

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 depth.

Configuration and Administration Guide

Linux

J2UL-2597-01ENZ0(00)
February 2020

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

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

Outline

The document consists of the following 6 chapters and 7 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 Single-Node Cluster Operation
- Appendix F Using Oracle Data Guard/Oracle Active Data Guard
- Appendix G Using Oracle Database 18c/19c
- Appendix H (Information) Action Definition File

Technical term

For technical words related to clusters in this document, refer to the manual. Unless otherwise specified, the following words are used for Oracle Database products. For details, refer to the Oracle Database manuals.

- **Oracle instance:**
Referred to as "instance" or "Oracle instance" in this document.
- **Oracle listener:**
Referred to as "Listener", or "Oracle listener" in this document.
- **Oracle Database:**
Referred to as "Oracle Database", "Oracle" or "Oracle *Version Release*" 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.

- **Grid user:**

Referred to "Grid user" in this document.
An operating system user account belonging to OSASM group to operate and manage Oracle ASM.

- **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:



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



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



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



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



Example

Describes settings using an example.

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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 the standby operation with Oracle database, the single-node cluster operation with Oracle database, the 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 F 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, Oracle instances and Listeners are restarted and a failover occurs automatically. For details, refer to "[3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle](#)".

- Oracle instance Monitoring

The daemon processes monitor Oracle instances in the following way.

- Process Monitoring

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

- Table Monitoring

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.

- Listener Monitoring

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

- Process Monitoring

The daemon process cyclically monitors Listener process.

- Tnsping command

The daemon process cyclically executes the tnsping command to check that Oracle Net Services are running.

- 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.

Start and Stop Control

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

- Oracle instance Start and Stop

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.

- Listener Start and Stop

In standby operation, the script starts up and stops the Listener with "lsnrctl start/stop" command, checking the state.

- CDB and PDB Start and Stop

The Starting and the stopping of the CDB are the same as "Starting and Stopping Oracle instances".

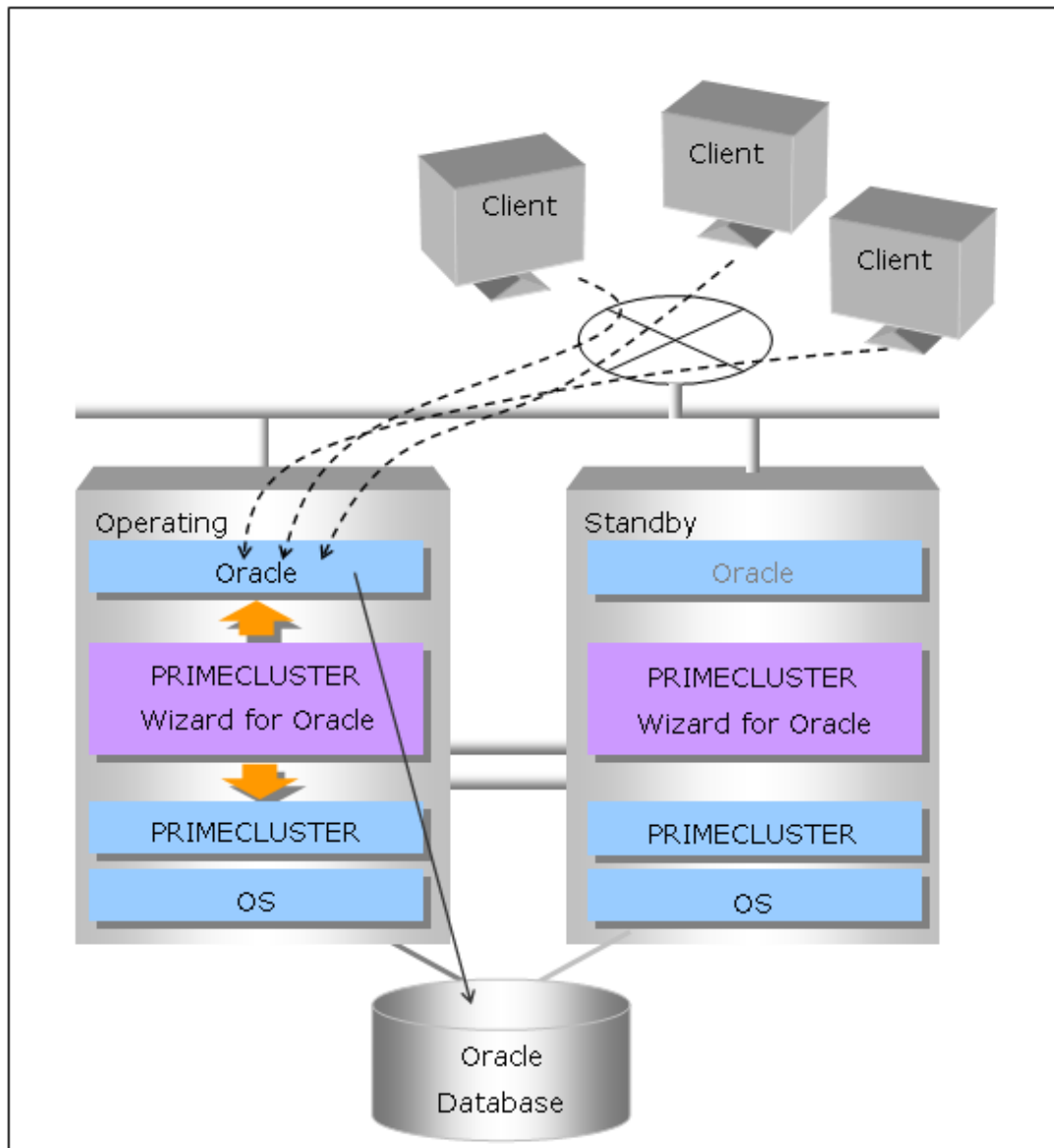
After CDB is started, all PDBs on the CDB are started.

Setup and Operation Commands

PRIMECLUSTER Wizard for Oracle provides auxiliary commands for setup and operation. For details, refer to "[Chapter 4 Command](#)".

