

FUJITSU Software

PRIMECLUSTER Wizard for Oracle 4.5

A decorative horizontal band with a red-to-dark-red gradient. It features abstract, glowing white and red lines that swirl and intersect, creating a sense of motion and energy.

Configuration and Administration Guide

Oracle Solaris

J2S0-0471-01ENZ0(01)
August 2021

Preface

Purpose

The purpose of the document is to outline functions of PRIMECLUSTER Wizard for Oracle. Further, it describes the procedures from installation to operation management.

Readers

This document is intended for system engineers and system administrators who design, configure, and manage PRIMECLUSTER systems. The reader should have expertise in the PRIMECLUSTER and Oracle database system.

Outline

The document consists of the following six chapters and seven appendices:

Chapter 1 Feature

Chapter 2 Environment setup

Chapter 3 Operation

Chapter 4 Command

Chapter 5 Notice

Chapter 6 Message

Appendix A Failure case studies

Appendix B Change Oracle Resource Settings

Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation

Appendix D Using Oracle Database Software on shared disks

Appendix E Using PRIMECLUSTER Wizard for Oracle in Oracle Solaris Zones Environment

Appendix F Single-Node Cluster Operation

Appendix G Using Oracle Data Guard/Oracle Active Data Guard

Appendix H Using Oracle Database 18c/19c

Appendix I (Information) Action Definition File

Technical term

For technical words related to clusters in this document, see the manual.

Oracle Solaris might be described as Solaris, Solaris Operating System, or Solaris OS.

Unless otherwise specified, the following words are used for Oracle Database products. For details, see the Oracle Database manuals.

Oracle instance:

Referred to as “instance”, “Oracle instance”, or “Oracle RAC instance” in this document.

Oracle listener:

Referred to as “Listener”, or “Oracle listener” in this document.

Oracle Database:

Referred to as "Oracle Database", "Oracle database", "Oracle" or "Oracle *Version Release*" in this document.

Oracle Real Application Clusters:

Referred to as “Oracle RAC”, or “Oracle RAC *Version Release*” in this document.

Refer to "Software Release Guide PRIMECLUSTER Wizard for Oracle for Oracle Solaris" for the version and the release of Oracle Real Application Clusters supported with this product.

Oracle Clusterware:

Referred to as “Oracle Clusterware” in this document.

Oracle Automatic Storage Management:

Referred to as "Oracle ASM" or "ASM" in this document.

Oracle Data Guard:

Referred to as "Oracle Data Guard" in this document.

Oracle Active Data Guard:

Referred to as "Oracle Active Data Guard" in this document.

In this document, "Oracle Data Guard" might contain the meaning of Oracle Data Guard and Oracle Active Data Guard.

Primary Database:

Referred to as "Primary Database" or "primary database" in this document.

Standby Database:

Referred to as "Standby Database" or "standby database" in this document.

There are three types of standby database "Physical Standby Database", "Logical Standby Database", and "Snapshot Standby Database".

Primary Site:

System that operates primary database is referred to as "Primary Site" or "primary site" in this document.

Standby Site:

System that operates standby database is referred to as "Standby Site" or "standby site" in this document.

Oracle user:

Referred to "Oracle user" in this document.

An operating system user account belonging to OSDBA group to operate and manage Oracle database system.

Multitenant container database:

Referred to "Multitenant container database" or "CDB" in this document.

Pluggable database:

Referred to "Pluggable database" or "PDB" in this document.

Notational convention

The document conforms to the following notational conventions:

 **Point**

.....
Contains important information about the subject at hand.
.....

 **Information**

.....
Describes information a user can refer to.
.....

 **See**

.....
Provides the names of manuals to be referenced.
.....

 **Note**

.....
Describes points where a user should take notice.
.....



Example

Describes settings using an example.

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Revision History

Revision	Location	Edition
Modified the startup confirmation procedure for Oracle database.	2.2.6.2 Identifying Database Startup Errors	1.1
Added patch Application by Out-of-place upgrade for standby operation and single-node cluster operation with Oracle ASM.	3.2.2.3 Patch Application by Out-of-place upgrade (Standby Operation and Single-Node Cluster Operation with Oracle ASM)	
Modified patch application procedure for Oracle database.	3.2.2.4 Patch Application by Out-of-place upgrade (Scalable Operation with Oracle RAC)	
Added that Oracle Data Guard Broker is not supported.	G.5 Notice	

Contents

Chapter 1 Feature.....	1
1.1 Feature outline.....	1
1.2 Operating Environment.....	2
Chapter 2 Environment setup.....	9
2.1 Oracle database Environment Setting.....	9
2.2 Standby Operation.....	9
2.2.1 PRIMECLUSTER Installation and Configuration.....	10
2.2.2 Oracle Database Software Installation and Configuration.....	10
2.2.3 userApplication Creation.....	12
2.2.4 userApplication with No Oracle Resources.....	13
2.2.4.1 userApplication Creation.....	14
2.2.4.2 Configuration-Generate and Configuration-Activate.....	14
2.2.5 userApplication Operation Check.....	14
2.2.6 Oracle database Creation and Setting.....	15
2.2.6.1 Oracle database Creation and Setting.....	15
2.2.6.2 Identifying Database Startup Errors.....	21
2.2.7 userApplication Edit.....	21
2.2.7.1 userApplication Deletion.....	22
2.2.7.2 Oracle Resource Creation.....	23
2.2.7.3 Other Resource Creation.....	34
2.2.7.4 userApplication Creation.....	34
2.2.7.5 Other userApplication Creation.....	34
2.2.7.6 Configuration-Generate and Configuration-Activate.....	35
2.2.8 userApplication Operation Check.....	35
2.3 Scalable Operation with Oracle RAC.....	36
2.3.1 PRIMECLUSTER Installation and Configuration.....	36
2.3.2 Oracle Database Software Installation and Configuration.....	36
2.3.3 userApplication and Resource Configuration.....	40
2.3.4 userApplication with Oracle Clusterware.....	45
2.3.5 userApplication with Oracle RAC Instances and Listeners.....	51
2.3.6 Other Resource and userApplication Registration.....	67
2.3.7 Configuration-Generate and Configuration-Activate.....	67
2.3.8 userApplication Operation Check.....	69
2.4 Information.....	71
2.4.1 Oracle resource Online/Offline Script.....	71
2.4.2 Oracle ASM (Automatic Storage Management).....	74
2.4.2.1 Environment configuration with Oracle Database 11g R1 or earlier.....	74
2.4.2.2 Environment configuration with Oracle Database 11g R2 or later.....	77
2.4.2.3 Precaution for Oracle ASM operation.....	81
Chapter 3 Operation.....	82
3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle.....	82
3.1.1 Standby Operation.....	82
3.1.1.1 Starting and Stopping Oracle resources.....	82
3.1.1.2 Monitoring Oracle resources.....	85
3.1.2 Scalable Operation with Oracle RAC.....	88
3.1.2.1 Starting and Stopping Oracle resources.....	88
3.1.2.2 Monitoring Oracle resources.....	89
3.1.3 Single-Node Cluster Operation.....	90
3.2 Oracle database Maintenance.....	90
3.2.1 Oracle database Setting Change.....	92
3.2.1.1 Oracle database must be stopped.....	92
3.2.2 Patch Application.....	93
3.2.2.1 Patch Application by In-place upgrade.....	94

3.2.2.2 Patch Application by Out-of-place upgrade (Standby Operation and Single-Node Cluster Operation without Oracle ASM)	95
3.2.2.3 Patch Application by Out-of-place upgrade (Standby Operation and Single-Node Cluster Operation with Oracle ASM)	99
3.2.2.4 Patch Application by Out-of-place upgrade (Scalable Operation with Oracle RAC)	102
3.2.3 Backup	104
3.2.3.1 Cold backup	104
3.2.3.2 Hot backup	105
3.2.4 Recovery	105
3.2.4.1 Oracle database must be stopped	106
3.2.4.2 Oracle database does not need to be stopped	107
3.2.5 Add and delete PDB	107
3.2.5.1 Add PDB	107
3.2.5.2 Delete PDB	108
3.3 Oracle SYSTEM User Password Change	108
3.4 Corrective Action against Failover	110
3.5 Troubleshooting Information	110
3.6 Log Files	111
Chapter 4 Command	113
4.1 hvoradisable - Discontinue Monitoring Resources	113
4.2 hvoraenable - Restart Monitoring Resources	114
4.3 clorapass - Register Password for Monitoring	115
4.4 cloracpy - Create Backup File for Oracle Database Setup	116
4.5 clgetoralog - Collect Troubleshooting Information	117
4.6 clorainfo - Display Resource Configuration and Monitoring Status	120
4.7 clorabr - Integrated Backup and Restoration of Configuration Files	122
Chapter 5 Notice	124
Chapter 6 Message	127
Appendix A Failure case studies	144
A.1 Oracle instances	144
A.1.1 Startup/stop failure	144
A.1.2 AutoRecover or Failover	145
A.1.3 Warning state	147
A.2 Oracle listeners	148
A.2.1 Startup/stop failure	148
A.2.2 AutoRecover or Failover	150
A.2.3 Warning state	150
A.3 PDBs	151
A.3.1 Startup/stop failure	151
A.3.2 Message was output	151
Appendix B Change Oracle Resource Settings	152
B.1 Resource Additional Creation	152
B.1.1 Respectively	152
B.1.2 In a Group	153
B.2 Change Resource Settings	154
B.3 Change Resource Name	156
B.4 Resource Deletion	157
B.4.1 Respectively	157
B.4.2 In a Group	158
Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation	159
Appendix D Using Oracle Database Software on shared disks	170
Appendix E Using PRIMECLUSTER Wizard for Oracle in Oracle Solaris Zones Environment	176

E.1 Notice of System Configuration.....	176
E.2 Construction Procedure.....	176
E.2.1 PRIMECLUSTER Wizard for Oracle Installation.....	176
E.2.2 Oracle Database Software Installation and Oracle database Creation.....	176
E.3 Maintenance Procedure.....	177
E.3.1 Oracle Database Maintenance.....	177
E.3.2 Patch Application to PRIMECLUSTER Wizard for Oracle.....	177
E.3.3 Troubleshooting Information.....	177
E.4 Uninstallation Procedure.....	177
Appendix F Single-Node Cluster Operation.....	178
F.1 Oracle ASM not used.....	179
F.2 Oracle ASM of Oracle Database 11g R1 or earlier used.....	180
F.3 Oracle ASM of Oracle Database 11g R2 or later used.....	181
Appendix G Using Oracle Data Guard/Oracle Active Data Guard.....	183
G.1 Feature Outline.....	183
G.2 Oracle Environment Setting.....	185
G.3 Operation.....	187
G.3.1 Oracle database Control (Standby Operation).....	187
G.3.2 Oracle database Control (Scalable Operation with Oracle RAC).....	190
G.4 Overview of switch procedure of database role.....	191
G.4.1 Example of switch procedure of database role.....	192
G.4.2 Switch of Primary Database and Physical Standby Database.....	192
G.4.3 Switch of Primary Database and Logical Standby Database.....	196
G.4.4 Converting a Physical Standby Database into a Snapshot Standby Database.....	200
G.4.5 Converting a Snapshot Standby Database into a Physical Standby Database.....	203
G.5 Notice.....	206
Appendix H Using Oracle Database 18c/19c.....	208
H.1 Using Oracle Database 18c.....	208
H.2 Using Oracle Database 19c.....	208
Appendix I (Information) Action Definition File.....	210

Chapter 1 Feature

1.1 Feature outline

PRIMECLUSTER Wizard for Oracle is a software product that facilitates cluster operation management for Oracle database operating on a PRIMECLUSTER system.

PRIMECLUSTER Wizard for Oracle allows you to operate a scalable operation with Oracle Real Application Clusters (Oracle RAC), a standby operation with Oracle database, a single-node cluster operation with Oracle database and a standby database cluster operation in the Oracle Data Guard/Oracle Active Data Guard environment.

The multitenant container database (CDB) and the pluggable database (PDB) using the multitenant architecture of the Oracle database are supported by the standby operation (cold standby) and the single-node cluster operation.

The feature of environment setup, monitoring, start and stop control, operation procedure for the CDB is the same as the Oracle instance unless otherwise stated. For PDB, refer to the article for PDB in each chapter.



See

.....
The standby database cluster operation in the Oracle Data Guard/Oracle Active Data Guard environment, refer to "[Appendix G Using Oracle Data Guard/Oracle Active Data Guard](#)".
.....

This software provides the following features:

Feature	Description
Environment setup	Environment setup tool to enable clustering of Oracle database
Monitoring	Daemon processes to monitor Oracle instance, Listener and detect their failures
Start and Stop Control	Scripts used for startup and stop of Oracle instances, Listeners
Setup and Operation Commands	Commands used for setup and operations

Environment setup

To enable clustering of Oracle database, it is required that Oracle instances and Listeners are registered on userApplication (cluster application) as a "resource". PRIMECLUSTER Wizard for Oracle enables it. For details, refer to "[Chapter 2 Environment setup](#)".

Monitoring

PRIMECLUSTER Wizard for Oracle provides daemon processes to monitor Oracle instances and Listeners and detect their failures. If errors are detected in monitoring, in standby operation, Oracle instances and Listeners are restarted and a failover occurs automatically. In scalable operation, Oracle Clusterware automatically restarts Oracle instances and listeners. For details, refer to "[3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle](#)".

- Monitoring Oracle instances

The daemon processes monitor Oracle instances in the following way:

- Monitoring processes

The daemon process connects to the Oracle instance as the SYSTEM user and cyclically monitors background processes (PMON, SMON, DBWn, LGWR and CKPT).

- Monitoring a table

The daemon process creates a table for monitoring and cyclically manipulates data on the table with SQL statements (INSERT, UPDATE, DELETE and COMMIT). It checks the SQL execution result to monitor Oracle instances. Therefore, it means that not only the background process failures but also logical failures can be detected.

- Monitoring Listener

The daemon process monitors a Listener process in the following way:

- Monitoring processes
The daemon process cyclically monitors Listener processes.
- Tnsping command
In standby operation, the daemon process cyclically executes the tnsping command to check that Oracle Net Services are running.
In scalable operation, "tnsping" command is not executed.
- Monitoring Oracle Clusterware
Oracle Clusterware is not monitored by PRIMECLUSTER Wizard for Oracle.
- Monitoring CDB and PDB
The monitoring of the CDB is the same as "Monitoring Oracle instances".
The monitoring of the PDB is the management table of PDB on the CDB is checked. When fault of PDBs is detected, the message is output to syslog. The restart and the failover due to fault of PDBs is not executed.

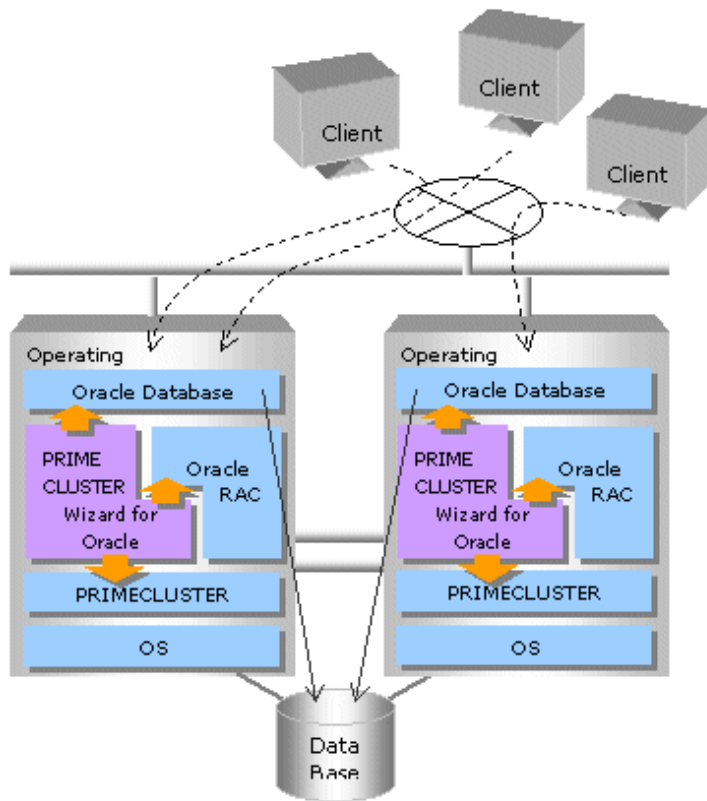
Startup and stop control

PRIMECLUSTER Wizard for Oracle provides scripts to start up and stop Oracle instances, Listeners and Oracle Clusterware automatically, according to the state transition of userApplication. For details, refer to "[3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle](#)".

- Starting and Stopping Oracle instances
In standby operation, the script starts up the Oracle instance, checking the state and recovering. For example, if the Oracle instance had failed during online backup, the scripts automatically execute "END BACKUP" during the startup. When stopping, the scripts stop the instance in the IMMEDIATE mode. If it fails, the script immediately tries in the ABORT. It means that the failover of userApplication can be performed at high-speed.
In scalable operation with Oracle RAC, Oracle RAC instances are started and stopped using srvctl command.
- Starting and Stopping Listeners
In standby operation, the script starts up and stops the Listener with "lsnrctl start/stop" command, checking the state.
In scalable operation, Listeners are started by the script.
- Starting and Stopping Oracle Clusterware
In scalable operation with Oracle RAC, Oracle Clusterware is started and stopped using crsctl command.
- Starting and Stopping CDB and PDB
The Starting and the stopping of the CDB are the same as "Starting and Stopping Oracle instances".
After CDB is started, all PDBs on the CDB are started.

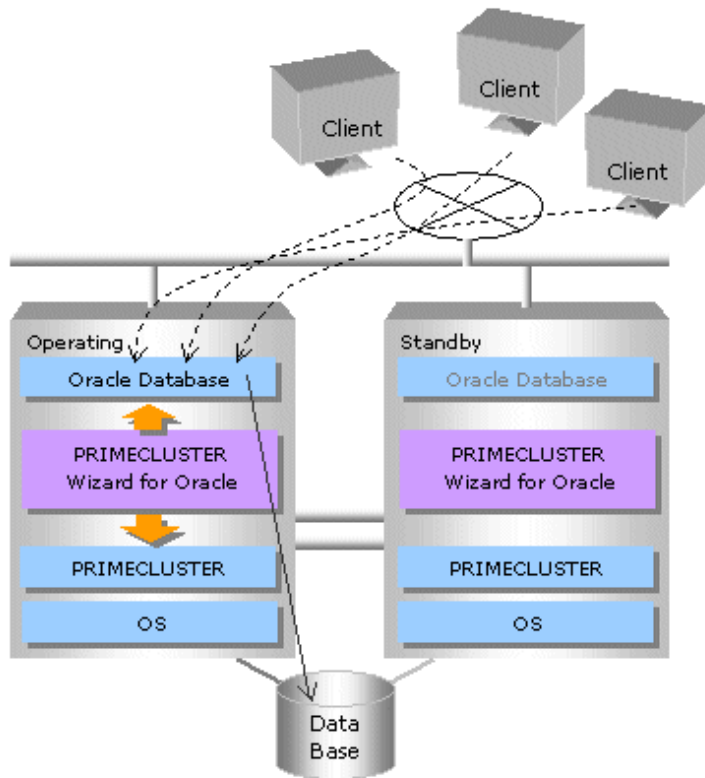
1.2 Operating Environment

Scalable operation



In scalable operation with Oracle RAC, Oracle instances are operated on all nodes. The clients can access to the database regardless of which node they are connected to.

Standby operation



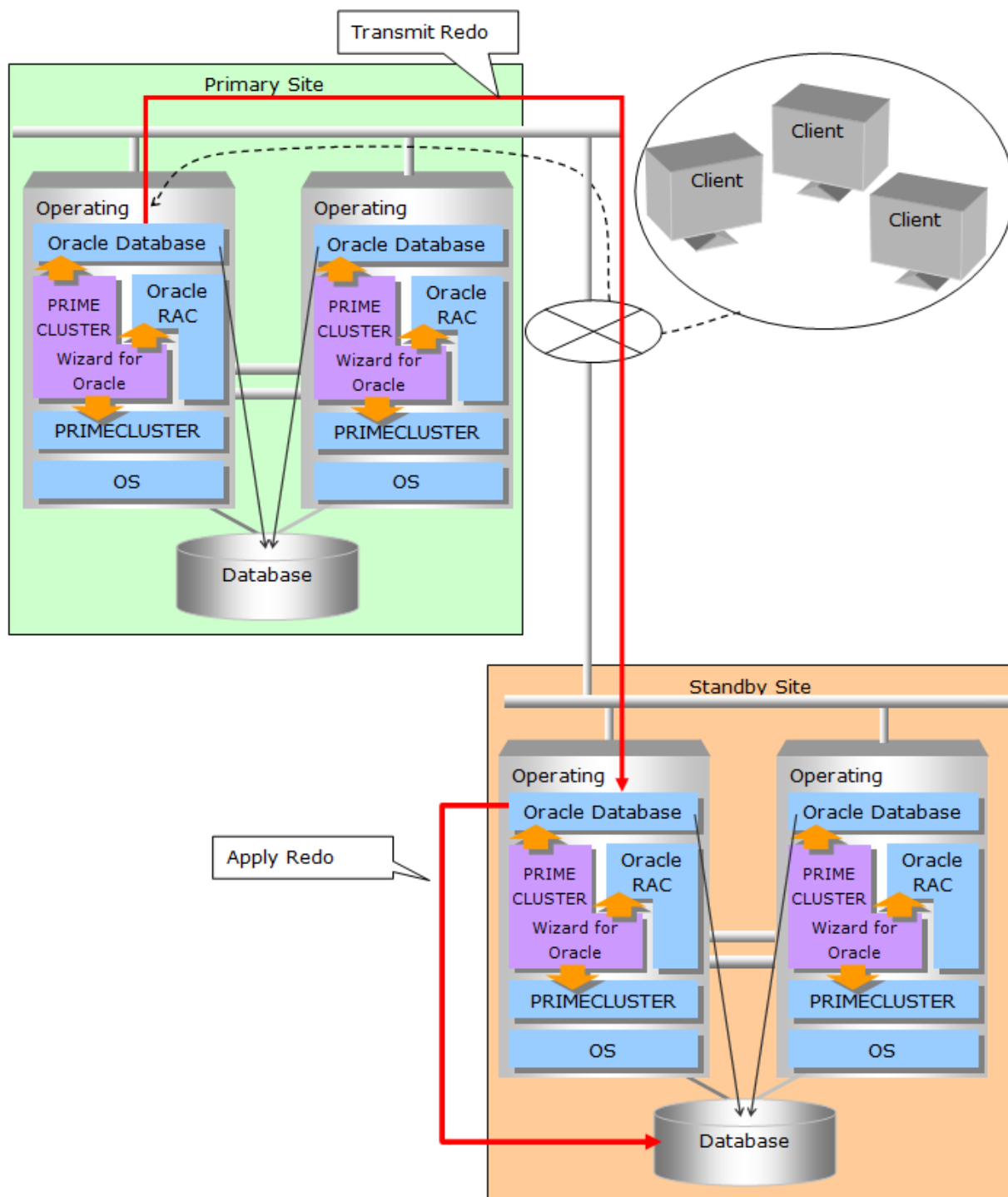
In standby operation, a cluster system consists of operating nodes and standby nodes. On the operating node, the resources such as Oracle applications, a logical IP address and shared disks are active. On the standby node, these resources are inactive. In the event of a failure, userApplication is switched to the standby node, and the resources on this standby node become activated. Then, the client can connect itself to the operating node using the logical IP address without changing any settings.

Note

- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating one user is not supported. A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle Database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.
- When using PRIMECLUSTER Wizard for Oracle with an Oracle Solaris Zones environment, refer to "[Appendix E Using PRIMECLUSTER Wizard for Oracle in Oracle Solaris Zones Environment](#)".

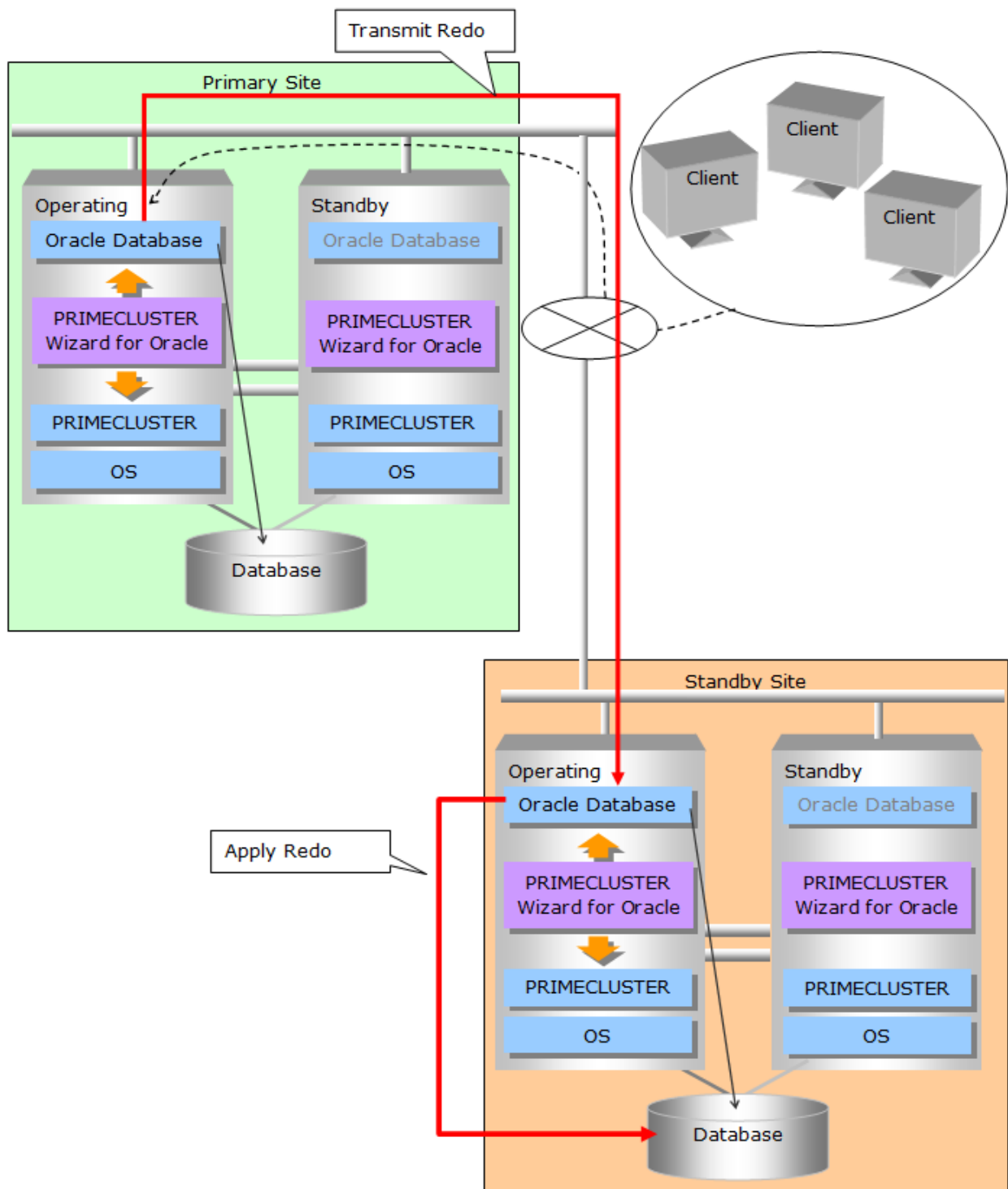
Standby database cluster operation using Oracle Data Guard/Oracle Active Data Guard

Scalable operation



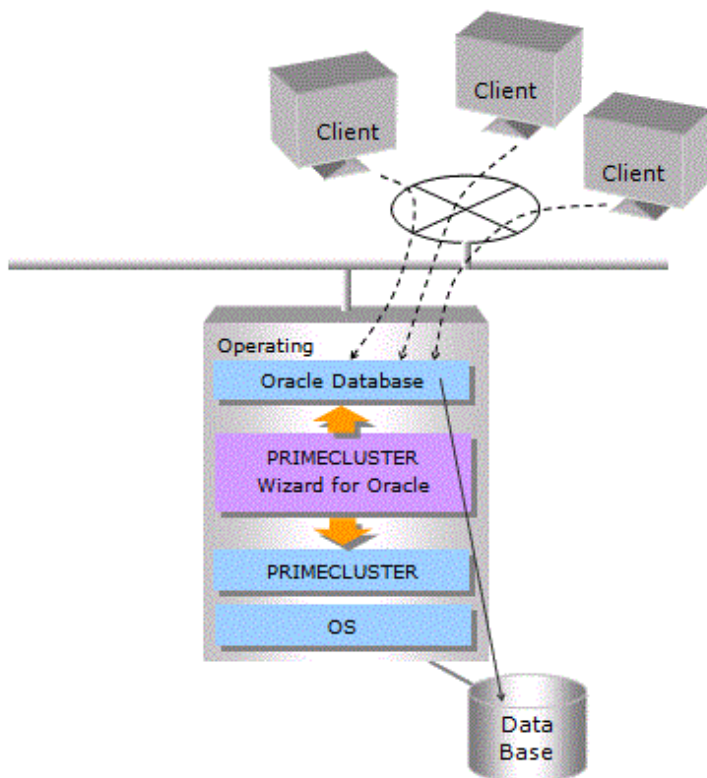
In the scalable operation with Oracle RAC using Oracle Data Guard, Oracle Database operates in all nodes on the primary site. In the standby site, Oracle Database operates in all nodes or in one node of them. You must set and operate apply services to start in one of the nodes.

Standby operation



In the standby operation using Oracle Data Guard, the operating node and the standby node exist on the primary site and the standby site. Oracle Database operates in the operating node of each site. In the event of a failure, userApplication is switched to the standby node, and the resources in this standby node become activated.

Single-Node Cluster operation



In Single-Node Cluster operation, a cluster system consists of one node.

The status of Oracle database is monitored. Oracle database operation can be continued by restarting Oracle database automatically if Oracle database failures are detected.

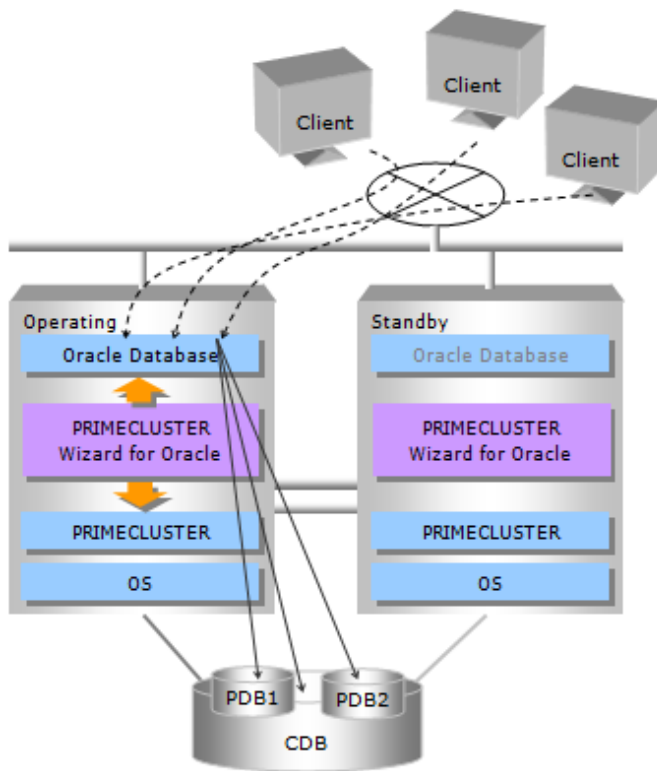
Note

- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating one user is not supported. A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.
- When using PRIMECLUSTER Wizard for Oracle with an Oracle Solaris Zones environment, refer to "[Appendix E Using PRIMECLUSTER Wizard for Oracle in Oracle Solaris Zones Environment](#)".

Information

For further details about the operation modes of Scalable operation, Standby operation and Single-Node Cluster operation, refer to "PRIMECLUSTER Installation and Administration Guide".

Multitenant configuration



The multitenant configuration is supported by the standby operation or the single-Node Cluster operation. The starting, the stopping and the monitoring of CDB are the same as Oracle instance. After CDB is started, PDBs are started. When fault of PDBs is detected, the message is output to syslog. The restart and the failover due to fault of PDBs is not executed.

1-252 PDBs(upper bound of Oracle Database) can be managed.

The single tenant configuration with only one PDB in CDB is supported.

Chapter 2 Environment setup

2.1 Oracle database Environment Setting

This section explains a general setup procedure of Oracle database operating on a PRIMECLUSTER system.

Note

Setup procedures in “Chapter 2” explain how to create userApplication newly. If environment has been created in earlier version, in the case of upgrading to 4.5A02, see “Software Release Guide PRIMECLUSTER Wizard for Oracle for Oracle Solaris”.

Standby operation

No	Procedure	
	Operating node	Standby node
1	Install and configure PRIMECLUSTER	Install and configure PRIMECLUSTER
2	Install PRIMECLUSTER Wizard for Oracle	Install PRIMECLUSTER Wizard for Oracle
3	Install and configure Oracle Database software	Install and configure Oracle Database software
4	Create userApplication	-
5	Create and set up an Oracle database	-
6	-	Set up an Oracle database
7	Create and set up Oracle resources	-

For details, see “[2.2 Standby Operation](#)”.

Scalable operation (Oracle RAC)

No	Procedure	
	One arbitrary node	Other nodes
1	Install and configure PRIMECLUSTER	Install and configure PRIMECLUSTER
2	Install PRIMECLUSTER Wizard for Oracle	Install PRIMECLUSTER Wizard for Oracle
3	Install and configure Oracle Database software	Install and configure Oracle Database software (*Installation automatically done)
4	Create and set up an Oracle database	-
5	Create and set up Oracle resources	-

For details, see "[2.3 Scalable Operation with Oracle RAC](#)".

Standby database cluster operation using Oracle Data Guard/Oracle Active Data Guard

For details, see "[Appendix G Using Oracle Data Guard/Oracle Active Data Guard](#)".

Single-node cluster operation

For details, see "[Appendix F Single-Node Cluster Operation](#)".

2.2 Standby Operation

This section describes how to configure an environment for standby operation.

For the configuration procedure for scalable operation with Oracle RAC, see ["2.3 Scalable Operation with Oracle RAC"](#).

Note

- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating one user is not supported. A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.
The install user of Oracle database is described "Oracle user" and the install user of Oracle Grid Infrastructure is described "Grid user" in this document.

2.2.1 PRIMECLUSTER Installation and Configuration

Set up hardware

Set up hardware required for PRIMECLUSTER. The shared disk is also required to create an Oracle database.

Install software

Install PRIMECLUSTER, referring to the "PRIMECLUSTER Software Release Guide".

Standby operation requires the following editions:

- PRIMECLUSTER Enterprise Edition
- PRIMECLUSTER HA Server
- PRIMECLUSTER Clustering Base

Install PRIMECLUSTER Wizard for Oracle following the instructions of the "Software Release Guide PRIMECLUSTER Wizard for Oracle".

Configure a cluster system

Configure a cluster system including network systems and shared disk units according to the PRIMECLUSTER manual. Global Disk Services (hereinafter GDS) is set as "switching disk".

Information

For further details, refer to "PRIMECLUSTER Installation and Administration Guide".

2.2.2 Oracle Database Software Installation and Configuration

This section explains how to install and configure Oracle Database software.

Note

- Install only Oracle Database software to all nodes. Do not create a database in this section (Database creation is performed in ["2.2.6 Oracle database Creation and Setting"](#)).
- If you install Oracle Database software on the shared disk, using Oracle ASM is not supported. Install the Oracle Database software on a local disk of each node when you use Oracle ASM.
- If multiple Oracle homes are configured on one server, a different user name must be assigned for each Oracle home.
- If you install Oracle Grid Infrastructure to use Oracle ASM on Oracle Database 11g R2 or later, you must create install user for the Oracle Grid Infrastructure and the Oracle database installations separately. For information on how to install this configuration, see ["2.4.2 Oracle ASM \(Automatic Storage Management\)"](#).

- Confirm the contents of "Chapter 5 Notice" before Installing.

Initial setup

Set up the kernel parameter

Set up values in the "/etc/system" file for Oracle database in addition to the values for PRIMECLUSTER. The kernel parameter values vary depending on the implemented Oracle database versions. Refer to the Oracle database installation guide. The parameter values should be the same on all the nodes.



For semopm, specify a value of 4 or more.

Oracle User

Create an operating system user account belonging to OSDBA group to allow users to install and operate Oracle database. The user ID and the group ID must be the same on all the nodes.



Create an operating system user account belonging to OSDBA group (dba) and Oracle Inventory group (oinstall).

```
# groupadd -g <groupID> dba
# groupadd -g <groupID> oinstall
# useradd -u <userID> -g oinstall -G dba -d /home/oracle -s /bin/sh -m oracle
# passwd oracle
```

Set up an environment variable of Oracle user.

Set the ORACLE_BASE, ORACLE_HOME and ORACLE_SID environment variables for your Oracle database environment.

Add \$ORACLE_HOME/bin into the PATH environment variable.

If the directory where listener.ora is stored is not under \$ORACLE_HOME/network/admin, set the TNS_ADMIN environment variable.



(.profile)

```
ORACLE_BASE=/opt/oracle; export ORACLE_BASE
ORACLE_HOME=/opt/oracle/product/11.2.0; export ORACLE_HOME
ORACLE_SID=ora; export ORACLE_SID
PATH=$ORACLE_HOME/bin:/usr/bin:/usr/ccs/bin:/usr/ucb; export PATH
TNS_ADMIN=$ORACLE_HOME/network/admin2; export TNS_ADMIN
```



For further details, refer to the Oracle Database manual.



PRIMECLUSTER Wizard for Oracle controls Oracle database as the operating system user belonging to OSDBA group(Oracle user).

- Check if root user access privileges can switch the user to the Oracle user, using the su(1M) command.

```
# su - <Oracle user>
```

- A command (e.g. script) that has interactive mode should not be described in Oracle user's profile. (e.g. /etc/profile, .bash_profile, .cshrc, .profile)
- Environment that Oracle user's home directory and profile are located on the shared disk is not supported. Oracle user's home directory and profile must be located on the local disk of each node.

Installation

If you install it on the local disk, refer to the Oracle Database manual.

If you install it on the shared disk, refer to "[Appendix D Using Oracle Database Software on shared disks](#)".

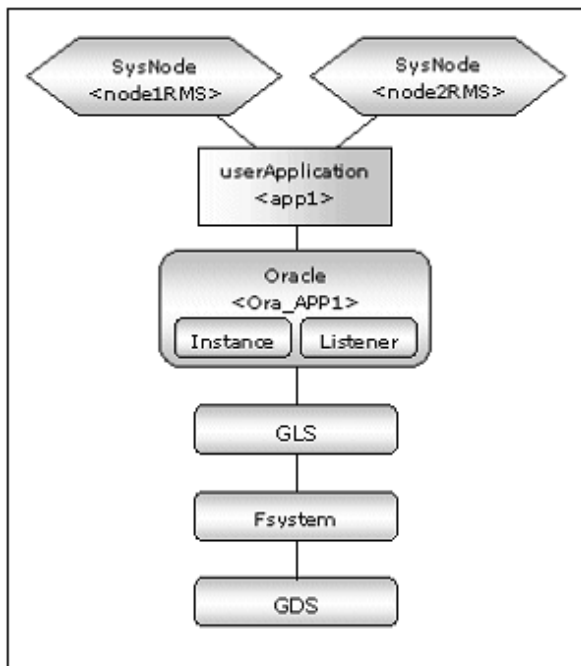
The database needs to be created on the shared disk when configuration of the cluster system is completed, not when Oracle Database software is installed. The details will be described later in this document([2.2.6 Oracle database Creation and Setting](#)).

Using Oracle Database 18c/19c

Execute the procedure in "[Appendix H Using Oracle Database 18c/19c](#)".

2.2.3 userApplication Creation

Operating userApplication is configured as follows:



GLS: Global Link Services

GDS: Global Disk Services

userApplication	Description	Resources
app1	userApplication on all operating nodes	Oracle resource (instance, listener) Gds resource Fsystem resource Gls resource

Information

The following setup values are recommended for userApplication app1. The other attributes not described below are optional.

Attributes	Values
Operation method	Standby
AutoSwitchOver	HostFailure ResourceFailure ShutDown
PersistentFault	1
HaltFlag	yes

The flow of userApplication creation is as follows:

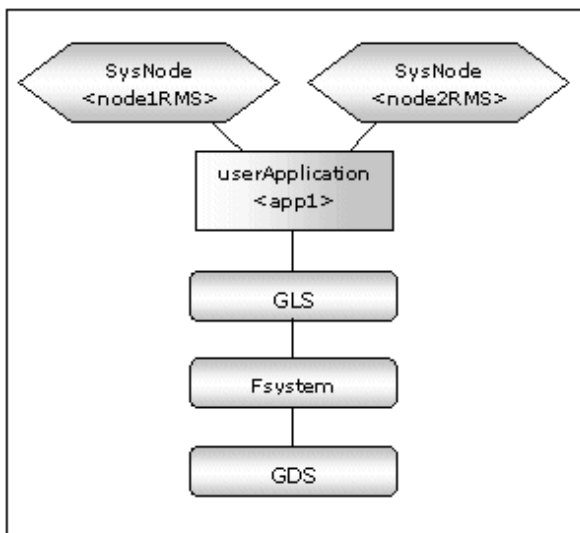
1	userApplication with No Oracle Resources userApplication Operation Check	2.2.4 userApplication with No Oracle Resources 2.2.5 userApplication Operation Check
2	Oracle database Creation and Setting	2.2.6 Oracle database Creation and Setting
3	userApplication with Oracle Resources userApplication Operation Check	2.2.7 userApplication Edit 2.2.8 userApplication Operation Check

Information

PersistentFault remains the same resource status (Faulted) even after RMS is restarted in the event of a resource failure. Users are supposed to locate the fault and check completion of recovery processing then start userApplication manually. For example, if a failure occurs, users can detect which userApplication failed even after server reboot. Even though AutoStartUp setup is set, userApplication will not be started, and automatic startup will prevent recurrence of the failure.

2.2.4 userApplication with No Oracle Resources

This section discusses the configuration of userApplication that does not include Oracle resources.



GLS: Global Link Services
GDS: Global Disk Services

GDS setup

It is possible to prepare the disk class for Oracle database SYSTEM tablespace and other Oracle data respectively, and the MONITORONLY attribute of the disk class is set to “NO” for the Oracle database SYSTEM tablespace and “YES” for the other Oracle data.

Information

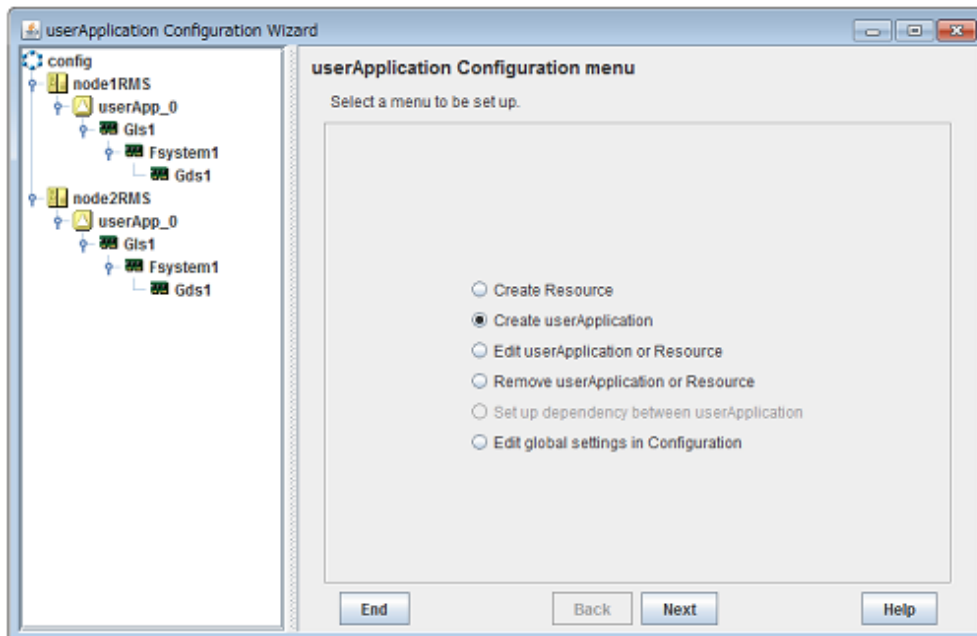
For further details of GDS resources, refer to “PRIMECLUSTER Installation and Administration Guide”.

2.2.4.1 userApplication Creation

Create userApplication using the userApplication Configuration Wizard. See “PRIMECLUSTER Installation and Administration Guide”. Set up userApplication using the userApplication Configuration Wizard. The userApplication Configuration Wizard uses the format that allows you to select information in the menu.

2.2.4.2 Configuration-Generate and Configuration-Activate

Check the set contents and then generate and activate the configuration. The image screens after activation are as follows:



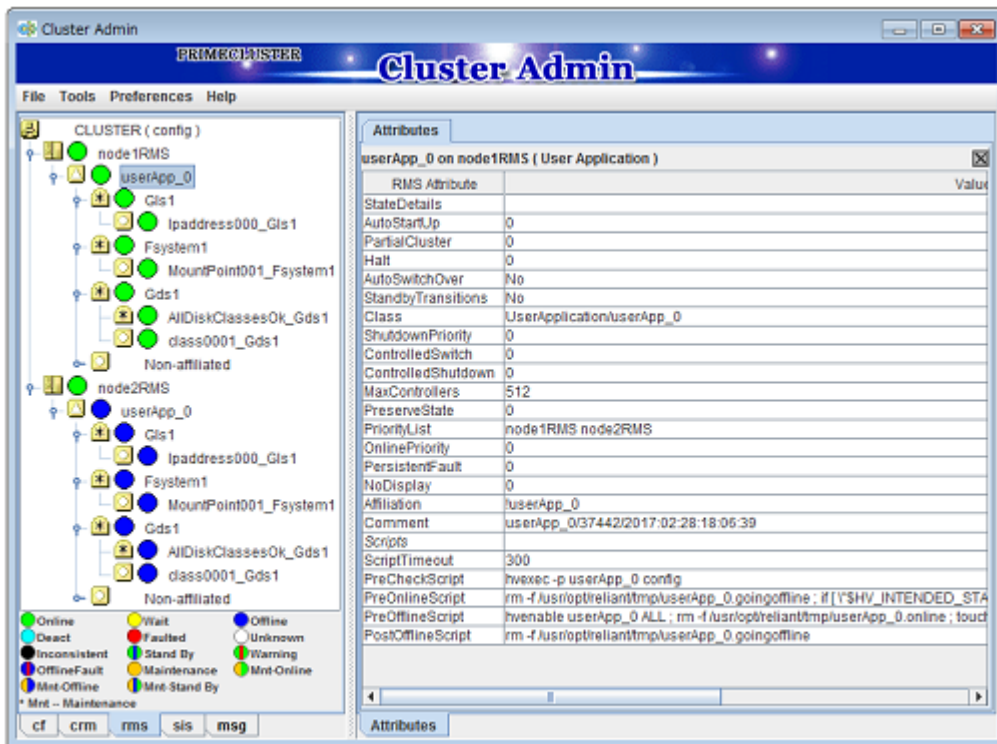
Gls: Global Link Services
Gds: Global Disk Services

2.2.5 userApplication Operation Check

Start up userApplication and check if it is normally running on all the nodes by.

Configuration of operations

Check if the configuration is correct in the Cluster Admin screen of Web-Based Admin View. The image screens of Cluster Admin are as follows:



Gls: Global Link Services
Gds: Global Disk Services

Shared disk

Check if you can access to the shared disk from the operating node. Also, check if a file can be created on the shared disk using Oracle user access privileges.

Logical IP address

Check if you can access the operating node from the client using the logical IP address.

2.2.6 Oracle database Creation and Setting

Create the database. Make sure that you can successfully start the database on all nodes after creation.

2.2.6.1 Oracle database Creation and Setting

Create and set the database.

- Allocate a database

Create a database on the shared disk. The shared disk must be activated.

The files are allocated as follows:

Files	Locations	Note
Initialization parameter file (PFILE)	Arbitrary	Recommend to allocate on a local disk of each node
Server parameter file (SPFILE)	Share	See "Parameter file" below.
Password file	Arbitrary	See "Password file" below.
Control files	Share	-
Data files	Share	-
Redo log files	Share	-

Files		Locations	Note
Archived redo log files		Arbitrary	Recommend to be multiplexed, allocating on a shared disk and a local disk.
Flash Recovery Area		Share	-
log files	AUDIT_FILE_DEST	Local	To be gathered surely for trouble investigation, allocate them on a local disk of each node.
	BACKGROUND_DUMP_DEST	Local	
	CORE_DUMP_DEST	Local	
	USER_DUMP_DEST	Local	
	DIAGNOSTIC_DEST (Oracle Database 11g or later)	Local	

Allocate each files as shown in the table when you create the database using the multitenant architecture.

Allocate the files of PDB on the shared disk.

Note

- Note that there is sufficient space to archive for archived redo log files if they are located on shared disks. If there is insufficient space, and data updating processing through monitoring SQL hangs, an oracle resource might fail. Afterwards, the service might stop finally on both operating node and standby nodes, because the space of shared disk is insufficient and the failover of userApplication fails on the standby node.
- Note that there is sufficient space in the disk of the directory specified by AUDIT_FILE_DEST for the database using the multitenant architecture. The log file in the AUDIT_FILE_DEST directory increases by about 1KB at monitoring interval of the Oracle instance resource(Default: 30 seconds) when the PDB is monitored. Capacity and frequency of the log file are different according to the environment. Check the capacity of the AUDIT_FILE_DEST directory, and backup/delete it regularly.
- If you install Oracle database software on the shared disk, locate database files referring to "[Appendix D Using Oracle Database Software on shared disks](#)".

Information

- Check if the Oracle user has privileges to write in a shared disk before creating the database.
 - If you use Oracle ASM, it is necessary to register the Oracle ASM as an RMS resource. See "[2.4.2 Oracle ASM \(Automatic Storage Management\)](#)".
- Create a database (Standby operation)
- Operating node
Create a database on the operating node. The database must be accessible from the standby nodes.

Note

If multiple Oracle homes are configured on one server, a different Oracle instance name must be assigned for each Oracle home.

Information

Refer to the Oracle Database manual.

- Standby node

Set up the standby nodes in the same configuration (directory creation, file copy, and links) as the operating node.

- Under <\$ORACLE_HOME>/dbs
- Under <\$ORACLE_BASE>/admin/<\$ORACLE_SID>
- Under <\$ORACLE_BASE>/diag (Oracle Database 11g R1 or later)
- Under <\$ORACLE_HOME>/network/admin
- If the directories which are specified in the initialization parameters, AUDIT_FILE_DEST, BACKGROUND_DUMP_DEST, CORE_DUMP_DEST, USER_DUMP_DEST and DIAGNOSTIC_DEST, do not exist, create them.

The access privilege to the directories and files must be also the same as that on the operating node.

If you set where archived redo log is output on the operating node, it is necessary to set the same on the standby nodes.

 **Information**

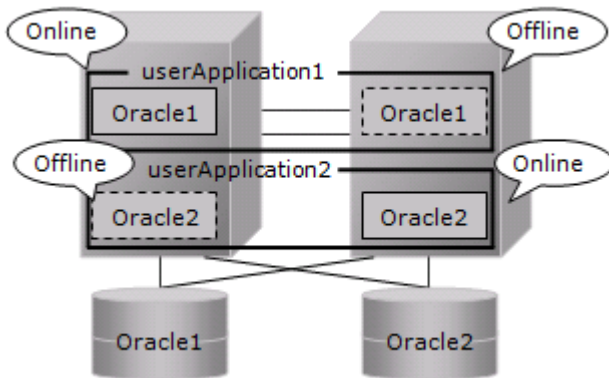
The required files on the operating node can be backed up in the tar format with the “cloracpy” command. See “4.4 cloracpy - Create Backup File for Oracle Database Setup”.

 **Example**

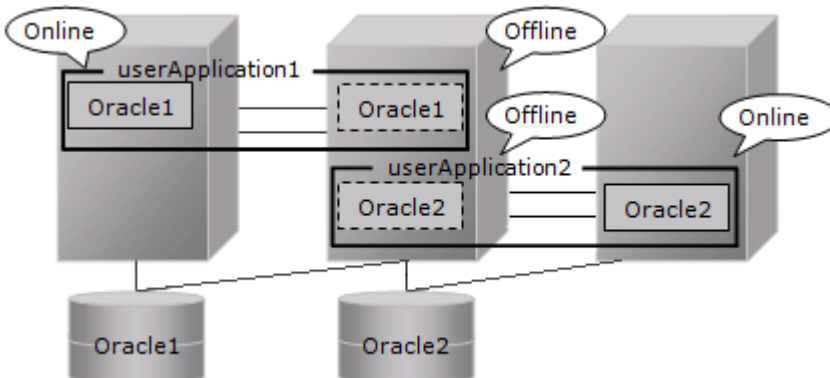
Mutual standby / N:1 Standby operation

Create a database on an operating node. The database on the shared disk created on the operating node must be accessible from the standby nodes. This is the same as the other operating modes.

- Mutual standby



- 2:1 Standby



- Parameter file

The initialization parameter setting of LOCAL_LISTENER must be compatible with that of listener.ora and tnsnames.ora. You should also pay close attention to set up Oracle database network.

If you use server parameter file, allocate it on a shared disk. If it is not allocated on the shared disk, the settings will be inconsistent between operating and standby nodes.

After you allocate server parameter file on a shared disk, configure the settings in both the operating node and the standby nodes for referring the server parameter file.

Example

- Method of making a symbolic link file to the server parameter file

```
$ ln -s <the mount point of a shared disk>/spfile<$ORACLE_SID>.ora <$ORACLE_HOME>/dbs/spfile<$ORACLE_SID>.ora
```

- Method to write the path of the server parameter file in initialization parameter file (initialization parameter file: \$ORACLE_HOME>/dbs/init<\$ORACLE_SID>.ora)

```
spfile = <the mount point of a shared disk>/spfile<$ORACLE_SID>.ora
```

Note

If you create a database using DBCA (Database Configuration Assistant), you might not be able to specify where the server parameter file is stored. If this occurs, move the server parameter file to the shared disk after creating the database as follows:

1. Mount the shared disk if it is not mounted. Start userApplication that is created at “[2.2.4 userApplication with No Oracle Resources](#)”.
2. Move the server parameter file to the shared disk.

```
# mv <$ORACLE_HOME>/dbs/spfile<$ORACLE_SID>.ora <shared disk>/spfile<$ORACLE_SID>.ora
```

3. Configure the settings for referring the server parameter file. (see Example above)

Execute step 3 on both of the operating node and standby nodes.

You can also use the clorcopy command to execute it on the standby nodes after the operating node.

- Password file

Allocate Password file on either a local disk or a shared disk. Decide which to allocate it to, refer to the following.

- Local disk

When allocate Password file on a local disk, it is necessary to edit it of each node. Therefore, the maintenance efficiency decreases compared with the case allocated on a shared disk.

- Shared disk

When allocate Password file on a shared disk, it only has to edit on a shared disk. Therefore, the maintenance efficiency improves compared with the case allocated on a local disk.

If you allocate Password file on a shared disk, create a Password file on the operating node and move it on a shared disk.

```
$ orapwd file=<$ORACLE_HOME>/dbs/orapw<SID> password=password force=y  
$ mv <$ORACLE_HOME>/dbs/orapw<SID> <shared disk>/orapw<SID>
```

Make a symbolic link file under the "\$ORACLE_HOME/dbs" of all nodes.

```
$ ln -s <shared disk>/orapw<SID> <$ORACLE_HOME>/dbs/orapw<SID>
```

- Network setup

The files are allocated as follows:

Files	Locations	Note
listener.ora	Arbitrary	For placement of the file, refer to the below "information".
tnsnames.ora	Arbitrary	Same as above
<LISTENER>.log	Local	

Information

Allocate listener.ora file and tnsnames.ora file on either a local disk or a shared disk. To which allocate them, refer to the following.

- Local disk

When allocate those files on a local disk, it is necessary to edit them of each node. Therefore, the maintenance efficiency decreases compared with the case allocated on a shared disk. In one side, it is possible to gather the files surely when the trouble is investigated because the influence of the state of the mount of a shared disk is not received.

- Shared disk

When allocate those files on a shared disk, it only has to edit them on a shared disk. Therefore, the maintenance efficiency improves compared with the case allocated on a local disk. In one side, when the mount is not done, a shared disk might not be able to gather the necessary files for the trouble is investigated.

When allocate those files on a shared disk, make a symbolic link file under the “\$ORACLE_HOME/network/admin” of each node.

- In the case of listener.ora

```
$ ln -s <the mount point of a shared disk>/listener.ora <$ORACLE_HOME>/network/admin/  
listener.ora
```

- In the case of tnsnames.ora

```
$ ln -s <the mount point of a shared disk>/tnsnames.ora <$ORACLE_HOME>/network/admin/  
tnsnames.ora
```

- listener.ora

If you use Oracle listener switching operation using a logical IP address, specify the logical IP address for the IP address of the Oracle listener.

Example

```
LISTENER =  
  (DESCRIPTION =  
    (ADDRESS = (PROTOCOL = TCP)(HOST = <logical IP address>)(PORT = 1521))  
  )  
  
SID_LIST_LISTENER =  
  (SID_LIST =  
    (SID_DESC =  
      (GLOBAL_DBNAME = ora)  
      (ORACLE_HOME = /u01/app/oracle/product/db)  
      (SID_NAME = ora)  
    )  
  )  
)
```

Note

- Operating system authentication (OS authentication) of Listener must be enabled. OS authentication is enabled in default. If the following parameter is defined in listener.ora file, OS authentication is enabled.

```
LOCAL_OS_AUTHENTICATION_<LISTENER_NAME> = ON
```

- If multiple Oracle homes are configured on one server, a different listener name must be assigned for each Oracle home.

- tnsnames.ora

If the Oracle listener is monitored through tnsping, set up the “tnsnames.ora” file. Then, specify the network service name set for tnsnames.ora in the environment setting of the Oracle listener of PRIMECLUSTER Wizard for Oracle. In that case, ORACLE_SID, host (logical IP address), and port number must be the same as those of the Oracle listener.

Example

```
Network service name =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = <logical IP address>)(PORT = 1521))
    (CONNECT_DATA = (SID = ora))
  )
```

- SYSTEM user password

PRIMECLUSTER Wizard for Oracle accesses and monitors Oracle instances as the Oracle database SYSTEM user. Therefore, the SYSTEM user's password must be registered in PRIMECLUSTER Wizard for Oracle. See “[4.3 clorapass - Register Password for Monitoring](#)” to register the password.

Register the password of the SYSTEM user of the CDB when you create the database using the multitenant architecture. The password of Local User of the PDB need not be registered.

- Define the full path of the log file

Define the full path of the alert log and the listener log in /opt/FJSVclora/etc/clgetoralog.conf. See the Note in “[4.5 clgetoralog - Collect Troubleshooting Information](#)” for details.

- Measure time that the Oracle instance starts and stops

Measure time that the Oracle instance starts and stops. Measure time that all the PDBs starts for the database using the multitenant architecture. Measurements are used in “[2.2.7.2 Oracle Resource Creation](#)”.

1. STARTUP
2. ALTER PLUGGABLE DATABASE OPEN; *For the database using the multitenant architecture.
3. SHUTDOWN IMMEDIATE

Note

- The Oracle “TWO_TASK” environment variable must not be used. It is used to add a connect identifier to connect to Oracle database then automatically connect to network. In PRIMECLUSTER Wizard for Oracle, network connection is not supported. Users are supposed to connect to Oracle instances in local connection (“/ as sysdba”). If network connection is required, specify “@connect identifier” instead of using the “TWO_TASK” environment variable when connecting at the connecting.
- The processes other than definition of SQL*Plus system variables must not be added to login.sql of Oracle DBA users. SQL can be described in the SQL*Plus profile login.sql. However, it might automatically be executed and affect ongoing operations because Oracle instance is controlled through SQL*Plus in PRIMECLUSTER Wizard for Oracle. It is available to setup the SQL*Plus system variables to login.sql by SET of SQL*Plus command.

2.2.6.2 Identifying Database Startup Errors

Start the database on all nodes and ensure that no errors occur.

PRIMECLUSTER Wizard for Oracle starts and stops the Oracle instance and Oracle listener after changing from the root user to the Oracle user by using su(1M).

Check if you can start and stop the Oracle instance and Oracle listener manually after changing from the root user to the Oracle user by using su(1M) in both the operating node and the standby nodes. Also, do not go through any users other than the root and Oracle users before logging in as the root user.

Check if you can start and stop the PDBs manually for the database using the multitenant architecture.

When you check on the standby nodes, switch userApplication to the standby nodes.

```
# su - <Oracle user>
$ lsnrctl start <ListenerName>
$ lsnrctl status <ListenerName>
$ lsnrctl stop <ListenerName>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> STARTUP
SQL> SELECT STATUS FROM V$INSTANCE;
SQL> ALTER PLUGGABLE DATABASE ALL OPEN; *For the database using the multitenant architecture.
SQL> SELECT NAME,OPEN_MODE FROM V$PDBS; *For the database using the multitenant architecture.
SQL> SHUTDOWN IMMEDIATE
SQL> EXIT
$ exit
#
```



Information

If the Oracle user's shell limits are not set properly, the Oracle instance and Oracle listener may fail to start.

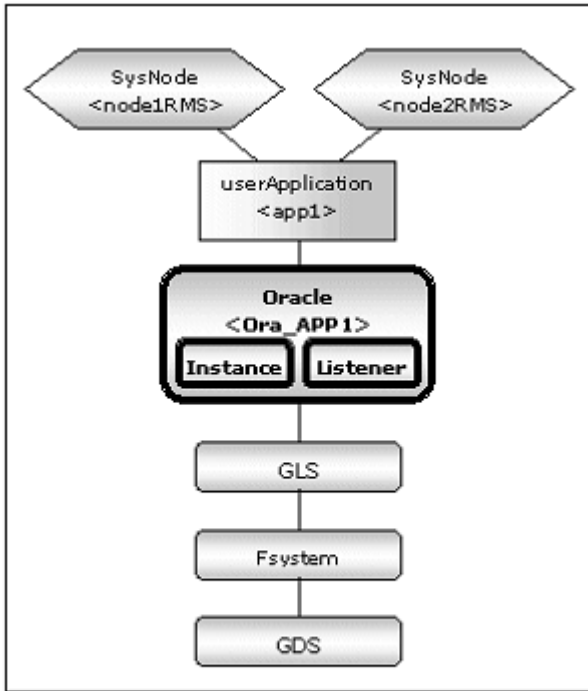
PRIMECLUSTER Wizard for Oracle starts the Oracle instance and Oracle listener after changing from the root user to the Oracle user by using su(1M). If the Oracle user's shell limits are not set, the root user's shell limits are inherited. Therefore, make sure that you can start the Oracle instance and Oracle listener after changing from the root user to the Oracle user.

