FUJITSU

FUJITSU Software
Symfoware Server V12.0.0

Cluster Operation Guide

Windows

Preface

Purpose of This Document

This document explains the items required to operate Symfoware Server on a cluster system.

Intended Readers

This document is aimed at people who install and operate Symfoware Server on a cluster system. Readers of this document are also assumed to have general knowledge of:

- PostgreSQL

- SQL

- Windows

- Windows Failover Clustering feature

Structure of This Document

This document is structured as follows:

```
First edition: April 2014
```

Copyright

Contents

Chapter 1 Definition of Cluster Operation

This chapter explains the features of a cluster system, the types of cluster operations, and the operation mode.

1.1 What Is a Cluster System?

A cluster system is a system that joins multiple systems (hereafter referred to as nodes) to achieve high availability.

High availability

If one of the nodes in a cluster system fails for any reason, any jobs operating on the node can be taken over by another node, keeping at a minimum the time that a system must be stopped. Because a normally functioning node takes over a job while the failed node is being repaired, recovery can be performed without any interruption to the job.

1.2 Cluster Operation Provided by Symfoware Server

The Symfoware Server provide the standby feature of failover operation. The operation mode they support is 1:1 standby.

An overview of failover operation follows.

Definition of failover operation in Symfoware Server

Failover is a feature in cluster systems to transfer a job operating on a node to another one when an abnormality occurs on the node.

The operation for performing failover is referred to as failover operation.

The presence of failover operation in Symfoware Server allows highly available systems to be constructed.

Feature of failover operation

Failover operation in Symfoware Server supports the standby feature.

When an abnormality occurs on a node, the standby feature activates the instance that is the standby system at the time of the switch, and transfers the job to it.

Operation mode of failover operation

The operation mode supported in failover operation in Symfoware Server is 1:1 standby.

1:1 standby is a mode in which one active system or standby system operates on one node. Because failover allows jobs to continue when an abnormality occurs in the active system, this mode allows highly reliable systems to be constructed.
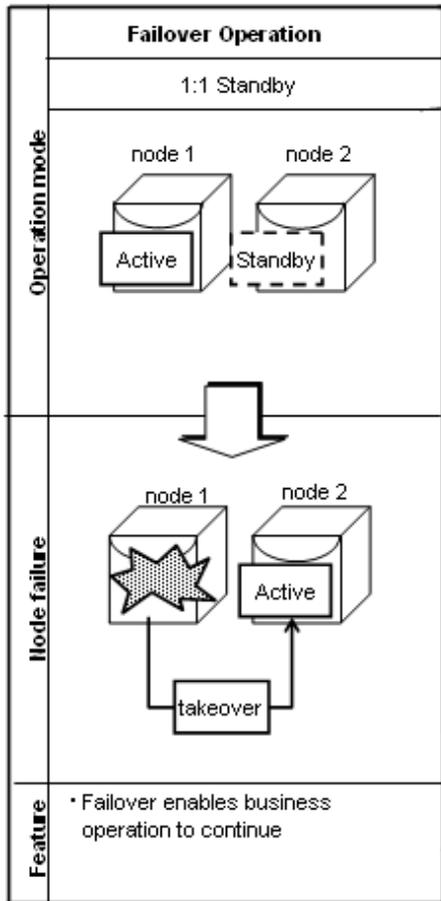
Chapter 2 Overview of Failover Operation

This chapter provides an overview of failover operation in Symfoware Server.

2.1 Definition of Failover Operation

When an abnormality occurs on any of the multiple server devices that make up the cluster system (hereafter referred to as "nodes"), the failover feature transfers a job operating on such a node to another one. Failover can reduce the time for which jobs are stopped when an abnormality occurs, and allows jobs to continue while the node on which the abnormality occurred is recovered.

Figure 2.1 Concept of failover
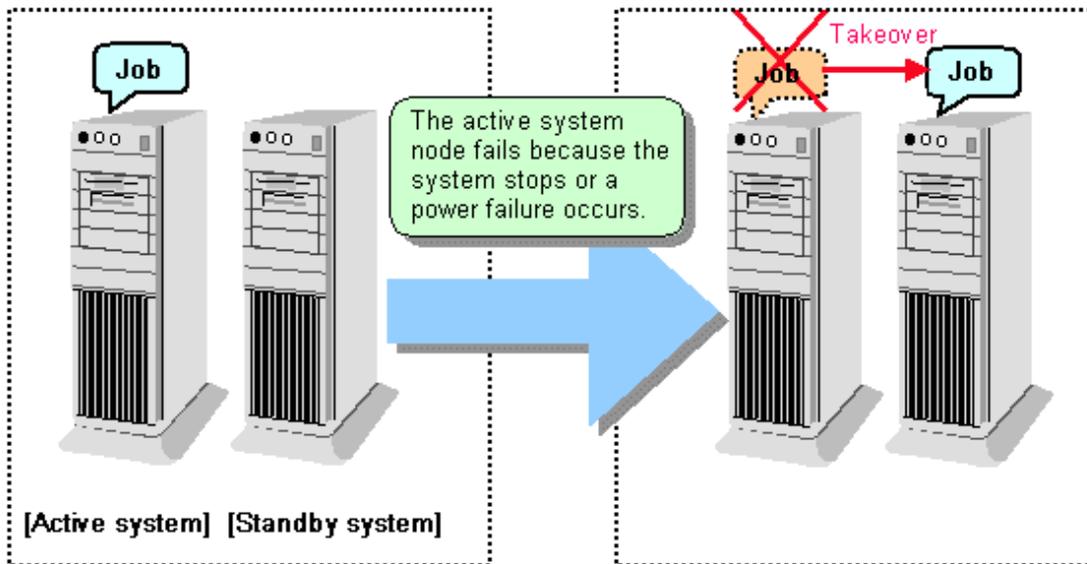
2.2 System Configuration of Failover Operation

In the illustration below, the file system is on a shared disk, mounted on node 1 only.