1.2 Operating Environment

Standby operation

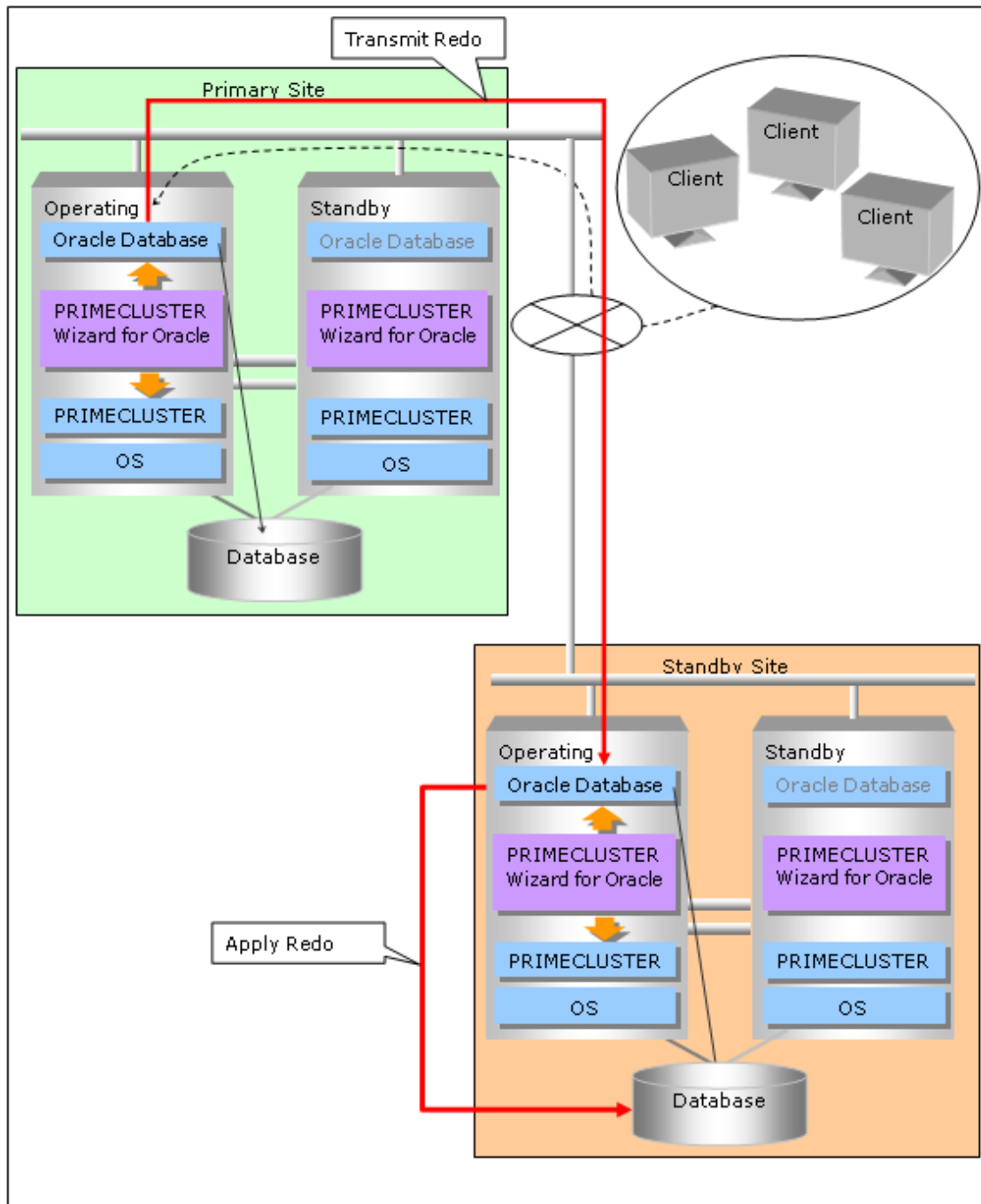


In standby operation, a cluster system consists of an operating node and standby nodes. On the operating node, the resources such as Oracle applications, a logical IP address and shared disks are active. On the standby node, these resources are inactive. In the event of a failure, userApplication is switched to the standby node, and the resources in 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

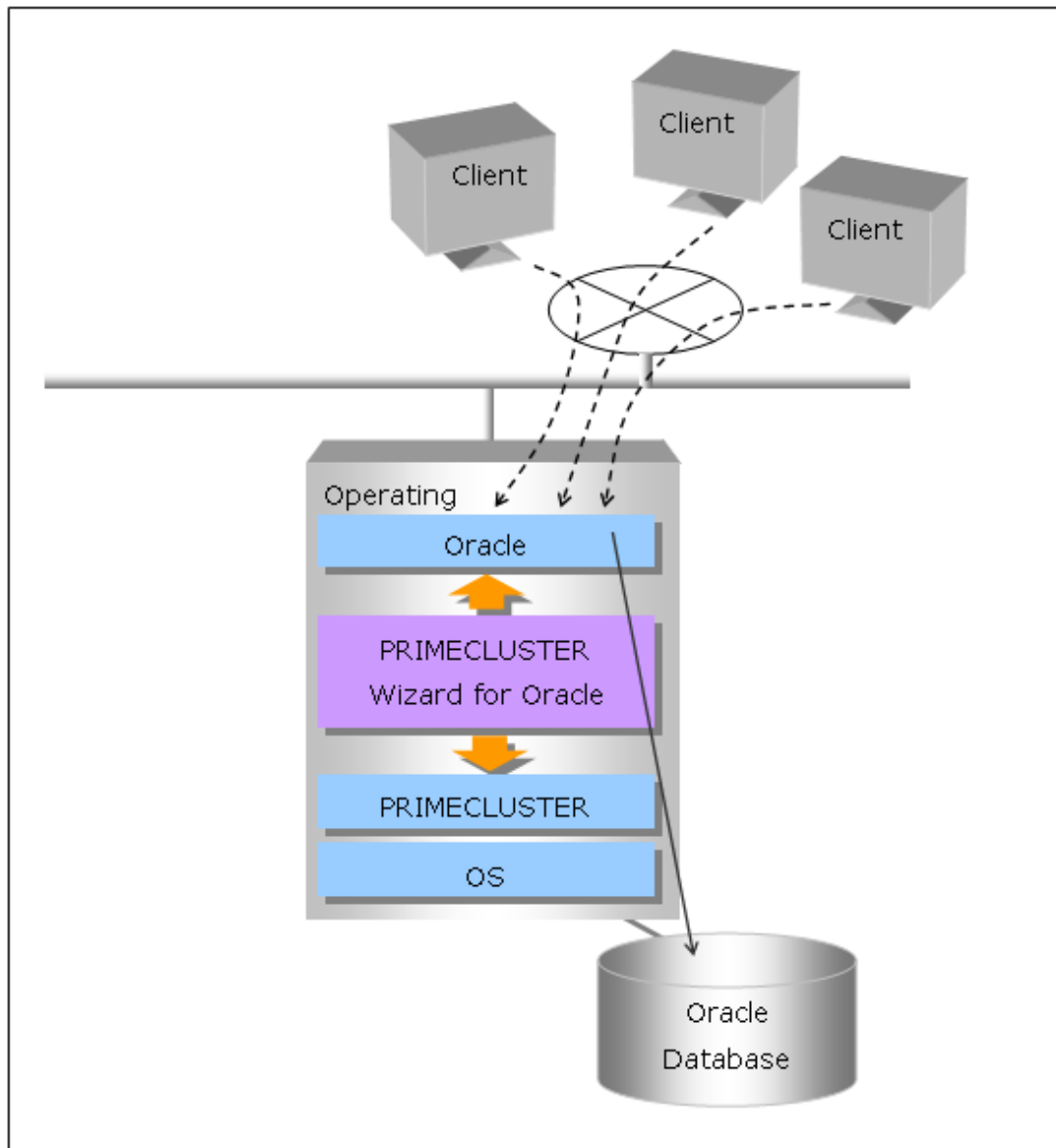
- In order to use Oracle ASM, it is necessary to install Oracle Grid Infrastructure. When installing Oracle Grid Infrastructure, the composition which separates the installation user of Oracle Database and the installation user of Oracle Grid Infrastructure is supported. The composition which creating 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.

Standby operation using Oracle Data Guard/Oracle Active Data Guard



In the standby operation using Oracle Data Guard, the operation node and the standby node exist on the primary site and the standby site. Oracle Database operates in the operation 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.

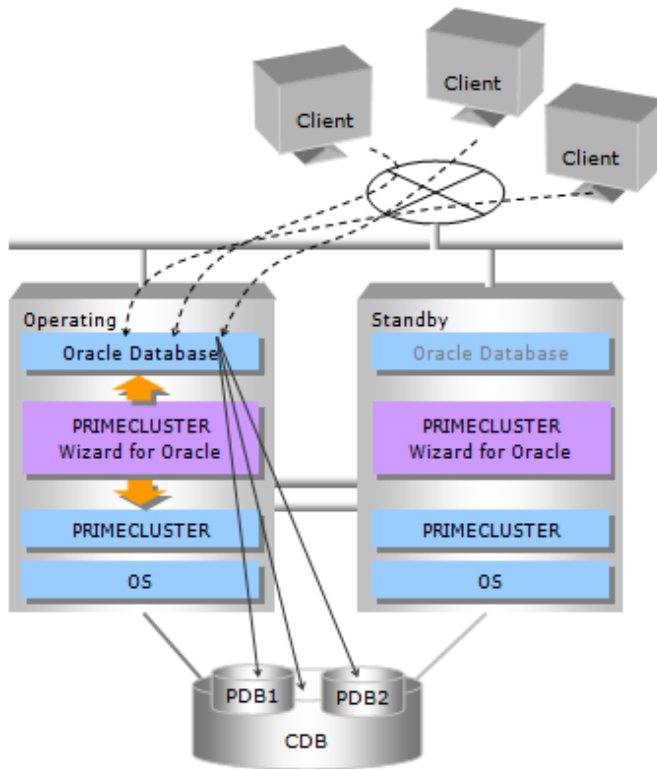
Note

- In order to use Oracle ASM, 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.

Information

For further details about the operation modes of 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 Environment Setting

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



The setup procedure explained in section "2.2 Standby Operation" assumes that the userApplication will be created newly. In the case of upgrading from previous version, refer to "Software Release Guide PRIMECLUSTER Wizard for Oracle".

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, refer to "2.2 Standby Operation".

Standby operation using Oracle Data Guard/Oracle Active Data Guard

For details, see "F.2 Oracle Environment Setting".

Single-node cluster operation

For details, see "Appendix E Single-Node Cluster Operation".