2.2.7 userApplication Edit

Register Oracle resources in userApplication that is created at [“2.2.4 userApplication with No Oracle Resources”](#).

In standby operation, userApplication is configured as follows.

Note that resource (Ora_App1) is being created and added.



GLS: Global Link Services
 GDS: Global Disk Services

Note

Check if Oracle database is properly running by starting and stopping manually before starting Oracle Resource Creation and Setting. Before starting this procedure, Oracle instances, Oracle listeners and RMS on all the cluster nodes should stop. Do not create multiple resources for the same Oracle instance or Listener.

userApplication is edited using the userApplication Configuration Wizard.

The flow of userApplication creation is as follows:

1	userApplication deletion	2.2.7.1 userApplication Deletion
2	Oracle resources creation	2.2.7.2 Oracle Resource Creation
3	Other resources creation	2.2.7.3 Other Resource Creation
4	userApplication creation	2.2.7.4 userApplication Creation
5	Other userApplication creation	2.2.7.5 Other userApplication Creation
6	Configuration-Generate and Configuration-Activate	2.2.7.6 Configuration-Generate and Configuration-Activate

2.2.7.1 userApplication Deletion

Delete only the userApplication that was created in "2.2.4 userApplication with No Oracle Resources" using the userApplication Configuration Wizard. Do not delete resources that are included in the userApplication.

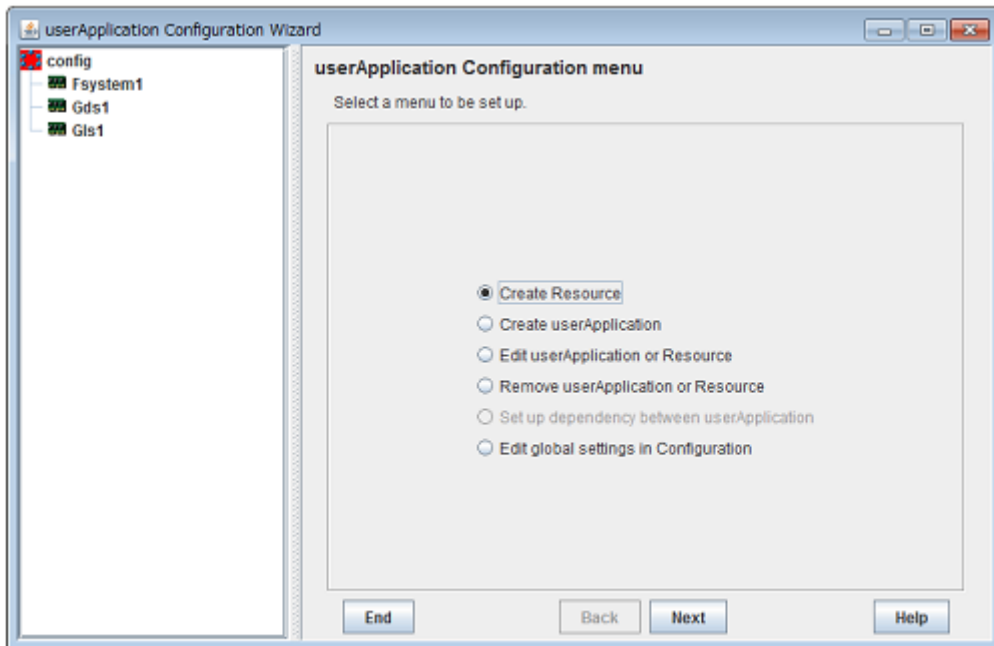
Information

For further details, refer to "PRIMECLUSTER Installation and Administration Guide".

2.2.7.2 Oracle Resource Creation

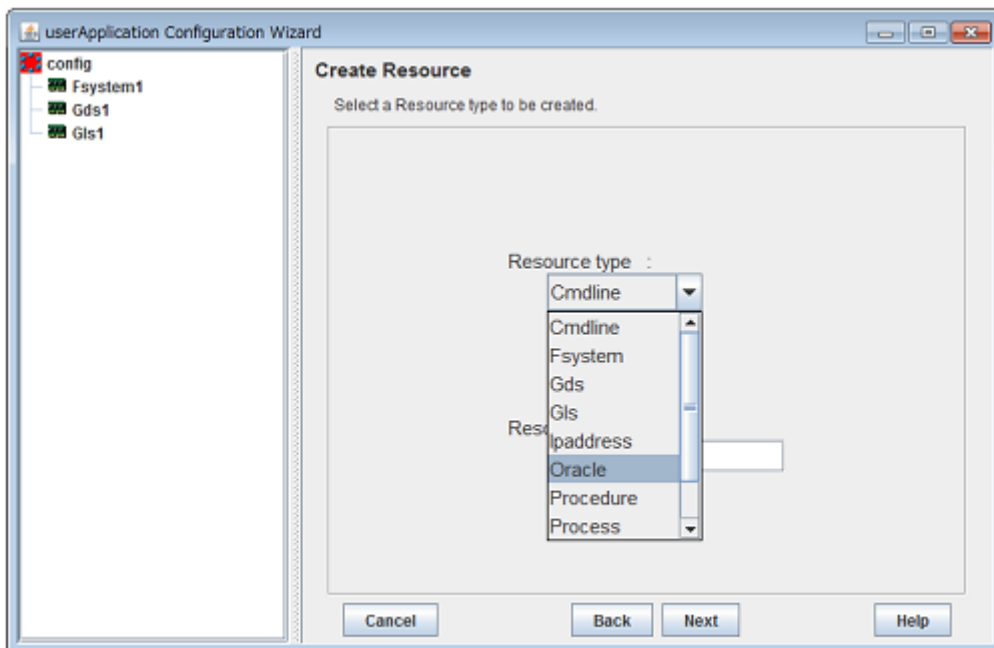
This section describes how to create an Oracle resource.

1. Select “Create Resource” in the “userApplication Configuration” menu.



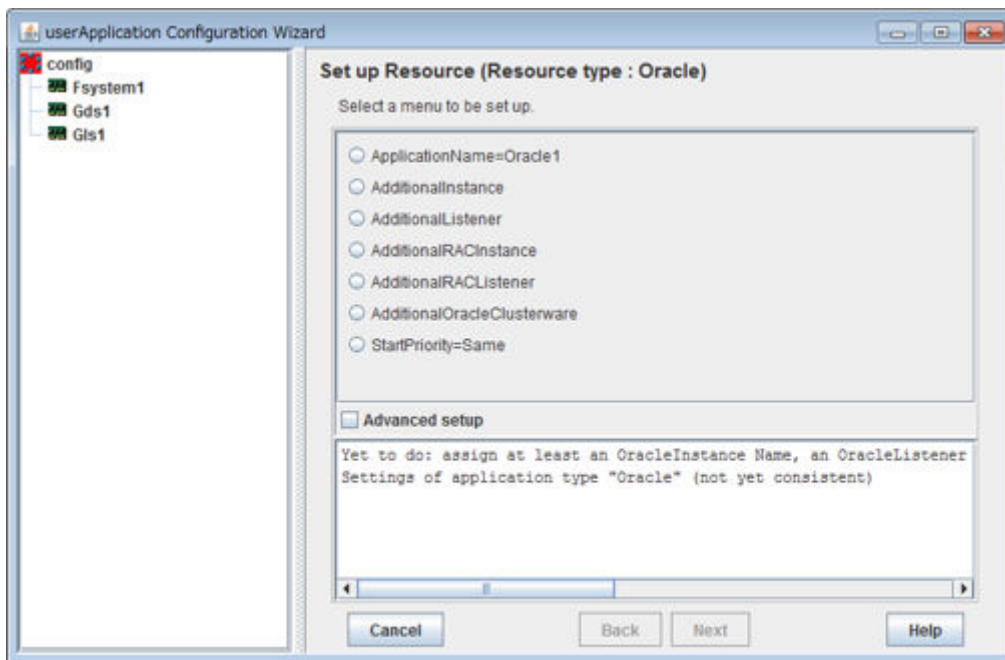
Gls: Global Link Services
Gds: Global Disk Services

2. Select “Oracle” in the “Resource Type” menu.



Gls: Global Link Services
Gds: Global Disk Services

3. Add the Oracle instance and Oracle listener in the “Set up Resource” menu.



Gls: Global Link Services
Gds: Global Disk Services

The settings are as follows:

Attributes	Description
ApplicationName	Change the application name. The default is “Oracle1”. It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZa bcdefghijklmnopqrstuvwxyz_
AdditionalInstance	Add an Oracle instance resource.
AdditionalListener	Add an Oracle listener resource.
AdditionalRACInstance	Not used.
AdditionalRACListener	Not used.
AdditionalOracleClusterware	Not used.
StartPriority	Set up the startup order of the Oracle instance and Oracle listener. The default is “Simultaneous startup”.

Information

A resource name on RMS is based on the application name (SubApplicationName) entered in “ApplicationName” on this step.

- Oracle instance resource/ Oracle ASM instance resource
ORACLE_<SubApplicationName>_<OracleSID>
- Oracle listener resource
LISTENER_<SubApplicationName>_<ListenerName>

These resource names have the following convention and rules.

- Characters per resource name must be up to 39 characters.

- "ORACLE_" and "LISTENER_" are fixed words.

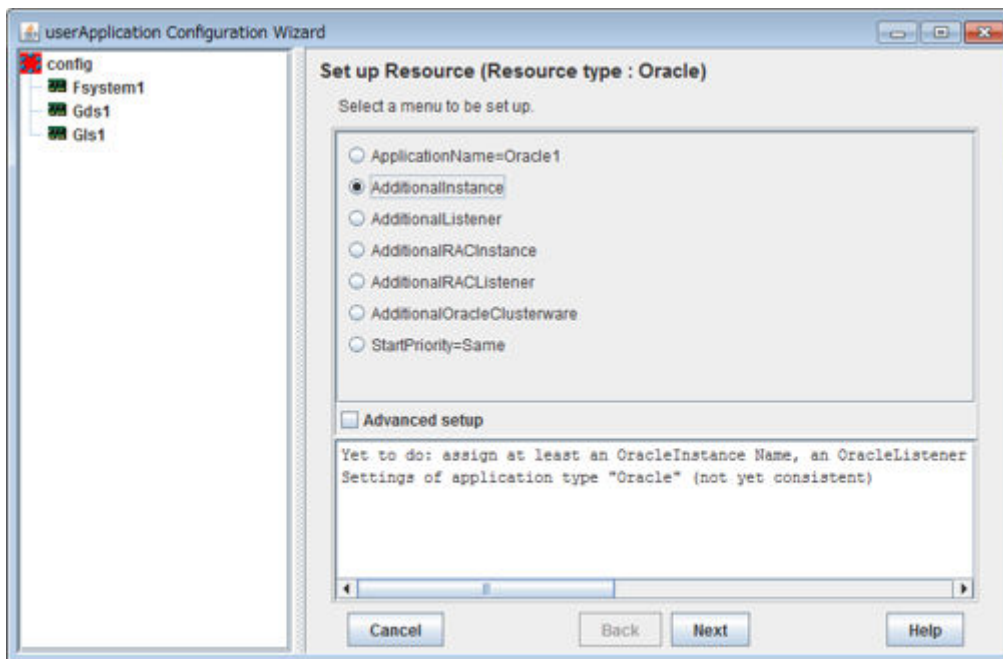
Note

If you create and register an Oracle ASM instance resource, refer to "2.4.2 Oracle ASM (Automatic Storage Management)".

Example

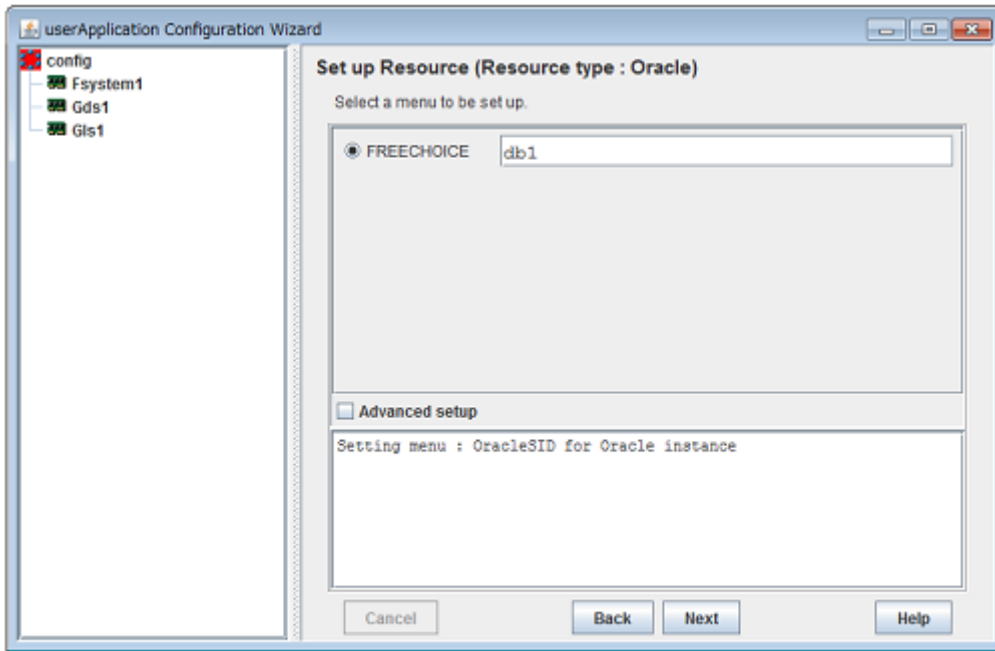
If a dynamic service information is used, specify "Listener" for the StartPriority attribute.

4. Set up the Oracle instance as follows:



Gls: Global Link Services
Gds: Global Disk Services

Enter ORACLE_SID.

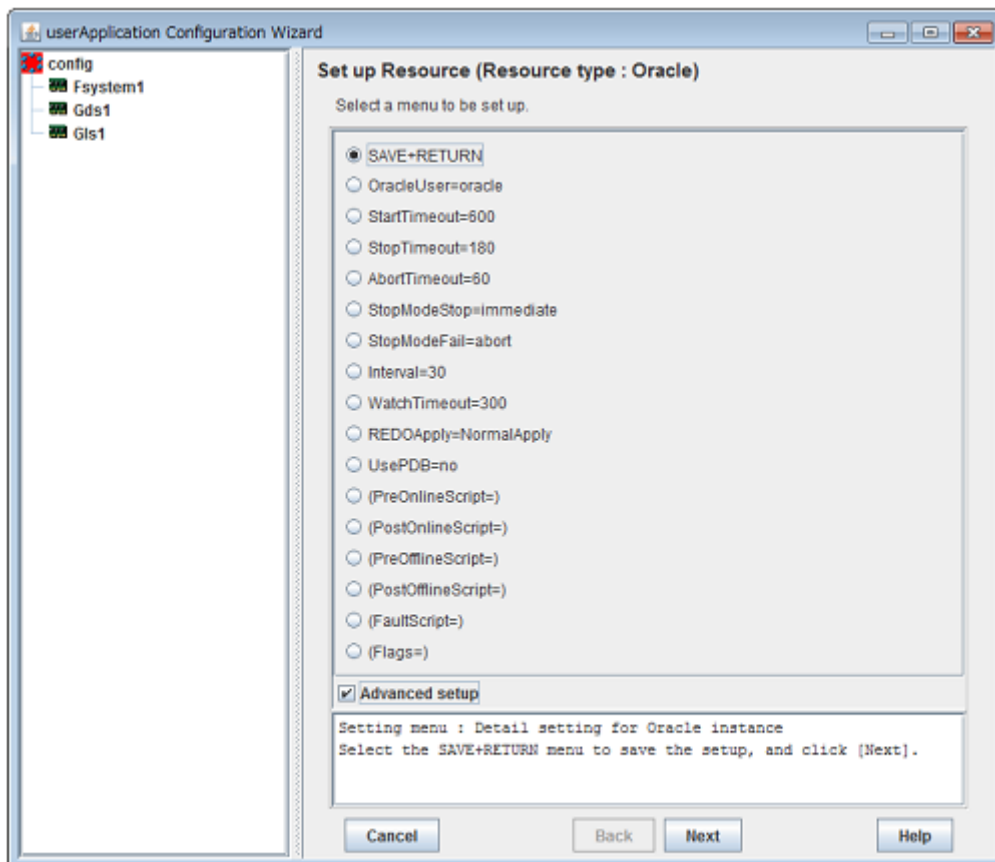


Gls: Global Link Services
Gds: Global Disk Services

5. Oracle instance settings

To change the settings, select setting item and click “Next” button.

To change the advanced settings, check “Advanced setup”.



Gls: Global Link Services
Gds: Global Disk Services

The settings for Oracle instance resource are as follows:

Attributes	Description
OracleSID	<p>ORACLE_SID</p> <p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+ -
OracleUser	<ul style="list-style-type: none"> - Oracle instance resource, Oracle ASM instance resource(Oracle Database 11g R1 or earlier) - Operating system user which belongs to OSDBA group. (refer to “Oracle User” of “2.2.2 Oracle Database Software Installation and Configuration”.) - Oracle ASM instance resource(Oracle Database 11g R2 or later) - Grid user <p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_ -
StartTimeout	<p>Timeout (sec) duration of Oracle instance startup.</p> <p>Default: 600 (300 - 86400)</p>
StopTimeout	<p>Timeout (sec) duration of Oracle instance stop.</p> <p>Default: 180 (60 - 86400)</p>
AbortTimeout	<p>Timeout (sec) duration of forced termination in the event of an Oracle instance stop error.</p> <p>Default: 60 (60 - 86400)</p>
StopModeStop	<p>Oracle instance stop mode in normal time.</p> <p>Default: Immediate mode (abort, immediate, transactional)</p>
StopModeFail	<p>Oracle instance stop mode in the event of a failure.</p> <p>Default: Abort mode (abort, immediate)</p>
Interval	<p>Monitoring interval (sec) of Oracle instance.</p> <p>Default: 30 (5 - 86400)</p>
WatchTimeout	<p>No response time (sec) during monitoring Oracle instance.</p> <p>Default: 300 (30 - 3600)</p>
REDOApply	<p>Method of applying redo log to standby database in Oracle Data Guard environment. This setting is enabled with the Oracle instance resource of the standby database.</p> <p>Default: NormalApply (ReceiveOnly, NormalApply, RealTimeApply, ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR)</p> <p>This setting is disregarded in the following instance resource.</p> <ul style="list-style-type: none"> - Oracle ASM instance resource - Oracle instance resource of primary database - Oracle instance resource without Oracle Data Guard <p>For details, see "G.2 Oracle Environment Setting".</p>
UsePDB	<p>Set <i>yes</i> when you use the PDB of the Oracle database using the multitenant architecture.</p> <p>Set <i>no</i> when you do not use the PDB.</p> <p>Default: no (yes, no)</p>

Attributes	Description
	This setting is not used for the Oracle ASM instance resource.

The advanced settings are as follows. These settings are optional:

Attributes	Description
PreOnlineScript	<p>Executed before online processing. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>.</p>
PostOnlineScript	<p>Executed after online processing. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>.</p>
PreOfflineScript	<p>Executed before offline processing. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>.</p>
PostOfflineScript	<p>Executed after offline processing. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>.</p>
FaultScript	<p>Executed when a fault occurs. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>.</p>
Flags	<p>NullDetector (D)</p> <p>If you do not want to monitor the resource, select this flag "NullDetector(D)". Default: "NullDetector(D)" is not selected.</p>
	<p>AutoRecover (A)</p> <p>If you want to restart the resource before failover when a resource failure occurs, select this flag "AutoRecover(A)". Default: "AutoRecover(A)" is not selected.</p>
	<p>MonitorOnly (M)</p> <p>If you do not want to generate a failover when a resource failure occurs, select this flag "MonitorOnly(N)". Default: "MonitorOnly(N)" is not selected.</p>

Information

- For details about Scripts, see “[2.4.1 Oracle resource Online/Offline Script](#)”.
- For details about Flags, see “9 Appendix - Attributes” of the “PRIMECLUSTER RMS Configuration and Administration Guide”.
- The following value is used for the timeout values (sec) of PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript and FaultScript.

```
StartTimeout + StopTimeout + AbortTimeout + 10
```

Note

- If NullDetector is enabled, the AutoRecover and MonitorOnly attribute will automatically be disabled.
- MonitorOnly can be enabled in the following cases:
 - One resource of “Instance” type and one resource of “Listener” type exist, and StartPriority is set to “Same”. In this case, MonitorOnly only for the one of them can be enabled.
 - More than one resources of “Instance” type exist. In this case, MonitorOnly for the one of them cannot be enabled, but all of the others can be enabled.
- Calculate StartTimeout based on the time measured in “[2.2.6.1 Oracle database Creation and Setting](#)”.

```
<UsePDB is no>  
Time of "STARTUP"+60 seconds  
  
<UsePDB is yes>  
Time of "STARTUP"+Time of "ALTER PLUGGABLE DATABASE ALL OPEN;" +60 seconds
```

Set the value when this time is larger than default value 600. Otherwise, set default value 600.

- Calculate StopTimeout based on the time measured in “[2.2.6.1 Oracle database Creation and Setting](#)”.

```
Time of "SHUTDOWN StopModeStop" +60 seconds  
*When StopModeStop is not IMMEDIATE, measure the time of StopModeStop.
```

Set the value when this time is larger than default value 180. Otherwise, set default value 180.

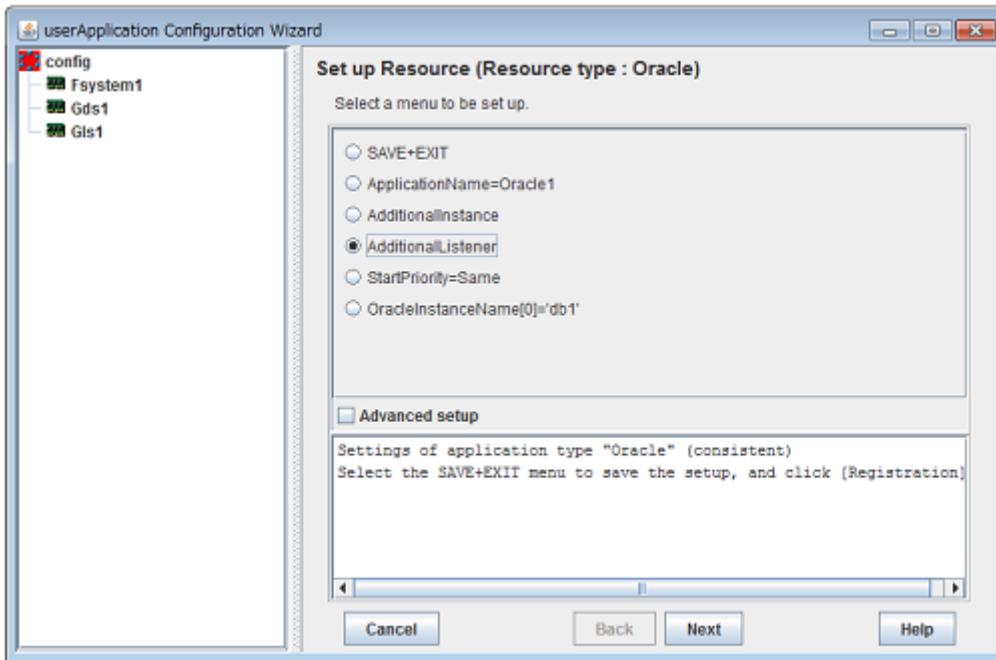
- Calculate AbortTimeout based on the time measured in “[2.2.6.1 Oracle database Creation and Setting](#)”.

```
<StopModeFail is IMMEDIATE>  
Time of "SHUTDOWN IMMEDIATE" +60 seconds  
  
<StopModeFail is ABORT>  
60 seconds
```

Set the value when this time is larger than default value 60. Otherwise, set default value 60.

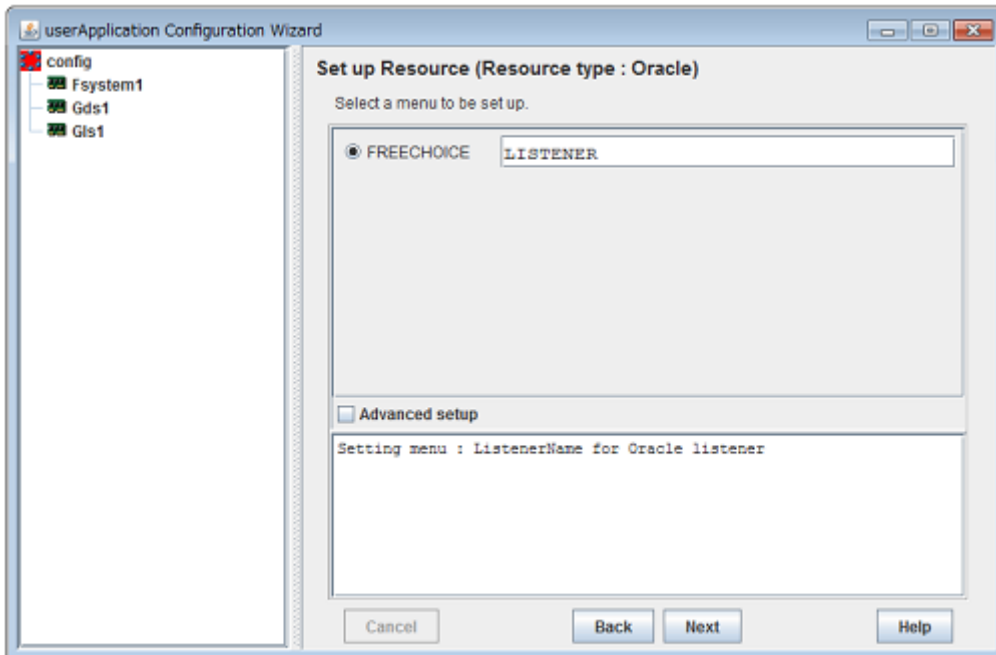
- Flags=<*Abbreviation*> indicates that the flag attribute is enabled.

6. Set up the Oracle listener as follows:



Gls: Global Link Services
Gds: Global Disk Services

Enter the listener name.

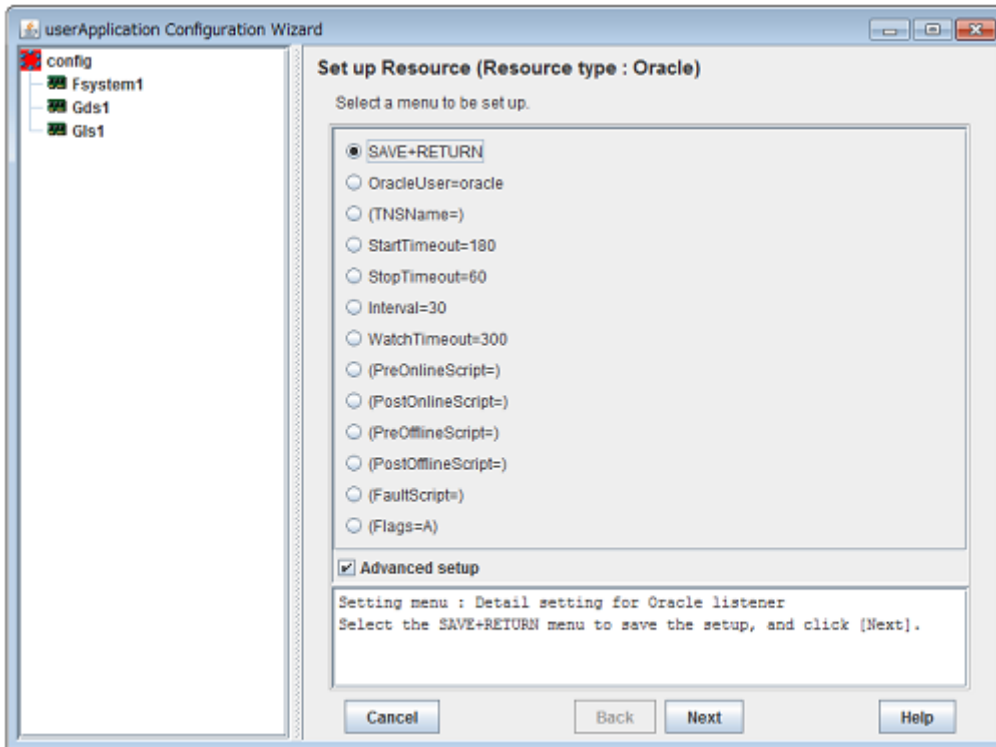


Gls: Global Link Services
Gds: Global Disk Services

7. Oracle listener settings

To change the settings, select setting item and click “Next” button.

To change the advanced settings, check “Advanced setup”.



GLS: Global Link Services
 GDS: Global Disk Services

The settings for Oracle listener resource are as follows:

Attributes	Description
ListenerName	<p>Listener name</p> <p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
OracleUser	<ul style="list-style-type: none"> - Oracle listener resource(Oracle Database 11g R1 or earlier), Oracle listener resource(Oracle ASM is not used with Oracle Database 11g R2 or later) - Operating system user for Listener control. - Oracle listener resource(Oracle ASM is used with Oracle Database 11g R2 or later) - Grid user <p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
StartTimeout	<p>Timeout (sec) duration of Oracle listener startup.</p> <p>Default: 180 (120 - 86400)</p>
StopTimeout	<p>Timeout (sec) duration of Oracle listener stop.</p> <p>Default: 60 (60 - 86400)</p>
Interval	<p>Monitoring interval (sec) of Oracle listener.</p> <p>Default: 30 (5 - 86400)</p>
WatchTimeout	<p>No response time (sec) during monitoring Oracle listener.</p> <p>Default: 300 (30 - 3600)</p>

The advanced settings are as follows. These settings are optional:

Attributes		Description
TNSName		<p>Network service for listener monitoring</p> <p>Execute the tnsping command to monitor the Oracle listener when TNSName is set (tnsnames.ora). If the TNSName is omitted, process monitoring of the Oracle listener will only be performed.</p> <p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-.
PreOnlineScript		<p>Executed before online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?
PostOnlineScript		<p>Executed after online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?
PreOfflineScript		<p>Executed before offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?
PostOfflineScript		<p>Executed after offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?
FaultScript		<p>Executed when a fault occurs.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?
Flags	NullDetector (D)	<p>If you do not want to monitor the resource, select this flag "NullDetector(D)".</p> <p>Default: "NullDetector(D)" is not selected.</p>
	AutoRecover (A)	<p>If you want to restart the resource before failover when a resource failure occurs, select this flag "AutoRecover(A)".</p> <p>Default: "AutoRecover(A)" is selected.</p>

Attributes		Description
	MonitorOnly (M)	If you do not want to generate a failover when a resource failure occurs, select this flag "MonitorOnly(N)". Default: "MonitorOnly(N)" is not selected.

Information

- For details about Scripts, see “2.4.1 Oracle resource Online/Offline Script”.
- For details about Flags, see “9 Appendix - Attributes” of the “PRIMECLUSTER RMS Configuration and Administration Guide”.
- The following value is used for the timeout values (sec) of PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript and FaultScript.

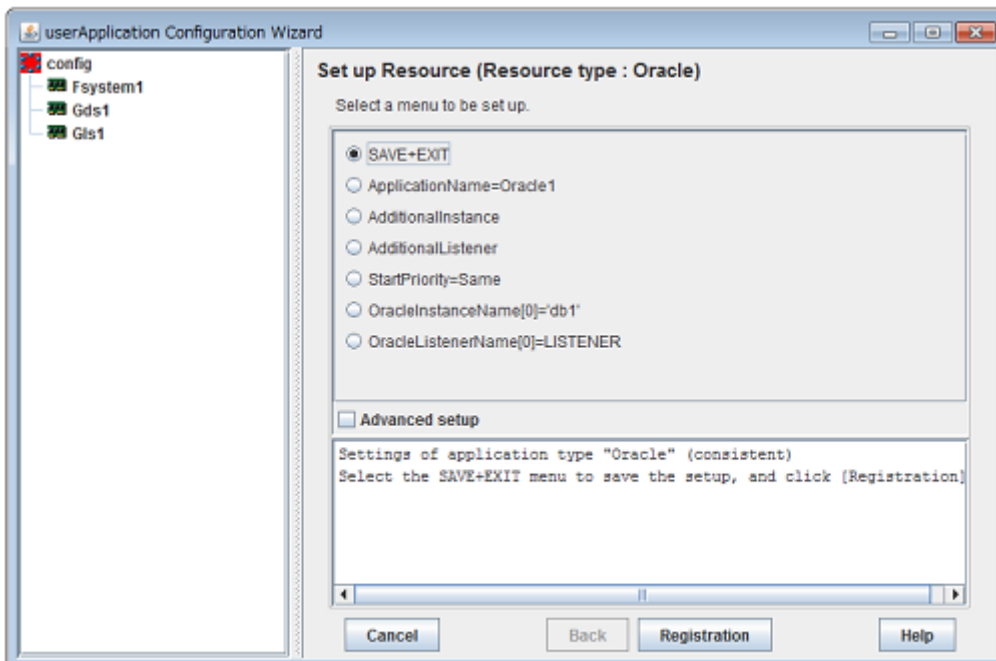
```
StartTimeout + StopTimeout + 10
```

Note

- If NullDetector is enabled, the AutoRecover and MonitorOnly attribute will automatically be disabled.
- MonitorOnly can be enabled in the following cases:
 - One resource of “Instance” type and one resource of “Listener” type exist, and StartPriority is set to “Same”. In this case, MonitorOnly only for the one of them can be enabled.
 - More than one resources of “Listener” type exist. In this case, MonitorOnly for the one of them cannot be enabled, but all of the others can be enabled.
- Flags=<Abbreviation> indicates that the flag attribute is enabled.

8. Save the settings by selecting “SAVE+EXIT”.

Check that the Oracle resource is set then save the settings by selecting SAVE+EXIT.



Gls: Global Link Services
Gds: Global Disk Services

Information

After set up userApplication, the settings in this section can be confirmed with `clorainfo -c` command. See “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)” for details.

2.2.7.3 Other Resource Creation

If you have any other required resources, create them.

Information

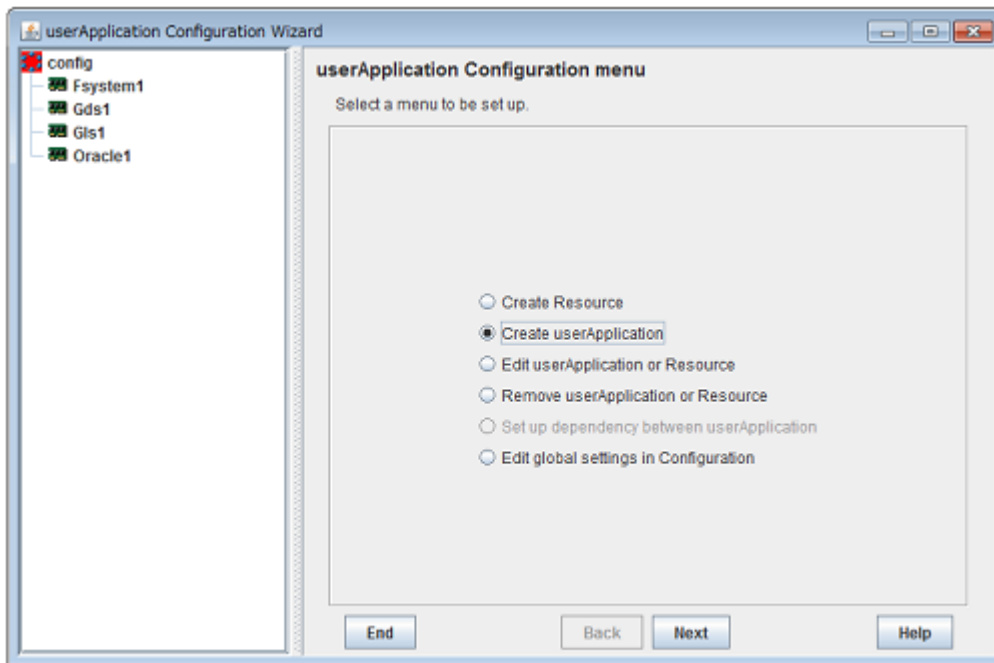
Other resources (ex. Procedure resource, resource concerning backup software) should be registered here.

For details of them, refer to the each manual. (For Procedure resource, refer to “PRIMECLUSTER Installation and Administration Guide”.)

2.2.7.4 userApplication Creation

Select “Create userApplication” in the “userApplication Configuration” menu to create userApplication including the resources created in “[2.2.7.2 Oracle Resource Creation](#)” and “[2.2.7.3 Other Resource Creation](#)”.

For further details of the attributes of userApplication, refer to “[2.2.3 userApplication Creation](#)”.



Gls: Global Link Services
Gds: Global Disk Services

Note

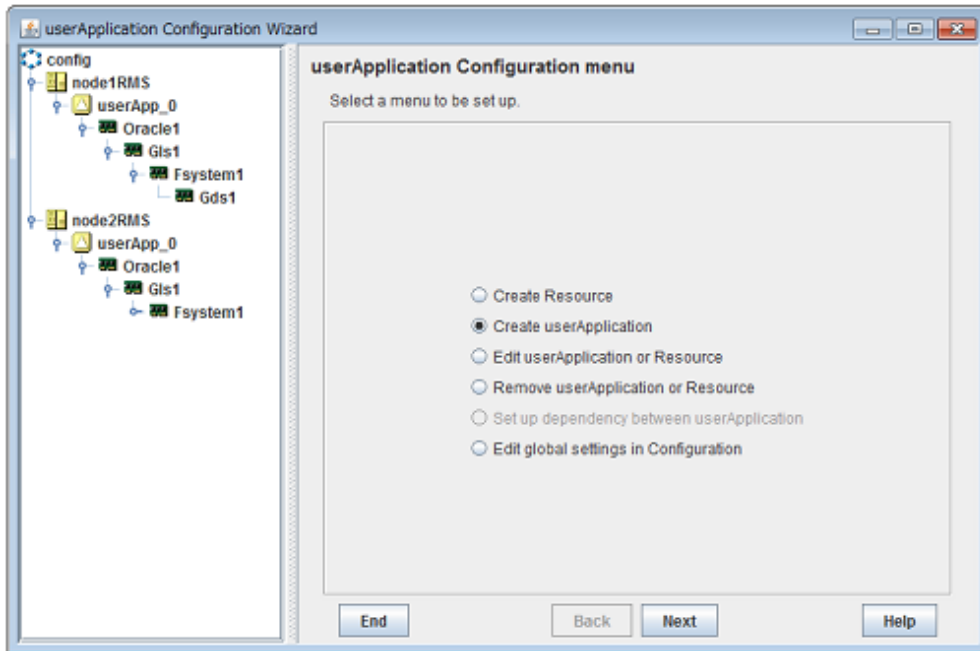
HELP description is common to GUI and CUI, so a part of them includes a description about CUI.

2.2.7.5 Other userApplication Creation

If you have any other required userApplications at “[2.2.7.4 userApplication Creation](#)”, create them using the userApplication Configuration Wizard.

2.2.7.6 Configuration-Generate and Configuration-Activate

Check the set contents and then generate and activate the configuration. The image screens after activation are as follows:



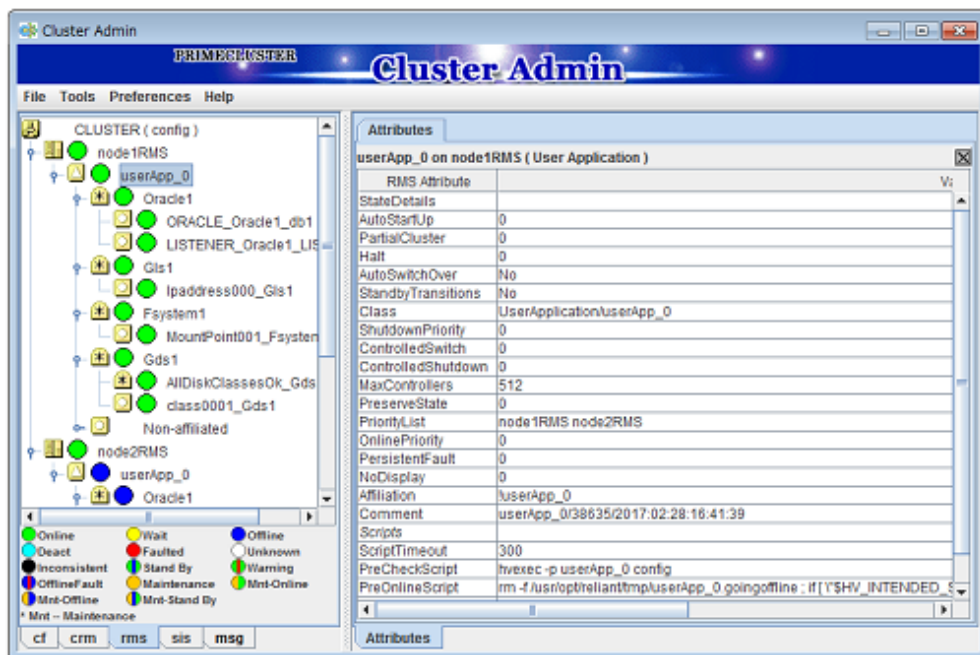
Gls: Global Link Services
Gds: Global Disk Services

2.2.8 userApplication Operation Check

Start userApplication by executing the hvcm command then check if it is properly running on all the nodes.

Configuration of operations

Check if the configuration is correct in the Cluster Admin screen of Web-Based Admin View. The image screens of Cluster Admin are as follows:



Gls: Global Link Services
Gds: Global Disk Services

Shared disk

Check if you can access to the shared disk from the operating node. Also, check if a file can be created on the shared disk using Oracle user access privileges.

Logical IP address

Check if you can access the operating node from the client using the logical IP address.

Oracle database

Check if you can access to Oracle database running on the operating node from the client using the logical IP address.

2.3 Scalable Operation with Oracle RAC

2.3.1 PRIMECLUSTER Installation and Configuration

- Hardware configuration

Configure hardware required to operate PRIMECLUSTER. A shared disk device is also required to create Oracle database files.

- Software installation

Install PRIMECLUSTER Enterprise Edition according to the “PRIMECLUSTER Enterprise Edition Software Release Guide”. Install PRIMECLUSTER Wizard for Oracle according to the “Software Release Guide PRIMECLUSTER Wizard for Oracle for Oracle Solaris”.

- Cluster configuration

Configure a cluster system, network, and shared disk device according to the PRIMECLUSTER manuals.

- Shared disk volumes Setup

If you do not register the Oracle Clusterware resource ([Configuration C](#)), a volume on the shared disk must be active before the Oracle Clusterware is activated, because the Oracle Clusterware accesses a shared disk device as soon as it is activated.

2.3.2 Oracle Database Software Installation and Configuration

Site Preparation

Install Oracle Grid Infrastructure and Oracle database referring to Oracle Database manuals and installation guides.

- Kernel parameters

For semopm, specify a value of 4 or more.

- Install Users

Create an install user for the Oracle Grid Infrastructure and another install user for Oracle database. It is possible to use the same install user to install both of them, but creating different ones is recommended by Oracle. PRIMECLUSTER Wizard for Oracle supports both of the methods. Also, make sure that user ID and group ID are identical on all the nodes.



.....
This document is described for creating different users. In the case of creating one user, it is necessary to replace “Grid user” with “Oracle user”.
.....

Oracle Grid Infrastructure installation

Install Oracle Grid Infrastructure by referring to the Oracle Grid Infrastructure manual and installation guide.

Note

- Install Oracle Grid Infrastructure on a local disk of all nodes.
- Check if root user access privileges can switch the user to the Grid user, using the su(1M) command.

```
# su - <Grid user>
```

- A command (e.g. script) that has interactive mode should not be described in Grid user's profile. (e.g. /etc/profile, .bash_profile, .cshrc, .profile)
- Environment that Grid user's home directory and profile are located on the shared disk is not supported. Grid user's home directory and profile must be located on the local disk of each node.

Oracle Database installation

Install Oracle Database by referring to the Oracle Database manual and installation guide.

Note

- Install Oracle Database on a local disk of all nodes.
- Check if root user access privileges can switch the user to the Oracle user, using the su(1M) command.

```
# su - <Oracle user>
```

- A command (e.g. script) that has interactive mode should not be described in Oracle user's profile. (e.g. /etc/profile, .bash_profile, .cshrc, .profile)
- Environment that Oracle user's home directory and profile are located on the shared disk is not supported. Oracle user's home directory and profile must be located on the local disk of each node.

Using Oracle Database 19c

Execute the procedure in "[Appendix H Using Oracle Database 18c/19c](#)".

Add RMS Stop Processing

To ensure that RMS is stopped before ohasd service of Oracle Grid Infrastructure is stopped during OS shutdown, execute the following procedure.

1. Create the script file /etc/init.d/stopRMS and add execution permission as a root user.
Create script file :

```
# vi /etc/init.d/stopRMS
(Paste the following the content of script file)
# chmod 744 /etc/init.d/stopRMS
```

Content of script file :

```
#!/usr/bin/bash
#
case "$1" in
'stop')
    /opt/SMAW/SMAWRrms/lib/svc/smawrrms stop
    ;;
*)
    echo "Usage: stopRMS { stop }"
```

```
;;
esac
```

2. Check the directory where the stop script of ohasd service of Oracle Grid Infrastructure is located.

```
# find /etc/rc*.d/ | grep ohasd
/etc/rc0.d/K19ohasd
/etc/rc1.d/K19ohasd
/etc/rc2.d/K19ohasd
/etc/rc3.d/S96ohasd
/etc/rcS.d/K19ohasd
```

3. Create a symbolic link "K00stopRMS" to /etc/init.d/stopRMS in the directory where "K<Two digit number>ohasd" is located. The example in step 2, create them in /etc/rc0.d, /etc/rc1.d, /etc/rc2.d, and /etc/rcS.d.

```
# ln -s /etc/init.d/stopRMS /etc/rc0.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rc1.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rc2.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rcS.d/K00stopRMS
```

Database creating and settings

Create a database by referring to the Oracle Database manual and installation guide.

Note

- If multiple Oracle homes are configured on one server, a different Oracle RAC instance name must be assigned for each Oracle home.
- If multiple Oracle homes are configured on one server, a different listener name must be assigned for each Oracle home.

Information

In scalable operation with Oracle RAC, the RMS resource name is generated based on the resource name of Oracle RAC as follows:

- Oracle RAC instance resource

```
<SubApplicationName>_<SID>.i
```

- Oracle listener resource

```
<SubApplicationName>_<lsnr_name>.l
```

The default value of <lsnr_name> is "LISTENER".

- Oracle Clusterware resource

```
<SubApplicationName>_Clusterware
```

These resource names have the following convention and rules.

- RMS resource name must be up to 39 characters.
- For information on how to set up <SubApplicationName>, see ["2.3.4 userApplication with Oracle Clusterware"](#) and ["2.3.5 userApplication with Oracle RAC Instances and Listeners"](#).

- SYSTEM user password

PRIMECLUSTER Wizard for Oracle accesses and monitors Oracle instances as the Oracle database SYSTEM user. Therefore, the SYSTEM user's password must be registered in PRIMECLUSTER Wizard for Oracle. See ["4.3 clorapass - Register Password for Monitoring"](#) to register the password.

Setting change

- Setting automatic startup of Oracle Clusterware

Set up automatic startup of Oracle Clusterware with Configuration A, B or C that you use.

Configuration	Setting automatic startup of Oracle Clusterware
Configuration A	disable
Configuration B	disable
Configuration C	enable

To confirm the setting of Oracle Clusterware, execute the following command.

```
# <ORACLE_HOME>/bin/crsctl config crs
```

If you set automatic startup of Oracle Clusterware to disable, execute the following command as the root user.

```
# <ORACLE_HOME>/bin/crsctl disable crs
```

If you set automatic startup of Oracle Clusterware to enable, execute the following command as the root user.

```
# <ORACLE_HOME>/bin/crsctl enable crs
```

<ORACLE_HOME> is the directory path where the Oracle Grid Infrastructure was installed.

- Disabling automatic startup of CRS resource

Disable automatic startup of Oracle RAC instance.

This is because the Oracle RAC instance is registered as an RMS resource and its startup is controlled by userApplication, not Oracle Clusterware.

See the following setup example:

```
$ srvctl modify database -d $DB_NAME -y manual
```



Information

For detail of editing, refer to Oracle RAC manuals.

Operation check

PRIMECLUSTER Wizard for Oracle starts and stops the Oracle RAC instance (database) and Oracle listener after changing from the root user to the Oracle user by using su(1M). Check if you can start and stop the Oracle RAC instance and Oracle listener manually after changing from the root user to the Oracle user by using su(1M) on all nodes in Oracle RAC.

Also, check if crsctl status resource command can be executed by Grid user, and srvctl config database command can be executed by Oracle user.



Example

The following example shows the operation results:

```
# su - <Grid user>
$ srvctl start listener -n $NODE_NAME -l $LSNR_NAME
$ srvctl stop listener -n $NODE_NAME -l $LSNR_NAME
# su - <Oracle user>
$ srvctl start instance -d $DB_NAME -i $ORACLE_SID
$ srvctl stop instance -d $DB_NAME -i $ORACLE_SID
```

```
# su - <Grid user>
$ crsctl status resource -t
```

NAME	TARGET	STATE	SERVER	STATE_DETAILS

Local Resources				

ora.DATA.dg				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	
ora.LISTENER.lsnr				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	
ora.asm				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	
ora.eons				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	
ora.gsd				
	OFFLINE	OFFLINE	node1	
	OFFLINE	OFFLINE	node2	
ora.net1.network				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	
ora.ons				
	ONLINE	ONLINE	node1	
	ONLINE	ONLINE	node2	

Cluster Resources				

ora.LISTENER_SCAN1.lsnr				
1	ONLINE	ONLINE	node1	
ora.oc4j				
1	OFFLINE	OFFLINE		
ora.racdb.db				
1	ONLINE	ONLINE	node1	Open
2	ONLINE	ONLINE	node2	Open
ora.scan1.vip				
1	ONLINE	ONLINE	node1	
ora.node1.vip				
1	ONLINE	ONLINE	node1	
ora.node2.vip				
1	ONLINE	ONLINE	node2	
\$				

```
# su - <Oracle user>
$ srvctl config database
racdb
$
```

Define the full path of the log file

Define the full path of the alert log and the listener log in /opt/FJSVclora/etc/clgetoralog.conf. See the Note in “4.5 clgetoralog - Collect Troubleshooting Information” for details.

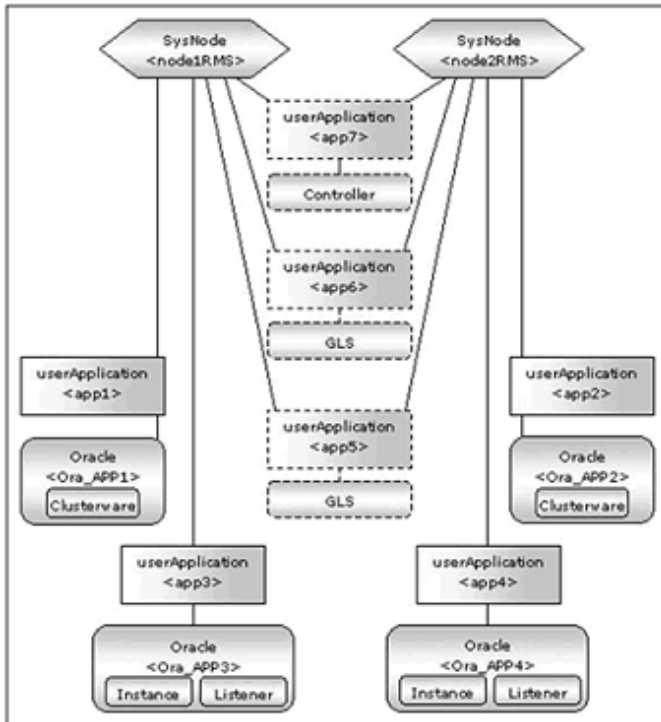
2.3.3 userApplication and Resource Configuration

Oracle RAC instances and listeners are managed as PRIMECLUSTER RMS resources. Also, the Oracle Clusterware can be registered in an RMS resource optionally.

Configuration A

The Oracle Clusterware and Oracle RAC instance are registered in different userApplication.

Use this configuration if Oracle Clusterware is registered in an RMS resource and you have plan to add Oracle RAC instances in the future or each node has multiple Oracle RAC instances.



GLS: Global Link Services

userApplication	Description	Resources
app1, app2	Controls Oracle Clusterware. It is created on each node.	Oracle resource (Clusterware)
app3, app4	Controls Oracle instances and listeners. It is created on each node.	Oracle resource (instances, listeners)
app5, app6	Used as standby for GLs or takeover network. (Option) Create them according to operating conditions.	GLs resource, etc
app7	Starts up or stops Oracle instance userApplication (app3 and app4) simultaneously on all nodes. (Option)	Controller resource

If userApplication app3 and app4 are stopped due to an Oracle RAC instance resource failure, userApplication app1 and app2 of Oracle Clusterware will not be affected.

Information

- The following setup values are recommended for userApplication which controls Oracle Clusterware (app1, app2). The other attributes that are not described below are optional.

Attributes	Values
Operation method	Standby
AutoSwitchOver	No
PersistentFault	1

- The following setup values are recommended for userApplication which controls Oracle instances and listeners (app3, app4). The other attributes that are not described below are optional.

Attributes	Values
Operation method	Standby
AutoStartUp	If you control userApplication startup and stop on all nodes by using the controlling userApplication, be sure to specify No.
AutoSwitchOver	No
PersistentFault	1

Note

If the “KeepOnline” flag of Oracle Clusterware resource is disabled, the userApplication which controls Oracle instances should be stopped first, and then the userApplication which controls Oracle Clusterware should be stopped.

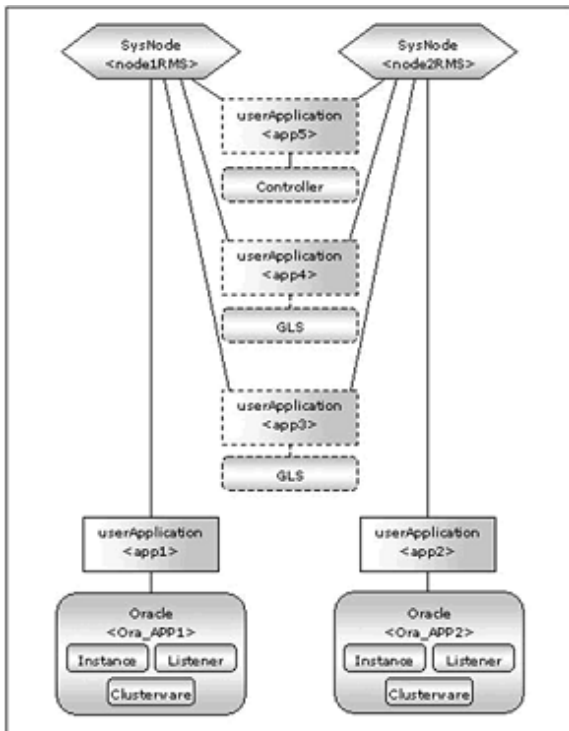
(In the above image, app3 should be stopped before app1 stopping. app4 should be stopped before app2 stopping.)

For further details of the “KeepOnline” flag, refer to “2.3.4 userApplication with Oracle Clusterware”.

Configuration B

The Oracle Clusterware and Oracle RAC instance are registered in the same userApplication.

Use this configuration if Oracle Clusterware is registered in an RMS resource and only one Oracle RAC instance exists on a node and having no plan to add Oracle RAC instances in the future.



GLS: Global Link Services

userApplication	Description	Resources
app1, app2	Controls Oracle Clusterware. It is created on each node.	Oracle resource (Clusterware, instances, listeners)

userApplication	Description	Resources
app3, app4	Used as standby for GLs or takeover network. (Option) Create them according to operating conditions.	GLs resource, etc
app5	Starts up or stops Oracle instance userApplication (app1 and app2) simultaneously on all nodes. (Option)	Controller resource

If userApplication app1 and app2 are stopped due to an Oracle RAC instance resource failure, Oracle Clusterware will also be stopped (when the KeepOnline flag is disabled).

Information

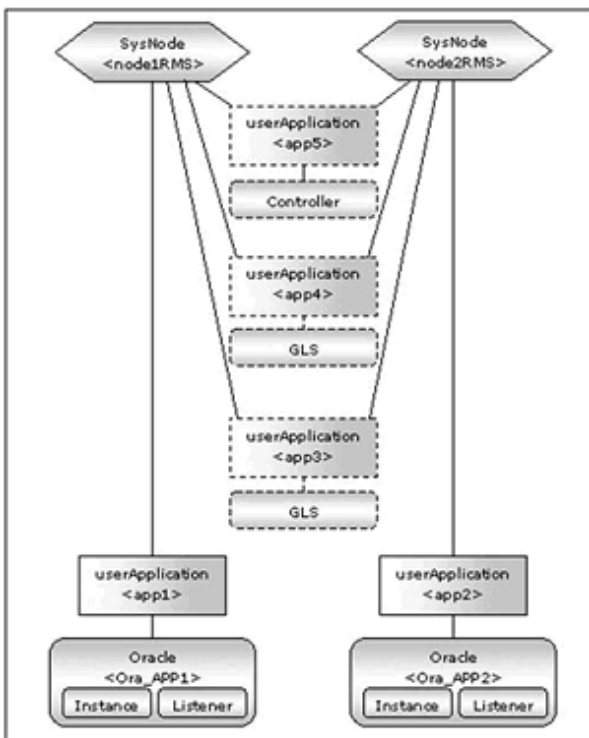
- The following setup values are recommended for userApplication which controls Oracle Clusterware, Oracle instance and listener (app1, app2). The other attributes that are not described below are optional.

Attributes	Values
Operation method	Standby
AutoStartUp	If you control userApplication startup and stop on all nodes by using the controlling userApplication, be sure to specify No.
AutoSwitchOver	No
PersistentFault	1

Configuration C

The Oracle Clusterware is not registered.

Use this configuration if you want to make Oracle Clusterware automatically start up along with OS startup without registering it in an RMS resource.



GLS: Global Link Services

userApplication	Description	Resources
app1, app2	Controls Oracle instances and listeners. It is created on each node.	Oracle resources (instances, listeners)
app3, app4	Used as standby for GIs or takeover network. (Option) Create them according to operating conditions.	GIs resource, etc
app5	Starts up or stops Oracle instance userApplication (app1 and app2) simultaneously on all nodes. (Option)	Controller resource

Information

- The following setup values are recommended for userApplication which controls Oracle instances and listeners (app1, app2). The other attributes that are not described below are optional.

Attributes	Values
Operation method	Standby
AutoStartUp	No.
AutoSwitchOver	No
PersistentFault	1

- Confirm Oracle Clusterware has already been started when you start userApplication (app1,app2). It fails in the start of the Oracle instance resources when Oracle Clusterware is starting or Oracle Clusterware has stopped.

The flow of userApplication creation is as follows:

1	Register Oracle Clusterware resources	2.3.4 userApplication with Oracle Clusterware
2	Register Oracle instance and listener resources	2.3.5 userApplication with Oracle RAC Instances and Listeners
3	Register the other required resources	2.3.6 Other Resource and userApplication Registration
4	Create userApplication	2.3.7 Configuration-Generate and Configuration-Activate 2.3.8 userApplication Operation Check

userApplication is configured with the userApplication Configuration Wizard. This userApplication Configuration Wizard forms Wizard format as follows:

Menu -> Settings -> Next button

Information

- For setting the userApplication Configuration Wizard, see “PRIMECLUSTER Installation/Administration Guide”.
- PersistentFault remains the same resource status (Faulted) even after RMS is restarted in the event of a resource failure. Users are supposed to locate the fault and check completion of recovery processing then start userApplication manually. For example, if a failure occurs, users can detect which userApplication failed even after server reboot. Even though AutoStartUp setup is set, userApplication will not be started, and automatic startup will prevent recurrence of the failure.

Note

Do not create multiple resources for the same Oracle RAC instance, Listener or Oracle Clusterware.

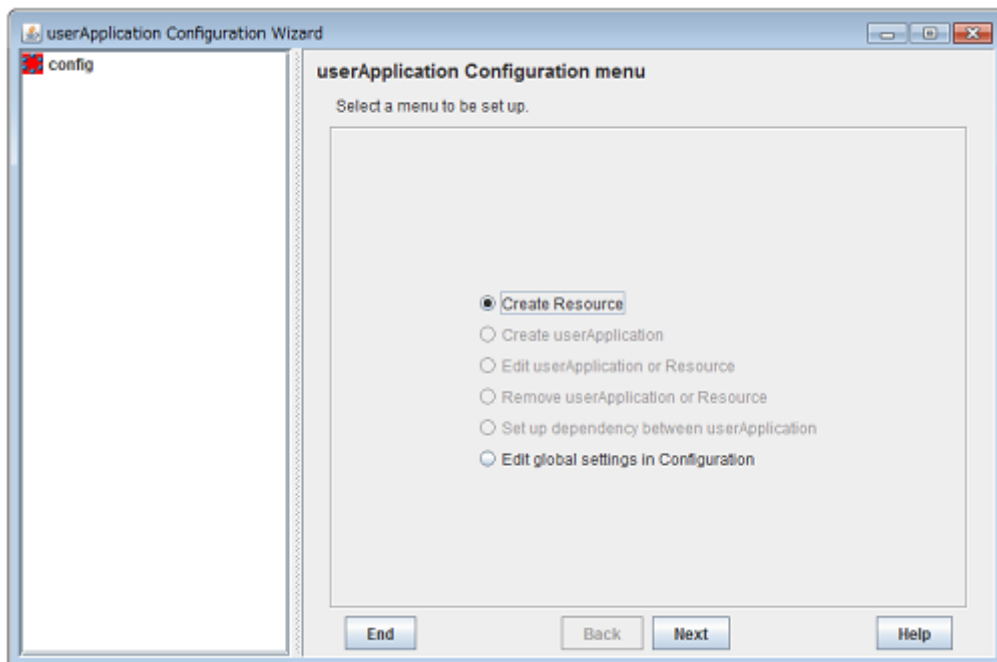
2.3.4 userApplication with Oracle Clusterware

This section describes how to register the Oracle Clusterware in an RMS resource using the userApplication Configuration Wizard.