The following Symfoware Server resources are located in this file system:

- Data storage destination directory

- Tablespaces

- Backup data storage destination directory

- Transaction log storage destination directory

A Symfoware Server process waits for connections of user applications that access the database, on a client access point activated on node 1 only.
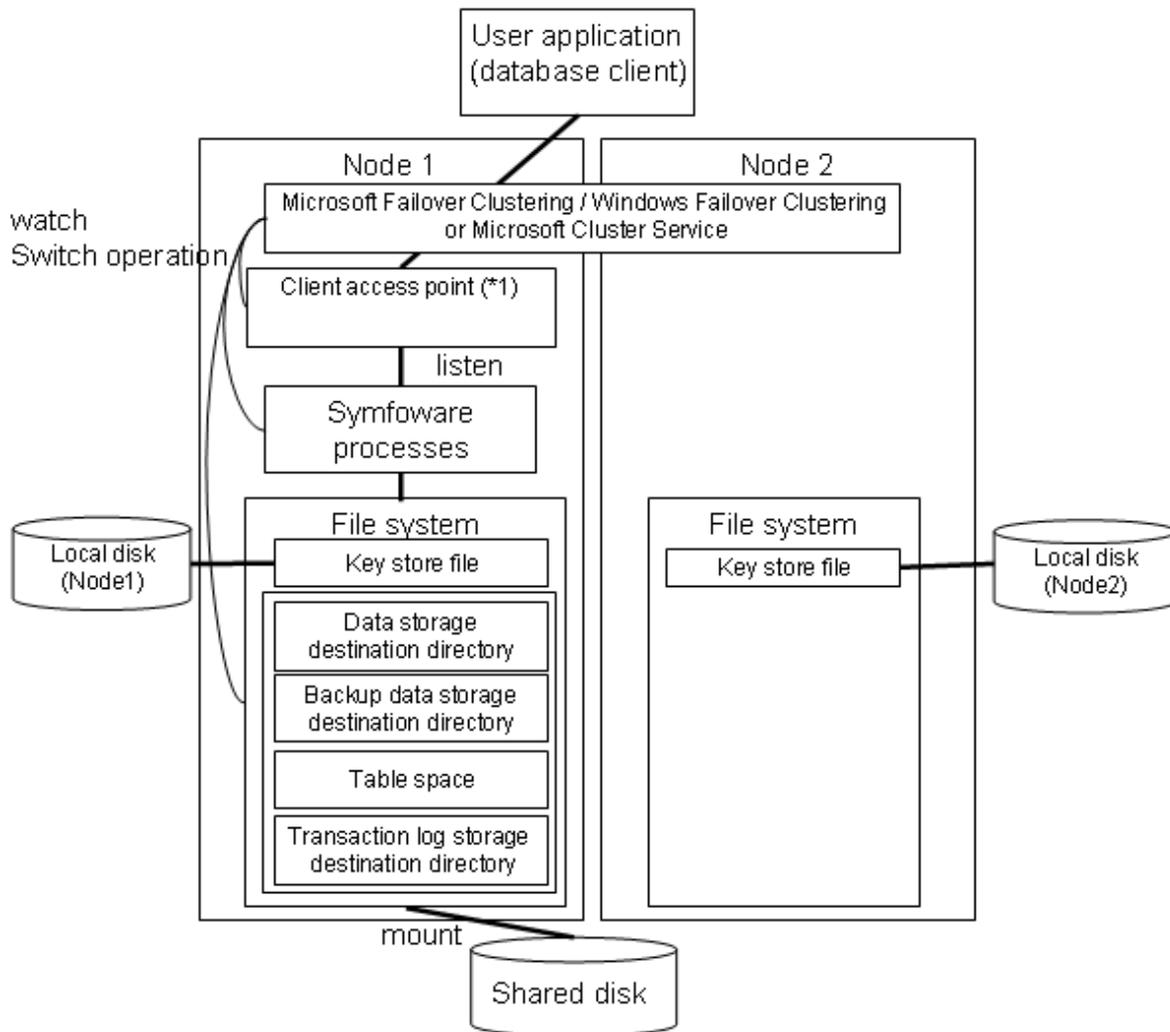
*1: A client access point is an IP address given to a cluster service.
A client that connects to a database can connect continually to an active database server by connecting to this IP address.
In Windows Server(R) 2003, this IP address is called a "cluster IP address".

When an error is detected on node 1, Microsoft Failover Clustering / Windows Failover Clustering or Microsoft Cluster Service mounts the file system on node 2 and activates the client access point on node 2. The Symfoware Server process is also started on node 2. Since the client access point remains unchanged, the user application can access Symfoware Server process on node 2 simply by re-establishing the database connection.
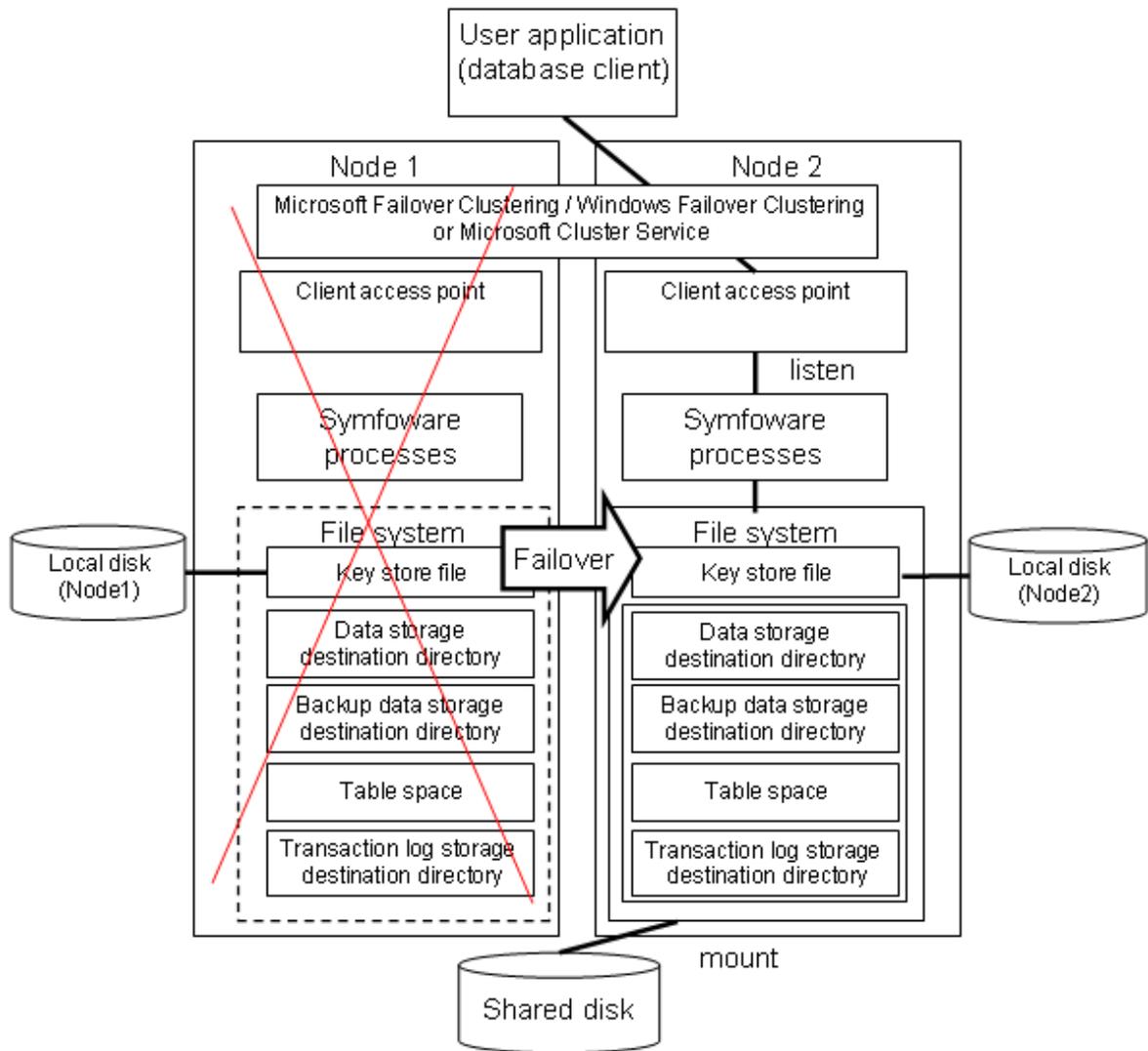
Chapter 3 Setting Up Failover Operation when Linked with Microsoft Failover Clustering / Windows Failover Clustering