2.2 Standby Operation

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

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 first, referring to "Software Release Guide" accompanying the software.
Then, install PRIMECLUSTER Wizard for Oracle referring to "Software Release Guide" accompanying the software.

Set up cluster system

Configure a cluster system according 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.



- 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, 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 "[2.3.2 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/sysctl.conf" 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 identical on all the nodes.

The kernel parameters can be configured with the sysctl (8) utility when they are executed. The procedures for changing the kernel parameters and setting up the new kernel parameters are explained below.



For semopm (the third value of "kernel.sem"), specify a value of 4 or more.



The following command enables the value of /etc/sysctl.conf for the kernel. You do not have to reconfigure the kernel.

To change the kernel parameter while the OS is running, use sysctl (8). For details about sysctl (8), refer to the manual pages.

```
sysctl -p <filename>
```

If <filename> is omitted, read from /etc/sysctl.conf.

- Oracle User

Create an OS user which belongs 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 <group ID> dba
# groupadd -g <group ID> oinstall
# useradd -g oinstall -G dba oracle
# passwd oracle
```

Set up the environment variables of the Oracle user.

- Set the environment variables ORACLE_BASE, ORACLE_HOME and ORACLE_SID for your Oracle database environment.
- Add \$ORACLE_HOME/bin into the PATH environment variable.
- If listener.ora is not in \$ORACLE_HOME/network/admin directory, set the TNS_ADMIN environment variable.

Example

(.bash_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=$ORACLE_HOME/bin:/usr/bin:/bin:/usr/bin/X11:/usr/local/bin; export PATH
TNS_ADMIN=$ORACLE_HOME/network/admin2; export TNS_ADMIN
```

Note

PRIMECLUSTER Wizard for Oracle controls Oracle database as the Oracle user which belongs to OSDBA group.

- 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.

See

For further details, refer to the Oracle Database manual.

Installation

Install Oracle database software using Oracle user access privileges.

Install a program on the local disk of each node or on the shared disk. 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 in "[2.2.6 Oracle Database Creation and Setting](#)".

See

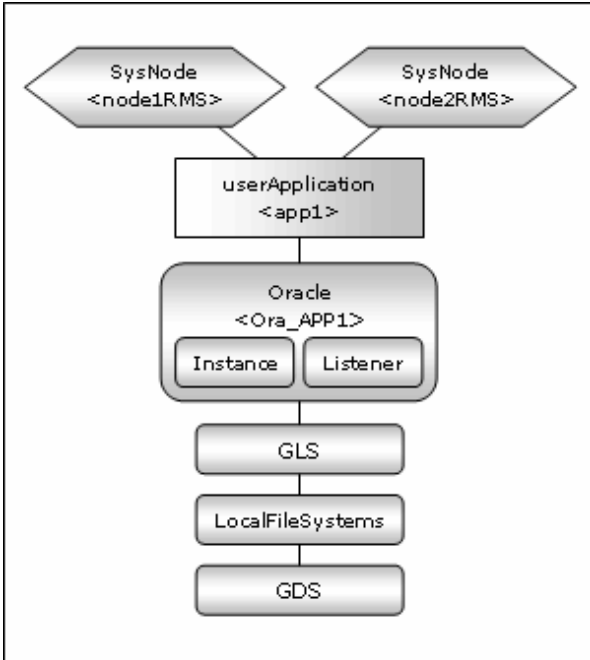
For further details, refer to the Oracle Database manual.

Using Oracle Database 18c/19c

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

2.2.3 userApplication Configuration

Operating userApplication is configured as follows:



GLS: Global Link Services
GDS: Global Disk Services

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

RMS Wizard allows you to set up the environment by selecting numbers from the menu.

Firstly, it is necessary to create userApplication without Oracle resources, and add the resource after creating an Oracle database. The sections below explain how to do it.



See

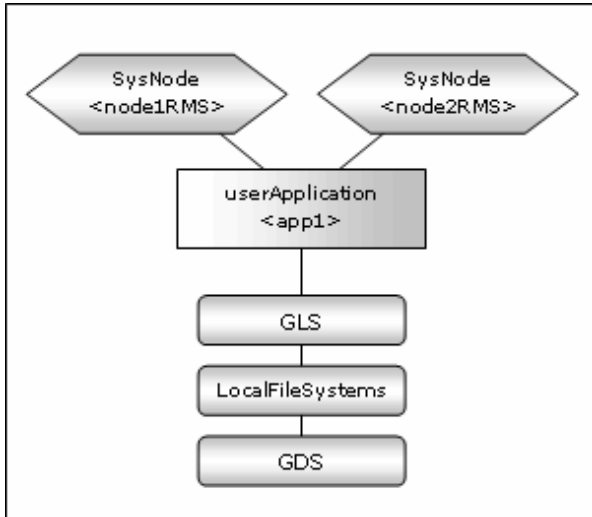
For further details, refer to the PRIMECLUSTER manuals.

2.2.4 userApplication Creation (without Oracle Resources)

This section explains how to create userApplication and set up non-Oracle resources.

Set up Oracle resources after creating a database.

Non-Oracle resources are configured first as follows:



GLS: Global Link Services
GDS: Global Disk Services

GDS setup

GDS is set as "switching disk" for standby operation.

Information

It is possible to prepare the disk class for Oracle system table space and other Oracle data respectively, and the MONITORONLY attribute of the disk class is set to "NO" for the Oracle system table space and "YES" for the other Oracle data.

userApplication setup

Create userApplication according to "PRIMECLUSTER Installation and Administration Guide".

Set up userApplication using the RMS Wizard. The RMS Wizard uses the format that allows you to select information in the menu.

2.2.4.1 userApplication creation

1. Execute hvw command on any one of the cluster nodes and start up RMS Wizard.

```
# hvw -n <Configuration Name>
```

2. Select Application-Create in the "Main configuration menu" screen.

```
node1: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP                                10) Configuration-Remove
2) QUIT                                 11) Configuration-Freeze
3) Application-Create                 12) Configuration-Thaw
4) Application-Edit                     13) Configuration-Edit-Global-Settings
5) Application-Remove                   14) Configuration-Consistency-Report
6) Application-Clone                     15) Configuration-ScriptExecution
7) Configuration-Generate                16) RMS-CreateMachine
8) Configuration-Activate                17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action: 3
```

3. Select WIZSTANDBY in the "Application type selection menu" screen.

```
Creation: Application type selection menu:
1) HELP                      6) GENERIC
2) QUIT                      7) ORACLE
3) RETURN                    8) SCALABLE
4) OPTIONS                   9) STANDBY
5) DEMO                      10) WIZSTANDBY
Application Type: 10
```

 **Note**

- If you use Oracle resources in combination with PRIMECLUSTER Wizard for NAS, refer to "PRIMECLUSTER Wizard for NAS Configuration and Administration Guide".

4. In the case of editing the userApplication name, specify ApplicationName in the "Settings of turnkey wizard "WIZSTANDBY" screen.

```
Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP                      4) REMOVE+EXIT
2) NO-SAVE+EXIT             5) ApplicationName=APP1
3) SAVE+EXIT                6) Machines+Basics(-)
Choose the setting to process: 5
```

5. Select Machines+Basics to set up nodes and basic setting of userApplication.

```
Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP                      4) REMOVE+EXIT
2) NO-SAVE+EXIT             5) ApplicationName=APP1
3) SAVE+EXIT                6) Machines+Basics(-)
Choose the setting to process: 6
```

Specify an operating node in "Machines[0]" and specify a standby node in "Machines[1]".

Select "AdditionalMachines" if you add nodes.