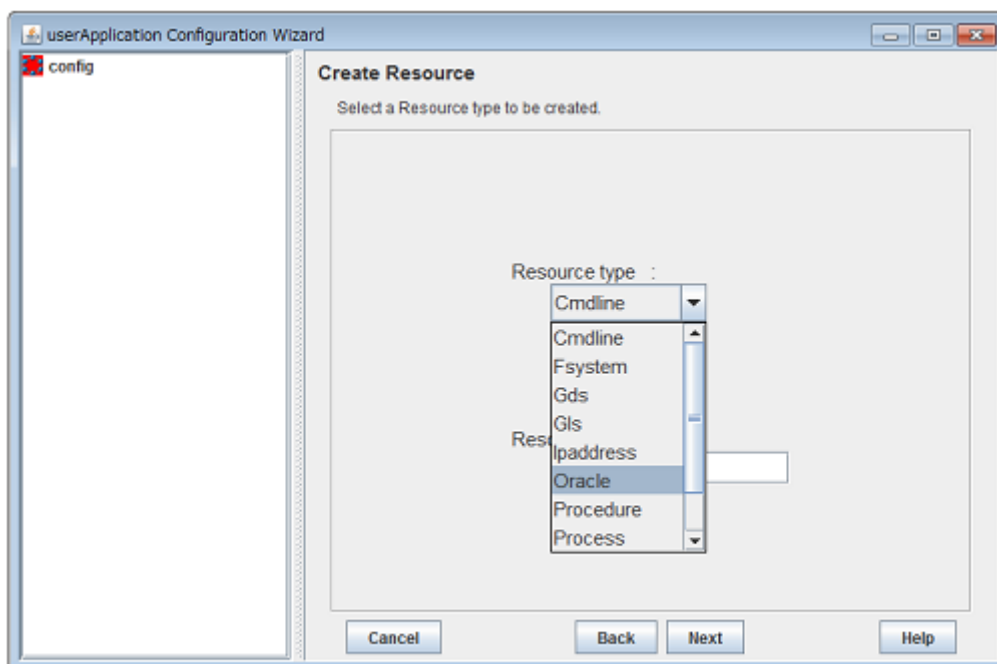
Note

If the Oracle Clusterware resource is not registered in an RMS resource ([Configuration C](#)), skip the procedure then go to “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

1. Select “Create Resource” in the “userApplication Configuration” menu.

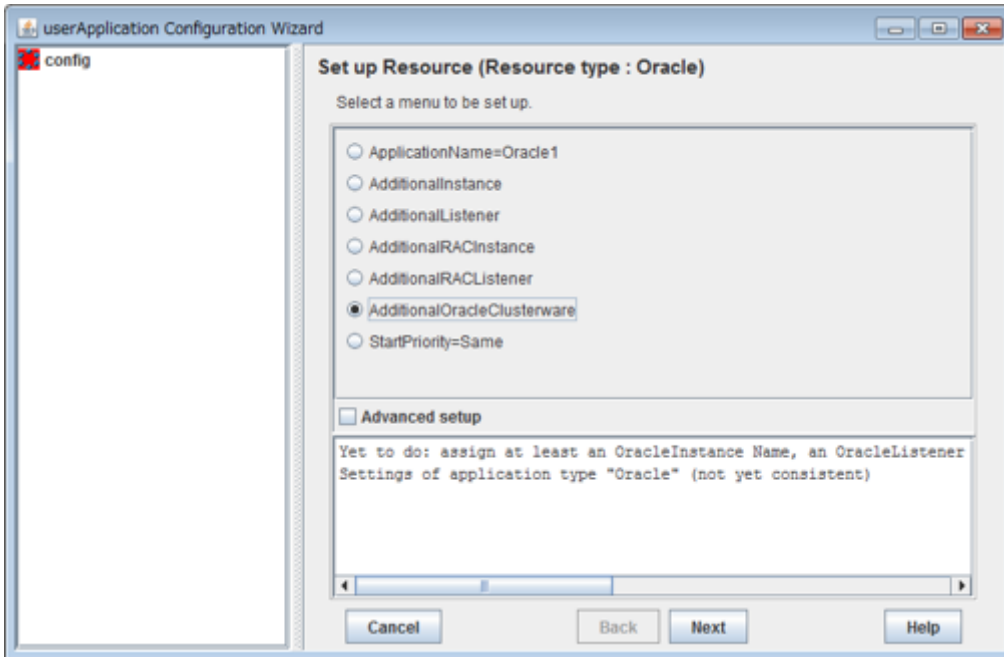


2. Select “Oracle” from the “Resource Type” list.



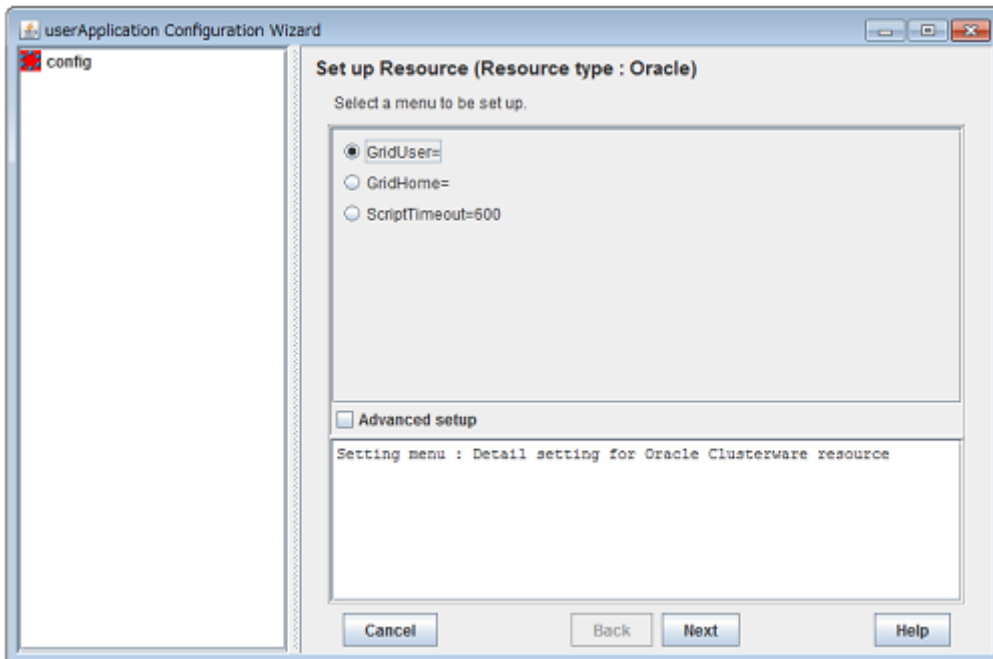
Gls: Global Link Services
Gds: Global Disk Services

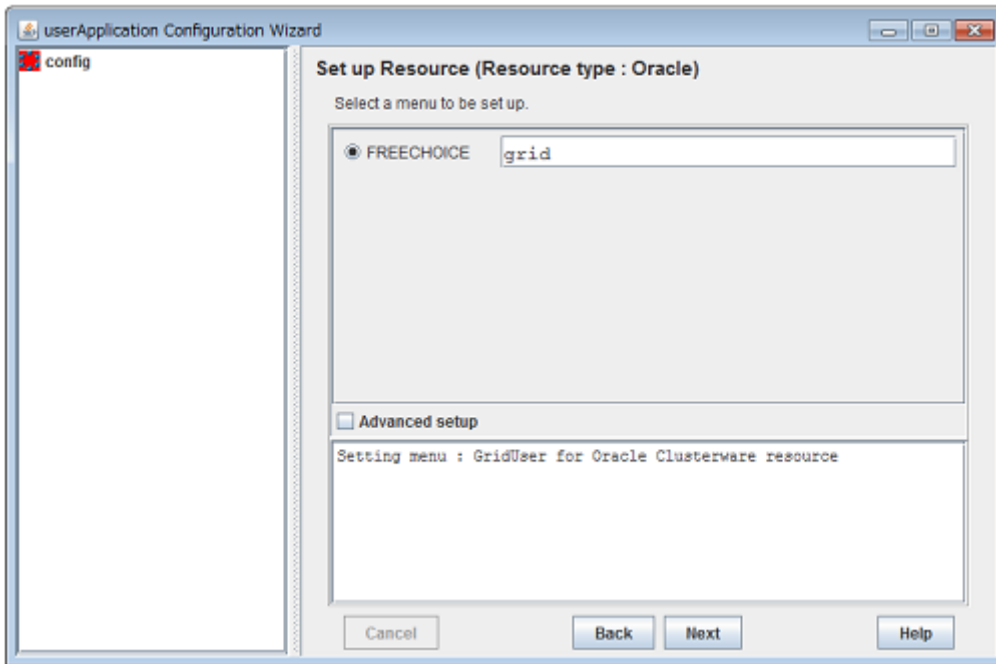
3. For changing a resource name, select “ApplicationName”, and change the name. If you register the resource without changing the name, select “AdditionalOracleClusterware”.



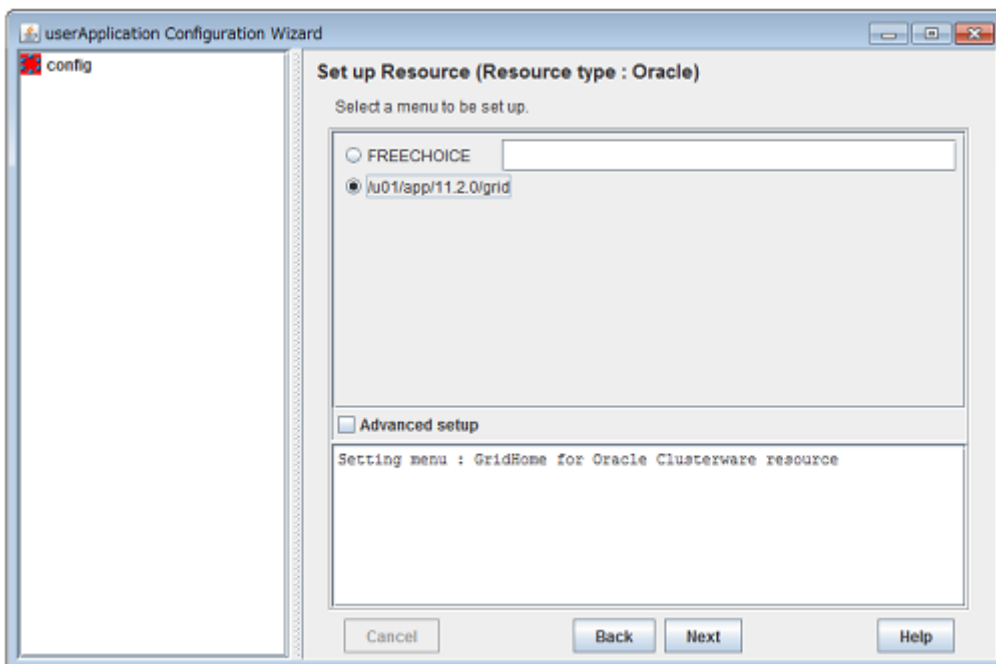
4. Set up the Oracle Clusterware resource as follows:

Enter Grid user name.

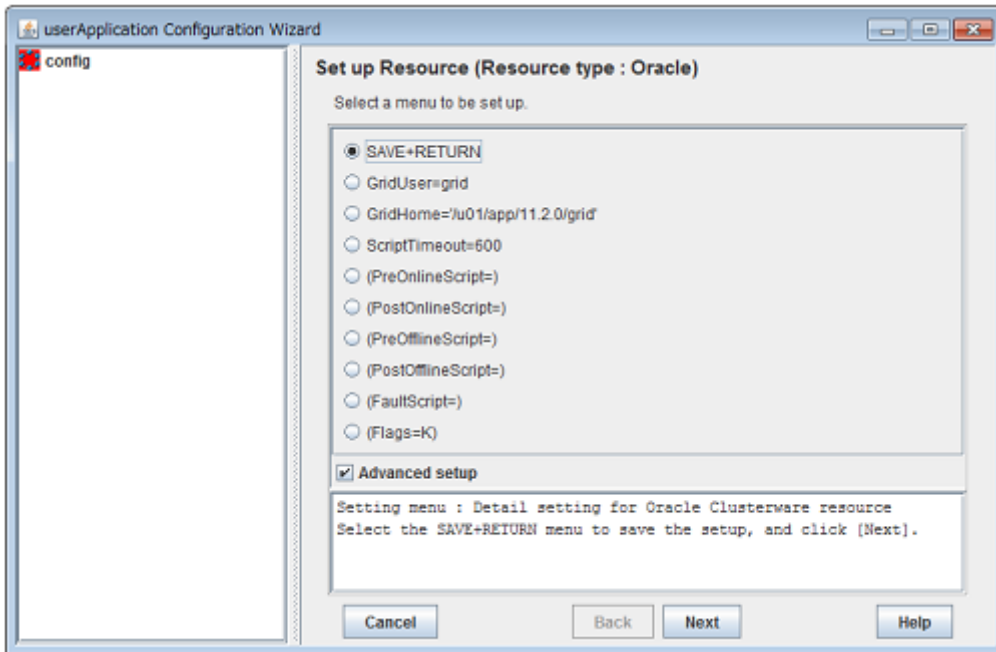




Next, enter or select a directory path where Oracle Grid Infrastructure was installed.



- To change the settings, select setting item and click "Next" button.
To change the advanced settings, check "Advanced setup".



Attributes	Description
GridUser	Owner user for Oracle Grid Infrastructure It can contain the following characters. However, the character string must not start with the hyphen. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
GridHome	Directory path where Oracle Grid Infrastructure was installed It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<.>?
ScriptTimeout	Timeout (sec) duration of the following processing. Default : 600 (300 - 86400) - Oracle Clusterware resource startup - Oracle Clusterware resource stop - PreOnlineScript - PostOnlineScript - PreOfflineScript - PostOfflineScript - FaultScript
PreOnlineScript	Executed before online processing The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks". It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<.>?
PostOnlineScript	Executed after online processing The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".

Attributes		Description
		<p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){ }[];:<,>.</p>
	PreOfflineScript	<p>Executed before offline processing</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){ }[];:<,>.</p>
	PostOfflineScript	<p>Executed after offline processing</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){ }[];:<,>.</p>
	FaultScript	<p>Executed in the event of a fault</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){ }[];:<,>.</p>
Flags	KeepOnline (K)	<p>If you do not want to stop the resource when the userApplication is stopped, select "Flags=K".</p> <p>In this case, the status of the resource is maintained "Online".</p> <p>Default: "Flags=K" is selected.</p>

Information

- For details about Scripts, see “[2.4.1 Oracle resource Online/Offline Script](#)”.
- For details about Flags, see “9 Appendix - Attributes” of the “PRIMECLUSTER RMS Configuration and Administration Guide”.

Note

- Flags=<*Abbreviation*> indicates that the flag attribute is enabled.
 - If the “KeepOnline” flag is enabled, and userApplication is stopped, an Oracle Clusterware resource will look Offline on the Cluster admin view but resource itself remains active.
 - Stop of userApplication with Oracle RAC instance resource by PreOfflineScript
- Set the following script to PreOfflineScript of the Oracle Clusterware resource, when the Oracle Clusterware and Oracle RAC instance are registered in different userApplication (“[Configuration A](#)” in “[2.3.3 userApplication and Resource Configuration](#)”). and the “KeepOnline” flag is disabled.

```
/opt/FJSVclora/sbin/clorastopwait <userApplication with Oracle RAC instance>
```

<userApplication with Oracle RAC instance> is as follows.

- specify app3 when you create app1

- specify app4 when you create app2

If there are multiple userApplications on the same node, delimit in space and specify all of <userApplication with Oracle RAC instance>.

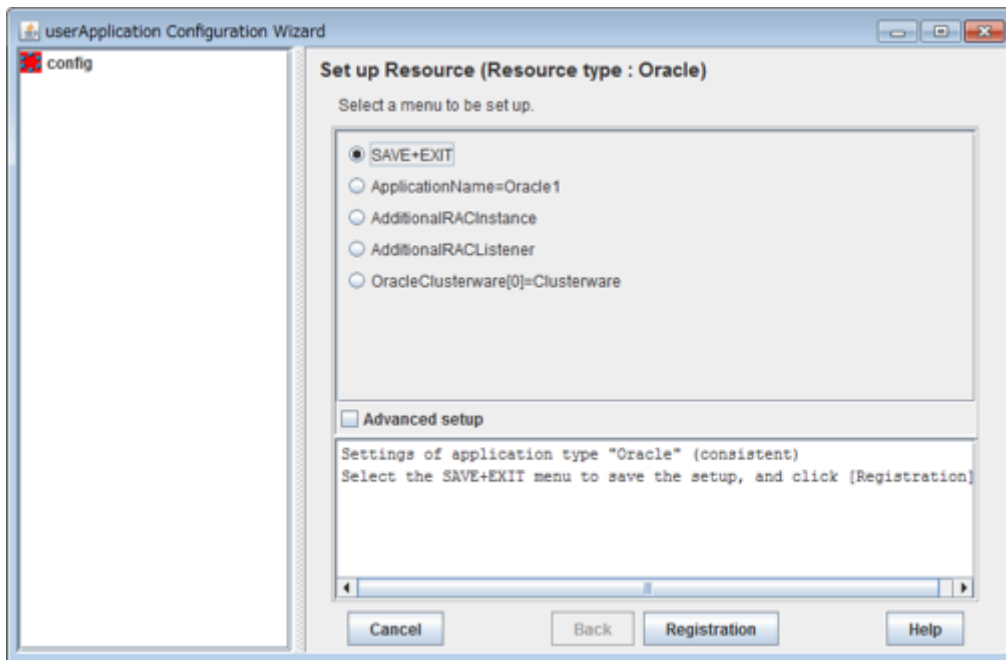
The clorastopwait script stops the userApplications and waits for them until entering their states other than "Online" and "Wait". The userApplications with Oracle RAC instance stop earlier than the userApplications with Oracle Clusterware because PreOfflineScript is set.

- In ScriptTimeout, set time to have added at least 30 or more (second) to the largest one among as follows.
 - The startup time of the Oracle Clusterware (confirm Oracle Clusterware log file)
 - The stop time of the Oracle Clusterware (confirm Oracle Clusterware log file)
 - The stop time of the <userApplication with Oracle RAC instance> specified for clorastopwait script in PreOfflineScript (confirm RMS log file)

If you specify two or more <userApplication with Oracle RAC instance>, use the userApplication that the stop time is the longest.



6. Save the settings by selecting "SAVE+ RETURN".
Check that the Oracle Clusterware is set then save the settings by selecting "SAVE+EXIT".



Information

If you register an Oracle RAC instance resource and a listener resource in the userApplication including the Oracle Clusterware resource ([Configuration B](#)), select "AdditionalRACInstance" and "AdditionalRACListener" then register Oracle RAC instances and listeners. For details, see steps 4 to 11, or 12 to 17 of "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)".



7. Repeat from steps 1 to 6 for each node.
8. Select "Create userApplication" in the "userApplication Configuration" menu and include the created Oracle resource (Oracle Clusterware resource) in userApplication.
For further details of the attributes of userApplication, refer to "[2.3.3 userApplication and Resource Configuration](#)".

2.3.5 userApplication with Oracle RAC Instances and Listeners

This section describes how to register Oracle RAC instance resources on each node using the userApplication Configuration Wizard.

- Oracle RAC instance resource

A registration target is an OracleSID for Oracle RAC instance associated with a database resource “ora.*.db” that is included in the output of “crsctl status resource” command.

- Oracle RAC listener resource

A registration target is a listener resource “ora.*.lsnr” that is included in the output of “crsctl status resource” command, excluding SCAN listeners.

These resources are registered in the same userApplication on each node.

Example

See the following example:

```
# su - <Grid user>
$ crsctl status resource -t
-----
NAME                TARGET  STATE    SERVER          STATE_DETAILS
-----
Local Resources
-----
ora.DATA.dg
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
ora.LISTENER.lsnr
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
ora.asm
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
ora.eons
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
ora.gsd
                OFFLINE OFFLINE   node1
                OFFLINE OFFLINE   node2
ora.net1.network
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
ora.ons
                ONLINE ONLINE    node1
                ONLINE ONLINE    node2
-----
Cluster Resources
-----
ora.LISTENER_SCAN1.lsnr
  1            ONLINE ONLINE    node1
ora.oc4j
  1            OFFLINE OFFLINE
ora.racdb.db
  1            ONLINE ONLINE    node1      Open
  2            ONLINE ONLINE    node2      Open
ora.scan1.vip
  1            ONLINE ONLINE    node1
ora.node1.vip
  1            ONLINE ONLINE    node1
ora.node2.vip
```

```
1          ONLINE  ONLINE          node2
$
```

In the above configuration, listeners for “ora.LISTENER.lsnr” and OracleSIDs for Oracle RAC instances associated with “ora.racdb.db” are registered as a resource respectively.

Note

Before configuring userApplication, make sure that Oracle Clusterware has been activated on all nodes, so the “crsctl status resource” command can be executed correctly with Grid user.

If Oracle Clusterware has not been activated, execute the following command as a root user.

```
# <ORACLE_HOME>/bin/crsctl start crs
```

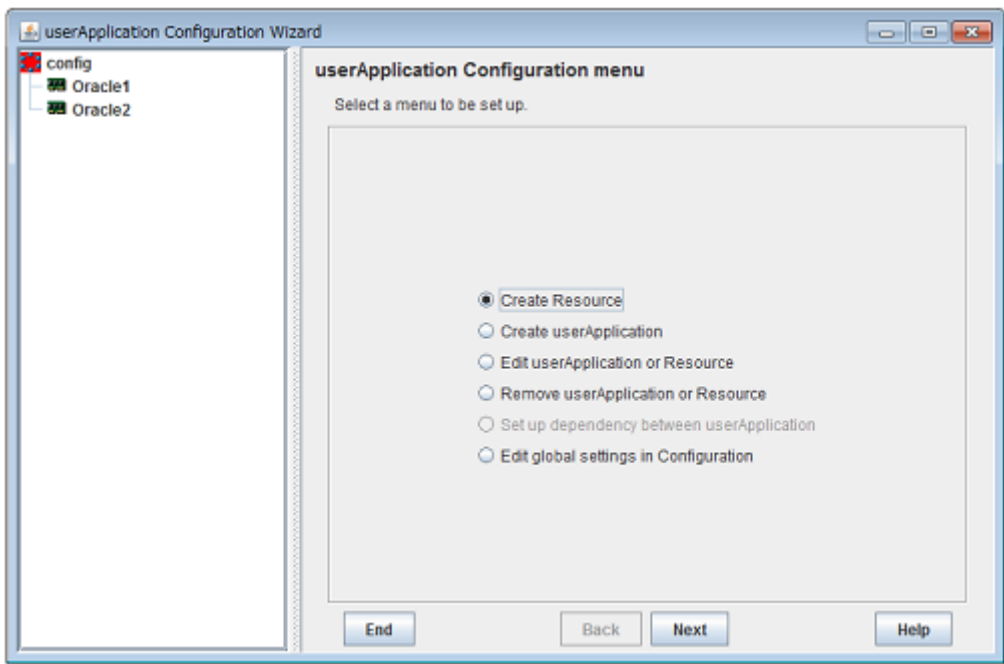
<ORACLE_HOME> is the directory path where the Oracle Grid Infrastructure was installed.

When Oracle Clusterware startup is completed, be sure to confirm that the “crsctl status resource” command can be executed correctly.

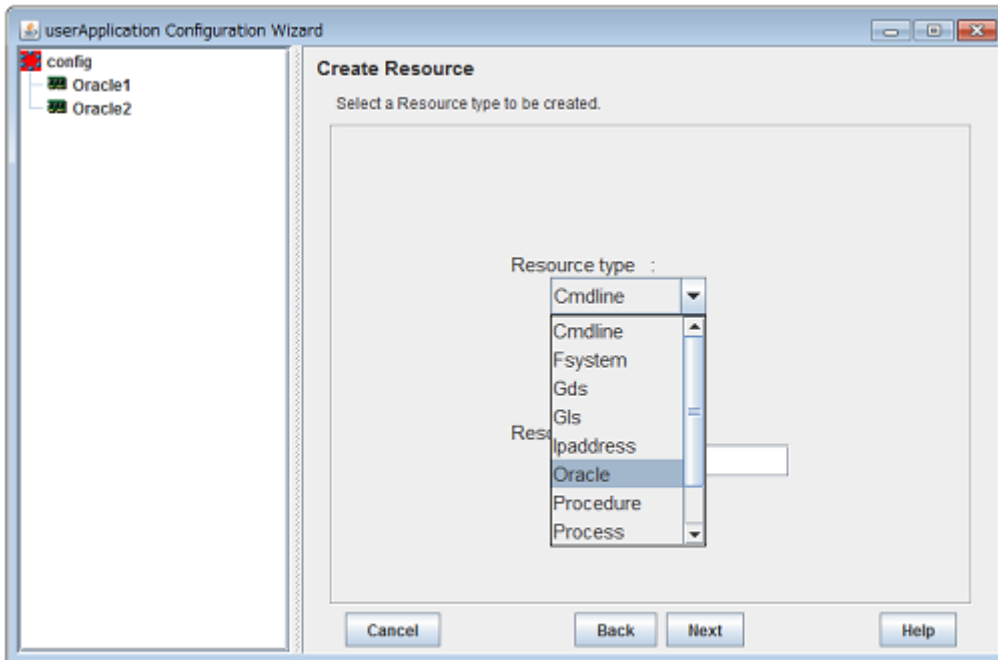
```
# su - <Grid user>
$ crsctl status resource
```

The procedures to register both Oracle RAC instances and listeners and create an Oracle resource are as follows.

1. Select “Create Resource” in the “userApplication Configuration” menu.

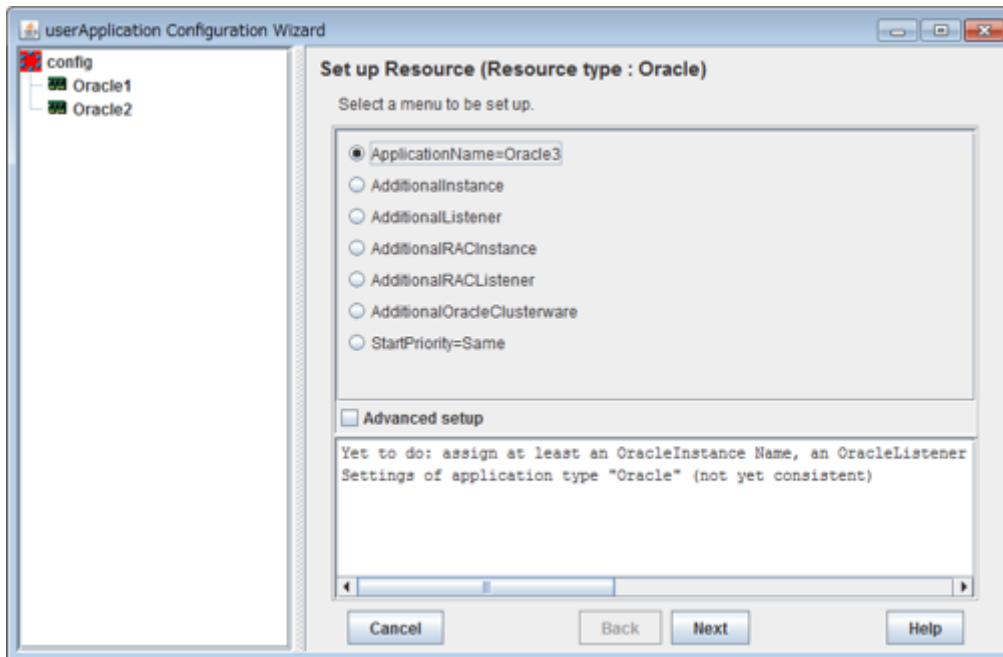


2. Select “Oracle” from the “Resource type” list.



GlS: Global Link Services
Gds: Global Disk Services

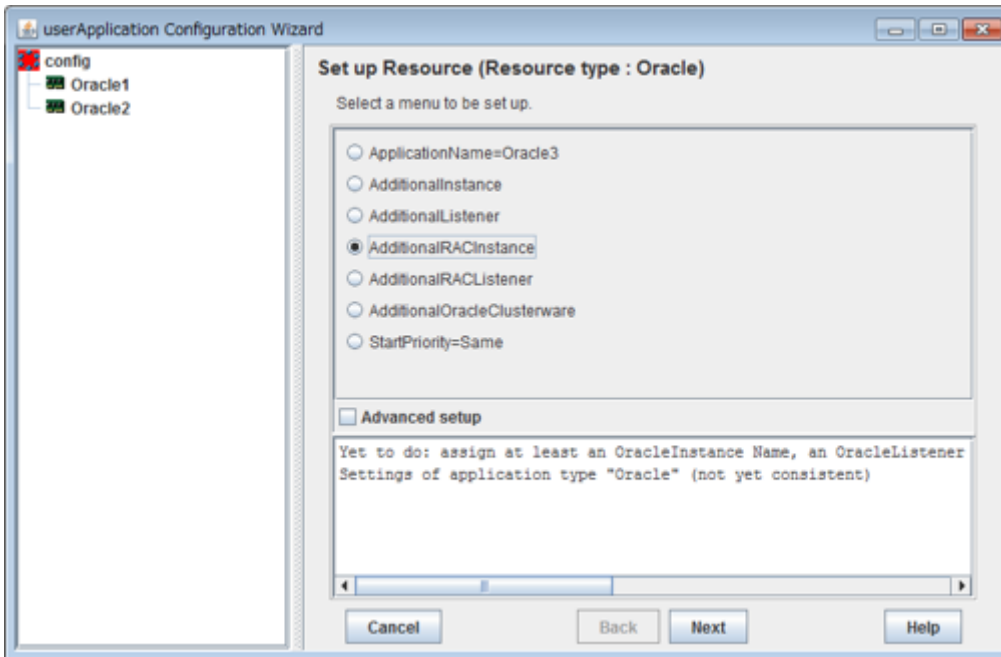
3. For changing a resource name, select “ApplicationName”, and change the name. If not, skip this step.



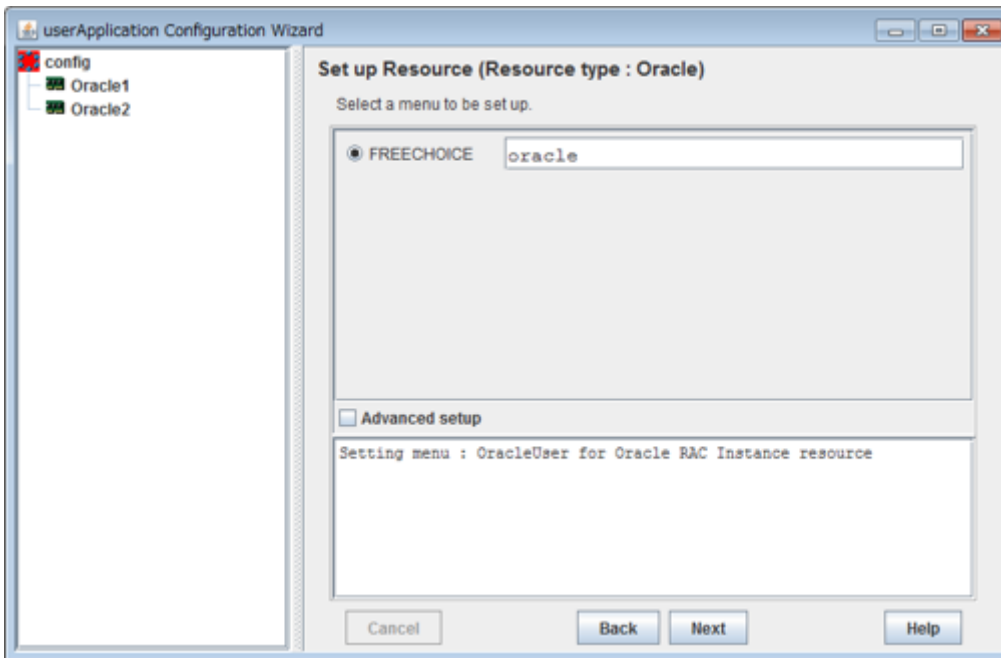
Information

Based on the value (SubApplicationName) entered in “ApplicationName” here, the Wizard for Oracle resource name is created on the RMS. For details, see “[2.3.2 Oracle Database Software Installation and Configuration](#)”.

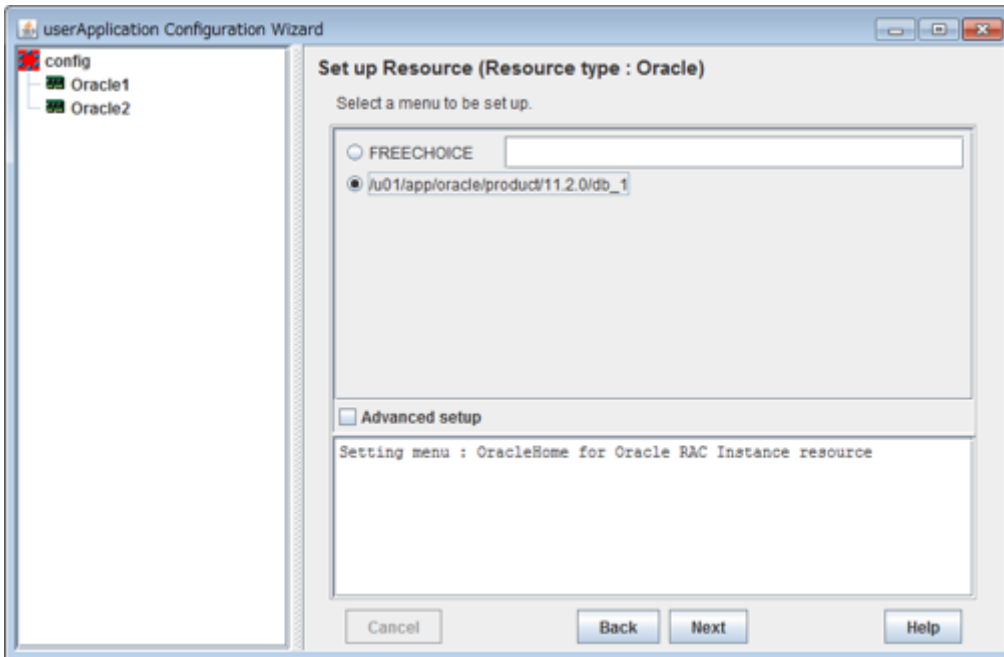
4. For creating and registering an Oracle RAC instance resource, select “AdditionalRACInstance”.



5. Enter Oracle user name.



6. Enter or select a directory path where Oracle Database was installed.

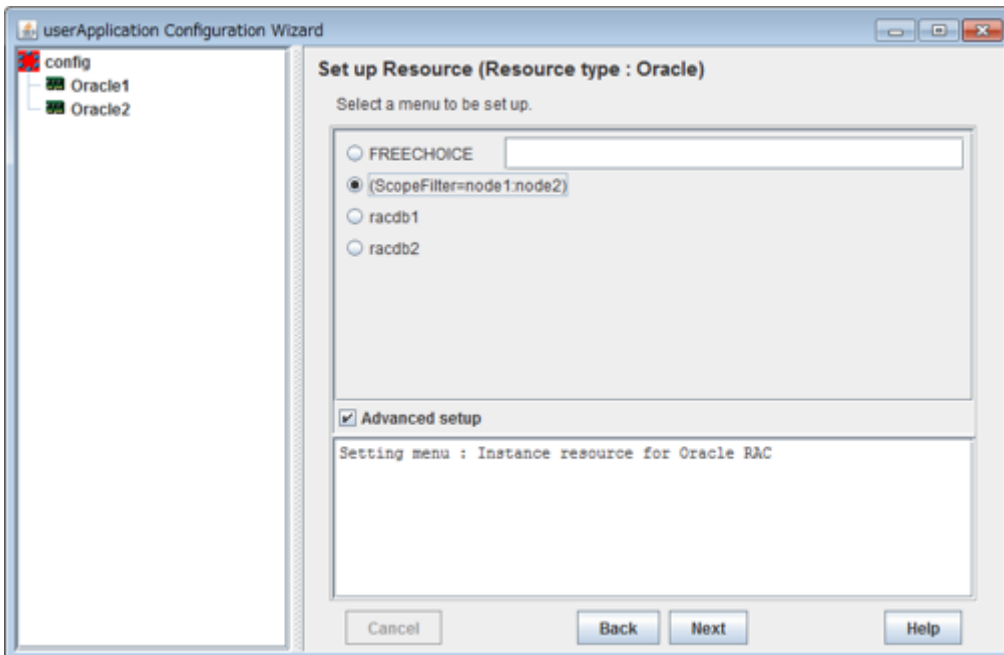


 **Note**

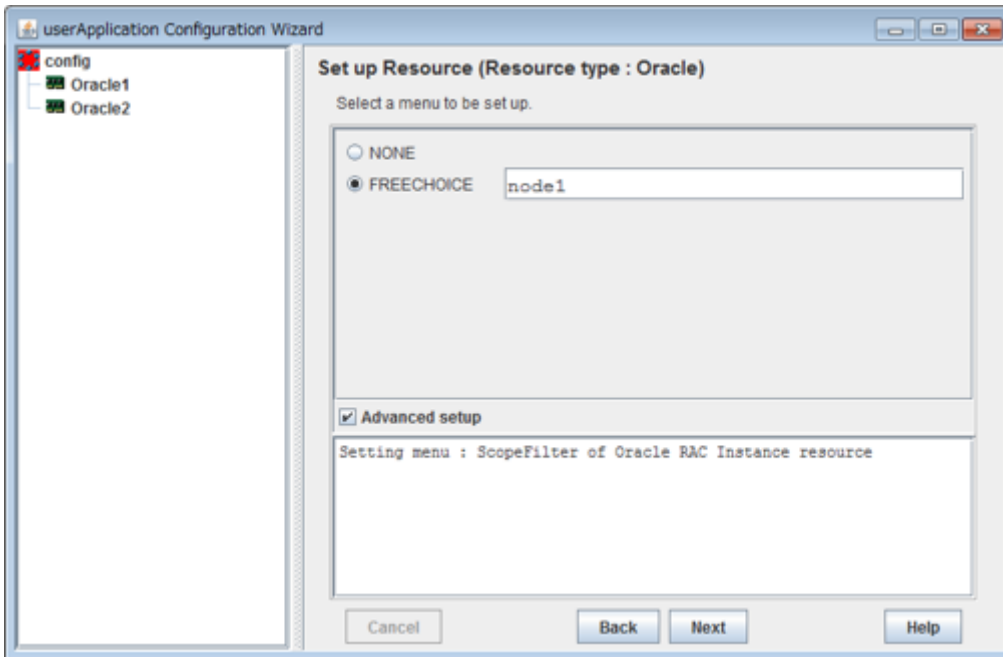
After OracleHome entered, it may take few seconds to transition to the next screen. This is because a list of Oracle RAC instance SID is acquired from Oracle RAC.

If Oracle user and OracleHome entered were incorrect, the list will not be displayed.

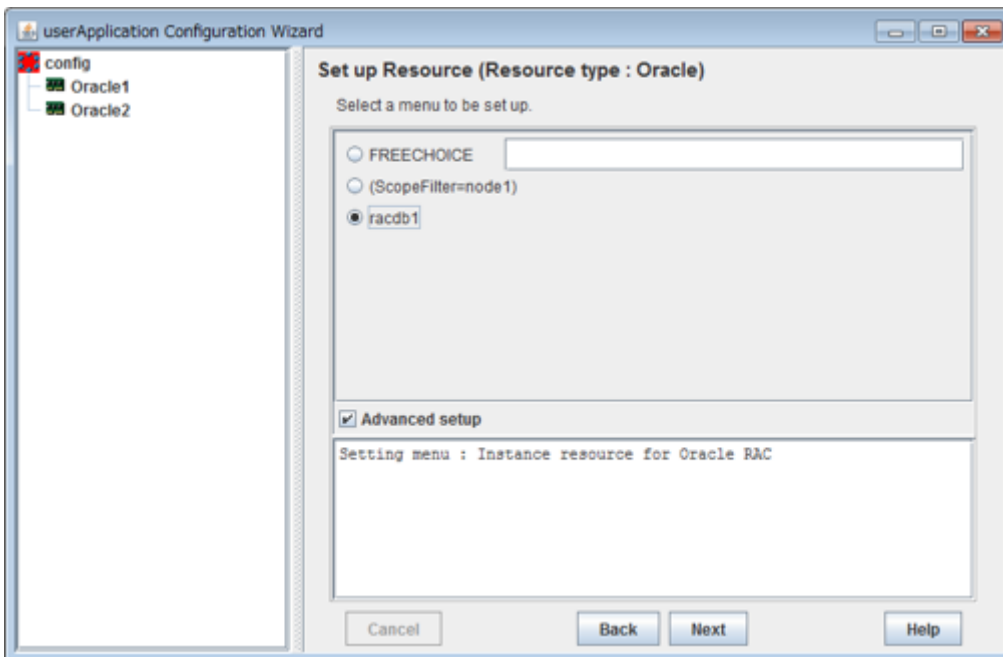
7. A list of registerable Oracle RAC instance SID is displayed.
Check “Advanced setup”, then specify a node with “ScopeFilter”.



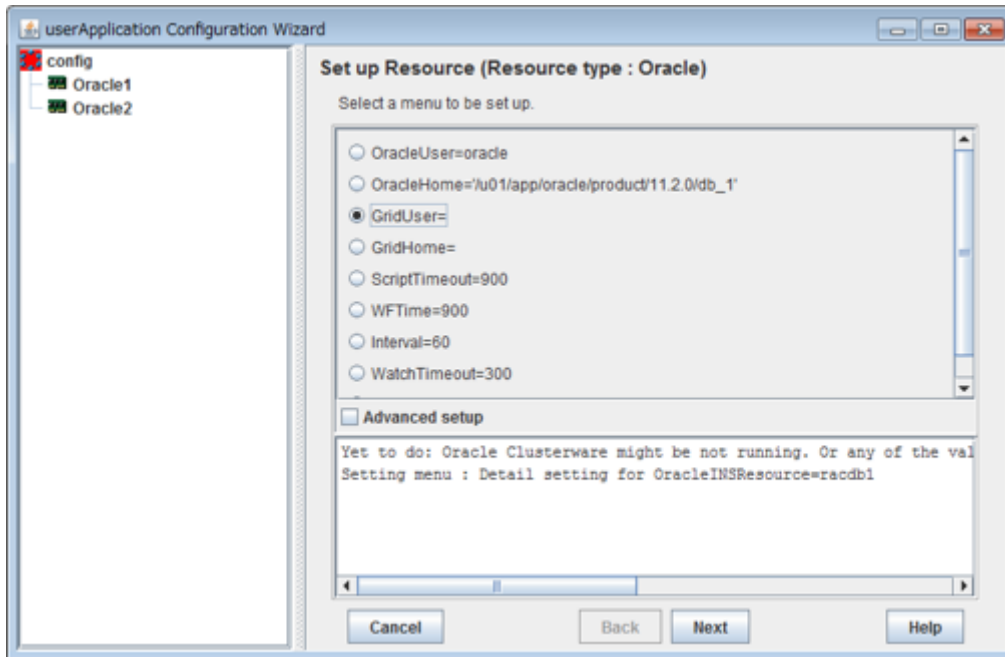
Input the name of a host where Oracle RAC instance SID that will be registered belongs to.



8. Select Oracle RAC instance SID.



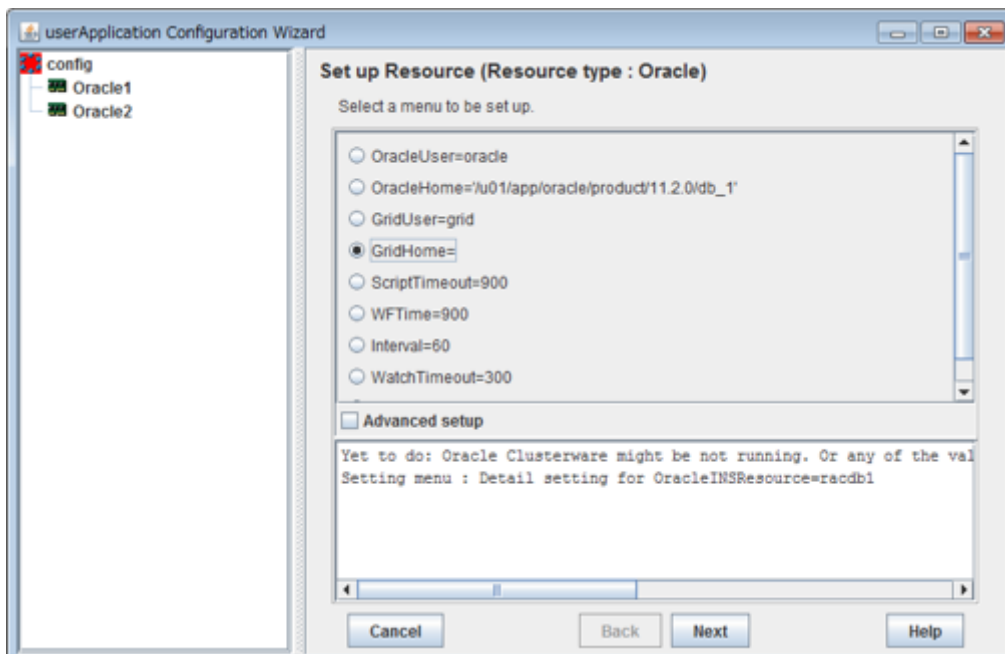
9. Enter Grid user name.



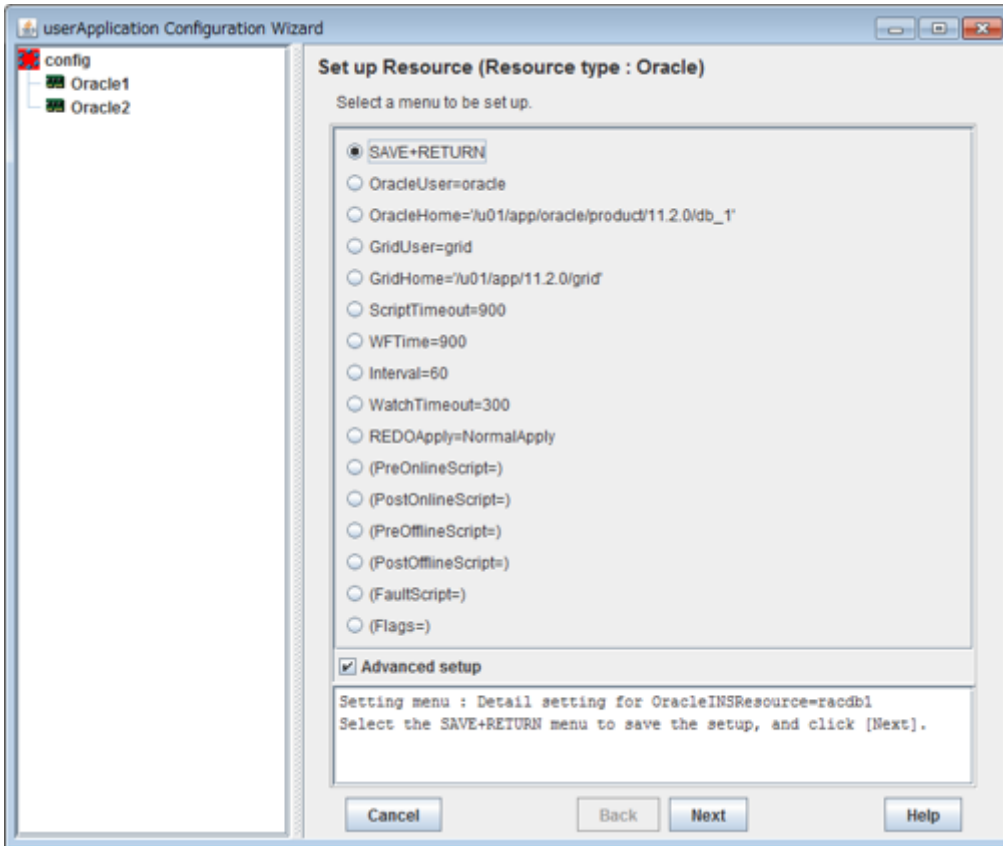
Note

If your Oracle RAC environment has one user for the Oracle Grid Infrastructure and the Oracle Database installations, enter Oracle user here.

Next, enter or select a directory path where Oracle Grid Infrastructure was installed.



10. To change the settings, select setting item and click “Next” button.
To change the advanced settings, check “Advanced setup”.



Attributes	Description
OracleUser	Owner user for Oracle database It can contain the following characters. However, the character string must not start with the hyphen. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
OracleHome	Directory path where Oracle Database was installed It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<.>?
GridUser	Owner user for Oracle Grid Infrastructure It can contain the following characters. However, the character string must not start with the hyphen. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
GridHome	Directory path where Oracle Grid Infrastructure was installed It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<.>?
ScriptTimeout	Timeout (sec) duration of the following processing. Default : 900 (300 - 86400) - Oracle RAC instance resource startup

Attributes	Description
	<ul style="list-style-type: none"> - Oracle RAC instance resource stop - PreOnlineScript - PostOnlineScript - PreOfflineScript - PostOfflineScript - FaultScript
WTime	<p>Waiting time for resource failure recovery through Oracle Clusterware</p> <ul style="list-style-type: none"> - PersistentWarning : Notifies Warning until resource recovery - ImmediateFault : Notifies Faulted without waiting resource recovery - (sec) 60 - 86400 Default : 900
Interval	<p>Monitoring interval (sec) of Oracle RAC instance.</p> <p>Default : 60 (5 - 86400)</p>
WatchTimeout	<p>No response time (sec) during monitoring Oracle RAC instance.</p> <p>Default : 300 (30 - 3600)</p>
REDOApply	<p>Method of applying redo log to standby database in Oracle Data Guard environment. This setting is enabled with the Oracle instance resource of the standby database.</p> <p>Default: NormalApply (ReceiveOnly, NormalApply, RealTimeApply, ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR)</p> <p>This setting is disregarded in the following instance resource.</p> <ul style="list-style-type: none"> - Oracle instance resource of primary database - Oracle instance resource without Oracle Data Guard <p>For details, see "G.2 Oracle Environment Setting".</p>
PreOnlineScript	<p>Executed before online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<,>.
PostOnlineScript	<p>Executed after online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<,>.
PreOfflineScript	<p>Executed before offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<,>.

Attributes		Description
PostOfflineScript		<p>Executed after offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%&*(){ }[];:<,>.?'</p>
FaultScript		<p>Executed when a fault occurs.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%&*(){ }[];:<,>.?'</p>
Flags	NullDetector (D)	<p>If you do not want to monitor the resource, select this flag "NullDetector(D)".</p> <p>Default: "NullDetector(D)" is not selected.</p>

Information

- For details about Scripts, see “2.4.1 Oracle resource Online/Offline Script”.
- For details about Flags, see “9 Appendix - Attributes” of the “PRIMECLUSTER RMS Configuration and Administration Guide”.
- The following value is used for the timeout values (sec) of PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript and FaultScript.

```
ScriptTimeout + 10
```

Note

- **Startup of Oracle Clusterware userApplication through PreOnlineScript**
If Oracle Clusterware and Oracle RAC instance are registered in different userApplication ([Configuration A](#)), set up the following script in PreOnlineScript of the Oracle RAC instance resource;

```
/opt/FJSVclora/sbin/clorastartwait <userApplication with Oracle Clusterware>
```

Specify the following userApplication:

For app3 : app1

For app4 : app2

This setting enables that a userApplication including Oracle Clusterware resource starts up before starting up of userApplication including Oracle RAC instance resources.

- In ScriptTimeout, set time to have added at least 30 or more (second) to the largest one among as follows.
 - The startup time of the Oracle RAC instance (confirm Oracle database alert log)
 - The stop time of the Oracle RAC instance (confirm Oracle database alert log)
 - The start time of the <userApplication with Oracle Clusterware> specified for clorastartwait script in PreOnlineScript (confirm RMS log file)

- **WFTime**

In Oracle RAC, Oracle Clusterware will recover a failure of an Oracle RAC instance or a listener instance. In PRIMECLUSTER Wizard for Oracle, the wait time for the failure recovery can be set for WFTime.

If WFTime=PersistentWarning is set, completion of the failure recovery will be waited forever. In the meantime, an RMS resource will enter Warning, so userApplication will not be degenerated. As soon as recovery is detected, the RMS resource will get back to Online.

If WFTime=ImmediateFault is set, completion of the failure recovery will not be waited but an RMS resource will be considered as fault. As soon as the RMS resource fails, userApplication will be degenerated.

WFTime=<second> is set, completion of the failure recovery will be waited for a certain period of time. After the predetermined amount of wait time passes, an RMS resource will be considered as fault then userApplication will be degenerated. During the wait time, the RMS resource indicates Warning. If recovery is detected within the wait time, the RMS resource will get back to Online.

- The relation between WFTime and WatchTimeout

If the response from the Oracle RAC instance is not received before WatchTimeout, the RMS resource and the userApplication will be as follows.

- If WFTime=PersistentWarning is set, the userApplication will not be degenerated in the state of Warning even if the watch timeout is continuously generated. As soon as recovery is detected, the RMS resource will get back to Online.
- If WFTime=ImmediateFault is set, the RMS resource will be considered as fault when the watch timeout is generated continuousness two times. As soon as the RMS resource fails, userApplication will be degenerated.
- WFTime=<second> is set, when the watch timeout is generated continuousness two times, the RMS resource and the userApplication will be as follows.
If the accumulation of time without the response from the Oracle RAC instance is shorter than WFTime, the RMS resource will get back to Warning.
If the accumulation time is longer than WFTime, the RMS resource will be considered as fault. As soon as the RMS resource fails, userApplication will be degenerated.

- **Flags**

Flags=<Abbreviation> indicates that the flag attribute is enabled.

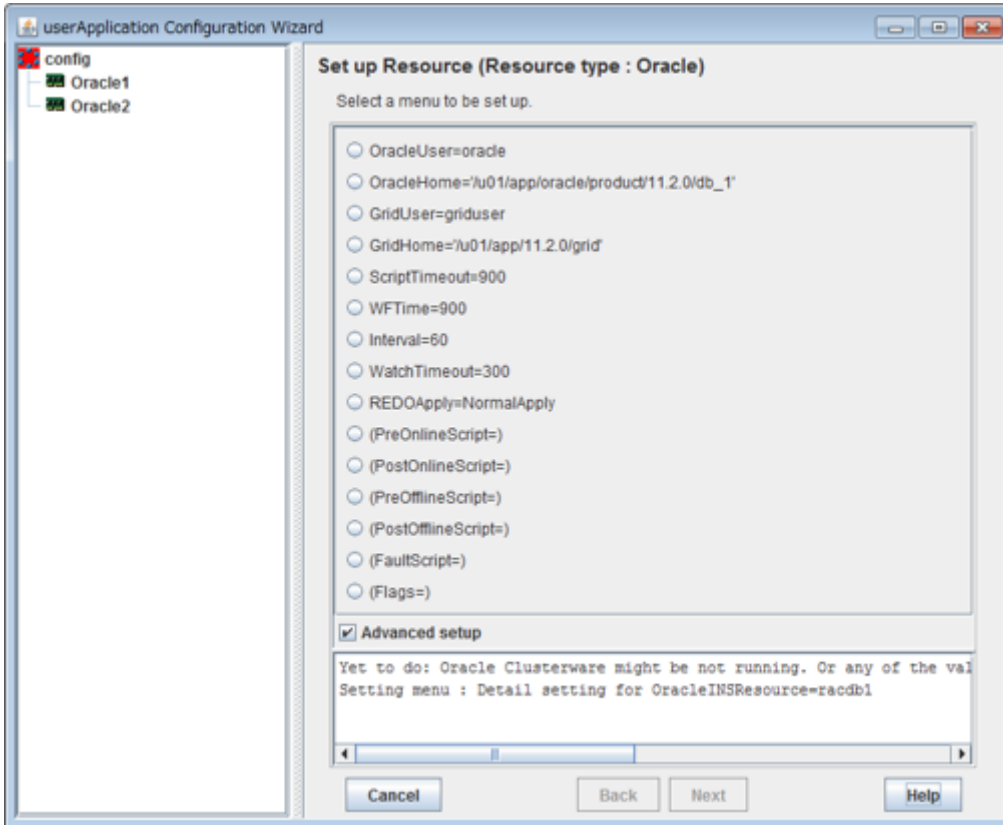
11. Check that the advanced settings are correctly set, and then save the settings by selecting “SAVE+RETURN”.

 **Note**

In the following cases, “SAVE+RETURN” is not displayed.

- Oracle Clusterware has stopped.
- The setting of the Oracleuser, the Oraclehome, the Griduser, and the Gridhome is wrong.

The reason of this is not to be able to execute the command of Oracle RAC, and not to be able to acquire information for the setting of the Oracle RAC instance resource.

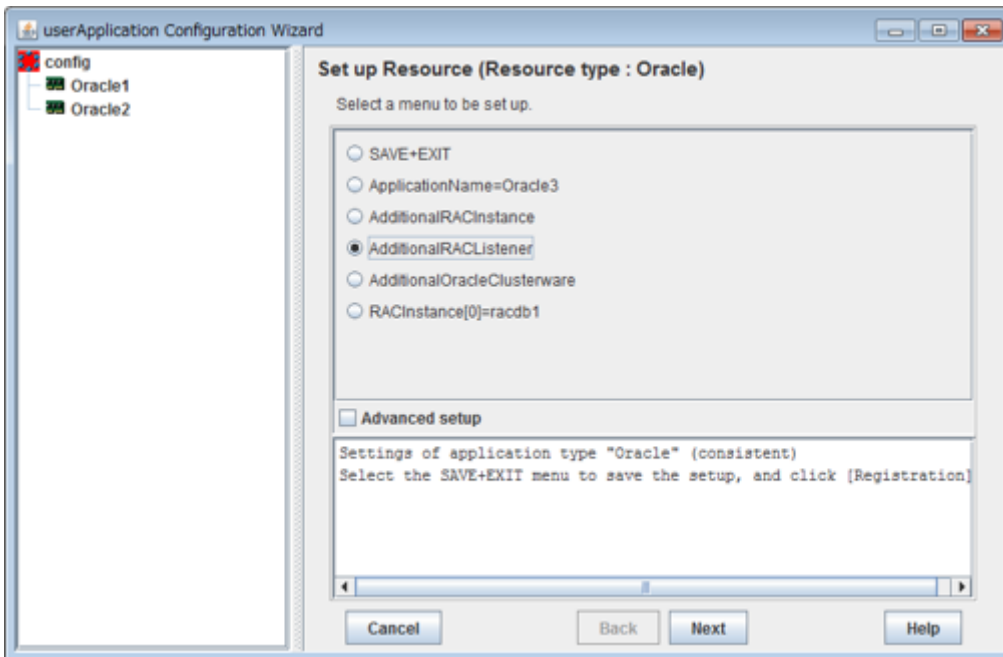


When "SAVE+RETURN" is not displayed, confirm that Oracle Clusterware is running, and confirm setting of OracleUser, OracleHome, GridUser and GridHome. When Oracle Clusterware is not running, start Oracle Clusterware. Afterwards, select either of attribute, and press "RETURN" without doing anything. (Move to other screens, and return to former screen again.)

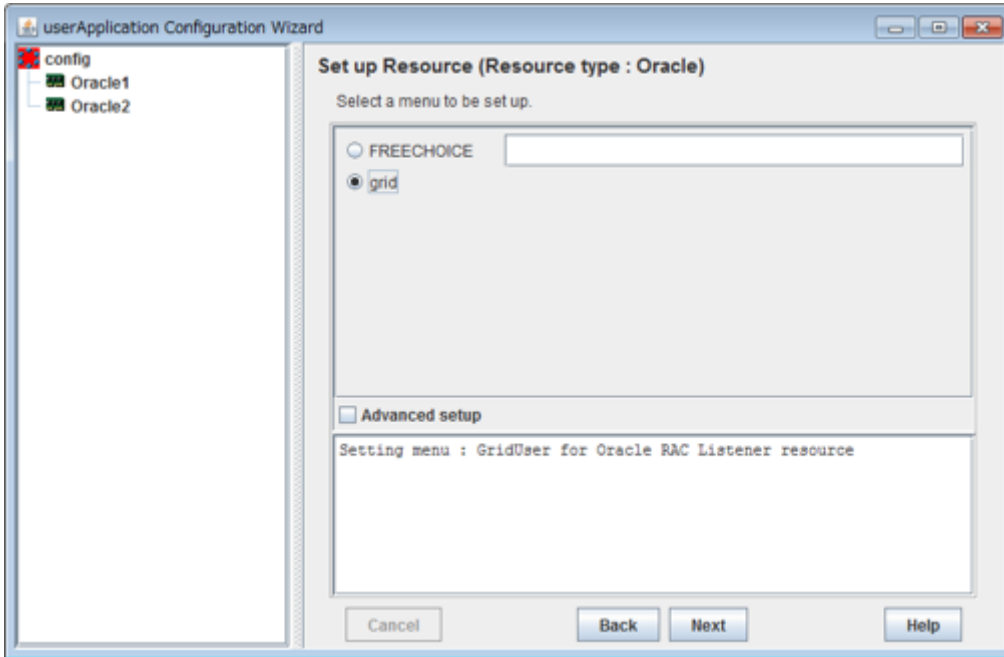
For the method to confirm that Oracle Clusterware is running, refer to the first note of "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)".



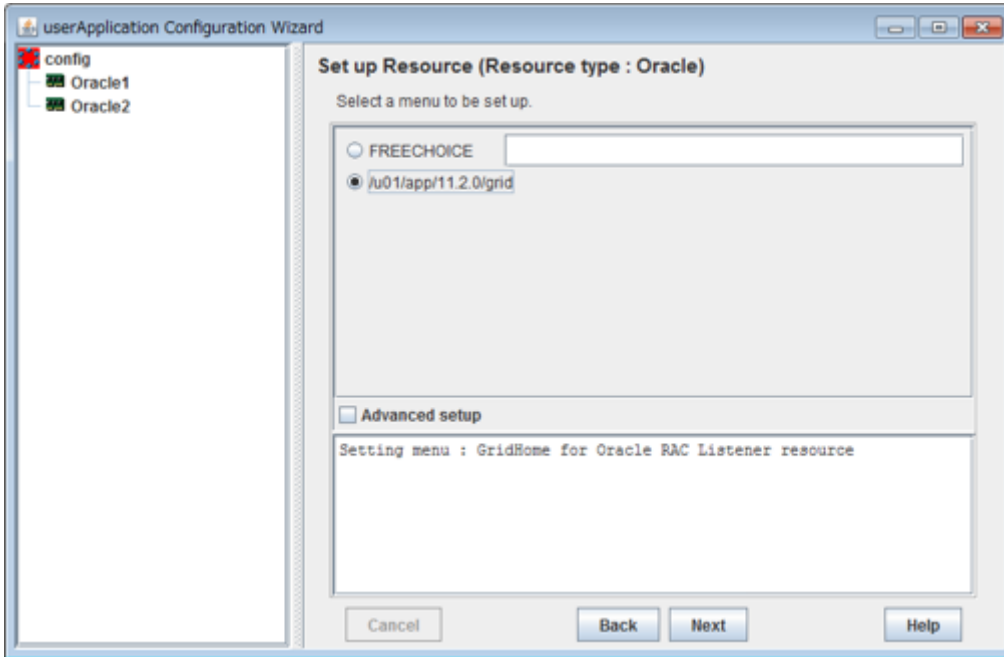
12. For creating and registering an Oracle RAC listener resource, select "AdditionalRACListener".



