FUJITSU Software
PRIMECLUSTER GL for Windows

Setup Guide
for Cluster Systems 4.5

Preface

Purpose of this Manual

This manual is intended to explain installation procedures for setting up the configuration of PRIMECLUSTER GL for Windows 4.5 (hereinafter GLS) in a cluster system.

Intended Readers

This manual is intended for system administrators responsible for setting up the GLS configuration in a cluster system.

It is assumed that readers of this manual have prior knowledge of the following:

- Operating systems

- Cluster systems

- Network hardware and software.

Structure of this Manual

This manual is structured as follows:

Chapter 1 Overview

Gives an overview of installing GLS in a cluster system.

Chapter 2 Layout

Describes how to plan GLS installation in a cluster system.

Chapter 3 Installation

Describes the procedures for installing GLS in a cluster system.

Chapter 4 Command Reference

Describes the GLS commands used in a cluster system.

Appendix A Changes From Previous Versions

Describes new features and changes of the GLS specification.

Related Documentation

- PRIMECLUSTER GL for Windows User's Guide 4.5

- PRIMECLUSTER GL for Windows 4.5 Software Release Guide

Notational Conventions

Product Name Abbreviations

This manual uses the following abbreviations for product names:

Abbreviation	Full Name	Comment
GLS	PRIMECLUSTER GL for Windows	
WSFC	Windows Server Failover Cluster	Can work together with GLS in the following environments: - Windows Server 2016 - Windows Server 2019

Command Prompts

Command prompts in this manual are indicated by the "greater than" symbol (>) at the beginning of the line, making example commands appear as follows:

```
> strhanet
```

Please note that GLS command paths are omitted here. With GLS installed in the default directory, if necessary, you can run commands by entering the full path, C:\Program Files\Fujitsu\PRIMECLUSTER GL\usr\command, before the command name.

For example, for above command, the input would be:

C:\Program Files\Fujitsu\PRIMECLUSTER GL\usr\command\strhanet

Also, when you execute GLS commands by a user other than an Administrator of the Administrators group, click [Run as administrator] to open the command prompt.

Symbols

This manual uses the following notational formats for items and reference information requiring extra caution:

Note

This section contains information that you should take extra note of. Make sure that you read this information.

Point

This section contains helpful practical information.

See

This section tells you where to find related reference information.

Information

This section contains useful supplementary information.

Export Controls

Exportation/release of this document may require necessary procedures in accordance with the regulations of your resident country and/or US export control laws.

Trademarks

- Microsoft, MS, MS-DOS, Windows, and Windows Server are trademarks or registered trademarks of Microsoft Corporation in the U.S.A. and other countries.
  All other trademarks are the properties of their respective owners.

- Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

- Ethernet is a registered trademark of Fuji Xerox Co., Ltd.

- Other product names are product names, trademarks, or registered trademarks of these companies.

Note that the trademark (TM) and registered trademark (R) symbols are omitted throughout this manual.

Date of publication and edition

April 2019, First edition

Use in Safety-Critical Systems

This Product has been designed, developed and manufactured contemplating general purposes, including without limitation, general office use, personal use, household use, and ordinary industrial use, but has not been designed, developed and manufactured contemplating use in systems or areas accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal

injury, severe physical damage or other loss (hereinafter "Use in Safety-Critical Systems"), including without limitation, nuclear reaction control in nuclear facilities, aircraft flight control, air traffic control, mass transport control, medical life support systems, missile launch control in weapon systems. You shall not use the Product in Safety-Critical Systems without sufficiently securing the required safety. If you wish to use this Product in Safety-Critical Systems, please consult with our sales representatives in charge beforehand.

Notes

- Do not copy this manual without permission.

- The contents of this manual may be revised without prior notice.

Copyright

Contents

Chapter 1 Overview

This chapter explains the procedures for setting up the GLS configuration for using PRIMECLUSTER GL for Windows (hereinafter GLS) in a cluster system.

1.1 Overview of Functions

If you have GLS installed in WSFC, using GLS virtual adapters for data communication in a user LAN triggers a failover whenever a linkdown of a virtual adapter or an error in the transmission path has been detected.

As such failovers of resource groups are carried out automatically between nodes, availability can be maintained without intervention by an administrator.