This chapter explains how to set up failover operation when linked with Microsoft Failover Clustering / Windows Failover Clustering.

Microsoft Failover Clustering / Windows Failover Clustering is abbreviated below as "MSFC".

3.1 Flow of Failover Operation Setup

Failover is the process whereby jobs that were being operated on the active node are taken over by the standby node when an error occurs on the Symfoware Server node.

To run failover operation linked with MSFC on Symfoware Server, you must register the services and applications in MSFC and set up Symfoware Server.

To set up failover operation, use the failover cluster management tool.

The failover cluster management tool refers to the following tool on each operating system:

- Windows Server(R) 2008

  Failover Cluster Management

- Windows Server(R) 2008 R2 or Windows Server(R) 2012

  Failover Cluster Manager

The failover cluster management tool is an application that manages clusters on the local machine and remote machines.

The procedure for setting up failover operation can be performed using the following steps:

- Configure the settings required for setting up Symfoware Server in MSFC.

- Set up Symfoware Server.

- Register the Symfoware Server service in MSFC.

The flow for setting up Symfoware Server and failover operation is shown below.

Figure 3.1 Flow of failover operation setup
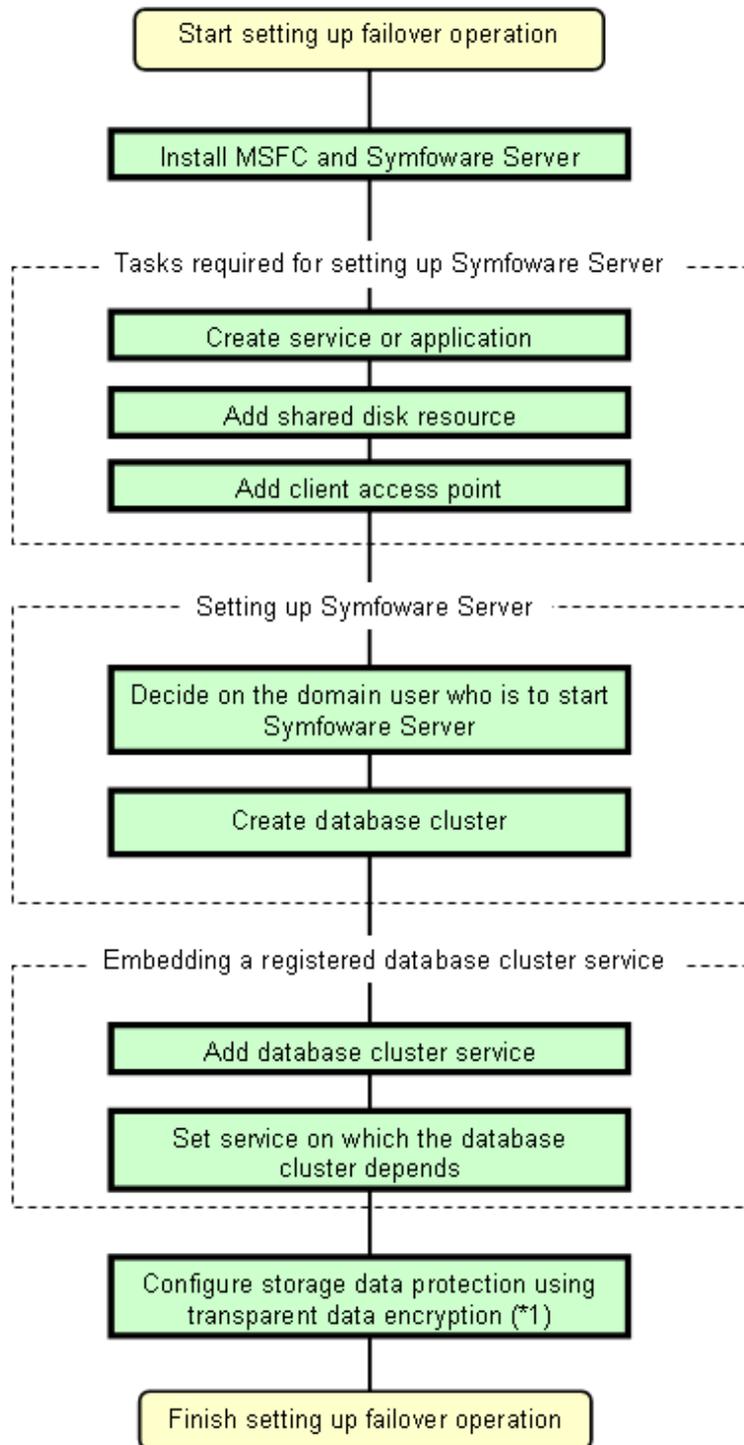
*1: Must be set only if the transparent data encryption function is used.