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

 **Information**

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

Attributes	Values
AutoSwitchOver	HostFailure ResourceFailure Shutdown
PersistentFault	1
HaltFlag	yes

```
Machines+Basics (appl:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalMachine
6) AdditionalConsole
7) Machines[0]=node1RMS
8) Machines[1]=node2RMS
9) (PreCheckScript=)
10) (PreOnlineScript=)
```

```

11) (PostOnlineScript=)
12) (PreOfflineScript=)
13) (OfflineDoneScript=)
14) (FaultScript=)
15) (AutoStartUp=no)
16) (AutoSwitchOver=HostFailure|ResourceFailure|ShutDown)
17) (PreserveState=no)
18) (PersistentFault=1)
19) (ShutdownPriority=)
20) (OnlinePriority=)
21) (StandbyTransitions=)
22) (LicenseToKill=no)
23) (AutoBreak=yes)
24) (AutoBreakMaintMode=no)
25) (HaltFlag=yes)
26) (PartialCluster=0)
27) (ScriptTimeout=)
Choose the setting to process:

```

6. Select SAVE+EXIT after setting Machines+Basics.

7. Set up a resource required for the shared disk (ex. GDS) in the "Setting of turnkey wizard "WIZSTANDBY"" screen.

```

Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP                                10) Oracle(-)
2) -                                    11) Symfoware(-)
3) SAVE+EXIT                            12) Procedure:SystemState3(-)
4) -                                    13) Procedure:SystemState2(-)
5) ApplicationName=APP1                 14) Gls:Global-Link-Services(Gls_APP1)
6) Machines+Basics(appl)                15) IpAddresses(-)
7) CommandLines(-)                      16) LocalFileSystems(Lfs_APP1)
8) Procedure:Application(-)              17) Gds:Global-Disk-Services(Gds_APP1)
9) Procedure:BasicApplication(-)
Choose the setting to process:

```

8. Return to the Main configuration menu by executing SAVE+EXIT. (Any settings related to Oracle should not be done here).

```

Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP                                10) Oracle(-)
2) -                                    11) Symfoware(-)
3) SAVE+EXIT                            12) Procedure:SystemState3(-)
4) -                                    13) Procedure:SystemState2(-)
5) ApplicationName=APP1                 14) Gls:Global-Link-Services(Gls_APP1)
6) Machines+Basics(appl)                15) IpAddresses(-)
7) CommandLines(-)                      16) LocalFileSystems(Lfs_APP1)
8) Procedure:Application(-)              17) Gds:Global-Disk-Services(Gds_APP1)
9) Procedure:BasicApplication(-)
Choose the setting to process: 3

```

2.2.4.2 Configuration-Generate and Configuration-Activate

1. Execute Configuration-Generate and Configuration-Activate. Then the environment setup will successfully be completed.

```

nodel: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP                                10) Configuration-Remove
2) QUIT                                11) Configuration-Freeze
3) Application-Create                   12) Configuration-Thaw
4) Application-Edit                     13) Configuration-Edit-Global-Settings
5) Application-Remove                   14) Configuration-Consistency-Report
6) Application-Clone                     15) Configuration-ScriptExecution

```

```

7) Configuration-Generate          16) RMS-CreateMachine
8) Configuration-Activate        17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action:

```

2. Select QUIT and terminate RMS Wizard.

```

node1: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP                          10) Configuration-Remove
2) QUIT                          11) Configuration-Freeze
3) Application-Create              12) Configuration-Thaw
4) Application-Edit                13) Configuration-Edit-Global-Settings
5) Application-Remove              14) Configuration-Consistency-Report
6) Application-Clone               15) Configuration-ScriptExecution
7) Configuration-Generate          16) RMS-CreateMachine
8) Configuration-Activate          17) RMS-RemoveMachine
9) Configuration-Copy
Choose an action: 2

```

2.2.5 userApplication Operation Check

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

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.

Switch userApplication to the standby node, and check them on the standby node as well as the operating node.

Logical IP address

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

Switch userApplication to the standby node, and check them on the standby node as well as the operating node.



See

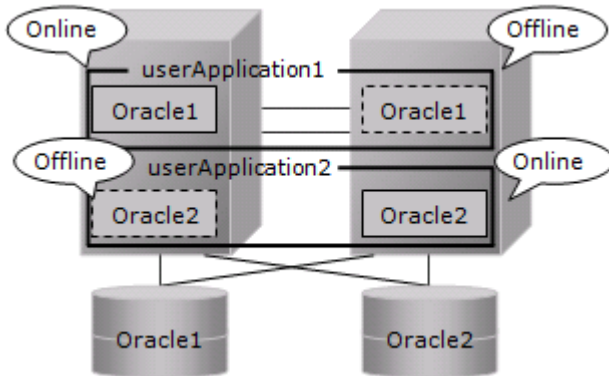
.....
For the RMS command, refer to the "PRIMECLUSTER Installation and Administration Guide".
.....

2.2.6 Oracle Database Creation and Setting

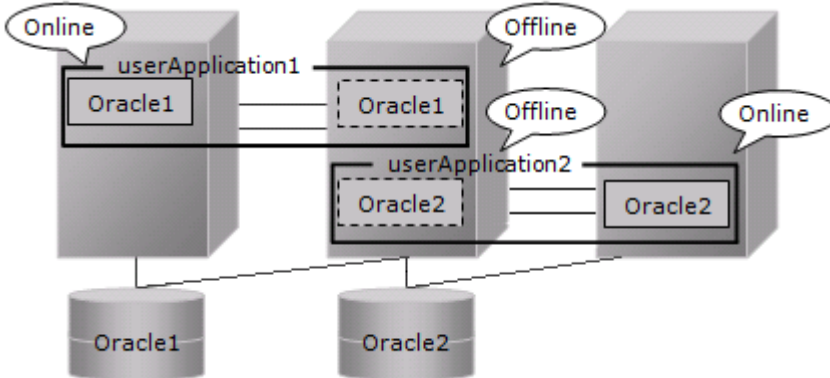
It is necessary to create a database on the shared disk. The creation should be performed on an operation node. After that, setup on standby nodes in the same configuration to be accessible to the database from the standby nodes.

Example

- Mutual standby



- 2:1 Standby



1. Startup of userApplication.

Start up userApplication on an operation node where a database is created.

2. Creation of database

Create a database on a shared disk mounted to the operation 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.
- Check if the Oracle user has privileges to write in a shared disk before creating the database.
- Confirm the contents of "[Chapter 5 Notice](#)" before creating.

- Destination of database files

Files	Locations	Note
Initialization Parameter File (PFILE)	Arbitrary	Recommend to allocate on a local disk of each node.

Files		Locations	Note
Server Parameter File (SPFILE)		Share	See "Server Parameter File (SPFILE)" below.
Password file		Arbitrary	See "Password file" below.
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	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	Local	

Allocate each file 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 node, 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](#)".

- Initialization Parameter File (PFILE)

The initial 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 network.

- Server Parameter File (SPFILE)

If you use the server parameter file, store it on a shared disk. If it is not stored 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 an operating and a standby both 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

How to set the initialized parameter file (<\$ORACLE_HOME>/dbs/init<\$ORACLE_SID>.ora):

```
spfile = /mnt2/db/parameter/spfile.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 "2.2.3 userApplication Configuration".
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. Edit the initialized parameter file <\$ORACLE_HOME>/dbs/init<\$ORACLE_SID>.ora as follows:

```
spfile=<shared disk>/spfile<$ORACLE_SID>.ora
```

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

You can also use "cloracpy" 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. To which allocate it, 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.

When allocate Password file on a shared disk, make a symbolic link file under the "\$ORACLE_HOME/dbs" of each node.

```
$ ln -s <the mount point of a shared disk>/orapw<SID> <$ORACLE_HOME>/dbs/orapw<SID>
```

Other notices for database creation are below.

 **Note**

- If you use Oracle ASM, it is necessary to register the Oracle ASM as an RMS resource. Refer to "2.3.2 Oracle ASM (Automatic Storage Management)".
- 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 Database is controlled through SQL*Plus in PRIMECLUSTER Wizard for Oracle. It is available to set the SQL*Plus system variables to login.sql by SET of SQL*Plus command.

3. Configuration of Oracle Net Services

Configure Oracle Net Services such as Listener and net service name on operation node.

- Network setup

Files	Locations	Note
listener.ora	Arbitrary	For placement of the file, refer to the below "information".

Files	Locations	Note
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
```

- Oracle listener

Create a Listener by editing listener.ora file, or using netca (Oracle Net Configuration Assistant).

```
$ORACLE_HOME/network/admin/listener.ora
```

If you use Oracle listener switching operation using a logical IP address for standby operation, 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)
    )
  )
)
```


- Net Service Name

If the Oracle listener is monitored through "tnsping" command, set up the tnsnames.ora file, or using netca (Oracle Net Configuration Assistant).

```
$ORACLE_HOME/network/admin/tnsnames.ora
```

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))
  )
```

Notices for Configuring Oracle Net Services are below.

Note

- The Oracle "TWO_TASK" environment variable must not be used.

It is used to add a connect identifier to connect to Oracle instances 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 at the connecting.

- OS authentication of Listener must be enabled.

There are two methods to enable it:

- Define a parameter in sqlnet.ora file as below.