Figure 1.1 GLS and the Cluster System
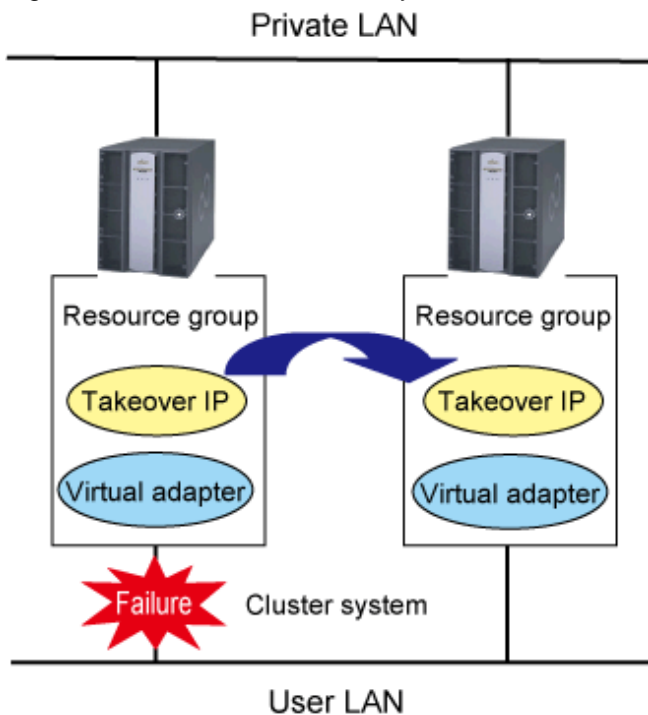
The GLS resource monitor serves to detect linkdowns of virtual adapters and errors in transmission paths. The GLS resource monitor is called up from the Generic Application resources created in "Roles" in WSFC, and monitors the virtual adapter statuses. As soon as the GLS resource monitor detects an error, the Generic Application triggers a failover.

1.2 Structure of Cluster System

The following illustration shows the structure of a cluster system that uses GLS for failing over.

Figure 1.2 Structure of Cluster System Using GLS for Failing Over
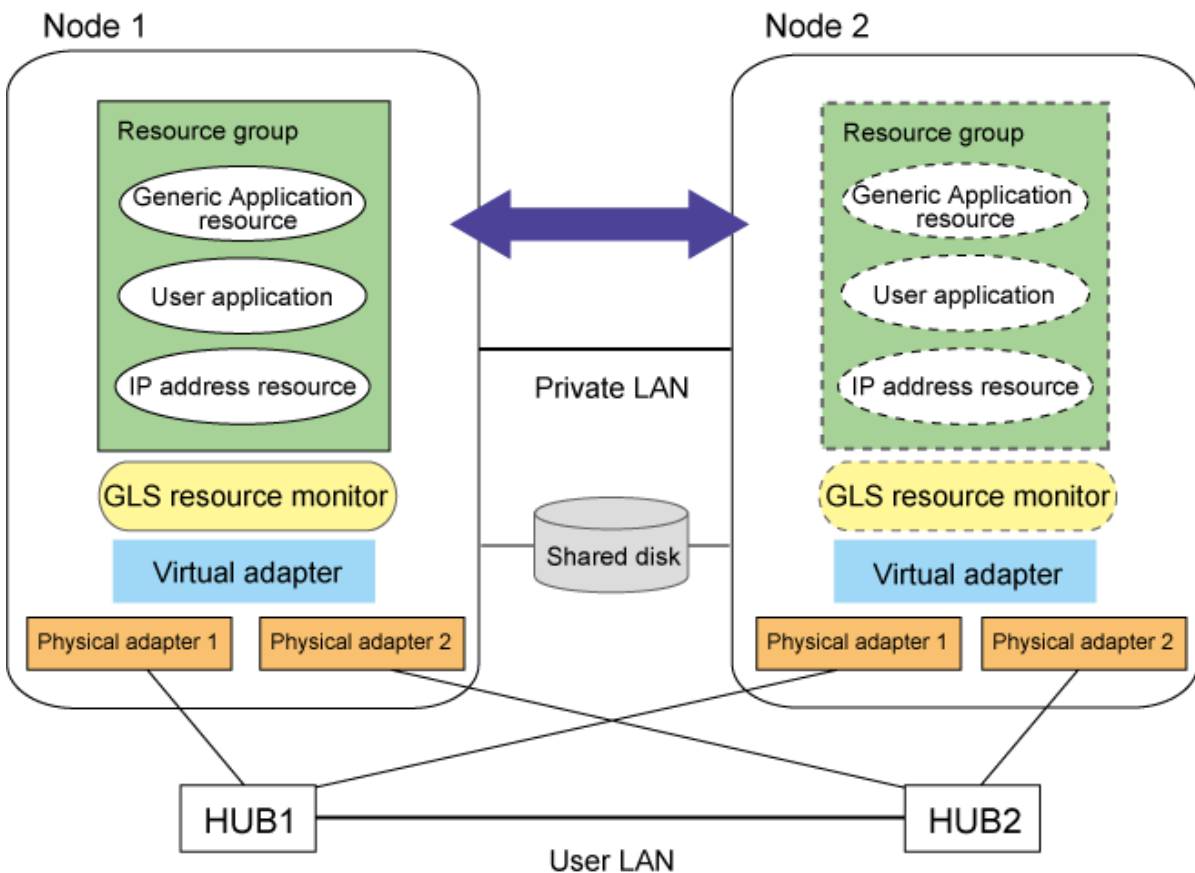
The components of the cluster system are listed below.