3.2 Setup of Failover Operation

This section explains the operation procedure illustrated in Figure 3.1. Perform the procedure in accordance with "Figure 3.1 Flow of failover operation setup".

3.2.1 Installing MSFC and Symfoware Server

Refer to the manual for each product, and then install each product.

📚 See
....
Refer to the "Installation and Setup Guide for Server" for information on how to install Symfoware Server.
....

3.2.2 Tasks Required for Setting Up Symfoware Server

Register services and applications for the failover operation on only one node using the failover cluster management tool.

This section explains the following operation procedures:

- Creating a service or application for failover operation

- Adding a shared disk resource

- Adding a client access point

Creating a service or application for failover operation

If using the Windows Server(R) 2008 or Windows Server(R) 2008 R2 failover cluster management tool, click [Services and Applications] and then in the menu click [More Actions] >> [Create Empty Service or Application] and create a service or application. Then click [Service or Application] that you created and then in the menu click [Rename] and rename the service or application as you want.

If using the Windows Server(R) 2012 failover cluster management tool, click [Roles] and then in the menu click [Create Empty Role] and create a role. Then click [New Role] that you created and then in the menu click [Properties] and rename the role as you want.

Adding a shared disk resource

The following resources of Symfoware Server must be located in the file system on a shared disk:

- Data storage destination directory

- Tablespaces

- Backup data storage destination directory

- Transaction log storage destination directory

Click [Service or Application] that you created and then in the menu click [Add storage] and add a disk. If using multiple disks in the database cluster, add all the disks.

📁 Note
....
- Locate the data storage destination directory or tablespaces in a different shared disk from the backup data storage destination directory in case the file system is corrupted.

- Locate the data storage destination directory in a different shared disk from the transaction log storage destination directory so that the I/O load is distributed.
....

Adding a client access point

To run operations using a client access point, add the client access point.

Click [Service or Application] that you created and then in the menu click [Add a resource] >> [Client Access Point] and add a client access point.

3.2.3 Setting Up Symfoware Server

Deciding on the domain user who is to start Symfoware Server

Decide on the domain user who will be the instance administrator. Use a newly added domain user or an existing domain user. To add a domain user, click [Control Panel] >> [Management Tool] and add a domain user in [Active Directory User and Computer]. Refer to "Help" on the [Active Directory User and Computer] window for details.

Note

When setting the domain user who is to start Symfoware Server, set the same name on all nodes that make up the cluster system.

Creating a database cluster

Refer to "Using the initdb Command" in "Creating an instance " in the Installation and Setup Guide for Server and create a database cluster. Note the points below when creating a database cluster.

Note

- Refer to the general notes on creating a database cluster in the opening paragraph of the reference before selecting a procedure in "Using the initdb Command".

- The following items must be considered if you are linking to a cluster system:

    - Create a database cluster on one node only. A shared disk must be able to be referenced on the node where you create the database cluster.

    - When creating a database cluster, specify directories on a shared disk as the data storage destination directory, tablespaces, backup data storage destination directory, and transaction log storage destination directory.

    - Since postgresql.conf is stored in the data directory, it becomes a common configuration file for each node in the shared disk. Therefore, it must be taken into account that the path set for postgresql.conf must be valid for the Symfoware Server processes started on each node. For example, if a local directory is specified in the core_directory parameter, that local directory must have been created on all nodes.

    - The value specified for the port parameter in postgresql.conf needs to be set in the services files on all nodes.

    - Register the same service name on the active node and standby node. Specifying different service names may cause startup and failover to fail.

    - To execute the Symfoware Server commands, you must configure the environment variables on each node. Refer to "Configure the environment variablus" in "Creating an Instance" in the Installation and Setup Guide for Server.

    - Specify "off" for the restart_after_crash parameter in postgresql.conf.
      If "on" is specified, or the default value is used for the restart_after_crash parameter, behaviors equivalent to restarting the Symfoware Server, including crash recovery, will be performed when some server processes go down. When linking with a cluster system, however, a failover will occur after an error is detected as soon as some server processes go down, and server processes restarting will be forced to stop. This is to inhibit complex behaviors such as processes being canceled in the middle of restarting for no particular meaningful purpose.

3.2.4 Embedding a Registered Database Cluster Service

Adding a database cluster service

Add a Symfoware Server service.

Click [Service or Application] that you created and then in the menu click [Add Resource] >> [Generic Service] and add the Symfoware Server service to be run using MSFC. Specify the service name you registered as explained in "Creating a database cluster" for the service to be added.

Setting a service on which the database cluster depends

Click [Service or Application] that you created and select the resource you added as explained in "Adding a database cluster service".

Then click [Properties] in the menu to display the properties window. Click the [Dependencies] tab in the properties window and set the dependency relationship of the resource. Set the dependency relationship so that the shared disk resource and client access point come online before the Symfoware Server service comes online.

Sequence for setting the dependency relationship

1. Shared disk resource

2. Client access point

3.3 Configuring Storage Data Protection Using Transparent Data Encryption

If using transparent data encryption, refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide to configure it. Take note on the following when configuring it:

Location of the keystore file

Do not specify a shared disk for the keystore_location parameter in postgresql.conf. Instead, specify a local directory with the same path on all nodes that comprise the cluster.

If you specify a shared disk, startup of the Symfoware Server service will fail. This is because the keystore.aks file, which is generated when automatic opening of the keystore is enabled, is obfuscated so that it can only be read on the node where it was generated, and therefore it cannot be shared across the shared disk.

Distribution of the keystore file

The master encryption key settings must be common across all nodes. For this reason, configure the master encryption key settings on one node, and then copy the keystore file to each node. Also, if the master encryption key or passphrase is changed, you must also copy the keystore file to each node.

Enabling automatic opening of the keystore

Automatic opening of the keystore must be enabled in all nodes that comprise the cluster. Note that, when enabling the automatic opening of the keystore, only the directory in which the keystore file is stored will be referenced, therefore tasks such as starting and stopping the shared disk are not required.

If you have not enabled automatic opening of the keystore, startup of the Symfoware Server service will fail. This is because the startup process will not finish, since it waits for the manual input of the passphrase that opens the keystore.

3.4 Checking Operation

To check if the environment was configured correctly, start the Symfoware Server service using the failover cluster management tool and check failover and Symfoware Server operations.

Chapter 4 Setting Up Failover Operation when Linked with Microsoft Cluster Service

This chapter explains how to set up failover operation when linked with Microsoft Cluster Service.

Microsoft Cluster Service is abbreviated below as "MSCS".