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

- Not define the "LOCAL_OS_AUTHENTICATION_<LISTENER_NAME>" parameter in sqlnet.ora file. (default)
- If multiple Oracle homes are configured on one server, a different Oracle Listener name must be assigned for each Oracle home.

4. Site preparation for standby nodes

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

- Agreement of configuration

All configurations of the database and Oracle Net Services on standby nodes must match that of the operating node.

- Under <\$ORACLE_HOME>/dbs
- Under <\$ORACLE_BASE>/admin/<\$ORACLE_SID>
- Under <\$ORACLE_BASE>/diag
- Under <\$ORACLE_HOME>/network/admin
- The directories set in the Oracle initialization parameters AUDIT_FILE_DEST, BACKGROUND_DUMP_DEST, CORE_DUMP_DEST, USER_DUMP_DEST and DIAGNOSTIC_DEST
- The access privilege to the directory must be also the same as that on the operating node.

The access privilege to the directories and files above 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 nodes.

Information

The required files on the operating node can be backed up in the tar format with the "cloracpy" command. Refer to "[4.4 cloracpy - Create Backup File for Oracle Database Setup](#)".

- SYSTEM user password

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 cloracpy - 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/FJISVclora/etc/clgetoralog.conf. See the Note in "[4.5 clgetoralog - Collect Troubleshooting Information](#)" for details.

5. Check Oracle database operation

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. 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
#
```

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

1.STARTUP

2.ALTER PLUGGABLE DATABASE ALL OPEN; *For the database using the multitenant architecture.

3.SHUTDOWN IMMEDIATE

Note

Before switching userApplication from the operating node to standby nodes, shut down all databases and Listeners on the operating node. If not, all processes associated with Oracle instance would be forcibly killed.

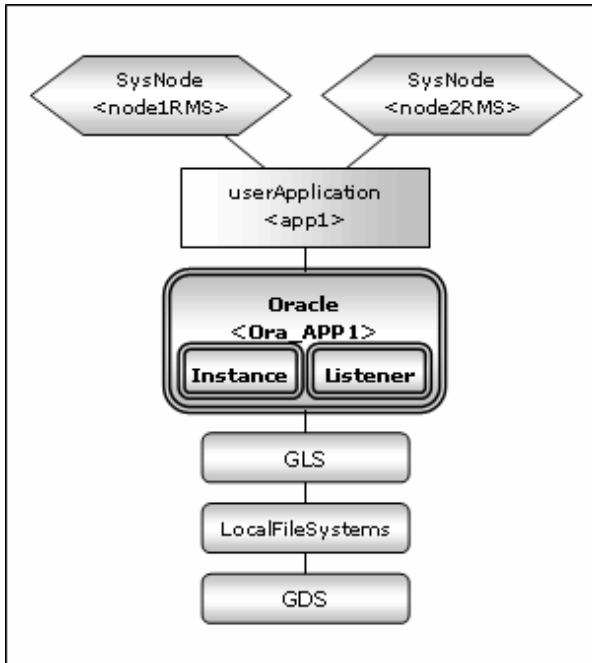
After the check completed, shut down all databases and Listeners, and stop RMS on all nodes.

2.2.7 userApplication Edit

Register Oracle resources in userApplication that was created at "2.2.4 userApplication Creation (without Oracle Resources)".

In standby operation, userApplication is configured as follows.

Note that userApplication resource (Ora_App1) is being created and added in this section.



GLS: Global Link Services
GDS: Global Disk Services

Note

- Check if Oracle database is properly running by starting and stopping the Oracle instance and Oracle listener manually.
- Stop the Oracle instance, Oracle listener, and RMS on all the nodes in a cluster system before starting next section.
- Do not create multiple resources for the same an Oracle instance or a Listener.

See

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

2.2.7.1 Oracle Resource Creation and Registration

The following example shows how to configure the Oracle environment.

1. Execute the following command on any one of the cluster nodes.
(Configuration name specified at "2.2.4 userApplication Creation (without Oracle Resources)" also should be specified as <Configuration Name>.)

```
# hvw -n <Configuration Name>
```

2. Select Application-Edit in the "Main configuration menu" screen.

```
node1: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP
2) QUIT
3) Application-Create
4) Application-Edit
5) Application-Remove
6) Application-Clone
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) RMS-CreateMachine
17) RMS-RemoveMachine
Choose an action: 4
```

3. Select userApplication (displayed in capital letters) created at "2.2.4 userApplication Creation (without Oracle Resources)".

```
Edit: Application selection menu (restricted):
1) HELP
2) QUIT
3) RETURN
4) OPTIONS
5) APP1
Application Name: 5
```

4. Select Oracle(-) in the "Settings of turnkey wizard "WIZSTANDBY"" screen.

```
Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP
2) -
3) SAVE+EXIT
4) -
5) ApplicationName=APP1
6) Machines+Basics(app1)
7) CommandLines(-)
8) Procedure:Application(-)
9) Procedure:BasicApplication(-)
10) Oracle(-)
11) Symfoware(-)
12) Procedure:SystemState3(-)
13) Procedure:SystemState2(-)
14) Gls:Global-Link-Services(Gls_APP1)
15) IpAddresses(-)
16) LocalFileSystems(Lfs_APP1)
17) Gds:Global-Disk-Services(Gds_APP1)
Choose the setting to process: 10
```

5. Add Oracle instances and Oracle listeners in the Oracle setup screen.

```
Oracle (Ora_APP1:not yet consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalInstance
6) AdditionalListener
7) StartPriority=Same
Choose the setting to process:
```

Attributes	Description
AdditionalInstance	Add an Oracle instance resource.
AdditionalListener	Add an Oracle listener resource.
StartPriority	Set up the startup order of the Oracle instance and Oracle listener. The default is "Same"(Simultaneous startup).

 **Example**

StartPriority

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

6. Add Oracle instance resource.

Select AdditionalInstance, FREECHOICE and enter ORACLE_SID.

```
Oracle (Ora_APP1:not yet consistent)
1) HELP                                4) REMOVE+EXIT                                7) StartPriority=Same
2) -                                    5) AdditionalInstance
3) SAVE+EXIT                            6) AdditionalListener
Choose the setting to process: 5
```

```
Setting menu : OracleSID for Oracle instance
1) HELP
2) RETURN
3) FREECHOICE
Set additional instance OracleSID: 3
>> ora
```

 **Information**

An Oracle instance resource name on RMS is based on the ORACLE_SID <OracleSID> entered on this step.

```
ORACLE_Ora_<ApplicationName>_<OracleSID>
```

This resource name has the following convention and rules.

- The resource name must be up to 39 characters.
- "ORACLE_Ora_" is a fixed word.
- For information on how to set up <ApplicationName>, refer to the step "4" of "2.2.4.1 userApplication creation".

 **Note**

For addition of Oracle ASM instance resource, refer to "2.3.2 Oracle ASM (Automatic Storage Management)".

7. Edit advanced settings of Oracle instance resource.