Table 1.1 Components of Cluster System

Component	Function
Node 1, Node 2	Nodes making up the cluster system
Resource group	Group of resources for running user applications ("Roles")
User application	Resource for operational software, disk, and network names
IP address resource	IP address resource used in resource group
Generic Application resource	Resource for calling up the GLS resource monitor and triggering failovers
GLS resource monitor	Command for monitoring GLS virtual adapters
Virtual adapter	Virtual adapter generated by GLS; has IP address set for use by a resource group.
Physical Adapter 1, Physical Adapter 2	Physical adapters used for GLS virtual adapters
Hub 1, Hub 2	Ping monitoring targets connected to GLS virtual adapters

GLS: PRIMECLUSTER GL for Windows

1.3 Outline of Setting Up Cluster System

This section gives an overview of setting up a cluster system that is using GLS.

1. Layout

In preparation for installing GLS in your cluster system, you should go through the following steps of layout planning:

- Layout of user LAN

- Layout of resource groups

- Layout of Generic Application resources

- Layout of IP address resources

- Setting of other resources

For further details, refer to "Chapter 2 Layout."

2. Installation

Follow the procedure below for installing GLS in your cluster system:

1. Installation of GLS

   Install GLS in all nodes of the cluster.

2. Creation of virtual adapters

   Create a GLS virtual adapter in every node.

3. Creation of clusters

   Create a cluster that is using virtual adapters for data communication in the user LAN.

4. Creation of resource group(s)

   Create the resource groups that are bundling the resources necessary for failing over.

For further details, refer to "Chapter 3 Installation."

Chapter 2 Layout

This section explains the layout of a cluster system with GLS, using the following models of operation as examples:

- 1:1 active standby setup

- Mutual standby setup

2.1 Layout of 1:1 Active Standby Setup

This section explains the 1:1 active standby setup of a cluster system, a layout for a simple resource group assigning only a single takeover IP address to the user LAN.

Figure 2.1 1:1 Active Standby Setup
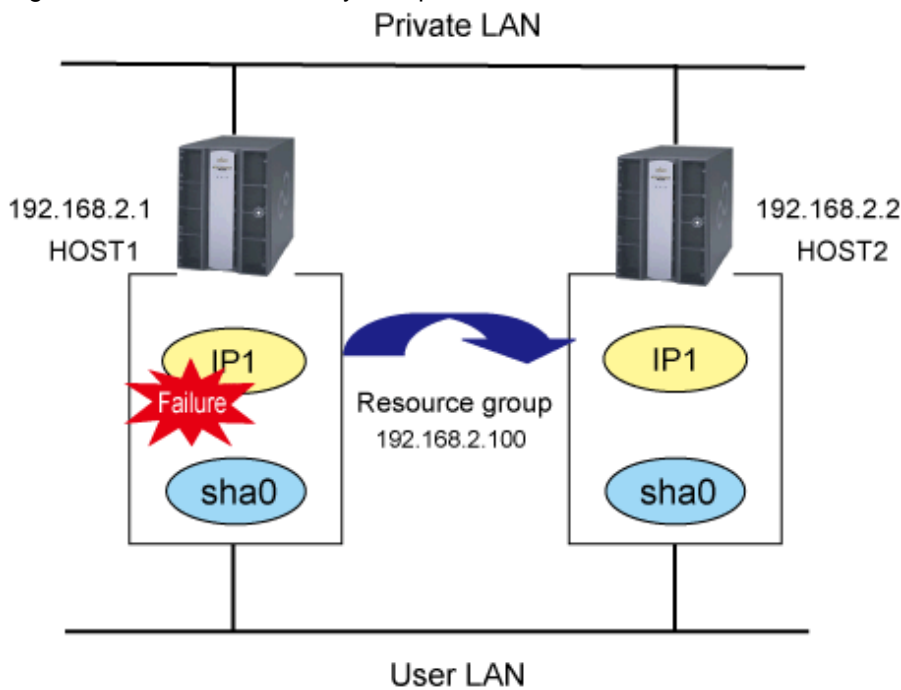
The structure of nodes and groups in above illustration is as follows:

Table 2.1 System Configurations and Settings

System Configuration	Settings
User LAN configuration for HOST1	Contains definitions for GLS virtual adapter sha0. Specific IP address "192.168.2.1" is set for HOST1.
User LAN configuration for HOST2	Contains definitions for GLS virtual adapter sha0. Specific IP address "192.168.2.2" is set for HOST2.
Configuration of resource group	Runs applications on HOST1. Switches operation to HOST2 when HOST1 fails. Uses "IP1" (192.168.2.100) as a takeover IP address for access to the application.

