 5, 「Changing Startup Settings for JobCenter」 .

2.3.7. Checking Startup of the Site (Active and Standby Servers)

The site can be started once the site database is created. Make sure that the site is properly started before registering JobCenter as a service of the cluster software.

To start or stop a site, use the cjcpw command. The format of the cjcpw command is shown below. For details of the cjcpw command, refer to in <Command Reference>Section 4.2, “cjcpw (Starting, Monitoring, or Stopping a Daemon Process)”.

■To start a site

```
# /usr/lib/nqs/cluster/cjcpw <Site name> <Site database path> ↵
```

■To stop a site

```
# /usr/lib/nqs/cluster/cjcpw -stop <Site name> ↵
```

Examples of starting and stopping the site "testsite" are shown below.

■Example of starting the site

```
# /usr/lib/nqs/cluster/cjcpw testsite /mnt/jobdb ↵
```

■Example of stopping the site

```
# /usr/lib/nqs/cluster/cjcpw -stop testsite ↵
```

To confirm that the site has been normally started, check that the following eight types of processes exist using the ps command or other method after starting the site by executing the cjcpw command.

HP-UX	Linux and AIX
/usr/lib/nqs/cluster/cjcpw	/usr/lib/nqs/cluster/cjcpw
/usr/lib/nqs/nqsdaemon	NQS nqsdaemon

HP-UX	Linux and AIX
/usr/lib/nqs/jnwcaster	/usr/lib/nqs/jnwcaster
/usr/lib/nqs/gui/bin/jnwengine	/usr/lib/nqs/gui/bin/jnwengine
/usr/lib/nqs/gui/bin/sclaunchd	/usr/lib/nqs/gui/bin/sclaunchd
/usr/lib/nqs/combase/comagent	/usr/lib/nqs/combase/comagent
/usr/lib/nqs/gui/bin/jcdbs	/usr/lib/nqs/gui/bin/jcdbs
/usr/lib/nqs/gui/bin/jnwlauncher	/usr/lib/nqs/gui/bin/jnwlauncher

Two sessions of jnwcasters start.

2.3.8. Registering a Service with the Cluster Software (Active and Standby Servers)

After confirming that the site has normally started or stopped, register JobCenter as a service of the cluster software . The details of this procedure differ depending on the cluster software. Carry it out by referring to one of the following chapters according to your cluster software.

HP Serviceguard	Chapter 3, 「HP Serviceguard」
ExpressCluster	Chapter 4, 「ExpressCluster」
Windows Server Failover Clustering (WSFC)	Chapter 5, 「Windows Server Failover Clustering(WSFC)」
Oracle Clusterware	Chapter 6, 「Oracle Clusterware」

■When using HP Serviceguard for Linux, the registration procedure is the same as when using HP Serviceguard.

■This manual does not cover the registration procedures for PowerHA (HACMP). For these products, register the cluster site start/stop command (cjcpw) with the cluster resource according to each procedure described in the cluster software's manual.

2.3.9. Confirming Cluster Operation (Active and Standby Servers)

After registering JobCenter with the cluster as a service, check that operations such as failover are properly performed, referring to your cluster software's manual or other documentation.

2.4. Procedure for Building the Cluster Environment (Windows)

This section describes how to build a cluster environment in JobCenter for Windows. To build the JobCenter cluster environment, follow the steps below.

2.4.1. Setting Up the Cluster Software (Active and Standby Servers)

For how to set up and build the cluster software, refer to your cluster software manual.

To enable shared (mirror) disk access before building the cluster environment as instructed in Section 2.2.3, "Accessing the Shared (Mirror) Disk" requires the cluster software function. At this stage, therefore, perform the setup procedure until shared (mirror) disk access is enabled. For how to set up WSFC, also refer to Chapter 5, 「Windows Server Failover Clustering(WSFC)」 .

2.4.2. Installing JobCenter to the Active and Standby Servers (Active and Standby Servers)

Install JobCenter to the active and standby servers. For details, refer to <Installation Guide>.

2.4.3. Determining the Site Parameters (Active and Standby Servers)

Determine the parameters required to create a JobCenter site. The following parameters are required.

■Site name

The host name corresponding to the relocatable IP address from which the site operates. Lookup and reverse lookup of the site name and the relocatable IP address must be possible on the network.

■Machine ID

An ID used to uniquely identify each JobCenter site. Because local and cluster sites are recognized as different sites, different machine IDs must be specified. This ID must be unique among the systems JobCenter links with.

■JobCenter site database path

A disk area in which job network definitions and schedules as well as job execution results are saved for each site.

This section uses as an example the following settings for the above parameters.

Table 2.2. Example of Site Parameters

Parameter	Value
Site name	testsite
Machine ID	200
JobCenter site database path	X:\Jobdb

2.4.4. Stopping JobCenter (Active and Standby Servers)

Stop the JobCenter local sites on the active and standby servers before building the cluster site. Follow the steps below to stop the JobCenter local site.

1. Open the JobCenter Server Environment Setup screen.

2. Select [Site] from the left tree and select [Stop] from the menu displayed by right-clicking the row that has the site name "(local)."

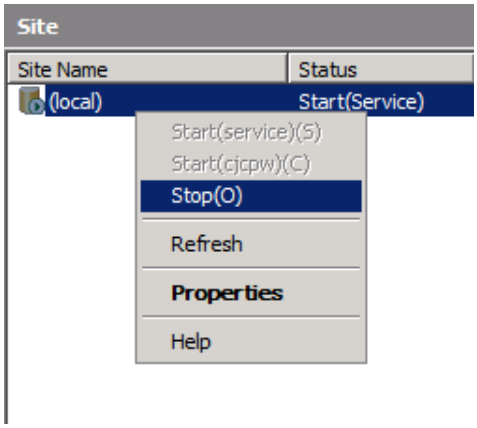

Figure 2.6. Example of Stopping the Local Site

2.4.5. Creating the JobCenter Site Database (Active Server)

Specify the settings related to the JobCenter site. Refer to the following items when specifying the settings.

■The mount point of the shared disk is valid.

■JobCenter is stopped on the local site.

■The relocatable IP address corresponding to the site name is valid.

■The database path of the site to be added is not identical to the database path of any other existing site.

Follow the steps below to create the site database.

1. Open the JobCenter Server Environment Setup screen.

2. Select the site in the left tree. While the site is selected, display the shortcut menu in the empty space of the right pane and select [Add site], and then [Add new site] from the menu.

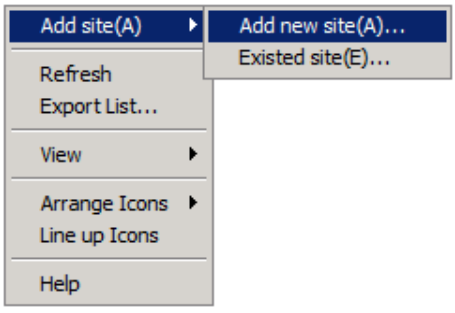

Figure 2.7. New Site Creation Menu

3. Set the parameters for the site to be created and click the [OK] button. The new site is created.

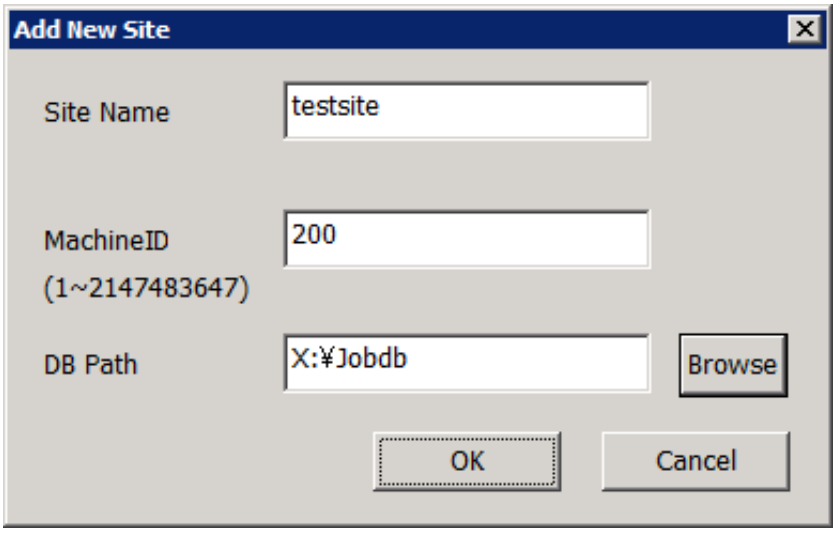

Figure 2.8. Example of the Site Parameters Setting Dialog Box

4. When the site is created, it is displayed in the right pane of the Server Environment Setup screen.

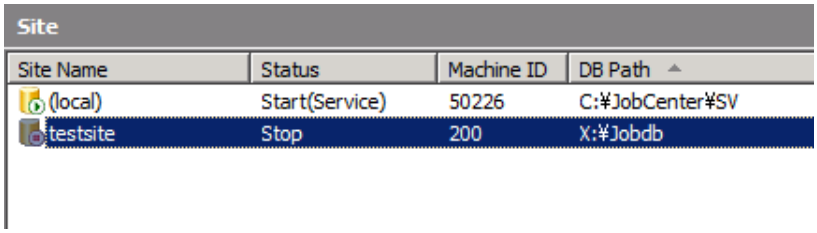

Figure 2.9. Confirmation Screen after Site Creation

Create the site database again referring to Section 2.6.1, “Procedures for Deleting the Site Database and Creating the Site Database Again” about how to create the site database again if an error occurs during site database creation or as needed.

2.4.6. Building the Site (Active and Standby Servers)

Specify the settings related to the JobCenter site. Refer to the following items when specifying the settings.

■Setting the JobCenter IP address to wait for communication

If there are multiple sites in the environment, a single machine uses multiple IP addresses to wait for communication. It is, therefore, necessary to set IP addresses to wait for communication to the local and cluster sites.

Use the following files for the setting.

Local site	<JobCenter installation directory>\etc\daemon.conf
Cluster site	<Site database path>\etc\daemon.conf

In the setting example below, "192.168.1.100" is used to wait for communication. For the cluster site, set a relocatable IP address.

```
ipaddress=192.168.1.100
```

For how to set ipaddress, refer to in <Environment Guide>Chapter 5, 「Changing Startup Settings for JobCenter」 .

■Setting site.conf

You can set the parameters related to starting and stopping each local or cluster site. Create a configuration file on the following path to specify the settings. It is not necessary to create the file if the default value is sufficient.

Local site	<JobCenter installation directory>\etc\site.conf
Cluster site	<Site database path>\etc\site.conf

A setting example of site.conf is shown below. For details about the setting values, refer to in <Environment Guide>Section 5.6.3, “Creating a site configuration file (site.conf)”.

```
BOOT_TIMEOUT=200
STOP_TIMEOUT=300
FORCEKILL_TIME=5
```

2.4.7. Checking Startup of the Site

The cluster site can be started once the site database is created. Make sure that the site is properly started before registering a service with the cluster software.

■After confirming that the site has started, stop it. If you log off from the Environment Setup screen while cjcpw remains active, the cjcpw process started by the JobCenter administrator and all JobCenter processes started from that process are forcibly stopped due to Windows specifications.

■To use the LSA queue at a cluster site, you need to start JobCenter as the service. In that case, also confirm that the site has started using the service.

2.4.7.1. Checking Startup of the Site (Active Servers)

Use the Server Environment Setup screen to start and stop a site. (If you want to use a command, check the details in <Command Reference>Section 4.2, “cjcpw (Starting, Monitoring, or Stopping a Daemon Process)”.)

1. Select [Start(cjcpw)] from the shortcut menu of the site you want to start from the Server Environment Setup screen.

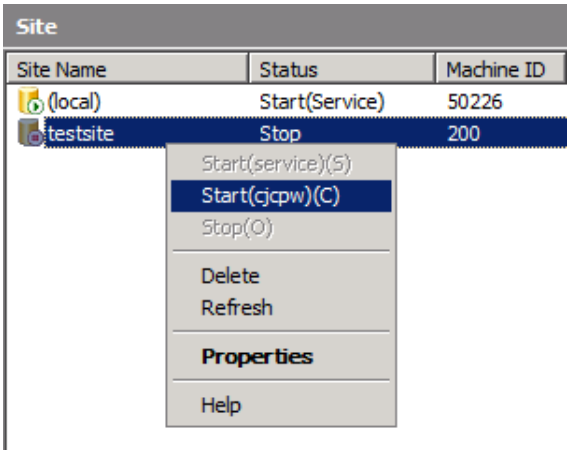

Figure 2.10. Starting a Site

2. When the site is successfully started, "Start (cjcpw)" is displayed in the [Status] column.

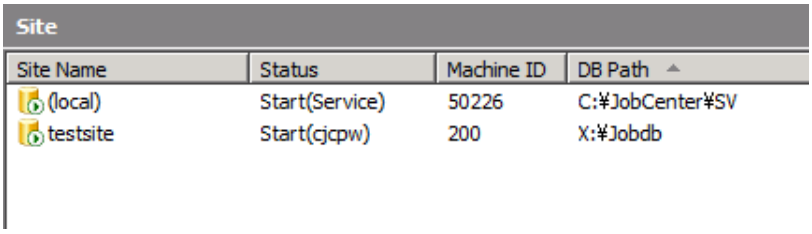

Figure 2.11. Example of the Site Startup Confirmation Screen

3. Check that the site has started using the service. Replace "Start (cjcpw)" in step 1 and 2 with "Start (service)," and then follow these steps to check the site .

This step is not required when starting up the cluster site by using the cluster software and cjcpw.

2.4.7.2. Checking Startup of the Site (Standby Servers)

Use the Server Environment Setup screen to add, start up, and stop a site. (If you want to use a command, refer to in <Command Reference>Section 4.2, “cjcpw (Starting, Monitoring, or Stopping a Daemon Process)”.)

1. Select [Add site] and then [Existed site] from the shortcut menu in the right-hand pane of the Server Environment Setup screen, and select the site database location.