4.1 Flow of Failover Operation Setup

Failover is the process whereby jobs that were being operated on the active node are taken over by the standby node when an error occurs on the Symfoware Server node.

To run failover operation linked with MSCS on Symfoware Server, you must set up Symfoware Server and register services and applications in MSCS.

To set up failover operation, use the failover cluster management tool.

The failover cluster management tool refers to the following tool:

- Windows Server(R) 2003

  Cluster Administrator

Cluster Administrator is an application that manages clusters on the local machine and remote machines.

The procedure for setting up failover operation can be performed using the following steps:

- Set up Symfoware Server.
- Register the Symfoware Server service in MSCS.

The flow for setting up Symfoware Server and failover operation is shown below.

Figure 4.1 Flow of failover operation setup


```
┌─────────────────────────────────────┐
│   Start setting up failover operation│
└─────────────────────────────────────┘
                 │
┌─────────────────────────────────────┐
│   Install MSCS and Symfoware Server  │
└─────────────────────────────────────┘
                 │
┌ ─ ─ ─ ─ ─ Setting up Symfoware Server ─ ─ ─ ─ ─ ┐
│                                                 │
│  ┌───────────────────────────────┐              │
│  │ Create domain user who is to start │          │
│  │      Symfoware Server          │             │
│  └───────────────────────────────┘              │
│                 │                               │
│  ┌───────────────────────────────┐              │
│  │     Create database cluster    │             │
│  └───────────────────────────────┘              │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

┌ ─ ─ Registering services and applications in MSCS ─ ─ ┐
│                                                       │
│  ┌───────────────────────────────┐                    │
│  │        Register a group        │                   │
│  └───────────────────────────────┘                    │
│                 │                                     │
│  ┌───────────────────────────────┐                    │
│  │   Register a cluster IP address │                   │
│  └───────────────────────────────┘                    │
│                 │                                     │
│  ┌───────────────────────────────┐                    │
│  │     Register a network name    │                   │
│  └───────────────────────────────┘                    │
│                 │                                     │
│  ┌───────────────────────────────┐                    │
│  │ Move the shared disk to a different group │         │
│  └───────────────────────────────┘                    │
│                 │                                     │
│  ┌───────────────────────────────┐                    │
│  │       Register a service       │                   │
│  └───────────────────────────────┘                    │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                 │
┌─────────────────────────────────────┐
│ Configure storage data protection using │
│  transparent data encryption (*1)    │
└─────────────────────────────────────┘
                 │
┌─────────────────────────────────────┐
│  Finish setting up failover operation│
└─────────────────────────────────────┘
```

*1: Must be set only if the transparent data encryption function is used.

4.2 Flow of Failover Operation Setup

This section explains the operation procedure illustrated in Figure 4.1. Perform the procedure in accordance with "Figure 4.1 Flow of failover operation setup".

4.2.1 Installing MSCS and Symfoware Server

Refer to the manual for each product, and then install each product.

See

. . . .

Refer to the "Installation and Setup Guide for Server" for information on how to install Symfoware Server.

. . . .

4.2.2 Setting Up Symfoware Server

Creating on the domain user who is to start Symfoware Server

Refer to "Deciding on the domain user who is to start Symfoware Server" in "Setting Up Failover Operation when Linked with Microsoft Failover Clustering / Windows Failover Clustering" for information on how to create a user who will start Symfoware Server.

Creating a database cluster

Refer to "Creating a database cluster" in "Setting Up Failover Operation when Linked with Microsoft Failover Clustering / Windows Failover Clustering" for information on how to create a database cluster.

4.2.3 Registering Services and Applications in MSCS

Register services and applications for the failover operation in MSCS on only one node using Cluster Administrator.

This section explains the following operation procedures:

- Registering a group

- Registering a cluster IP address

- Registering a network name

- Moving the shared disk to a different group

- Registering a service

Registering a group

The failover operation is processed per group in a cluster.

Register an environment consisting of an active/standby node pair as a single group in MSCS.

The items to be registered in a group are as follows:

- Symfoware Server database cluster service

- Cluster IP address

- Network name

- Shared disk

To register a group:

1. Start group registration

   Click [Cluster Administrator] >> [File] >> [New] >> [Group].

2. Specify the name of the group

   A window for configuring a new group is displayed.
   Specify the name and description of the group to be registered, and then click [Next].

3. Specify the preferred owner of the group.

   Specify the sequence of the nodes for determining on which node the group to be registered is to be preferentially executed.

   Clicking [Finish] registers the group.

One database cluster forms one group, so give each database cluster a group name that makes it easily recognizable.

Registering a cluster IP address

Register a cluster IP address for the group.

To register a cluster IP address:

1. Start resource registration

   Click [Cluster Administrator] >> [File] >> [New] >> [Resource].

2. Specify the name of a resource

   A window for configuring the new resource is displayed.
   Specify the name, description, resource type, and group of the resource to be registered, and then click [Next].

3. Specify the executable owners

   A window for setting the executable owners is displayed.
   Specify a node and click [Next].

4. Specify the dependency relationships

   A window for configuring dependency relationships is displayed. Specify the resources that must be brought online by MSCS and click [Next].

5. Specify the cluster IP address parameters

   Specify the network, address, and subnet mask to be used, and then click [Finish].

   The following table shows the settings for the cluster IP address to be registered:

Item	Setting
Resource name	Any name
Resource type	"IP address"
Group	Group name of database cluster
Executable owners	Nodes making up the cluster system
Network to be used	Network name
Address	Value of the TCP/IP address
Subnet mask	Subnet mask

Registering a network name

Register the virtual network name corresponding to the IP address.

An IP address is required for this resource, so register the corresponding IP address for the same group and configure the dependency relationships.

Refer to "Registering a cluster IP address" for information on registering a network name.

Moving the shared disk to a different group

Move the shared disk that was defined when you developed the cluster system using MSCS to the group you registered as explained in "Registering a group".

To move the shared disk to a different group:

1. Select the shared disk

   Select the shared disk to be moved and click [Cluster Administrator] >> [File] >> [Move Group].

2. Select the destination group

   Select the destination group from the list of created groups.

Registering a service

Register a database cluster service as a single resource in MSCS.

To register a service:

1. Start resource registration

   Click [Cluster Administrator] >> [File] >> [New] >> [Resource].

2. Specify the name of a resource

   A window for configuring the new resource is displayed.
   Specify the name, description, resource type, and group of the resource to be registered, and then click [Next].