GLS: PRIMECLUSTER GL for Windows

2.1.1 Layout of User LAN

Plan the following layout items for the virtual adapters in all nodes to be used in the user LAN.

Table 2.2 Layout Requirements for Virtual Adapters

Item	Explanation
Virtual adapter name	Set the same name in all nodes for the virtual adapters that are specified targets of takeover IP addresses.
IP address	Assign individual IP addresses in all nodes.
Subnet mask	Assign subnet masks according to the network environment of the user LAN.

Example

The following table shows a sample layout.

Table 2.3 Sample Layout of Virtual Adapters in Every Node

Node name	Item	Settings
HOST1	Virtual adapter name	sha0
	IP address	192.168.2.1
	Subnet mask	255.255.255.0
HOST2	Virtual adapter name	sha0
	IP address	192.168.2.2
	Subnet mask	255.255.255.0

2.1.2 Layout of Resource Groups

Plan the following layout items for resource groups.

Table 2.4 Layout Requirements for Resource Groups

Item	Explanation
Group name	Specify unique names, avoiding duplicate names of other resources and groups.
Preferred owners	Specify the nodes that are to operate at the highest priority. Ex.: For setting HOST1 as an operational node and HOST2 as a standby node, specify HOST1 as a preferred owner.

Example

The following table shows a sample layout.

Table 2.5 Sample Layout of Resource Groups

Item	Settings
Group name	PUBLIC LAN

Item	Settings
Preferred owners	HOST1

2.1.3 Layout of Generic Application Resources

Plan the following layout items for the Generic Application resources that trigger the GLS resource monitor.

Table 2.6 Layout Requirements for Generic Application Resources

Item	Explanation
Name	Specify unique names, avoiding duplicate names of other resources and groups.
Resource type	Specify a Generic Application.
Group	Specify the group in which the resource shall operate.
Dependencies	No setting necessary.
Command line	Specify a command for the GLS resource monitor. For more details, refer to "4.1 GLS Resource Monitor Command."
Parameter	Specify parameters for the GLS resource monitor command.
Current directory	Specify the target directory for the GLS resource monitor to store data.
Registry replication	No setting necessary.

GLS: PRIMECLUSTER GL for Windows

Example

The following table shows a sample layout.

Table 2.7 Sample Layout of Generic Application Resources

Item	Settings
Name	sha0-IP1
Resource type	Generic Application
Group	PUBLIC LAN
Dependencies	None
Command line	GLS installation folder\usr\command\dsphanet.exe
Parameter	-n sha0 -c m -i 5
Current directory	GLS installation folder\usr\command
Registry replication	None

GLS: PRIMECLUSTER GL for Windows

2.1.4 Layout of IP Address Resources

Plan the following layout items for the IP address resources which specify the takeover IP addresses.

Table 2.8 Layout Requirements for IP Address Resources

Item	Explanation
Name	Specify unique names, avoiding duplicate names of other resources and groups.
Resource type	Set IP addresses.
Group	Set the group in which the resource shall operate.
Dependencies	Specify the resources that have to be put online first for the cluster service. At this point, specify the Generic Application resources that trigger the GLS resource monitor.
Address	Set the takeover IP address.
Subnet mask	Specify the subnet mask of the user LAN.
Network	Specify GLS virtual adapters.

GLS: PRIMECLUSTER GL for Windows

Example
. . . .
The following table shows a sample layout.

Table 2.9 Sample Layout of IP Address Resources

Item	Settings
Name	IP1
Resource type	IP address
Group	PUBLIC LAN
Dependencies	sha0-IP1
Address	192.168.2.100
Subnet mask	255.255.255.0
Network	sha0

. . . .

2.1.5 Layout of Other Resources

Add the application resources to be used in the resource group.

Since the layout items depend on the added type of resource, plan the layout as described below.

- When using a takeover IP address for operation of the resource:

    In order to enable the application resource to go online after the IP address resource, set the takeover IP address in Dependencies.

- When switching NetBIOS names between nodes:

    Add the network name resource.

2.2 Layout of Mutual Standby Setup

This section explains the layout of the mutual standby setup of a cluster system, with one takeover IP address each assigned in the user LAN of each resource group in HOST1 and HOST2.