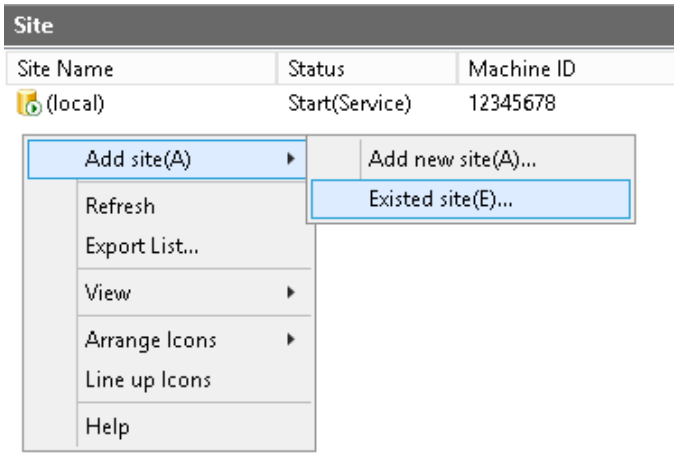

Figure 2.12. Example of the Site Addition Screen

2. Select [Start (cjcpw)] from the shortcut menu of the site you want to start from the Server Environment Setup screen.

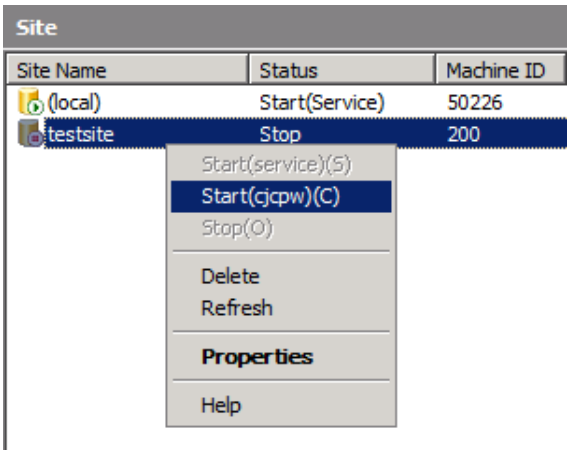

Figure 2.13. Example of the Site Startup Screen

3. When the site is successfully started, "Start (cjcpw)" is displayed in the [Status] column.

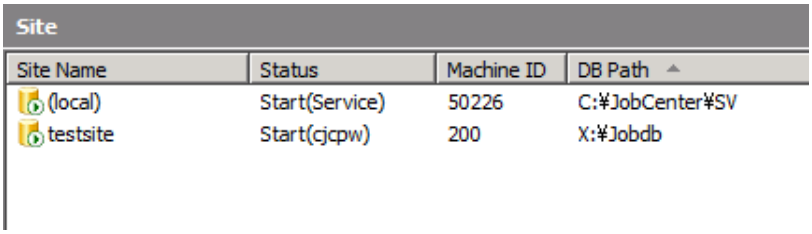

Figure 2.14. Example of the Site Startup Confirmation Screen

4. Check that the site has started using the service. After stopping the site, replace "Start (cjcpw)" in step 2 and 3 with "Start (service)" and then follow these steps to check the site.

This step is not required when starting up the cluster site by using the cluster software and cjcpw.

2.4.8. Registering a Service with the Cluster Software (Active and Standby Servers)

After confirming that the site has normally started or stopped, register JobCenter as a service of the cluster software . The details of this procedure differ depending on the cluster software. Carry it out by referring to one of the following chapters according to your cluster software.

ExpressCluster	Chapter 4, 「ExpressCluster」
WSFC	Chapter 5, 「Windows Server Failover Clustering(WSFC)」

To use the LSA queue at a cluster site, you need to start JobCenter as a service. When registering JobCenter as a service of the cluster software, register and control it so that the JobCenter cluster site is started using the service.

2.4.9. Confirming Cluster Operation (Active and Standby Servers)

After registering JobCenter with the cluster software as a service, check that operations such as failover are properly performed, referring to your cluster software's manual or other documentation.

2.5. Building and Operating a Job Execution Environment in the Cluster Environment

This section describes how to build the job execution environment in the cluster environment and items to be noted during operation.

2.5.1. Logging in to the Cluster Site by Using CL/Win

To build the job execution environment for the cluster site, log into the created cluster site by using CL/Win.

Enter the cluster site name you want to log into, the JobCenter administrator name (nsumsmgr for UNIX and the administrator name specified during installation for Windows), and the administrator password on the CL/Win login screen to log into the cluster site.

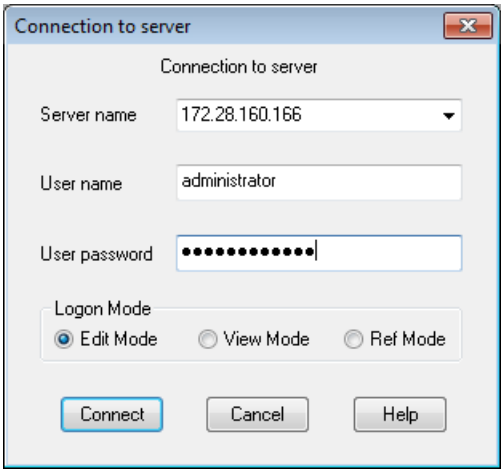

Figure 2.15. Example of the CL/Win Login Screen

2.5.2. Environment Variable NQS_SITE

Once a cluster site is created, the local site and the cluster site coexist on a single host. To use a JobCenter command or API in this state, the user must explicitly specify the site to use.

Specify the operation target site by specifying the site name in the environment variable NQS_SITE immediately before executing the command.

For example, perform the following operation to refer to the queue list on the site "testsite" in a UNIX environment (/bin/sh is used in this execution example).

```
# NQS_SITE=testsite ↵
# export NQS_SITE ↵
# /usr/bin/qstat ↵
```

(Display example)

```
guilb_def@testsite; type=PIPE; [ENABLED, INACTIVE]; pri=10
0 depart;  0 route;  0 queued;  0 wait;  0 hold;  0 arrive;
 :
 :
```

If no value is specified in the environment variable NQS_SITE, the local site is used. The same operation is performed if the machine's host name is specified in NQS_SITE. In the example below, the queue list on the local site is referred to when the local site properly operates in a UNIX environment.

```
# unset NQS_SITE ↵
# /usr/bin/qstat ↵

guilb_def@localhost;  type=PIPE; [ENABLED, INACTIVE];  pri=10
0 depart;  0 route;  0 queued;  0 wait;  0 hold;  0 arrive;
 :
 :
```

If a wrong site name or a site name that does not exist on that machine is specified in the environment variable NQS_SITE, an error message is output after command execution (the displayed error message varies depending on the command) below is a an example of an error message displayed when you try to refer to the queue list while specifying an incorrect site name.

```
Qstat(FATAL): Unable to setup NQS rootdir
```

It is not required to set the environment variable NQS_SITE in advance when running the following commands. Check the details of the commands for which the environment variable NQS_SITE must be set in advance in <Command Reference>Chapter 1, 「Command List」 .

■cjcls (displays the list and status of a site)

■cjcmksite (creates the site database)

■cjcpw (starts or stops the site)

■nqsstart (starts the site)

■nqsstop (stops the site)

2.5.3. Checking the Site Status

This section describes how to check the status of the local and cluster sites. The check procedures differ between the Windows version and the UNIX version of JobCenter.

2.5.3.1. UNIX Version

The cjcls command can be used to check whether the site is active or not.

An execution example of this command is shown below. For details about the cjcls command, refer to in <Command Reference>Section 4.3, “cjcls (Listing the Sites Running on the Machine That Executed the Command)”.

```
# /usr/lib/nqs/cluster/cjcls ↵

-------------------------------------------------------------------------
SITE-NAME         DAEMON-PID       DB-PATH(LINK)                 CJCPW
-------------------------------------------------------------------------

testsite             1320           /mnt/jobdb                    ON
                                    (/usr/spool/nqs/0AC0120A)

othersite            SHUT           /mnt/other-jobdb              OFF
                                    (/usr/spool/nqs/0AC0120B)

-------------------------------------------------------------------------
```

2.5.3.2. Windows Version

The Server Environment Setup screen can be used to check whether the site is active or not. The cjcls command can be also used as in the UNIX version.

For details about the cjcls command in the Windows version, refer to in <Command Reference>Section 4.3, “cjcls (Listing the Sites Running on the Machine That Executed the Command)”.

2.5.4. Setting for Continuing Job Execution at Failover

You can specify whether to execute the jobs that were being executed before a failover again after the failover if a failure occurs during job execution and JobCenter failover is performed

Whether jobs are executed again after a failover is determined by the combination of the following two parameters:

■The settings of the restart attribute for the queue containing the job when JobCenter has stopped

■The [Restart] setting on the [MISC Parameters] tab for the unit job parameters

The queue restart attribute can be set to "RESTART," "PURGE," "STOP," "MIGRATION_PURGE," or "MIGRATION_STOP." [Restart] for the unit job can be set to "ENABLE" or "DISABLE."

This section describes how the queue restart attribute and the unit job restart setting affect the re-execution of jobs after a failover. The queue restart attribute is set to "RESTART" and "PURGE" in the examples.

For details about the queue restart attribute, refer to Section 6.1 in <JobCenter Guide for using NQS function> (Japanese only). For details about the [Restart] setting on the [MISC Parameters] tab for the unit job parameters, refer to in <Basic Guide>Section 4.2.2.5, “[MISC Parameters] tab”.

The above parameters and re-execution of jobs after a failover are described using cases 1 through 3, in which the parameters are set as follows:

	Queue restart attribute	**Unit job restart setting**
Case 1	RESTART	ENABLE
Case 2	RESTART	DISABLE
Case 3	PURGE	ENABLE

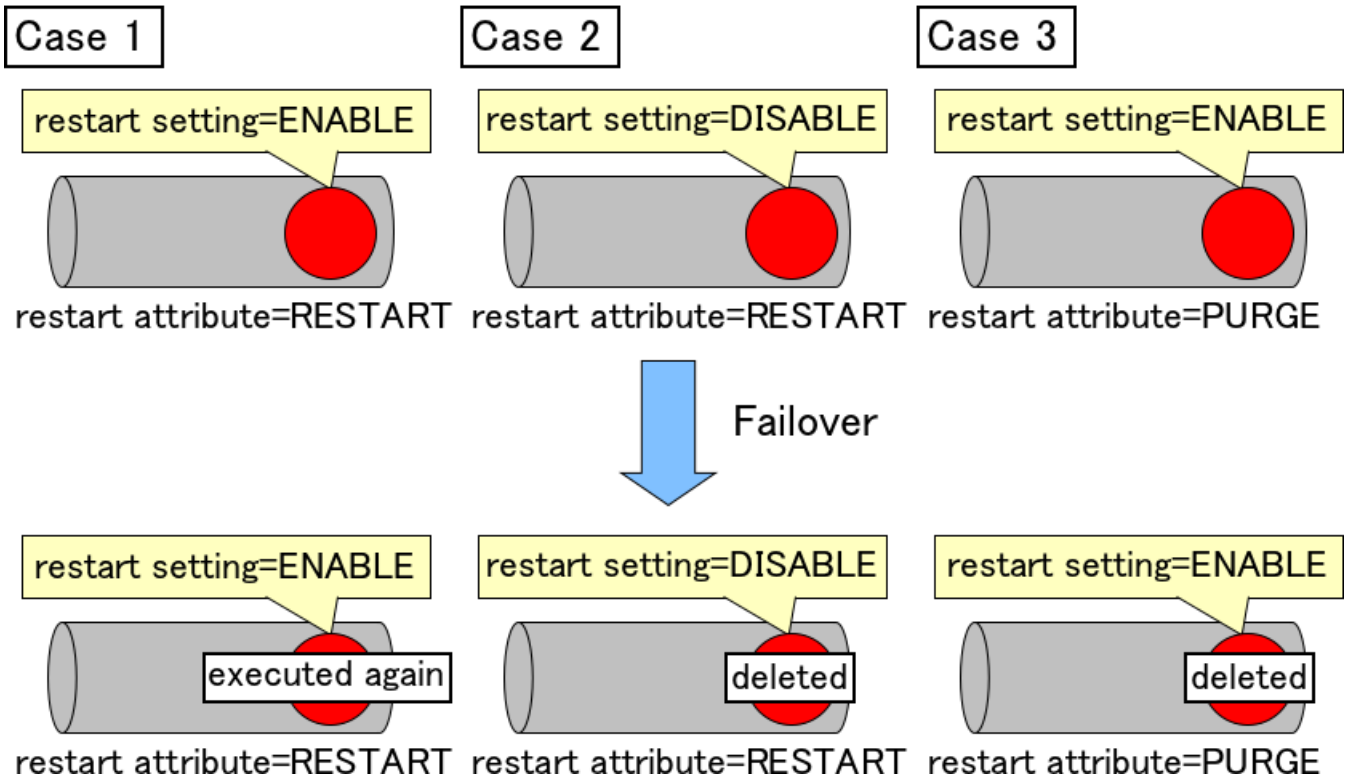

Figure 2.16. Examples of the Job Operations after Failover

When the queue restart attribute is RESTART, the job submitted to that queue is executed again after a failover by default (case 1).

If the restart setting is explicitly set to "DISABLE", jobs are deleted and not executed again after failover as specified by the job settings (Case 2).

When the queue restart attribute is PURGE, all the jobs submitted to that queue are deleted and not executed again after failover regardless of the job settings (Case 3).

Jobs must be re-executable to effectively use the function to execute jobs again after failover. Design the script and program executed as a job so that they can be executed again at any time.

2.5.5. Starting JobCenter in Maintenance Mode (UNIX Version Only)

If JobCenter startup is registered as a cluster software service, starting up and stopping JobCenter is linked with starting up and stopping a service of the cluster software. This might make it difficult to maintain the site database in the shared disk.

If it is necessary to stop only JobCenter processes while the service of the cluster software is active for maintenance purposes, use one of the following two methods:

■nqsstart and nqsstop commands

These commands can be used to start or stop processes other than cjcpw at the cluster site runnning as an active service of the cluster software. If JobCenter is started or stopped with this method, the cjcpw process registered with cluster software is not affected. Therefore, you can start or stop JobCenter without affecting the cluster software.

In the example below, the cluster site "testsite" is started and stopped with the nqsstart and nqsstop commands.

- To start a site

```
# /usr/lib/nqs/nqsstart testsite ↵
```

- To stop a site

```
# /usr/lib/nqs/nqsstop testsite ↵
```

■maintenance option

It is possible to only start the cjcpw process without starting processes when starting the site. This allows you to stop the operation only of the cluster site without changing the cluster software settings.

To enable this option, add the following setting to "/usr/lib/nqs/rc/daemon.conf":

```
maintenance=ON
```

If you start the site with the cjcpw command after specifying the above setting, only the cjcpw process is started.

The methods introduced in this section are available when the cluster software only monitors cjcpw. If the cluster software directly monitors each JobCenter process, these methods cannot be used.

In such a case, temporarily stop the cluster service.

2.6. Notes on JobCenter in a Cluster Environment

This section indicates items to note when building and operating JobCenter in a cluster environment.

2.6.1. Procedures for Deleting the Site Database and Creating the Site Database Again

If the site database is not successfully created while creating the cluster site, delete the site database and create a new one following the steps below:

■UNIX Version

1. Stopping the local site

   If the local site is active, stop it by executing the following command.

   ```
   # /usr/lib/nqs/nqsstop ↵
   ```

2. Deleting the symbolic link to the site database

   Delete the symbolic link to the cluster site database on the following path.

   ```
   usr/spool/nqs/<symbolic-link-name-corresponding-to-the-site-name>
   ```

   Replace <symbolic-link-name-corresponding-to-the-site-name> according to the IP address correspond to the site name, as follows.