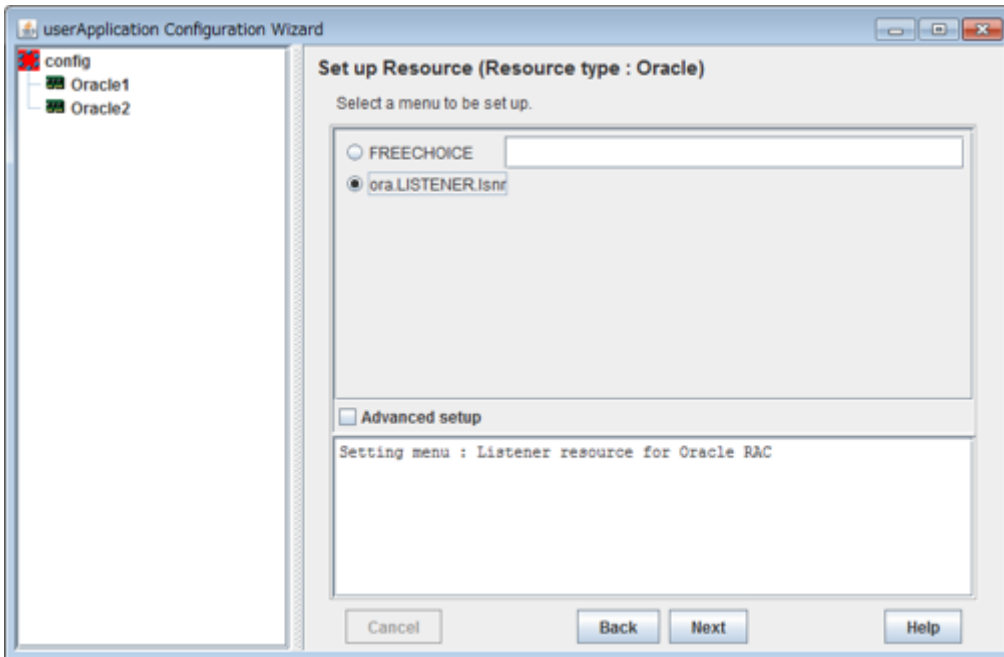
13. Enter Grid user name.



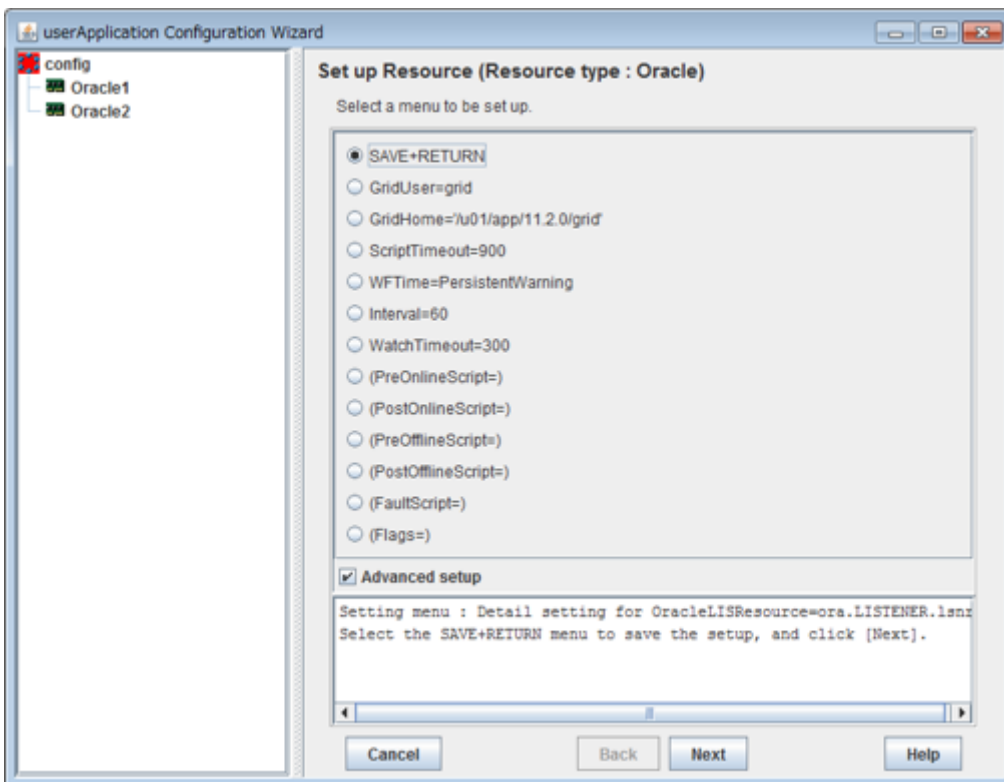
14. Enter or select a directory path where Oracle Grid Infrastructure was installed.



15. Select Oracle RAC listener.



16. To change the settings, select setting item and click “Next” button.
To change the advanced settings, check “Advanced setup”.



Attributes	Description
GridUser	Owner user for Oracle Grid Infrastructure It can contain the following characters. However, the character string must not start with the hyphen.

Attributes	Description
	<ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-
GridHome	<p>Directory path where Oracle Grid Infrastructure was installed</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"`#\$^&*(){}[];:<>.
ScriptTimeout	<p>Timeout (sec) duration of the following processing.</p> <p>Default : 900 (300 - 86400)</p> <ul style="list-style-type: none"> - Oracle RAC listener resource startup - Oracle RAC listener resource stop - PreOnlineScript - PostOnlineScript - PreOfflineScript - PostOfflineScript - FaultScript
WFTime	<p>Waiting time for resource failure recovery through Oracle Clusterware</p> <ul style="list-style-type: none"> - PersistentWarning : <p>Notifies Warning until resource recovery</p> <ul style="list-style-type: none"> - ImmediateFault : <p>Notifies Faulted without waiting resource recovery</p> <ul style="list-style-type: none"> - (sec) 60 - 86400 <p>Default value: PersistentWarning</p>
Interval	<p>Monitoring interval (sec) of Oracle RAC instance.</p> <p>Default : 60 (5 - 86400)</p>
WatchTimeout	<p>No response time (sec) during monitoring Oracle RAC instance.</p> <p>Default : 300 (30 - 3600)</p>
PreOnlineScript	<p>Executed before online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"`#\$^&*(){}[];:<>.
PostOnlineScript	<p>Executed after online processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"`#\$^&*(){}[];:<>.
PreOfflineScript	<p>Executed before offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".</p> <p>Optional</p> <p>It can contain the following characters.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"`#\$^&*(){}[];:<>.
PostOfflineScript	<p>Executed after offline processing.</p> <p>The script must be entered with a full path name. If you are specifying arguments,</p>

Attributes		Description
		separate the arguments with "blanks". Optional It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>?
	FaultScript	Executed when a fault occurs. The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks". Optional It can contain the following characters. - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<.>?
Flags	NullDetector (D)	If you do not want to monitor the resource, select this flag "NullDetector(D)". Default: "NullDetector(D)" is not selected.

Information

- For details about Scripts, see “2.4.1 Oracle resource Online/Offline Script”.
- For details about Flags, see “9 Appendix - Attributes” of the “PRIMECLUSTER RMS Configuration and Administration Guide”.
- The following value is used for the timeout values (sec) of PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript and FaultScript.

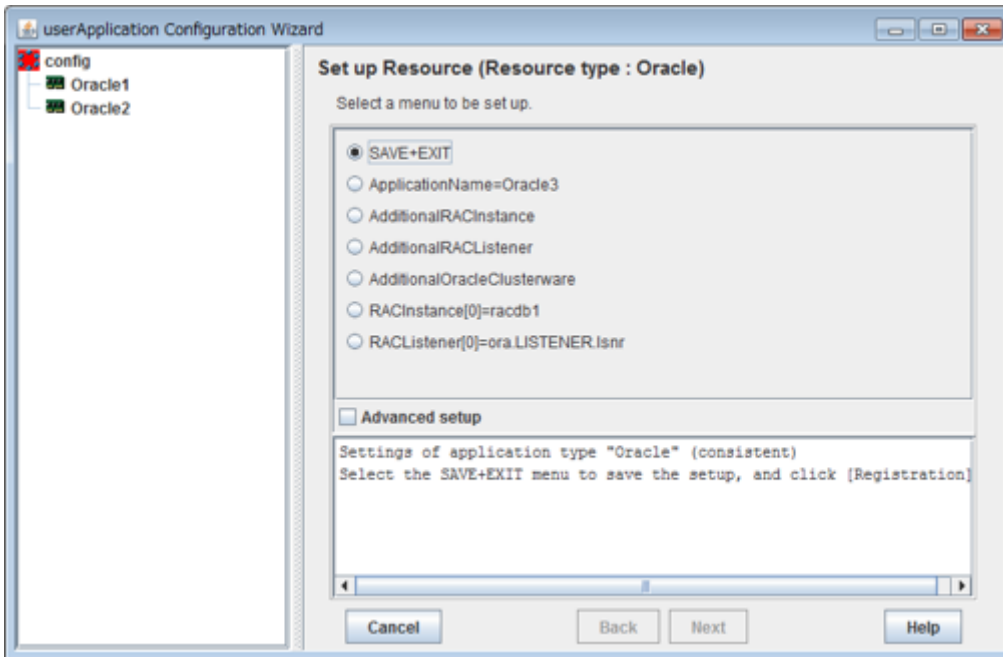
```
ScriptTimeout + 10
```

Note

- **WTime**
This is the same as Oracle RAC instance resource. For details, see the Note of step 10.
- **Flags**
Flags=<Abbreviation> indicates that the flag attribute is enabled.

17. Check that the advanced settings are correctly set, and then save the settings by selecting “SAVE+RETURN”.

18. Check that the Oracle RAC instance and listener are set, then save the settings by selecting “SAVE+EXIT”.



19. Repeat steps 1 to 18 for each node.
20. Select “Create userApplication” in the “userApplication Configuration” menu and include the created Oracle resource (Oracle RAC instance resource, listener resource) in userApplication.
For further details of the attributes of userApplication, refer to “[2.3.3 userApplication and Resource Configuration](#)”.

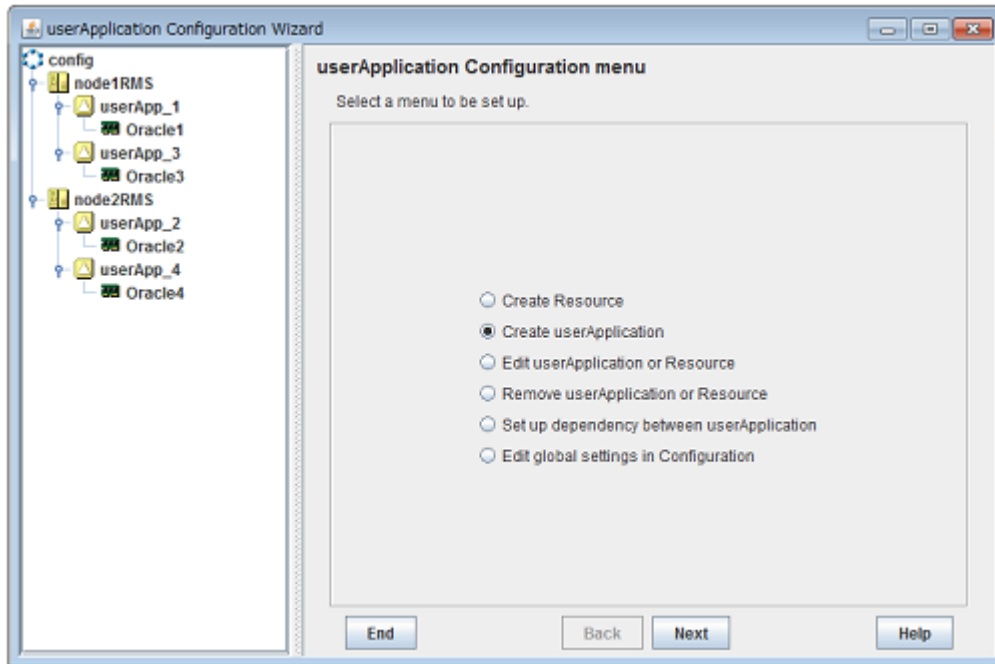
2.3.6 Other Resource and userApplication Registration

If there are other necessary resources, register them using the userApplication Configuration Wizard. GDS volumes on which OCR, Voting Disk and Oracle databases are configured must not be registered as RMS resources.

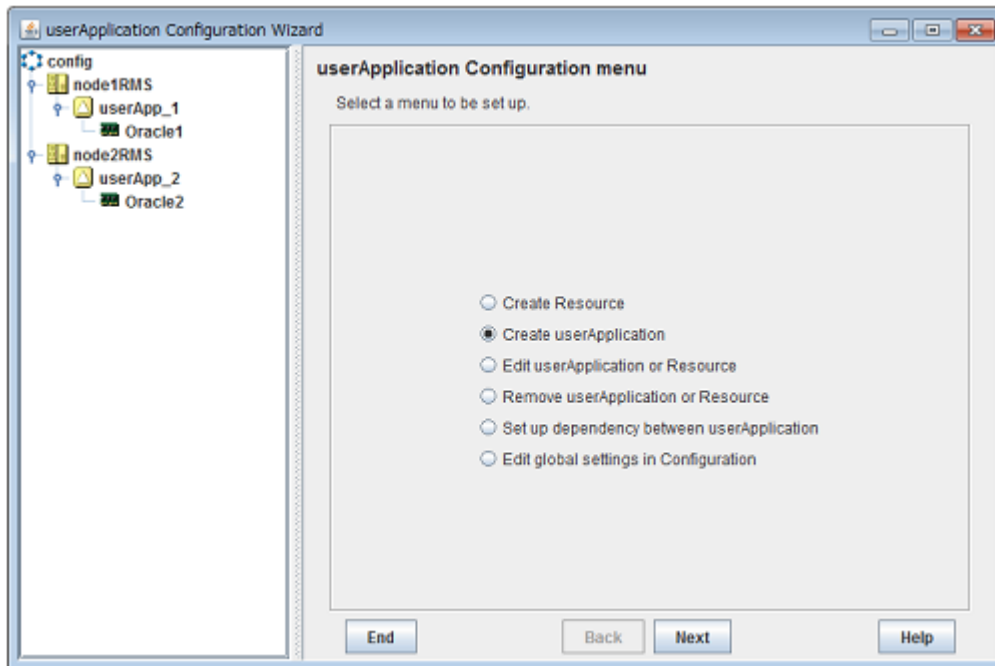
2.3.7 Configuration-Generate and Configuration-Activate

Check the set contents and then generate and activate the configuration. The image screens after activation are as follows:

- Configuration A



- Configuration B
Configuration C



Information

You can check userApplication setup using the `clorainfo -c` command. For details, see “4.6 [clorainfo - Display Resource Configuration and Monitoring Status](#)”.

Note

Before creating and distributing RMS configuration, make sure that Oracle Clusterware has been activated on all nodes, so the “crsctl status resource” command can be executed correctly with Grid user.

If Oracle Clusterware has not been activated, execute the following command as a root user.

```
# <ORACLE_HOME>/bin/crsctl start crs
```

<ORACLE_HOME> is the directory path where the Oracle Grid Infrastructure was installed.

When Oracle Clusterware startup is completed, be sure to confirm that the “crsctl status resource” command can be executed correctly.

```
# su - <Grid user>
$ crsctl status resource
```

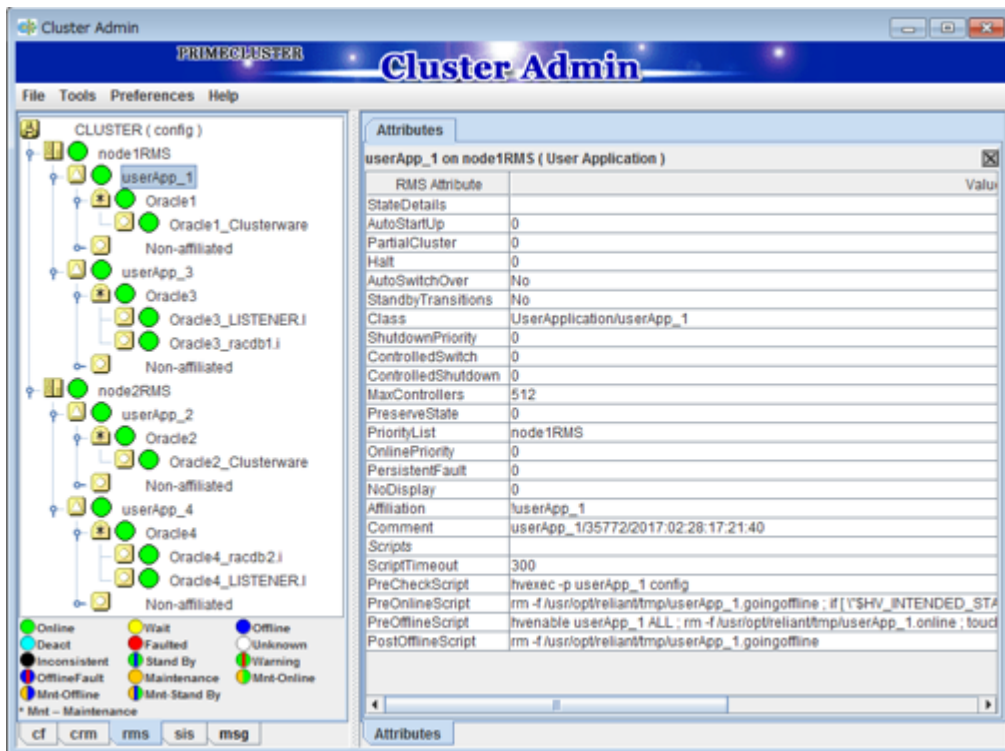
2.3.8 userApplication Operation Check

Start userApplication by executing the hvcm command then check if it is properly running on all the nodes.

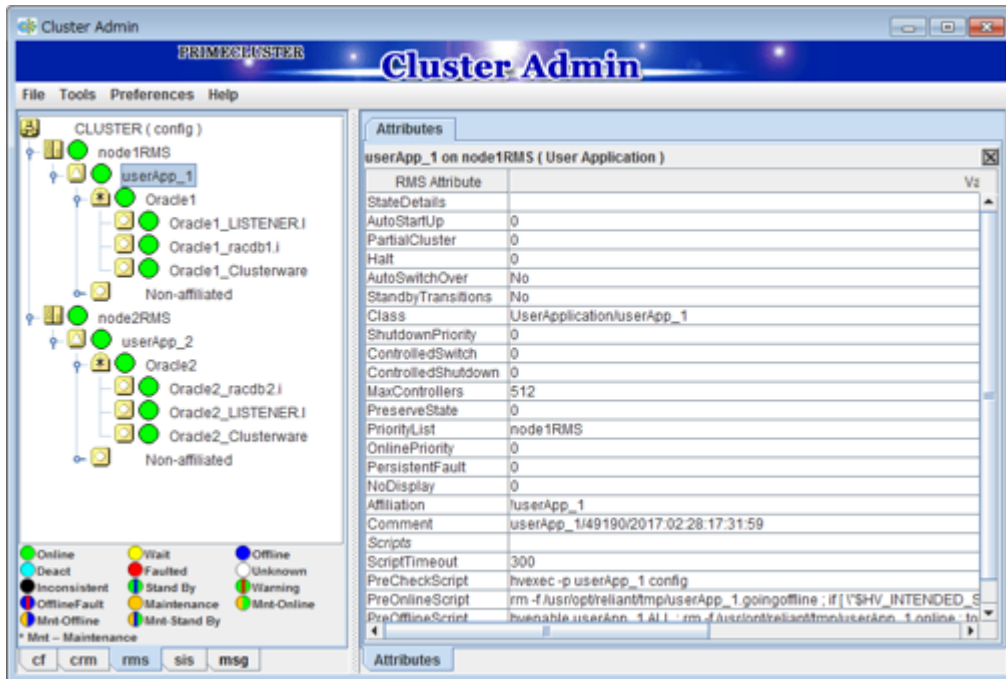
Configuration of operations

Check if the configuration is correct in the Cluster Admin screen of Web-Based Admin View. The image screens of Cluster Admin are as follows:

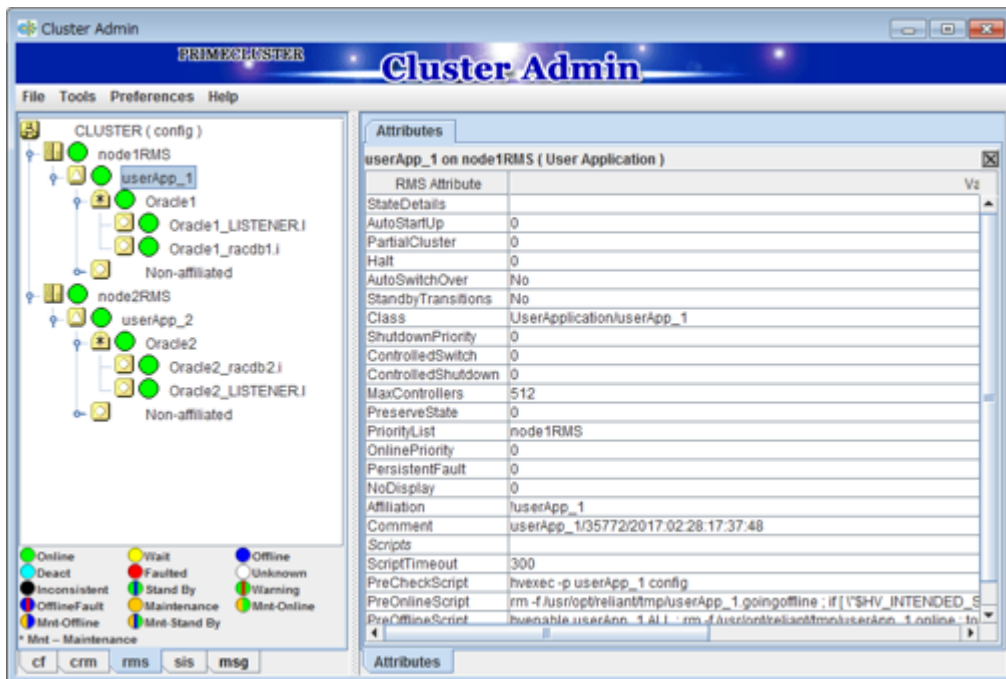
- Configuration A



- Configuration B



- Configuration C



Logical IP address

Check if you can access the operating node from the client using the logical IP address.

Oracle database

Check if you can access to Oracle database running on the operating node from the client using the logical IP address.

2.4 Information

2.4.1 Oracle resource Online/Offline Script

PRIMECLUSTER Wizard for Oracle allows users to execute their own unique processing before, while or after startup or stop of Oracle instances and listeners (Online/ Offline processing). For example, application startup/stop and batch processing can be executed along with startup or stop of Oracle instances and listeners.

Script Type

Script		Description
startup	PreOnlineScript	Executed before OnlineScript. Set up in userApplication Configuration Wizard.
	OnlineScript	Starts resource up during userApplication Online processing. It is impossible to setup by user.
	prestartup*	It is usable only for the Oracle instance resource in standby operation. Executed before Oracle instance startup. If the Oracle instance state (STATUS of the V\$INSTANCE view) has to be checked Put the executable file that begins with "prestartup" in the "/opt/FJSVclora/usr" directory.
	nomount*	It is usable only for the Oracle instance resource in standby operation. Executed when the Oracle instance status (STATUS column in V\$INSTANCE view) is "STARTED" during Oracle instance startup. Put the executable file that begins with "nomount" in the "/opt/FJSVclora/usr" directory.
	mount*	It is usable only for the Oracle instance resource in standby operation. Executed when the Oracle instance status (STATUS column in V\$INSTANCE view) is "MOUNTED" during Oracle instance startup. Put the executable file that begins with "mount" in the "/opt/FJSVclora/usr" directory.
	PostOnlineScript	Executed after OnlineScript. Set up in userApplication Configuration Wizard.
stop	PreOfflineScript	Executed before OfflineScript. Set up in userApplication Configuration Wizard.
	OfflineScript	Stops resource down during userApplication Offline processing. It is impossible to setup by user.
	PostOfflineScript	Executed after OfflineScript. Set up in userApplication Configuration Wizard.
other	FaultScript	Executed when failures occur. Set up in userApplication Configuration Wizard.



See

For information on how to set up the scripts below, see the step 5 or 7 of “[2.2.7.2 Oracle Resource Creation](#)”, the step 5 of “[2.3.4 userApplication with Oracle Clusterware](#)”, or the step 7 or 10 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

- PreOnlineScript
- PostOnlineScript
- PreOfflineScript
- PostOfflineScript
- FaultScript

For detail of these scripts below, refer to “[3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle](#)”.

- OnlineScript
- OfflineScript

Execution Sequence

Script		userApplication startup	resource AutoRecover	userApplication stop (normal)	userApplication stop (resource failure)
startup	PreOnlineScript	1	-	-	-
	OnlineScript	2	1	-	-
	prestartup*	3	2	-	-
	nomount*	4	3	-	-
	mount*	5	4	-	-
	PostOnlineScript	6	5	-	-
stop	PreOfflineScript	-	-	1	2
	OfflineScript	-	-	2	3
	PostOfflineScript	-	-	3	4
other	FaultScript	-	-	-	1



Example

A sample of execution sequence where an Oracle instance resource and a listener resource are registered in the standby operation and StartPriority is set as "Listener" is described below.

- userApplication startup

Note that all PreOnlineScript are executed firstly.

1. PreOnlineScript of Listener resource
2. PreOnlineScript of Oracle instance resource
3. OnlineScript of Listener resource
4. PostOnlineScript of Listener resource
5. OnlineScript (including startup*, nomount*, mount*) of Oracle instance resource
6. PostOnlineScript of Oracle instance resource

- Listener resource AutoRecover

Note that PreOnlineScript of Listener resource is not executed.

1. OnlineScript of Listener resource
2. PostOnlineScript of Listener resource

- normal userApplication stop (user operation)

Note that all PreOfflineScript are executed firstly.

1. PreOfflineScript of Oracle instance resource
2. PreOfflineScript of Listener resource
3. OfflineScript of Oracle instance resource

4. PostOfflineScript of Oracle instance resource
 5. OfflineScript of Listener resource
 6. PostOfflineScript of Listener resource
- userApplication stop caused by Listener resource failure

Note that not only FaultScript of Listener resource but also FaultScript of Oracle instance resource are executed.

1. FaultScript of Listener resource
2. FaultScript of Oracle instance resource
3. PreOfflineScript of Oracle instance resource
4. PreOfflineScript of Listener resource
5. OfflineScript of Oracle instance resource
6. PostOfflineScript of Oracle instance resource
7. OfflineScript of Listener resource
8. PostOfflineScript of Listener resource

Notice (PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript, FaultScript)

- Execute the scripts using root privileges.
- The exit code 0 indicates normal termination. The value other than 0 indicates abnormal termination or Online processing or Offline processing of userApplication failure.
- If the script exceeds the maximum execution time (ScriptTimeout), Online processing or Offline processing of userApplication will fail.
- Each script has the environment variable defined in RMS.
- The script must be entered with a full path name. If you are specifying arguments, separate the arguments with "blanks".



See

For details of each script, see "2.6.3 Script" of the "PRIMECLUSTER RMS Configuration and Administration Guide".

Notice (prestartup*, nomount*, mount*)

- The file is stored in /opt/FJSVclora/usr. If there are two or more files, they will be executed in alphabetical order of the file name.
- A return code of 0 indicates normal termination. A return code of other than 0 indicates abnormal termination. If the script terminates abnormally, Oracle instance startup will also fail.
- root privileges are used for script execution.
- The parameters are as follows:
 - \$1 : \$ORACLE_HOME
 - \$2 : \$ORACLE_SID
 - \$3 : Oracle user name
- If the script is not completed within the timeout period for Oracle instance startup, it will be considered as abnormal exit. Refer to step 5 of "[2.2.7.2 Oracle Resource Creation](#)".
- Using of the "su -" command is not supported for user scripts(prestartup*, nomount*, mount*) under /opt/FJSVclora/usr.



Note

These scripts are enabled with Oracle instance resources in standby operation.

Note that they cannot be used with resources other than Oracle instance resources, and cannot also be used in scalable operation with Oracle RAC.

2.4.2 Oracle ASM (Automatic Storage Management)

An Oracle ASM can be used for standby operation or scalable operation.

Standby operation

Create an Oracle ASM instance resource.

The Oracle ASM instance will not be monitored, but only started or stopped.

If the Oracle ASM instance fails, an Oracle instance resource error will be detected, so userApplication will be switched to the standby node, and ongoing operations will never be disrupted.

About notes on building the environment, in case of Oracle Database 11g R1 or earlier, refer to "[2.4.2.1 Environment configuration with Oracle Database 11g R1 or earlier](#)", and in case of Oracle Database 11g R2 or later, refer to "[2.4.2.2 Environment configuration with Oracle Database 11g R2 or later](#)".

Scalable operation

Do not create an Oracle ASM instance resource if Oracle ASM is used for Oracle RAC. The Oracle ASM instance will be controlled by Oracle Clusterware.

2.4.2.1 Environment configuration with Oracle Database 11g R1 or earlier

Notes in the case of using Oracle ASM of Oracle Database 11g R1 or earlier in standby operation are as follows.

Creation and configuration of Oracle ASM instances

- Operating node

The Oracle ASM instance and database are only created on the operating node. The standby nodes will only operate the database on the shared disk of the operating node.



Note

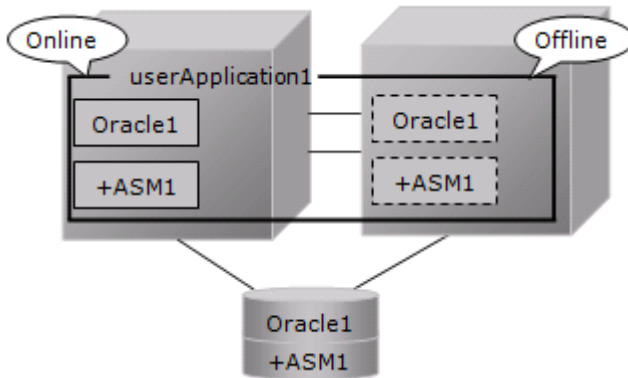
- An Oracle ASM instance name must begin with "+". The default name is "+ASM".

If multiple Oracle ASM instances are configured on one server, a different Oracle ASM instance name must be assigned for Oracle ASM instance.

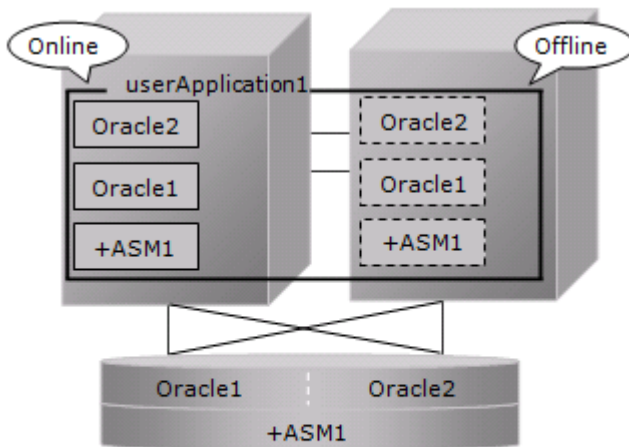
- If multiple Oracle homes are configured on one server, a different Oracle instance name must be assigned for each Oracle home.

- The relation between an Oracle ASM instance and database should become 1:1 or 1:n.

- An Oracle ASM instance : database = 1:1



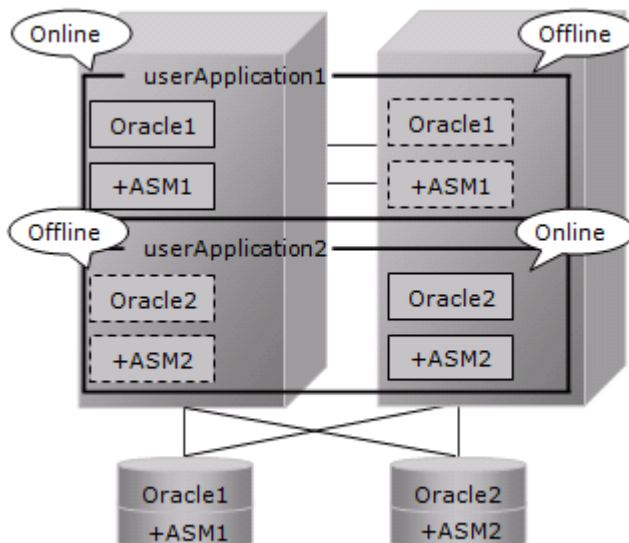
- An Oracle ASM instance : database = 1:n



- In mutual standby operation and N:1 standby operation, the relation between an Oracle ASM instance and database should become 1:1 or 1:n on each userApplication.

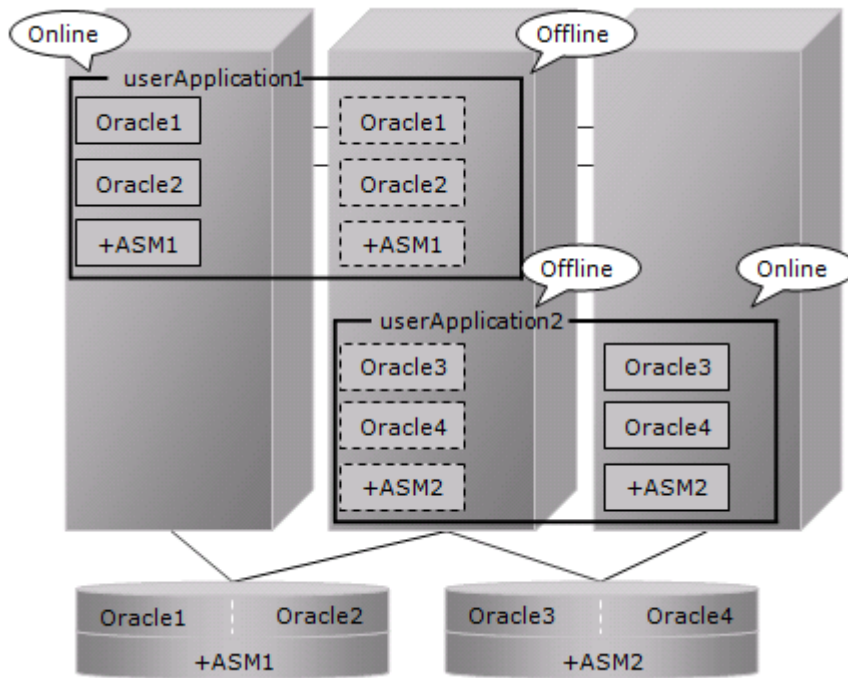
- Mutual standby

The following figure shows an example that an Oracle ASM instance : database = 1:1 on each userApplication.



- N:1 standby

The following figure shows an example that an Oracle ASM instance : database = 1:2 on each userApplication.



See

Refer to the Oracle Database manual.

- Standby node

Set up the standby nodes in the same configuration (directory creation, file copy, and links) as the operating node where the AMS instance and database are created.

Under \$ORACLE_HOME/dbs

Under \$ORACLE_BASE/admin/\$ORACLE_SID

Under \$ORACLE_BASE/admin/< Oracle ASM instance name>

\$ORACLE_BASE/diag/asm (Oracle Database 11g)

The access privilege to the directories and files must be also the same as that on the operating node.

If you set where archived redo log is output on the operating node, it is necessary to set the same on the standby nodes.

CSS on the standby node must be set and started by manually, though CSS on the operating node is set and started automatically while Oracle database is being created.



Note

If required files on the operating node is backed up in the tar format with the /opt/FJSVclora/sbin/cloracpy command, configuration information of the Oracle ASM instance will not be backed up. Copy the following file manually in the tar format:

- \$ORACLE_BASE/admin/< Oracle ASM instance name>

Oracle ASM initialization parameter check

Check if the disk group in which the Oracle database is created is set for the Oracle ASM instance initialization parameter "ASM_DISKGROUPS".

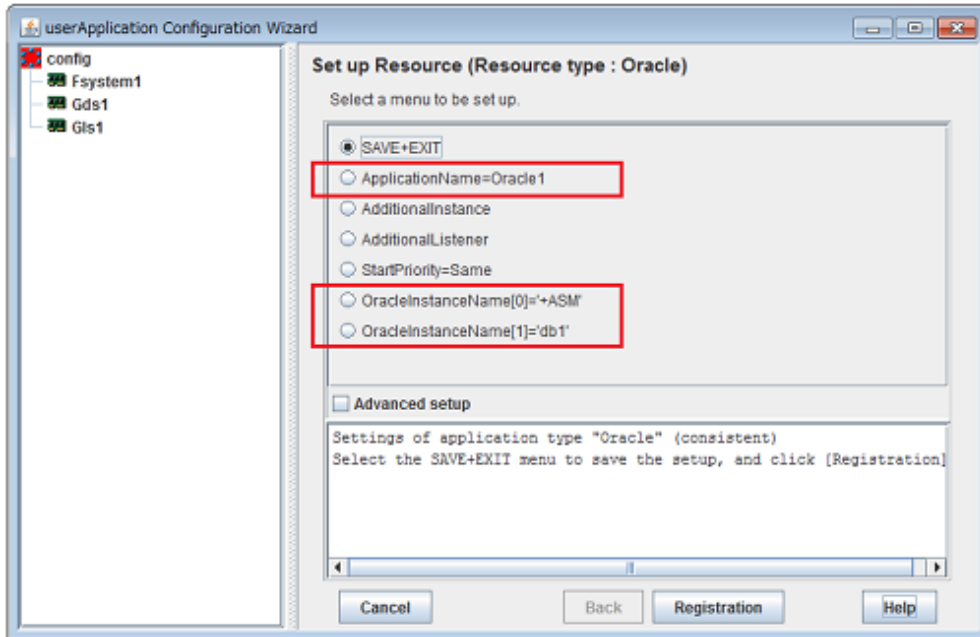


For the initialization parameter of the Oracle ASM instance, see the Oracle Database manual.

userApplication creation

When creating userApplication, create an Oracle ASM instance resource and Oracle instance resource. Register them in the same Oracle resource.

The following screen is an example of the Oracle resource "Oracle1" with the Oracle ASM "+ASM" instance and the Oracle instance "db1".



Gls: Global Link Services
Gds: Global Disk Services

Information

- For further details of registering Oracle ASM instance in an Oracle resource, refer to step 3 of "[2.2.7.2 Oracle Resource Creation](#)"
- The NULLDETECTOR attribute is automatically set to the flag of the Oracle ASM instance resource. This value cannot be changed.

2.4.2.2 Environment configuration with Oracle Database 11g R2 or later

Notes in the case of using Oracle ASM of Oracle Database 11g R2 or later in standby operation are as follows.

Supported Configurations

In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. The composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported in standby operation or single-node cluster operation. The composition which creating one user is not supported.

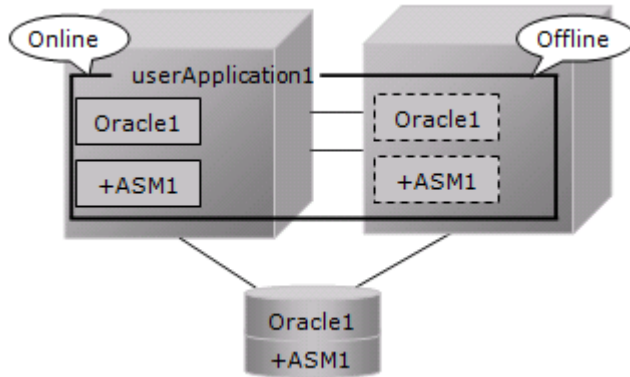
A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.

Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle database Creation

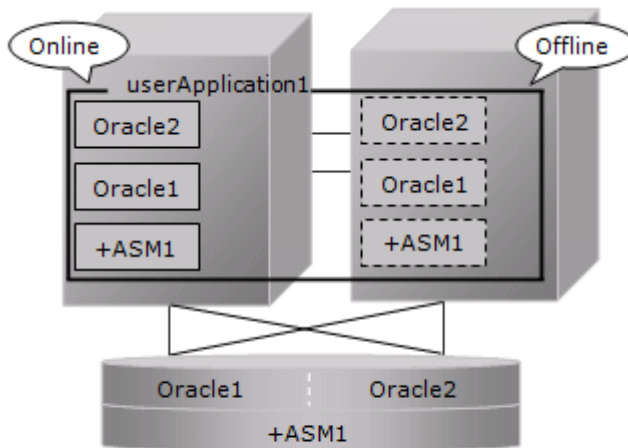
See "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)" to install Oracle Grid Infrastructure and create Oracle ASM instance, Oracle database.

Note

- An Oracle ASM instance name must begin with "+". The default name is "+ASM".
- If multiple Oracle homes are configured on one server, a different Oracle instance name must be assigned for each Oracle home. The relation between an Oracle ASM instance and database should become 1:1 or 1:n.
 - ASM instance : database = 1:1



- An Oracle ASM instance : database = 1:n
The following figure shows an example that an Oracle ASM instance : database = 1:2.



- The following configuration of standby operation using Oracle ASM 11g R2 or later is supported.
 - 1:1 standby
- The following configuration of standby operation using Oracle ASM 11g R2 or later is not supported.
 - Cascade
 - Mutual standby
 - N:1 standby
 - Priority transfer
 - N:M standby



See

Refer to the Oracle Database manual.

Using Oracle Database 18c/19c

Execute the procedure in "[Appendix H Using Oracle Database 18c/19c](#)".

Add RMS Stop Processing

To ensure that RMS is stopped before ohasd service of Oracle Grid Infrastructure is stopped during OS shutdown, execute the following procedure.

1. Create the script file /etc/init.d/stopRMS and add execution permission as a root user.

Create script file :

```
# vi /etc/init.d/stopRMS
(Paste the following the content of script file)
# chmod 744 /etc/init.d/stopRMS
```

Content of script file :

```
#!/usr/bin/bash
#
case "$1" in
'stop')
    /opt/SMAW/SMAWRrms/lib/svc/smawrrms stop
    ;;
*)
    echo "Usage: stopRMS { stop }"
    ;;
esac
```

2. Check the directory where the stop script of ohasd service of Oracle Grid Infrastructure is located.

```
# find /etc/rc*.d/ | grep ohasd
/etc/rc0.d/K19ohasd
/etc/rc1.d/K19ohasd
/etc/rc2.d/K19ohasd
/etc/rc3.d/S96ohasd
/etc/rcS.d/K19ohasd
```

3. Create a symbolic link "K00stopRMS" to /etc/init.d/stopRMS in the directory where "K<Two digit number>ohasd" is located. The example in step 2, create them in /etc/rc0.d, /etc/rc1.d, /etc/rc2.d, and /etc/rcS.d.

```
# ln -s /etc/init.d/stopRMS /etc/rc0.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rc1.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rc2.d/K00stopRMS
# ln -s /etc/init.d/stopRMS /etc/rcS.d/K00stopRMS
```

Change Oracle Restart Settings

Change the settings of Oracle Restart to control Oracle ASM by PRIMECLUSTER Wizard for Oracle.

- Oracle Database 11g R2/12c R1(12.1.0.1)

Execute the following command on each node with Grid user access privileges to set for Oracle Restart and the CSS(Cluster Synchronization Services) daemon to start when OS starts, and disable automatic startup of Oracle instances, Oracle listener, and Oracle ASM.

Component	Command
Oracle Restart	crsctl enable has
CSS	crsctl modify resource ora.cssd -attr "AUTO_START=always"
Oracle ASM	srvctl disable asm
Oracle listener	srvctl disable listener [-l <listener_name>]
Oracle instance	srvctl disable database -d <db_unique_name>

- Oracle Database 12c R1(PSR12.1.0.2 or later)/12c R2/18c/19c

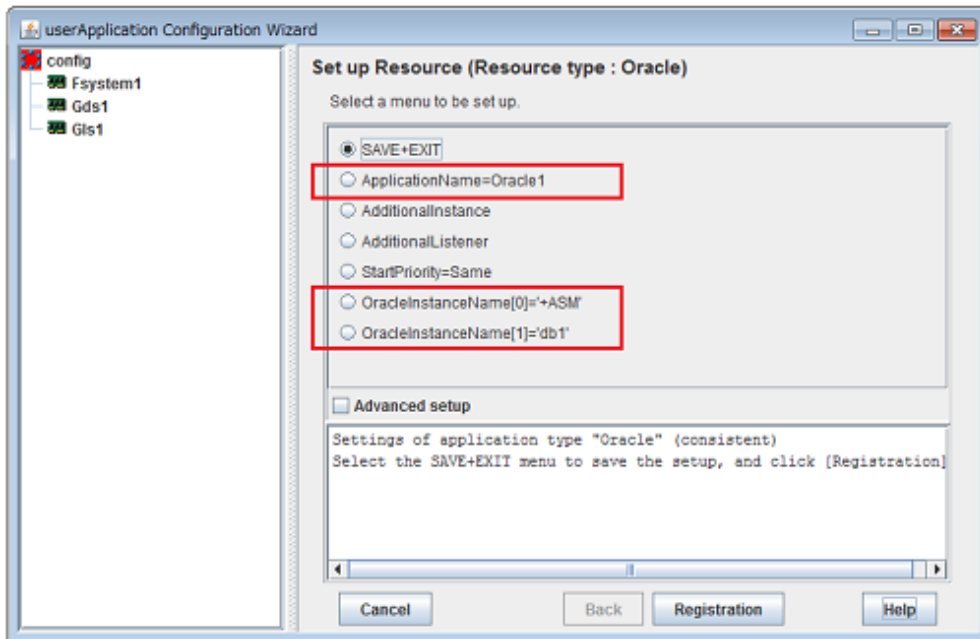
Execute the following command on each node with Grid user access privileges to set for Oracle Restart to start when OS starts, and disable automatic startup of Oracle instances, Oracle listener, and Oracle ASM.

Component	Command
Oracle Restart	crsctl enable has
Oracle ASM	srvctl disable asm
Oracle listener	srvctl disable listener [-l <listener_name>]
Oracle instance	srvctl disable database -d <db_unique_name>

userApplication Create

When creating userApplication, create an Oracle ASM instance resource and Oracle instance resource. Register them in the same Oracle resource.

The following screen is an example of the Oracle resource "Oracle1" with the Oracle ASM "+ASM" instance and the Oracle instance "db1".



Gls: Global Link Services
Gds: Global Disk Services

Information

- For further details of registering Oracle ASM instance in a Oracle resource, refer to step 3 of "2.2.7.2 Oracle Resource Creation"
- The NULLDETECTOR attribute is automatically set to the flag of the Oracle ASM instance resource. This value cannot be changed.

Note

- Set up Grid user to Oracle ASM instance resource and Oracle listener resource, Oracle user to Oracle instance resource.
- In case of Oracle Database 11g R2/12c R1(12.1.0.1), set up the following script in PreOnlineScript of the Oracle ASM instance resource to start Oracle ASM after CSS started. In case of Oracle Database 12c R1(PSR12.1.0.2 or later)/12c R2/18c/19c, do not set up the following script.

```
/opt/FJSVclora/sbin/cloracsswait <Grid user>
```

In case of using Oracle database services

In case of using Oracle database services other than the default service made when Oracle data base is made, set up the following script.

- Create the Cmdline resource, and set up the following scripts to the Start script. The Stop script and the Check script is not set. Set NULLDETECTOR to "Yes". Set TIMEOUT to default value 300.

```
/opt/FJSVclora/sbin/clorasrvstart <Grid user> <db_unique_name>[ ,<db_unique_name> , ... ]
```

db_unique_name that uses the Oracle database service is two or more cases, place a comma between db_unique_name.

After starting the Oracle instance, all the Oracle database services registered in db_unique_name start.

See

For Oracle database services, refer to the Oracle Database manual.

2.4.2.3 Precaution for Oracle ASM operation

A disk group that is used for the Oracle ASM instance must not be mounted or unmounted manually. If the disk group is mounted, the following message might be output to the console when the Oracle ASM resource is activated, but no action needs to be taken.

ORA-15032: not all alterations performed

ORA-15017: diskgroup "diskgroup name" cannot be mounted

ORA-15030: diskgroup name "diskgroup name" is in use by another diskgroup

Chapter 3 Operation

3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle

3.1.1 Standby Operation

This section describes startup, shutdown and monitoring of Oracle resources in standby operation.



See

In the Oracle Data Guard/Oracle Active Data Guard environment, for details about startup, shutdown and monitoring of Oracle resources in the standby database cluster operation, see "[G.3.1 Oracle database Control \(Standby Operation\)](#)".

3.1.1.1 Starting and Stopping Oracle resources

Oracle instance startup

Startup procedure of an Oracle instance is as follows:

1. su - <Oracle user>
2. sqlplus /nolog
3. CONNECT / AS SYSDBA
4. STARTUP NOMOUNT or STARTUP MOUNT
5. ALTER DATABASE MOUNT (if "STARTUP NOMOUNT" was executed at step 4.)
6. ALTER DATABASE OPEN
7. ALTER PLUGGABLE DATABASE ALL OPEN (if UsePDB of Oracle instance resource is set to yes.)

In the Oracle Data Guard/Oracle Active Data Guard environment, when the CDB started to the OPEN state, which is able to start the PDBs, this command is executed. For details, see "Starting and Stopping CDB and PDB" in "[G.1 Feature Outline](#)".

- Initialization parameter file and server parameter file

The initialization parameter file is not specified for Oracle instance startup through PRIMECLUSTER Wizard for Oracle, so the default initialization parameter file will be used instead. Specify the initialization parameter file for the following default path (symbolic link).

```
<$ORACLE_HOME>/dbs/init<$ORACLE_SID>.ora
```

The server parameter file must be located on the shared disk device because it is dynamically changed. When you use the server parameter file, enter the full path for the initialization parameter file. See "[2.2.6.1 Oracle database Creation and Setting](#)".

It is recommended that the initialization parameter file settings are the same on the operating nodes and standby nodes.

- Recovery processing

PRIMECLUSTER Wizard for Oracle recovers the Oracle instance in the following cases:

1. When there is ACTIVE tablespace in the V\$BACKUP view.
2. When there are files required to be recovered in the V\$RECOVER_FILE view.

- DBA authentication

PRIMECLUSTER Wizard for Oracle connects to Oracle instance with SYSDBA system privilege to start up or stop Oracle instance/database. In this case, local connection in operating system authentication is used.

Oracle instance shutdown

Shutdown procedure of an Oracle instance is as follows:

- When users shut down and switch userApplication, the procedure is as follows:

1. su - <Oracle user>
2. sqlplus /nolog
3. CONNECT / AS SYSDBA
4. SHUTDOWN <IMMEDIATE/ABORT/TRANSACTIONAL> (Setup with StopModeStop)
Default : IMMEDIATE
5. If the Oracle instance is not stopped at step 4 (except for ABORT), use SHUTDOWN ABORT.
6. If the Oracle instance is not stopped at step 4 or step 5, shut it down forcibly by sending SIGKILL to the background process.

- The procedure of stopping failed Oracle resources including non-Oracle resources is as follows:

1. su - <Oracle user>
2. sqlplus /nolog
3. CONNECT / AS SYSDBA
4. SHUTDOWN <IMMEDIATE/ABORT> (Setup with StopModeFail)
Default : ABORT
5. If the Oracle instance is not stopped at step 4 (except for ABORT), use SHUTDOWN ABORT.
6. If the Oracle instance is not stopped at step 4, shut it down forcibly by sending SIGKILL to the background process.

Even if UsePDB of Oracle instance resource is set to yes, PDBs is not stopped. PDBs stops by stopping the CDB.

Listener startup

Startup procedure of a Listener is as follows:

1. su - <Oracle user>
2. lsnrctl start <ListenerName>
3. Make sure that a listener process does exist.

Listener shutdown

Shutdown procedure of a Listener is as follows:

1. su - <Oracle user>
2. lsnrctl stop <ListenerName>
3. Make sure that a listener process does not exist.
4. If Listener is not stopped at step 3, shut it down forcibly by sending SIGKILL to the background process.

Oracle ASM instance startup

Oracle ASM instance startup procedure is as follows:

- Oracle Database 10g R2/11g R1/11g R2/12c R1(12.1.0.1)
 1. su - <Oracle user>
 2. sqlplus /nolog
 3. CONNECT / AS SYSDBA (In case of Oracle Database 11g or later, "CONNECT / AS SYSASM")
 4. STARTUP MOUNT (When the state is already STARTED, "ALTER DISKGROUP ALL MOUNT;")
- Oracle Database 12c R1(PSR12.1.0.2 or later)/12c R2/18c/19c
 1. su - <Oracle user>
 2. Confirm that Oracle Restart started.

3. `srvctl enable asm`
4. `srvctl start asm`
5. `srvctl disable asm`

Oracle ASM instance shutdown

Oracle ASM instance shutdown procedure is as follows:

- Oracle Database 10g R2/11g R1/11g R2/12c R1(12.1.0.1)
 - At the shutdown of manual shutdown and switch userApplication by operator
 1. `su - <Oracle user>`
 2. `sqlplus /nolog`
 3. `CONNECT / AS SYSDBA` (In case of Oracle Database 11g or later, "`CONNECT / AS SYSASM`")
 4. `SHUTDOWN <IMMEDIATE/ABORT/TRANSACTIONAL>` (Setup by "`StopModeStop`")
default : IMMEDIATE
 5. If the Oracle ASM has not stopped in "4", execute "`SHUTDOWN ABORT`". (When choosing excluding "ABORT" in "4")
 6. If the Oracle ASM has not stopped in "4" or "5", abort the background process by sending SIGKILL.
 - At the shutdown in the event of a resource failure (resource failure of excluding Oracle ASM is included)
 1. `su - <Oracle user>`
 2. `sqlplus /nolog`
 3. `CONNECT / AS SYSDBA` (In case of Oracle Database 11g or later, "`CONNECT / AS SYSASM`")
 4. `SHUTDOWN <IMMEDIATE/ABORT>` (Setup by "`StopModeFail`")
default : ABORT
 5. If the Oracle ASM has not stopped in "4", execute "`SHUTDOWN ABORT`". (When choosing excluding "ABORT" in "4")
 6. If the Oracle ASM has not stopped in "4" or "5", abort the background process by sending SIGKILL.
- Oracle Database 12c R1(PSR12.1.0.2 or later)/12c R2/18c/19c
 - At the shutdown of manual shutdown and switch userApplication by operator
 1. `su - <Oracle user>`
 2. `srvctl stop asm -stopoption <IMMEDIATE/ABORT/TRANSACTIONAL (Setup by "StopModeStop")> -force`
default : IMMEDIATE
 3. If the Oracle ASM has not stopped in "2", execute the following.
`sqlplus /nolog`
`CONNECT / AS SYSASM`
`SHUTDOWN <IMMEDIATE/ABORT/TRANSACTIONAL (Setup by "StopModeStop")>`
 4. If the Oracle ASM has not stopped in "3", execute the following. (When choosing excluding "ABORT" in "3")
`sqlplus /nolog`
`CONNECT / AS SYSASM`
`SHUTDOWN ABORT`
 5. If the Oracle ASM has not stopped in "3" or "4", abort the background process by sending SIGKILL.
 - At the shutdown in the event of a resource failure (resource failure of excluding Oracle ASM is included)
 1. `su - <Oracle user>`
 2. `srvctl stop asm -stopoption <IMMEDIATE/ABORT (Setup by "StopModeFail")> -force`
default : ABORT

3. If the Oracle ASM has not stopped in "2", execute the following.


```
sqlplus /nolog
CONNECT / AS SYSASM
SHUTDOWN <IMMEDIATE/ABORT (Setup by "StopModeFail ")>
```
4. If the Oracle ASM has not stopped in "3", execute the following. (When choosing excluding "ABORT" in "3")


```
sqlplus /nolog
CONNECT / AS SYSASM
SHUTDOWN ABORT
```
5. If the Oracle ASM has not stopped in "3" or "4", abort the background process by sending SIGKILL.

3.1.1.2 Monitoring Oracle resources

Monitoring Oracle instances

Monitoring procedure of an Oracle instance is as follows:

1. Check the background processes (PMON, SMON) periodically. If the process status can be confirmed after Oracle instance gets activated, go to step 2.
2. su - <Oracle user>
3. Local connection to the Oracle instance as a SYSTEM user
4. If the state of the database which is OPEN can be confirmed, go to step "5".
5. Check if the background processes (PMON, SMON, DBWn, LGWR, CKPT) are alive.
The monitoring interval can be changed at the setting of "Interval" and its default value is 30 seconds.
6. Check if SQL (INSERT, UPDATE, DELETE and COMMIT) can be properly executed using the monitoring table on the SYSTEM user's default tablespace.
The monitoring with SQL is executed in accordance with the setting of "Interval". The elapsed time from the last monitoring is checked. Only when 60 seconds or more pass, the monitoring with SQL is executed.
7. Monitoring PDB
When UsePDB of Oracle instance resource is set to yes, the monitoring of PDB is executed in accordance with the setting of "Interval".
OPEN_MODE of each PDBs is checked by the V\$PDBS table.

In the Oracle Data Guard/Oracle Active Data Guard environment, when the CDB started to the OPEN state, which is able to start the PDBs, this step is executed. For details, see "Starting and Stopping CDB and PDB" in "[G.1 Feature Outline](#)".
8. Oracle instance is reconnected once every 24 hours.

In the standby node, step 1 is executed to confirm that the background processes (PMON, SMON) do not exist.

- SYSTEM user password

PRIMECLUSTER Wizard for Oracle monitors Oracle instances as a SYSTEM user. Register the SYSTEM user's password. See "[4.3 clorapass - Register Password for Monitoring](#)".

- Monitoring table (FAILSAFEORACLE_<ORACLE_SID>)

PRIMECLUSTER Wizard for Oracle creates a monitoring table on the SYSTEM user's default tablespace if the monitoring table does not exist. The table is only a few bites, and will not be deleted.

- Warning notification

If the following symptoms are detected, PRIMECLUSTER Wizard for Oracle will notify RMS of the warning state. It is not the Fault state, so a failover will not occur.

- Oracle instance cannot be connected due to incorrect SYSTEM user's password that is registered with the "clorapass" command. (ORA-01017 detected)
- Since the SYSTEM user's account is locked, so Oracle instance connection is not allowed. (ORA-28000 detected)
- Since the SYSTEM user's password has expired, so Oracle instance connection is not allowed (ORA-28001 detected)

- When the max session or max process error occurs, so Oracle instance connection is not allowed. (ORA-00018 or ORA-00020 detected)
- When the monitoring timeout occurs due to getting no reply from SQL for a certain period of time.
If the monitoring timeout occurs, SQL is executed again. If a reply from SQL is received, the Online state is notified.
- Oracle database errors that causes failover

If the Oracle database errors are detected, PRIMECLUSTER Wizard for Oracle will notify RMS of the Offline state. Then the Oracle instance resources become the resource failure state and a failover will occur.

If the AutoRecover(A) flags of the Oracle instance resources are selected, the Oracle instances will be restart before failover when the Oracle instance resource failure occurs. For details about AutoRecover(A), refer to "[2.2.7.2 Oracle Resource Creation](#)".

In the following case, the Offline state is notified to RMS:

- The background processes (PMON, SMON, DBWn, LGWR and CKPT) do not exist.

Example

For example, the following cases correspond:

- Oracle instance terminates abnormally.
 - Oracle instance is stopped without stopping the monitoring.
-
- Oracle database errors (ORA-xxxxx) are returned after executing SQL.
Oracle database errors (ORA-xxxxx) detected during monitoring will be handled in accordance with the action definition file (/opt/FJSVclora/etc/FJSVclorafm.actionlist).
If the Oracle database errors defined as Of in the action definition file are detected, the Offline state is notified. See "[Appendix I \(Information\) Action Definition File](#)".

Example

For example, the following cases correspond:

- ORA-04031 (out of memory in the shared pool) occurs.
-
- The monitoring timeout occurs twice in a row after executing SQL.
If the reply from SQL does not return for 300 seconds (default), the monitoring timeout occurs and the Oracle instance resource will be the Warning state. Then PRIMECLUSTER Wizard for Oracle reconnects to the Oracle instance. If the reply does not return for 300 seconds during reconnection, the Offline state is notified.
The monitoring timeout can be changed at the setting of "WatchTimeout" and its default value is 300 seconds.

Example

For example, the following cases correspond:

- Oracle Database hangs up because archive logs run out of space.
 - The system load is too high.
-
- Monitoring PDB
- OPEN_MODE of each PDBs is checked by the V\$PDBS table. If OPEN_MODE is "READ WRITE", it is judged that the PDB is normal. If OPEN_MODE is not "READ WRITE", It is judged that the PDB is abnormal. The monitoring of PDB is executed in accordance with the setting of "Interval". When the state changes when monitoring it last time, the message is output to syslog. The restart and the failover due to fault of PDBs is not executed.

When the state of PDB becomes normal, the following messages are output.

```
FSP_PCLW-ORACLE_FJsvclora: INFO: 9142: OPEN_MODE of PDB <PDB name> was OPEN. (CDB=<ORACLE_SID of CDB> PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

When the state of PDB becomes abnormal, the following messages are output.

```
FSP_PCLW-ORACLE_FJsvclora: ERROR: 9242: clorapdbmon detected OPEN_MODE of PDB <PDB name> is invalid. (CDB=<ORACLE_SID of CDB> PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

For details about the monitoring PDB in the Oracle Data Guard/Oracle Active Data Guard environment, see "[G.1 Feature Outline](#)".

Note

Failover occurs according to the setting of AutoSwitchOver of userApplication (cluster application).

If AutoSwitchOver=ResourceFailure (at resource failure) is selected, a userApplication will failover when a resource failure occurs. For details about the settings of userApplication (cluster application), refer to "PRIMECLUSTER Installation and Administration Guide"

Monitoring Listeners

Monitoring procedure of a Listener is as follows:

1. Make sure that a listener process does not exist.
The monitoring interval can be changed at the setting of "Interval" and its default value is 30 seconds.
2. Make sure that the net service name is valid by using "tnsping" command.
The monitoring with tnsping is executed in accordance with the setting of "Interval". The elapsed time from the last tnsping is checked. Only when 60 seconds or more pass, the monitoring with tnsping is executed.

Note

When TNSName is set, tnsping is executed. For details about TNSName, refer to "[2.2.7.2 Oracle Resource Creation](#)".

In the standby node, step 1 is executed to confirm that the Listener processes do not exist.

- Monitoring timeout

If there is no reply from tnsping command after a certain period of time, the monitoring timeout will be considered then the Oracle Listener resource will be put into Warning. If the monitoring timeout occurs twice in a row, a resource will be considered as fault then a failover will be performed.

The monitoring timeout (the wait time from Oracle Listener) can be changed with WatchTimeout.