Figure 2.2 Mutual Standby Setup
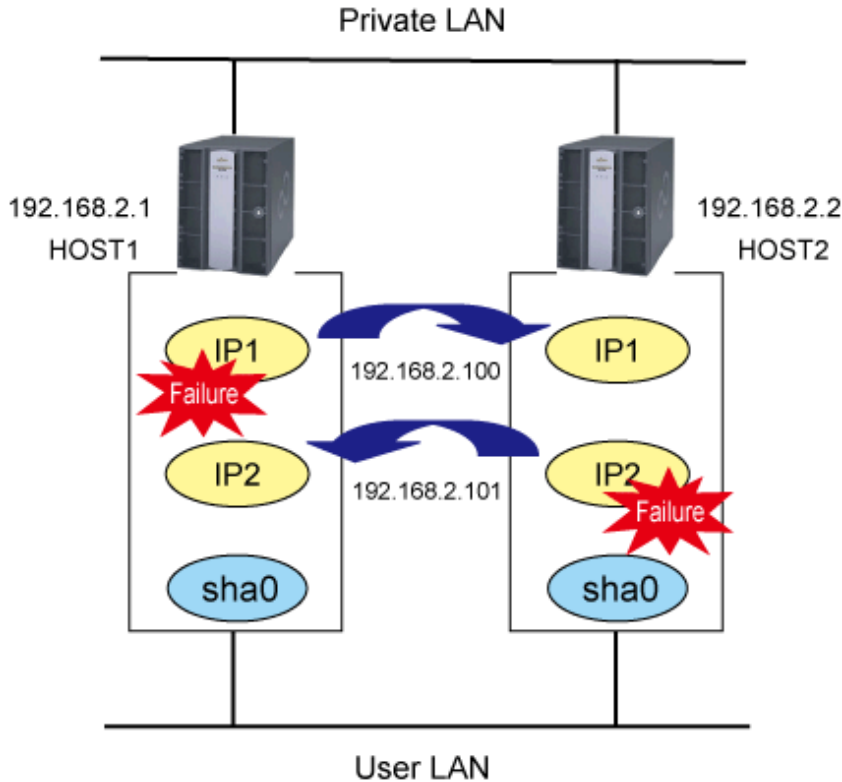
The structure of nodes and groups in above illustration is as follows:

Table 2.10 System Configurations and Settings

System Configuration	Settings
User LAN configuration for HOST1	Contains definitions for GLS virtual adapter sha0. Specific IP address "192.168.2.1" is set for HOST1.
User LAN configuration for HOST2	Contains definitions for GLS virtual adapter sha0. Specific IP address "192.168.2.2" is set for HOST2.
Configuration of resource group	Runs applications on HOST1 and HOST2. When HOST1 fails: Fails operations over to HOST2. Uses "IP1" (192.168.2.100) as a takeover IP address for access to the application. When HOST2 fails: Fails operations over to HOST1. Uses "IP2" (192.168.2.101) as a takeover IP address for access to the application.

GLS: PRIMECLUSTER GL for Windows

2.2.1 Layout of User LAN

Plan the following layout items for the virtual adapters in all nodes to be used in the user LAN.

Table 2.11 Layout Requirements for Virtual Adapters

Item	Explanation
Virtual adapter name	Set the same name in all nodes for the virtual adapters that are specified targets of takeover IP addresses.
IP address	Assign individual IP addresses in all nodes.
Subnet mask	Assign subnet masks according to the network environment of the user LAN.

Example

The following table shows a sample layout.

Table 2.12 Sample Layout of Virtual Adapters in Every Node

Node name	Item	Settings
HOST1	Virtual adapter name	sha0
	IP address	192.168.2.1
	Subnet mask	255.255.255.0
HOST2	Virtual adapter name	sha0
	IP address	192.168.2.2
	Subnet mask	255.255.255.0

2.2.2 Layout of Resource Groups

Create 1 resource group each as operational nodes for HOST1 and for HOST2.

Plan the following layout items for each resource group.

Table 2.13 Layout Requirements for Resource Groups

Item	Explanation
Group name	Specify unique names, avoiding duplicate names of other resources and groups.
Preferred owners	Specify the node that is to operate at the highest priority. Ex.: For setting HOST1 as an operational node and HOST2 as a standby node, specify HOST1 as a preferred owner.

Example

The following tables show sample layouts.

Table 2.14 Preferred Owner: HOST1

Item	Settings
Group name	PUBLIC LAN1
Preferred owners	HOST1

Table 2.15 Preferred Owner: HOST2

Item	Settings
Group name	PUBLIC LAN2
Preferred owners	HOST2

2.2.3 Layout of Generic Application Resources

Create 1 Generic Application in each resource group for triggering the GLS resource monitor.