IP address version	Symbolic link name
IPv4	String representing the IP address in hexadecimal notation
IPv6	IPv6 address excluding ":" (hexadecimal notation)

   

   If the site name can be resolved as both an IPv4 and an IPv6 address, the IPv4 address takes precedence for a symbolic link name.

3. Deleting the site database

   Delete all the files and directories under the site database path created with cjcmksite.

4. Creating the site database again

   Execute the jcmksite command again to create a new site database.

   

   Make sure that you have specified the local site startup setting (local_daemon=SITE or local_daemon=OFF) in daemon.conf and then restarted the local site before creating a new site database.

■Windows Version

1. Selecting the site to delete

   Select the site to delete on the Server Environment Setup screen and select [Delete] from the shortcut menu,

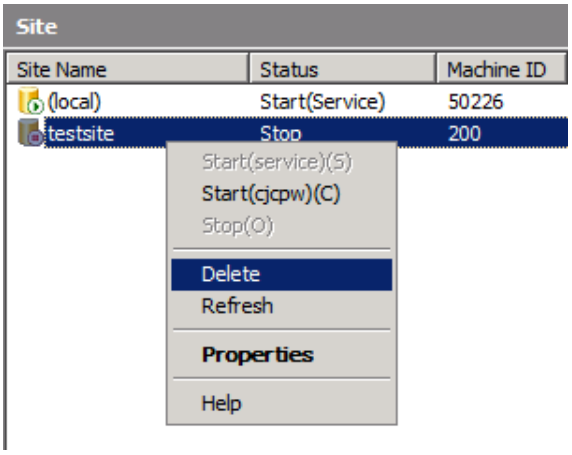

Figure 2.17. Example of the Site Deletion Screen

2. Selecting the site deletion method

   The dialog box to select the site deletion method appears. There are two methods; one is [Clear] (to delete only the site information retaining the site database), and the other is [Delete] (to delete both the site database folder and site information).

   Here, select [Delete] to delete the whole site database.

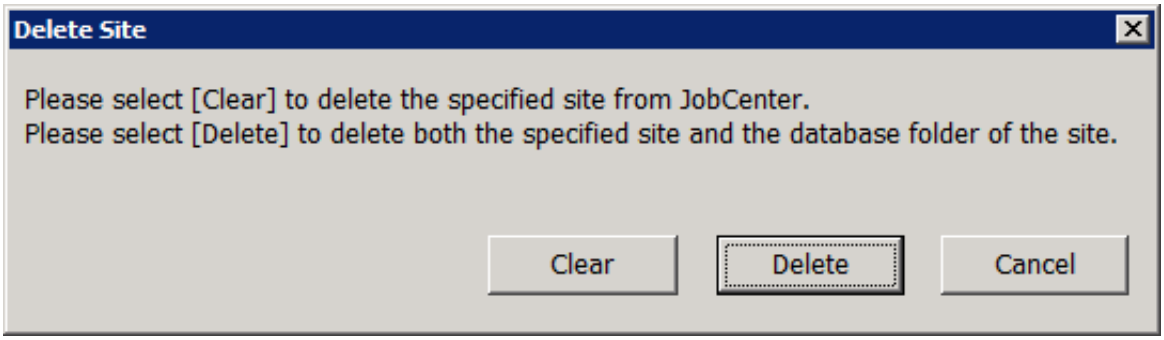

Figure 2.18. Site Deletion Method Selection Screen

3. Creating the site database again

   Create a new site database referring to Section 2.4, "Procedure for Building the Cluster Environment (Windows)" about how to build a cluster environment in JobCenter for Windows.

2.6.2. Upgrading the Site Database

The file storage path in the JobCenter site database has been changed in JobCenter R13.1 or later.

To reuse the site database after upgrading, upgrade the site database following the steps below.

2.6.2.1. Upgrading the Site Database (Windows Version)

1. Adding the existing site

   Select the site from the left tree on the Server Environment Setup screen. While the site is selected, select [Add site], then [Existed site] from the shortcut menu in the right pane.

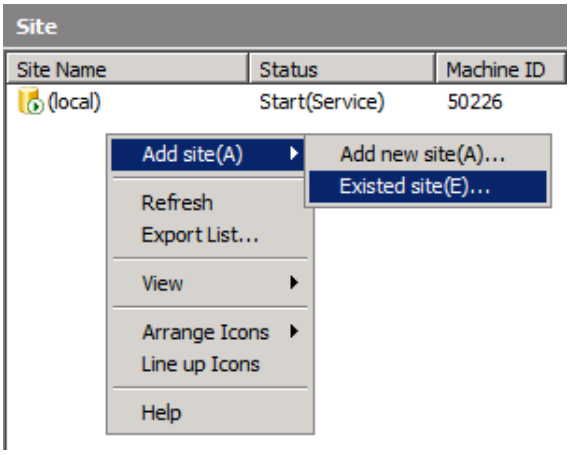

Figure 2.19. Example of the Existing Site Addition Screen

2. Selecting the site database location

   Select the site database location from Explorer.

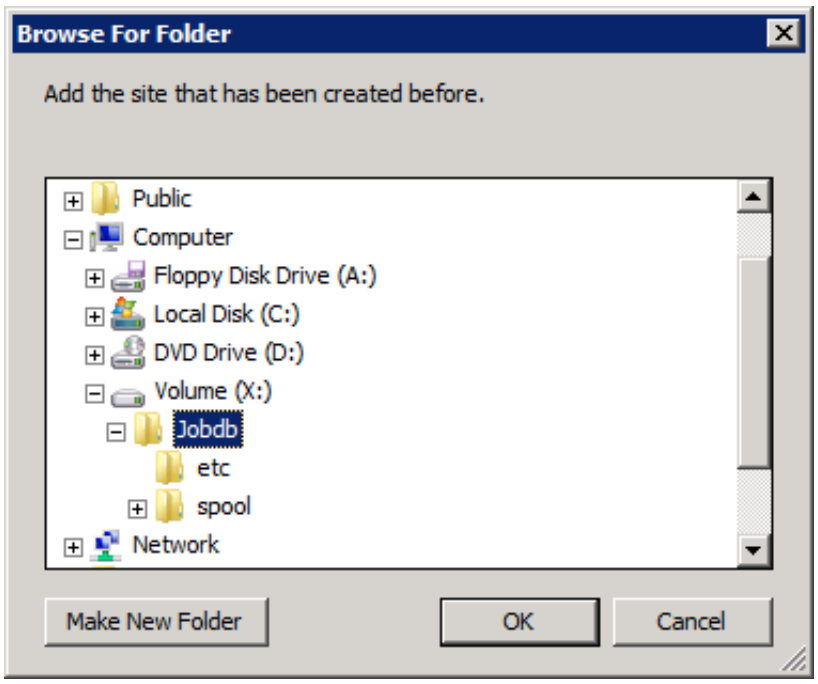

Figure 2.20. Site Database Addition Screen

3. If you select a site database created with JobCenter of R12.10.x or earlier, a dialog box is displayed to confirm the version upgrade. If you select [Yes], the version upgrade starts.

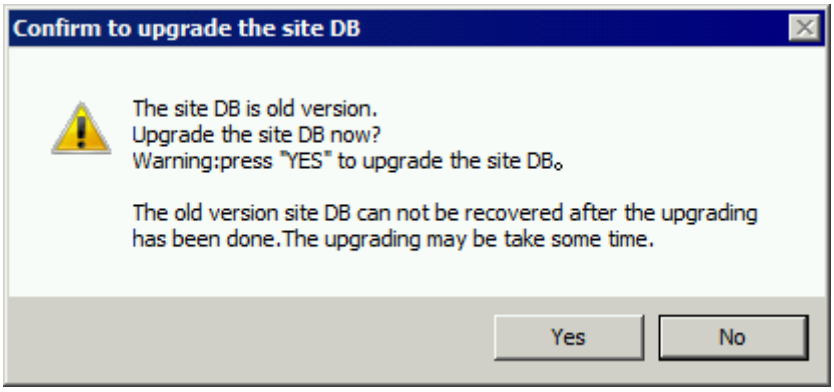

Figure 2.21. Version Upgrade Confirmation Dialog Box

4. Confirming the site startup

   When the added site is displayed in the right pane, start the site to confirm that it was properly upgraded.

2.6.2.2. Upgrading the Site Database (UNIX Version)

In the UNIX version, the version of the site database is upgraded using the spoolconv command. For details about the spoolconv command, refer to in <Command Reference>Section 3.22, “spoolconv (Migrating User Definition Information of R12.10.x or Earlier)”.

An example of upgrading the site database version of the site "testsite" is shown below.

* In this example, /mnt/jobdb is the spool area of the old version.

```
# export NQS_SITE=testsite
# /usr/lib/nqs/gui/bin/spoolconv -c /mnt/jobdb ↵
Do you convert the spool directory for SITE [testsite] ?
[y/n](default: n) y↵
Could not connect to Redis at /usr/spool/nqs/C0A81A0A/database/.jcdbs.sock: No such file or
 directory
start jcdbs temporarily.
start convert spool directory.
 :
 :
 :
end convert spool directory.
temporary jcdbs is stopped.
```

■After the command is executed, the name of the site whose database is to be upgraded is displayed. Before upgrading the version, check that an incorrect site name is not specified.

■The user-defined information existing prior to the version upgrade is not changed or deleted. After the version upgrade is complete, check the operation and delete the information if necessary.

2.6.3. Other Notes

■Resource consumption when several sites are active

Note that if two sites are active on the same machine, resource consumption is twice than when a single site is active. Overall processing speed also becomes slower.

If it is possible that you will start several sites, increase the upper limit value of each consumed resource in advance.

■Phenomena that occur in rare circumstances in times of failure

If a failure such as machine power discontinuity occurs, the JobCenter tracker or site database might not be normally written from the CPU cache to the file below, consequently corrupting the files necessary for JobCenter.

If such a failure occurs and the job results in an error, manually execute the job again.

■Site database permissions

The "755" permission is necessary to access the site database.

Check the umask value and make sure that the "755" permission is not masked before executing the cjcmksite command.

■Behavior under conditions where a process is accessing the shared disk when the service of the cluster software is stopped

If a process is accessing the shared disk when the service of the cluster software is stopped, the cluster software may not be able to properly unmount the disk.

As some cluster software does not automatically terminate the processes that are accessing the disk when the service is stopped, the user must explicitly manage such processes.

Normally, the process started from JobCenter automatically receives a signal from JobCenter when JobCenter is stopped. Therefore, such a process is usually stopped when JobCenter is stopped. However, if background processes are intentionally started from JobCenter using nqsbg or another method, they cannot be stopped from JobCenter.

The system must be designed so that a process started in this way is automatically stopped when a service is stopped by using a different method (such as fuser -k).

■If the warning message below is shown in the setup log, the host name and event ID specified by the user by using [Default parameter]-[Event reception part] are not inherited. To resolve this problem, set the default parameter for each user after connecting with CL/Win.

```
Warning : Convert Skip ([DefaultParameter]EventReceive user="user name" hostname="host name
 specified by the default parameter" eventid="event ID specified by the default parameter")
```

3 HP Serviceguard

This chapter describes an example of building a cluster environment by using the HP cluster software "HP Serviceguard."

For information about procedures for creation of the JobCenter cluster site up until a startup check, refer to Chapter 2, 「Overview of Building the JobCenter Cluster Environment」 .

3.1. Registering a Service with HP Serviceguard

You must register the cjcpw process as a service to HP Serviceguard to use HP Serviceguard for JobCenter clustering. The cjcpw process controls the starting and stopping of JobCenter sites and monitors processes.

This section describes how to register the cjcpw process to HP Serviceguard.

For details about HP Serviceguard, refer to the HP Serviceguard manual. For details about the cjcpw command, refer to in <Command Reference>Section 4.2, “cjcpw (Starting, Monitoring, or Stopping a Daemon Process)”.

This section assumes the following JobCenter site parameters.

Parameter	Value
Service name	jcservice
Site name	testsite
Site database path	/mnt/jobdb

The scripts in this manual are samples. Refer separately to your cluster software manual for information about creating correct start and stop scripts.

If a service does not normally start, begin the troubleshooting process by referring to the cluster software manual to isolate the problem.

3.1.1. Registering a Data Service

Register the startup of a JobCenter site as an HP Serviceguard service. After registration, JobCenter starts up at the same time as the package. If the JobCenter process contains an error, packages are switched or another measure is taken.

An example of registering a service with HP Serviceguard is shown below.

```
#
# CJC Service
#
SERVICE_NAME[0]=jobservice
SERVICE_CMD[0]="/usr/lib/nqs/cluster/cjcpw testsite /mnt/jobdb"
SERVICE_RESTART[0]=""
```

3.1.2. Starting a Process by Using a Command

HP Serviceguard supports the use of commands to start a process in addition to starting a process through the service. However, note that a process started with a command is not monitored. To specify this setting, add cjcpw for startup and stop to customer_defined_run_cmds and customer_defined_halt_cmds.

```
(Startup)
function customer_defined_run_cmds
{
    /usr/lib/nqs/cluster/cjcpw -c testsite /mnt/jodb
    :
    :
}
```

```
(Stop)
function customer_defined_halt_cmds
{
    /usr/lib/nqs/cluster/cjcpw -stop testsite
    :
    :
}
```

3.1.3. nqsportkpr

In rare cases, a process other than JobCenter uses the socket port to be used by JobCenter, preventing JobCenter from starting up. Use nqsportkpr to avoid this problem.

This command temporarily binds the nqs 607 port until the JobCenter daemon binds the port so that no other process can use it.

The format of the nqsportkpr command is shown below.

```
/usr/lib/nqs/nqsportkpr <address>
```

<address> is the IP address (or corresponding site name) set to the site where JobCenter operates. This is the same as the IP address (or corresponding site name) that corresponds to the first argument in /usr/lib/nqs/cluster/cjcpw.

Set this command to customer_defined_run_cmds in each package's start script. Make sure that this command is always executed at the beginning.

A registration example is shown below.

```
function customer_defined_run_cmds
{
    /usr/lib/nqs/nqsportkpr testsite
    :
    :
}
```

Even if nqsportkpr is used, JobCenter cannot start up if another process has already been using port 607 prior to starting the nqsportkpr process.

Ensure in advance that the port used by JobCenter does not conflict with the port used by any other application.

The port for localhost (127.0.0.1) is bound at system startup so that any other process cannot bind INADDR_ANY.

4 ExpressCluster

This chapter describes an example of building a cluster environment by using the NEC cluster software "ExpressCluster."

For information about procedures for creation of the JobCenter cluster site up until a startup check, refer to Chapter 2, 「Overview of Building the JobCenter Cluster Environment」 .