- Failover

If the Oracle listener errors are detected, PRIMECLUSTER Wizard for Oracle will notify RMS of the Offline state. Then the Oracle listener resources become the resource failure state and a failover will occur.

If the AutoRecover(A) flags of the Oracle listener resources are selected, the Oracle listener will be restart before failover when the Oracle listener resource failure occurs. For details about AutoRecover(A), refer to "[2.2.7.2 Oracle Resource Creation](#)".

In the following case, the Offline state is notified to RMS:

- The listener process does not exist.
- The tnsping command fails.
- The monitoring timeout occurs twice in a row.

Note

Failover occurs according to the setting of AutoSwitchOver of userApplication (cluster application).

If AutoSwitchOver=ResourceFailure (at resource failure) is selected, a userApplication will failover when a resource failure occurs.

For details about the settings of userApplication (cluster application), refer to "PRIMECLUSTER Installation and Administration Guide".

Monitoring Oracle ASM instance

Oracle ASM is not monitored. NullDetector flag is automatically enabled.

3.1.2 Scalable Operation with Oracle RAC

This section describes startup, shutdown and monitoring of Oracle resources in the scalable operation with Oracle RAC.



See

In the Oracle Data Guard/Oracle Active Data Guard environment, for details about startup, shutdown and monitoring of Oracle resources in the scalable operation with Oracle RAC, see "G.3.2 Oracle database Control (Scalable Operation with Oracle RAC)".

3.1.2.1 Starting and Stopping Oracle resources

Oracle RAC instance startup

Startup procedure of an Oracle RAC instance is as follows:

1. su - <Oracle user>
2. srvctl start instance -d *\$DB_NAME* -i *\$ORACLE_SID* -o mount
3. sqlplus /nolog
4. CONNECT / AS SYSDBA
5. ALTER DATABASE OPEN;

Oracle RAC instance stop

Stop procedure of an Oracle RAC instance is as follows:

1. su - <Oracle user>
2. srvctl stop instance -d *\$DB_NAME* -i *\$ORACLE_SID*

Listener startup

Listener startup depends on Oracle Clusterware. PRIMECLUSTER Wizard for Oracle checks listeners. If the listeners are not started, they are started by PRIMECLUSTER Wizard for Oracle.

Startup procedure of a listener is as follows:

1. su - <Grid user>
2. srvctl start listener -n *\$NODE_NAME* -l *\$LSNR_NAME*

Listener shutdown

Listener stop depends on Oracle Clusterware, not PRIMECLUSTER Wizard for Oracle.

Oracle Clusterware startup

Startup procedure of an Oracle Clusterware is as follows:

1. Start up Oracle Clusterware using "crsctl start crs".
2. Check if Oracle Clusterware is activated using "crsctl status resource -t".

Oracle Clusterware stop

Stop procedure of an Oracle Clusterware is as follows:

1. Shut down Oracle Clusterware using “crsctl stop crs”.

Note

- If you want to startup, stop, or switch Oracle instances, execute hvswitch and hvutil on RMS userApplication. If you execute the Oracle Clusterware srvctl command or SHUTDOWN command to the Oracle instance directly, PRIMECLUSTER will consider that the instance fails, and recovery processing might be initiated for the Oracle instance. To executing the command, put userApplication into maintenance mode.
- Stop userApplication and RMS before shutting down or restarting the OS for maintenance. When shutting down or restarting the OS, the Oracle Clusterware, the Oracle instance, and the listener stop. Therefore, the Oracle instance resource and the listener resource failure will occur when userApplication is Online state.

3.1.2.2 Monitoring Oracle resources

Monitoring Oracle RAC instances

The monitoring of an Oracle RAC instance is the same as standby operation. For details, see “[3.1.1.2 Monitoring Oracle resources](#)”.

- Monitoring interval (Interval)

The default value of monitoring interval for the background processes (PMON, SMON, DBWn, LGWR, CKPT) is 60 seconds.

- Oracle RAC instance errors and recovery

- If Oracle RAC instance errors are detected, PRIMECLUSTER Wizard for Oracle notifies RMS of the warning state and waits for Oracle RAC resources to be restarted by Oracle Clusterware.
- Oracle Clusterware automatically restart Oracle RAC resources if they fail.
- If Oracle Clusterware cannot restart them within a set time of "Interval", PRIMECLUSTER Wizard for Oracle notifies RMS of the Fault state and stops Oracle RAC instances.
For details about "Interval", see "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)".

- Monitoring PDB

PDB is not monitored.

Monitoring Listeners

The monitoring of listeners is the same as standby operation. For details, see “[3.1.1.2 Monitoring Oracle resources](#)”.

- Monitoring interval (Interval)

The default value of monitoring interval for listener processes using ps command is 60 seconds.

- The tnsping monitoring is not performed.

- Listener errors and recovery

- If Listener errors are detected, PRIMECLUSTER Wizard for Oracle notifies RMS of the warning state and waits for Listeners to be restarted by Oracle Clusterware.
- Oracle Clusterware automatically restart Listeners if they fail.
- If Oracle Clusterware cannot restart them within a set time of "Interval", PRIMECLUSTER Wizard for Oracle notifies RMS of the Fault state. PRIMECLUSTER Wizard for Oracle does not stop Listeners.
For details about "Interval", see "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)".

Oracle Clusterware monitoring

PRIMECLUSTER Wizard for Oracle does not monitor Oracle Clusterware. NullDetector flag is automatically enabled.

3.1.3 Single-Node Cluster Operation

In single-node cluster operation, PRIMECLUSTER Wizard for Oracle controls Oracle database in the same way as standby operation. For details, see ["3.1.1 Standby Operation"](#).



In single-node cluster operation, the procedure of "Initialization parameter file and server parameter file" in ["3.1.1 Standby Operation"](#) is not necessary.

3.2 Oracle database Maintenance

This section discusses how to change Oracle database settings, apply Oracle database patches, backup and recover Oracle databases. In a cluster system, the shared disk device in which Oracle data is stored is activated and deactivated along with Oracle database startup and stop.

- Oracle database is monitored during userApplication operation. If Oracle database is stopped manually, then the cluster system will consider that the Oracle resource fails, so Oracle database will be restarted or Oracle database operation will be switched to the standby node.
- While userApplication is not running, the shared disk is deactivated.

If you need to control Oracle database manually for Oracle cold backup or other maintenance tasks, put PRIMECLUSTER in maintenance mode, and stop monitoring the Oracle instances and listeners temporarily.

General procedure

The general maintenance procedure is as follows:

1. Start userApplication

Start userApplication that includes the Oracle instance resource if it is stopped.

2. Put userApplication into maintenance mode and stop monitoring

Put userApplication into maintenance mode.

Next, stop monitoring the Oracle instance and listener resources by executing the "hvoradisable" command.

3. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.

(Refer to note of ["4.1 hvoradisable - Discontinue Monitoring Resources"](#).)

4. Enable Oracle Restart settings

Enable Oracle Restart settings when the standby operation that uses ASM and execute the following work.

- Select the diskgroups in DBCA
- `srvctl start asm`
- `srvctl start database`
- `srvctl start listener`

Execute the following commands as a Grid user to enable Oracle Restart settings.

```
srvctl enable asm
srvctl enable listener [-l <listener_name>]
srvctl enable database -d <db_unique_name>
```

When selecting the diskgroups in DBCA, the state of Oracle ASM and diskgroups should be ONLINE on Oracle Restart. Execute the following commands as a Grid user.

```
crsctl status resource -t
srvctl start asm (If the Oracle ASM is OFFLINE.)
srvctl start diskgroup -g <diskgroup name> (If the diskgroups are OFFLINE.)
```

When the message that the Oracle ASM and the diskgroups have already been started is output, ignore the message because it is no problem.

5. Stop Oracle database-dependent resources

If there are Oracle database-dependent resources, stop them manually before stopping Oracle database.

6. Stop Oracle database

Stop Oracle instance and listener manually.

7. Do maintenance on Oracle database

Change the Oracle database settings, apply Oracle database patches, backup and recovery Oracle databases.

8. Start Oracle database

After the maintenance is completed, start Oracle instance. Restart the Oracle listener, if it is also stopped. Start PDBs for the database using the multitenant architecture. Before going on to the next step, be sure to check that Oracle instance and listener are properly running. The Oracle instance must be OPEN. The OPEN_MODE of PDBs must be "READ WRITE" for the database using the multitenant architecture.

9. Disable Oracle Restart settings

If "4. Enable Oracle Restart settings" is executed, execute the following commands as a Grid user to disable Oracle Restart settings.

```
srvctl disable asm
srvctl disable listener [-l <listener_name>]
srvctl disable database -d <db_unique_name>
```

10. Start Oracle database-dependent resources

If Oracle database-dependent resources are stopped, start them manually.

11. Restart resource monitoring and stop maintenance mode

Restart monitoring the Oracle instance and listener resources again using the hvoraenable command. Next, stop maintenance mode of userApplication.

12. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode have been successfully done. (Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

Information

- About Discontinue Monitoring, Restart Monitoring

For stopping Oracle database while userApplication is running, use function of "Discontinue Monitoring" of PRIMECLUSTER Wizard for Oracle.

Function of "Discontinue Monitoring" discontinue only Oracle resource monitoring. Therefore, note that the failover occurs due to the failure of the resource other than Oracle database.

- Oracle RAC

To operate Oracle RAC resources, control RMS userApplication without using the srvctl or SHUTDOWN command. If you execute these commands to the Oracle instance directly, PRIMECLUSTER will consider that the resource fails, and recovery processing might be initiated for the Oracle resource. To execute these commands, put userApplication into maintenance mode.

- Maintenance mode of userApplication

If you put userApplication into maintenance mode, resource failure is ignored. It means that userApplication failover and resource autorecovery do not occur even if Oracle database is manually stopped. This enables maintenance work of resources including Oracle resources.

For information on how to put userApplication into maintenance mode, see "5.4.11 Maintenance mode" of the "PRIMECLUSTER RMS Configuration and Administration Guide".

- Oracle instance and listener monitoring

hvoradisable and hvoraenable commands enable to discontinue and restart monitoring Oracle instances and Oracle listener resources. If you put userApplication into maintenance mode only, Oracle session for monitoring remains. If you execute hvoradisable command additionally, the Oracle session is killed. This enables executing SHUTDOWN command with "NORMAL" option in Oracle database manual stop.

For information on how to cancel or restart monitoring the Oracle instance and listener resources, see "[4.1 hvoradisable - Discontinue Monitoring Resources](#)" and "[4.2 hvoraenable - Restart Monitoring Resources](#)".

Note

- Monitoring restart

If Oracle instances and Oracle listeners are stopped manually after resource monitoring disruption, start them manually before starting resource monitoring again. Start PDBs manually for the database using the multitenant architecture. If you restart resource monitoring with the Oracle resources inactive, the Oracle resources may fail.

- Resource state during monitoring

If the "hvoradisable" command properly stops monitoring the resources, they will enter Warning.

- Plan the maintenance procedure according to the operation environment and the maintenance requirement. Refer to the procedures described in this section and the Oracle Database documents.
- Be sure to stop monitoring the Oracle instance and listener resources by executing the "hvoradisable" command in "2. Put userApplication into maintenance mode and stop monitoring".

If the hvoradisable command is not executed, the following problems might be caused.

- The monitoring modules of PRIMECLUSTER Wizard for Oracle are using the library of Oracle Database. If the patch of the Oracle database is applied while the monitoring modules has executed, the library files of Oracle database may not be updated. Therefore, stop monitoring to stop the monitoring modules.
- When it was executed only to put userApplication into maintenance mode, the failover etc. are not executed. However, the monitoring modules monitor the Oracle instance resource and the listener resource. Under such a condition, because failure is internally detected when the Oracle instance and the listener stops, unexpected resource failure or userApplication failover might be caused.

3.2.1 Oracle database Setting Change

You can change Oracle database settings such as initialization parameters and data files using the procedures described below.

Note

Oracle database must be stopped depending on the settings. For details, see the Oracle Database manual.

3.2.1.1 Oracle database must be stopped

If Oracle database must be stopped, change the settings as follows:

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.
(Refer to note of "[4.1 hvoradisable - Discontinue Monitoring Resources](#)".)

3. Enable Oracle Restart settings

Enable Oracle Restart settings if necessary.
(Refer to "[3.2 Oracle database Maintenance](#)".)

4. Oracle database stop

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> SHUTDOWN IMMEDIATE
```

5. Setup change

Change Oracle database settings such as initialization parameters and path of data files.

6. Oracle database startup

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> STARTUP
```

7. PDB startup(for the database using the multitenant architecture)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```

8. Disable Oracle Restart settings

If "3. Enable Oracle Restart settings" is executed, disable Oracle Restart settings.
(Refer to "[3.2 Oracle database Maintenance](#)".)

9. Monitoring restart / Maintenance mode stop

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

10. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done.
(Refer to note of "[4.2 hvoraenable - Restart Monitoring Resources](#)".)

3.2.2 Patch Application

The method of applying an Oracle patch (e.g. Oracle PSR: Patch Set Release) varies depending on database mounting.

If a database does not need to be mounted before and after patch application, be sure to stop RMS before applying a patch.

If a database needs to be mounted before and after patch application, monitoring must be cancelled before applying a patch as follows:



Information

The following are offered from Oracle Database 11g R2 as a method of applying Oracle PSR (Patch Set Release).

- In-place upgrade

It is a method of installing PSR on an existing Oracle home by the superscription. It is offered from previous version.
For further details, refer to "[3.2.2.1 Patch Application by In-place upgrade](#)"

- Out-of-place upgrade

It is a method of installing PSR in a new Oracle home which is different from an existing Oracle home. It is offered from Oracle Database 11g R2.

For further details, refer to "[3.2.2.2 Patch Application by Out-of-place upgrade \(Standby Operation and Single-Node Cluster Operation without Oracle ASM\)](#)", "[3.2.2.3 Patch Application by Out-of-place upgrade \(Standby Operation and Single-Node Cluster Operation with Oracle ASM\)](#)", "[3.2.2.4 Patch Application by Out-of-place upgrade \(Scalable Operation with Oracle RAC\)](#)".

3.2.2.1 Patch Application by In-place upgrade

This section discusses how to apply PSR in Oracle Database 11g R1 or earlier, or In-place upgrade in Oracle Database 11g R2 or later.

1. Start userApplication (Operating node)

Start userApplication that includes the Oracle instance and listener resources if it is stopped.

2. Maintenance mode (Operating node)

Start maintenance mode for userApplication on the operating node.

Example

If you start maintenance mode for all userApplication, execute the following command.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that state of userApplication has become "Maintenance" on all nodes.

3. Monitoring disruption of Oracle resource (All nodes)

Stop monitoring the Oracle instance and listener resources by executing the "hvoradisable" command on all nodes.

Example

If you stop monitoring all the Oracle resources on a local node, execute the following command.

```
# /opt/FJSVclora/sbin/hvoradisable -a
```

Confirm that states of the Oracle instance and listener resources have become "Warning" on all nodes.

Information

In standby operation, applying Oracle PSR (Patch Set Release) on the standby node without stopping monitoring Oracle resources might cause problems because Oracle database is monitored on the standby node. Therefore it is necessary to stop monitoring them on the standby node.

4. Oracle database stop (if necessary)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> SHUTDOWN IMMEDIATE
```

5. Patch application

Apply patches according to the placement of the Oracle Database software.



See

For further details, refer to the Oracle Database manual.

6. Oracle database startup (if stopped)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> STARTUP
```

7. PDB startup (for the database using the multitenant architecture, and if stopped)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```

8. Restart Oracle resource monitoring (All nodes)

Restart monitoring the Oracle instance and listener resources again using the hvoraenable command on all nodes.



Example

If you restart monitoring all the Oracle resources on a local node, execute the following command.

```
# /opt/FJSVclora/sbin/hvoraenable -a
```

Confirm that states of the Oracle instance and listener resources have become the previous state ("Online" or "Offline") from "Warning" on all nodes.

9. Stop maintenance mode (Operating node)

Stop maintenance mode of userApplication on the operating node.



Example

If you stop maintenance mode for all userApplication, execute the following command.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

Confirm that state of userApplication has become the previous state ("Online", "Standby" or "Offline") from "Maintenance" on all nodes.

3.2.2.2 Patch Application by Out-of-place upgrade (Standby Operation and Single-Node Cluster Operation without Oracle ASM)

This section discusses how to apply PSR by Out-of-place upgrade in standby operation and single-node cluster operation without Oracle ASM of Oracle Database 11g R2 or later.



Note

- Upgrade to local disk if the Oracle Database software is located on local disk.
- Upgrade to shared disk if the Oracle Database software is located on shared disk.
- Changing the placement (local disk, shared disk) of the Oracle Database software at the upgrade does not support.

1. Start userApplication (Operating node)

Start userApplication that includes the Oracle instance and listener resources if it is stopped.

2. Maintenance mode (Operating node)

Start maintenance mode for userApplication on the operating node.

 **Example**

If you start maintenance mode for all userApplication, execute the following command.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that state of userApplication has become "Maintenance" on all nodes.

3. Monitoring disruption of Oracle resource (All nodes)

Stop monitoring the Oracle instance and listener resources by executing the "hvoradisable" command on all nodes.

 **Example**

If you stop monitoring all the Oracle resources on a local node, execute the following command.

```
# /opt/FJSVclora/sbin/hvoradisable -a
```

Confirm that states of the Oracle instance and listener resources have become "Warning" on all nodes.

 **Information**

In standby operation, applying Oracle PSR (Patch Set Release) on the standby node without stopping monitoring Oracle resources might cause problems because Oracle database is monitored on the standby node. Therefore it is necessary to stop monitoring them on the standby node.

4. Stop Oracle database-dependent resources (Operating node)

If there are Oracle database-dependent resources, stop them manually before stopping Oracle database.

5. Applying PSR, and upgrade of database

1. Applying PSR

- In the case that the Oracle Database software is located on local disk

Execute the Out-of-place upgrade on all nodes. For information on how to execute the Out-of-place upgrade, refer to the Oracle Database manual.

- In the case that the Oracle Database software is located on shared disk

Execute the Out-of-place upgrade on the operating node. For information on how to execute the Out-of-place upgrade, refer to the Oracle Database manual.

 **Note**

- Select "Install database software only" on the "Select Installation Option" screen.
- For details, refer to the Oracle Database manual.

2. Upgrade of database (Operating node)

Execute dbua (Database Upgrade Assistant) on the operating node, and upgrade the database.

Note

- Execute "<New ORACLE_HOME>/bin/dbua".
- For details, refer to the Oracle Database manual.

3. Move the SPFILE to the shared disk (Operating node)

Move the SPFILE (server parameter file) to the shared disk when it is newly generated on a local disk after the upgrade of the database is executed. Afterwards, specify SPFILE path to PFILE (the initialization parameter file "<New ORACLE_HOME>/dbs/init<SID>.ora") or make a symbolic link file to SPFILE.

Note

If Oracle Database Software is located in shared disk, this step is not necessary.

See

For details, see "[2.2.6.1 Oracle database Creation and Setting](#)".

6. PRIMECLUSTER Wizard for Oracle Settings

1. Login profile Setting Change (All nodes)

Open Oracle user's login profile with editor (e.g. vi), and change the setting of the ORACLE_BASE and ORACLE_HOME environment variable to new path. Execute this procedure on all nodes.

Example

Before changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1
```

After changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_2
```

See

For details, see "[2.2.2 Oracle Database Software Installation and Configuration](#)".

2. Transfer PFILE to standby nodes (Operating node, Standby node)

Create tar archive file from "<New ORACLE_HOME>/dbs" on the operating node.

Example

```
# su - oracle
$ tar cfpvP /tmp/dbs.tar <New ORACLE_HOME>/dbs
```

After that, transfer the archive file from the operating node to the standby node by FTP, and expand it.

Example

```
# su - oracle
$ tar xfpvP /tmp/dbs.tar
```

Note

- If Oracle Database Software is located in shared disk, this step is not necessary.
- This step is not necessary for single-node cluster operation.
- Do not use the cloracpy command of PRIMECLUSTER Wizard for Oracle on this step.
- Set the access privilege of files which are expanded on the standby node same as the files on operating node.

See

For details, see "2.2.6.1 Oracle database Creation and Setting".

3. The allocation of Oracle Net Services configuration file

Copy the Oracle Net Services configuration file from under the <Old ORACLE_HOME> to under the <New ORACLE_HOME>. Execute this procedure on all nodes

- In the case that the Oracle Database software is located on local disk
Execute this procedure on all nodes
- In the case that the Oracle Database software is located on shared disk
Execute this procedure on the operating node

Example

```
$ cp -p <Old ORACLE_HOME>/network/admin/*.ora <New ORACLE_HOME>/network/admin/
```

Note

- Edit "<New ORACLE_HOME>/network/admin/*.ora" file when there are parameters depending on ORACLE_BASE and ORACLE_HOME in the Oracle Net Services configuration file after copy.
- Do not use the cloracpy command of PRIMECLUSTER Wizard for Oracle on this step.

7. Confirming Oracle database Startup (Operating node)

Confirm that Oracle instance and Listener started. If not, start up them manually. Start PDBs manually for the database using the multitenant architecture.

Note

- The Oracle instance should start in the state of OPEN.
- Confirm the process of the listener is as "<New ORACLE_HOME>/bin/tnslsnr".
If the process of the listener is as "<Old ORACLE_HOME>/bin/tnslsnr", stop it and start as "<New ORACLE_HOME>/bin/tnslsnr".

8. Start resources dependent on Oracle database (Operating node)

If resources that are dependent on Oracle database had been stopped on step 4, start them manually.

9. Restart Oracle resource monitoring (All nodes)

Restart monitoring the Oracle instance and listener resources again using the hvoraenable command on all nodes

 **Example**

If you restart monitoring all the Oracle resources on a local node, execute the following command.

```
# /opt/FJsvclora/sbin/hvoraenable -a
```

Confirm that states of the Oracle instance and listener resources have become the previous state ("Online" or "Offline") from "Warning" on all nodes.

10. Stop maintenance mode (Operating node)

Stop maintenance mode of userApplication on the operating node.

 **Example**

If you stop maintenance mode for all userApplication, execute the following command.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

Confirm that state of userApplication has become the previous state ("Online", "Standby" or "Offline") from "Maintenance" on all nodes.

11. Confirming of switch to the standby node

Confirm the switch of userApplication to the standby node, and the correct start.

 **Note**

- This step is not necessary for single-node cluster operation.
- Confirm step 6 when you cannot correctly start userApplication on the standby node.

12. Restart service

Switch userApplication to the operating node if necessary, and restart service.

3.2.2.3 Patch Application by Out-of-place upgrade (Standby Operation and Single-Node Cluster Operation with Oracle ASM)

This section discusses how to apply PSR by Out-of-place upgrade in standby operation and single-node cluster operation with Oracle ASM of Oracle Database 11g R2 or later.

 **Point**

To avoid Oracle Database failure, manually start the Oracle instance on all nodes after the PSR is applied. See Doc ID 1750666.1 in MY ORACLE SUPPORT for more information.

1. Stopping userApplication (All nodes)

Stop userApplication on all nodes to be Offline.

2. Applying PSR (All nodes)

To upgrade, execute the following procedure. For details, refer to the Oracle Database manual.

1. Upgrade of Grid Infrastructure Software
2. Upgrade of Oracle Database Software

3. Changing the login profile setting (All nodes)

Open Oracle user's login profile with editor (e.g. vi), and change the setting of the ORACLE_BASE and ORACLE_HOME environment variable to new path. Execute this procedure on all nodes.

Example

Before changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1
```

After changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_2
```

4. The allocation of Oracle Net Services configuration file (All nodes)

Copy the Oracle Net Services configuration file from under the <Old ORACLE_HOME> to under the <New ORACLE_HOME>.

Example

```
$ cp -p <Old ORACLE_HOME>/network/admin/*.ora <New ORACLE_HOME>/network/admin/
```

Note

Edit "<New ORACLE_HOME>/network/admin/*.ora" file when there are parameters depending on ORACLE_BASE and ORACLE_HOME in the Oracle Net Services configuration file after copy.

5. Monitoring disruption of Oracle resource (All nodes)

Stop monitoring the Oracle instance and listener resources by executing the "hvoradisable" command on all nodes.

Example

If you stop monitoring all the Oracle resources on a local node, execute the following command.

```
# /opt/FJSVclora/sbin/hvoradisable -a
```

Confirm that states of the Oracle instance and listener resources have become "Warning" on all nodes.

6. Starting userApplication (Operating node)

Start userApplication on operating node.

Monitoring of Oracle instance and listener resources is stopped, so resources other than the Oracle instance and listener are started.

7. Enable Oracle Restart settings (Operating node)

Execute the following commands as a Grid user to enable Oracle Restart settings.

```
$ srvctl enable asm  
$ srvctl enable database -d <db_unique_name>
```

8. Starting Oracle instance (Operating node)

Execute the following command as a Grid user to start the Oracle instance.

```
$ srvctl start database -d <db_unique_name>
```

9. Upgrade database (Operating node)

Execute any necessary post-patch tasks, such as upgrading the database.

10. Stopping Oracle instance (Operating node)

Execute the following command as a Grid user to stop the Oracle instance.

```
$ srvctl stop database -d <db_unique_name>
```

11. Disable Oracle Restart settings (Operating node)

Execute the following commands as a Grid user to disable Oracle Restart settings.

```
$ srvctl disable asm  
$ srvctl disable database -d <db_unique_name>
```

12. Switch userApplication (All nodes)

In standby operation, switch userApplication to the standby node. Monitoring of Oracle instance and listener resources is stopped on the standby node, so resources other than the Oracle instance and listener are started.

In single-node cluster operation, go to step 17 without switching userApplication.

13. Enable Oracle Restart settings (Standby node)

Execute the following commands as a Grid user to enable Oracle Restart settings.

```
$ srvctl enable asm  
$ srvctl enable database -d <db_unique_name>
```

14. Starting Oracle instance (Standby node)

Execute the following command as a Grid user to start the Oracle instance.

```
$ srvctl start database -d <db_unique_name>
```

15. Stopping Oracle instance (Standby node)

Execute the following command as a Grid user to stop the Oracle instance.

```
$ srvctl stop database -d <db_unique_name>
```

16. Disable Oracle Restart settings (Standby node)

Execute the following commands as a Grid user to disable Oracle Restart settings.

```
$ srvctl disable asm  
$ srvctl disable database -d <db_unique_name>
```

17. Confirmation of switching to the operation node

Switch userApplication to the operation node and verify that it starts correctly.

18. Confirmation of switching to the standby node

Switch userApplication to the standby node and verify that it starts correctly.

This step is not required for single-node cluster operation.

19. Restart service

If necessary, switch userApplication to the operation node and restart service when there is no problem.

3.2.2.4 Patch Application by Out-of-place upgrade (Scalable Operation with Oracle RAC)

This section discusses how to apply PSR by Out-of-place upgrade in scalable operation with Oracle RAC of Oracle Database 11g R2 or later.

1. Stopping userApplication (All nodes)

Stop userApplication on all nodes to be Offline.



If the Oracle Clusterware resource and the Oracle RAC instance resource are registered in different userApplication, stop userApplications in the following order.

1. userApplication including Oracle RAC instance resource
2. userApplication including Oracle Clusterware

2. Stopping RMS (All nodes)

Stop RMS on all nodes.

3. Applying PSR, and upgrade of database (All nodes or any one of them)

To upgrade, execute the following procedure. For details, refer to the Oracle Database manual.

1. Upgrade of Grid Infrastructure Software
2. Upgrade of Oracle Database Software (Oracle RAC)
3. Upgrade of Oracle Database

4. Changing the login profile setting (All nodes)

Open Oracle user's login profile with editor (e.g. vi), and change the setting of the ORACLE_BASE and ORACLE_HOME environment variable to new path. Execute this procedure on all nodes.



Before changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_1
```

After changes

```
ORACLE_HOME=/u01/app/oracle/product/11.2.0/dbhome_2
```

5. Setting automatic startup

1. Starting Oracle Clusterware (All nodes)

If Oracle Clusterware is not started, start it on all nodes.



For details about starting Oracle Clusterware, refer to the Oracle Database manual.

2. Setting automatic startup of Oracle Clusterware (All nodes)

Set up automatic startup of Oracle Clusterware. For details about setting, see "[2.3.2 Oracle Database Software Installation and Configuration](#)".

3. Disabling automatic startup of Oracle RAC instance (any one of the nodes)

Confirm that automatic startup of Oracle RAC instance is disabled.

Example

```
# su - oracle
$ srvctl config database -d <DB_NAME>
:
Management policy: automatic
:
$
```

In the above example, "automatic" means that automatic startup is not disabled. Refer to the following example to disable automatic startup.

Example

```
$ srvctl modify database -d <DB_NAME> -y manual
```

6. Changing the Oracle resource settings

1. Changing the Oracle resource settings (Any one of nodes)

Start userApplication Configuration Wizard and change the setting of Oracle resource in all nodes. Set the new path after Out-of-place upgrade to all of the following settings.

- Oracle Clusterware resource
Grid home (GridHome)
- Oracle RAC instance resource
Oracle home (OracleHome)
Grid home (GridHome)
- Oracle RAC listener resource
Grid home (GridHome)

See

For details about the procedures for changing the Oracle resource settings, see "[2.3.4 userApplication with Oracle Clusterware](#)", "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)" and "[B.2 Change Resource Settings](#)".

2. Confirming the settings (All nodes)

To confirm the settings of Oracle RAC instance or listener resource, execute clorainfo command.

Example

```
# /opt/FJSVclora/bin/clorainfo -c
```

To confirm the settings of Oracle Clusterware, execute grep command and find them in the configuration file.

Example

```
# grep Clusterware /usr/opt/reliant/etc/hvgsdconfig | grep GridHome
Oracle1_Clusterware GridHome /u01/app/11.2.0.3/grid
Oracle2_Clusterware GridHome /u01/app/11.2.0.3/grid
#
```

7. Starting RMS (All nodes)

Start RMS on all nodes.

8. Starting userApplication (All nodes)

Start userApplication on all nodes, and confirm to be Online and Offline.

Also, confirm that Oracle Clusterware, Oracle RAC instance and Oracle RAC listener resource become Online and Offline following the starting and stopping of userApplication.

9. Restart service

If RMS and userApplication run correctly, restart service.

3.2.3 Backup

This section discusses how to backup Oracle databases.

3.2.3.1 Cold backup

You can perform Oracle database cold backup (offline backup) as follows. If there are Oracle database-dependent resources (e.g. SAP R/3), a resource failure might occur during Oracle database stop, so it is necessary to stop them manually in advance.

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.
(Refer to note of "[4.1 hvoradisable - Discontinue Monitoring Resources](#)".)

3. Enable Oracle Restart settings

Enable Oracle Restart settings if necessary.
(Refer to "[3.2 Oracle database Maintenance](#)".)

4. Oracle database stop

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> SHUTDOWN IMMEDIATE
```

5. Cold backup

Perform cold backup of the database.

6. Oracle database startup

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> STARTUP
```

7. PDB startup(for the database using the multitenant architecture)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```

8. Disable Oracle Restart settings

If "3. Enable Oracle Restart settings" is executed, disable Oracle Restart settings.
(Refer to "3.2 Oracle database Maintenance".)

9. Monitoring restart / Maintenance mode stop

```
# /opt/FJsvclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

10. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done.
(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

3.2.3.2 Hot backup

You can perform Oracle database hot backup (online backup) as follows.

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJsvclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.
(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)

3. Hot backup

Perform hot backup of the database. Be sure to check that the Oracle instance and listener are properly running before going on to the next step. Be sure to check that the PDBs are properly running for the database using the multitenant architecture.

4. Monitoring restart / Maintenance mode stop

```
# /opt/FJsvclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

5. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done.
(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

3.2.4 Recovery

Recover the Oracle database according to the necessity of Oracle database stop.



Information

When Oracle database must be stopped to recover the Oracle database:

- The data file belongs to SYSTEM tablespace or UNDO tablespace
- The whole database is recovered
- Incomplete recovery is performed

When Oracle database does not have to be stopped to recover the Oracle database:

- The data file does not belong to SYSTEM tablespace or UNDO tablespace
- Complete recovery is performed

For details, see the Oracle Database manual

3.2.4.1 Oracle database must be stopped

If Oracle database must be stopped, recovery the Oracle database as follows. If there are Oracle database-dependent resources (e.g. SAP R/3), a resource failure might occur during Oracle database stop, so it is necessary to stop them manually in advance.

1. userApplication stop

```
# /opt/SMAW/SMAWRrms/bin/hvutil -f <userApplication>
```

2. Monitoring disruption

Resource which monitoring is stopped by hvoradisable command will not start up even if the userApplication starts up. Using this function, the resources other than Oracle database can start up.

```
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication>
```

3. Confirmation of stop of monitoring

Confirm that stop of monitoring has been successfully done.
(Refer to note of "[4.1 hvoradisable - Discontinue Monitoring Resources](#)".)

4. Enable Oracle Restart settings

Enable Oracle Restart settings if necessary.
(Refer to "[3.2 Oracle database Maintenance](#)".)

5. userApplication startup

```
# /opt/SMAW/SMAWRrms/bin/hvswitch <userApplication>
```

6. Recovery

Recover the database.

7. Oracle instance and listener startup

```
# su - <Oracle user>
$ lsnrctl start <ListenerName>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> STARTUP
```

8. PDB startup(for the database using the multitenant architecture)

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER PLUGGABLE DATABASE ALL OPEN;
```

9. Disable Oracle Restart settings

If "4. Enable Oracle Restart settings" is executed, disable Oracle Restart settings.
(Refer to "[3.2 Oracle database Maintenance](#)".)

10. Monitoring restart

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication>
```

11. Confirmation of restart of monitoring

Confirm that restart of monitoring has been successfully done.
(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

3.2.4.2 Oracle database does not need to be stopped

If the Oracle database does not need to be stopped, recover the Oracle database as follows:

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.
(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)

3. Recovery

Recover the database. Be sure to check if the Oracle instance and listener are properly running before going on to the next step. Be sure to check that the PDBs are properly running for the database using the multitenant architecture.

4. Monitoring restart / Maintenance mode stop

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

5. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done.
(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

3.2.5 Add and delete PDB

The procedure for add and delete PDB is as follows for the database using the multitenant architecture.

3.2.5.1 Add PDB

Add PDB when userApplication is Online. Execute the following procedures on the node whose userApplication is Online.

There is no setting change of the Oracle instance resource. After the monitoring restart, added PDB is automatically monitored.

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done.
(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)

3. Add PDB

Allocate the files of the PDB on the shared disk. Start the PDB and check that OPEN_MODE is "READ WRITE".



See

.....
For details, see the Oracle Database manual
.....

4. Monitoring restart / Maintenance mode stop

```
# /opt/FJsvclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

5. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done. (Refer to note of "[4.2 hvoraenable - Restart Monitoring Resources](#)".)

6. Confirmation of PDB

Check that the following messages are output to syslog.

```
FSP_PCLW-ORACLE_FJsvclora: INFO: 9142: OPEN_MODE of PDB <PDB name> was OPEN. (CDB=<ORACLE_SID of CDB> PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

7. Confirming of switch to the standby node

Confirm the switch of userApplication to the standby node, and CDB/PDBs start correctly.

3.2.5.2 Delete PDB

Delete PDB when userApplication is Online. Execute the following procedures on the node whose userApplication is Online.

There is no setting change of the Oracle instance resource. After the monitoring restart, deleted PDB comes off from the monitor automatically.

1. Maintenance mode / Monitoring disruption

```
# /opt/SMAW/SMAWRrms/bin/hvutil -m on <userApplication> (Maintenance mode)
# /opt/FJsvclora/sbin/hvoradisable -a <userApplication> (Monitoring disruption)
```

2. Confirmation of maintenance mode and stop of monitoring

Confirm that changing into maintenance mode and stop of monitoring have been successfully done. (Refer to note of "[4.1 hvoradisable - Discontinue Monitoring Resources](#)".)

3. Delete PDB



See

For details, see the Oracle Database manual

4. Monitoring restart / Maintenance mode stop

```
# /opt/FJsvclora/sbin/hvoraenable -a <userApplication> (Monitoring restart)
# /opt/SMAW/SMAWRrms/bin/hvutil -m off <userApplication> (Maintenance mode stop)
```

5. Confirmation of restart of monitoring and maintenance mode

Confirm that restart of monitoring and changing out of maintenance mode has been successfully done. (Refer to note of "[4.2 hvoraenable - Restart Monitoring Resources](#)".)

3.3 Oracle SYSTEM User Password Change

You can change the Oracle SYSTEM user password without stopping operation by using the following steps on the node where userApplication is Online.

1. Discontinue monitoring the Oracle instance resources.

Execute the following command to stop monitoring Oracle resources. In standby operation, execute it on the operating node. In scalable operation with Oracle RAC, execute it on all the cluster nodes. In single-node cluster operation, execute it on the one node.

```
# /opt/FJsvclora/sbin/hvoradisable -a <userApplication>
```

Be sure to check the following message in syslog before going to the next step:

```
INFO: 0101: Fault Watching is disable
```

or

```
INFO: 0101: Fault Watching is disabled
```

2. Change the Oracle SYSTEM user password

Change the Oracle SYSTEM user password.

In standby operation, change the password on the operating node. In scalable operation with Oracle RAC, change the password on any one of the nodes. In single-node cluster operation, change the password on the one node.



Example

The following example shows how to change password to “oracle”.

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER USER SYSTEM IDENTIFIED BY oracle;
SQL> EXIT
```

3. Register the Oracle SYSTEM user password to PRIMECLUSTER Wizard for Oracle

Register the Oracle SYSTEM user password to PRIMECLUSTER Wizard for Oracle using the clorapass command.

In standby operation, register the password on the operating node. In scalable operation with Oracle RAC, register the passwords for each instance on any one of the nodes. In single-node cluster operation, execute it on the one node.

```
# /opt/FJsvclora/sbin/clorapass
Enter OracleSID > sid (Enter ORACLE_SID)
Enter Password > ***** (Enter “oracle” for password.)
Re-enter Password > ***** (Re-enter “oracle” for password.)
Finished
```

4. Restart monitoring the Oracle instance resources

Execute the following command to restart monitoring Oracle resources. In standby operation, execute it on the operating node. In scalable operation with Oracle RAC, execute it on all the cluster nodes. In single-node cluster operation, execute it on the one node.

```
# /opt/FJsvclora/sbin/hvoraenable -a <userApplication>
```

Be sure to check the following message in syslog after execution:

```
INFO: 0102: Fault Watching is enable
```

or

```
INFO: 0102: Fault Watching is enabled
```



Information

- For the hvoradisable or hvoraenable command, see “[4.1 hvoradisable - Discontinue Monitoring Resources](#)”, “[4.2 hvoraenable - Restart Monitoring Resources](#)”.
- For information on how to change the Oracle SYSTEM user password, refer to the Oracle Database manual.
- For the clorapass command, refer to “[4.3 clorapass - Register Password for Monitoring](#)”.

- When passwords of Oracle user, Grid user, and Oracle SYS user are changed, the setting of PRIMECLUSTER Wizard for Oracle need not be changed.
- Register the password of the SYSTEM user of the CDB when you create the database using the multitenant architecture. The password of Local User of the PDB need not be registered.

3.4 Corrective Action against Failover

Oracle database logging

If a failover or degeneration occurs in the event of a failure in PRIMECLUSTER operation with Oracle database, solve the problem referring to the Oracle database alert log or trace log.

PRIMECLUSTER Wizard for Oracle logging

PRIMECLUSTER Wizard for Oracle provides information what kind of failure is detected and what corrective action should be taken in the following log files:

```
/var/opt/reliant/log/FJSVclora_<OracleSID>*.log
/var/opt/reliant/log/FJSVclora_<ListenerName>*.log
```

The log file formats are as follows:

```
Date/type/ID/text
2002/04/25 15:18:40 [Info] [1101] Starting Oracle detector
2002/04/25 15:18:40 [Info] [1102] Connected to Oracle
2002/04/25 15:18:40 [Error] [1299] ORA-01034 Oracle not available.
```

- Date
Output in the format of YYYY/MM/DD HH:MM:SS.
- Type
Indicates classification. (Information, Error, Warning)
- ID
Indicates a message number.
- Text
Indicates message content.



Note

There is no restriction of space or memory for log files. RMS manages the log files.

The log files will be used for troubleshooting. Do not delete or edit them.

3.5 Troubleshooting Information

If you encounter any problems with PRIMECLUSTER Wizard for Oracle operation you will need to conduct troubleshooting from log files and setup files of PRIMECLUSTER Wizard for Oracle and its related products.

You may use the following files:

Oracle database information

- Configuration files
 - \$ORACLE_HOME/network/admin/*.ora
 - \$ORACLE_HOME/dbs/*.ora
 - \$ORACLE_BASE/admin/\$ORACLE_SID/pfile/*.ora

- Log files

\$ORACLE_HOME/rdbms/log/alert_<ORACLE_SID>.log
 \$ORACLE_BASE/admin/<ORACLE_SID>/bdump/alert_<ORACLE_SID>.log
 Under \$ORACLE_BASE/diag (Oracle 11g or later)
 \$ORACLE_HOME/network/log/<ListenerName>.log
 \$ORA_CRS_HOME/crs/log/<nodename>.log (Oracle RAC)

PRIMECLUSTER information

Refer to “PRIMECLUSTER Configuration and Administration Guide”.

PRIMECLUSTER Wizard for Oracle information

- Configuration files

/opt/FJSVclora/etc/*
 /usr/opt/reliant/etc/hvgsdconfig
 /usr/opt/reliant/build/<RMS configuration name>.usfiles/*

- Log files

/var/opt/reliant/log/*



You can collect troubleshooting information for Oracle database and PRIMECLUSTER Wizard for Oracle using the fjsnap command. The fjsnap command is a system information tool and is included in ESF (Enhanced Support Facility). If an error occurs on a PRIMECLUSTER system, the command will collect required information to solve the problem. Oracle database information can be collected only if PRIMECLUSTER Wizard for Oracle is correctly set.

For information on how to collect troubleshooting information of PRIMECLUSTER Wizard for Oracle only, see “4.5 clgetoralog - Collect Troubleshooting Information”.

3.6 Log Files

PRIMECLUSTER Wizard for Oracle generates log files under the following directory.

- /var/opt/reliant/log

Log files having information about startup/stop are stored in this directory.
 Disk space for the directory is managed by PRIMECLUSTER.



Refer to “PRIMECLUSTER Installation and Administration Guide”.

- /var/opt/FJSVclora

Log files having information about monitoring are stored in this directory.
 Required disk space for the directory is described below;

- Oracle instance resource :
 5.5 MB per resource
- Listener resource :
 4.5 MB per resource
- Oracle ASM instance resource :
 0.0 MB per resource (no output)

- Oracle Clusterware resource :
0.0 MB per resource (no output)

However, when the watch timeout is detected, the following log files are made by the write-once type.

- FJSVclora_<SID>_ldto.trclog
- FJSVclora_<LISTENER>_ldto.trclog

These increase by 62 bytes about one watch timeout. In addition, the amount of consumption management by RMS is not performed because these logs are management outside in RMS.

The following log file is generated for the database using the multitenant architecture.

- FJSVclora_<SID>_pdbmon.log
10.0 MB per resource

The backup is generated at one generation when 10MB(log about 5 days) is exceeded and the log file is generated again.

The backup file name is as follows.

FJSVclora_<SID>_pdbmon.bklog

Note

Do not remove these log files. They will be used for troubleshooting.

Chapter 4 Command

4.1 hvoradisable - Discontinue Monitoring Resources

User

Super user

Format

```
/opt/FJSVclora/sbin/hvoradisable userApplication Resource  
/opt/FJSVclora/sbin/hvoradisable -a [userApplication ]
```

Function

hvoradisable discontinues monitoring the Oracle instance and Oracle listener resources on the local node where the command is executed. The command is used to stop the Oracle instances or Oracle listeners for maintenance. Also, it is available regardless of whether userApplication is activated or deactivated.

If the command is executed while userApplication is stopped, and then it is started, the Oracle resources will enter Warning without being started.

If the command is executed while userApplication is running, it will disable resource monitoring. The Oracle resources will enter Warning. Even though the Oracle instance and Oracle listener are stopped, they will remain Warning. When you execute the command while userApplication is running, be sure to check the resource state is Warning the stop the Oracle instance and Oracle listener.

Stopping userApplication, or clearing faulted state of userApplication will automatically restart monitoring resource.



Information

- The Oracle ASM instance resource and Oracle Clusterware resource are not monitored, so it is not necessary to discontinue monitoring the resource with the command. For further details about Oracle ASM instance resources, see “[2.4.2 Oracle ASM \(Automatic Storage Management\)](#)”.
- The monitoring of PDB discontinues by this command for the database using the multitenant architecture.

Parameter

userApplication Resource

Specify userApplication including Oracle resources that will be disrupted monitoring.

Specify either of the Oracle instance or Oracle listener that will be disrupted monitoring.

userApplication and *Resource* that are specified as parameters should exist on the local node.

-a [*userApplication*]

The option discontinues monitoring all Oracle instance and Oracle listener resources that belong to userApplication that is running on a local node and is specified for *userApplication*.

If *userApplication* is omitted, the option will discontinue monitoring all the Oracle resources on the local node.

Exit status

0: Normal termination

1: Abnormal termination

2: Abnormal termination (disruption of resource monitoring with the -a option fails)



Note

Note that execution timing. Unexpected resource failure or userApplication failover might be caused.

- Do not execute the command while state transition of userApplication is in progress.
- Do not execute the command while RMS is not running.
- Do not operate userApplications right after execution of the command. (At least a five-second interval is necessary.)
- Operate Oracle instances and Oracle listeners, after confirming that stop of monitoring has become effective. Confirm the stop of monitoring by using one of the following ways before the Oracle database operation.
 - Output of message “INFO: 0101: Fault Watching is disable” or “INFO: 0101: Fault Watching is disabled” in syslog
 - Transition of resources onto Warning
 - Output of clorainfo -m command is “disable”.

4.2 hvoraenable - Restart Monitoring Resources

User

Super user

Format

```
/opt/FJSVclora/sbin/hvoraenable userApplication Resource
/opt/FJSVclora/sbin/hvoraenable -a [ userApplication ]
```

Function

hvoraenable restarts monitoring the Oracle instance and Oracle listener resources on the local node where resource monitoring is disrupted. It is available regardless of whether userApplication is activated or deactivated.

If the command is executed while userApplication is stopped, disabling resource monitoring with hvoradisable will be cancelled.

If the command is executed while userApplication is running, it will restart resource monitoring.

The command must be executed after the Oracle instance and Oracle listener are started manually. Be sure to check the resource state is changed from Warning to Online.



Information

- The Oracle ASM instance resource and Oracle Clusterware resource are not monitored, so it is not necessary to cancel resource monitoring with the command. For further details about Oracle ASM instance resources, see “[2.4.2 Oracle ASM \(Automatic Storage Management\)](#)”.
- The monitoring of PDB restarts by this command for the database using the multitenant architecture.

Parameter

userApplication Resource

Specify userApplication including Oracle resources that will be restarted monitoring.

Specify either of the Oracle instance or Oracle listener that will be restarted monitoring.

userApplication and *Resource* that are specified as parameters should exist on the local node.

-a [*userApplication*]

The option restarts monitoring all Oracle instance and Oracle listener resources that belong to userApplication that is running on a local node and is specified for *userApplication*.

If *userApplication* is omitted, the option will restart monitoring all the Oracle resources on the local node.

Exit status

- 0: Normal termination
- 1: Abnormal termination

2: Abnormal termination (restart of resource monitoring with the -a option fails)

Note

Note that execution timing. Unexpected resource failure or userApplication failover might be caused.

- Do not execute the command while state transition of userApplication is in progress.
- Do not operate userApplications right after execution of the command. (At least a five-second interval is necessary.)
- If Oracle instances or Oracle listeners have been stopped manually while stop of monitoring, start them up manually before the execution of this command.
- Confirm the restart of monitoring using one of the following ways.
 - Output of message “INFO: 0102: Fault Watching is enable” or “INFO: 0102: Fault Watching is enabled” in syslog.
 - Transition of resources onto the previous state("Online", "Offline").
 - Output of clorainfo -m command is “enable”.

4.3 clorapass - Register Password for Monitoring

User

Super user

Format

/opt/FJSVclora/sbin/clorapass

Function

clorapass registers the Oracle SYSTEM user password for PRIMECLUSTER Wizard for Oracle. The detector monitors Oracle instances using the SYSTEM user privileges, so it requires the SYSTEM user password.

If the password is not registered, the detector will use “manager” as the SYSTEM user password.

Execute the command on any one of the nodes. In scalable operation (Oracle RAC) with multiple Oracle instances, execute the command for each Oracle instance then set the Oracle SYSTEM user password.

Parameter

None.

Exit status

0: Normal termination

Non-0: Abnormal termination

Example

```
# /opt/FJSVclora/sbin/clorapass
Enter OracleSID > ora          (Enter ORACLE_SID, e.g.: "ora")
Enter Password > *****      (Enter the Oracle SYSTEM user password, e.g.: "oracle")
Re-enter Password > *****    (Re-enter the Oracle SYSTEM user password, e.g.: "oracle")
finished
```

Information

- For information on how to change the password of the Oracle SYSTEM operating on a cluster system, see “[3.3 Oracle SYSTEM User Password Change](#)”.

- The password character string that the "clorapass" command handles is explained below.
 - ASCII character; hexadecimal digit 21, 23-3f and 41-7e (decimal digit 33,35-63 and 65-126)
 - Nonquoted identifiers; alphanumeric characters, underscore (_), dollar sign (\$) and pound sign (#)

```
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789_ $#
```

- The following characters in quoted identifiers
 - !%&'()*+,-./:;<=>?[\]^`{|}~
- It cannot contain spaces, tabs, "at" signs(@) and multibyte characters.
- If it contains quoted characters or it begins with a character except alphabetical characters, you do not have to enclose the password in double quotation marks("").
- It can be as long as 63 characters. (In Oracle database, the name can be as long as 30 characters)
- Register the password of the SYSTEM user of the CDB when you create the database using the multitenant architecture. The password of Local User of the PDB need not be registered.



Note

For scalable operation, the Oracle SYSTEM user password needs to be registered for each Oracle RAC instance.
 Example: In case of DB_NAME=ora, ORACLE_SID=ora1, ORACLE_SID=ora2,
 Execute the command twice then register password for ora1 and ora2 respectively.

4.4 cloracpy - Create Backup File for Oracle Database Setup

User

Oracle DBA user

Format

/opt/FJSVclora/sbin/cloracpy

Function

cloracpy enables users to backup files required for Oracle database setup on the operating node in the tar format. Also, the users can copy the file and set links by extracting the backup data on the standby nodes.

- The command can be used in the following cases:
 - Standby operation
 - Oracle Database Software is located on local disk of each node.
 - The \$ORACLE_HOME and \$ORACLE_BASE settings are the same between the operating node and the standby nodes.
 - The Oracle database configuration is the same between the operating node and the standby nodes.
 - Database creation and setup is already completed on the operating node.
 - The command is executed with Oracle user access privileges
 - \$ORACLE_BASE, \$ORACLE_HOME, and \$ORACLE_SID are set in the Oracle user environment variables.
- The following backup files can be created in the tar format:
 - All files under \$ORACLE_HOME/dbs
 - All files under \$ORACLE_BASE/admin/\$ORACLE_SID
 - All files under \$ORACLE_HOME/network/admin

- All files under \$ORACLE_BASE/diag

The files on the operating node will be stored in the “/tmp/oracle.\$ORACLE_SID.tar” file. Transfer the file to standby nodes and execute “tar xvf /tmp/oracle.\$ORACLE_SID.tar” command there, then the archived files will be deployed on the standby nodes.

Information

tar command on standby nodes should be executed with root user or Oracle user.

If executed with root user, specify “xvfPp” options. (tar xvfP /tmp/oracle.<\$ORACLE_SID>.tar)

If executed with Oracle user, specify “xvfP” options. (tar xvf /tmp/oracle.<\$ORACLE_SID>.tar)

Note

- Since cloracpy creates and deploy the backup files in the tar format using the full path, it cannot be used if the “\$ORACLE_BASE” and “\$ORACLE_HOME” settings are incompatible between the operating and standby nodes.

Also, if the operation method is different between the operating node and standby nodes such as mutual or N:1 standby operation, the command cannot be used. If a file with the same name exists, it will be overridden.

- In the standby node, if the directories which are specified in the initialization parameters, AUDIT_FILE_DEST, BACKGROUND_DUMP_DEST, CORE_DUMP_DEST, USER_DUMP_DEST and DIAGNOSTIC_DEST, do not exist, create them. The access privilege to the directory must be also the same as that on the operating node.

- When the database name and ORACLE_SID are different, all files under \$ORACLE_BASE/admin/\$ORACLE_SID directory cannot be backed up. Therefore, copy all files under \$ORACLE_BASE/admin/<database name> manually.

When cloracpy is executed in the configuration that the database name and ORACLE_SID are different, the following message is output.

```
cloracpy: <$ORACLE_BASE>/admin/<$ORACLE_SID> is invalid.
```

Parameter

None.

Exit status

0: Normal termination

Non-0: Abnormal termination

4.5 clgetoralog - Collect Troubleshooting Information

User

Super user

Format

```
/opt/FJSVclora/bin/clgetoralog [ -n RMSconfiguration ] [ -d output_directory ] [ -a ]
```

Function

clgetoralog collects Oracle database information for troubleshooting. The “clgetoralog” command collects Oracle database setup information and log files on a PRIMECLUSTER system.

The information will be collected in the “<hostname>_<yymmddHHMMSS>_clgetoralog.tar” file.

The “clgetoralog” command collects

- Initialization parameter file
\$ORACLE_HOME/dbs/*.ora
\$ORACLE_BASE/admin/\$ORACLE_SID/pfile/*.ora

- Oracle database alert log
BACKGROUND_DUMP_DEST/*.log
\$ORACLE_BASE/admin/\$ORACLE_SID/bdump/*.log
\$ORACLE_HOME/rdbms/log/*.log
\$ORACLE_HOME/dbs/*.log
Under \$ORACLE_BASE/diag
- listener.ora, tnsnames.ora
\$ORACLE_HOME/network/admin/*.ora
- Listener log
\$ORACLE_HOME/network/log/*.log
- Oracle Clusterware Information
\$ORA_CRS_HOME/crs/admin/*
\$ORA_CRS_HOME/crs/log/* (\$ORA_CRS_HOME/log/<hostname>/crsd/*)
- V/L, configuration, and log files of PRIMECLUSTER Wizard for Oracle
- V/L and log files (switchlog) of RMS
- V/L, configuration, and patch information of PRIMECLUSTER
- System information
uname -a (system basic information)
uptime (system operating time)
psrinfo -v
/usr/platform/`arch -k`/sbin/prtdiag
cat /etc/release (Solaris version)
cat /var/sadm/system/admin/CLUSTER (Solaris software group)
cat /var/sadm/ptf/newprev/Rcontents (PTF information)
grep -h "Install Solaris" /var/sadm/install_data/*OK (RSPC information)
pkgparam -v FJSVbse (ESF information)
isainfo -b, isainfo -v (instruction set architectures information)
sysdef -i (kernel parameter)
ipcs (shared resources)
swap -l (swap information)
ptree -a, ps -efZ, ps -efL -o (process information)
zonename, zoneadm list -vc (zone information)
ntpq -p (NTP information)
/var/adm/messages files
- System information (Solaris 10 only)
showrev -p (patch information)
- UpdateSite(MW) information
uam showup (patch information)



Information

The `fjsnap` command can also be used to collect troubleshooting information. (When `-a` or `-h` option is specified.)

Parameter

[`-n` *RMSconfiguration*]

Specify RMS configuration name for *RMSconfiguration*.

If this option is specified, `clgetoralog` command collects RMS configuration information in addition to the information described in "Function". When the cluster application has been built by using GUI (userApplication Configuration Wizard), the RMS configuration name is "config". The RMS configuration name can be confirmed by the following command while RMS is running.

```
# /opt/SMAW/SMAWRrms/bin/hvdisp -a | grep Configuration
Configuration: /opt/SMAW/SMAWRrms/build/config.us
```

If this option is not specified, clgetoralog command collects only information described in “Function”.

[-d *output_directory*]

Specify the directory where information is collected.

Then, the command will store the “<hostname>_<yymmddHHMMSS>_clgetoralog.tar” file in the directory. If the directory specified does not exist, it will automatically be created.

If this option is omitted, the command will store the “<hostname>_<yymmddHHMMSS>_clgetoralog.tar” file under the default directory (/var/tmp).

[-a]

The option will collect the following information in addition to the information described in [Function]:

- Group of currently active RMS configuration files (all RMS configuration files with the -n option)
- RMS log files (/var/opt/reliant/log/*)
- RMS environment variable configuration file (/usr/opt/reliant/bin/hvenv.local)
- /var/adm/messages*
- /etc/hosts, /etc/inet/hosts
- /etc/passwd
- /etc/services, /etc/inet/services
- /etc/system
- /etc/vfstab
- /etc/vfstab.pcl
- showrev -p

Exit status

0: Normal termination

Non-0: Abnormal termination

Note

This command gets the value of BACKGROUND_DUMP_DEST or DIAGNOSTIC_DEST parameter from the initialization parameter file or the server parameter file, and searches the Oracle database alert log and listener log. However, if these parameter files cannot be read (e.g. the server parameter file exists on a shared disk that is not mounted), the logs are not also collected.

To prevent it, define the alert log and listener log in /opt/FJSVclora/etc/clgetoralog.conf using the full path so that you can securely collect them. Where they are stored is defined in BACKGROUND_DUMP_DEST parameter. (BACKGROUND_DUMP_DEST / DIAGNOSTIC_DEST parameter can be found in the initialization parameter file or the server parameter file. It can be also displayed by SQL “SHOW PARAMETER DEST”.)

The following shows how to define /opt/FJSVclora/etc/clgetoralog.conf. (Example: BACKGROUND_DUMP_DEST is “/oracle/admin/orclsid/bdump”):

```
COLLECTOBJ=/oracle/admin/orclsid/bdump/alert_orclsid.log
COLLECTOBJ=/oracle/product/network/log/listener.log
```

* BACKGROUND_DUMP_DEST = /oracle/admin/orclsid/bdump

Start with “COLLECTOBJ=” and specify the file name using the full path after “=”.

Wild card characters “*” cannot be used in the middle of the path name.

```
COLLECTOBJ=/oracle/admin/orclsid/bdump/*.trc [OK]
COLLECTOBJ=/oracle/admin/*/bdump/*.trc [NG]
```

If the size of the troubleshooting information including the information which defined /opt/FJSVclora/etc/clgetoralog.conf exceeds 10MB, the troubleshooting information is collected except for the information which defined /opt/FJSVclora/etc/clgetoralog.conf.

The -a option will collect the troubleshooting information including the information which defined /opt/FJSVclora/etc/clgetoralog.conf even if the size exceeds 10MB.

4.6 clorainfo - Display Resource Configuration and Monitoring Status

User

Super user

Format

```
/opt/FJSVclora/bin/clorainfo { -c [ RMSconfiguration ] | -e | -m [ ResourceName ] | -v }
```

Function

clorainfo displays configuration information and monitoring state of Wizard for Oracle.

Parameter

-c [RMSconfiguration]

The option displays setup information of Wizard for Oracle resources that are defined in the specified RMS configuration. Specify the RMS configuration name for *RMSconfiguration*

If *RMSconfiguration*s omitted, setup information of Wizard for Oracle resources that are currently active in the RMS configuration will be displayed.

-e

The option displays Oracle database setup information on the local node.



Note

- The kernel parameter values is not displayed.
- When composing of the single installation user in scalable operation with Oracle RAC

When you compose the single installation user of Oracle Database and Oracle Grid Infrastructure, the environment variable of the Oracle RAC instance resource and the Oracle RAC listener resource is same.

The Setting of Protocol Addresses of the Oracle RAC listener resource displays information on ORACLE_HOME defined in installation user's login profile.

It is an example as follows when ORACLE_HOME of Oracle Database is defined in the login profile of the single installation user "Oracle".



Example

```
# /opt/FJSVclora/bin/clorainfo -e
:
node1 : Oracle1_orcl1.i
-----
User registered in RMS (uid) : oracle (501)
User Group (gid)           : oinstall (1000)
                           : dba (501)
                           : asmadmin (1100)
                           : asmdba (1300)
ORACLE_BASE                : /u01/app/oracle
ORACLE_HOME                : /u01/app/oracle/product/12.1.0/dbhome_1
```

```

ORACLE_SID                : orcl1
ORACLE_SID registered in RMS : orcl1
ORA_NLS33                 : ----
LD_LIBRARY_PATH          : /u01/app/oracle/product/12.1.0/dbhome_1/lib
LD_LIBRARY_PATH_64       : /u01/app/oracle/product/12.1.0/dbhome_1/lib
PATH                      : /u01/app/oracle/product/12.1.0/dbhome_1/bin:/usr/bin:/usr/sbin
NLS_LANG                 : AMERICAN_AMERICA.US7ASCII
GridUser registered in RMS (uid): oracle (501)
GridUser Group (gid)     : oinstall (1000)
                        : dba (501)
                        : asmadmin (1100)
                        : asmdba (1300)
ORACLE_BASE              : /u01/app/oracle
ORACLE_HOME              : /u01/app/oracle/product/12.1.0/dbhome_1
ORACLE_SID              : orcl1
ORACLE_SID registered in RMS : +ASM1
ORA_NLS33                 : ----
LD_LIBRARY_PATH          : /u01/app/oracle/product/12.1.0/dbhome_1/lib
LD_LIBRARY_PATH_64       : /u01/app/oracle/product/12.1.0/dbhome_1/lib
PATH                      : /u01/app/oracle/product/12.1.0/dbhome_1/bin:/usr/bin:/usr/sbin
NLS_LANG                 : AMERICAN_AMERICA.US7ASCII

node1 : Oracle1_LISTENER.1
-----
GridUser registered in RMS (uid): oracle (501)
GridUser Group (gid)     : oinstall (1000)
                        : dba (501)
                        : asmadmin (1100)
                        : asmdba (1300)
ORACLE_HOME              : /u01/app/oracle/product/12.1.0/dbhome_1
Listener registered in RMS : LISTENER
Protocol Addresses       : (ADDRESS=(PROTOCOL=tcp)(HOST=)(PORT=1521))

```

-m [*ResourceName*]

The option displays whether or not Wizard for Oracle resources are being monitored (enable: monitoring is active, disable: monitoring is inactive).

If *ResourceName* is specified, it will check the status of resource monitoring and returns the one of the following codes:

- 0: Monitoring is active (RMS is running)
- 2: Monitoring is inactive (RMS is running)
- 10: Monitoring is active (RMS is not running)
- 12: Monitoring is inactive (RMS is not running)

The resource name of Wizard for Oracle (*ResourceName*) must exist on the local node.

If *ResourceName* is omitted, whether or not all the resources of Wizard for Oracle on the local node are monitored will be displayed.