Plan the following layout items for each resource group.

Table 2.16 Layout Requirements for Generic Application Resources

Item	Explanation
Name	Specify unique names, avoiding duplicate names of other resources and groups.
Resource type	Specify a Generic Application.
Group	Specify the group in which the resource shall operate.
Dependencies	No setting necessary.
Command line	Specify a command for the GLS resource monitor. For more details, refer to "4.1 GLS Resource Monitor Command."
Parameter	Specify parameters for the GLS resource monitor command.
Current directory	Specify the target directory for the GLS resource monitor to store data.
Registry replication	No setting necessary.

GLS: PRIMECLUSTER GL for Windows

 Example

The following tables show sample layouts.

Table 2.17 Preferred Owner: HOST1

Item	Settings
Name	sha0-IP1
Resource type	Generic Application
Group	PUBLIC LAN1
Dependencies	None
Command line	GLS installation folder\usr\command\dsphanet.exe
Parameter	-n sha0 -c m -i 5
Current directory	GLS installation folder\usr\command
Registry replication	None

GLS: PRIMECLUSTER GL for Windows

Table 2.18 Preferred Owner: HOST2

Item	Settings
Name	sha0-IP2

Item	Settings
Resource type	Generic Application
Group	PUBLIC LAN2
Dependencies	None
Command line	GLS installation folder\usr\command\dsphanet.exe
Parameter	-n sha0 -c m -i 5
Current directory	GLS installation folder\usr\command
Registry replication	None

GLS: PRIMECLUSTER GL for Windows

. . . .

2.2.4 Layout of IP Address Resources

Create the IP address resources that specify the takeover IP addresses separately for each resource group.

Plan the following layout items for each resource group.

Table 2.19 Layout Requirements for IP Address Resources

Item	Explanation
Name	Specify unique names, avoiding duplicate names of other resources and groups.
Resource type	Set IP addresses.
Group	Set the group in which the resource shall operate.
Dependencies	Specify the resources that have to be put online first for the cluster service. At this point, specify the Generic Application resources that trigger the GLS resource monitor.
Address	Set the takeover IP address.
Subnet mask	Specify the subnet mask of the user LAN.
Network	Specify GLS virtual adapters.

GLS: PRIMECLUSTER GL for Windows

Example
. . . .
The following tables show sample layouts.

Table 2.20 Preferred Owner: HOST1

Item	Settings
Name	IP1
Resource type	IP address
Group	PUBLIC LAN1
Dependencies	sha0-IP1
Address	192.168.2.100
Subnet mask	255.255.255.0
Network	sha0

Table 2.21 Preferred Owner: HOST2

Item	Settings
Name	IP2
Resource type	IP address
Group	PUBLIC LAN2
Dependencies	sha0-IP2
Address	192.168.2.101
Subnet mask	255.255.255.0
Network	sha0

2.2.5 Layout of Other Resources

Add the application resources to be used in each resource group.

Since the layout items depend on the added type of resource, plan the layout as described below.

 - When using a takeover IP address for operation of the resource:

   In order to enable the application resource to go online after the IP address resource, set the takeover IP address in Dependencies.

 - When switching NetBIOS names between nodes:

   Add the network name resource.

Chapter 3 Installation

This chapter explains the installation procedures for using GLS in a cluster system.

3.1 Installation of GLS

Install GLS in all nodes of the cluster.

📑 See
. . . .

For details on the installation procedure, refer to "GLS Software Release Guide."
. . . .

📒 Note
. . . .

- Use the same GLS installation directory in every node of the cluster system.

- Use identical names for the virtual adapters created in every node of the cluster system.

- With WSFC, adapter teaming for data communication in private LANs is not recommendable. Therefore, GLS virtual adapters should be used only in user LANs.

. . . .

3.2 Creation of Virtual Adapters

Create a GLS virtual adapter in every node.

For details on creating virtual adapters, refer to "Installation" in "PRIMECLUSTER GL for Windows User's Guide 4.5."

3.3 Creation of Clusters

Create a cluster that is using virtual adapters for data communication in the user LAN.

📑 See
. . . .
For details on cluster planning and the installation procedure, refer to the WSFC manuals.
. . . .

3.4 Creation of Resource Group(s)

This section explains the workflow for creating resource groups.

For details, refer to "3.4.1 Installation Procedure for WSFC."

1. Creation of "Roles"

    Create "Roles," for running the necessary resources for operation. As starting, stopping, and failover of operation are carried out in units of "Roles," these units must be defined here.