A manual on linkage with JobCenter is also available for ExpressCluster X. Refer to it in combination with this manual (Japanese only).

http://jpn.nec.com/clusterpro/clp/download.html

	JobCenter Linux version	JobCenter Windows version
ExpressCluster	Refer to Section Section 4.1, "Registering a Service with ExpressCluster (Linux Version)".	Refer to Section Section 4.2, "Registering a Service with ExpressCluster (Windows Version)".
ExpressCluster X	Refer to <JobCenter on ExpressCluster X for Linux How To> (*1).	Refer to <ExpressCluster X for Windows PP Guide (ESMPRO/WebSAM)> (*2).

■*1 JobCenter on ExpressCluster X for Linux How To

The above URL - [Linux Software Configuration Guide (X1.0)] - [Job Management WebSAM JobCenter]

■*2 ExpressCluster X for Windows PP Guide (ESMPRO/WebSAM)

The above URL - [Windows Software Configuration Guide (X3.0/X2.x/X1.0)] - [PP Guide (ESMPRO/WebSAM)]

4.1. Registering a Service with ExpressCluster (Linux Version)

This section describes how to register a service to the Linux version of ExpressCluster assuming the following JobCenter site parameters.

Service name	jcservice
Site name	testsite
Site database path	/mnt/jobdb

The scripts in this manual are samples. Refer separately to your cluster software manual for information about creating correct start and stop scripts.

If a service does not normally start, begin the troubleshooting process by referring to the cluster software manual to isolate the problem.

4.1.1. Creating the JobCenter Failover Group

Create a JobCenter failover group to register the JobCenter services to ExpressCluster for Linux. Follow the steps below to create the failover group.

4.1.1.1. Creating ExpressCluster Resources

You must create the following resources before building the JobCenter cluster environment according to the ExpressCluster manual.

- Relocatable IP resource
- exec resource
- Disk resource
- RAW monitoring resource

Do not create the start and stop scripts for the exec resource at this point. The start and stop scripts are created in the sections that describes how to create the start or stop script for the exec resource.

4.1.1.2. Setting Up the Exec Resource

Because the cjcpw command, which starts the JobCenter site, is executed in the foreground, it is necessary to set [Asynchronous] to the parameter in the start script for the exec resource. Follow the steps below to set [Asynchronous] for the exec resource.

1. Click the [Tuning] button on the [Details] tab in the [Resource Definition of Group] or [Resource Properties] dialog box.

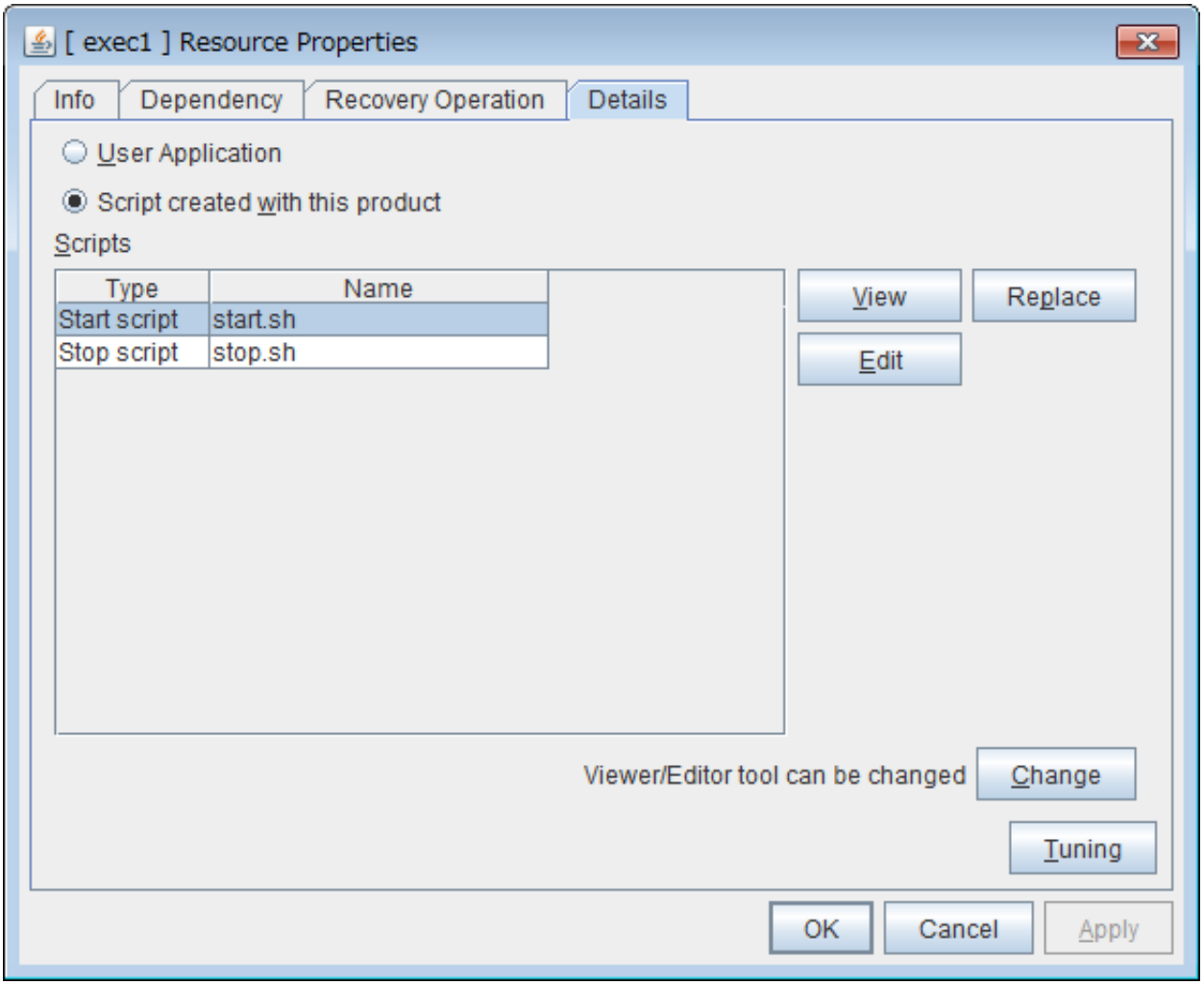

Figure 4.1. Example of the Resource Properties Dialog Box

2. Set the start script setting to [Asynchronous] on the [Parameter] tab in the [Resource Tuning Properties] dialog box.

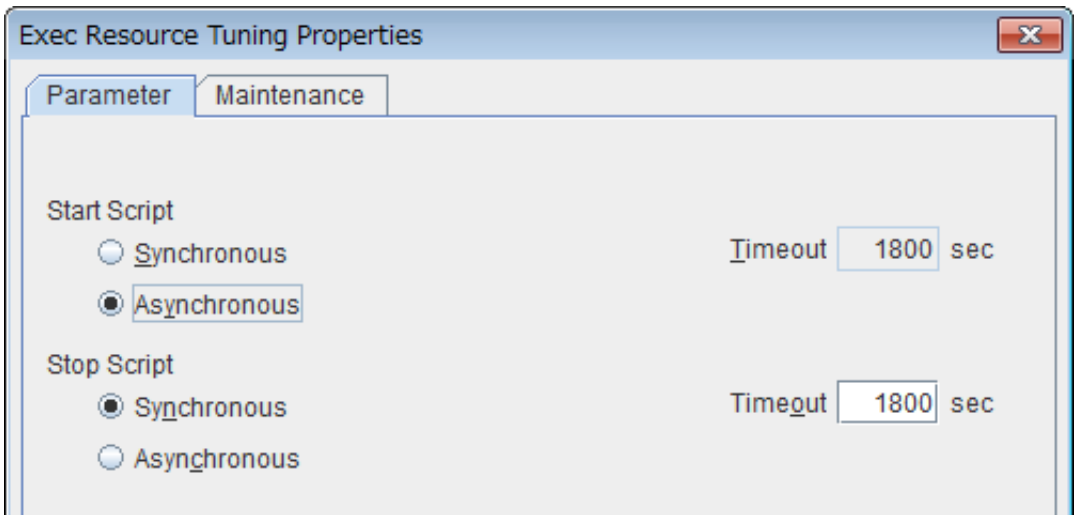

Figure 4.2. Example of the Resource Tuning Properties Dialog Box

4.1.1.3. Setting Up the Monitoring Resource

To monitor JobCenter processes as well as detect process failures and perform failover, add and set the PID monitoring resource following the steps below.

You must add the PID monitoring resource to detect exit of the cjcpw process (that is, to detect an error in an asynchronously started exec resource), reactivate the recovery target and perform failover or other processing. (This does not apply to cases in which processes are not monitored or a different product monitors processes.)

1. Select the already added JobCenter-related exec resource as the target resource on the [Monitor(common)] tab in the [Monitor Resource Definition] or [Monitor Resource Properties] dialog box for the PID monitor.

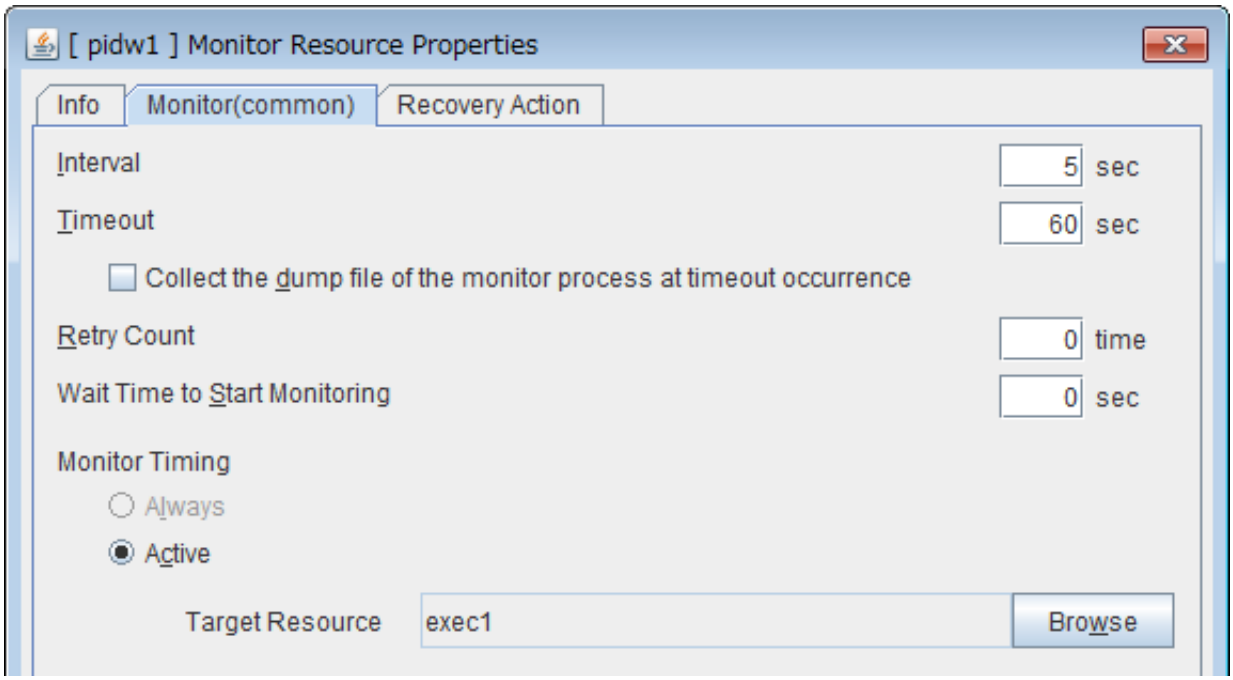

Figure 4.3. Example of the Monitor Resource Properties Dialog Box

2. Select the failover group related to JobCenter as the recovery target on the [Recovery Action] tab in the [Monitor Resource Definition] or [Monitor Resource Properties] dialog box for the PID monitor.

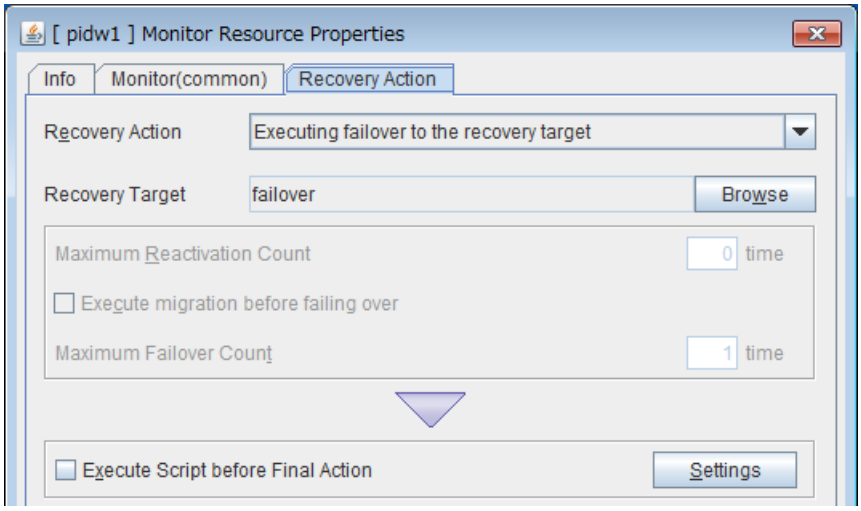

Figure 4.4. Example of the Recovery Action Tab in the Monitor Resource Properties Dialog Box

4.1.1.4. Checking Operations of the ExpressCluster Resources

After setting up ExpressCluster, check that the relocatable IP address setting, the mount point of shared disk and other necessary settings are valid.

4.1.2. Registering a Service

After creating the JobCenter site environment, register the JobCenter services. Stop the JobCenter failover group before starting registration and follow the steps below.

4.1.2.1. Creating the Start Script for the Exec Resource

Create a script to start JobCenter services corresponding to the cluster group using the cjcpw command when the failover group is (re)started or failover is performed.

■Command example when the JobCenter services are monitored by ExpressCluster

```
/usr/lib/nqs/cluster/cjcpw testsite /mnt/jobdb
```

■Command example when the JobCenter services are not monitored

When using the following specifications, failover is not triggered by the failure of JobCenter process.

```
/usr/lib/nqs/cluster/cjcpw -c testsite /mnt/jobdb
```

Shown below is an example of the service start command (start.sh) when ExpressCluster monitors the JobCenter services.

```
#! /bin/sh

ulimit -s 8192

if [ "$CLP_EVENT" = "START" ]
then
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
        echo "NORMAL CJCPW STARTUP"
        /usr/lib/nqs/cluster/cjcpw testsite /mnt/jobdb
    fi
```

```
elif [ "$CLP_EVENT" = "FAILOVER" ]
then
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
        echo "FAILOVER CJCPW STARTUP"
        /usr/lib/nqs/cluster/cjcpw testsite /mnt/jobdb
    fi
else
    #NO_CLP
fi
#EXIT

exit 0
```

While the Linux version of JobCenter requires a stack size of 8 MB or more, the exec resource is executed with the stack size set to 2 MB for ExpressCluster X 1.1.0-1 or later. Therefore, write the ulimit command at the beginning of the start script and set the stack size to 8 MB or more.