-v

The option displays package information of Wizard for Oracle that is installed on the local node.

Exit status

- 0: Normal termination or RMS is running and resource monitoring is active (“-m *ResourceName*” specified)
- 2: RMS is running and resource monitoring is inactive (“-m *ResourceName*” specified)
- 10: RMS is stopped, and resource monitoring is active (“-m *ResourceName*” specified)
- 12: RMS is stopped, and resource monitoring is inactive (“-m *ResourceName*” specified) Other than the above values: Abnormal termination

4.7 clorabr - Integrated Backup and Restoration of Configuration Files

User

Super user

Format

```
/opt/FJSVclora/bin/clorabr { backup | restore } [ -d backup_directory ]
```

Function

PRIMECLUSTER Wizard for Oracle supports integrated backup and restoration (cfbackup/cfrestore) of PRIMECLUSTER systems. The clorabr command can only backup and restore PRIMECLUSTER Wizard for Oracle configuration information.

Note

For integrated backup and restoration of PRIMECLUSTER systems, refer to “PRIMECLUSTER Installation and Administration Guide”.

The following files can be backed up and restored:

- /opt/FJSVclora/etc/FJSVclora.pwd
- /opt/FJSVclora/etc/clgetoralog.conf
- /opt/FJSVclora/usr/*

Parameter

backup

Backs up PRIMECLUSTER Wizard for Oracle configuration information. With this option, a list of configuration files that will be backed up in standard output is displayed. The configuration information will be stored in FJSVclora on the specified directory or the directory (current directory) that is created with the clorabr command. For example, if this command is executed when the current directory is /var/tmp, the backup information will be stored in /var/tmp/FJSVclora.

restore

Restores the PRIMECLUSTER Wizard for Oracle configuration information that has previously been configured. With this option, a list of configuration files that will be restored in standard output is displayed. Check that backed up configuration information is stored in the specified directory or in FJSVclora in the directory (current directory) that is created with the clorabr command. For example, if the backup information is stored in /var/tmp/FJSVclora, execute the command after moving it to /var/tmp.

Note

The following versions of PRIMECLUSTER Wizard for Oracle are permitted to be restored.

- 4.2A00
- 4.2A01
- 4.2A02
- 4.3A10
- 4.3A20
- 4.3A30
- 4.3A40
- 4.5A00
- 4.5A01

- 4.5A02

[-d backup_directory]

Specifies the directory where data will be backed up or restored using the full path. With the backup option, the FJSVclora directory will be created on the specified directory, and data will be stored in the FJSVclora. With the restore option, data will be restored from the FJSVclora.

Without this option, data will be backed up or restored in the current directory where the command is executed.

Exit status

0: Normal termination

Non-0: Abnormal termination

Chapter 5 Notice

Particular attention must be given to the operation of PRIMECLUSTER Wizard for Oracle.

Prerequisites and requirements

PRIMECLUSTER Wizard for Oracle has specific system requirements and component prerequisites that need to be understood prior to operation.

- More than one Oracle Database product which version/release is different can be installed on the same node. However, the version and release should be same on an operating node and standby nodes.
For the Oracle Database products supported, see “Software Release Guide” and “Handbook”.
- A user name, user ID, group name, and group ID should be identical on all the nodes to install Oracle Database.
- If multiple Oracle homes are configured on one server, a different user name must be assigned for each Oracle home.
- An Oracle database must be configured on the shared disk.
When the database using the multitenant architecture is created, it is necessary to allocate the database of CDB and PDB on the shared disk.
- Setting Oracle database log output on the shared disk is not recommended. When a disk device fails, log is not output, and the trouble may be unable to be investigated.
- Note of location of archived redo logs.
 - Located on local disks
If Oracle database recovery is required, the archived redo logs on both nodes should be put together.
 - Located on shared disks
Note that there is sufficient space to archive for archived redo log files. If there is insufficient space, and data updating processing through monitoring SQL hangs, an oracle resource might fail.
Afterwards, the service might stop finally on both operating node and standby nodes, because the space of shared disk is insufficient and the failover of userApplication fails on the standby node.
- In the database using the multitenant architecture, the scalable operation with Oracle RAC is not supported.
- Note that there is sufficient space in the disk of the directory specified by AUDIT_FILE_DEST for the database using the multitenant architecture. The log file in the AUDIT_FILE_DEST directory increases by about 1KB at monitoring interval of the Oracle instance resource(Default: 30 seconds) when the PDB is monitored. Capacity and frequency of the log file are different according to the environment. Check the capacity of the AUDIT_FILE_DEST directory, and backup/delete it regularly.
- The Oracle “TWO_TASK” environment variable cannot be used. For details, see “[2.2.6.1 Oracle database Creation and Setting](#)”.
- The setting to connect to an Oracle database must not be described in login.sql of an Oracle user. For details, see “[2.2.6.1 Oracle database Creation and Setting](#)”.
- The password file authentication cannot be used. Use OS authentication.
- PRIMECLUSTER Wizard for Oracle connects to Oracle instance with SYSDBA system privilege to start up or stop Oracle instance/database. In this case, local connection in operating system authentication is used. Therefore, the following requirements should be satisfied. (If not, startup and stop of Oracle instance/database might fail.)
 - Oracle user that is set for Oracle instance resource in “[2.2.7.2 Oracle Resource Creation](#)” or “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)” should belong to OSDBA group.
 - SQLNET.AUTHENTICATION_SERVICES parameter should not define in sqlnet.ora file.The other connections (e.g. user own connection for maintenance) can use the password file authentication.
- A command (e.g. script) that has interactive mode should not be described in Oracle user's profile (e.g. /etc/profile, .bash_profile, .cshrc, .profile).
It may cause the following failures.
 - Failures of userApplication startup, shutdown or monitoring of Oracle resources.
 - clgetoralog command and clorainfo command hang up and they do not return to command line.

- Environment that Oracle user's home directory and profile are located on the shared disk is not supported. Oracle user's home directory and profile must be located on the local disk of each node.
- Operating system authentication of Listener should be enabled. For details, refer to “[2.2.6.1 Oracle database Creation and Setting](#)”.
- Oracle user should have access privileges for /tmp directory.
The programs of PRIMECLUSTER Wizard for Oracle working with Oracle user use /tmp directory. If Oracle user does not have access privileges for /tmp directory, the programs do not work correctly and startup or shutdown of Oracle database fails.
- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. In standby operation or single-node cluster operation, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. The composition that has single installation user is not supported.
In scalable operation with Oracle RAC, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. Also the composition that has single installation user is supported. When composing of the single installation user in scalable operation with Oracle RAC, there is note for -e parameter of the clorainfo command. For details, see “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.
- In order to use Oracle ASM of Oracle Database 11g R2 or later, a different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.
- Upgrade to local disk if the Oracle Database software is located on local disk.
Upgrade to shared disk if the Oracle Database software is located on shared disk.
Changing the placement of the Oracle Database software at the upgrade does not support.
- Using of the "su -" command is not supported for user scripts(prestartup*, nomount*, mount*) under /opt/FJSVclora/usr.
- In scalable operation, install Oracle Grid Infrastructure and Oracle database on a local disk of all nodes.

Features and functions

Below are guidelines and precautions to be taken in using the features and functions provided by PRIMECLUSTER Wizard for Oracle.

- The detector connects itself to the database using SYSTEM user access privileges to monitor Oracle instances. It also monitors Oracle database operation by creating a monitoring table on the SYSTEM user default tablespace. The size of the table is only a few bytes. The table data is periodically updated, so the REDO log is updated, and the archived redo log data is output.
- Stopping an Oracle instance in the “IMMEDIATE” mode fails while Oracle Online backup is running.
In this case, the Oracle instance will be stopped in "ABORT" mode.
- The time required for Oracle instance startup and stop varies depending on the database size. The default startup timeout is 10 minutes. The default stop timeout is 3 minutes.
The RMS command “hvshut” has its own timeout. Even though hvshut times out, userApplication stop processing will be continued along with RMS stop.
- In standby operation or single-node cluster operation, PRIMECLUSTER Wizard for Oracle recovers Oracle instance automatically from backup mode or media failure when the errors are detected during the startup of Oracle instance.
In scalable operation with Oracle RAC, PRIMECLUSTER Wizard for Oracle does not recover it automatically from the errors.
- In scalable operation with Oracle RAC, an RMS resource is created based on the resource name of Oracle RAC or OracleSID. For details, see “[2.3.2 Oracle Database Software Installation and Configuration](#)”.
- MonitorOnly can be enabled in the following cases. For details, see “[2.2.7.2 Oracle Resource Creation](#)”.
 - One resource of “Instance” type and one resource of “Listener” type exist, and StartPriority is set to “Same”. In this case, MonitorOnly only for the one of them can be enabled.
 - More than one resources of “Instance” type exist. In this case, MonitorOnly for the one of them cannot be enabled, but all of the others can be enabled.
 - More than one resources of “Listener” type exist. In this case, MonitorOnly for the one of them cannot be enabled, but all of the others can be enabled.
- Do not execute “srvctl” or “sqlplus” commands to shut down Oracle instance. It might cause mismatched status between RMS and Oracle RAC.

Configuration

Below are guidelines and precautions to be taken in configuring an environment that allows for PRIMECLUSTER Wizard for Oracle operations.

- Be aware of the exit code and timeout duration when the following scripts are set: PreOnlineScript, PostOnlineScript, PreOfflineScript, PostOfflineScript, and FaultScript. For details, see [“2.4.1 Oracle resource Online/Offline Script”](#).
- If you use Oracle resources in combination with PRIMECLUSTER Wizard for NAS, refer to "PRIMECLUSTER Wizard for NAS Configuration and Administration Guide".

Operations

Users need to take a special precaution when changing the SYSTEM password for PRIMECLUSTER Wizard for Oracle as follows:

- For information on how to change the Oracle SYSTEM user password while a cluster system is running, see [“3.3 Oracle SYSTEM User Password Change”](#).
When passwords of Oracle user, Grid user, and Oracle SYS user are changed, the setting of PRIMECLUSTER Wizard for Oracle need not be changed.
- When UsePDB of Oracle instance resource is set to yes, the monitoring of PDB is executed. When fault of PDB is detected, the message is output to syslog. Refer to ["Chapter 6 Message"](#) for the content of the messages. The restart and the failover due to fault of PDBs is not executed.

Others

Users need to take the following special precaution when operating PRIMECLUSTER Wizard for Oracle:

- If an Oracle instance is stopped in the ABORT mode, it will automatically be recovered at the next instance startup.

Chapter 6 Message

This chapter describes messages generated by PRIMECLUSTER Wizard for Oracle and lists the possible causes and actions you can take to resolve any problems indicated by a message.

The following messages appear in syslog (daemon.err).

- Oracle instance resource messages
- Oracle listener resource messages
- PDB messages (daemon.err)
- Common messages

The following messages appear in syslog (daemon.notice).

- PDB messages (daemon.notice)

The following messages appear in command execution screen.

- clgetalog messages
- clorainfo messages
- hvoradisable/hvoraenable messages
- cloracpy messages
- clorapass messages

Oracle instance resource messages

ERROR: 1202: Cannot map shared memory or get semaphore

[Content]

A system error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 1203: Cannot open actionlist

[Content]

The action definition file cannot be opened.

[Corrective action]

Check if the action definition file already exists, or file access privileges have been changed.

ERROR: 1204: Corrupted actionlist: Invalid errno, line=*linenumber*

[Content]

The errno setting of the action definition file is incorrect.

[Corrective action]

Check the errno setting of line=*linenumber* in the action definition file.

ERROR: 1205: Corrupted actionlist: Invalid status, line=*linenumber*

[Content]

The status setting of the action definition file is incorrect.

[Corrective action]

Check the status setting of line=*linenumber* in the action definition file.

ERROR: 1206: Corrupted actionlist: Invalid action, line=*linenumber*

[Content]

The action setting of the action definition file is incorrect.

[Corrective action]

Check the action setting of line=*linenumber* in the action definition file.

ERROR: 1208: Oracle process process error

[Content]

An Oracle instance process error was detected.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 1213: Action error detected: Offline

[Content]

The Offline state of the resource will be notified.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 1214: Action error detected: Faulted

[Content]

The Faulted state of the resource will be notified.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 1215: Action error detected: Restart

[Content]

Monitoring will be retried.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 1219: Cannot read hvgdconfig

[Content]

The RMS configuration file (hvgdconfig file) cannot be read.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 1220: Not Found ResourceName setting in hvgdconfig

[Content]

The *ResourceName* setting of the RMS configuration file (hvgdconfig file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 1223: Not found *AttributeName* in hvgdconfig

[Content]

The *AttributeName* setting of the RMS configuration file (hvgdconfig file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 1224: Receiving of monitoring instruction failed (*detail*)

[Content]

An internal error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

Contact system administrators.

ERROR: 1225: Reporting of monitoring result failed : *status*

[Content]

An internal error occurred. Notification of monitoring result failed.

[Corrective action]

Contact system administrators.

ERROR: 1226: Checking existence of Detector process failed

[Content]

An internal error occurred. Checking whether or not the detector process is alive failed.

[Corrective action]

Contact system administrators.

ERROR: 1227: Invalid setting in hvgdconfig : *AttributeName*

[Content]

The *AttributeName* setting of the RMS configuration file (hvgdconfig file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 1299: ORA-xxxxx

[Content]

An Oracle instance error ORA-xxxxx is output.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

WARNING: 1302: Action error detected: Warning

[Content]

The warning state of the resource will be notified.

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 3402: clorainstance detected Oracle error! (ORA-xxxxx:)

[Content]

An Oracle instance error occurred while Oracle instance startup or shutdown was in progress (svrmgrl).

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 3403: clorainstance detected Oracle error! (ORA-xxxxx:)
ERROR: 7301: clasminstance detected Oracle error! (ORA-xxxxx:)

[Content]

An Oracle instance error occurred while Oracle instance startup or shutdown was in progress (sqlplus).

[Corrective action]

Check if the Oracle instance is properly running by referring to the Oracle instance alert log.

ERROR: 6227: cloranap terminates the startup of Oracle RAC instance resource ResourceName, because UNKNOWN state of ASM was detected. (detail) Please check ASM.

[Content]

Startup of Oracle RAC instance has been terminated because UNKNOWN state of Oracle ASM was detected during the startup process of the Oracle RAC instance. Information about Oracle ASM is described in the *detail*. (Oracle ASM resource name, status)
This message may appear in the environment of Oracle RAC using Oracle ASM.

[Corrective action]

Check the status of Oracle ASM described in the *detail*, and resolves a problem.

Oracle listener resource messages

ERROR: 2202: Cannot map shared memory or get semaphore

[Content]

A system error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 2203: Cannot get ORACLE_HOME

[Content]

ORACLE_HOME cannot be acquired.

[Corrective action]

Check if ORACLE_HOME is correctly set for the environment variable.

ERROR: 2204: Cannot read hvgdconfig

[Content]

The RMS configuration file (hvgdconfig file) cannot be read.

[Corrective action]

Modify the RMS configuration file manually then check the file settings.

ERROR: 2205: Not Found *ResourceName* setting in hvgdconfig

[Content]

The *ResourceName* setting of the RMS configuration file (hvgdconfig file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 2206: Not Found *AttributeName* in hvgdconfig

[Content]

The *AttributeName* setting of the RMS configuration file (hvgdconfig file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 2210: Tnsping detected the error (*detail*)

[Content]

Listener monitoring with the tnsping command failed.

[Corrective action]

Check the Listener log and if the Listener is properly running.

ERROR: 2211: The listener name is invalid

[Content]

The Oracle listener name is incorrect.

[Corrective action]

Check the Listener settings such as listener.ora and tnsnames.ora.

ERROR: 2214: The process of the listener does not exist

[Content]

An Oracle listener process failure was detected. It will be output along with userApplication stop.

[Corrective action]

If the error is output during userApplication is online, check the Listener log and if the Listener is properly running.

ERROR: 2215: Process ID of the listener is not found

[Content]

The Listener process ID is unknown.

[Corrective action]

Check the Listener log and if the Listener is properly running.

ERROR: 2219: Reporting of monitoring result failed : *status*

[Content]

An internal error occurred. Notification of monitoring result failed.

[Corrective action]

Contact system administrators.

ERROR: 2220: System error occurred(*detail*)

[Content]

A system error occurred.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 2221: Receiving of monitoring instruction failed (*detail*)

[Content]

An internal error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

Contact system administrators.

ERROR: 2222: Checking existence of Detector process failed

[Content]

An internal error occurred. Checking whether or not the detector process is alive failed.

[Corrective action]

Contact system administrators.

PDB messages(daemon.err)

ERROR: 9242: clorapdbmon detected OPEN_MODE of PDB *PDB_name* is invalid. (CDB=ORACLE_SID PDB=*PDB_name* OPEN_MODE=*OPEN_MODE*)

[Content]

The status of PDB is abnormal.

OPEN_MODE is *OPEN_MODE* of the PDB read from V\$PDBS.

[Corrective action]

Check if the PDB is properly running by referring to the Oracle instance alert log.

ERROR: 9245: ORACLE_HOME/bin/sqlplus not found

[Content]

The *ORACLE_HOME*/bin/sqlplus file does not exist.

[Corrective action]

Check if *ORACLE_HOME* is correctly set for the environment variable.

Check if the *ORACLE_HOME*/bin/sqlplus file exists.

ERROR: 9247: Timeout occurred in the processing that gets V\$PDBS information

[Content]

The timeout occurred because of processing that read the V\$PDBS table from CDB.

[Corrective action]

Check if the CDB is properly running by referring to the Oracle instance alert log.

ERROR: 9260: Cannot get V\$PDBS information. (ORA-xxxxx)

[Content]

The error occurred because of processing that read the V\$PDBS table from CDB.

ORA-xxxxx is an error that the Oracle instance output.

[Corrective action]

Check if the CDB is properly running by referring to the Oracle instance alert log.

Common messages

INFO: 0101: Fault Watching is disable
INFO: 0101: Fault Watching is disabled

[Content]

Monitoring resource was discontinued after the hvoradisable was executed.

[Corrective action]

None. Execute the hvoraenable command to restart resource monitoring.



See

.....
For details of the commands, see “4.1 hvoradisable - Discontinue Monitoring Resources”.
.....

INFO: 0102: Fault Watching is enable
INFO: 0102: Fault Watching is enabled

[Content]

Resource monitoring was restarted after the “hvoraenable” command was executed.

[Corrective action]

None.



See

.....
For details of the commands, see “4.2 hvoraenable - Restart Monitoring Resources”.
.....

ERROR: 0207: Cannot allocate memory for hvgdconfig : AttributeName
ERROR: 0207: Cannot allocate memory for execv

[Content]

A system error occurred. Acquisition of memory failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0208: Data init error

[Content]

A system error occurred. Acquisition of semaphore failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0209: Fork error**[Content]**

A system error occurred. Generation of process failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0211: User *UserName* not found.**[Content]**

The Oracle user settings are incorrect.

[Corrective action]

Check if Oracle user information (e.g. username) is correct.

ERROR: 0212: Cannot create log *path_name***[Content]**

Log files cannot be created.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0213: Library init error**[Content]**

A system error occurred. Initialization failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0219: Detector aborted**[Content]**

A system error occurred. The detector will be terminated.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

ERROR: 0220: Not found *AttributeName* in *hvgdconfig*.**[Content]**

The *AttributeName* setting of the RMS configuration file (*hvgdconfig* file) is not set.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 0221: Invalid setting in *hvgdconfig* : *AttributeName***[Content]**

The *AttributeName* setting of the RMS configuration file (*hvgdconfig* file) is incorrect.

[Corrective action]

If you modify the RMS configuration file manually, check the settings.

ERROR: 0222: Checking permission of resource monitoring failed**[Content]**

An internal error occurred. Checking monitoring disruption failed.

[Corrective action]

Contact system administrators.

ERROR: 0223: Checking existence of fault monitor process failed**[Content]**

An internal error occurred. Checking whether or not the monitoring process is alive failed.

[Corrective action]

Contact system administrators.

ERROR: 0224: Sending monitoring instruction failed (*detail*)**[Content]**

A system error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

Contact system administrators.

ERROR: 0225: Receiving of monitoring result failed (*detail*)**[Content]**

A system error occurred. Acquisition of shared memory or semaphores failed.

[Corrective action]

Contact system administrators.

ERROR: 0226: Watch Timeout occurred (*count*)**[Content]**

Since there's no response from Oracle instance or Listener, timeout occurs.

[Corrective action]

Check if the Oracle instance or Listener is properly running by referring to the Oracle instance alert log or Listener log.

ERROR: 0227: Receiving of Script notice failed**[Content]**

An internal error occurred. Communication with the script failed.

[Corrective action]

Contact system administrators.

ERROR: 0228: Starting fault monitor failed**[Content]**

Startup of the monitoring process failed.

[Corrective action]

Contact system administrators.

ERROR: 0229: Pipe error

[Content]

A system error occurred. Creation of output pipe failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.



.....
PRIMECLUSTER Wizard for Oracle outputs error messages to system console other than messages described above if error in Oracle instance startup occurs.
.....

PDB messages(daemon.notice)

INFO: 9142: OPEN_MODE of PDB *PDB_name* was OPEN. (CDB=ORACLE_SID PDB=*PDB_name* OPEN_MODE=*OPEN_MODE*)

[Content]

It is information message that the PDB became OPEN.

OPEN_MODE is *OPEN_MODE* of the PDB read from V\$PDBS.

[Corrective action]

None.

clgetoralog messages

clgetoralog [ERROR] Creation of temporary directory failed! (*directory_name*)

[Content]

Cannot make a temporary directory.

[Corrective action]

/tmp space may be insufficient. Check the system environment.

clgetoralog [ERROR] Invalid RMS Configuration name! (*RMS_configuration*)

[Content]

The specified RMS configuration *RMS_configuration* does not exist.

[Corrective action]

Retry with a correct RMS configuration name.

clgetoralog [ERROR] No space in *path_name* (*details*)!

[Content]

Not enough disk space in *path_name*.

[Corrective action]

path_name space may be insufficient. Check the system environment.

clgetoralog [ERROR] Creation of directory failed! (*directory_name*)

[Content]

Cannot make a directory *directory_name* where collected information is stored.

[Corrective action]

Disk space may be insufficient. Check the system environment.

clgetalog [ERROR] "*file_name*" already exists!

[Content]

Cannot make *file_name* because the same name file already exists.

[Corrective action]

The directory where the collected information has been stored is shown in the following message. Create an archive file from the directory manually with other file name.

clgetalog [ERROR] Creation of "*file_name*" failed!

[Content]

Cannot create an archive file *file_name*.

[Corrective action]

The directory where the collected information has been stored is shown in the following message. Create an archive file from the directory manually.

clgetalog [WARN] Obtaining local SysNode Name failed!

[Content]

Cannot get local SysNode name, but clgetalog continues collecting information.

[Corrective action]

None.

clgetalog [WARN] Execution of hvw failed!

[Content]

Cannot execute an RMS command hvw(1M) correctly, but clgetalog continues collecting information.

[Corrective action]

None.

clgetalog [WARN] Result of hvw is invalid!

[Content]

An RMS command hvw(1M) has returned unexpected result, but clgetalog continues collecting information.

[Corrective action]

None.

clgetalog [WARN] Wizard for Oracle resources not found in hvgdconfig!

[Content]

There are no definitions of PRIMECLUSTER Wizard for Oracle resources in hvgdconfig file, but clgetalog continues collecting information.

[Corrective action]

None.

clgetalog [WARN] Obtaining RMS Configuration name from CONFIG.rms failed!

[Content]

Cannot get RMS configuration name, but clgetoralog continue collecting information.

[Corrective action]

None.

clgetoralog [WARN] Invalid RMS Configuration name! (RMS_configuration)

[Content]

Cannot get RMS configuration name, but clgetoralog continue collecting information.

[Corrective action]

None.

clorainfo messages

clorainfo: ERROR: Obtaining local SysNode Name failed!

[Content]

Cannot get a local SysNode name.

[Corrective action]

Check if CF (Cluster Foundation) has been configured and is "UP" state.

clorainfo: ERROR: Checking RMS running status failed! (details)

[Content]

Cannot check if RMS is running or not.

[Corrective action]

Check if PRIMECLUSTER installation, cluster setup and building a cluster application (userApplication) have been completed.

clorainfo: ERROR: Obtaining RMS configuration name failed! (details)

[Content]

Cannot get an RMS configuration name.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

clorainfo: ERROR: CONFIG.rms does not exist! (details)

[Content]

CONFIG.rms file does not exist.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

clorainfo: ERROR: Wizard for Oracle resources not found

[Content]

There is no PRIMECLUSTER Wizard for Oracle resources in a build userApplication (cluster application).

[Corrective action]

Check if building a userApplication (cluster application) has been completed or Oracle instance resources or Listener resources are included in the userApplication.

clorainfo: ERROR: The specified resource does not exist on this SysNode (SysNode_name), or does not belong to Wizard for Oracle! - resource_name

[Content]

The specified resource *resource_name* does not exist on the local node *SysNode_name*, or is not a PRIMECLUSTER Wizard for Oracle resource.

[Corrective action]

Retry with a correct resource name.

clorainfo: ERROR: Resource does not belong to Wizard for Oracle - resource_name

[Content]

The specified resource *resource_name* is not a PRIMECLUSTER Wizard for Oracle resource.

[Corrective action]

Retry with a correct resource name.

clorainfo: ERROR: Invalid RMS Configuration.

[Content]

RMS configuration is invalid.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

clorainfo: ERROR: RMS_configuration does not exist.

[Content]

The specified RMS configuration *RMS_configuration* does not exist.

[Corrective action]

Retry with a correct RMS configuration name.

hvoradisable/hvoraenable messages

command: ERROR: Internal error! (details)

[Content]

Internal error occurred.

[Corrective action]

Contact your system administrator.

command: ERROR: Failed to disable/enable resource monitoring - resource_name

[Content]

Cannot disable or enable monitoring.

[Corrective action]

Contact your system administrator.

command: ERROR: hvgdconfig does not exist!

[Content]

hvgdconfig file does not exist.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

command: ERROR: Obtaining local SysNode Name failed!

[Content]

Cannot get a local SysNode name.

[Corrective action]

Check if CF (Cluster Foundation) has been configured and is "UP" state.

command: ERROR: Obtaining RMS configuration Name failed!

[Content]

Cannot get an RMS configuration name.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

command: ERROR: Execution of hvw failed!

[Content]

Cannot execute an RMS command hvw(1M) correctly.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

command: ERROR: Result of hvw is invalid!

[Content]

Cannot get a result of RMS command hvw(1M) correctly.

[Corrective action]

Check if building a userApplication (cluster application) has been completed.

command: ERROR: Failed to disable/enable resource monitoring! (details)

[Content]

Cannot disable or enable monitoring because of details.

[Corrective action]

Check if PRIMECLUSTER installation, cluster setup and building a cluster application (userApplication) have been completed.

command: ERROR: No Wizard for Oracle resources belong to specified userApplication! - userApplication_name

[Content]

There is no PRIMECLUSTER Wizard for Oracle resources in the specified userApplication *userApplication_name*.

[Corrective action]

Retry with a correct userApplication name.

command: ERROR: No Wizard for Oracle resources are in the current RMS configuration!

[Content]

There is no PRIMECLUSTER Wizard for Oracle resources in the current RMS configuration.

[Corrective action]

Check if building a userApplication (cluster application) has been completed or Oracle instance resources or Listener resources are included in the userApplication.

command: ERROR: No Wizard for Oracle resources exist on this node! - SysNode_name

[Content]

There is no PRIMECLUSTER Wizard for Oracle resources on a local node *SysNode_name*.

[Corrective action]

Check if building a userApplication (cluster application) has been completed or Oracle instance resources or Listener resources are included in the userApplication.

command: ERROR: Invalid userApplication or Resource!

[Content]

The specified userApplication name or resource name is invalid.

[Corrective action]

Retry with a correct userApplication name and resource name.

command: ERROR: The specified resource does not exist on SysNode_name! - resource_name

[Content]

The specified resource does not exist on a local node *SysNode_name*.

[Corrective action]

Retry with a correct resource name or retry on a correct node.

command: WARNING: RMS is not running, but the monitoring of resource_name is disabled/enabled.

[Content]

The monitoring is disabled or enabled although RMS is not running.

[Corrective action]

This setting will become effective in the next RMS startup.

cloracpy messages

ORACLE_SID not found.

[Content]

ORACLE_SID cannot be acquired.

[Corrective action]

Check if ORACLE_SID is correctly set for the environment variable.

ORACLE_HOME not found.

[Content]

ORACLE_HOME cannot be acquired.

[Corrective action]

Check if ORACLE_HOME is correctly set for the environment variable.

ORACLE_BASE not found.

[Content]

ORACLE_BASE cannot be acquired.

[Corrective action]

Check if ORACLE_BASE is correctly set for the environment variable.

ORACLE_HOME/dbs is invalid.

[Content]

ORACLE_HOME/dbs directory does not exist.

[Corrective action]

Check if the directory exists.

ORACLE_HOME/network/admin is invalid.

[Content]

ORACLE_HOME/network/admin directory does not exist.

[Corrective action]

Check if the directory exists.

cloracpy: ORACLE_BASE/admin/ORACLE_SID is invalid.

[Content]

ORACLE_BASE/admin/ORACLE_SID directory does not exist.

[Corrective action]

On the standby node, extract the backup data and create directory which is specified in the AUDIT_FILE_DEST initialization parameter.

The access privilege to the directory must be also the same as that on the operating node.

cloracpy: ORACLE_BASE/diag is invalid.

[Content]

ORACLE_BASE/diag directory does not exist.

[Corrective action]

On the standby node, extract the backup data and create directory which is specified in the DIAGNOSTIC_DEST initialization parameter.

The access privilege to the directory must be also the same as that on the operating node.

cloracpy:tar is error.(EXIT_CODE).

[Content]

Cannot execute tar(1) command correctly.

[Corrective action]

Check the disk space or authority of /tmp directory.

clorapass messages

Cannot read password_file.

[Content]

Cannot read the password file.

[Corrective action]

Check the password file.

File format error *password_file*.

[Content]

Password file occurred format error.

[Corrective action]

Delete the password file, set password again. If more than one password was registered in the file, set all of them.

Cannot allocate memory.

[Content]

A system error occurred. Acquisition of memory failed.

[Corrective action]

The problem might be due to insufficient system resource. Check the system environment.

Cannot write *password_file*.

[Content]

Cannot write the password file.

[Corrective action]

Check the password file.

Password not match.

[Content]

An incorrect password was entered.

[Corrective action]

Enter a correct password.

Appendix A Failure case studies

Most of Oracle instance startup failures or cluster failover failures are due to Oracle instance down invents. Sometimes, the same or similar problems can occur due to setup or evaluation mistakes made by users.

This section discusses possible causes, corrective and preventive action of problems caused by improper settings or mistaken evaluations

Oracle instances	Startup/stop failure	A.1.1 Startup/stop failure
	AutoRecover or Failover	A.1.2 AutoRecover or Failover
	Warning status	A.1.3 Warning state
Oracle listeners	Startup/stop failure	A.2.1 Startup/stop failure
	AutoRecover or Failover	A.2.2 AutoRecover or Failover
	Warning status	A.2.3 Warning state
PDBs	Startup/stop failure	A.3.1 Startup/stop failure
	Message was output	A.3.2 Message was output

A.1 Oracle instances

A.1.1 Startup/stop failure

Oracle instance startup or stop failed.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

Oracle instance startup or stop fails when the PRIMECLUSTER RMS resource settings are invalid.

Check the resource setup information by executing the “clorainfo -c” command. See “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.

- Oracle user
- OracleSID
- Scripts (e.g. PreOnlineScript)
 - A correct path must be set.
 - The script must have execution permission.
 - The script must behave correctly.

If your setup information is incorrect, set proper values again. See “[Chapter 2 Environment setup](#)”.

[Case 2] (Standby Operation, Single-Node Cluster Operation)

Oracle instance startup or stop fails when user script settings in /opt/FJSVclora/usr are incorrect (standby operation only).

Check if the user scripts behave correctly.

[Case 3] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

Oracle instance startup or stop fails when Oracle database settings are invalid.

Check the Oracle database alert log, so you might be able to detect the cause of the failure.

Also, check if Oracle database can be started or stopped properly. If you discontinue Oracle instance resource monitoring, you can operate Oracle database manually. See “[3.2.4.1 Oracle database must be stopped](#)”.

[Case 4] (Scalable Operation with Oracle RAC)

When starting userApplication with Oracle RAC Instances resource in the state where Oracle Clusterware is not running, the resource state enters Wait until exceeds the time set as ScriptTimeout (refer to step 10 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”). If it exceeds the time set as ScriptTimeout with the resource state maintain Wait, the resource state will enter Faulted.

Execute the following methods according to each pattern.

- In the case of configuration that the Oracle Clusterware and Oracle RAC instance are registered in different userApplication. (It matches “Configuration A” in “2.3.3 userApplication and Resource Configuration”.)

At first, check whether Oracle Clusterware is running.

The following command execution, you can check whether Oracle Clusterware is running.

```
# su - <Grid user>
$ crsctl status resource
```

When the following message is outputted, Oracle Clusterware may be not running.

```
CRS-0184: Cannot communicate with the CRS daemon.
```

When Oracle Clusterware is not running, there is a possibility that the setting that Oracle Clusterware starts earlier than Oracle RAC Instance is incorrect.

Check whether the script which starts Oracle Clusterware resource is set as the PreOnlineScript of Oracle RAC Instance (refer to “note” of step 10 of “2.3.5 userApplication with Oracle RAC Instances and Listeners”).

- In the case of configuration that the Oracle Clusterware and Oracle RAC instance are registered in the same userApplication. (It matches “Configuration B” in “2.3.3 userApplication and Resource Configuration”.)

There is a possibility that starting of Oracle RAC Instance resource is failed.

Check whether you have no mistakes in setting of Oracle RAC Instance resource (“2.3.5 userApplication with Oracle RAC Instances and Listeners”).

In addition, check whether you have no mistakes in setting of PRIMECLUSTER RMS and Oracle database (refer to “Case 1” and “Case 3”).

- In the case of configuration that the Oracle Clusterware is not registered. (It matches “Configuration C” in “2.3.3 userApplication and Resource Configuration”.)

Check whether Oracle Clusterware is running.

The following command execution, you can check whether Oracle Clusterware is running.

```
# su - <Grid user>
$ crsctl status resource
```

When the following messages are outputted, Oracle Clusterware may be not running.

```
CRS-0184: Cannot communicate with the CRS daemon.
```

Clear Faulted state of the resource, after that, execute the following commands and start Oracle Clusterware.

```
# <Grid user's $ORACLE_HOME>/crsctl start crs
```

After that, start userApplication.

[Case 5] (Scalable Operation with Oracle RAC)

In the case of userApplication or the resources setting is changed when Oracle Clusterware has stopped, Oracle RAC instance startup or stop fails. Start Oracle Clusterware on all nodes beforehand when you do the setting change of userApplication or the resources. (Refer to “2.3.7 Configuration-Generate and Configuration-Activate”)

A.1.2 AutoRecover or Failover

AutoRecover, userApplication failover or degeneration occurred because of an Oracle instance resource failure.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

If there is insufficient space to archive, and data updating processing through monitoring SQL hangs, an oracle resource might fail.

Afterwards, the service might stop finally on both operating node and standby nodes, because the space of shared disk is insufficient and the failover of userApplication fails on the standby node.

Check the Oracle database alert log, so you might be able to detect the cause of the failure.

Execute the following procedures to backup archived redo logs and reserve enough disk space.

1. Stop RMS on both the operating node and standby nodes.

```
# hvshut -a
```

2. On the operating node, mount a volume where the archive redo logs are stored.

- zpool used

```
# sdxvolume -N -c <class>
# zpool import -d /dev/sfdsk/<class >/dsk <mountpoint>
```

- zpool not used

```
# sdxvolume -N -c <class> -v <volume>
# mount -F ufs /dev/sfdsk/<class>/dsk/<volume> <mountpoint>
```

3. Move to the mountpoint mounted at Step 2 and backup archived redo logs.

```
# cd <mountpoint>
# mv ./<the directory of archived redo logs>/<archived redo logs> /<the destination for backup>/.
```

4. Unmount the volume mounted at Step 2.

- zpool used

```
# cd /
# zpool export <mountpoint>
# sdxvolume -F -c <class>
```

- zpool not used

```
# cd /
# umount <mountpoint>
# sdxvolume -F -c <class> -v <volume>
```

5. Start RMS on all nodes by executing the hvcm command on any one of the nodes.

```
# hvcm -a
```

6. Clear the faulted state of userApplication

```
# hvutil -c <userApplication>
```

7. Start userApplication by executing the hvswitch command on any one of the nodes.

```
# hvswitch <userApplication> <SysNode>
```

[Case 2] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

If monitoring timeout occurs twice in a row, a resource failure will occur. If the following error message is output to syslog, you can determine the cause of this problem:

“ERROR: 0226: Watch Timeout occurred”

Take corrective action on Oracle database.

In Oracle instance monitoring of PRIMECLUSTER Wizard for Oracle, if there is no reply from Oracle database within a specified time, monitoring timeout will be considered. At the first monitoring timeout, the resource will only enter Warning, however, if it occurs twice in a row, a resource failure will be determined.

A.1.3 Warning state

An Oracle instance has been activated, but an Oracle instance resource has entered Warning.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

An Oracle instance resource enters Warning when

- The Oracle SYSTEM user password is not registered in PRIMECLUSTER Wizard for Oracle,
- The Oracle SYSTEM user password is registered in PRIMECLUSTER Wizard for Oracle, but it is incorrect, or
- The correct Oracle SYSTEM user password is registered in PRIMECLUSTER Wizard for Oracle, but it is disabled.

If ORA-01017 is output to syslog, you can determine the cause of this problem.

Register the correct SYSTEM user password again. See [“3.3 Oracle SYSTEM User Password Change”](#).

[Case 2] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

An Oracle instance resource enters Warning when the Oracle SYSTEM user account is locked, so you are not allowed to connect to Oracle instance.

If ORA-28000 is output to syslog, you can determine the cause of this problem.

You can also check the SYSTEM user account by referring to the following SQL.

If the “account_status” column indicates “LOCKED(TIMED)” or “LOCKED”, you can determine the cause of this problem.

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> SELECT USERNAME, ACCOUNT_STATUS FROM DBA_USERS;
```

Access Oracle instance using sysdba privileges then release account locking of the SYSTEM user.

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT / AS SYSDBA
SQL> ALTER USER SYSTEM ACCOUNT UNLOCK;
```

If ORA-01017 is output to syslog as well as ORA-28000, an incorrect password might have been registered. In this case, correct the SYSTEM user password. See [“3.3 Oracle SYSTEM User Password Change”](#). Then, release account locking using the procedure above.

[Case 3] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

An Oracle instance resource enters Warning when instance monitoring is discontinued.

Check the monitoring status by executing the “clorainfo -m” command. See [“4.6 clorainfo - Display Resource Configuration and Monitoring Status”](#).

If instance monitoring has been discontinued, check if the Oracle instance has been activated with the OPEN status then restart monitoring. See [“4.2 hvoraenable - Restart Monitoring Resources”](#).

[Case 4] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

In Oracle instance monitoring, an Oracle instance resource enters Warning if there is no reply from SQL (e.g. INSERT, UPDATE, etc.) within a specified time, but you can access the Oracle instance, and the instance indicates OPEN. “ERROR: 0226: Watch Timeout occurred” message will also be output to syslog.

Take corrective action on Oracle database.

In Oracle instance monitoring of PRIMECLUSTER Wizard for Oracle, if there is no reply from the Oracle instance within a specified time, monitoring timeout will be considered. At the first monitoring timeout, the resource will only enter Warning, however, if it occurs twice in a row, a resource failure will be determined.

[Case 5] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

In Oracle instance monitoring, an Oracle instance resource enters Warning if you cannot access the Oracle instance because of a max session error or max process error.

If ORA-00018 or ORA-00020 is output to syslog, you can determine the cause of this problem.

For the maximum number of sessions that are set in the Oracle SESSIONS parameter, or the maximum number of processes that are set in the PROCESSES parameter, estimate enough values considering monitoring sessions for PRIMECLUSTER Wizard for Oracle.

For details see the Oracle Database manual.

[Case 6] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

An Oracle instance resource enters Warning when the SYSTEM user's password has expired, so Oracle instance connection is not allowed. If ORA-28001 is output to syslog, you can determine the cause of this problem.

You can also check it by referring to the following SQL statement. If the ORA-28001 error message appears, you can determine the cause of this problem.

```
# su - <Oracle user>
$ sqlplus /nolog
SQL> CONNECT SYSTEM/PASSWORD
ERROR:
ORA-28001: the password has expired

Changing password for system
New password:
```

In this case, change the SYSTEM user's password. After that, register the password with “clorapass” command. Refer to “[3.3 Oracle SYSTEM User Password Change](#)”.

[Case 7] (Scalable Operation with Oracle RAC)

The monitoring of Oracle RAC instance resource becomes failure when setting of WFTIME is the followings, the resource state enter Warning until it is recovered by Oracle Clusterware.

- [PersistentWarning]
- [<second>]

It is possible to check setting of WFTIME by the “clorainfo -c” command. (For detail of “WFTIME”, refer to step 10 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”).

Check the Oracle database alert log, so you might be able to detect the cause of the failure.

A.2 Oracle listeners

A.2.1 Startup/stop failure

Oracle listener startup or stop failed.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

Oracle listener startup or stop fails when the PRIMECLUSTER RMS resource settings are invalid.

Check the following resource setup information by executing the “clorainfo -c” command. See “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.

- Oracle user name
- Listener name
- TNSName (net service name)
- Scripts (e.g. PreOnlineScript)

A correct path must be set.

The script must have execution permission.

The script must behave correctly.

If your setup information is incorrect, set proper values again. See “[Chapter 2 Environment setup](#)”.

[Case 2] (Standby Operation, Single-Node Cluster Operation)

Oracle listener startup or stop fails when the listener settings such as IP address and port number are incorrect.

Check listener logs, so you might be able to detect the cause of the failure.

Check if the settings of listener.ora are correct.

Also, check if the listener can be started or stopped properly. If you discontinue Oracle instance resource monitoring, you can operate Oracle database manually. See “[3.2.4.1 Oracle database must be stopped](#)”.

[Case 3] (Scalable Operation with Oracle RAC)

When starting userApplication with listener resource in the state where Oracle Clusterware is not running, the resource state enters Warning until exceeds the time set as ScriptTimeout (refer to step 16 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”). If it exceeds the time set as ScriptTimeout with the resource state maintain Wait, the resource state will enter Faulted.

Execute the following methods according to each pattern.

- In the case of configuration that the Oracle Clusterware and Oracle RAC instance are registered in different userApplication. (It matches “[Configuration A](#)” in “[2.3.3 userApplication and Resource Configuration](#)”.)

At first, check whether Oracle Clusterware is running.

The following command execution, you can check whether Oracle Clusterware is running.

```
# su - <Grid user>
$ crsctl status resource
```

When the following message is outputted, Oracle Clusterware may be not running.

```
CRS-0184: Cannot communicate with the CRS daemon.
```

When Oracle Clusterware is not running, there is a possibility that the setting that Oracle Clusterware starts earlier than Oracle RAC Instance is incorrect.

Check whether the script which starts Oracle Clusterware resource is set as the PreOnlineScript of Oracle RAC Instance (refer to “note” of step 10 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”).

- In the case of configuration that the Oracle Clusterware and Oracle RAC instance are registered in the same userApplication. (It matches “[Configuration B](#)” in “[2.3.3 userApplication and Resource Configuration](#)”.)

There is a possibility that starting of listener resource is failed.

Check whether you have no mistakes in setting of listener resource (“[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”).

In addition, check whether you have no mistakes in setting of listener (refer to “Case 2”).

- In the case of configuration that the Oracle Clusterware is not registered. (It matches “[Configuration C](#)” in “[2.3.3 userApplication and Resource Configuration](#)”.)

Check whether Oracle Clusterware is running.

The following command execution, you can check whether Oracle Clusterware is running.

```
# su - <Grid user>
$ crsctl status resource
```

When the following messages are outputted, Oracle Clusterware may be not running.

```
CRS-0184: Cannot communicate with the CRS daemon.
```

Clear Faulted state of the resource, after that, execute the following commands and start Oracle Clusterware.

```
# <Grid user's $ORACLE_HOME>/crsctl start crs
```

After that, start userApplication.

A.2.2 AutoRecover or Failover

A userApplication failover or degeneration occurred because of Oracle listener resource failure.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

A userApplication failover or degeneration occurs when the PRIMECLUSTER RMS resource settings (especially TNSName) are invalid. Check the following resource setup information by executing the “clorainfo -c” command. See “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.

- Oracle user name
- Listener name
- TNSName (net service name)

If your setup information is incorrect, set proper values again. See “[Chapter 2 Environment setup](#)”.

[Case 2] (Standby Operation, Single-Node Cluster Operation)

userApplication failover or cluster degeneration occurs when the net service name of tnsnames.ora is incorrect. Check the net service name in tnsnames.ora file.

A.2.3 Warning state

A listener resource has entered Warning.

[Case 1] (Standby Operation, Scalable Operation with Oracle RAC, Single-Node Cluster Operation)

A listener resource enters Warning when listener monitoring is discontinued.

Check the monitoring status by executing the “clorainfo -m” command. Refer to “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.

If listener monitoring has been discontinued, check if the listener has been activated then restart monitoring. Refer to “[4.2 hvoraenable - Restart Monitoring Resources](#)”.

[Case 2] (Standby Operation, Single-Node Cluster Operation)

In listener monitoring using the tnsping command of the Oracle database, when constant time did not have the reply of the tnsping command, the resource enters Warning (WatchTimeout).

If the following error message is output to syslog, you can confirm the cause of this problem: “ERROR: 0226: Watch Timeout occurred”

Check the listener log, and investigate and handle it.

In listener monitoring of PRIMECLUSTER Wizard for Oracle, if there is no reply from tnsping within a specified time, monitoring timeout will be considered. At the first monitoring timeout, the resource will only enter Warning, however, if it occurs twice in a row, a resource failure will be determined.

[Case 3] (Scalable Operation with Oracle RAC)

The monitoring of listener resource becomes failure when setting of WFTime is the followings, the resource state enter Warning until it is recovered by Oracle Clusterware.

- [PersistentWarning]
- [<second>]

It is possible to check setting of WFTime by the “clorainfo -c” command. (For detail of “WFTime”, refer to step 16 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”).

Check whether the cause of resource failure is reported referring to the listener log or log files.

A.3 PDBs

A.3.1 Startup/stop failure

a PDB startup or stop failed.

[Case 1] (Standby Operation, Single-Node Cluster Operation)

a PDB startup or stop fails when the PRIMECLUSTER RMS resource settings are invalid.

Check the following resource setup information by executing the “clorainfo -c” command. See “[4.6 clorainfo - Display Resource Configuration and Monitoring Status](#)”.

- Oracle user name
- Oracle user's environment variable ORACLE_HOME
- OracleSID

If your setup information is incorrect, set proper values again. See “[Chapter 2 Environment setup](#)”.

A.3.2 Message was output

The message was output to syslog due to fault of PDBs.

[Case 1] (Standby Operation, Single-Node Cluster Operation)

If the PDB is abnormal, the following message is output.

```
FSP_PCLW-ORACLE_FJSVclora: ERROR: 9242: clorapdbmon detected OPEN_MODE of PDB <PDB name> is invalid.  
(CDB=<ORACLE_SID of CDB> PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

Take corrective action on Oracle database.

For details about the monitoring of PDB, see "[3.1.1.2 Monitoring Oracle resources](#)".

For details about the monitoring of PDB in the Oracle Data Guard/Oracle Active Data Guard environment , see "[G.1 Feature Outline](#)".

Appendix B Change Oracle Resource Settings

This section explains how to change the Oracle resource settings.

B.1 Resource Additional Creation

B.1.1 Respectively

This section explains how to create an Oracle resource newly and register it to an existing userApplication that includes an Oracle resource already.



Example

To create a Listener “LISTENER_2” newly and register it to an existing userApplication including an Oracle instance resource and a Listener resource “LISTENER” already.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.



Note

If you create and register an Oracle RAC instance resource or a Listener resource in the Oracle RAC Scalable Operation, start up Oracle Clusterware on all nodes.

For details, see “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

3. Select “Edit userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the target resource (e.g. Oracle1) from the list in the “List of userApplication and resource” screen, and click “Next”.
5. Select a resource that one wants to create from the menu in the “Set up Resource” screen, and click “Next”.
 - In the Standby Operation
If you create and register an Oracle instance resource or an Oracle ASM instance resource, select “AdditionalInstance” here, and click “Next”. After that, create and set the resource according to the steps 4, 5 of “[2.2.7.2 Oracle Resource Creation](#)”.
If you create and register a Listener resource, select “AdditionalListener” here, and click “Next”. After that, create and set the resource according to the steps 6, 7 of “[2.2.7.2 Oracle Resource Creation](#)”.
 - In the Oracle RAC Scalable Operation
If you create and register an Oracle Clusterware resource, select “AdditionalOracleClusterware” here, and click “Next”. After that, create and set the resource according to the steps 3 to 5 of “[2.3.4 userApplication with Oracle Clusterware](#)”.
If you create and register an Oracle RAC instance resource, select “AdditionalRACInstance” here, and click “Next”. After that, create and set the resource according to the steps 7 to 11 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.
If you create and register an Oracle RAC listener resource, select “AdditionalRACListener” here, and click “Next”. After that, create and set the resource according to the steps 13 to 17 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.
 - In the Single-Node Cluster Operation
If you create and register an Oracle instance resource or an Oracle ASM instance resource, select “AdditionalInstance” here, and click “Next”. After that, create and set the resource according to the steps 4, 5 of “[2.2.7.2 Oracle Resource Creation](#)”.
If you create and register a Listener resource, select “AdditionalListener” here, and click “Next”. After that, create and set the resource according to the steps 6, 7 of “[2.2.7.2 Oracle Resource Creation](#)”.
The setting of AutoRecover Flag is recommended for Oracle instance resources and Oracle Listener resources.

The availability is increased by restarting Oracle instance resources and Oracle Listener resources automatically when an error is detected.

Attributes	Values
Flags	AutoRecover (A)

6. Repeat the step 5 if need to create and register resources else.
7. After completion, select “SAVE+EXIT” in the “Set up Resource” screen, and click “Registration”.
After that, reply “Yes” to the displayed message “0803 Do you want to register setup in a cluster system?”
8. Reply “Yes” to the displayed message “0817 Do you want to distribute RMS Configuration?”
9. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

B.1.2 In a Group

This section explains how to create an Oracle resource newly and register it to an existing userApplication that does not include any Oracle instance resource and Listener resource.

For further details, refer to “PRIMECLUSTER Installation and Administration Guide”.



Example

To create an Oracle instance resource and(or) a Listener resource newly and register them(it) to an existing userApplication including Gds, Fsystem and Gl resources already.

In the standby operation, it is the same as the procedure in “2.2.7.2 Oracle Resource Creation”.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.



Note

If you create and register an Oracle RAC instance resource or a Listener resource in the Oracle RAC Scalable Operation, start up Oracle Clusterware on all nodes.

For details, see “2.3.5 userApplication with Oracle RAC Instances and Listeners”.

3. Select “Remove userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the existing userApplication (e.g. userApp_1) from the list in the “List of userApplication and resource” screen, and click “Remove”.
After that, click “userApplication” to reply to the displayed message “0807 Do you want to remove only selected userApplication (*userApplication_name*)? Do you want to remove all the resources userApplication?”



Note

Do not click “All” to reply to the message. Not only the userApplication but also existing resources will be removed.

5. Select “Create Resource” in the “userApplication Configuration menu” screen, and click “Next”.
6. Select “Oracle” from the “Resource type” list in the “Create Resource” screen, and click “Next”.

7. Select a resource that one wants to create from the menu in the “Set up Resource” screen, and click “Next”.

- In the Standby Operation

If you create and register an Oracle instance resource or an Oracle ASM instance resource, select “AdditionalInstance” here, and click “Next”. After that, create and set the resource according to the steps 4, 5 of “[2.2.7.2 Oracle Resource Creation](#)”.

If you create and register a Listener resource, select “AdditionalListener” here, and click “Next”. After that, create and set the resource according to the steps 6, 7 of “[2.2.7.2 Oracle Resource Creation](#)”.

- In the Oracle RAC Scalable Operation

If you create and register an Oracle Clusterware resource, select “AdditionalOracleClusterware” here, and click “Next”. After that, create and set the resource according to the steps 3 to 5 of “[2.3.4 userApplication with Oracle Clusterware](#)”.

If you create and register an Oracle RAC instance resource, select “AdditionalRACInstance” here, and click “Next”. After that, create and set the resource according to the steps 7 to 11 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

If you create and register an Oracle RAC listener resource, select “AdditionalRACListener” here, and click “Next”. After that, create and set the resource according to the steps 13 to 17 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

- In the Single-Node Cluster Operation

If you create and register an Oracle instance resource or an Oracle ASM instance resource, select “AdditionalInstance” here, and click “Next”. After that, create and set the resource according to the steps 4, 5 of “[2.2.7.2 Oracle Resource Creation](#)”.

If you create and register a Listener resource, select “AdditionalListener” here, and click “Next”. After that, create and set the resource according to the steps 6, 7 of “[2.2.7.2 Oracle Resource Creation](#)”.

The setting of AutoRecover Flag is recommended for Oracle instance resources and Oracle Listener resources.

The availability is increased by restarting Oracle instance resources and Oracle Listener resources automatically when an error is detected.

Attributes	Values
Flags	AutoRecover (A)

8. Repeat the step 7 as many times as needed.

9. Select “Create userApplication” in the “userApplication Configuration menu” screen, and click “Next”.

After that, create a userApplication including the Oracle resource.

- In the Standby Operation

For further details of the attributes of userApplication, refer to “[2.2.3 userApplication Creation](#)”.

- In the Oracle RAC Scalable Operation

For further details of the attributes of userApplication, refer to “[2.3.3 userApplication and Resource Configuration](#)”.

- In the Single-Node Cluster Operation

The settings for userApplication are as follows. For the attribute of the others, see the PRIMECLUSTER manuals.

Attributes	Values
AutoSwitchOver	Do not set the values.
PersistentFault	1
HaltFlag	no
ShutdownPriority	Do not set the values.
OnlinePriority	Do not set the values.

10. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

B.2 Change Resource Settings

This section explains how to change settings of an existing resource.

Example

To change “Interval” attribute of an existing Oracle instance resource, from “60” to “30”.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.

Note

If you create and register an Oracle RAC instance resource or a Listener resource in the Oracle RAC Scalable Operation, start up Oracle Clusterware on all nodes.

For details, see “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

3. Select “Edit userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the resource (e.g. Oracle1) which includes the resource (Oracle Clusterware resource, Oracle instance resource or the Listener resource) that one wants to modify from the list in the “List of userApplication and resource” screen, and click “Next”.
5. Select the existing resource that one wants to modify from the menu in the “Set up Resource” screen, and click “Next”.
 - In the Standby Operation or the Single-Node Cluster Operation
If you modify an Oracle instance resource or an Oracle ASM instance resource, select “OracleInstanceName[n]=*OracleSID*” here, and click “Next”. In the next screen, select “SELECTED=*OracleSID*”, and click “Next”.
If you modify an Oracle listener resource, select “OracleListenerName[n]=*LISTENER*” here, and click “Next”. In the next screen, select “SELECTED=*LISTENER*”, and click “Next”.
 - In the Oracle RAC Scalable Operation
If you modify an Oracle Clusterware resource, select “OracleClusterware[n]=Clusterware” here, and click “Next”. In the next screen, select “SELECTED=Clusterware”, and click “Next”.
If you modify an Oracle RAC instance resource, select “RACInstance[n]=*OracleSID*” here, and click “Next”. In the next screen, select “SELECTED=*OracleSID*”, and click “Next”.
If you modify an Oracle RAC listener resource, select “RACListener[n]=*CRS resource name*” here, and click “Next”. In the next screen, select “SELECTED=*CRS resource name*”, and click “Next”.
6. Change settings in the “Set up Resource” screen.
 - In the Standby Operation or the Single-Node Cluster Operation
In the case of an Oracle instance resource or an Oracle ASM instance resource, change settings according to the step 5 of “[2.2.7.2 Oracle Resource Creation](#)”.
In the case of a Listener resource, change settings according to the step 7 of “[2.2.7.2 Oracle Resource Creation](#)”.
 - In the Oracle RAC Scalable Operation
In the case of an Oracle Clusterware resource, change settings according to the step 5 of “[2.3.4 userApplication with Oracle Clusterware](#)”.
In the case of an Oracle RAC instance resource, change settings according to the step 10 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.
In the case of an Oracle RAC listener resource, change settings according to the step 16 of “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.
7. Select “SAVE+RETURN” in the “Set up Resource” screen after completed.
8. Repeat the steps 5 to 7 if need to change resources else.

9. After completion, select “SAVE+EXIT” in the “Set up Resource” screen, and click “Registration”.
After that, reply “Yes” to the displayed message “0803 Do you want to register setup in a cluster system?”
10. Reply “Yes” to the displayed message “0817 Do you want to distribute RMS Configuration?”
11. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

B.3 Change Resource Name

This section explains how to change the resource name of the existing resource. It is necessary to delete the existing userApplication. For details, refer to “PRIMECLUSTER Installation and Administration Guide”.

Example

To change the name of Oracle resource including Oracle Clusterware resource, from “Oracle1” to “Oracle2”.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.

Note

If you create and register an Oracle RAC instance resource or a Listener resource in the Oracle RAC Scalable Operation, start up Oracle Clusterware on all nodes.

For details, see “[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)”.

3. Select “Remove userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the existing userApplication (e.g. userApp_1) from the list in the “List of userApplication and resource” screen, and click “Remove”.
After that, click “userApplication” to reply to the displayed message “0807 Do you want to remove only selected userApplication (userApplication_name)? Do you want to remove all the resources userApplication?”

Note

Do not click “All” to reply to the message. Not only the userApplication but also existing resources will be removed.

5. Select “Edit userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
6. Select the resource (e.g. Oracle1) which you want to change from the list in the “List of userApplication and resource” screen, and click “Next”.
7. Select the “Resource” from the menu in the “Set up Resource” screen, and click “Next”.
8. Enter the Oracle resource name in the “Set up Resource” screen, and click “Next”.
9. Select “SAVE+EXIT” in the “Set up Resource” screen.
After that, reply “Yes” to the displayed message “0803 Do you want to register setup in a cluster system?”
10. Select “Create userApplication” in the “userApplication Configuration menu” screen, and click “Next”.
After that, create a userApplication that includes the remaining resources.
11. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

B.4 Resource Deletion

B.4.1 Respectively

This section explains how to delete an Oracle instance or a Listener resource from an existing userApplication that includes an Oracle resource already.



Example

To delete only a Listener resource from an existing userApplication including an Oracle instance resource and a Listener resource already in standby operation.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.
3. Select “Edit userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the resource (e.g. Oracle1) which includes the resource (Oracle Clusterware resource, Oracle instance resource or the Listener resource) that one wants to delete from the list in the “List of userApplication and resource” screen, and click “Next”.
5. Select the existing resource that one wants to delete from the menu in the “Set up Resource” screen, and click “Next”.
 - In the Standby Operation or the Single-Node Cluster Operation
If you modify an Oracle instance resource or an Oracle ASM instance resource, select “OracleInstanceName[*n*]=*OracleSID*” here, and click “Next”. In the next screen, select “NONE”, and click “Next”.
If you modify an Oracle listener resource, select “OracleListenerName[*n*]=*LISTENER*” here, and click “Next”. In the next screen, select “NONE”, and click “Next”.
 - In the Oracle RAC Scalable Operation
If you modify an Oracle Clusterware resource, select “OracleClusterware[*n*]=Clusterware” here, and click “Next”. In the next screen, select “NONE”, and click “Next”.
If you modify an Oracle RAC instance resource, select “RACInstance[*n*]=*OracleSID*” here, and click “Next”. In the next screen, select “NONE”, and click “Next”.
If you modify an Oracle RAC listener resource, select “RACListener[*n*]=*CRS resource name*” here, and click “Next”. In the next screen, select “NONE”, and click “Next”.
6. Repeat the step 5 if need to delete resources else.



Note

You may not delete all the resources included in the Oracle resource (e.g. Oracle1). At least one or more resources (Oracle Clusterware resource, Oracle instance resource or Listener resource) should exist in the Oracle resource.

If you need to delete all the resources included in the Oracle resource, perform the steps in “[B.4.2 In a Group](#)”.

7. After completion, select “SAVE+EXIT” in the “Set up Resource” screen, and click “Registration”.
After that, reply “Yes” to the displayed message “0803 Do you want to register setup in a cluster system?”
8. Reply “Yes” to the displayed message “0817 Do you want to distribute RMS Configuration?”
9. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

B.4.2 In a Group

This section explains how to delete an Oracle resource and a Listener resource in a group from an existing userApplication including them already.

For further details, refer to “PRIMECLUSTER Installation and Administration Guide”.



Example

When delete an Oracle resource and a Listener resource in a group from an existing userApplication including them already in standby operation.

1. Stop RMS on all nodes.
2. Start up userApplication Configuration Wizard.
3. Select “Remove userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
4. Select the existing userApplication (e.g. userApp_1) from the list in the “List of userApplication and resource” screen, and click “Remove”.
After that, click “userApplication” to reply to the displayed message “0807 Do you want to remove only selected userApplication (*userApplication_name*)? Do you want to remove all the resources userApplication?”



Note

Do not click “All” to reply to the message. Not only the userApplication but also existing resources will be removed.

5. Select “Remove userApplication or Resource” in the “userApplication Configuration menu” screen, and click “Next”.
6. Select the target resource (e.g. Oracle1) from the list in the “List of userApplication and resource” screen, and click “Remove”.
After that, reply “Yes” to the displayed message “0808 Do you want to remove only selected Resource (*Resource_name*) and all the resources under Resource?”
7. Select “Create userApplication” in the “userApplication Configuration menu” screen, and click “Next”.
After that, create a userApplication that includes the remaining resources.
8. Click “End” in the “userApplication Configuration menu” screen, and terminate userApplication Configuration Wizard.

Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation

This section describes how to install Oracle Grid Infrastructure and Oracle Database when you use Oracle ASM of Oracle Database 11g R2 or later.

Point

When Oracle ASM of Oracle Database 11g R2 or later is used in standby operation, it is necessary to install Oracle Grid Infrastructure.

Note

- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle Database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating one user is not supported.
A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle Database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.
- Diskgroup that stores the parameter file and the password file of Oracle ASM is not shared between each node.

Install Oracle Grid Infrastructure and Oracle Database on the local disk of each node.

The Oracle ASM instance is created on each node. The database are only created on the operating node. The standby node will only set the database made by the operating node.

The table below shows the common method of installation and settings of Oracle Grid Infrastructure and Oracle Database.

No	Overview	
	Operating node	Standby node
1	Set up the kernel parameter	Set up the kernel parameter
2	Create Grid user, Oracle user	Create Grid user, Oracle user
3	Set up shared disk units	
4	Create userApplication with No Oracle Resources	Create userApplication with No Oracle Resources
5	userApplication startup	
6	Install Oracle Grid Infrastructure	
7	Create diskgroup for the database	
8	Check CSS and OHAS of Oracle Grid Infrastructure is online	
9	Check all services status of Oracle Grid Infrastructure	
10	Stop Oracle High Availability Services	
11		Switch userApplication
12		Install Oracle Grid Infrastructure
13		Mount Diskgroup for the database
14		Check CSS and OHAS of Oracle Grid Infrastructure is online

No	Overview	
	Operating node	Standby node
15		Check all services status of Oracle Grid Infrastructure
16		Restart Oracle High Availability Services
17		Check all services status of Oracle Grid Infrastructure
18		Stop Oracle High Availability Services
19	Switch userApplication	
20	Start Oracle High Availability Services	
21	Check all services status of Oracle Grid Infrastructure	
22	Install Oracle Database	
23	Create database	
24	Check database status	
25	Restart Oracle High Availability Services	
26	Check all services status of Oracle Grid Infrastructure	
27	Change IP address of the Oracle listener	
28	Check parameter file of the database	
29	Check directory of the database	
30	Stop Oracle High Availability Services	
31		Switch userApplication
32		Start Oracle High Availability Services
33		Check all services status of Oracle Grid Infrastructure
34		Install Oracle Database
35		Environment setting of the database
36	Register SYSTEM user password	Register SYSTEM user password
37		Register the database resource
38		Start the database resource
39		Stop Oracle High Availability Services

For details of each steps as follows.

1. Set up the kernel parameter

Set up values in the “/etc/system” file for Oracle database in addition to the values for PRIMECLUSTER.

The kernel parameter values vary depending on the implemented Oracle Database versions.

Refer to the Oracle Database installation guide. The parameter values should be the same on all the nodes.

For semopm, specify a value of 4 or more.

2. Create Grid user, Oracle user

Create separate users, Grid user and Oracle user. Grid user is for installation of Oracle Grid Infrastructure and Oracle user is for Oracle Database.

Set the ORACLE_BASE, ORACLE_HOME and ORACLE_SID environment variables for your Oracle database environment.

Add \$ORACLE_HOME/bin into the PATH environment variable.

If the directory where listener.ora is stored is not under \$ORACLE_HOME/network/admin, set the TNS_ADMIN environment variable.

Set a different directory for an ORACLE_BASE of the installation user of Oracle Database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure, respectively. Set ORACLE_HOME of Oracle Grid Infrastructure to Grid user's ORACLE_HOME environment variable.

Set ORACLE_HOME of Oracle Database to Oracle user's ORACLE_HOME environment variable.

Set ORACLE_SID of Oracle Grid Infrastructure to Grid user's ORACLE_SID environment variable.

Set ORACLE_SID of Oracle Database to Oracle user's ORACLE_SID environment variable.

The user ID, the group ID and environment variable must be the same on all nodes.

Example

The example of setting Oracle user's environment variable.

(.profile)

```
ORACLE_BASE=/u01/app/oracle; export ORACLE_BASE
ORACLE_HOME=/u01/app/oracle/product/db; export ORACLE_HOME
ORACLE_SID=ora; export ORACLE_SID
PATH=$ORACLE_HOME/bin:/usr/bin:/usr/ccs/bin:/usr/ucb; export PATH
```

Example

The example of setting Grid user's environment variable.

(.profile)

```
ORACLE_BASE=/u01/app/grid; export ORACLE_BASE
ORACLE_HOME=/u01/app/grid/product/db; export ORACLE_HOME
ORACLE_SID=+ASM; export ORACLE_SID
PATH=$ORACLE_HOME/bin:/usr/bin:/usr/ccs/bin:/usr/ucb; export PATH
TNS_ADMIN=$ORACLE_HOME/network/admin2; export TNS_ADMIN
```

3. Set up shared disk units

Set shared disk units that are managed by Oracle ASM. Create shared disk to store the database and shared disk to store the parameter file and the password file of Oracle ASM. Set the Grid user to the owner of the device files of the shared disks.

The following three shared disks are at least necessary.

- Disk for Oracle ASM on the operating node
The disk should have a size of 300MB.
- Disk for Oracle ASM on the standby node
The disk should have a size of 300MB.
- Disk for the database
The database is stored. The disk is shared between each node.

4. Create userApplication with No Oracle Resources

Create userApplication that does not include Oracle resources before installing Oracle Grid Infrastructure.

For information on how to create the userApplication, see following.

- [2.2.3 userApplication Creation](#)
- [2.2.4 userApplication with No Oracle Resources](#)
- [2.2.5 userApplication Operation Check](#)

5. userApplication startup on the operating node

Start userApplication on the operating node, and verify the shared disk units and the takeover IP address are enabled.

6. Install Oracle Grid Infrastructure on the operating node

Install Oracle Grid Infrastructure to the local disks on the operating node with Grid user according to the Oracle Database manuals and the installation guide.

- Oracle Database 11g R2
Select the "Configure Oracle Grid Infrastructure for a Standalone Server" option to install and create the Oracle ASM instance.
- Oracle Database 12c R1
Select the "Install and Configure Oracle Grid Infrastructure for a Standalone Server" option to install and create the Oracle ASM instance.
- Oracle Database 12c R2/18c/19c
Select the "Configure Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)" option to install and create the Oracle ASM instance.

Create diskgroup in the disk for Oracle ASM on the operating node.

The Oracle ASM instance name must begin with "+". The default name is "+ASM".

7. Create diskgroup for the database on the operating node

Create diskgroup in the disk for the database with ASMCA or SQL*Plus. For details about ASMCA, refer to the manual of Oracle Grid Infrastructure.

1. Execute the SQL*Plus as a Grid user, and connect to Oracle ASM instance

```
# su - <Grid user>
$ export ORACLE_SID=<ASM SID>
$ sqlplus / as sysasm
```

2. Add the disk discovery string associated with the diskgroup for the database to the ASM_DISKSTRING parameter

```
SQL> ALTER SYSTEM SET ASM_DISKSTRING = <Disk discovery string associated with the diskgroup
for Oracle ASM on the operating node> , <Disk discovery string associated with the diskgroup
for the database> SCOPE=BOTH;
```

Specify the disk discovery string of diskgroup made at step 6 for <disk discovery string associated with the diskgroup for Oracle ASM on the operating node>.

Delimit it by “,” when there are two or more disk discovery string of diskgroup for the database.

3. Add the diskgroup for the database to the ASM_DISKGROUPS parameter

```
SQL> ALTER SYSTEM SET ASM_DISKGROUPS = <Diskgroup for Oracle ASM on the operating node> ,
<Diskgroup for the database> SCOPE=BOTH;
```

Specify the diskgroup made at step 6 for <Diskgroup for Oracle ASM on the operating node>.

Delimit it by “,” when there are two or more diskgroups for the database.

4. Create diskgroup for the database

```
SQL> CREATE DISKGROUP <Diskgroup for the database> DISK <Disk discovery string associated
with the diskgroup for the database>;
```

Specify the diskgroup made at step 6 for <Diskgroup for Oracle ASM on the operating node>.

Execute SQL for each diskgroup when there are two or more diskgroups for the database.

Example

Example for there are two diskgroups for the database.

- The diskgroup for Oracle ASM on the operating node is "ASM1", and the disk discovery string is "/dev/raw/raw1".
- The diskgroup for the database is "DATA", and the disk discovery string is "/dev/raw/raw3", "/dev/raw/raw4".

- The diskgroup for the database(backup) is "BACKUP", and the disk discovery string is "/dev/raw/raw5".