2. Creation of Generic Application Resources

   Create the Generic Application resources for monitoring the statuses of the virtual adapters.

3. Creation of IP Address Resources

   Create the IP address resources for specifying the takeover IP addresses.

4. Putting "Roles" Online

   Check that the newly created "Roles" is able to go online.

3.4.1 Installation Procedure for WSFC

This section explains the procedure for creating resource groups in WSFC.

3.4.1.1 Cluster Network Settings

The procedure for setting the cluster network is as follows:

1. Select a cluster network that contains GLS virtual adapters.

   In the left frame of the [Failover Cluster Management] window, select the applicable cluster network.

2. Make the settings for the cluster network.

   Open the [Properties] window of the selected [Cluster Network]. Select [Allow the cluster communication this network] and check [Allow the cluster communication this network].

   Click the [OK] button to close this window.

3.4.1.2 Creation of Services and Applications

The procedure for creating services and applications is as follows:

1. Create a service or application.

   In the [Failover Cluster Management] window, select [Services and Applications]. From the pull-down menu displayed by clicking the right mouse button, select [More Actions...] - [Create Empty Service or Application].

2. Set the properties for the service or application.

   Open the [New service or application Properties] window, and specify the [Name] and the [Preferred owners].

   Click the [OK] button to close this window.

3.4.1.3 Creation of Generic Application Resources

The procedure for creating a Generic Application resource is as follows:

1. Create a Generic Application resource.

   From the [Action] menu in the [Failover Cluster Management] window, select [Add a resource] - [Generic Application].

2. Make settings for the Generic Application.

   From the left frame in the [New Resource Wizard] window, select [Generic Application Settings]. Specify the [Command line] and the [Parameters], then click [Next].

   For details on the setting values, refer to the following sections:

   - 1:1 Active Standby Setup

     "2.1.3 Layout of Generic Application Resources"

- Mutual Standby Setup

  "2.2.3 Layout of Generic Application Resources"

The examples of [Generic Application Resources] settings are as follows:

Item	Settings
Command line	GLS installation folder\usr\command\dsphanet.exe
Parameter	-n sha0 -c m -i 5

GLS: PRIMECLUSTER GL for Windows

3. Check that the settings are correct.

   From the left frame in the [New Resource Wizard] window, select [Confirmation]. Check the contents displayed in the right frame, and then, if there is no mistake, click [Next].

   The Generic Application resource is now created. Click the [Finish] button to close this window.

4. Set a name for the resource.

   From the newly created Generic Application resource, open the [dsphanet Application Properties] window, and specify the [Resource Name].

   Click the [OK] button to close this window.

   The examples of [dsphanet Application Properties] settings are as follows:

Item	Settings
Name	sha0-IP1
Command line	GLS installation folder\usr\command\dsphanet.exe
Parameter	-n sha0 -c m -i 5

GLS: PRIMECLUSTER GL for Windows

5. Check the failover settings.

   Select [dsphanet Application Properties] - [Policies] tab.

   The following settings are recommended for GLS:

   [Number of attempts to restart within the specified time]: 0 times

   Check [Fail over all the resources that act this role if the restart fails].

   In the cluster, the restart of resources is attempted for a specified time. If the specified time is 0, the restart is not attempted.

   When a resource is not executed within the specified time, and if [Fail over all the resources that act this role if the restart fails] box is checked, the clustered role is failed over. If the box is unchecked, the resource stops after the restart failed.

   For details, refer to the manual of cluster.

3.4.1.4 Creation of IP Address Resources

The procedure for creating an IP address resource is as follows:

1. Create an IP address resource.

   From the [Action] menu in the [Failover Cluster Management] window, select [Add a resource] - [More resources...] - [Add IP Address].

2. Set IP addresses.

   From the newly created IP address resource, open the [IP Address: <not configured> Properties] window. On the [General] tab, specify the network to which to set the IP address, and the IP address itself.

For details on the setting values, refer to the following sections:

- 1:1 Active Standby Setup

   "2.1.4 Layout of IP Address Resources"

- Mutual Standby Setup

   "2.2.4 Layout of IP Address Resources"

The examples of [IP Address: <not configured> Properties] settings are as follows:

Item	Settings
Name	IP1
Network	192.168.2.0/24
Static IP Adress	192.168.2.100

3. Specify a Generic Application resource in Dependencies.

   Set the Generic Application so as to be put online before the IP address resource. On the [Dependencies] tab in the [IP Address: <not configured> Properties] window, select the Generic Application resource.

🅿 Point
. . . .