Reference URL

■About a stack overflow that occurs in an application launched by the exec resource in X1.1.0-1 or a later version

http://jpn.nec.com/clusterpro/clp/linux/notes/stacksize.html

Do not register any other operation application in the above start script. In ExpressCluster for Linux 3.1 or later, process monitoring means monitoring whether the start script (start.sh) is active or not. Therefore, to monitor the processes of several applications, you must define the exec resource for each application, and edit and register start.sh.

4.1.2.2. Creating the Stop Script for the Exec Resource

Create a script to stop JobCenter services corresponding to the cluster group when the failover group is stopped or failover is performed.

Setting [Synchronous] to the parameter in the exec resource stop script is recommended because it takes about one or two minutes for the cjcpw command to stop services.

■Specification example of stopping the JobCenter services

```
/usr/lib/nqs/cluster/cjcpw -stop testsite
```

An example of the JobCenter service stop command (stop.sh) is shown below.

```
#! /bin/sh

if [ "$CLP_EVENT" = "START" ]
then
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
        echo "NORMAL CJCPW STOP"
        /usr/lib/nqs/cluster/cjcpw -stop testsite
    fi
elif [ "$CLP_EVENT" = "FAILOVER" ]
then
```

```
    if [ "$CLP_DISK" = "SUCCESS" ]
    then
        echo "FAILOVER CJCPW STOP"
        /usr/lib/nqs/cluster/cjcpw -stop testsite
    fi
else
    #NO_CLP
fi
#EXIT

exit 0
```

4.1.2.3. Updating ExpressCluster Settings

Save the cluster settings and script, and then transfer them to the master server with the trekking tool. Apply the same settings to all clusters by using clpcfctrl.

■After executing the trekking tool on a Windows machine, execute the following command.

```
root> clpcfctrl --push -l [-x <directory>] ↵
```

■When the following message appears after executing the command, press the Return key.

```
root> clpcfctrl --push -w [-x <directory>] ↵
```

When the following message appears after executing the command, press the Return key.

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

The cluster has been normally generated if the message below appears after pressing the Return key.

```
    success. (code:0)
```

Then, restart all the servers to apply the new parameters. For details, refer to the manuals of "ExpressCluster for Linux."

4.1.3. nqsportkpr

In rare cases, a process other than JobCenter uses the socket port to be used by JobCenter, preventing JobCenter from starting up. Use nqsportkpr to avoid this problem. This command temporarily binds the nqs 607 port until the JobCenter daemon binds the port so that no other process can use it.

Include this command in the start script if needed.

The format of the nqsportkpr command is shown below.

```
/usr/lib/nqs/nqsportkpr <address>
```

<address> is the IP address (or corresponding site name) set to the site where JobCenter operates. This is the same as the IP address (or corresponding site name) that corresponds to the first argument in /usr/lib/nqs/cluster/cjcpw.

4.2. Registering a Service with ExpressCluster (Windows Version)

This section shows how to register a service to the Windows version of ExpressCluster.

This section assumes the following JobCenter site parameters.

Service name	jcservice
Site name	testsite
Site database path	X:\Jobdb
JobCenter installation directory	D:\JobCenter\SV
JobCenter administrator account name	Job-Admin

The scripts in this manual are samples. Refer separately to your cluster software manual for information about creating correct start and stop scripts.

If a service does not normally start, begin the troubleshooting process by referring to the cluster software manual to isolate the problem.

The service registration examples in this chapter are based on ExpressCluster for Windows (Ver8.0 or earlier).

For information on how to register a JobCenter service with ExpressCluster X for Windows, refer to <PP Guide (ESMPRO/WebSAM),> which is a document provided with ExpressCluster X (<Windows Software Creation Guide>).

4.2.1. Registering a Service

Create the scripts to start and stop the JobCenter services in the group start and stop scripts from ExpressCluster Manager. Follow the steps below.

Use the following ExpressCluster commands in the scripts to start or stop the JobCenter services. For details about each command, refer to the ExpressCluster/ActiveRecoveryManager manual.

ARMLOAD	Starts the service to be clustered.
ARMLOADC	Suspends monitoring of the service to be clustered.
ARMKILL	Stops the service to be clustered.

4.2.1.1. Creating the Group Start Script (start.bat)

Create a script to start the JobCenter services corresponding to the cluster group when the group is (re)started or failover is performed.

The script for R12.8 or later differs from that for R12.7.x or earlier because it is no longer necessary to execute the cjcinit command.

■Command example when the JobCenter services are monitored by ExpressCluster

```
ARMLOAD JOBSTART /M /U Job-Admin "d:\JobCenter\SV\bin\cluster\cjcpw" "testsite" "x:\Jobdb"
```

■Command example when the JobCenter services are not monitored

```
ARMLOAD JOBSTART /U Job-Admin "d:\JobCenter\SV\bin\cluster\cjcpw" "-c" "testsite" "x:\Jobdb"
```

Specify the /U option for the ARMLOAD command so that the cjcpw command is executed by the JobCenter administrator specified during JobCenter SV installation.

You must register the account you will specify with ExpressCluster before using the /U option for the ARMLOAD command. To register an account, select [Cluster (M)] -> [Properties] from the menu in ExpressCluster Manager.

After the /M option is added to the ARMLOAD command, the node operated by JobCenter is shut down when the JobCenter services corresponding to the cluster group stop.

The same watchID ("JOBSTART" in the above example) cannot be specified for the ARMLOAD parameter in a cluster. To start several cluster sites in a cluster, specify different watchIDs.

The above script keeps the prompt screen open at all times. If you close this prompt, failover occurs because the system recognizes that JobCenter has been abruptly stopped. If you do not want to display the prompt screen, use the ARMLOAD command option (/WINDOW hide).

For details, refer to the ExpressCluster manual.

4.2.1.2. Overview of Creating the Group Stop Script (stop.bat)

Create a script to stop JobCenter services corresponding to the cluster group (with cjcpw) when the group is stopped or failover is performed.

If services are monitored using ARMLOAD, the cjcpw process monitors whether JobCenter has been stopped. Therefore, interrupt monitoring (ARMLOADC) before stopping the JobCenter services (cjcpw -stop), and then terminate the monitor targets (ARMKILL) at the end.

■Command example

```
ARMLOADC JOBSTART /W PAUSE
d:\JobCenter\SV\bin\cluster\cjcpw -stop testsite
ARMKILL JOBSTART
```

When monitoring is cancelled with a /C option like "ARMKILL JOBSTART /C," ExpressCluster cannot release some Windows resources. This means that it might become impossible to start a process with ARMLOAD after repeated failover. To avoid this, be sure to interrupt monitoring with ARMLOADC as described above before stopping the processes with ARMKILL.

4.2.2. Sample Scripts

■Sample for start.bat

```
rem ***********************************
rem *          start.bat              *
rem *                                 *
rem ***********************************

rem ***********************************
rem Startup factor check
rem ***********************************
IF "%ARMS_EVENT%" == "START" GOTO NORMAL
IF "%ARMS_EVENT%" == "FAILOVER" GOTO FAILOVER
IF "%ARMS_EVENT%" == "RECOVER" GOTO RECOVER

rem ActiveRecoveryManager not operating
GOTO no_arm

rem ***********************************
```

```
rem Normal startup processing
rem **********************************
:NORMAL

rem Disk check
IF "%ARMS_DISK%" == "FAILURE" GOTO ERROR_DISK

rem *** JobCenter ***
ARMLOAD JOBSTART /M /U JobCenter administrator account
"d:\JobCenter\SV\bin\cluster\cjcpw" "testsite" "x:\Jobdb"

rem **********************************
rem Normal operation processing
rem ********************************** :NORMAL

rem Failover occurs when a resource is abnormal in ARMRSP
rem If ARMRSP is abnormal, ARMLOAD shuts down the server
rem (Example) ARMLOAD watchID /R 9 /H 1 ARMRSP /A /PL 10.10.9.8 /PL 10.10.9.9

rem Priority check
IF "%ARMS_SERVER%" == "OTHER" GOTO ON_OTHER1

rem **********************************
rem Processing with the highest priority
rem (Example) ARMBCAST /MSG "Currently started on the server with the highest priority" /A
rem **********************************
GOTO EXIT

:ON_OTHER1
rem **********************************
rem Processing with other priority
rem (Example) ARMBCAST /MSG "Processing with other priority" /A
rem **********************************
GOTO EXIT

rem **********************************
rem Recovery processing
rem **********************************
:RECOVER

rem **********************************
rem Recovery processing after cluster restoration
rem **********************************
GOTO EXIT

rem **********************************
rem Failover processing
rem **********************************
:FAILOVER

rem Disk check
IF "%ARMS_DISK%" == "FAILURE" GOTO ERROR_DISK

rem *** JobCenter ***
ARMLOAD JOBSTART /M /U JobCenter administrator account "d:\JobCenter\SV\bin\cluster\cjcpw"
 "testsite" "x:\Jobdb"
```

```
rem **********************************
rem Operation start and restoration processing after failover
rem **********************************

rem Failover occurs when a resource is abnormal in ARMRSP
rem Failover occurs when a resource is abnormal in ARMRSP
rem (Example) ARMLOAD watchID /R 9 /H 1 ARMRSP /A /PL 10.10.9.8 /PL 10.10.9.9

rem Priority check
IF "%ARMS_SERVER%" == "OTHER" GOTO ON_OTHER2

rem **********************************
rem Processing with the highest priority
rem (Example) ARMBCAST /MSG "Currently started on the server with the highest priority" /A
rem **********************************
GOTO EXIT

:ON_OTHER2
rem **********************************
rem Processing with other priority
rem (Example) ARMBCAST /MSG "Currently started on the server other than the priority server
 (after failover)" /A
rem **********************************
GOTO EXIT


rem **********************************
rem Exception processing
rem **********************************

rem Disk-related error processing
:ERROR_DISK
ARMBCAST /MSG "Connecting the switching partition fails" /A
GOTO EXIT

rem ARM not operating
:no_arm
ARMBCAST /MSG "ActiveRecoveryManager is not active" /A


:EXIT
```

■Sample for stop.bat

```
rem **********************************
rem *          stop.bat              *
rem *                                *
rem **********************************

rem **********************************
rem Startup factor check
rem **********************************
IF "%CLP_EVENT%" == "START" GOTO NORMAL
IF "%CLP_EVENT%" == "FAILOVER" GOTO FAILOVER

rem ExpressCluster Server not operating
```

```
GOTO no_arm

rem **********************************
rem Normal termination processing
rem **********************************
:NORMAL

rem Disk check
IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK

rem *** JobCenter ***
ARMLOADC JOBSTART /W PAUSE
d:\JobCenter\SV\bin\cluster\cjcpw -stop testsite
ARMKILL JOBSTART


rem **********************************
rem Normal operation processing
rem **********************************

rem Stop monitoring for a resource error
rem Command to stop ARMRSP started with ARMLOAD
rem Use the watchID set when ARMLOAD is specified
rem (Example) ARMKILL watchID

rem Priority check
IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTHER1

rem **********************************
rem Processing with other priority
rem (Example) ARMBCAST /MSG "Currently stopped on the server with the highest priority" /A
rem **********************************
GOTO EXIT

:ON_OTHER1
rem **********************************
rem Processing with other priority
rem (Example) ARMBCAST /MSG "Currently stopped on the server other than the priority server" /A
rem **********************************
GOTO EXIT


rem **********************************
rem Failover processing
rem **********************************
:FAILOVER

rem Disk check
IF "%CLP_DISK%" == "FAILURE" GOTO ERROR_DISK

rem *** JobCenter ***
ARMLOADC JOBSTART /W PAUSE
d:\JobCenter\SV\bin\cluster\cjcpw -stop testsite
ARMKILL JOBSTART
```

```
rem **********************************
rem Operation start and restoration processing after failover
rem **********************************

rem Stop monitoring for a resource error
rem Command to stop ARMRSP started with ARMLOAD
rem Use the watchID set when ARMLOAD is specified
rem (Example) ARMKILL watchID

rem Priority check
IF "%CLP_SERVER%" == "OTHER" GOTO ON_OTHER2

rem **********************************
rem Processing with the highest priority
rem (Example) ARMBCAST /MSG "Currently stopped on the server with the highest priority (after
 failover)" /A
rem **********************************
GOTO EXIT

:ON_OTHER2
rem **********************************
rem Processing with other priority
rem (Example) ARMBCAST /MSG "Currently stopped on the server other than the priority server
 (after failover)" /A
rem **********************************
GOTO EXIT


rem **********************************
rem Exception processing
rem **********************************

rem Disk-related error processing
:ERROR_DISK
ARMBCAST /MSG "Connecting the switching partition fails" /A
GOTO EXIT

rem ARM not operating
:no_arm
ARMBCAST /MSG "ExpressCluster Server is not active" /A


:EXIT
```

5 Windows Server Failover Clustering(WSFC)

This chapter describes an example of building a cluster environment by using the Microsoft cluster software "Windows Server Failover Clustering(WSFC)."

This section assumes the following JobCenter site parameters and describes the procedure for registering JobCenter to WSFC as a service.

Table 5.1. JobCenter Site Parameters

Parameter	Value
Site name	jcgpkg
The IP address corresponding to the site name	192.168.50.194
Site database path	Y:\Jobdb
JobCenter installation directory	C:\JobCenter\SV

This description applies to Windows Server 2008, Windows Server 2012, and Windows Server 2016.

In Windows Server 2008, some screens and item names, and some procedures are different from those in other environments. For the settings requiring different procedures, please check the supplementary information in the related section. For different item names, check the correspondence and replace the names according to the following table.

Windows Server 2016	Windows Server 2008
Failover Cluster Manager	Failover Cluster Management
Roles	Services and Applications
Create Empty Role	Create Empty Service or Application

5.1. Creating the WSFC Cluster Service

Follow the steps below to create the WSFC cluster service. (If the WSFC cluster service was created in preparation, the following steps can be skipped.)

5.1.1. Creating a Role of the JobCenter Cluster

Right-click [Roles] on the tree on the left pane of the [Failover Cluster Manager] screen, and then select [Create Empty Role]. If a role is created with the status "Running", right-click it and select [Stop Role] to set the status to "Stopped".