   Specify information such as the dependency relationships.

   The following table shows the settings for each service to be registered:

Item	Setting
Resource name	Any name
Resource type	"Generic service"
Group	Group created in accordance with this chapter
Executable owners	Nodes making up the cluster system
Dependency relationships	Shared disk configured in accordance with this chapter Cluster IP address configured in accordance with this chapter
Service name	Service name registered as explained in "Creating a database cluster"

4.3 Configuring Storage Data Protection Using Transparent Data Encryption

Refer to "3.3 Configuring Storage Data Protection Using Transparent Data Encryption" in "Setting Up Failover Operation when Linked with Microsoft Failover Clustering / Windows Failover Clustering".

4.4 Checking Operation

To check if the environment was configured correctly, start the Symfoware Server service using Cluster Administrator and check switching and Symfoware Server operations.

Chapter 5 Failover Operation

This chapter explains the procedures involved in failover operation.

5.1 Operations under Normal Circumstances

Starting and stopping

For cluster operations, perform starting and stopping from the failover cluster management tool. If starting and stopping are performed by using the pg_ctl command, net command, or sc command or from the Windows service window during failover operation, the failover cluster management tool will misjudge that services have gone down, resulting in unexpected behaviors.

Switching

There are two ways to switch between the active node and the standby node, as shown below.

- MSFC:

    - If using the Windows Server(R) 2008 or Windows Server(R) 2008 R2 failover cluster management tool, go to the console tree and right-click [Service or Application] that you created as explained in "Creating a service or application for failover operation". Click [Move this service or application to another node] and select the switch destination node.

    - If using the Windows Server(R) 2012 failover cluster management tool, go to the console tree and click [Roles] >> [Service or Application] that you created as explained in "Creating a service or application for failover operation". Then in the menu click [Move] >> [Best Possible Node] or [Select Node] and select the best possible node.

- MSCS:

    Click [Cluster Administrator], right-click [Group], and click [Move Group].

5.2 Operation at State Transition

Symfoware Server runs on only one node, and clients communicate with Symfoware Server via a cluster IP address.

The workflow for operation at state transition is shown below.

Activation during failover operation will be performed automatically.

Procedure for failover operation

The flow for operating Symfoware Server when running failover operation is shown below.

Figure 5.1 Flow for operating Symfoware Server when running failover operation
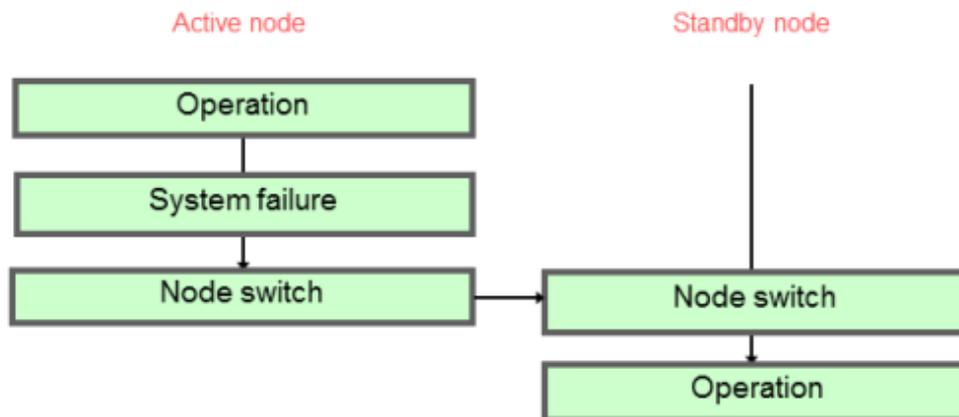
Non-transferrable feature

- All transactions being processed on the active node will be rolled back.

- The statistics Symfoware Server has collected will be initialized. The statistics will be initialized in any of the following cases. Refer to the notes outlined in "Starting and Stopping an Instance" in the Operation Guide for details.

    - When the node goes down because of a kernel panic, for example

    - When the Symfoware Server service ends abnormally

5.3 Notes and Actions to Take When Creating an Application

Notes to be taken when creating an application

For the IP address to be specified when creating an application, specify the cluster IP address. By doing this, the application can be executed by just re-executing it without any changes made when state transition occurs.

Actions for the application when state transition occurs

This section explains the error information that is returned to client applications connected to Symfoware Server when Symfoware Server is switched, and actions to be taken.

Table 5.1 JDBC driver

Status		Error information (*1)	Action
Node is down or Symfoware Server system is down	Went down during access	57P01 08006	After switch is completed, reestablish the connection, or execute the application again.
	Accessed while node/system is down	08001	
Switch to standby node	Switched during access	57P01 08006	
	Accessed while switching	08001	

*1: This is the return value of getSQLState() in SQLException.

Table 5.2 ODBC driver

Status		Error information (*1)	Action
Node is down or Symfoware Server system is down	Went down during access	57P01 08S01 Empty string	After switch is completed, reestablish the connection, or execute the application again.
	Accessed while node/system is down	08001	
Switch to standby node	Switched during access	57P01 08S01 Empty string	
	Accessed while switching	08001	

*1: This is the return value of SQLSTATE.

Table 5.3 .NET Data Provider

Status		Error information	Action
Node is down or Symfoware Server system is down	Went down during access	57P01 (*1) Empty string (*1) A NullReferenceException occurs	After switch is completed, reestablish the connection, or execute the application again.
	Accessed while node/system is down	Empty string (*1)	
Switch to standby node	Switched during access	57P01 (*1) Empty string (*1) A NullReferenceException occurs	
	Accessed while switching	Empty string (*1)	

*1: This is the return value of the "Code" attribute in NpgsqlException.

Table 5.4 libpq - C library

Status		Error information	Action
Node is down or Symfoware Server system is down	Went down during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	After switch is completed, reestablish the connection, or execute the application again.
	Accessed while node/system is down	CONNECTION_BAD(*3)	
Switch to standby node	Switched during access	PGRES_FATAL_ERROR(*1) 57P01(*2) NULL(*2)	
	Accessed while switching	CONNECTION_BAD(*3)	

*1: This is the return value of PQresultStatus().

*2: This is the return value of PG_DIAG_SQLSTATE in PQresultErrorField().

*3: This is the return value of PQstatus().