```
Setting menu : Detail setting for Oracle instance
1) HELP                                11) WatchTimeout=300
2) NO-SAVE+RETURN                      12) REDOApply=NormalApply
3) SAVE+RETURN                          13) UsePDB=no
4) OracleUser=oracle                    14) (PreOnlineScript=)
5) StartTimeout=600                     15) (PostOnlineScript=)
6) StopTimeout=180                       16) (PreOfflineScript=)
7) AbortTimeout=60                       17) (PostOfflineScript=)
8) StopModeStop=immediate                18) (FaultScript=)
9) StopModeFail=abort                    19) (Flags=)
10) Interval=30
Choose the setting to process:
```

The settings for Oracle instance resource are as follows:

Attributes	Description
OracleSID	ORACLE_SID

Attributes	Description
	<p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <ul style="list-style-type: none"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzvwxyz_+
OracleUser	<ul style="list-style-type: none"> - Oracle instance resource - Oracle Database software installation user (refer to “Oracle User” of “2.2.2 Oracle Database Software Installation and Configuration”.) - Oracle ASM instance resource - Oracle Grid Infrastructure software installation 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"> - 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzvwxyz_
StartTimeout	<p>Timeout duration of Oracle instance startup. (seconds) Default: 600 (300 - 86400)</p>
StopTimeout	<p>Timeout duration of Oracle instance stop. (seconds) Default: 180 (60 - 86400)</p>
AbortTimeout	<p>Timeout duration of forced termination in the event of an Oracle instance stop error. (seconds) Default: 60 (60 - 86400)</p>
StopModeStop	<p>Oracle instance stop mode in normal time. Default: Immediate mode (abort, immediate, transactional)</p>
StopModeFail	<p>Oracle instance stop mode in the event of a failure. Default: Abort mode (abort, immediate)</p>
Interval	<p>Monitoring interval of Oracle instance. (seconds) Default: 30 (5 - 86400)</p>
WatchTimeout	<p>No response time during monitoring Oracle instance. (seconds) 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. 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 "F.2 Oracle Environment Setting".</p>
UsePDB	<p>Set <i>yes</i> when you use the PDB of the Oracle database using the multitenant architecture. Set <i>no</i> when you do not use the PDB. Default: no (yes, no)</p> <p>This setting is not used for the Oracle ASM instance resource.</p>
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>

Attributes		Description
		<p>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[] :;<,>.</p>
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> <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 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> <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>
	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 not selected.</p>
	MonitorOnly (M)	<p>If you do not want to generate a failover when a resource failure occurs, select this flag "MonitorOnly(M)".</p> <p>Default: "MonitorOnly(M)" is not selected.</p>



- For details about *Script, refer to "2.3.1 Oracle resource Online/Offline Script".
- For details about Flags, refer to "PRIMECLUSTER RMS with Wizard Tools Configuration and Administration Guide".

Information

- Calculate StartTimeout based on the time measured in "2.2.6 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 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 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.
- 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.
- Flags=<Abbreviation> indicates that the flag attribute is enabled.

8. Select SAVE+RETURN to quit advanced settings.

```
Setting menu : Detail setting for Oracle instance
1) HELP                                11) WatchTimeout=300
2) NO-SAVE+RETURN                       12) REDOApply=NormalApply
3) SAVE+RETURN                         13) UsePDB=no
4) OracleUser=oracle                   14) (PreOnlineScript=)
5) StartTimeout=600                    15) (PostOnlineScript=)
6) StopTimeout=180                     16) (PreOfflineScript=)
7) AbortTimeout=60                     17) (PostOfflineScript=)
8) StopModeStop=immediate               18) (FaultScript=)
9) StopModeFail=abort                  19) (Flags=)
```



```
10) Interval=30
Choose the setting to process: 3
```

9. Add Oracle listener resource.
Select AdditionalListener, FREECHOICE and enter Listener name.

```
Oracle (Ora_APP1:consistent)
1) HELP                               5) AdditionalInstance
2) -                                   6) AdditionalListener
3) SAVE+EXIT                          7) StartPriority=Same
4) REMOVE+EXIT                        8) OracleInstanceName[0]='ora'
Choose the setting to process: 6
```

```
Setting menu : ListenerName for Oracle listener
1) HELP
2) RETURN
3) FREECHOICE
Set additional Listener Name: 3
>> LISTENER
```

Information

An Oracle listener resource name on RMS is based on the listener name <ListenerName> entered on this step.

```
LISTENER_Ora_<ApplicationName>_<ListenerName>
```

This resource name has the following convention and rules.

- The resource name must be up to 39 characters.
- "LISTENER_Ora_" is a fixed word.
- For information on how to set up <ApplicationName>, refer to the step "4" of "[2.2.4.1 userApplication creation](#)".

10. Edit advanced settings of Oracle listener resource.

```
Setting menu : Detail setting for Oracle listener
1) HELP                               6) StartTimeout=180                11) (PostOnlineScript=)
2) NO-SAVE+RETURN                    7) StopTimeout=60                 12) (PreOfflineScript=)
3) SAVE+RETURN                       8) Interval=30                   13) (PostOfflineScript=)
4) OracleUser=oracle                 9) WatchTimeout=300              14) (FaultScript=)
5) (TNSName=)                        10) (PreOnlineScript=)           15) (Flags=A)
Choose the setting to process:
```

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 ASM is not used) - Operating system user for Listener control. - Oracle listener resource(Oracle ASM is used) - Grid user

Attributes	Description
	<p>It can contain the following characters. However, the character string must not start with the hyphen.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-</p>
TNSName	<p>Network service for Listener monitoring</p> <p>Execute "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> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_-</p>
StartTimeout	<p>Timeout during Oracle listener startup. (seconds)</p> <p>Default: 180 (120 - 86400)</p>
StopTimeout	<p>Timeout during Oracle listener stop. (seconds)</p> <p>Default: 60 (60 - 86400)</p>
Interval	<p>Monitoring interval of Oracle listener. (seconds)</p> <p>Default: 30 (5 - 86400)</p>
WatchTimeout	<p>No response time during monitoring Oracle listener. (seconds)</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>It can contain the following characters.</p> <p>- 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz_+/"#\$%^&*(){}[];:<,>.?`</p>
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> <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 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>

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

 See

- For details about *Script, refer to "2.3.1 Oracle resource Online/Offline Script".
- For details about Flags, refer to "PRIMECLUSTER RMS with Wizard Tools Configuration and Administration Guide".

 Information

- 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.

11. Select SAVE+RETURN to quit advanced settings.

```
Setting menu : Detail setting for Oracle listener
1) HELP                               6) StartTimeout=180                11) (PostOnlineScript=)
2) NO-SAVE+RETURN                     7) StopTimeout=60                 12) (PreOfflineScript=)
3) SAVE+RETURN                       8) Interval=30                   13) (PostOfflineScript=)
4) OracleUser=oracle                  9) WatchTimeout=300              14) (FaultScript=)
5) (TNSName=)                         10) (PreOnlineScript=)           15) (Flags=A)
Choose the setting to process: 3
```

- Confirm that Oracle instance and listener resources have been set, and then select SAVE+EXIT. In the next screen, confirm that Oracle (Ora_XXX) have been set.

```
Oracle (Ora_APP1:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalInstance
6) AdditionalListener
7) StartPriority=Same
8) OracleInstanceName[0]='ora'
9) OracleListenerName[0]=LISTENER
Choose the setting to process: 3
```

```
Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP
2) -
3) SAVE+EXIT
4) -
5) ApplicationName=APP1
6) Machines+Basics(app1)
7) CommandLines(-)
8) Procedure:Application(-)
9) Procedure:BasicApplication(-)
10) Oracle(Ora_APP1)
11) Symfoware(-)
12) Procedure:SystemState3(-)
13) Procedure:SystemState2(-)
14) Gls:Global-Link-Services(Gls_APP1)
15) IpAddresses(-)
16) LocalFileSystems(Lfs_APP1)
17) Gds:Global-Disk-Services(Gds_APP1)
Choose the setting to process:
```

2.2.7.2 Other Resource Creation and Registration

- If you have any other required resources, register and create them in the "Settings of turnkey wizard "WIZSTANDBY"" screen.



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".)

- Select SAVE+EXIT to return Main configuration menu.

```
Settings of turnkey wizard "WIZSTANDBY" (APP1:not yet consistent)
1) HELP
2) -
3) SAVE+EXIT
4) -
5) ApplicationName=APP1
6) Machines+Basics(app1)
7) CommandLines(-)
8) Procedure:Application(-)
9) Procedure:BasicApplication(-)
10) Oracle(Ora_APP1)
11) Symfoware(-)
12) Procedure:SystemState3(-)
13) Procedure:SystemState2(-)
14) Gls:Global-Link-Services(Gls_APP1)
15) IpAddresses(-)
16) LocalFileSystems(Lfs_APP1)
17) Gds:Global-Disk-Services(Gds_APP1)
Choose the setting to process: 3
```

- If you have any other required userApplications, create them in Main configuration menu screen.

2.2.7.3 Configuration-Generate and Configuration-Activate

- Execute Configuration-Generate and Configuration-Activate.

```
nod1: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP
2) QUIT
3) Application-Create
4) Application-Edit
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
```

```

5) Application-Remove
6) Application-Clone
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy
Choose an action:
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) RMS-CreateMachine
17) RMS-RemoveMachine

```

2. Select QUIT and terminate RMS Wizard.