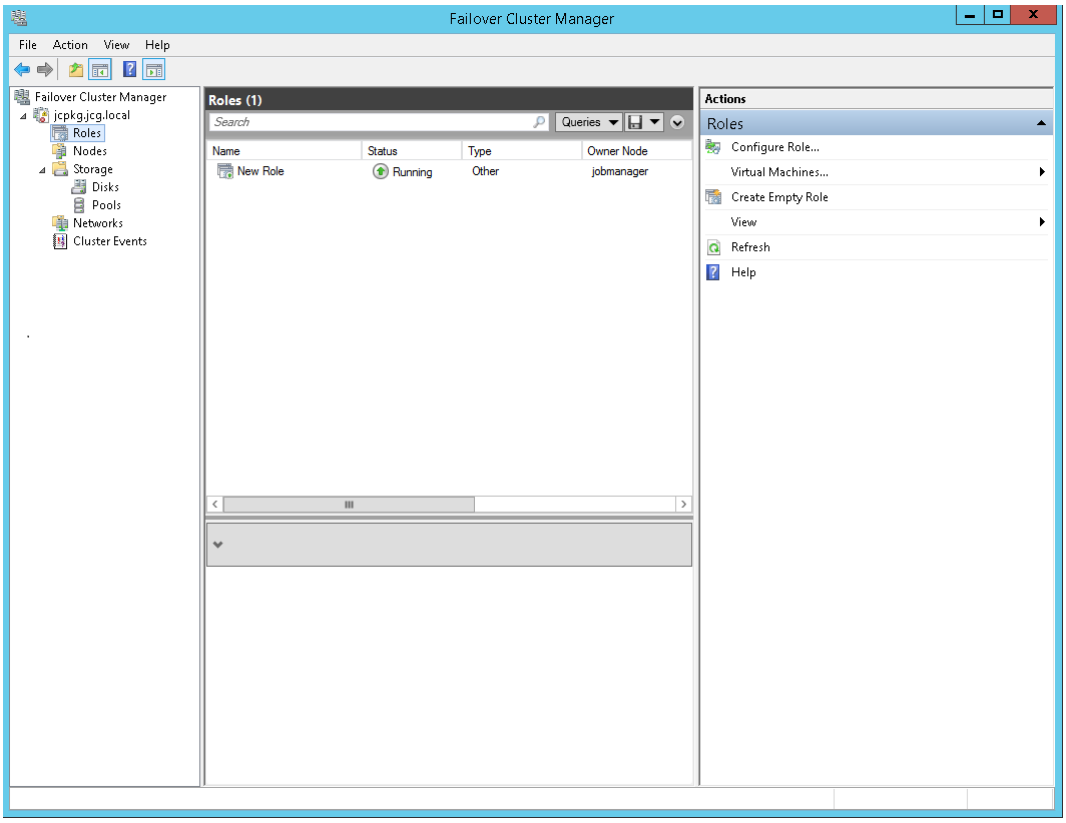

Figure 5.1. Example of the Failover Cluster Manager Screen

Right-click the created new role, and then select [Properties] to rename it to a manageable name. In the example below, it is renamed to "JobCenterCluster" set in

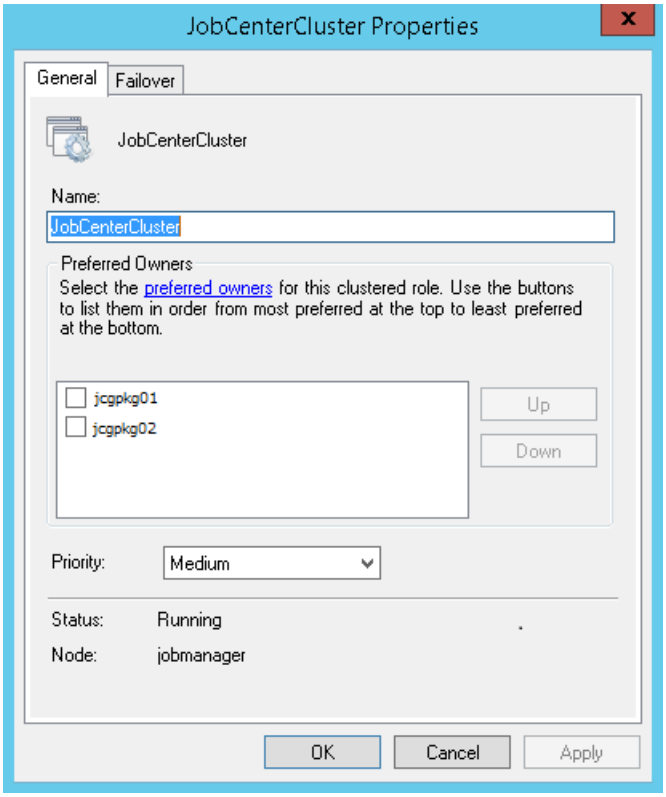

Figure 5.2. Example of Renaming a Role

5.1.2. Selecting the Storage Area to Use

Select [Add storage] from the shortcut menu. Select the cluster disk that contains the site database from displayed options on the [Add Storage] screen.

Select the check box for the disk that contains the site database as shown in the example below and click [OK].

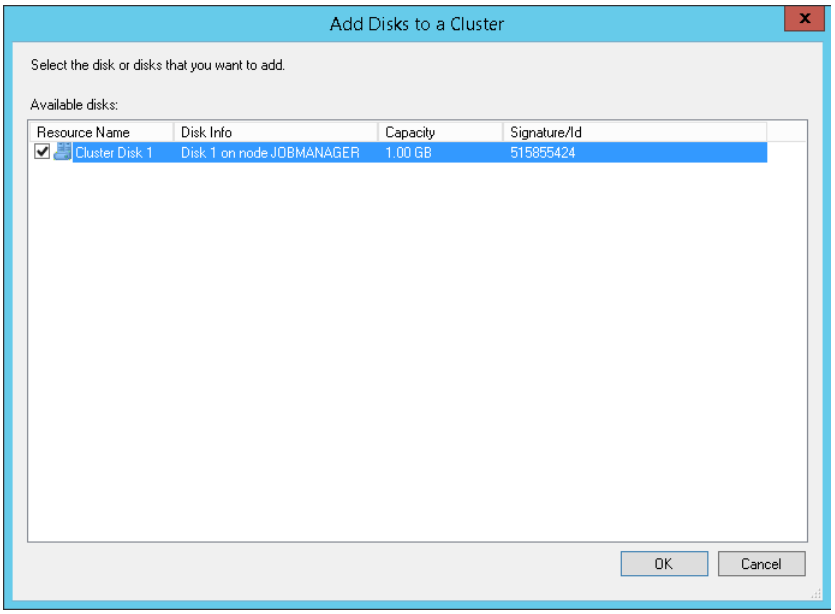

Figure 5.3. Example of the Add Storage Screen

5.1.3. Selecting the IP Address to Use

Right-click [Roles], and select [Add a resource], [Other Resources], and then [IP address] from the shortcut menu.

At the bottom of the [Failover Cluster Manager] screen, right-click [IP address], select [Properties], and then select [IP address]. Specify the relocatable IP address corresponding to the site name.

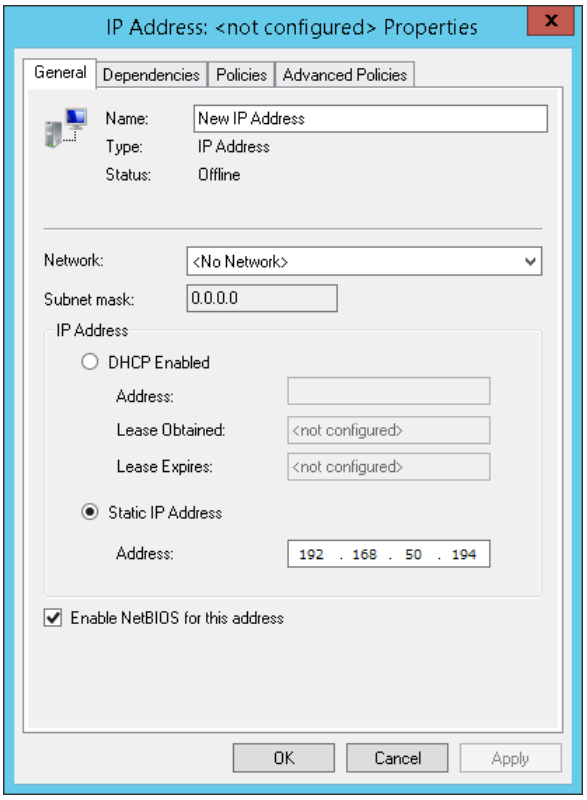

Figure 5.4. Example of the Screen for Adding an IP Address

Also, specify both the FQDN and the short name of the host name in the resolv.def file for both the active and standby servers in order to relate the relocatable IP address to the host name.

Setting example of resolv.def

```
192.168.50.194      jcgpkg.domain.jp      jcgpkg
```

Check the details of details about the resolv.def setting in <Environment Guide>Section 2.3.2, “Using resolv.def to resolve names”.

For Windows Server 2008, select [Add a resource] and [Client Access Point] to add the IP address. Enter the JobCenter cluster site name and the corresponding relocatable IP address.

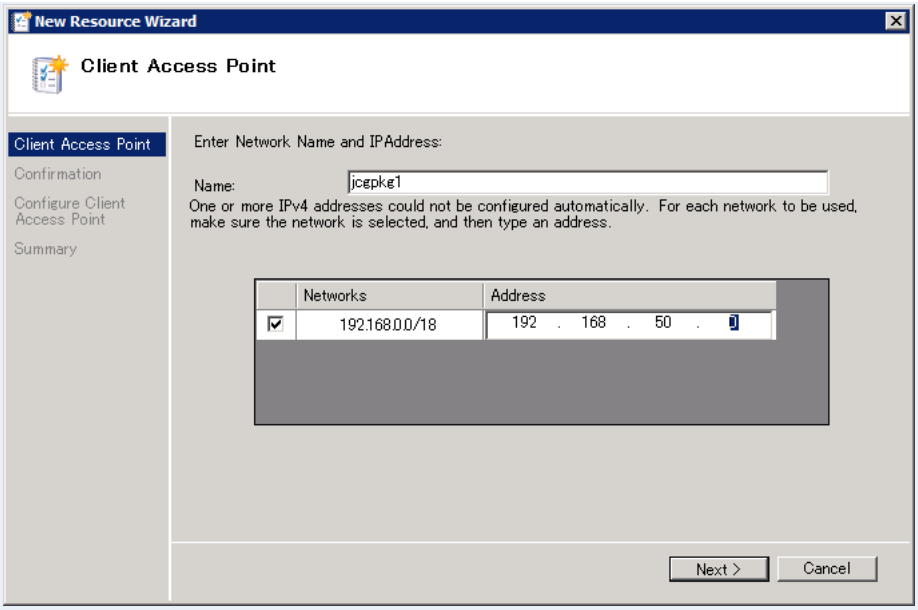

Figure 5.5. "Client Access Point" screen

5.2. Building the JobCenter Cluster Environment

After creating a cluster service, build the JobCenter cluster environment. Perform the works described in Section 2.4.2, “Installing JobCenter to the Active and Standby Servers (Active and Standby Servers)” to Section 2.4.7, “Checking Startup of the Site” of Section 2.4, “Procedure for Building the Cluster Environment (Windows)”. (If these works have been completed, you can omit them.)

5.3. Registering the WSFC Cluster Resource

After creating the cluster service and building the JobCenter cluster environment, register the JobCenter cluster resource according to the following procedure.

The resource to be registered varies depending on whether the cluster site of JobCenter is started up as a service or it is started up by cjcpw. The procedures are described separately.

5.3.1. Starting up Cluster Site as a Service

5.3.1.1. Registering the Service of the JobCenter Cluster Site

Add a generic service from "Add a resource" from the shortcut menu. Specify "JobCenter Service (<Cluster site name of the JobCenter>)" for the service to be added.

If the JobCenter cluster site has not started up yet as the service, the list does not show the service. Check that the cluster site is started by cjcpw command or started up as a service according to Section 2.4.7, “Checking Startup of the Site”.

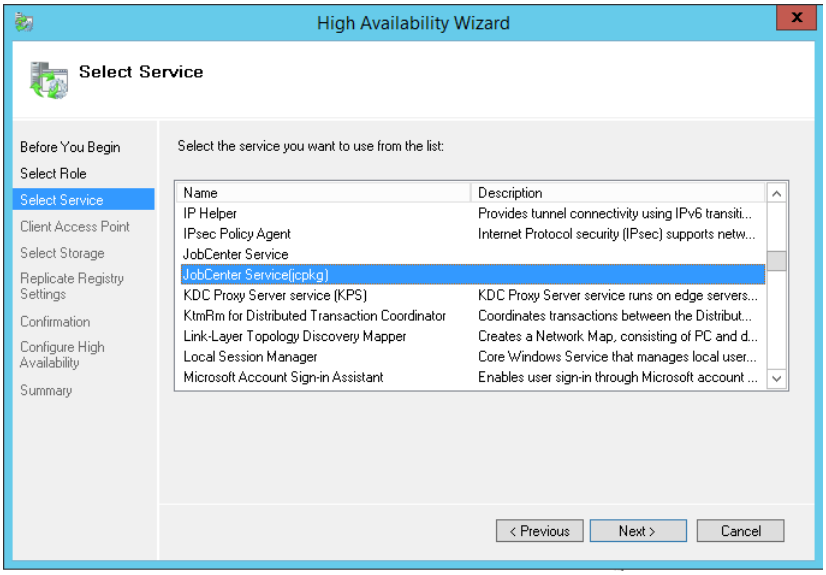

Figure 5.6. Example of adding a generic service resource

5.3.1.2. Setting Dependency

Click [Roles] on the tree on the left-hand pane of the screen, and select the "Resources" tab at the bottom of the window.

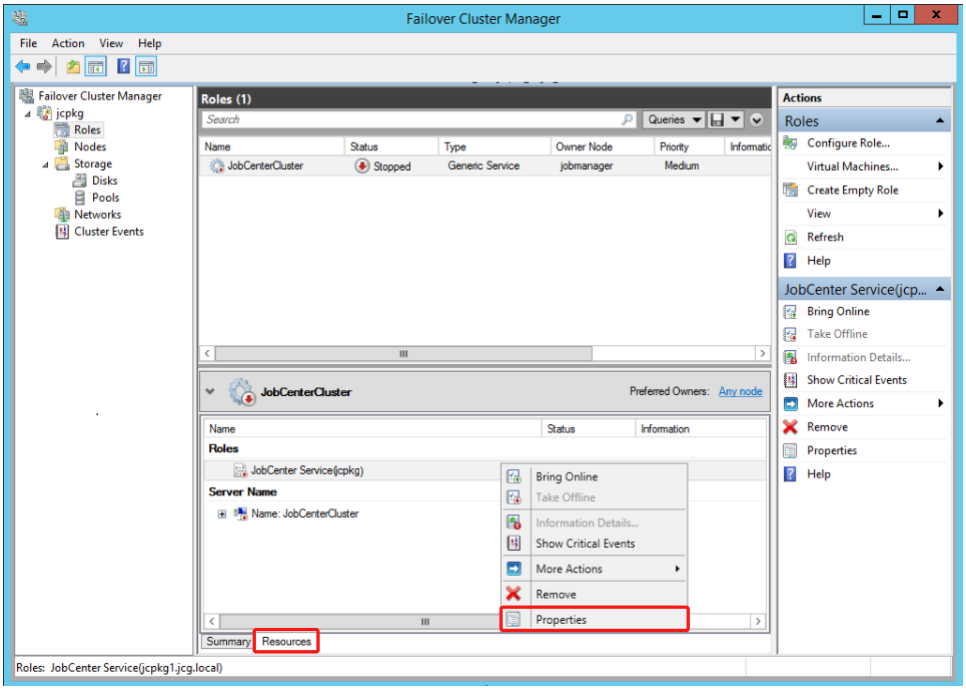

Figure 5.7. Example of Overview of the Cluster Service

Choose Properties for "Generic Service" in the Resource tab. Click the "Dependencies" tab of the Properties window, and set the dependencies between resources.