```
SQL> ALTER SYSTEM SET ASM_DISKSTRING = '/dev/raw/raw1' , '/dev/raw/raw3' , '/dev/raw/raw4' , '/dev/raw/raw5' SCOPE=BOTH;
SQL> ALTER SYSTEM SET ASM_DISKGROUPS = 'ASM1' , 'DATA' , 'BACKUP' SCOPE=BOTH;
SQL> CREATE DISKGROUP DATA DISK '/dev/raw/raw3' , '/dev/raw/raw4';
SQL> CREATE DISKGROUP BACKUP DISK '/dev/raw/raw5';
```

8. Check CSS and OHAS of Oracle Grid Infrastructure is online on the operating node

Execute the following commands as a Grid user on the operating node.

Check Oracle High Availability Services and Cluster Synchronization Services of Oracle Grid Infrastructure are online.

```
# su - <Grid user>
$ crsctl check has
$ crsctl check css
```

 Example

```
$ crsctl check has
CRS-4638: Oracle High Availability Services is online
$ crsctl check css
CRS-4529: Cluster Synchronization Services is online
```

9. Check all services status of Oracle Grid Infrastructure on the operating node

Execute the following commands as a Grid user on the operating node.

```
# su - <Grid user>
$ crsctl status resource -t
```

 Example

```
$ crsctl status resource -t
-----
NAME                TARGET  STATE        SERVER                STATE_DETAILS
-----
Local Resources
-----
ora.ASM1.dg
ora.DATA.dg         ONLINE  ONLINE       node1
ora.asm             ONLINE  ONLINE       node1                Started
ora.ons             OFFLINE OFFLINE       node1
-----
Cluster Resources
-----
ora.cssd
   1                ONLINE  ONLINE       node1
ora.diskmon
   1                OFFLINE OFFLINE
ora.evmd
   1                ONLINE  ONLINE       node1
$
```

Check Diskgroup("ora.*.dg") and ASM("ora.asm") are online.

10. Stop Oracle High Availability Services on the operating node

Execute the following commands as a Grid user on the operating node to stop Oracle High Availability Services.

```
# su - <Grid user>
$ crsctl stop has
```

11. Switch userApplication to the standby node

Switch userApplication to the standby node, and verify the shared disk units and the takeover IP address are enabled.

12. Install Oracle Grid Infrastructure on the standby node

Install Oracle Grid Infrastructure to the local disks on the standby node with Grid user according to the Oracle Database manuals and the installation guide.

- Oracle Database 11g R2
Select the "Configure Oracle Grid Infrastructure for a Standalone Server" option to install and create the Oracle ASM instance.
- Oracle Database 12c R1
Select the "Install and Configure Oracle Grid Infrastructure for a Standalone Server" option to install and create the Oracle ASM instance.
- Oracle Database 12c R2/18c/19c
Select the "Configure Oracle Grid Infrastructure for a Standalone Server (Oracle Restart)" option to install and create the Oracle ASM instance.

Create diskgroup in the disk for Oracle ASM on the standby node. Specify the Oracle ASM instance name. The Oracle ASM instance name must be same made at step 6. The diskgroup for Oracle ASM must be different name and disk discovery string made at step 6.

13. Mount Diskgroup for the database on the standby node

1. Execute the SQL*Plus as a Grid user, and connect to Oracle ASM instance

```
# su - <Grid user>
$ export ORACLE_SID=<ASM SID>
$ sqlplus / as sysasm
```

2. Add the disk discovery string associated with the diskgroup for the database to the ASM_DISKSTRING parameter

```
SQL> ALTER SYSTEM SET ASM_DISKSTRING = <Disk discovery string associated with the diskgroup
for Oracle ASM on the standby node> , <Disk discovery string associated with the diskgroup
for the database> SCOPE=BOTH;
```

Specify the disk discovery string of diskgroup made at step 12 for <disk discovery string associated with the diskgroup for Oracle ASM on the standby node>.

Delimit it by “,” when there are two or more disk discovery string of diskgroup for the database.

3. Add the diskgroup for the database to the ASM_DISKGROUPS parameter

```
SQL> ALTER SYSTEM SET ASM_DISKGROUPS = <Diskgroup for Oracle ASM on the standby node> ,
<Diskgroup for the database> SCOPE=BOTH;
```

Specify the diskgroup made at step 12 for <Diskgroup for Oracle ASM on the standby node>.

Delimit it by “,” when there are two or more diskgroups for the database.

4. Mount Diskgroup for the database

```
SQL> ALTER DISKGROUP <Diskgroup for the database> MOUNT;
```

Execute SQL for each diskgroup when there are two or more diskgroups for the database.

Example

Example for there are two diskgroups for the database.

- The diskgroup for Oracle ASM on the standby node is "ASM2", and the disk discovery string is "/dev/raw/raw2".
- The diskgroup for the database is "DATA", and the disk discovery string is "/dev/raw/raw3", "/dev/raw/raw4".
- The diskgroup for the database(backup) is "BACKUP", and the disk discovery string is "/dev/raw/raw5".

The diskgroup for Oracle ASM "ASM2" has already been mounted.

```
SQL> ALTER SYSTEM SET ASM_DISKSTRING = '/dev/raw/raw2' , '/dev/raw/raw3' , '/dev/raw/raw4' ,  
'/dev/raw/raw5' SCOPE=BOTH;  
SQL> ALTER SYSTEM SET ASM_DISKGROUPS = 'ASM2' , 'DATA' , 'BACKUP' SCOPE=BOTH;  
SQL> ALTER DISKGROUP 'DATA' MOUNT;  
SQL> ALTER DISKGROUP 'BACKUP' MOUNT;
```

14. Check CSS and OHAS of Oracle Grid Infrastructure is online on the standby node

Execute the following commands as a Grid user on the standby node.

Check Oracle High Availability Services and Cluster Synchronization Services of Oracle Grid Infrastructure are online.

```
# su - <Grid user>  
$ crsctl check has  
$ crsctl check css
```

15. Check all services status of Oracle Grid Infrastructure on the standby node

Execute the following commands as a Grid user on the standby node.

```
# su - <Grid user>  
$ crsctl status resource -t
```

16. Restart Oracle High Availability Services on the standby node

Execute the following commands as a Grid user on the standby node.

```
# su - <Grid user>  
$ crsctl stop has  
$ crsctl start has
```

17. After restart, check all services status of Oracle Grid Infrastructure on the standby node

Execute the following commands as a Grid user on the standby node.

```
# su - <Grid user>  
$ crsctl status resource -t
```

18. Stop Oracle High Availability Services on the standby node

Execute the following commands as a Grid user on the standby node to stop Oracle High Availability Services.

```
# su - <Grid user>  
$ crsctl stop has
```

19. Switch userApplication to the operating node

Switch userApplication to the operating node, and verify the shared disk units and the takeover IP address are enabled.

20. Start Oracle High Availability Services on the operating node

Execute the following commands as a Grid user on the operating node to start Oracle High Availability Services.

```
# su - <Grid user>  
$ crsctl start has
```

21. Check all services status of Oracle Grid Infrastructure on the operating node

Execute the following commands as a Grid user on the operating node.

```
# su - <Grid user>
$ crsctl status resource -t
```

22. Install Oracle Database on the operating node

Install Oracle Database to the local disks on the operating node with Oracle user by referring to the Oracle Database manual and installation guide. Install only Oracle Database software, and do not create the database in this step.

23. Create Oracle Database on the operating node

On the operating node, create Oracle Database on diskgroup for the database made at step 7.

24. Check the database status on the operating node

Execute the following commands as a Grid user on the operating node.

```
# su - <Grid user>
$ crsctl status resource -t
or
$ crsctl status resource ora.<Database name>.db
```

Example

Example for "crsctl status resource ora.<Database name>.db".

```
$ crsctl status resource ora.racdb.db
NAME=ora.racdb.db
TYPE=ora.database.type
TARGET=ONLINE
STATE=ONLINE on dbsv1
```

25. Restart Oracle High Availability Services on the operating node

Execute the following commands as a Grid user on the operating node.

```
# su - <Grid user>
$ crsctl stop has
$ crsctl start has
```

26. Check all services status of Oracle Grid Infrastructure on the operating node

After restart, wait for about five seconds, and execute the following commands as a Grid user on the operating node.

```
# su - <Grid user>
$ crsctl status resource -t
```

27. Change IP address of the Oracle listener

If you use Oracle listener switching operation using a logical IP address, specify the logical IP address for the IP address of the Oracle listener.

- <Grid user's \$ORACLE_HOME>/network/admin/listener.ora

If the Oracle listener is monitored through tns ping, set up the following file.

- <Oracle user's \$ORACLE_HOME>/network/admin/tnsnames.ora

- <Grid user's \$ORACLE_HOME>/network/admin/tnsnames.ora

For information on how to modify, see "2.2.6.1 Oracle database Creation and Setting".

28. Check parameter file of the database

Execute the following command as a Grid user on the operating node and record the location of the SPFILE.

```
# su - <Grid user>
$ crsctl status resource <Oracle Database resource name> -p | grep SPFILE
SPFILE=+DATA/xxxx/spfilexxxx.ora <-- record after "SPFILE =" of this line
```

You can confirm <Oracle Database resource name> using "crsctl status resource -t" command.

```
# su - <Grid user>
$ crsctl status resource -t
-----
NAME                TARGET  STATE        SERVER                STATE_DETAILS
-----
Local Resources
-----
ora.DATA.dg
                ONLINE  ONLINE       node1
ora.LISTENER.lsnr
                ONLINE  ONLINE       node1
ora.asm
                ONLINE  ONLINE       node1                Started
ora.ons
                OFFLINE OFFLINE       node1
-----
Cluster Resources
-----
ora.orcl.db
  1                ONLINE  ONLINE       node1                Open
ora.cssd
  1                ONLINE  ONLINE       node1
ora.diskmon
  1                OFFLINE OFFLINE
ora.evmd
  1                ONLINE  ONLINE       node1
$
```

In the above configuration, <Oracle Database resource name> is "ora.racdb.db".

29. Check directory of the database

Check the path and access privilege of the directory set in the following Oracle initialization parameters.

- AUDIT_FILE_DEST, BACKGROUND_DUMP_DEST, CORE_DUMP_DEST, USER_DUMP_DEST, DIAGNOSTIC_DEST

30. Stop Oracle High Availability Services on the operating node

Execute the following commands as a Grid user on the operating node to stop Oracle High Availability Services.

```
# su - <Grid user>
$ crsctl stop has
```

31. Switch userApplication to the standby node

Switch userApplication to the standby node, and verify the shared disk units and the takeover IP address are enabled.

32. Start Oracle High Availability Services on the standby node

Execute the following commands as a Grid user on the standby node to start Oracle High Availability Services.

```
# su - <Grid user>
$ crsctl start has
```

33. Check all services status of Oracle Grid Infrastructure on the standby node

Execute the following commands as a Grid user on the standby node.

```
# su - <Grid user>
$ crsctl status resource -t
```

34. Install Oracle Database on the standby node

Install Oracle Database to the local disks on the standby node with Oracle user by referring to the Oracle Database manual and installation guide. Install only Oracle Database software, and do not create the database in this step.

35. Environment setting of the database on the standby node

1. Copy the following directory of the operating node to the standby node.

- Under <Grid user's \$ORACLE_HOME>/network/admin
- Under <Oracle user's \$ORACLE_HOME>/network/admin

2. Create the directory checked at step 29 on the standby node.

The access privilege to the directories and files must be also the same as that on the operating node.

If you set where archive log is output on the operating node, it is necessary to set the same on the standby node.

36. Register SYSTEM user password

Execute the command on any one of the nodes, the operating node or the standby node.

PRIMECLUSTER Wizard for Oracle accesses and monitors Oracle instances as the Oracle SYSTEM user. Therefore, the SYSTEM user's password must be registered in PRIMECLUSTER Wizard for Oracle. Refer to "[4.3 clorapass - Register Password for Monitoring](#)" to register the password.

Register the password of the SYSTEM user of the CDB when you create the database using the multitenant architecture. The password of Local User of the PDB need not be registered.

37. Register the database resource

Execute the following command as an Oracle user on the standby node to register database resource made at step 23 to Oracle Restart of the standby node.

Specify the <db_unique_name>, <db_name> made at step 23 for <db_unique_name>, <db_name>.

Specify the Oracle user's ORACLE_HOME for <oracle_home>.

Specify the SPFILE recorded at step 28 for <SPFILE PATH>

Specify the Diskgroup made at step 7 for <disk_group_list>.

```
# su - <Oracle user>
$ srvctl add database -d <db_unique_name> -o <oracle_home> -p <SPFILE PATH> -s OPEN -y AUTOMATIC
-n <db_name> -a <disk_group_list> -t IMMEDIATE
```

Note

- Note that <db_unique_name> and <db_name> are different when this command is executed on the standby site of Oracle Data Guard.
- Add "-i <instance_name>" option when database name and instance name (ORACLE_SID) are different.

38. Start the database resource on the standby node

Execute the following command as an Oracle user on the standby node and verify the Oracle Database can be started.

```
# su - <Oracle user>
$ export ORACLE_SID=<ORACLE SID>
$ sqlplus / as sysdba
SQL> STARTUP
```

39. Stop Oracle High Availability Services on the standby node

Execute the following command as a Grid user on the standby node to stop Oracle High Availability Services.

```
# su - <Grid user>  
$ crsctl stop has
```

After the installation of Oracle Grid Infrastructure and Oracle Database is completed, change Oracle Restart Settings and create userApplication. For details, see "[2.4.2.2 Environment configuration with Oracle Database 11g R2 or later](#)".

Appendix D Using Oracle Database Software on shared disks

This section describes how to build a cluster application when Oracle Database software is installed on shared disks.

In the case of using Oracle Database 12c R2 or earlier, the Oracle Database software can be installed on shared disk.

In the case of using Oracle Database 18c/19c, the Oracle Database software cannot be installed on shared disk.

The table below shows the procedure for settings of Oracle database.

No	Overview	
	Operating node	Standby node
1	Install PRIMECLUSTER and PRIMECLUSTER Wizard for Oracle	Install PRIMECLUSTER and PRIMECLUSTER Wizard for Oracle.
2	Create userApplication with No Oracle Resources	
3	Set up the kernel parameter	Set up the kernel parameter
4	Create Oracle user	Create Oracle user
5	userApplication startup	
6	Set up shared disk units	
7	Set up Oracle Inventory	
8	Set up environment variables	
9	Install Oracle Database	
10	Create Oracle listener	
11	Create Oracle database	
12	Check Operation of Oracle database and listener	
13	Set up PRIMECLUSTER Wizard for Oracle	
14	Create userApplication with Oracle Resources	
15	Check Operation of userApplication	

For details of each step as follows.

1. Install PRIMECLUSTER and PRIMECLUSTER Wizard for Oracle
 Install PRIMECLUSTER and PRIMECLUSTER Wizard for Oracle.
 For information on how to install them, see following.
 - [2.2.1 PRIMECLUSTER Installation and Configuration](#)
2. Create userApplication with No Oracle Resources
 Create userApplication that does not include Oracle resources.
 For information on how to create it, see following.
 - [2.2.3 userApplication Creation](#)
 - [2.2.4 userApplication with No Oracle Resources\)](#)
 - [2.2.5 userApplication Operation Check](#)
3. Set up the Kernel parameter
 For information on how to set up Kernel parameter, see following.

- [2.2.2 Oracle Database Software Installation and Configuration](#)

4. Create Oracle user

For information on how to create Oracle user, see following.

- [2.2.2 Oracle Database Software Installation and Configuration](#)

Note

Set the path names(on shared disk) of the Oracle base directory and the Oracle home directory in Oracle user's login profile.

5. userApplication startup

Start up userApplication on the operating node, and verify the shared disk units and the takeover IP address are enabled.

6. Set up shared disk units

Set the write permission for Oracle user to the shared disk.

7. Set up Oracle Inventory

Create Oracle Inventory directory on the shared disk.

Example

```
$ mkdir -p $ORACLE_BASE/product/11.2.0/db_1/oraInventory
```

Create oraInst.loc on the shared disk.

Example

```
$ cat $ORACLE_BASE/etc/oraInst.loc
inventory_loc=$ORACLE_BASE/product/11.2.0/db_1/oraInventory
inst_group=oinstall
```

Specify the full path of Oracle Inventory directory for inventory_loc in the oraInst.loc file.

8. Set up environment variables

Set up environment variables before Oracle Universal Installer(OUI) starts.

```
$ unset TZ PERL
$ export ORACLE_HOSTNAME=<logical IP address>
```

9. Install Oracle Database

Install Oracle Database by Oracle Universal Installer(OUI).

Example

```
$ runInstaller -invPtrLoc $ORACLE_BASE/etc/oraInst.loc ORACLE_HOSTNAME=<logical IP address > [-debug]
```

Specify the full path of the oraInst.loc made at step 7 for the argument of "-invPtrLoc".

Specify logical IP address for "ORACLE_HOSTNAME".

The "-debug" is optional.

Proceed with the installation by following the OUI prompt.

- Oracle Database 11g R2 or later
In "Select Installation Option " screen, select the "Install database software only".
- Oracle Database 11g R1
In "Select Installation Method " screen, uncheck " Create Starter Database".

10. Create Oracle listener

The files are allocated as follows:

Files	Locations	Note
listener.ora	Share	-
tnsnames.ora	Share	-
<LISTENER>.log	Share	-

For information on how to set up listener.ora and tnsnames.ora, see following.

- [2.2.6.1 Oracle database Creation and Setting](#)

11. Create Oracle database

Create the database by Database Configuration Assistant (DBCA).

- Allocate a database

Create a database on the shared disk. The shared disk must be activated.

The files are allocated as follows:

Files	Locations	Note
Initialization parameter file (PFILE)	Share	-
Server parameter file (SPFILE)	Share	-
Password file	Share	-
Control files	Share	-
Data files	Share	-
Redo log files	Share	-
Archived redo log files	Arbitrary	Recommend to be multiplexed, allocating on a shared disk and a local disk.
Flash Recovery Area	Share	-
log files	AUDIT_FILE_DEST	Share
	BACKGROUND_DUMP_DEST	Share
	CORE_DUMP_DEST	Share
	USER_DUMP_DEST	Share
	DIAGNOSTIC_DEST (Oracle Database 11g or later)	Share

 Note

- Note that there is sufficient space to archive for archived redo log files if they are located on shared disks. If there is insufficient space, and data updating processing through monitoring SQL hangs, an oracle resource might fail. Afterwards, the service might stop finally on both operating node and standby nodes, because the space of shared disk is insufficient and the failover of userApplication fails on the standby node.
- Note that there is sufficient space in the disk of the directory specified by AUDIT_FILE_DEST for the database using the multitenant architecture. The log file in the AUDIT_FILE_DEST directory increases by about 1KB at monitoring interval of the

Oracle instance resource(Default: 30 seconds) when the PDB is monitored. Capacity and frequency of the log file are different according to the environment. Check the capacity of the AUDIT_FILE_DEST directory, and backup/delete it regularly.

Information

- Check if the Oracle user has privileges to write in a shared disk before creating the database.
- Create a database (In the case that the Oracle Database software is located on shared disk)
 - Operating node
Create a database on the operating node.

Note

If multiple Oracle homes are configured on one server, a different Oracle instance name must be assigned for each Oracle home.

Information

Refer to the Oracle Database manual.

- Standby node
There is no procedure on the standby node.

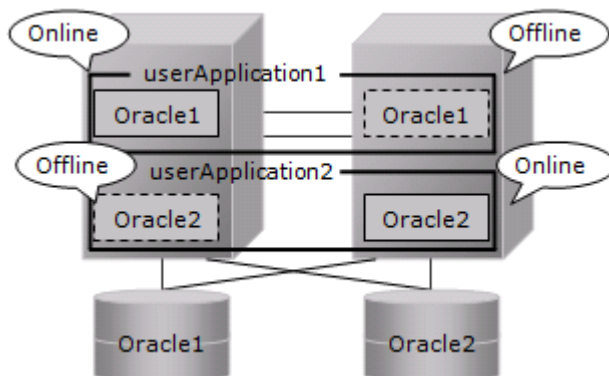
Note

Do not use "cloracpy" command in PRIMECLUSTER Wizard for Oracle if Oracle Database software is located on the shared disk.

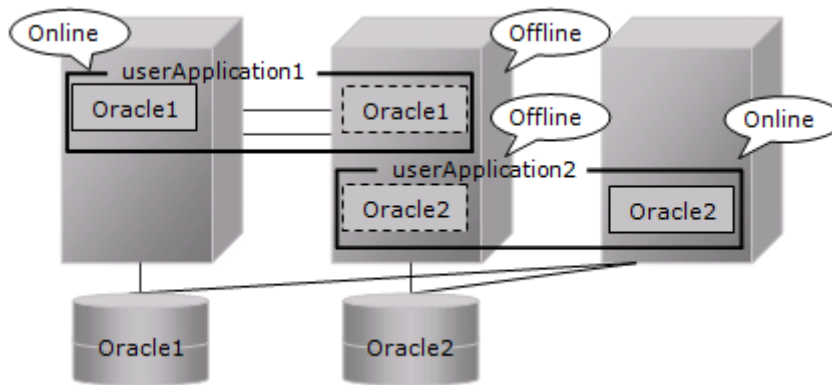
Example

In the case of Mutual standby operation and N:1 Standby operation, create a database on an operating node as well as 1:1 Standby operation. There is no procedure on the standby node. This is the same as the other operating modes.

- Mutual standby



- 2:1 Standby



12. Check Operation of Oracle database and listener

Check operation of Oracle database and listener of each node.

1. Start up RMS on all nodes if RMS does not start.

```
# /opt/SMAW/SMAWRrms/bin/hvcm -a
```

Stop Oracle database and listener on the operating node.

```
# su - <Oracle user>
$ sqlplus / as sysdba
SQL> SHUTDOWN IMMEDIATE
SQL> EXIT
$ lsnrctl stop <ListenerName>
$ exit
#
```

2. Switch userApplication to the standby node.

```
# /opt/SMAW/SMAWRrms/bin/hvswitch <userApplication> <SysNode>
```

3. Start up listener and Oracle database on the standby node.
Check operation of Oracle database and listener on the standby node.
After that, stop Oracle database and listener.

```
# su - <Oracle user>
$ lsnrctl start <ListenerName>
$ sqlplus / as sysdba
SQL> STARTUP

Confirming operation of Oracle database and listener

SQL> SHUTDOWN IMMEDIATE
SQL> EXIT
$ lsnrctl stop LISTENER
$ exit
#
```

4. Execute step 2 and step 3 on all standby nodes.
5. Stop RMS on all nodes.

 Note

- The Oracle "TWO_TASK" environment variable must not be used.
It is used to add a connect identifier to connect to Oracle instance then automatically connect to network. In PRIMECLUSTER

Wizard for Oracle, network connection is not supported. Users are supposed to connect to Oracle instance in local connection (“ / as sysdba”). If network connection is required, specify “@connect identifier” instead of using the “TWO_TASK” environment variable when connecting at the connecting.

- The processes other than definition of system environment variables must not be added to login.sql of Oracle DBA users. SQL can be described in the SQL*Plus profile login.sql. However, it might automatically be executed and affect ongoing operations because Oracle instance is controlled through SQL*Plus in PRIMECLUSTER Wizard for Oracle. It is available to setup the system environment variables to login.sql by SET command.



13. Set up PRIMECLUSTER Wizard for Oracle

Register the Oracle SYSTEM user password by "clorapass" command. See following.

- [4.3 clorapass - Register Password for Monitoring](#)

Define the full path of the alert log and the listener log in /opt/FJSVclora/etc/clgetoralog.conf. See following.

- [4.5 clgetoralog - Collect Troubleshooting Information](#)

14. Create userApplication with Oracle Resources

For information on how to create userApplication with Oracle Resources, see following.

- [2.2.7 userApplication Edit](#)

15. Check operation of userApplication

For information on how to check operation of userApplication, see following.

- [2.2.8 userApplication Operation Check](#)

Appendix E Using PRIMECLUSTER Wizard for Oracle in Oracle Solaris Zones Environment

This section explains notices, configuration procedures, and maintenance procedures in the case of using PRIMECLUSTER Wizard for Oracle with an Oracle Solaris Zones environment.

Note

To build single-node cluster operations on Oracle Solaris Zones environment, see "[Appendix F Single-Node Cluster Operation](#)". For the maintenance procedure of single-node cluster operations on Oracle Solaris Zones environment, see "[E.3 Maintenance Procedure](#)".

Information

About the method of installing PRIMECLUSTER in Oracle Solaris Zones environment, refer to "PRIMECLUSTER Installation and Administration Guide".

E.1 Notice of System Configuration

- Oracle RAC cannot be made a cluster in non-global zone.
- When you allocate the image of non-global zone on shared disks, create the volume for Oracle database allocated on the shared disk class for non-global zone where Oracle is installed.
When you allocate the image of non-global zone on a local disk, create the volume for Oracle database allocated on shared disk class, and enable it to access from non-global zone.

E.2 Construction Procedure

This section explains construction procedure of Oracle database and PRIMECLUSTER Wizard for Oracle in non-global zone. It needs to be beforehand completed to the setup of PRIMECLUSTER in non-global zone.

E.2.1 PRIMECLUSTER Wizard for Oracle Installation

Mount the media of PRIMECLUSTER Wizard for Oracle on non-global zone, or copy to non-global zone, and install PRIMECLUSTER Wizard for Oracle. About the installation procedure of PRIMECLUSTER Wizard for Oracle, refer to the Software Release Guide PRIMECLUSTER Wizard for Oracle for Oracle Solaris.

E.2.2 Oracle Database Software Installation and Oracle database Creation

Install Oracle Database software and create Oracle database. Refer to the following chapters.

- [2.2.2 Oracle Database Software Installation and Configuration](#)
- [2.2.6 Oracle database Creation and Setting](#)

Note

Be careful of the following points at the time of Oracle Database software installation, and database creation.

- About the allocation of Oracle Database software and a database, read description of the above-mentioned chapter as follows.
 - It is necessary to replace "local disk" with "Volume for root file system of non-global zone".
 - It is necessary to replace "shared disk" with "Volume for Oracle data allocation".
- When non-global zone image is shared, because the operating node and standby node shares the root file system of non-global zone, installation/setup of Oracle Database software, and creation/setup of a database are only once carried out by the operating node.

When non-global zone image is not shared, installation/setup of Oracle Database software are carried out by all the nodes. creation/setup of database are only once carried out by the operating node, and database setup of the operating node is copied to standby node using the cloracpy command.

- Carry out registration of the SYSTEM user's password by the clorapass command in every non-global zone.
 - Oracle listeners' IP address is set up according to the use existence or nonexistence of the GIs resource on non-global zone. When you don't use GIs resource, specify the IP address of non-global zone. When you use a GIs resource, specify the virtual IP (taking over IP).
 - In order to use Oracle ASM in Oracle Solaris Zones environment, for the specification of Oracle database, it is necessary to add a proc priocntl privilege toward non-global zone in advance.
- Execute the following commands on the global zone before installing Oracle Database software.

```
# zonecfg -z <zone name> set limitpriv=default,proc_priocntl
```

E.3 Maintenance Procedure

This section explains maintenance procedure of Oracle database and PRIMECLUSTER Wizard for Oracle in non-global zone.

E.3.1 Oracle Database Maintenance

To stop Oracle database of non-global zone for maintenance work, such as cold backup, it is necessary to interrupt Oracle instance monitoring temporarily. Refer to the following chapter.

- [3.2 Oracle database Maintenance](#)



Note at the time of the Oracle database maintenance work in non-global zone.

- In the above-mentioned chapter, although it is indicated that both the maintenance mode of PRIMECLUSTER and stop monitoring / restart monitoring command of PRIMECLUSTER Wizard for Oracle(hvoradisable, hvoraenable) are used, use only command of PRIMECLUSTER Wizard for Oracle(hvoradisable, hvoraenable) in non-global zone.

E.3.2 Patch Application to PRIMECLUSTER Wizard for Oracle

When applying a patch to PRIMECLUSTER Wizard for Oracle in non-global zone, set non-global zone as single user mode. At this time, use maintenance mode in global zone. Refer to "PRIMECLUSTER Installation and Administration Guide".

E.3.3 Troubleshooting Information

If the failure about Oracle database and PRIMECLUSTER Wizard for Oracle that are operated in non-global zone occur, login the non-global zone by zlogin from a global zone, and collect troubleshooting Information using the clgetoralog command. Refer to the following chapters.

- [4.5 clgetoralog - Collect Troubleshooting Information](#)

E.4 Uninstallation Procedure

About the uninstallation procedure of PRIMECLUSTER Wizard for Oracle, refer to the "Software Release Guide PRIMECLUSTER Wizard for Oracle for Oracle Solaris". About the back out procedure of patch, refer to README contained in the patch.

Appendix F Single-Node Cluster Operation

This section explains construction procedures and maintenance procedures in the case of using PRIMECLUSTER Wizard for Oracle with Single-node cluster operation.

Configuration Procedure

Configuration procedures depend on whether Oracle ASM is used and the version of Oracle ASM. Configure it by the following procedures according to your environment. Configuration procedures of single-node cluster operation on the Oracle Solaris Zones environment is also the following.

- Oracle ASM not used

No	Procedure
1	Install and configure PRIMECLUSTER
2	Install PRIMECLUSTER Wizard for Oracle
3	Install and configure Oracle Database software
4	Create userApplication with No Oracle resources
5	Create and set up an Oracle database
6	Edit userApplication
7	Check Operation of userApplication

For details, see “[F.1 Oracle ASM not used](#)”.

- Oracle ASM of Oracle Database 11g R1 or earlier used

No	Procedure
1	Install and configure PRIMECLUSTER
2	Install PRIMECLUSTER Wizard for Oracle
3	Install and configure Oracle Database software
4	Create userApplication with No Oracle resources
5	Create and set up an Oracle database
6	Edit userApplication
7	Check Operation of userApplication

For details, see “[F.2 Oracle ASM of Oracle Database 11g R1 or earlier used](#)”.

- Oracle ASM of Oracle Database 11g R2 or later used

No	Procedure
1	Install and configure PRIMECLUSTER
2	Install PRIMECLUSTER Wizard for Oracle
3	Set up the kernel parameter
4	Create Grid user, Oracle user
5	Set up shared disk units
6	Create userApplication with No Oracle resources
7	Start userApplication
8	Install Oracle Grid Infrastructure software
9	Install Oracle Database software

No	Procedure
10	Create and set up an Oracle database
11	Edit userApplication
12	Check Operation of userApplication

For details, see “[F.3 Oracle ASM of Oracle Database 11g R2 or later used](#)”.

Note

- In order to use Oracle ASM of Oracle Database 11g R2 or later, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating one user is not supported.
- In order to use Oracle ASM of Oracle Database 11g R2 or later, a different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.

Maintenance Procedures

For maintenance procedures for single-node cluster operation, see "[Chapter 3 Operation](#)". For maintenance procedures for single-node cluster operation on Oracle Solaris Zones, see "[E.3 Maintenance Procedure](#)".

F.1 Oracle ASM not used

1. Install and configure PRIMECLUSTER
Install and configure PRIMECLUSTER according to Software Release Guides and manuals of PRIMECLUSTER.
2. Install PRIMECLUSTER Wizard for Oracle
Install PRIMECLUSTER Wizard for Oracle according to a Software Release Guide of PRIMECLUSTER Wizard for Oracle.
3. Install and configure Oracle Database software
Set up the kernel parameter, create Oracle user and install Oracle Database software. See "[2.2.2 Oracle Database Software Installation and Configuration](#)".
4. Create userApplication with No Oracle resources
Create userApplication with No Oracle resources and check the operation of userApplication. See the following:
 - [2.2.4 userApplication with No Oracle Resources](#)
 - [2.2.5 userApplication Operation Check](#)

In single-node cluster operation, the settings for userApplication are as follows. For the attribute of the others, see the PRIMECLUSTER manuals.

Attributes	Values
AutoSwitchOver	Do not set the values.
PersistentFault	1
HaltFlag	no
ShutdownPriority	Do not set the values.
OnlinePriority	Do not set the values.

5. Create and set up an Oracle database
 - In single-node cluster operation, create and set up an Oracle database
Create Oracle databases and Oracle listeners according to the Oracle Database manuals.

- SYSTEM user password
Register the Oracle SYSTEM user password. See "[4.3 clorapass - Register Password for Monitoring](#)".
 - Define the full path of the log file
Define the full path of the alert log and the listener log in /opt/FJSVclora/etc/clgetoralog.conf. See "[4.5 clgetoralog - Collect Troubleshooting Information](#)".
 - Check Oracle database operation
Check if the Oracle database operation is properly running by executing start and stop of Oracle instances and Oracle listeners manually.
6. Edit userApplication
Register Oracle instance resources and Oracle listener resources to userApplication that is created at the step 4. See "[2.2.7 userApplication Edit](#)".
The setting of AutoRecover Flag is recommended for Oracle instance resources and Oracle listener resources. The availability is increased by restarting Oracle instance resources and Oracle listener resources automatically when an error is detected.

Attributes	Values
Flags	AutoRecover (A)

7. Check Operation of userApplication
Check the operation of userApplication including Oracle resources. See "[2.2.8 userApplication Operation Check](#)".

F.2 Oracle ASM of Oracle Database 11g R1 or earlier used

1. Install and configure PRIMECLUSTER
Install and configure PRIMECLUSTER according to Software Release Guides and manuals of PRIMECLUSTER.
2. Install PRIMECLUSTER Wizard for Oracle
Install PRIMECLUSTER Wizard for Oracle according to a Software Release Guide of .PRIMECLUSTER Wizard for Oracle.
3. Install and configure Oracle Database software
Set up the kernel parameter, create Oracle user and install Oracle Database software. See "[2.2.2 Oracle Database Software Installation and Configuration](#)".

Note

In order to use Oracle ASM in Oracle Solaris Zones environment, for the specification of Oracle database, it is necessary to add a proc priocntl privilege to non-global zone in advance.
Execute the following commands on the global zone before installing Oracle Database software.

```
# zonecfg -z <zone name> set limitpriv=default,proc_priocntl
```

4. Create userApplication with No Oracle resources
Create userApplication with No Oracle resources and check the operation of userApplication. See the following:
 - [2.2.4 userApplication with No Oracle Resources](#)
 - [2.2.5 userApplication Operation Check](#)

In single-node cluster operation, the settings for userApplication are as follows. For the attribute of the others, see the PRIMECLUSTER manuals.

Attributes	Values
AutoSwitchOver	Do not set the values.
PersistentFault	1
HaltFlag	no
ShutdownPriority	Do not set the values.

Attributes	Values
OnlinePriority	Do not set the values.

5. Create and set up an Oracle database

- In single-node cluster operation, create and set up an Oracle database
Create Oracle databases and Oracle listeners according to the Oracle Database manuals.
- SYSTEM user password
Register the Oracle SYSTEM user password. See "[4.3 clorapass - Register Password for Monitoring](#)".
- Define the full path of the log file
Define the full path of the alert log and the listener log in /opt/FJISVclora/etc/clgetoralog.conf. See "[4.5 clgetoralog - Collect Troubleshooting Information](#)".
- Check Oracle database operation
Check if the Oracle database operation is properly running by executing start and stop of Oracle instances and Oracle listeners manually.

6. Edit userApplication

Register the Oracle instance resources, the Oracle ASM resource and the Oracle listener resources to userApplication that is created at the step 4. See "[2.4.2.1 Environment configuration with Oracle Database 11g R1 or earlier](#)".

The setting of AutoRecover Flag is recommended for Oracle instance resources and Oracle listener resources. The availability is increased by restarting Oracle instance resources and Oracle listener resources automatically when an error is detected.

Attributes	Values
Flags	AutoRecover (A)

7. Check Operation of userApplication

Check the operation of userApplication including Oracle resources. See "[2.2.8 userApplication Operation Check](#)".

F.3 Oracle ASM of Oracle Database 11g R2 or later used

1. Install and configure PRIMECLUSTER
Install and configure PRIMECLUSTER according to Software Release Guides and manuals of PRIMECLUSTER.
2. Install PRIMECLUSTER Wizard for Oracle
Install and configure PRIMECLUSTER according to Software Release Guides and manuals of PRIMECLUSTER Wizard for Oracle.
3. Set up the kernel parameter
Set up the kernel parameter. See the step 1 of "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)".
4. Create Grid user, Oracle user
Create and set up the Oracle user and Grid user. See the step 2 of "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)".
5. Set up shared disk units
Set shared disk units that are managed by Oracle ASM. Set the Grid user to the owner of the device files of the shared disk.
6. Create userApplication with No Oracle resources
Create userApplication with No Oracle resources and check the operation of userApplication. See the following:
 - [2.2.4 userApplication with No Oracle Resources](#)
 - [2.2.5 userApplication Operation Check](#)

In single-node cluster operation, the settings for userApplication are as follows. For the attribute of the others, see the PRIMECLUSTER manuals.

Attributes	Values
AutoSwitchOver	Do not set the values.
PersistentFault	1
HaltFlag	no
ShutdownPriority	Do not set the values.
OnlinePriority	Do not set the values.

7. Start userApplication

Start userApplication on the operating node, and verify the shared disk units and the takeover IP address are enabled.

8. Install Oracle Grid Infrastructure software

It is necessary to install Oracle Grid Infrastructure software and Oracle Database software.

Install Oracle Grid Infrastructure software. See the step 6 of "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)".

 Note

In order to use Oracle ASM in Oracle Solaris Zones environment, for the specification of Oracle database, it is necessary to add a proc priocntl privilege to non-global zone in advance.

Execute the following commands on the global zone before installing Oracle Database software.

```
# zonecfg -z <zone name> set limitpriv=default,proc_priocntl
```

9. Install Oracle Database software

Install Oracle Database software. See the step 22 of "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)".

In Oracle Database 18c/19c, execute the following procedure.

- [Appendix H Using Oracle Database 18c/19c](#)

10. Create and set up an Oracle database

- In single-node cluster operation, create and set up an Oracle database
Create Oracle databases and Oracle listeners according to the Oracle Database manuals.
- SYSTEM user password
Register the Oracle SYSTEM user password. See "[4.3 clorapass - Register Password for Monitoring](#)".
- Define the full path of the log file
Define the full path of the alert log and the listener log in /opt/FJSVclora/etc/clgetoralog.conf. See "[4.5 clgetoralog - Collect Troubleshooting Information](#)".
- Check Oracle database operation
Check if the Oracle database operation is properly running by executing start and stop of Oracle instances and Oracle listeners manually.

11. Edit userApplication

Add RMS stop processing and change the setting of Oracle Restart. Then register The Oracle instance resources, the Oracle ASM resource and the Oracle listener resources to userApplication that is created at the step 3. See "[2.4.2.2 Environment configuration with Oracle Database 11g R2 or later](#)".

The setting of AutoRecover Flag is recommended for Oracle instance resources and Oracle listener resources. The availability is increased by restarting Oracle instance resources and Oracle listener resources automatically when an error is detected.

Attributes	Values
Flags	AutoRecover (A)

12. Check Operation of userApplication

Check the operation of userApplication including Oracle resources. See "[2.2.8 userApplication Operation Check](#)".

Appendix G Using Oracle Data Guard/Oracle Active Data Guard

This section explains function and construction procedures and maintenance procedures in the case of using PRIMECLUSTER Wizard for Oracle with Oracle Data Guard/Oracle Active Data Guard.

Note

- Oracle Data Guard/Oracle Active Data Guard in Oracle Database 12c R1 or later is supported.
- Oracle Data Guard/Oracle Active Data Guard in Oracle Database 11g R2 or earlier is not supported.

G.1 Feature Outline

In the Oracle Data Guard/Oracle Active Data Guard environment, you can operate Oracle database on the primary site and standby site as a standby operation or a scalable operation on a PRIMECLUSTER system.

This software provides the following features:

Feature	Description
Environment Setup	Environment setup tool to enable clustering of Oracle database
Monitoring	Daemon processes to monitor Oracle instance, Listener and detect their failures
Start and Stop Control	Scripts used for startup and stop of Oracle instances, Listeners
Setup and Operation Commands	Commands used for setup and operations

Environment Setup

RMS Wizard allows you to set up the REDOApply setting in the standby database. For details, refer to "[G.2 Oracle Environment Setting](#)".

Monitoring

PRIMECLUSTER Wizard for Oracle provides daemon processes to monitor Oracle instances and Listeners and detect their failures. If errors are detected in monitoring, Oracle instances and Listeners are restarted and a failover occurs automatically. For details, refer to "[G.3 Operation](#)".

- Monitoring Oracle instances

The daemon processes monitor Oracle instances in the following way.

- Primary Site (Role is "PRIMARY")

The Monitoring of the primary site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)".

- Monitoring Processes

The daemon process connects to the Oracle instance as the SYSTEM user and cyclically monitors Oracle background processes (PMON, SMON, DBWn, LGWR and CKPT).

- Monitoring a table

The daemon process creates a table for monitoring and cyclically manipulates data on the table with SQL statements (INSERT, UPDATE, DELETE and COMMIT). It checks the SQL execution result to monitor Oracle instances. Therefore, it means that not only the background process failures but also logical failures can be detected.

- Standby Site(Role is "PHYSICAL STANDBY" or "LOGICAL STANDBY" or "SNAPSHOT STANDBY")

- The daemon process connects to the Oracle instance using SYSDBA privilege ("/ as sysdba") and cyclically monitors Oracle background processes (PMON, SMON, DBWn, LGWR and CKPT).

- Monitoring Listener

The daemon process monitors a Listener process in the following way. The Monitoring of the primary site and the standby site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)".

- Process Monitoring

The daemon process cyclically monitors Listener process.

- Tnsping command

In the standby operation, the daemon process cyclically executes the tnsping command to check that Oracle Net Services are running.

In the scalable operation with Oracle RAC, Oracle Net Services are not monitored by using the tnsping command.

- Monitoring Oracle Clusterware

The monitoring of the primary site and the standby site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)". Oracle Clusterware is not monitored.

- Monitoring CDB and PDB

The monitoring of the CDB is the same as "Monitoring Oracle instances".

The monitoring of the PDB is the management table of PDB on the CDB is checked. When fault of PDBs is detected, the message is output to syslog. The restart and the failover due to fault of PDBs is not executed.

For details, see "[G.3 Operation](#)".

Startup and stop control

PRIMECLUSTER Wizard for Oracle provides scripts to start up and stop Oracle instances, Listeners and Oracle Clusterware automatically, according to the state transition of userApplication. For details, see "[3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle](#)".

- Starting and Stopping Oracle instances

- Primary Site (Role is "PRIMARY")

Start and Stop Control of the primary site and the standby site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)". Start Oracle instance to the OPEN state.

When stopping, the scripts stop the instance in the IMMEDIATE mode. If it fails, the script immediately tries in the ABORT.

- Standby Site (Role is "PHYSICAL STANDBY" or "LOGICAL STANDBY" or "SNAPSHOT STANDBY")

Start Oracle instance to the MOUNTED state or the OPEN state, and start apply services. Apply services is not monitored, and redo transport services are not controlled.

When stopping, the scripts stop the instance in the IMMEDIATE mode. If it fails, the script immediately tries in the ABORT. Also apply services is stopped.

- Starting and Stopping Listeners

Start and Stop of the primary site and the standby site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)".

- The script starts up and stops the Listener with "lsnrctl start/stop" command, checking the state.

- Starting and Stopping Oracle Clusterware

Start and Stop of the primary site and the standby site is same as does not use Oracle Data Guard of "[1.1 Feature outline](#)".

Oracle Clusterware is started and stopped using the crsctl command.

- Starting and Stopping CDB and PDB

The Starting and the stopping of the CDB are the same as "Starting and Stopping Oracle instances".

When the CDB started to the MOUNTED state, the PDBs are not started. When the CDB started to the OPEN state, all the PDBs on the CDB are started. For details, see "[G.3 Operation](#)".

Setup and Operation Commands

PRIMECLUSTER Wizard for Oracle provides auxiliary commands for setup and operation. For details, see "[Chapter 4 Command](#)".

For details about the operating environment using Oracle Data Guard, see "[1.2 Operating Environment](#)".

G.2 Oracle Environment Setting

This section explains construction procedures the primary site and the standby site of Oracle Data Guard/Oracle Active Data Guard on the cluster system by using PRIMECLUSTER Wizard for Oracle.

Configuration Procedure

Execute the following procedures to configure the cluster system on the primary site and the standby site in the Oracle Data Guard/Oracle Active Data Guard environment.

- Primary Site

In the standby operation, configure the primary site referring to ["2.2 Standby Operation"](#).

In the scalable operation with Oracle RAC, configure the primary site referring to ["2.3 Scalable Operation with Oracle RAC"](#).

- Standby Site

In the standby operation, configure the standby site referring to ["2.2 Standby Operation"](#). Configuration of the standby database depends on whether Oracle ASM is used.

- Oracle ASM not used

Configure the standby database from the primary database referring to ["2.2.6 Oracle database Creation and Setting"](#) and Oracle Database manual.

- Oracle ASM used

Configure the standby database from the primary database referring to the step "23" of ["Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation"](#) and Oracle Database manual.

In the scalable operation with Oracle RAC, configure the standby database from the primary database referring to ["2.3 Scalable Operation with Oracle RAC"](#) and Oracle Database manual.

Setting of REDO Apply

You can set the setting of REDO Apply on the standby database when you create the Oracle instance resources and Oracle RAC instance resources.

In the standby operation, see ["2.2.7.2 Oracle Resource Creation"](#).

In the scalable operation with Oracle RAC, see ["2.3.5 userApplication with Oracle RAC Instances and Listeners"](#).

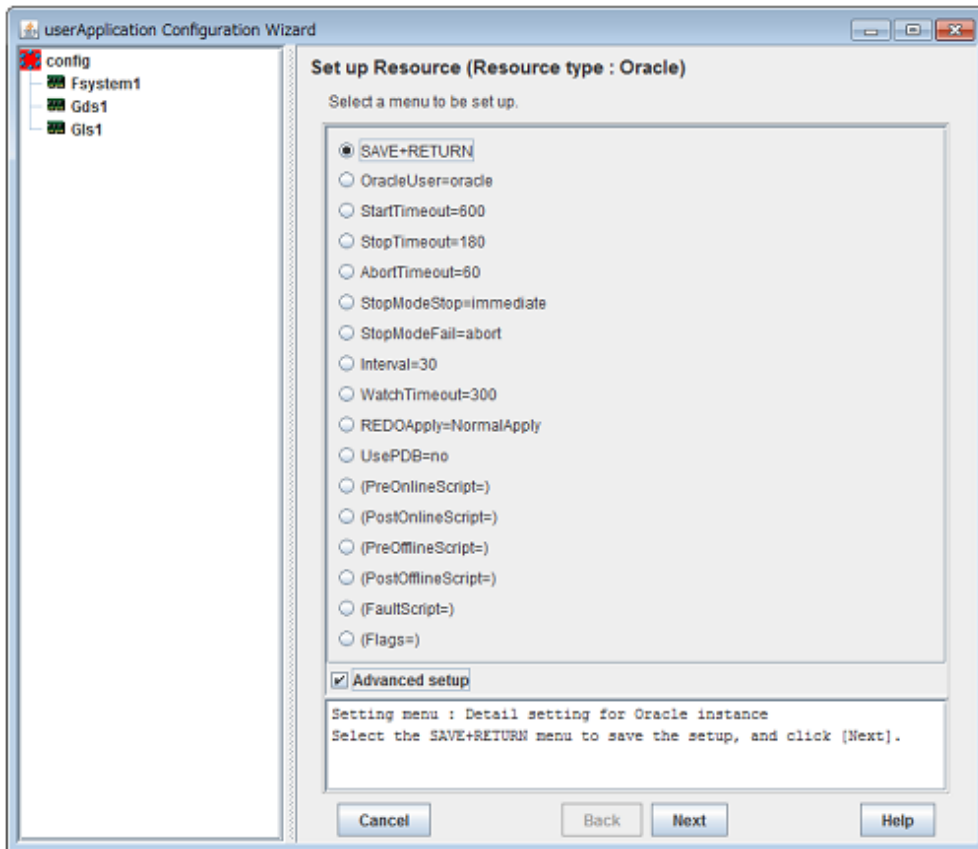
This setting is disregarded in the Oracle ASM instance resource and Oracle instance resource of primary database and Oracle instance resource without Oracle Data Guard.

The setting of redo apply can be set at the attributes of "REDOApply". The default of "REDOApply" is "NormalApply".

The setting of attributes "REDOApply"	Description
ReceiveOnly	The standby database is started, and the REDO apply is not started.
NormalApply *Default	In the case of physical standby database, the physical standby database is started, and the REDO apply is started. In the case of logical standby database, the logical standby database is started, and the SQL apply is started. In the case of snapshot standby database, this setting is disregarded. (It is similar to ReceiveOnly.)
RealTimeApply	In the case of physical standby database, the physical standby database is started, and the REDO apply with the real-time apply feature is started. In the case of logical standby database, the logical standby database is started, and the SQL apply with the real-time apply feature is started. In the case of snapshot standby database, this setting is disregarded. (It is similar to ReceiveOnly.)

The setting of attributes "REDOApply"	Description
ReadOnlyOPEN	In the case of physical standby database, the physical standby database is started to "READ ONLY OPEN" status, and the REDO apply is not started. In the case of logical standby database and snapshot standby database, this setting is disregarded. (It is similar to ReceiveOnly.)
RealTimeQueryN	In the case of physical standby database, the physical standby database is started to "READ ONLY OPEN" status, and the real-time query feature is enabled. (The REDO apply is started.) In the case of logical standby database and snapshot standby database, this setting is disregarded. (It is similar to ReceiveOnly.) This setting is enabled in Oracle Active Data Guard environment.
RealTimeQueryR	In the case of physical standby database, the physical standby database is started to "READ ONLY OPEN" status, and the real-time query feature is enabled. (The REDO apply with the real-time apply feature is started.) In the case of logical standby database and snapshot standby database, this setting is disregarded. (It is similar to ReceiveOnly.) This setting is enabled in Oracle Active Data Guard environment.

The setting of attributes "REDOApply" can be set on the "Set up Resource" screen.



Gls: Global Link Services
Gds: Global Disk Services

G.3 Operation

G.3.1 Oracle database Control (Standby Operation)

This section describes startup, shutdown and monitoring of Oracle resources in standby operation using Oracle Data Guard/Oracle Active Data Guard.

Oracle instance startup

Startup procedure of an Oracle instance is as follows:

1. su - <Oracle user>
2. sqlplus /nolog
3. CONNECT / AS SYSDBA
4. STARTUP NOMOUNT or STARTUP MOUNT
5. ALTER DATABASE MOUNT; (if "STARTUP NOMOUNT" was executed at step "4")
6. The procedure according to the database role is executed.

If UsePDB of Oracle instance resource is set to yes, start the PDBs.

- Primary Database

```
ALTER DATABASE OPEN;
```

```
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

- Physical Standby Database

The procedure according to the REDOApply of the Oracle instance resource is executed.

- ReceiveOnly

No procedure.

- NormalApply

```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
```

- RealTimeApply

```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

- ReadOnlyOPEN

```
ALTER DATABASE OPEN;
```

```
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

- RealTimeQueryN

```
ALTER DATABASE OPEN;
```

```
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
```

- RealTimeQueryR

```
ALTER DATABASE OPEN;
```

```
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

- Logical Standby Database

The procedure according to the REDOApply of the Oracle instance resource is executed.

- ReceiveOnly, ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR
ALTER DATABASE OPEN;
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
- NormalApply
ALTER DATABASE OPEN;
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
ALTER DATABASE START LOGICAL STANDBY APPLY;
- RealTimeApply
ALTER DATABASE OPEN;
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE;
- Snapshot Standby Database
ALTER DATABASE OPEN;
ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)

Oracle instance shutdown

Shutdown procedure of an Oracle instance is as follows:

- Shutdown procedure of an Oracle instance by user operation is as follows:
 1. su - <Oracle user>
 2. sqlplus /nolog
 3. CONNECT / AS SYSDBA
 4. When the roll is PHYSICAL STANDBY or LOGICAL STANDBY, stop REDO apply.
 - Physical Standby Database
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;
 - Logical Standby Database
ALTER DATABASE ABORT LOGICAL STANDBY APPLY;
 5. SHUTDOWN <IMMEDIATE/ABORT/TRANSACTIONAL> (Setup with StopModeStop)
Default : IMMEDIATE
 6. If Oracle instance is not stopped at step "5" (except for ABORT), use SHUTDOWN ABORT.
 7. If Oracle instance is not stopped at step "5" or "6", shut it down forcibly by sending SIGKILL to the background process.
- Shutdown procedure of an Oracle instance by resource failure or failover is as follows:
 1. su - <Oracle user>
 2. sqlplus /nolog
 3. CONNECT / AS SYSDBA
 4. SHUTDOWN <IMMEDIATE/ABORT> (Setup with StopModeFail)
Default : ABORT
 5. If Oracle instance is not stopped at step "4" (except for ABORT), use SHUTDOWN ABORT.
 6. If Oracle instance is not stopped at step "4" or "5", shut it down forcibly by sending SIGKILL to the background process.

Monitoring Oracle instances

Monitoring procedure of an Oracle instance is as follows:

1. Check the Oracle background processes (PMON, SMON) every 30 seconds (static).
If the processes status can be confirmed after Oracle instance gets activated, go to the step "2".
2. su - <Oracle user>
3. Local connection to the Oracle instance as the SYSTEM user or SYSDBA privilege.
4. When the roll is PRIMARY, LOGICAL STANDBY or SNAPSHOT STANDBY, check the status of the Oracle instance is "OPEN".
When the roll is PHYSICAL STANDBY, check the status of the Oracle instance is "MOUNTED" or "OPEN".
5. Check if the Oracle background processes (PMON, SMON, DBWn, LGWR, CKPT) are alive.
The monitoring interval can be changed at the setting of "Interval" and its default value is 30 seconds.
6. When the roll is PRIMARY, check if SQL (INSERT, UPDATE, DELETE and COMMIT) can be properly executed using the monitoring table on the SYSTEM user's default table space.
The monitoring with SQL is executed in accordance with the setting of "Interval". The elapsed time from the last monitoring is checked. Only when 60 seconds or more pass, the monitoring with SQL is executed.
7. Monitoring PDB
When UsePDB of Oracle instance resource is set to yes and the CDB is started to the OPEN state, the monitoring of PDB is executed in accordance with the setting of "Interval".
OPEN_MODE of each PDBs is checked by the V\$PDBS table.
8. Oracle instance is reconnected once every 24 hours.

In the standby node, step 1 is executed to confirm that the Oracle background processes (PMON, SMON) do not exist

Monitoring PDB

OPEN_MODE of each PDBs is checked by the V\$PDBS table.

- Primary Database, Logical Standby Database and Snapshot Standby Database

If OPEN_MODE is "READ WRITE", it is judged that the PDB is normal.

If OPEN_MODE is not "READ WRITE", It is judged that the PDB is abnormal.

- Physical Standby Database

The procedure according to the REDOApply of the Oracle instance resource is executed.

- ReceiveOnly, NormalApply and RealTimeApply

The PDBs are not monitored.

- ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR

If OPEN_MODE is "READ ONLY", it is judged that the PDB is normal.

If OPEN_MODE is not "READ ONLY", It is judged that the PDB is abnormal.

The monitoring of the PDB is executed in accordance with the setting of "Interval". When the state changes when monitoring it last time, the message is output to syslog. The restart and the failover due to fault of PDBs is not executed.

When the state of PDB becomes normal, the following messages are output.