```

node1: Main configuration menu, current configuration: config_standby
No RMS active in the cluster
1) HELP
2) QUIT
3) Application-Create
4) Application-Edit
5) Application-Remove
6) Application-Clone
7) Configuration-Generate
8) Configuration-Activate
9) Configuration-Copy
Choose an action: 2
10) Configuration-Remove
11) Configuration-Freeze
12) Configuration-Thaw
13) Configuration-Edit-Global-Settings
14) Configuration-Consistency-Report
15) Configuration-ScriptExecution
16) RMS-CreateMachine
17) RMS-RemoveMachine

```

Information

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

2.2.8 userApplication Operation Check

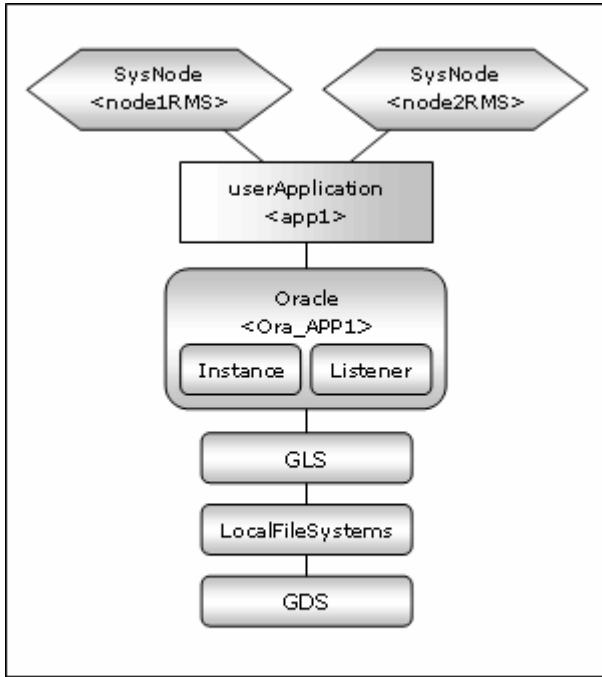
Start userApplication by executing "hvcm" command then check if it is properly running on all the nodes.

See

For the RMS command, refer to "PRIMECLUSTER Installation and Administration Guide".

Cluster configuration

Check if the configuration is as follows in the Cluster Admin screen of Web-Based Admin View.



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.



Information

.....
 If Oracle instance resource becomes Warning state, it might have been caused by wrong registration of SYSTEM user password. Register the correct password using "clorapass" command to prevent it. For details, refer to "4.3 clorapass - Register Password for Monitoring".

2.3 Information

2.3.1 Oracle resource Online/Offline Script

PRIMECLUSTER Wizard for Oracle allows users to execute their own unique processing before 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 RMS Wizard ("hvw" command).

Script		Description
	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. 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. 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. 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 RMS Wizard ("hvw" command).
Stop	PreOfflineScript	Executed before OfflineScript. Set up in RMS Wizard ("hvw" command).
	OfflineScript	Stops resource down during userApplication Offline processing. It is impossible to setup by user.
	PostOfflineScript	Executed after OfflineScript. Set up in RMS Wizard ("hvw" command).
other	FaultScript	Executed when failures occur. Set up in RMS Wizard ("hvw" command).



See

For information on how to set up these scripts, refer to "[2.2.7.1 Oracle Resource Creation and Registration](#)".

- PreOnlineScript
- PostOnlineScript
- PreOfflineScript
- PostOfflineScript
- FaultScript

For detail of these scripts, 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	----	----

Script		userApplication startup	resource AutoRecover	userApplication stop (normal)	userApplication stop (resource failure)	
	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

The execution sequence of scripts is described below when StartPriority set as "Listener";

- 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 switching process failures.
- If the script exceeds the maximum execution time (ScriptTimeout), switching process 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, refer to the "PRIMECLUSTER RMS with Wizard Tools 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.
- System administrator access 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 the step "7" of "2.2.7.1 Oracle Resource Creation and Registration".

2.3.2 Oracle ASM (Automatic Storage Management)

An Oracle ASM can be used for standby 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.

Refer to "2.3.2.1 Environment configuration".

2.3.2.1 Environment configuration

Notes in the case of using Oracle ASM in standby operation are as follows.

Supported Configurations

In order to use Oracle ASM, 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.

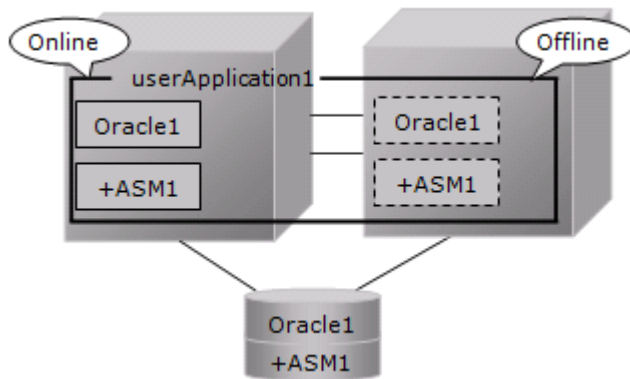
A different directory must be assigned respectively for an ORACLE_BASE of the installation user of Oracle Database and an ORACLE_BASE of the installation user of Oracle Grid Infrastructure.

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

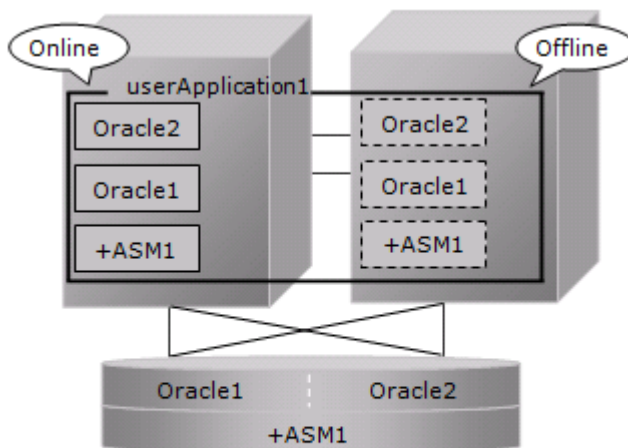
See "[Appendix C Oracle Grid Infrastructure Installation and Oracle ASM instance, Oracle Database Creation](#)" to install Oracle Grid Infrastructure and create Oracle ASM instance, Oracle Database.

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 Oracle ASM instance and database should become 1:1 or 1:n.
 - Oracle ASM instance : database = 1:1



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



- The following configuration of standby operation using Oracle ASM is supported.
 - 1:1 standby

The following configuration of standby operation using Oracle ASM 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 G Using Oracle Database 18c/19c](#)".

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.

Information

- For further details of registering Oracle ASM instance in an Oracle resource, refer to the step 5 of "[2.2.7.1 Oracle Resource Creation and Registration](#)"
- 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.

2.3.2.2 Precaution for Oracle ASM operation

A disk group that is used for the Oracle ASM instance must not be mounted or unmounted manually. For 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

This section describes startup, shutdown and monitoring of Oracle resources in standby operation and single-node cluster operation.



See

The standby database cluster operation in the Oracle Data Guard/Oracle Active Data Guard environment, refer to "F.3 Operation".

3.1.1 Oracle resources Startup and Shutdown

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 "F.1 Feature Outline".

- Initialized parameter file and server parameter file

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

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

The server parameter file should be located in the shared disk because it is dynamically changed. When you use the server parameter file, specify the full path of the server parameter file to the initialization parameter file. Refer to "2.2.6 Oracle Database Creation and Setting".

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



Note

In single-node cluster operation, the definition described at "Initialized parameter file and server parameter file" is not necessary.

- Recovery processing

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

- When there is ACTIVE table space in the V\$BACKUP view.
- 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 by user operation 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 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 processes.
- 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 processes.

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. Makes 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. Makes 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

Startup procedure of an Oracle ASM instance is as follows:

- Oracle Database 11g R2/12c R1(12.1.0.1)
 1. su - <Oracle user>
 2. sqlplus /nolog

3. CONNECT / AS SYSASM

4. STARTUP MOUNT; (if "STARTED" already, "ALTER DISKGROUP ALL MOUNT" is executed.)

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

1. su - <Oracle user>
2. Check that Oracle Restart started.
3. srvctl enable asm
4. srvctl start asm
5. srvctl disable asm

Oracle ASM instance Shutdown

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

- Shutdown procedure of an Oracle ASM instance by user operation is as follows:

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

- Shutdown procedure of an Oracle ASM instance by resource failure or failover is as follows:

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

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

- Shutdown procedure of an Oracle ASM instance by user operation is as follows:

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")>
default : IMMEDIATE
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.
- Shutdown procedure of an Oracle ASM instance by resource failure or failover is as follows:
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 ")>
default : ABORT
 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.

3.1.2 Oracle resources Monitoring

Oracle instance Monitoring

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.
4. If the state of the database which is OPEN can be confirmed, go to the step "5".
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. 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, 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 "F.1 Feature Outline".
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.

- SYSTEM user password

PRIMECLUSTER Wizard for Oracle monitors Oracle instance as the SYSTEM user. Set the SYSTEM user's password. Refer to "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 table space if the monitoring table does not exist. The table 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 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 "[2.2.7.1 Oracle Resource Creation and Registration](#)".

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 H \(Information\) 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 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_FJSSVclora: 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_FJSSVclora: 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 "[F.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 the "PRIMECLUSTER Installation and Administration Guide".

.....

Listener Monitoring

Monitoring procedure of a Listener is as follows:

1. Makes sure that a Listener process is alive by using ps command.
2. Makes 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 "[2.2.7.1 Oracle Resource Creation and Registration](#)".

.....

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 "[2.2.7.1 Oracle Resource Creation and Registration](#)".

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 the "PRIMECLUSTER Installation and Administration Guide".

Oracle ASM instance Monitoring

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

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>
```