For JobCenter sites to start, the shared disk must be mounted and the virtual IP address must be valid. To make the virtual IP address valid, add the cluster disk resource and virtual IP address to the [Dependencies] tab.

Relate the cluster disk to the IP address by using the AND operator as shown in the example below.

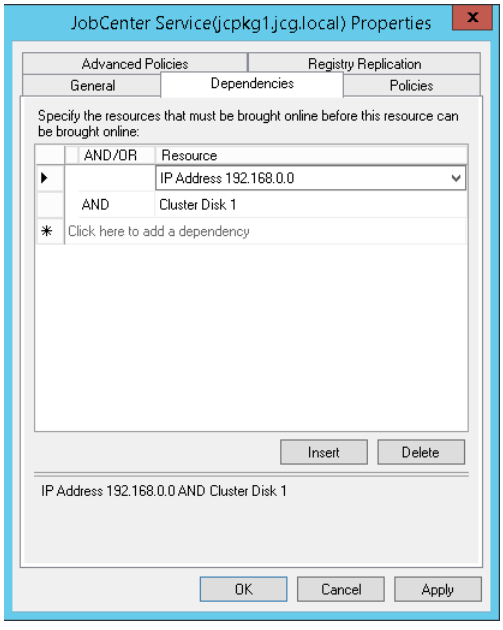

Figure 5.8. Example of Overview of Setting Dependencies

5.3.2. Starting the cluster site by using cjcpw

After creating a cluster service, follow the procedure below to register the JobCenter cluster resource.

5.3.2.1. Placing the JobCenter Cluster Startup Script

Place the generic script "JobCenterCluster.vbs" that manages the JobCenter cluster in an area used as a shared disk. JobCenterCluster.vbs is stored in the setup directory under the JobCenter installation directory.

5.3.2.2. Registering the JobCenter Cluster Startup Script

Right-click [Roles], and then select [Add Resource] from the shortcut menu to add a generic script. Specify the path of the shared disk placed in Section 5.3.2.1, “Placing the JobCenter Cluster Startup Script” for the path of the generic script to be added.

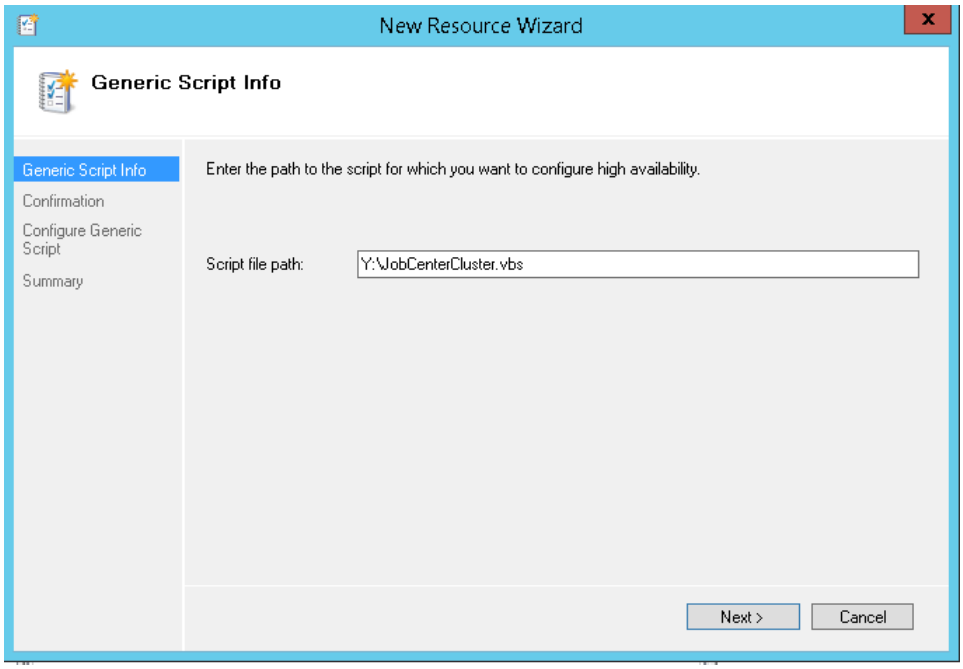

Figure 5.9. Example of Adding a Generic Script Resource

At the bottom of the [Failover Cluster Manager] screen, right-click [Roles], and then select [Properties] to rename the script to a manageable name. In the example screen, it is renamed to "ControlScript" set in Table 5.1, “JobCenter Site Parameters”.

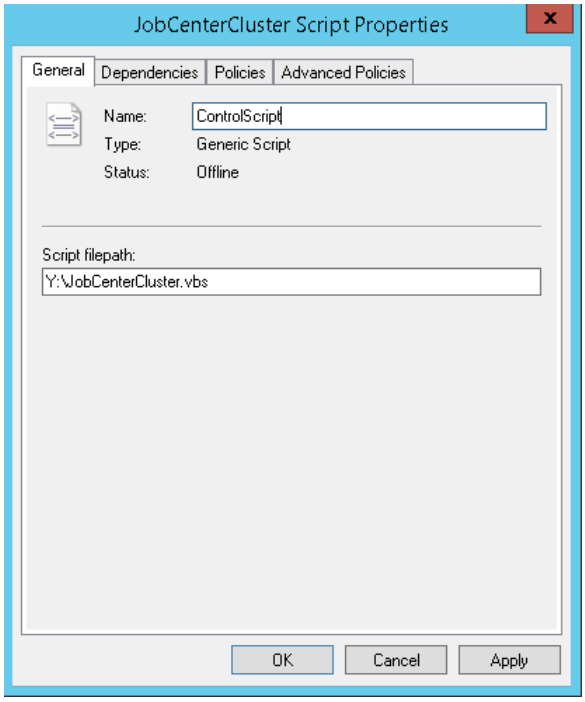

Figure 5.10. Example of Renaming a Generic Script

5.3.2.3. Confirming the Registration of JobCenter Cluster Startup Script

Open Windows PowerShell and confirm the JobCenter script is added to the execution result of Get-ClusterResource.

An execution example of the command is as follows:

```
PS C:\Users\Administrator.JCG> Get-ClusterResource↵

Name               State    OwnerGroup  ResourceType
----               -----    ----------  ------------
ControlScript   Offline  JobCenterCluster   Generic Script
```

For Windows Server 2008, open the command prompt and run the following command.

```
cluster res ControlScript↵
Creating the status list of a resource 'ControlScript' :

Resoruce             Group                Node            Status
-------------------- -------------------- --------------- ------
ControlScript        New service or application   jcgpkg01   online
```

5.3.2.4. Setting Dependencies

This procedure is the same as the dependency setting when starting up the cluster site as the service. Replace "generic service" with "generic script" for reading and set the dependency by referring to Section 5.3.1.2, “Setting Dependency”.

5.3.2.5. Setting the Cluster Resource Parameters

Set the cluster resource parameters.

From Windows PowerShell, specify the cluster site name and the site database path for the cluster resource parameters.

Here, specify the name of the created cluster site for "SiteName", and the path of the site database for "DBPath". Start Windows PowerShell, and then run the following commands:

Use a machine whose disk state is on-line and whose node is the same as the owner node to run the commands.

■Example of setting the cluster site name

```
PS C:\Users\Administrator.JCG> Get-ClusterGroup JobCenterCluster | Get-ClusterResource
 ControlScript | Set-ClusterParameter SiteName "jcgpkg"↵
```

■Example of setting the site database path

```
PS C:\Users\Administrator.JCG> Get-ClusterGroup JobCenterCluster | Get-ClusterResource
 ControlScript | Set-ClusterParameter DBPath "Y:\Jobdb"↵
```

■Checking the setting result

```
PS C:\Users\Administrator.JCG> Get-ClusterGroup JobCenterCluster | Get-ClusterResource
 ControlScript | Get-ClusterParameter↵

Object            Name            Value                    Type
------            ----            -----                    ----
ControlScript     ScriptFilepath  Y:\JobCenterCluster.vbs  String
ControlScript     SiteName        jcgpkg                   String
ControlScript     DBPath          Y:\Jobdb                 String
```

If the ScriptFilepath, SiteName, and DBPath parameters are set, the JobCenter cluster environment has been built successfully.

In the setting example, the command according to the parameter set in Table 5.1, "JobCenter Site Parameters" is executed. Specify the parameters shown in the setting example according to the building environment.

For Windows Server 2008, open the command prompt and run the following command.

■Example of setting the cluster site name

```
cluster res ControlScript /priv SiteName="jcpkg1"↵
```

■Example of setting the site database path

```
cluster res ControlScript /priv DBPath="Y:\jobdb"↵
```

■Check the setting result.

```
cluster res ControlScript /priv↵

Creating the status list of private properties of 'ControlScript' :

T  Resource            Name                          Value
-- ------------------- ----------------------------- ----------------------
S  ControlScript       ScriptFilepath                Y:\JobCenterCluster.vbs
```

```
S  ControlScript        SiteName                        jcgpkg
S  ControlScript        DBPath                          Y:\jobdb
```

5.4. Checking the WSFC Cluster Operation

Building of the cluster environment has been completed. Check that operations such as failover are properly performed.

By default, the active server tries to restore the system without failing over to the standby server if a failure occurs in the operation node. Change the settings appropriately according to your operation method.

6 Oracle Clusterware

This chapter describes an example of building a cluster environment by using Oracle clustering software "Oracle Clusterware".

For information about procedures for creating the JobCenter cluster site up until a startup check, refer to Chapter 2, 「Overview of Building the JobCenter Cluster Environment」 .

6.1. Overview

6.1.1. System Requirements

This manual is based on the environment shown below.

Product	Version
Oracle Linux	5.6
Oracle Clusterware	11g Release 2 (11.2)
MasterScope JobCenter	12.5.7

6.1.2. Overview of Coordination

Oracle Clusterware is required to configure Oracle Real Application Cluster (RAC), and is based on the Active-Active configuration. However, the JobCenter clustering feature does not support the Active-Active configuration.

JobCenter operates on either node as a virtual host associated with VIP, and is based on the Active-Standby configuration that switches the node in case of a failure (executes a failover). Coordination with Oracle Clusterware is also based on this operation.

The coordination mechanism is as follows:

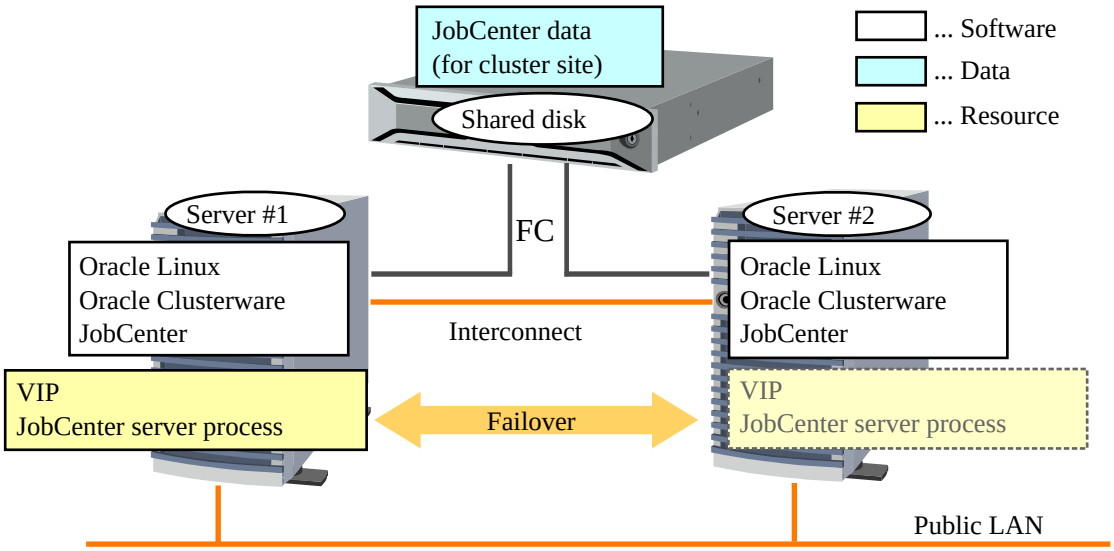

Figure 6.1. Configuration Example

■Server process

A JobCenter server process is registered and managed with Oracle Clusterware as an application resource, and operated on either node. The VIP is also managed because it is needed for the operation. When clustering software detects a JobCenter process being down or a server error, it executes a failover, activates the VIP on another node, and restarts JobCenter.

■Shared disk

For JobCenter, to inherit data when a failover occurs, data must be stored in a shared disk that can be referred to by all nodes. In Figure 6.1, “Configuration Example”, the shared disk is located outside the server and connected via Fibre Channel. Any format of shared disk is possible as long as it can be referred to by all nodes.

Oracle Clusterware is based on the RAC configuration, and does not have a feature for controlling accesses for disk partitions like other HA cluster software has. Therefore, the shared disk provided for the cluster can be accessed by all nodes simultaneously.

Because the JobCenter process for clusters is managed by Oracle Clusterware as an application resource, it only accesses the shared disk from an active node. However, other processes may access the shared disk, which may cause malfunction. Therefore, configure the system so that JobCenter data on the shared disk is only accessed from the active node.

6.2. Registering a Service with Oracle Clusterware

First, set up Oracle Clusterware, and then configure the cluster. For the procedure, refer to the Oracle Clusterware manual.

This section describes how to register a service with Oracle Clusterware, assuming the JobCenter site parameters are as shown below.

The description below is based on the environment and parameters indicated in Table 6.1, "Example of Site Parameters". Adapt them to your environment when executing a command.

Table 6.1. Example of Site Parameters

Parameter	Value
Cluster site name	testsite
Machine ID	100
JobCenter site database path	/mnt/jobdb
Application VIP resource name	jobcenter_vip
Application VIP IP address	10.10.100.100
Server pool resource name	jobcenter_sp
Server name to register with the server pool resource.	oracle-cw1 and oracle-cw2
Action script path	/opt/oracle/cluster/scripts/as_jobcenter.sh
Application resource name	jobcenter_res

6.2.1. Oracle Clusterware: Enabling VIP (Active Server)

To create a JobCenter cluster site, the virtual host name and VIP (floating IP) for the cluster site must be available. Therefore, create an application VIP resource by using Oracle Clusterware, and then start it up on an active server.