Table 5.5 ECPG - Embedded SQL in C

Status		Error information(*1)	Action
Node is down or Symfoware Server system is down	Went down during access	57P01 57P02 YE000 26000	After switch is completed, reestablish the connection, or execute the application again.
	Accessed while node/system is down	08001	
Switch to standby node	Switched during access	57P01 57P02	

Status		Error information(*1)	Action
		YE000	
		26000	
	Accessed while switching	08001	

*1: This is the return value of SQLSTATE.

5.4 Maintenance Tasks

Perform simultaneous stopped node maintenance when you need to recover the database or perform maintenance on hardware shared by the active node and standby node, such as a disk, or hardware related to resources registered in a cluster service. Consider performing mutual switch maintenance when you need to apply patches or perform maintenance on hardware other than that indicated above, such as the CPU and memory. Mutual switch maintenance enables you to perform maintenance without stopping jobs.

The procedures for simultaneous stopped node maintenance and mutual switch maintenance are shown below in "Maintenance workflows".

Refer to the tasks outlined below in either "Figure 5.2 Workflow for simultaneous stopped node maintenance" or "Figure 5.3 Workflow for mutual switch maintenance", and perform your maintenance tasks accordingly.

Maintenance workflows

Figure 5.2 Workflow for simultaneous stopped node maintenance
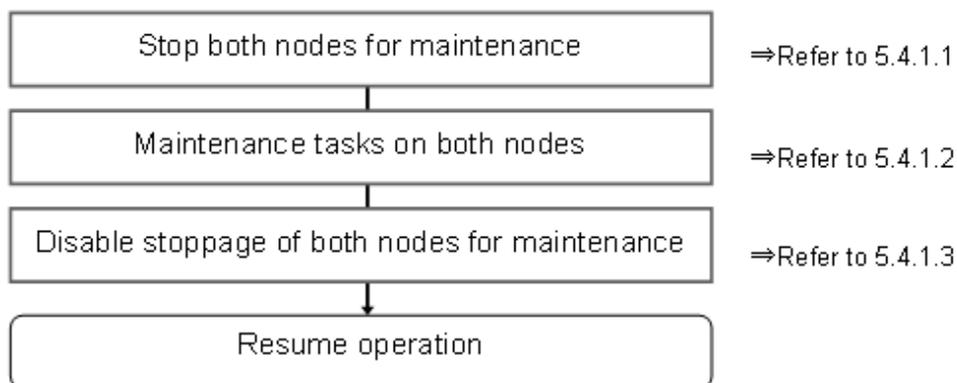
Figure 5.3 Workflow for mutual switch maintenance
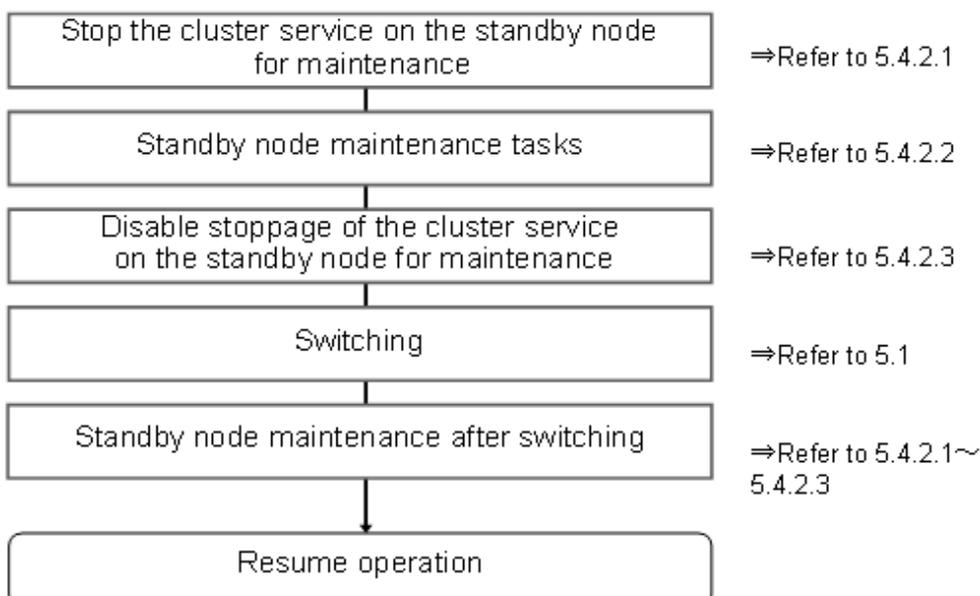
5.4.1 Simultaneous Stopped Node Maintenance

This section explains the procedure for stopping both the active and standby nodes simultaneously to perform maintenance.

5.4.1.1 Stopping Both Nodes for Maintenance

Use the following procedure to stop both nodes for maintenance:

- Stopping both nodes for maintenance using MSFC

- Stopping both nodes for maintenance using MSCS

Stopping both nodes for maintenance using MSFC

1. Select the standby node in the console tree of the failover cluster management tool, and in the menu click [More Actions] >> [Stop Cluster Service].

2. The Symfoware service on the active node will also be stopped, but if the cluster service is stopped, the disk cannot be brought online. For example, use the following procedure if the task requires access to the disk, such as disk maintenance and database recovery:

   - If using the Windows Server(R) 2008 or Windows Server(R) 2008 R2 failover cluster management tool, go to the console tree and click all [Service or Application] that include a disk where Symfoware resources are located, and then in the menu click [Take this service or application offline].

   - If using the Windows Server(R) 2012 failover cluster management tool, go to the console tree and click [Roles]. Then click all [Service or Application] that include a disk where the Symfoware resources of the failover cluster management tool are located, and then in the menu click [Stop Role].

3. If using the Windows Server(R) 2008 or Windows Server(R) 2008 R2 failover cluster management tool and performing a task that requires access to the disk, go to the list of storage areas and select the disk that must be accessed, and then in the menu click [Bring this resource online].

   If using the Windows Server(R) 2012 failover cluster management tool and performing a task that requires access to the disk, go to the list of storage areas and select the disk that must be accessed, and then in the menu click [Bring Online].

Stopping both nodes for maintenance using MSCS

1. Select the standby node in the console tree of [Cluster Administrator] and click [File] >> [Stop Cluster Service].

2. The Symfoware service on the active node will also be stopped, but if the cluster service is stopped, the disk cannot be brought online. For example, use the following procedure if the task requires access to the disk, such as disk maintenance and database recovery:

   Go to the console tree of [Cluster Administrator] and right-click all [Group] that use a disk where Symfoware resources are located, and then click [Take Offline].