```
FSP_PCLW-ORACLE_FJSVclora: INFO: 9142: OPEN_MODE of PDB <PDB name> was OPEN. (CDB=<ORACLE_SID of CDB>
PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

When the state of PDB becomes abnormal, the following messages are output.

```
FSP_PCLW-ORACLE_FJSVclora: ERROR: 9242: clorapdbmon detected OPEN_MODE of PDB <PDB name> is invalid.
(CDB=<ORACLE_SID of CDB> PDB=<PDB name> OPEN_MODE=<state of PDB>)
```

Listener startup, shutdown and monitoring

Startup, shutdown and monitoring of listeners are same as does not use Oracle Data Guard. For details, see "3.1.1 Standby Operation".

Oracle ASM instance startup, shutdown and monitoring

Startup, shutdown and monitoring of Oracle ASM instance are same as does not use Oracle Data Guard. For details, see "[3.1.1 Standby Operation](#)".

G.3.2 Oracle database Control (Scalable Operation with Oracle RAC)

This section describes startup, shutdown and monitoring of Oracle resources in scalable operation with Oracle RAC using Oracle Data Guard/Oracle Active Data Guard.

Oracle RAC instance startup

Startup procedure of an Oracle RAC instance is as follows:

1. su - <Oracle user>
2. srvctl stop instance -d *\$DB_NAME* -i *\$ORACLE_SID*
3. srvctl start instance -d *\$DB_NAME* -i *\$ORACLE_SID* -o mount
4. The procedure according to the database role is executed.
 - Primary Database
ALTER DATABASE OPEN;
 - Physical Standby Database
 - ReceiveOnly
No procedure.
 - NormalApply
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
 - RealTimeApply
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
 - ReadOnlyOPEN
ALTER DATABASE OPEN;
 - RealTimeQueryN
ALTER DATABASE OPEN;
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
 - RealTimeQueryR
ALTER DATABASE OPEN;
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
 - Logical Standby Database
The procedure according to the REDOApply of the Oracle instance resource is executed.
 - ReceiveOnly, ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR
ALTER DATABASE OPEN;
 - NormalApply
ALTER DATABASE OPEN;
ALTER DATABASE START LOGICAL STANDBY APPLY;

- RealTimeApply

```
ALTER DATABASE OPEN;
```

```
ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE;
```

- Snapshot Standby Database

```
ALTER DATABASE OPEN;
```

Oracle RAC instance shutdown

Shutdown procedure of an Oracle RAC instance is as follows:

- Shutdown procedure of an Oracle RAC instance by user operation is as follows:

1. su - <Oracle user>

2. When the roll is PHYSICAL STANDBY or LOGICAL STANDBY, stop REDO apply.

- Physical Standby Database

```
ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;
```

- Logical Standby Database

```
ALTER DATABASE ABORT LOGICAL STANDBY APPLY;
```

3. srvctl stop instance -d *\$DB_NAME* -i *\$ORACLE_SID*

- Shutdown procedure of an Oracle instance by resource failure or failover is as follows:

1. su - <Oracle user>

2. srvctl stop instance -d *\$DB_NAME* -i *\$ORACLE_SID*

Monitoring Oracle RAC instance

Monitoring of the Oracle RAC is same as that of Oracle instance in the standby operation, except for the following points. For details, see "[G.3.1 Oracle database Control \(Standby Operation\)](#)"

- Monitoring interval (Interval)

The default value of monitoring interval for the background processes (PMON, SMON, DBWn, LGWR, CKPT) is 60 seconds.

- Oracle RAC instance errors and recovery

- If Oracle RAC instance errors are detected, PRIMECLUSTER Wizard for Oracle notifies RMS of the warning state and waits for Oracle RAC resources to be restarted by Oracle Clusterware.

- Oracle Clusterware automatically restart Oracle RAC resources if they fail.

- If Oracle Clusterware cannot restart them within a set time of "Interval", PRIMECLUSTER Wizard for Oracle notifies RMS of the Fault state and stops Oracle RAC instances. For details about "Interval", see "[2.3.5 userApplication with Oracle RAC Instances and Listeners](#)".

- Monitoring PDB

PDB is not monitored.

Listener startup, shutdown and monitoring

Startup, shutdown and monitoring of listeners are same as does not use Oracle Data Guard. For details, see "[3.1.2 Scalable Operation with Oracle RAC](#)".

G.4 Overview of switch procedure of database role

This section describes the switch procedure of database role in the Oracle Data Guard environment that composes on PRIMECLUSTER. The procedure of switching the roll in the Oracle Data Guard environment is as follows. See "[G.4.1 Example of switch procedure of database role](#)" for the example of the switch procedure.

No	Overview
1	Starting maintenance mode of PRIMECLUSTER
2	Monitoring disruption of Oracle resource
3	Switch roll of Oracle Data Guard (Switchover)
4	Restart Oracle resource monitoring
5	Stopping maintenance mode of PRIMECLUSTER

G.4.1 Example of switch procedure of database role

An example of the switch procedure of database role is as follows.

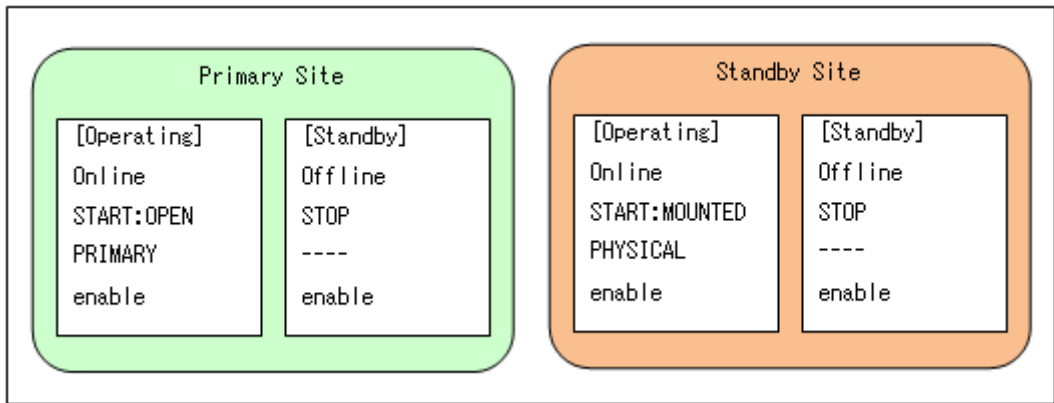
The state of the userApplication, the Oracle database, the database roll, and the Oracle resource has been described respectively of the node that composes the cluster.

		[Operating]	[Standby]
State of userApplication	→	Online	Off line
State of Oracle Database	→	START : OPEN	STOP
State of database role	→	PRIMARY	----
State of Oracle resources	→	enable	enable

G.4.2 Switch of Primary Database and Physical Standby Database

The transition figure of the switch of primary database and physical standby database is as follows.

1. Initial status.



2. Confirm if there is redo gap on a physical standby database.

Confirm whether the sequence number is corresponding to the primary site and the standby site before and after the log switch. If the sequence number do not correspond, resolve a redo gap.



See

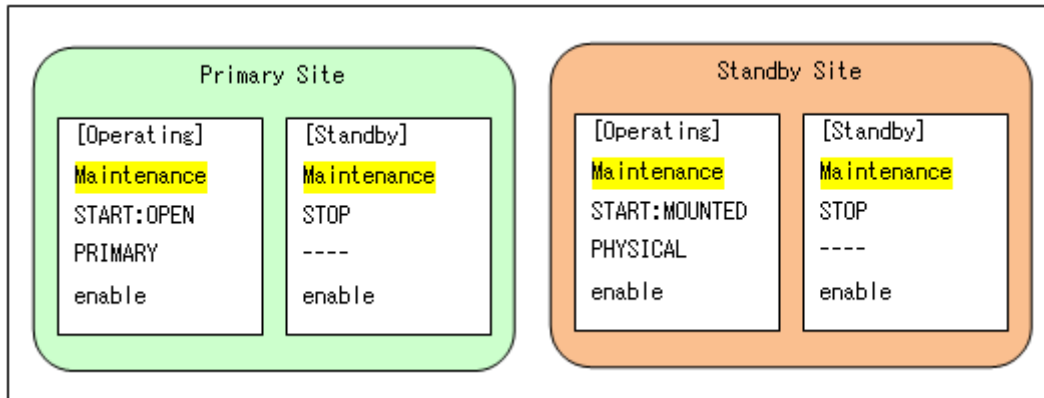
For further details, refer to the Oracle Database manual.

3. Start maintenance mode of PRIMECLUSTER.

To prevent the failover that userApplication does not intend, start the maintenance mode of PRIMECLUSTER on the operation node of both sites.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that the state of userApplication becomes "Maintenance".



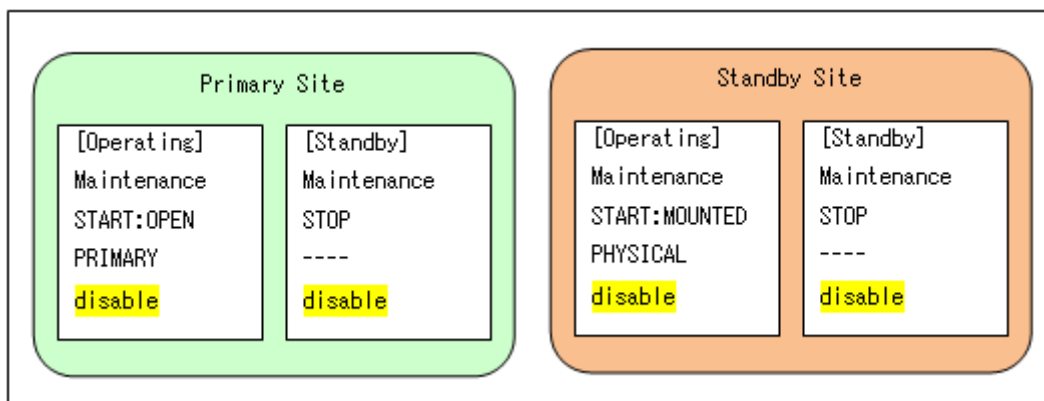
4. Monitoring disruption of Oracle resource.

To kill the session to Oracle, stop monitoring the Oracle instance and Listener resources on the both nodes of both sites.

```
# /opt/FJVSvclora/sbin/hvoradisable -a <userApplication>
```

Confirm that stop of monitoring have been successfully done.

(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)



5. Switch roll of Oracle Data Guard (Switchover)

The procedure that switch roll of Oracle Data Guard is as follows.

 See

For further details, refer to the Oracle Database manual.

1. Verify it is possible to perform a switchover.

Issue the following SQL statement on a primary database.

```
SQL> ALTER DATABASE SWITCHOVER TO <db_unique_name of target standby database> VERIFY;
```

If this operation had been successful, a database altered message would have been returned. Go to the next step.
If Oracle database error was returned, resolve the error. After issue the above SQL statement again.

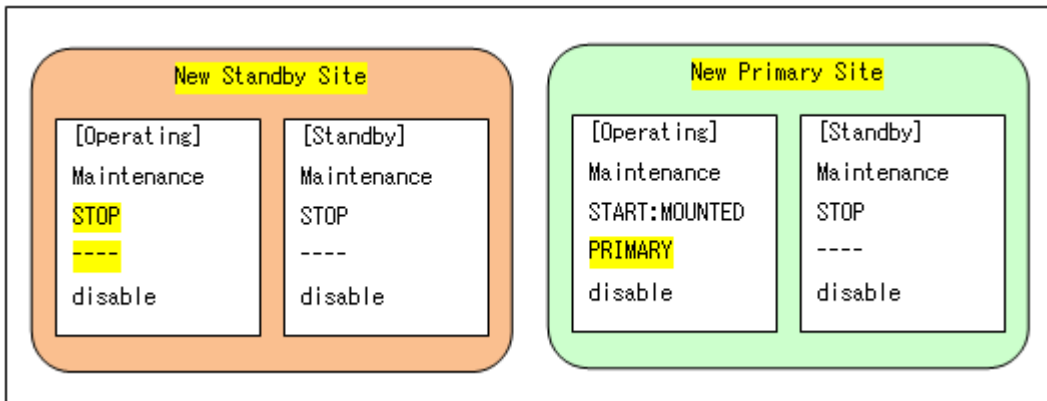
2. Initiate the switchover.

Issue the following SQL statement on a primary database to initiate the switchover.


```
SQL> ALTER DATABASE SWITCHOVER TO <db_unique_name of target standby database>;
```

The database of the new standby site stops.

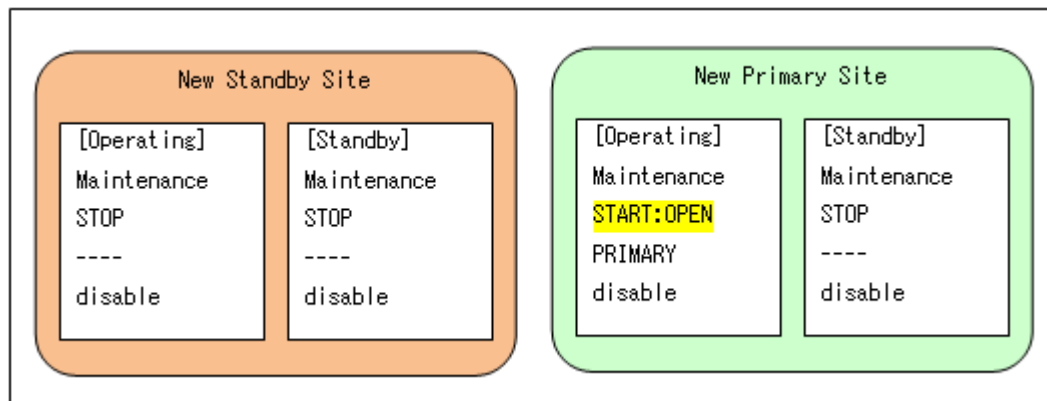
The database roll of new primary site becomes "PRIMARY".



3. Open the new primary database.

Issue the following SQL statement on a new primary database.

```
SQL> ALTER DATABASE OPEN;  
SQL> ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```



4. Mount a new physical standby database.

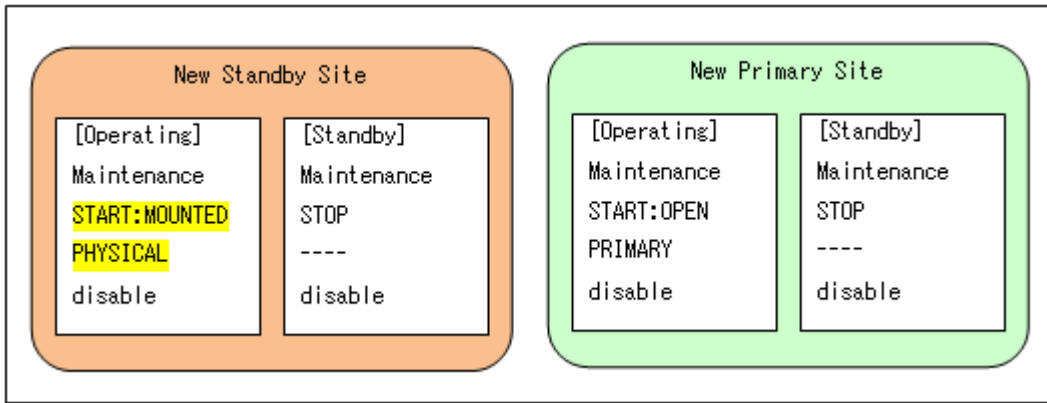
Issue the following SQL statement on a new standby database.

```
SQL> STARTUP MOUNT
```

When a new standby database is a physical standby database of Oracle Active Data Guard, open the database to "READ ONLY" by issuing the following SQL statement.

If UsePDB of Oracle instance resource is set to yes, start the PDBs.

```
SQL> STARTUP  
SQL> ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```



5. Start REDO Apply on the new physical standby database.

Issue the following SQL statement according to the REDOApply of the Oracle instance resource on the new standby database.

- NormalApply, RealTimeQueryN

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
```

- RealTimeApply, RealTimeQueryR

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

- ReceiveOnly, ReadOnlyOPEN

No procedure.

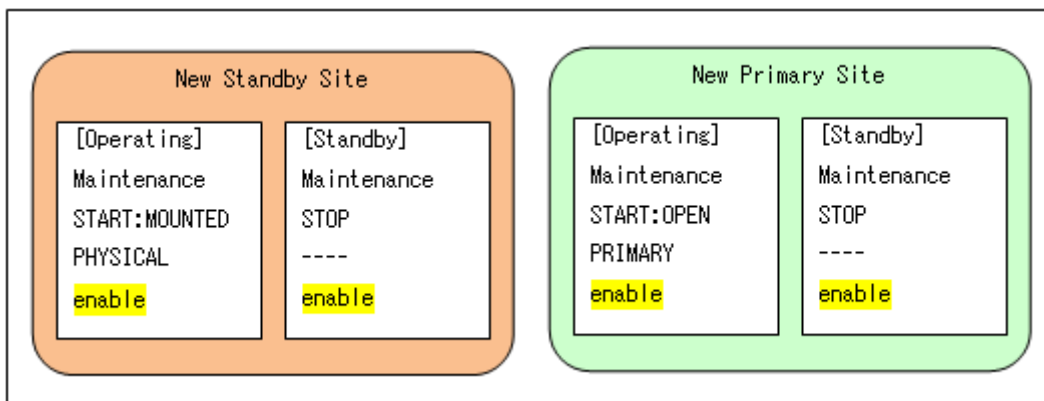
6. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of both sites.

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication>
```

Confirm that restart of monitoring have been successfully done.

(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

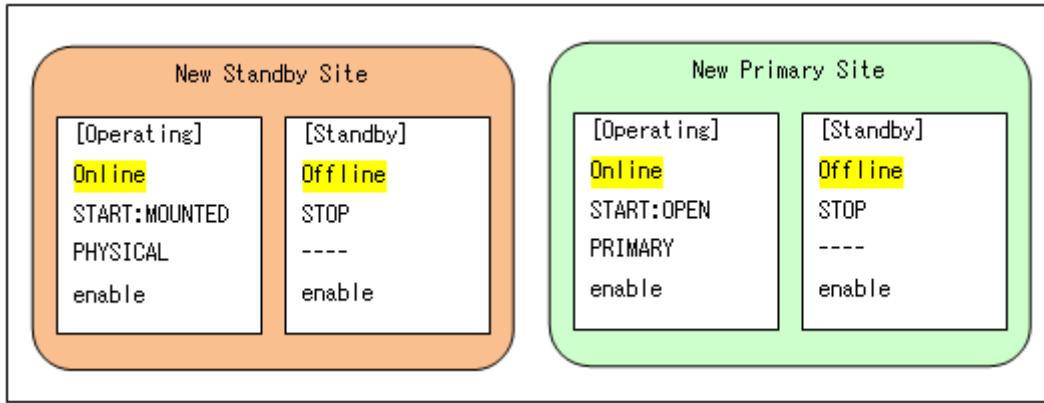


7. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of both sites.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

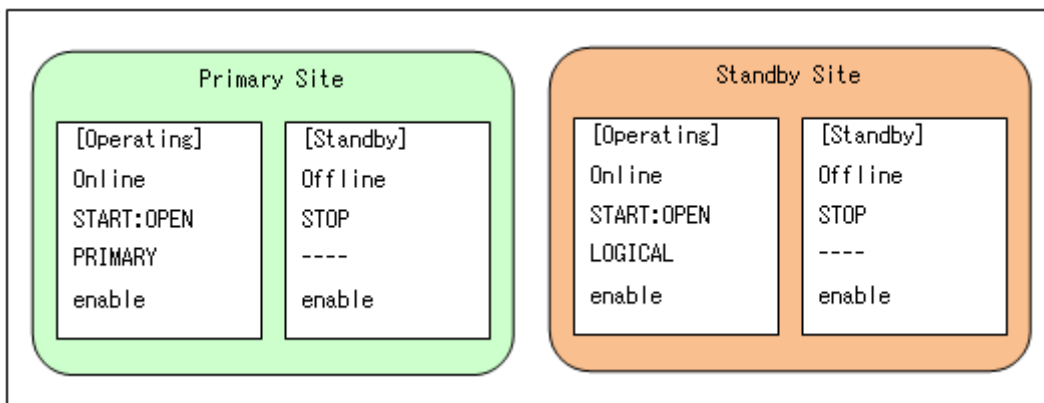
Confirm the state of userApplication becomes "Online" or "Offline".



G.4.3 Switch of Primary Database and Logical Standby Database

The transition figure of the switch of primary database and logical standby database is as follows.

1. Initial status.



2. Confirm if there is redo gap on a logical standby database.

Confirm whether the sequence number is corresponding to the primary site and the standby site before and after the log switch. If the sequence number do not correspond, resolve a redo gap.

 See

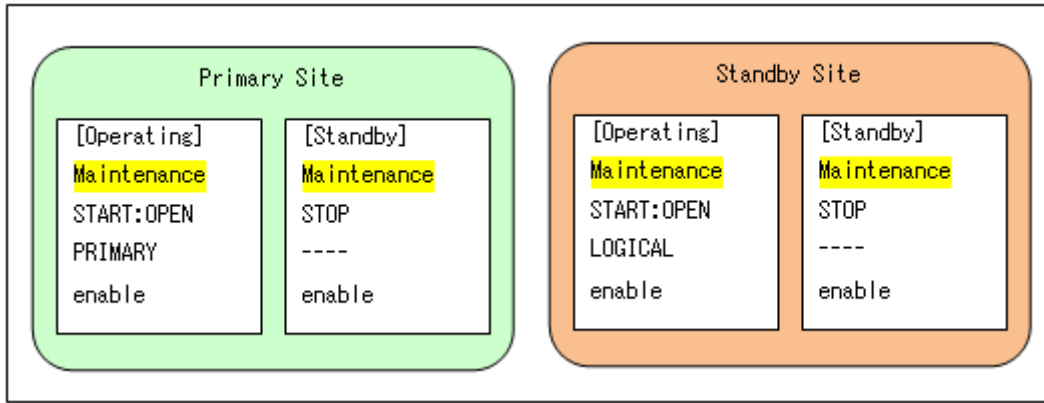
.....
 For further details, refer to the Oracle Database manual.

3. Start maintenance mode of PRIMECLUSTER.

To prevent the failover that userApplication does not intend, start the maintenance mode of PRIMECLUSTER on the operation node of both sites.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that the state of userApplication becomes "Maintenance".

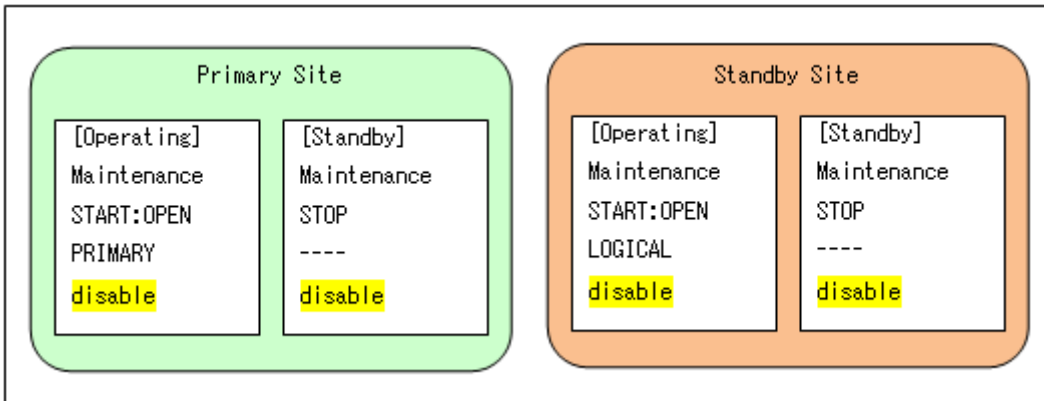


4. Monitoring disruption of Oracle resource.

To kill the session to Oracle, stop monitoring the Oracle instance and Listener resources on the both nodes of both sites.

```
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication>
```

Confirm that stop of monitoring have been successfully done.
(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)



5. Switch roll of Oracle Data Guard (Switchover)

The procedure that switch roll of Oracle Data Guard is as follows.



For further details, refer to the Oracle Database manual.

1. Verify it is possible to perform a switchover.

Issue the following SQL statement on a primary database.

```
SQL> SELECT SWITCHOVER_STATUS FROM V$DATABASE;
```

A value of TO STANDBY or SESSIONS ACTIVE in the SWITCHOVER_STATUS column indicates that it is possible to switch the primary database to the logical standby role. Go to the next step.

If one of these values is not displayed, resolve the error. After issue the above SQL statement again and confirm SWITCHOVER_STATUS column.

2. Prepare the current primary database for the switchover.

Issue the following SQL statement on a primary database to initiate the switchover.

```
SQL> ALTER DATABASE PREPARE TO SWITCHOVER TO LOGICAL STANDBY;
```

The value PREPARING SWITCHOVER is displayed in the SWITCHOVER_STATUS column in V\$DATABASE view if this operation succeeds.

3. Prepare the target logical standby database for the switchover.

Issue the following SQL statement on a logical standby database.

```
SQL> ALTER DATABASE PREPARE TO SWITCHOVER TO PRIMARY;
```

The value PREPARING SWITCHOVER is displayed in the SWITCHOVER_STATUS column in V\$DATABASE view if this operation succeeds.

4. Confirm whether the database has received a data dictionary.

Issue the following SQL statement on a primary database.

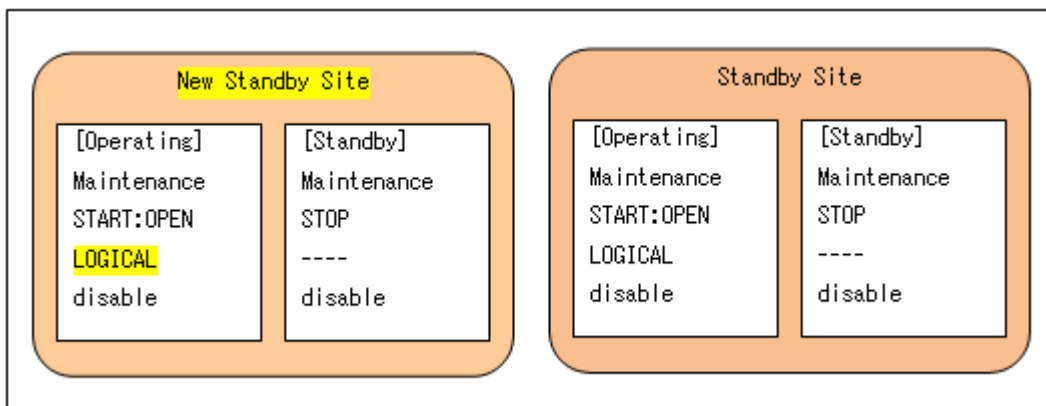
```
SQL> SELECT SWITCHOVER_STATUS FROM V$DATABASE;
```

A value of TO LOGICAL STANDBY in the SWITCHOVER_STATUS column indicates that the database has received a data dictionary from a logical standby database. Go to the next step.

5. Switch the primary database to the logical standby database role.

6. Issue the following SQL statement on a primary database.

```
SQL> ALTER DATABASE COMMIT TO SWITCHOVER TO LOGICAL STANDBY;
```



7. Confirm whether the logical standby database is ready to switch to the primary database.

Issue the following SQL statement on a logical standby database.

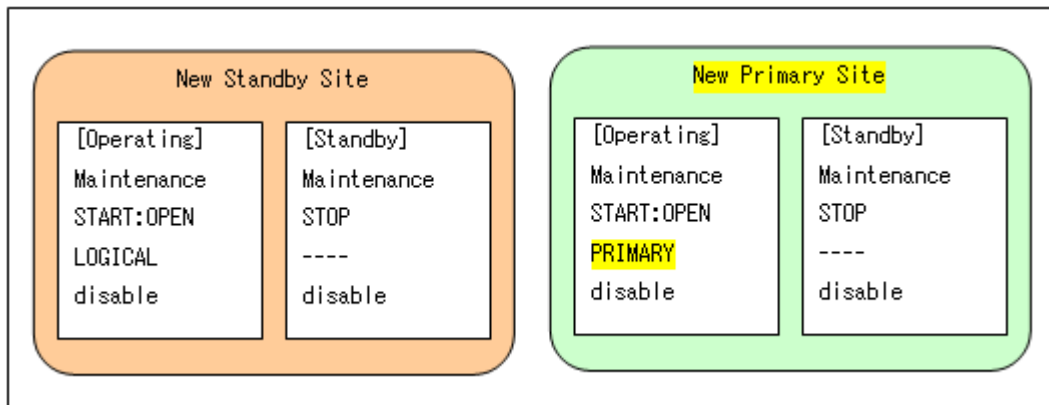
```
SQL> SELECT SWITCHOVER_STATUS FROM V$DATABASE;
```

A value of TO PRIMARY in the SWITCHOVER_STATUS column indicates that the logical standby database is ready to switch to the primary database. Go to the next step.

8. Switch the target logical standby database to the primary database role.

Issue the following SQL statement on a logical standby database.

```
SQL> ALTER DATABASE COMMIT TO SWITCHOVER TO PRIMARY;
```



9. Start SQL Apply on the new logical standby database.

Issue the following SQL statement according to the REDOApply of the Oracle instance resource on the new logical standby database.

- ReceiveOnly, ReadOnlyOPEN, RealTimeQueryN, RealTimeQueryR
No procedure.
- NormalApply

```
SQL> ALTER DATABASE START LOGICAL STANDBY APPLY;
```

- RealTimeApply

```
SQL> ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE;
```

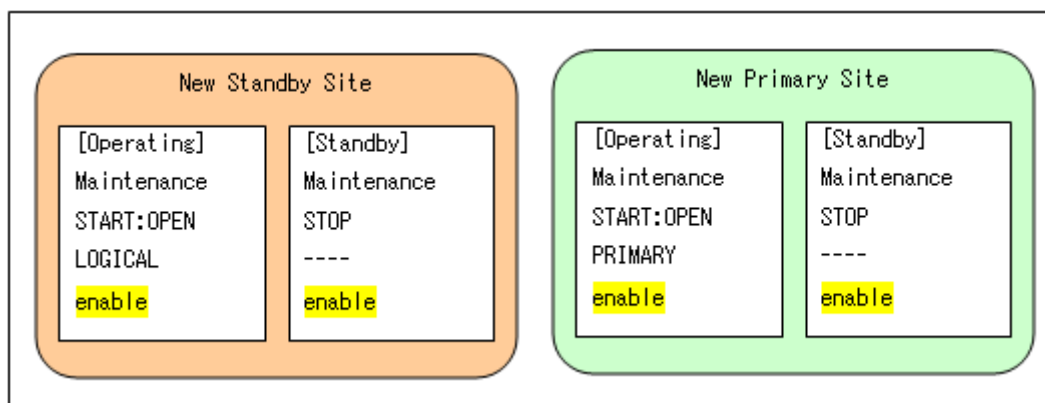
6. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of both sites.

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication>
```

Confirm that restart of monitoring have been successfully done.

(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

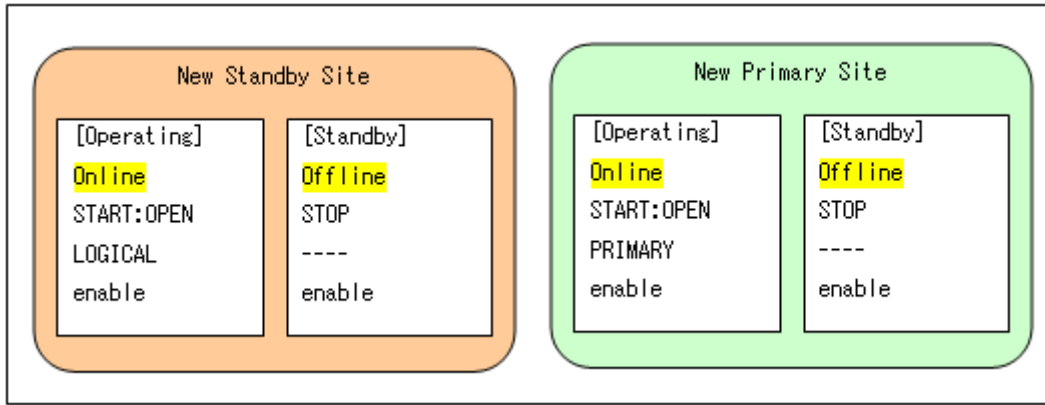


7. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of both sites.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

Confirm the state of userApplication becomes "Online" or "Offline".



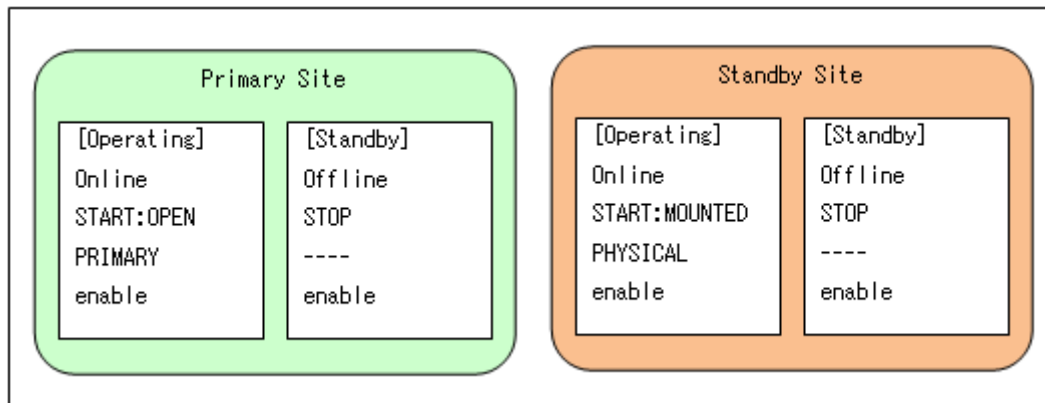
G.4.4 Converting a Physical Standby Database into a Snapshot Standby Database

The transition figure that converting a physical standby database into a snapshot standby database on standby site is as follows.

Note

- This operation is executed only on the standby site. The operation on the primary site is not necessary.

1. Initial status.

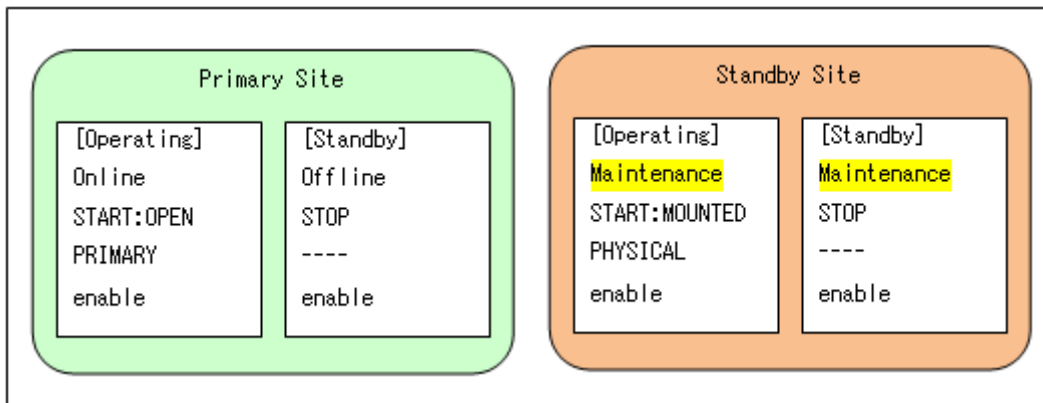


2. Start maintenance mode of PRIMECLUSTER.

To prevent the failover that userApplication does not intend, start the maintenance mode of PRIMECLUSTER on the operation node of standby site.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that the state of userApplication becomes "Maintenance".



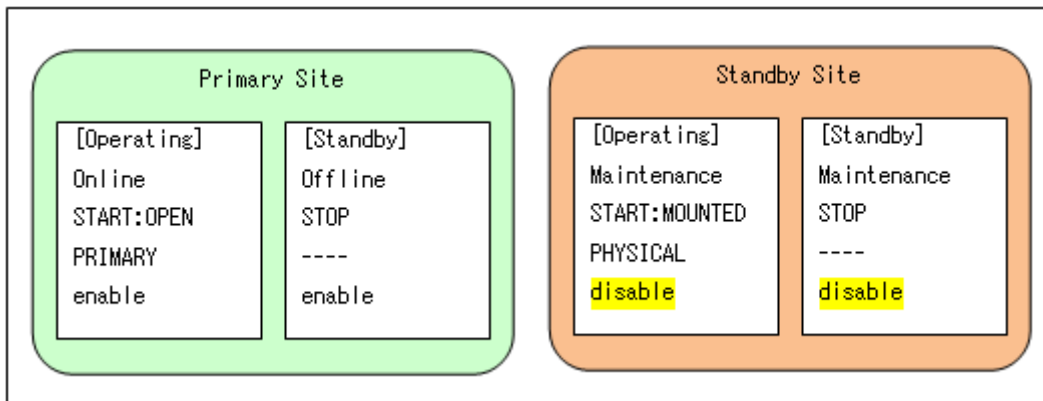
3. Monitoring disruption of Oracle resource.

To kill the session to Oracle, stop monitoring the Oracle instance and Listener resources on the both nodes of standby site.

```
# /opt/FUSVclora/sbin/hvoradisable -a <userApplication>
```

Confirm that stop of monitoring have been successfully done.

(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)



4. Converting roll of Oracle Data Guard.

The procedure that converting roll of Oracle Data Guard is as follows.



For further details, refer to the Oracle Database manual.

1. Stop Redo Apply, if it is active.

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;
```

2. Mount the standby database, if it is not mounted.

```
SQL> SHUTDOWN IMMEDIATE
SQL> STARTUP MOUNT
```

3. Perform the conversion.

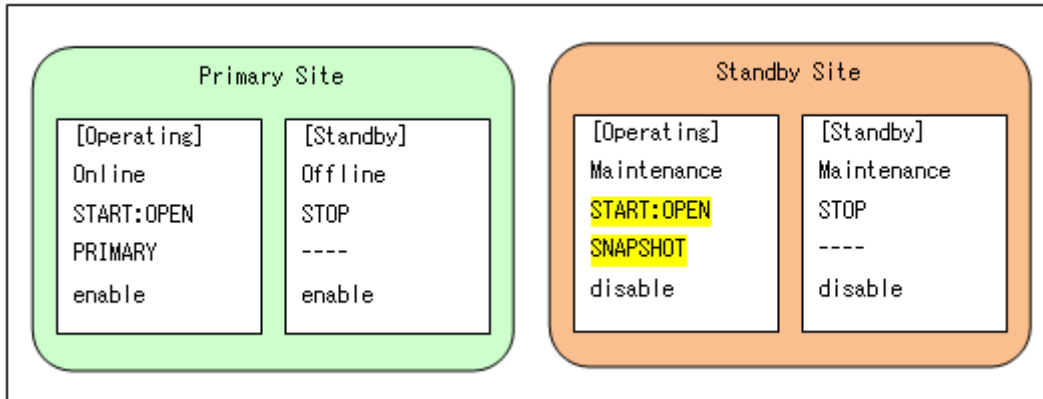
```
SQL> ALTER DATABASE CONVERT TO SNAPSHOT STANDBY;
```

4. Restart the standby database.

If UsePDB of Oracle instance resource is set to yes, start the PDBs.


```
SQL> SHUTDOWN IMMEDIATE
SQL> STARTUP
SQL> ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

After the roll is converted, it becomes the following.

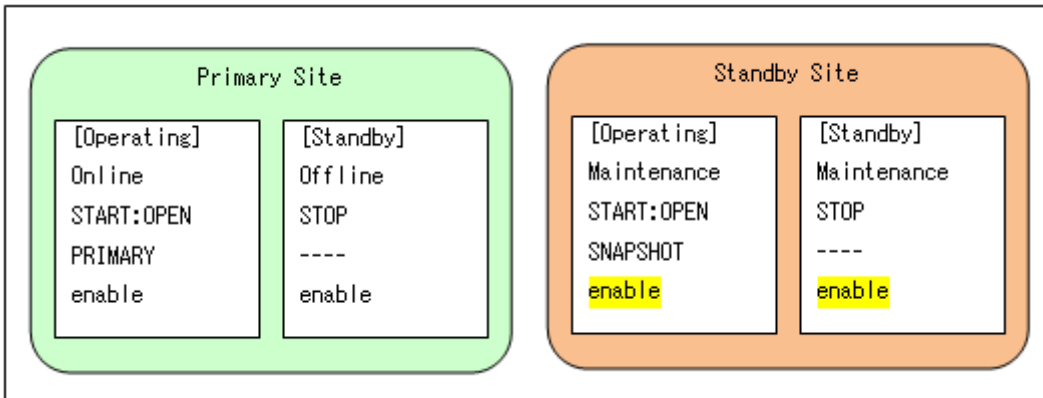


5. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of standby site.

```
# /opt/FJSVclora/sbin/hvoraenable -a <userApplication>
```

Confirm that restart of monitoring have been successfully done on standby site.
(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

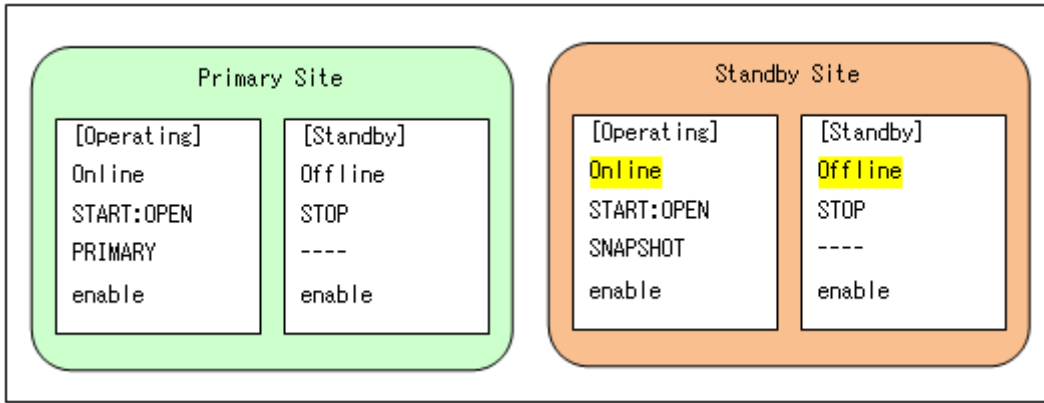


6. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of standby site.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

Confirm the state of userApplication becomes "Online" or "Offline".



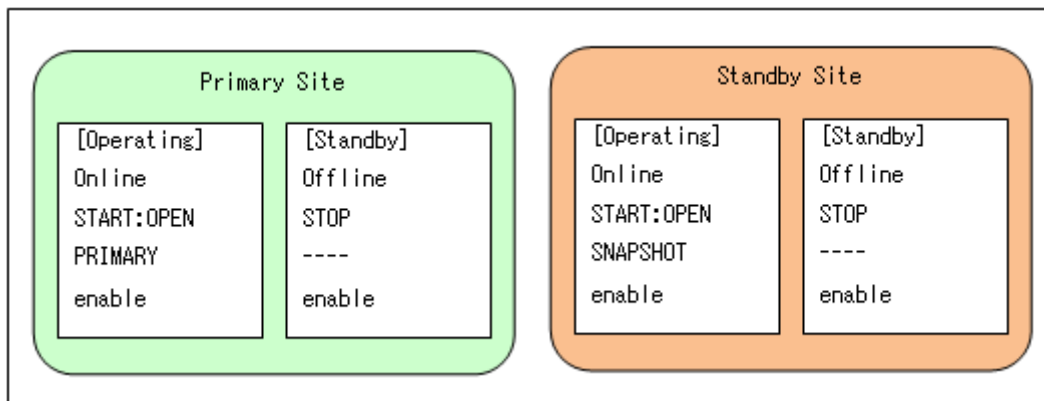
G.4.5 Converting a Snapshot Standby Database into a Physical Standby Database

The transition figure that converting a snapshot standby database into a physical standby database on standby site is as follows.

Note

- This operation is executed only on the standby site. The operation on the primary site is not necessary.

1. Initial status.

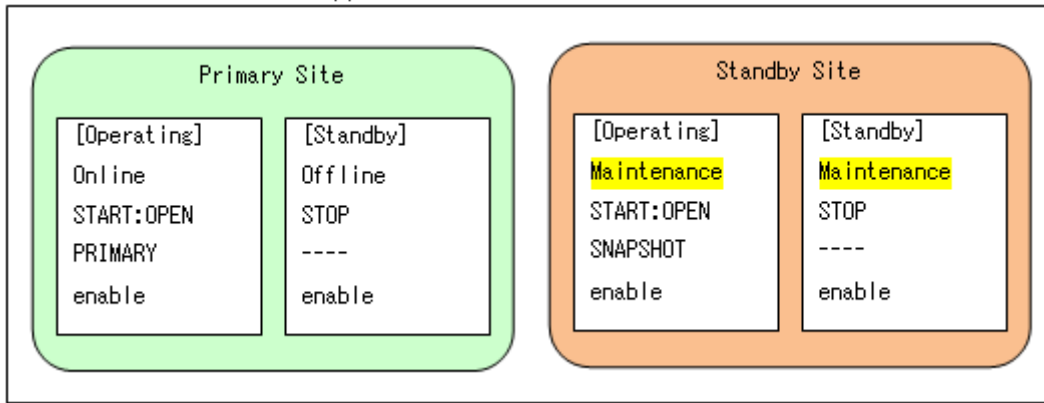


2. Start maintenance mode of PRIMECLUSTER.

To prevent the failover that userApplication does not intend, start the maintenance mode of PRIMECLUSTER on the operation node of standby site.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M on
```

Confirm that the state of userApplication becomes "Maintenance".

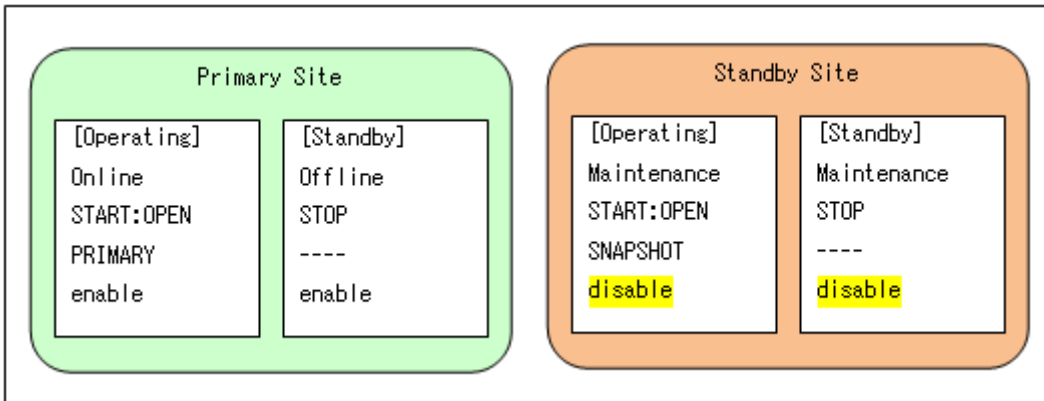


3. Monitoring disruption of Oracle resource.

To kill the session to Oracle, stop monitoring the Oracle instance and Listener resources on the both nodes of standby site.

```
# /opt/FJSVclora/sbin/hvoradisable -a <userApplication>
```

Confirm that stop of monitoring have been successfully done.
(Refer to note of "4.1 hvoradisable - Discontinue Monitoring Resources".)



4. Converting roll of Oracle Data Guard.

The procedure that converting roll of Oracle Data Guard is as follows.

See

For further details, refer to the Oracle Database manual.

1. Mount the standby database, if it is not mounted.

```
SQL> SHUTDOWN IMMEDIATE
SQL> STARTUP MOUNT
```

2. Perform the conversion.

```
SQL> ALTER DATABASE CONVERT TO PHYSICAL STANDBY;
```

3. Restart the standby database mount or open.

If UsePDB of Oracle instance resource is set to yes and the CDB is started to the OPEN state, start the PDBs.

```
SQL> SHUTDOWN IMMEDIATE
SQL> STARTUP MOUNT または STARTUP
SQL> ALTER PLUGGABLE DATABASE ALL OPEN; (if UsePDB of Oracle instance resource is set to yes.)
```

4. Start REDO Apply on the physical standby database.

Issue the following SQL statement according to the REDOApply of the Oracle instance resource on the standby database.

- NormalApply, RealTimeQueryN

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
```

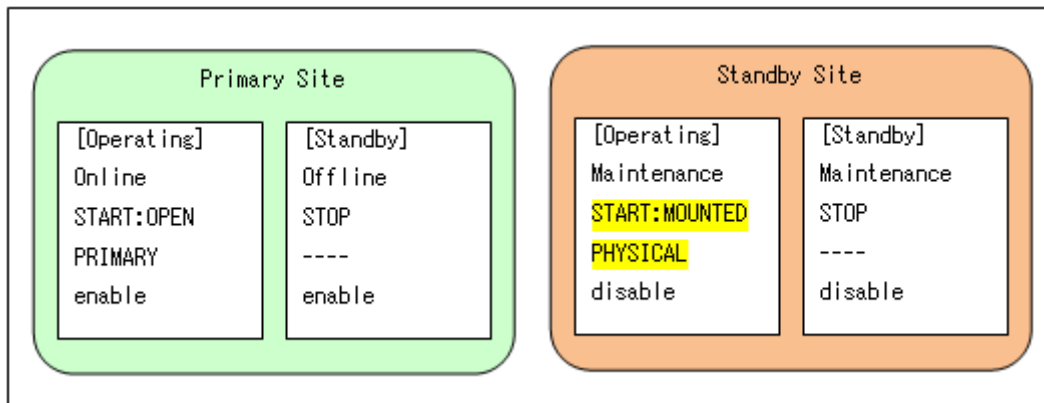
- RealTimeApply, RealTimeQueryR

```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE DISCONNECT;
```

- ReceiveOnly, ReadOnlyOPEN

No procedure.

After the roll is converted, it becomes the following. (The following example shows when operating in the state of MOUNTED.)



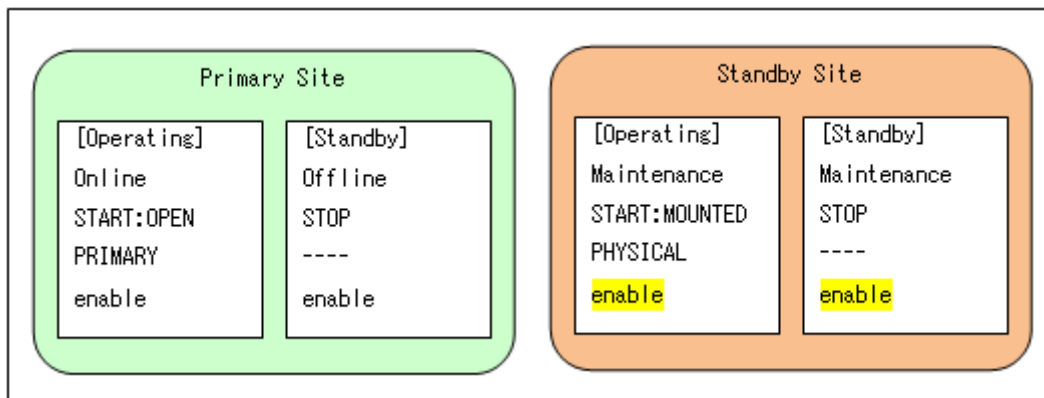
5. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of standby site.

```
# /opt/FJVSvclora/sbin/hvoraenable -a <userApplication>
```

Confirm that restart of monitoring have been successfully done on standby site.

(Refer to note of "4.2 hvoraenable - Restart Monitoring Resources".)

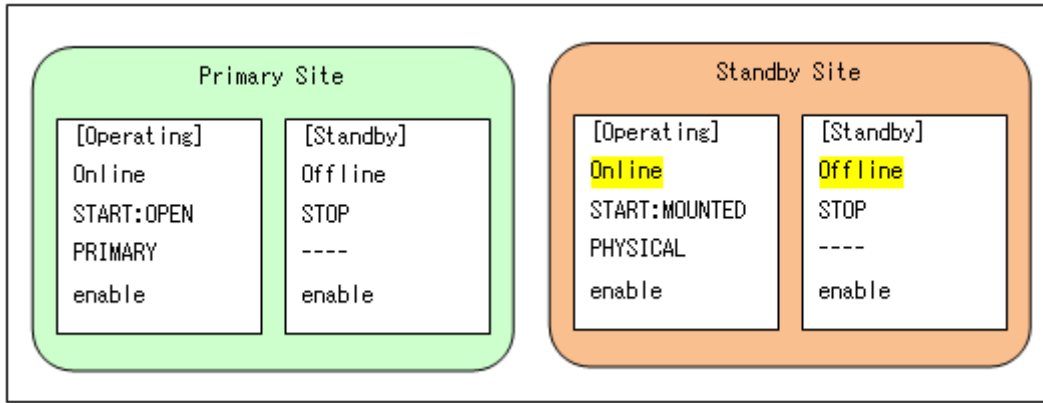


6. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of standby site.

```
# /opt/SMAW/SMAWRrms/bin/hvutil -M off
```

Confirm the state of userApplication becomes "Online" or "Offline".



G.5 Notice

Particular attention must be given to the operation of PRIMECLUSTER Wizard for Oracle in the Oracle Data Guard environment.

- Oracle Data Guard Broker is not supported.
- Operation that automatically executes failover from the primary database to the standby database is not supported.
- You can change the apply services using ALTER statements while a cluster system is running, but the attribute "REDOApply" of the Oracle instance resource is not changed. For changing the attribute "REDOApply" of the Oracle instance resource, stop RMS on all nodes and use RMS Wizard to change it.
- When switch the database role, start maintenance mode of PRIMECLUSTER and stop monitoring the Oracle resources. For details, see "G.4 Overview of switch procedure of database role".
- There is no problem though the following messages might be output to syslog when stopping and switching of userApplication on the standby site.
 - Message including ORA-01109

```
FSP_PCLW-ORACLE_FJSVclora: ERROR: 3403: clorainstance detected Oracle error! (ORA-01109:
database not open ) Please check the Oracle alert log file.
```

The above message is output to syslog when stopping and switching of userApplication on the physical standby database in MOUNTED state.

- Message including ORA-16136

```
FSP_PCLW-ORACLE_FJSVclora: ERROR: 3403: clorainstance detected Oracle error! (ORA-16136:
Managed Standby Recovery not active ) Please check the Oracle alert log file.
```

The above message is output to syslog when stopping and switching of userApplication on the physical standby database with apply services is not active.

- There is no problem though the following messages might be output to an alert log of the Oracle database when the start and the switch of userApplication are done on the standby site when the communication has not been established between the primary site and the standby site after database is converted from the snapshot standby to the physical standby. There are cases that the primary database has stopped, the listener has stopped, and network is abnormal as the communication has not been established.

```
Sun Jul 24 01:14:28 2011
ALTER DATABASE RECOVER AUTOMATIC DATABASE
Media Recovery Start
  started logmerger process
Sun Jul 24 01:14:28 2011
Managed Standby Recovery not using Real Time Apply
Media Recovery failed with error 1666
Recovery Slave PR00 previously exited with exception 283
ORA-283 signalled during: ALTER DATABASE RECOVER AUTOMATIC DATABASE...
```

- If you stop Oracle instance by maintenance on the standby site, become the same state in which the log apply services is specified for attribute "REDOApply" of the Oracle instance resource when you restart Oracle instance.
- The parameter passed to user script mount* under the /opt/FJSVclora/usr is as follows. For details about user script mount* under the /opt/FJSVclora/usr, see "[2.3.1 PRIMECLUSTER Installation and Configuration](#)".
 - \$1 : \$ORACLE_HOME
 - \$2 : \$ORACLE_SID
 - \$3 : Oracle user name
 - \$4 : Database role (DATABASE_ROLE column in V\$DATABASE view)
- In the scalable operation with Oracle RAC, when the Oracle instance failure occurs on the standby database and the Oracle instance is recovered by Oracle Clusterware, the Oracle instance becomes the state of OPEN and the REDO Apply is not restarted, regardless of the setting of REDO Apply of PRIMECLUSTER Wizard for Oracle.
- In the scalable operation with Oracle RAC, you must set and operate apply services of the standby database to start on one of the nodes.

Appendix H Using Oracle Database 18c/19c

This section explains procedure for using Oracle Database 18c/19c.

H.1 Using Oracle Database 18c

In Oracle Database 18c, execute the following procedure to create a symbolic link for the Oracle libraries on all nodes where you installed Oracle Database.

1. Change directory to the Oracle library directory as an Oracle user.
The Oracle library directory is "lib" under the directory specified by the environment variable "ORACLE_HOME".

```
$ cd $ORACLE_HOME/lib
```

2. Check whether the symbolic link file "libclntsh.so.12.1" exists.

```
$ ls -l libclntsh.so.12.1
```

If not exists, create a symbolic link file.

```
$ ln -s libclntsh.so libclntsh.so.12.1
$ ls -l libclntsh.so*
lrwxrwxrwx 1 oracle oinstall 17 Sep 3 15:35 libclntsh.so -> libclntsh.so.18.1
lrwxrwxrwx 1 oracle oinstall 12 Sep 3 15:35 libclntsh.so.10.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall 12 Sep 3 15:35 libclntsh.so.11.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall 12 Sep 3 17:31 libclntsh.so.12.1 -> libclntsh.so
-rwxr-xr-x 1 oracle oinstall 86167136 Sep 3 15:35 libclntsh.so.18.1
```

3. Check whether the symbolic link file "libclntshcore.so.12.1" exists.

```
$ ls -l libclntshcore.so.12.1
```

If not exists, create a symbolic link file.

```
$ ln -s libclntshcore.so libclntshcore.so.12.1
$ ls -l libclntshcore.so*
lrwxrwxrwx 1 oracle oinstall 21 Sep 3 15:35 libclntshcore.so -> libclntshcore.so.18.1
lrwxrwxrwx 1 oracle oinstall 16 Sep 3 17:34 libclntshcore.so.12.1 -> libclntshcore.so
-rwxr-xr-x 1 oracle oinstall 14342848 Sep 3 15:35 libclntshcore.so.18.1
```

H.2 Using Oracle Database 19c

In Oracle Database 19c, execute the following procedure to create a symbolic link for the Oracle libraries on all nodes where you installed Oracle Database.

1. Change directory to the Oracle library directory as an Oracle user.
The Oracle library directory is "lib" under the directory specified by the environment variable "ORACLE_HOME".

```
$ cd $ORACLE_HOME/lib
```

2. Check whether the symbolic link file "libclntsh.so.12.1" exists.

```
$ ls -l libclntsh.so.12.1
```

If not exists, create a symbolic link file.

```
$ ln -s libclntsh.so libclntsh.so.12.1
$ ls -l libclntsh.so*
lrwxrwxrwx 1 oracle oinstall 17 Sep 10 09:50 libclntsh.so -> libclntsh.so.19.1
lrwxrwxrwx 1 oracle oinstall 12 Sep 10 09:50 libclntsh.so.10.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall 12 Sep 10 09:50 libclntsh.so.11.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall 12 Sep 12 11:43 libclntsh.so.12.1 -> libclntsh.so
```

```
lrwxrwxrwx 1 oracle oinstall 12 Sep 10 09:50 libclntsh.so.18.1 -> libclntsh.so
-rwxr-xr-x 1 oracle oinstall 92869184 Sep 10 09:50 libclntsh.so.19.1
```

3. Check whether the symbolic link file "libclntshcore.so.12.1" exists.

```
$ ls -l libclntshcore.so.12.1
```

If not exists, create a symbolic link file.

```
$ ln -s libclntshcore.so libclntshcore.so.12.1
$ ls -l libclntshcore.so*
lrwxrwxrwx 1 oracle oinstall 21 Sep 10 09:50 libclntshcore.so -> libclntshcore.so.19.1
lrwxrwxrwx 1 oracle oinstall 16 Sep 12 13:27 libclntshcore.so.12.1 -> libclntshcore.so
-rw-r--r-- 1 oracle oinstall 14429736 Apr 19 15:41 libclntshcore.so.18.1
-rwxr-xr-x 1 oracle oinstall 14430280 Sep 10 09:50 libclntshcore.so.19.1
```


Appendix I (Information) Action Definition File

The Oracle instance-monitoring detector of RIMECLUSTER Wizard for Oracle determines in accordance with the Action Definition File what corrective action should be taken from the error code. The Action Definition File provides Oracle instance error numbers, corrective actions, and error descriptions.

- **Action Definition File name and path**

```
/opt/FJSVclora/etc/FJSVclorafm.actionlist
```

- **File format**

```
errno/Status/Action/Message
 18   Cn   Wa  "maximum number of sessions exceeded"
 20   Cn   Wa  "maximum number of processes (%s) exceeded"
470  All  Of  "LGWR process terminated with error"
471  All  Of  "DBWR process terminated with error"
472  All  Of  "PMON process terminated with error"
942  Ol   Np  "table or view does not exist"
1012 All  Rs  "not logged on"
1034 All  Of  "ORACLE not available"
```

- **errno**

Indicates the Oracle instance error number (ORA-xxxxx).

- **Status**

Indicates the processing state of the detector which monitors Oracle instances.

- Cn : When connecting to an Oracle instance.
- Ol : Under connection with an Oracle instance.
- Dc : When disconnecting to an Oracle instance.
- All : Any status of above.

- **Action**

Indicates the action how the detector handles Oracle instance error.

- Np : Ignores any detected Oracle instance errors and continues to monitor. Notifies the state which is the same as previous time.
- Of : Notifies Offline and stops monitoring.
- Wa : Notifies Warning and continues to monitor.
- Rs : Restarts detector and retries monitoring.
- Fa : Notifies Faulted and stops monitoring.

- **Message**

Indicates text of the error code



- The Oracle instance errors (ORA-xxxxx) that are not defined in the Action Definition File will be handled as Np.

- In the cases such as the following, Oracle instance errors will be handled as an action which is different from the action defined in the Action Definition File.
 - When the Oracle instance errors (ORA-xxxxx) are detected during UPDATE processing in the SQL table monitoring, the errors will be handled as follows. It prevents to remain the abnormal state when SQL commands cannot be continued.
 - The Oracle instance errors(ORA-xxxxx) that are defined as Np or are not defined in the Action Definition File will be handled as Rs.
 - The Oracle instance errors(ORA-xxxxx) that are defined as Wa will be handled as Rs after notifying of Warning.
 - When the Oracle instance errors (ORA-xxxxx) are detected during connecting to the Oracle instance, the errors that are defined as Np or are not defined will be handled as Of.
The following situation corresponds.
When Oracle database archive files are full, the monitoring timeout occurs and the Oracle instance error, ORA-00257 (archiver error. Connect internal only, until freed.), is detected during connecting to the Oracle instance.
 - When ORA-01012, ORA-03113 or ORA-03135 are detected except when connecting to the Oracle instance, the errors will be handled as Rs.
-