Follow the procedure below on the active server.

6.2.1.1. Creating an Application VIP Resource

Run the command below to create an application VIP resource.

```
$Grid_home/bin/appvipcfg create -network=<network number> -ip=<VIP for JobCenter> \-
vipname=<resource name> -user=<resource owner>
```

$Grid_home is the directory in which Oracle Grid Infrastructure is installed. It is used on the command line throughout this manual.

\ represents a line break, but input the command in one line.

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/appvipcfg create -network=1 -ip=10.10.100.100 \
-vipname=jobcenter_vip -user=root ↵
Production Copyright 2007, 2008, Oracle. All rights reserved
2011-12-01 14:17:14: Skipping type creation
2011-12-01 14:17:14: Create the Resource
2011-12-01 14:17:14: Executing cmd: \
/u01/app/11.2.0/grid/bin/crsctl add resource testsite \
-type app.appvip.type -attr USR_ORA_VIP=10.10.100.100, \
```

```
START_DEPENDENCIES=hard(ora.net1.network) pullup(ora.net1.network), \
STOP_DEPENDENCIES=hard(ora.net1.network), \
ACL='owner:root:rwx,pgrp:root:r-x,other::r--,group:oinstall:r-x,user:grid:r-x'
```

Run the follow command to confirm that the resource is created correctly.

```
$Grid_home/bin/crsctl status resource <resource name> -p
```

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl status resource jobcenter_vip -p ↵
NAME=jobcenter_vip
TYPE=app.appvip.type
ACL=owner:root:rwx,pgrp:root:r-x,other::r--,group:oinstall:r-x,user:grid:r-x
ACTION_FAILURE_TEMPLATE=
ACTION_SCRIPT=
ACTIVE_PLACEMENT=0
AGENT_FILENAME=%CRS_HOME%/bin/orarootagent%CRS_EXE_SUFFIX%
AUTO_START=restore
CARDINALITY=1
CHECK_INTERVAL=1
DEFAULT_TEMPLATE=
DEGREE=1
DESCRIPTION=Application VIP
ENABLED=1
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=
LOAD=1
LOGGING_LEVEL=1
NLS_LANG=US7ASCII
NOT_RESTARTING_TEMPLATE=
OFFLINE_CHECK_INTERVAL=0
PLACEMENT=balanced
PROFILE_CHANGE_TEMPLATE=
RESTART_ATTEMPTS=0
SCRIPT_TIMEOUT=60
SERVER_POOLS=*
START_DEPENDENCIES=hard(ora.net1.network) pullup(ora.net1.network)
START_TIMEOUT=0
STATE_CHANGE_TEMPLATE=
STOP_DEPENDENCIES=hard(ora.net1.network)
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ENV=
USR_ORA_VIP=10.10.100.100
VERSION=11.2.0.1.0
```

6.2.1.2. Starting the Application VIP Resource

Run the command below to start the application VIP resource created.

```
$Grid_home/bin/crsctl start resource <resource name>
```

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl start resource jobcenter_vip ↵
```

```
CRS-2672: Starting 'jobcenter_vip'('oracle-cw1')...
CRS-2676: 'jobcenter_vip'('oracle-cw1') started successfully.
```

If the resource attribute is "PLACEMENT=balanced" and the server name is not specified, the resource starts on a low loaded server. To start a resource on a specific server, specify the -n option.

```
$Grid_home/bin/crsctl start resource <resource name> [-n <server name>]
```

6.2.2. JobCenter: Creating a Site Database (Active Server)

Create a site database by referring to Section 2.3.5, “Creating the JobCenter Site Database (Active Server)”.

6.2.3. Oracle Clusterware: Registering an Application Resource

Register JobCenter on Oracle Clusterware as an application resource.

6.2.3.1. Creating a Server Pool Resource

First, create a server pool resource for JobCenter. Specify the names of the servers subject to failover for SERVER_NAMES, and specify generic server pools for PARENT_POOLS.

Run the following command on one of the servers that make up the cluster:

```
$Grid_home/bin/crsctl add serverpool <server pool name> \
-attr "PARENT_POOLS=Generic, SERVER_NAMES=<server-name server-name...>"
```

\ represents a line break, but input the command in one line.

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl add serverpool jobcenter_sp \
-attr "PARENT_POOLS=Generic, SERVER_NAMES=oracle-cw1 oracle-cw2" ↵
```

Run the command below to check the server pool resource created.

```
# /u01/app/11.2.0/grid/bin/crsctl status serverpool jobcenter_sp -p ↵
NAME=jobcenter_sp
IMPORTANCE=0
MIN_SIZE=0
MAX_SIZE=-1
SERVER_NAMES=oracle-cw1 oracle-cw2
PARENT_POOLS=Generic
EXCLUSIVE_POOLS=
ACL=owner:oracle:rwx,pgrp:oinstall:rwx,other::r--
```

6.2.3.2. Creating an Action Script

Create a script (action script) that defines each action (start, stop, check, clear) executed by Oracle Clusterware so that the JobCenter cluster site can be started, stopped, and monitored. For details about each action, refer to the Oracle Clusterware manual.

■Place a created action script on each server that make up the cluster (with the same path name) or a location that can be accessed by both servers.

■The permissions of the administrator user (root) must be assigned.

An example of action script is as follows:

```
#!/bin/sh
cjccmd=/usr/lib/nqs/cluster/cjcpw
sitename=testsite
sitepath=/mnt/jobdb
countmax=18
countsleep=10

case $1 in
'start')
    count=0
    cjcexist=0
    /usr/lib/nqs/cluster/cjcpw $sitename $sitepath >/dev/null 2>&1 &
    while [ $count -lt $countmax ]
    do
        NQSPID=`/usr/lib/nqs/cluster/cjcls | grep "^ *$sitename " | awk '{ print $2 }'`
        if [[ "$NQSPID" =~ ^[0-9]+$ ]];
        then
            cjcexist=1
            break
        else
            count=`expr $count + 1`
            sleep $countsleep
        fi
    done

    if [ $cjcexist -eq 1 ];
    then
        echo "cjcpw: started"
        RET=0
    else
        echo "cjcpw: timeout for starting."
        RET=1
    fi
    ;;
'stop')
    /usr/lib/nqs/cluster/cjcpw -stop $sitename
    RET=$?

    count=0
    while [ $count -lt $countmax ]
    do
        CJCPID=`ps -ef | grep "$cjccmd $sitename" | grep -v grep | awk '{ print $2 }'`
        if [ "X$CJCPID" = "X" ];
        then
            echo "cjcpw: stopped"
            break
        else
            count=`expr $count + 1`
            sleep $countsleep
        fi
    done
```

```
    ;;
'check')
    CJCPID=`ps -ef | grep "$cjccmd $sitename" | grep -v grep | awk '{ print $2 }'`
    if [ "X$CJCPID" != "X" ];
    then
        echo "running"
        RET=0
    else
        echo "not running"
        RET=1
        /usr/lib/nqs/cluster/cjcpw -stop $sitename >/dev/null 2>&1
    fi
    ;;
'clean')
    /usr/lib/nqs/cluster/cjcpw -stop $sitename
    RET=$?

    count=0
    while [ $count -lt $countmax ]
    do
        CJCPID=`ps -ef | grep "$cjccmd $sitename" | grep -v grep | awk '{ print $2 }'`
        if [ "X$CJCPID" = "X" ];
        then
            echo "cjcpw: stopped"
            break
        else
            count=`expr $count + 1`
            sleep $countsleep
        fi
    done
    ;;
*)
    echo "Usage: "`basename $0`" {start|stop|check|clean}"
    RET=0
    ;;
esac

# EXESTATUS_CHECK
# 0: success; 1 : error

if [ $RET -eq 0 ];
then
    exit 0
else
    exit 1
fi
```

This section describes the contents included in the action script.

■Variables

The following variables are defined at the beginning of the script:

Variable name	Content
cjccmd	The command path for controlling the JobCenter cluster site
sitename	JobCenter cluster site name

Variable name	Content
sitepath	JobCenter cluster site database path
countmax	Maximum value (count) of JobCenter process confirmation
countsleep	Interval of JobCenter process confirmation (in seconds)

■Processing details

Each action executes processing corresponding to the Oracle Clusterware actions (start, stop, check, clean).

Action	Processing details
start	It starts the cluster site initiated by the cjcpw command and waits for start completion based on confirmation by using the cjcls command.
stop	It stops the cluster site by using the cjcpw command and waits for the process to stop completely.
check	It monitors whether the cjcpw command is running. If the cluster site being down is detected, it issues the stop command to address this.
clean	It stops the cluster site by using the cjcpw command and waits for the process to stop completely.

Oracle Clusterware executes the check action defined in the action script at the following timings:

■At the interval (in seconds) specified for the resource attribute "CHECK_INTERVAL"

■After the "start", "stop", or "clean" action defined in the action script is executed

The resource status (cluster site status) is checked based on the exit code in the check action processing result. In the above example, exit code "0" is returned if the JobCenter process (cjcpw) exists, and exit code "1" is returned if it does not exist.

6.2.3.3. Creating an Application Resource

Register the JobCenter cluster site as an application resource, associating resources and scripts created.

Run the resource creation command on either of the servers that make up the cluster.

```
$Grid_home/bin/crsctl add resource <resource name> -type cluster_resource \
-attr "<resource attribute>, <resource attribute>, ..."
```

\ represents a line break, but input the command in one line.

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl add resource jobcenter_res -type cluster_resource \
-attr "ACTION_SCRIPT=/opt/oracle/cluster/scripts/as_jobcenter.sh, \
PLACEMENT='restricted', \
SERVER_POOLS=jobcenter_sp, \
CHECK_INTERVAL='30', \
RESTART_ATTEMPTS='1', \
SCRIPT_TIMEOUT='300', \
START_TIMEOUT='600', \
STOP_TIMEOUT='600', \
```

```
START_DEPENDENCIES='hard(jobcenter_vip)pullup(jobcenter_vip)', \
STOP_DEPENDENCIES='hard(jobcenter_vip)'" ↵
```

The values of resource attributes should be changed according to your configuration. For details about the resource attributes, refer to the Oracle Clusterware manual. The table below describes the typical attributes shown in the above registration example.

Resource attributes	Description
PLACEMENT	Specify how servers are selected when the resource starts. Specify "restricted" because only the servers that belong to the specified server pools are targeted.
ACTION_SCRIPT	Specify the absolute path of the script created in Section 6.2.3.2, "Creating an Action Script".
SCRIPT_TIMEOUT	The time-out time (in seconds) after executing the action script. Specify a time longer than the actual execution time.
SERVER_POOLS	Specify the server pool on which the resource can start. Specify the server pool resource name created in Section 6.2.3.1, "Creating a Server Pool Resource".
CHECK_INTERVAL	Specify the interval (in seconds) for repeating the check action.
RESTART_ATTEMPTS	Number of times of trying to restart the resource on the current server before executing failover when a resource down is detected by the check action, etc.
START_DEPENDENCIES	Define the dependencies at startup. Associate with the VIP resource created in Section 6.2.1.1, "Creating an Application VIP Resource" by the hard and pullup dependencies.
START_TIMEOUT	The time-out time (in seconds) after executing the start action. Specify a time longer than the actual time required for startup.
STOP_DEPENDENCIES	Define the dependencies at stoppage. Associate with the VIP resource created in Section 6.2.1.1, "Creating an Application VIP Resource".
STOP_TIMEOUT	The time-out time (in seconds) after executing the stop action. Specify a time longer than the actual time required for stoppage.

Run the command below to confirm the resource is created as expected.

```
# /u01/app/11.2.0/grid/bin/crsctl status resource jobcenter_res -p ↵
NAME=jobcenter_res
TYPE=cluster_resource
ACL=owner:root:rwx,pgrp:root:r-x,other::r--
ACTION_FAILURE_TEMPLATE=
ACTION_SCRIPT=/opt/oracle/cluster/scripts/as_jobcenter.sh
ACTIVE_PLACEMENT=0
AGENT_FILENAME=%CRS_HOME%/bin/scriptagent
AUTO_START=restore
CARDINALITY=1
CHECK_INTERVAL=30
DEFAULT_TEMPLATE=
DEGREE=1
DESCRIPTION=
ENABLED=1
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=
```

```
LOAD=1
LOGGING_LEVEL=1
NOT_RESTARTING_TEMPLATE=
OFFLINE_CHECK_INTERVAL=0
PLACEMENT=restricted
PROFILE_CHANGE_TEMPLATE=
RESTART_ATTEMPTS=1
SCRIPT_TIMEOUT=300
SERVER_POOLS=jobcenter_sp
START_DEPENDENCIES=hard(jobcenter_vip)pullup(jobcenter_vip)
START_TIMEOUT=600
STATE_CHANGE_TEMPLATE=
STOP_DEPENDENCIES=hard(jobcenter_vip)
STOP_TIMEOUT=600
UPTIME_THRESHOLD=1h
```

6.2.4. Oracle Clusterware: Starting the JobCenter Cluster Site

Run the command below to start the application resource registered with Oracle Clusterware (JobCenter cluster site).

```
$Grid_home/bin/crsctl start resource  <resource name>
```

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl start resource jobcenter_res ↵
CRS-2672: Starting 'jobcenter_res'('oracle-cw1')...
CRS-2676: 'jobcenter_res'('oracle-cw1') started successfully.
```

6.3. Verifying the Operation

Through the procedures up to the previous section, JobCenter has been registered with Oracle Clusterware and started successfully. Finally, verify its operation.

6.3.1. Failover

Run the following command to restart JobCenter on another node when a failover occurs:

```
$Grid_home/bin/crsctl relocate resource <resource name> -f
```

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl relocate resource jobcenter_res -f ↵
CRS-2673: Stopping 'jobcenter_res'('oracle-cw1')...
CRS-2677: 'jobcenter_res'('oracle-cw1') stopped successfully.
CRS-2673: Stopping 'testsite'('oracle-cw1')...
CRS-2677: 'testsite'('oracle-cw1') stopped successfully.
CRS-2672: Starting 'testsite'('oracle-cw2')...
CRS-2676: 'testsite'('oracle-cw2') started successfully.
CRS-2672: Starting 'jobcenter_res'('oracle-cw2')...
CRS-2676: 'jobcenter_res'('oracle-cw2') started successfully.
```

6.3.2. Stopping the Application Resource

Run the following command to stop the application resource to stop the JobCenter cluster site:

```
$Grid_home/bin/crsctl stop resource <resource name>
```

An execution example is as follows:

```
# /u01/app/11.2.0/grid/bin/crsctl stop resource jobcenter_res ↵
CRS-2673: Stopping 'jobcenter_res'('oracle-cw1')...
CRS-2677: 'jobcenter_res'('oracle-cw1') stopped successfully.
```

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