3. If performing a task that requires access to the disk, right-click the disk and click [Online].

5.4.1.2 Maintenance Tasks on Both Nodes

Perform maintenance tasks to recover the database or maintain hardware shared by the active node and standby node, such as a disk, or hardware related to resources registered in a cluster service.

5.4.1.3 Disabling Stoppage of Both Nodes for Maintenance

Use the following procedure to disable stoppage of both nodes:

- Disabling stoppage of both nodes for maintenance using MSFC

- Disabling stoppage of both nodes for maintenance using MSCS

Disabling stoppage of both nodes for maintenance using MSFC

1. If using the Windows Server(R) 2008 or Windows Server(R) 2008 R2 failover cluster management tool, go to the console tree and click [Service or Application], and then in the menu click [Bring this service or application online].

   If using the Windows Server(R) 2012 failover cluster management tool, go to the console tree and click [Roles] >> all [Service or Application] which were stopped for maintenance tasks, and then in the menu click [Start Role].

2. Select the standby node in the console tree of the failover cluster management tool, and in the menu click [More Actions] >> [Start Cluster Service].

Disabling stoppage of both nodes for maintenance using MSCS

1. Go to the console tree of [Cluster Administrator] and right-click [Groups], and click [Bring Online].

2. Select the standby node in the console tree of [Cluster Administrator] and click [File] >> [Start Cluster Service].

5.4.2 Mutual Switch Maintenance

This section explains the procedure for performing maintenance on the standby node while running the active node.

5.4.2.1 Stopping the Cluster Service on the Standby Node for Maintenance

Use the following procedure to stop only the cluster service on the standby node for maintenance:

- Stopping only the cluster service on the standby node for maintenance using MSFC
- Stopping only the cluster service on the standby node for maintenance using MSCS

Stopping only the cluster service on the standby node for maintenance using MSFC

Select the standby node in the console tree of the failover cluster management tool, and in the menu click [More Actions] >> [Stop Cluster Service].

Stopping only the cluster service on the standby node for maintenance using MSCS

Select the standby node in the console tree of [Cluster Administrator] and click [File] >> [Stop Cluster Service].

5.4.2.2 Standby Node Maintenance Tasks

Perform maintenance tasks such as patch application and hardware component replacement.

5.4.2.3 Disabling Stoppage of the Cluster Service on the Standby Node for Maintenance

Use the following procedure to disable stoppage of only the cluster service on the standby node for maintenance:

- Disabling stoppage of only the cluster service on the standby node for maintenance using MSFC
- Disabling stoppage of only the cluster service on the standby node for maintenance using MSCS

Disabling stoppage of only the cluster service on the standby node for maintenance using MSFC

Select the standby node in the console tree of the failover cluster management tool, and in the menu click [More Actions] >> [Start Cluster Service].

Disabling stoppage of only the cluster service on the standby node for maintenance using MSCS

Select the standby node in the console tree of [Cluster Administrator] and click [File] >> [Start Cluster Service].

5.4.2.4 Switching

Refer to "Switching" in "5.1 Operations under Normal Circumstances".

5.4.2.5 Standby Node Maintenance after Switching

To perform maintenance tasks on the node that became the standby node after mutual switching, follow the procedures explained in "5.4.2.1 Stopping the Cluster Service on the Standby Node for Maintenance" to "5.4.2.3 Disabling Stoppage of the Cluster Service on the Standby Node for Maintenance".

Chapter 6 Procedures Required after a Failover Error

This chapter explains how to perform recovery when an abnormality occurs during failover operation.

If an error occurs during failover operation, refer to the event log and identify the cause of the error. Then stop the service and perform recovery. To resume normal operations, restart the service when recovery is complete.

Perform this procedure in accordance with "Figure 6.1 Operation flow when a failover error occurs".

Figure 6.1 Operation flow when a failover error occurs
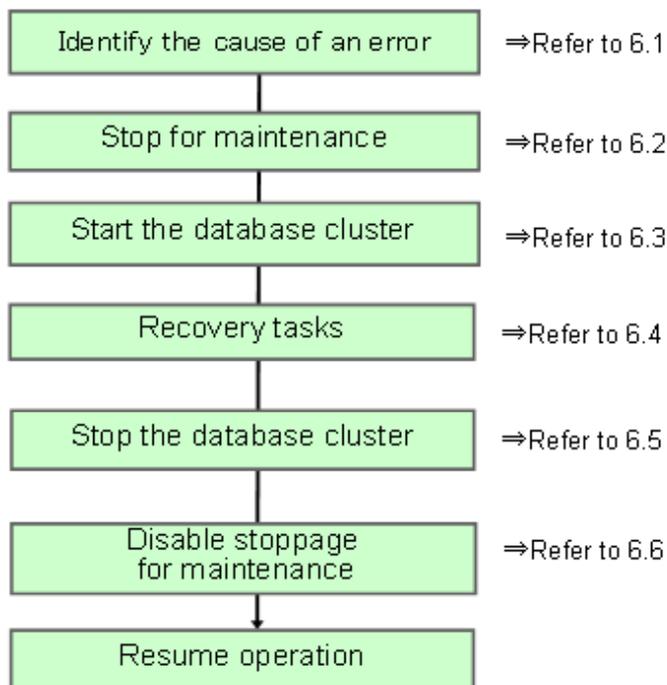
6.1 Identifying the Cause of an Error

If an error occurs during failover operation or if the cluster service fails to start, refer to the event log and identify the cause of the error.

6.2 Stopping for Maintenance

If an error occurs during failover operation, stop the cluster service and perform recovery. Refer to "5.4 Maintenance Tasks" and stop the cluster service for maintenance.

This procedure is not required if the machine stops when the error occurs and the cluster service is stopped.

6.3 Starting the Database Cluster

To perform recovery when an error occurs, it is necessary to start the Symfoware Server without using the failover cluster management tool.

See
....
If the database cluster must be started, refer to "Starting and Stopping an Instance" in the Operation Guide.
....

6.4 Recovery Tasks

Refer to "Actions When an Error Occurs" in the Operation Guide for information on how to perform recovery. If there are two ways available to perform recovery; using WebAdmin or commands, use commands.

6.5 Stopping the Database Cluster

If a database cluster is started, stop the database cluster.

See

Refer to "Starting and Stopping an Instance" in the Operation Guide for information on how to stop the database cluster.

6.6 Disabling Stoppage for Maintenance

Refer to "5.4 Maintenance Tasks" to disable stoppage of the cluster service for maintenance.

Index