When using the GLS ping monitoring, you should set the time in the [Basic resource health check interval] of WSFC longer than the failure detection time of the ping monitoring. If you set the time shorter than the failure detection time of the ping monitoring, a failover may occur before GLS detects an error and switch a network adapter.

. . . .

3.4.1.5 Putting Roles Online

After completing addition of resources to Roles, check that the groups can be put online normally.

1. Put the group online.

   In the left frame of the [Failover Cluster Manager] window, select Roles. From the center frame, select the group that you have created.

   Use any of the following methods to put it online.

   - In the [Action] menu, select [Start Role].

   - In the center frame, right-click and select [Start Role].

2. Check that the value in the Status column switches to "Online".

   Check that the added resource starts normally, and that the Status column in the center frame is displaying "Online".

Chapter 4 Command Reference

This chapter explains the commands used in the cluster system.

For details on command syntax, refer to the "Command Reference" in "PRIMECLUSTER GL for Windows User's Guide 4.5."

4.1 GLS Resource Monitor Command

This section describes the GLS resource monitor command, which is triggered by the Generic Application resources in the cluster system.

Syntax

```
dsphanet -n vadapt -c m|l [-i timer]
```

Function

This command periodically monitors the statuses of the resources in the cluster system. It also displays statuses of the virtual adapters.

After registering this command as a Generic Application resource for the cluster, the command is activated whenever the resources are put online, and stopped when they are put offline. As soon as this command detects an error in a virtual adapter, the command stops and a failover is triggered.

For details on the status display for virtual adapters, refer to "Command Reference" in "PRIMECLUSTER GL for Windows User's Guide 4.5."

Options

-n *vadapt*

Specifies the virtual adapters to be monitored. Based on the settings for this option, statuses of the virtual adapters are periodically monitored.

-c *m*|*l*

Specifies the conditions for failing over. Select from the following conditions:

- Condition specified by "m"

  Failover will be carried out either when a virtual adapter has linked down, or when ping monitoring has detected an error.

- Condition specified by "l"

  Failover will be carried out only when a virtual adapter has linked down.

-i *timer*

This option specifies the intervals (in seconds) for requesting resource statuses from the GLS service. Default value: 5 seconds.

Note

Since this command requests resource statuses from the GLS service, it cannot be used when the GLS service is stopped.

Example

Ex. 1

Setting for failing over when a virtual adapter has linked down or when ping monitoring has detected an error, with 5-second intervals for requesting resource statuses:

```
> dsphanet -n sha0 -c m -i 5
```

Ex. 2

Setting for failing over only when a virtual adapter has linked down, with 5-second intervals for requesting resource statuses:

```
> dsphanet -n sha0 -c l -i 5
```

Appendix A Changes From Previous Versions

This appendix describes new features and changes of the GLS specification.

A.1 Changes from 4.3A00 to 4.3A10

The following table lists the changes from the previous version.

Table A.1 List of Changes from 4.3A00 to 4.3A10

Category	Item	Version
New command	None	-
Incompatible command	None	-
Incompatible function	None	-

A.2 Changes from 4.3A10 to 4.3A20

The following table lists the changes from the previous version.

Table A.2 List of Changes from 4.3A10 to 4.3A20

Category	Item	Version
New command	None	-
Incompatible command	None	-
Incompatible function	Changed the default value of the parameter set for the generic application resource of MSFC.	4.3A20 or later

A.2.1 New Command

There is no new command.

A.2.2 Incompatible Command

There is no incompatible command.

A.2.3 Incompatible Function

This section describes the incompatible function of GLS 4.3A20 from the previous version.

A.2.3.1 Changed the Default Value of the Parameter Set for the Generic Application Resource of MSFC

[Incompatible Content]

For the parameter set for the generic application resource of MSFC, the default value of the -i option is changed to 5, which is the recommended value of MSFC.

[Changes]

Before modification

The default value of the -i option is 10 (recommended value of MSCS).

After modification

The default value of the -i option is 5 (recommended value of MSFC).

A.3 Changes from 4.3A20 to 4.3A30

The following table lists the changes from the previous version.

Table A.3 List of Changes from 4.3A20 to 4.3A30

Category	Item	Version
New command	None	-
Incompatible command	None	-
Incompatible function	None	-

A.4 Changes from 4.3A30 to 4.4A00

The following table lists the changes from the previous version.

Table A.4 List of Changes from 4.3A30 to 4.4A00

Category	Item	Version
New command	None	-
Incompatible command	None	-
Incompatible function	None	-

A.5 Changes from 4.4A00 to 4.5A10

The following table lists the changes from the previous version.

Table A.5 List of Changes from 4.4A00 to 4.5A10

Category	Item	Version
New command	None	-
Incompatible command	None	-
Incompatible function	None	-