If the Oracle Restart settings was enabled, disable the Oracle Restart settings in "9. Disable Oracle Restart settings".

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.

To avoid starting Oracle ASM and diskgroups on both nodes, execute the following commands only on the node where userApplication is running.

```
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 to "OPEN" status. Start PDBs for the database using the multitenant architecture. Start Listener if it is also stopped.

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 "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](#)".)

13. Restart userApplication

When the Oracle instance, listener, or ASM is stopped and started manually, restart the userApplication including Oracle resources.

Information

- Maintenance mode and resource monitoring

To stop Oracle database with userApplication active, use the "monitoring disruption" function of PRIMECLUSTER Wizard for Oracle. "Monitoring disruption" - Stop the Oracle resource monitoring only. If non-Oracle resource fails, a failover will be generated.

- 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 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 resource, refer to "[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 will 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, it is necessary to stop the monitoring modules by stop monitoring.
- 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 initialized parameters and data files using the procedures described below.



Note

Oracle database must be stopped depending on the settings. For details, refer to 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 initialized parameters and 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](#)".)

11. Restart userApplication

When the Oracle instance, listener, or ASM is stopped and started manually, restart the userApplication including Oracle resources.

```
# hvutil -f <userApplication>
# hvswitch <userApplication> <SysNode>
```

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 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 new ORACLE_HOME which is different from 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](#)"

3.2.2.1 Patch Application by In-place upgrade

This section discusses how to apply PSR by In-place upgrade.

1. Start userApplication (Operation node)

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

2. Maintenance mode (Operation node)

Start maintenance mode for userApplication on operation 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 depending on the destination 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 (Operation node)

Stop maintenance mode of userApplication on operation 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.

10. Restart userApplication

When the Oracle instance, listener, or ASM is stopped and started manually, restart the userApplication including Oracle resources.

```
# hvutil -f <userApplication>
# hvswitch <userApplication> <SysNode>
```

3.2.2.2 Patch Application by Out-of-place upgrade

This section discusses how to apply PSR by Out-of-place upgrade.

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 (Operation node)

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

2. Maintenance mode (Operation node)

Start maintenance mode for userApplication on operation 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 (Operation 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 (All nodes)

- If Oracle Database Software is located in local disk, execute the Out-of-place upgrade on all nodes.
- If Oracle Database Software is located in shared disk, execute the Out-of-place upgrade on operation 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 (Operation node)

Execute dbua (Database Upgrade Assistant) on operation 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 (Operation 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 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 (Operation node, Standby node)

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

Example

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

After that, transfer the archive file from operation node to 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.
- In single-node cluster operation, this step is not necessary.
- 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 Oracle Database Creation and Setting](#)".

3. 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>. Execute this procedure on all nodes

- If Oracle Database Software is located in local disk, execute this procedure on all nodes.
- If Oracle Database Software is located in shared disk, execute this procedure on operation 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 Startup (Operation 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 (Operation 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 (Operation node)

Stop maintenance mode of userApplication on operation node.

Example

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

```
# /opt/MAW/MAWRrms/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

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

12. Restart service

Switch userApplication to the operation node if necessary, and 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](#)".)

11. Restart userApplication

When the Oracle instance, listener, or ASM is stopped and started manually, restart the userApplication including Oracle resources.

```
# hvutil -f <userApplication>
# hvswitch <userApplication> <SysNode>
```

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 table area or UNDO table area
- 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 table area or UNDO table area
- Complete recovery is performed

For details, refer to the Oracle Database manual

3.2.4.1 Oracle database must be stopped

If Oracle database must be stopped, recover 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 <Listener>
$ 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](#)".)

12. Restart userApplication

When the Oracle instance, listener, or ASM is stopped and started manually, restart the userApplication including Oracle resources.

```
# hvutil -f <userApplication>
# hvswitch <userApplication> <SysNode>
```

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/FJSSVclora/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/FJSSVclora/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/FJSSVclora/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



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 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 disabled
```

2. Change the Oracle SYSTEM user password

Change the Oracle SYSTEM user password, or unlock SYSTEM user account.

- Change the Oracle SYSTEM user password

In standby operation, change the password on the operating node. In single-node cluster operation, change it 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
```

- Unlock SYSTEM user account
Refer to [Case 2] of "[A.1.3 Warning State](#)".

3. Register the Oracle SYSTEM user password to PRIMECLUSTER Wizard for Oracle

Register the Oracle SYSTEM user password to PRIMECLUSTER Wizard for Oracle using "clorapass" command.

In standby operation, register the password on the operating node. In single-node cluster operation, register 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 operation node. 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 enabled
```

Information

- For the "hvoradisable" or "hvoraenable" command, refer to "[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 does not need to 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 occurs in the event of a failure in PRIMECLUSTER operation with Oracle database, solve the problem referring to the Oracle database alert log or log files.

Log of PRIMECLUSTER Wizard for Oracle

PRIMECLUSTER Wizard for Oracle provides information what kind of failure is detected and what corrective action is taken in the following log files:

```
/var/opt/reliant/log/FJSVclora_<OracleSID>*.log  
/var/opt/reliant/log/FJSVclora_<ListenerName>*.log
```

The format of log files is 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

- initialization parameter file

\$ORACLE_HOME/dbs/*.ora

\$ORACLE_BASE/admin/\$ORACLE_SID/pfile/*.ora

- Oracle Net Services file

\$ORACLE_HOME/network/admin/*.ora

- Log files

- Oracle alert log

\$ORACLE_HOME/rdbms/log/alert_<ORACLE_SID>.log

\$ORACLE_BASE/diag/*

- listener log

\$ORACLE_HOME/network/log/<ListenerName>.log

\$ORACLE_BASE/diag/*

PRIMECLUSTER information

Refer to "PRIMECLUSTER Configuration and Administration Guide".

PRIMECLUSTER Wizard for Oracle information

- Configuration files
 - /opt/FJSVclora/etc/*
 - /usr/opt/reliant/etc/hvgdconfig
 - /usr/opt/reliant/build/< RMS configuration name >.usfiles/*
- Log files
 - /var/opt/reliant/log/*

Information

You can collect troubleshooting information for Oracle database and PRIMECLUSTER Wizard for Oracle using "pclsnap" command. The "pclsnap" 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 details, refer to "[4.5 clgetalog - 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.

See

Refer to "PRIMECLUSTER Installation and Administration Guide".

- /var/opt/FJSVclora
- Log files having information about monitoring are stored in this directory. When the log files would reach the maximum size of their files, a message will overwrite the oldest stored messages.

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)

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/FJSPVclora/sbin/hvoradisable userApplication Resource`

`/opt/FJSPVclora/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 is not monitored, so it is not necessary to discontinue monitoring the resource with the command.
- For further details about Oracle ASM instance resources, refer to "[2.3.2 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.

Specify them 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.)
- Do not operate Oracle instances and Oracle listeners manually right after execution of the command.
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 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 is not monitored, so it is not necessary to cancel monitoring for them with the command.
- For further details about Oracle ASM instance resources, refer to "[2.3.2 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.

Specify them 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 (restarting 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 by using one of the following ways.
 - Output of message "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.

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 Oracle SYSTEM user's password while the cluster system is running, refer to "[3.3 Oracle SYSTEM user Password Change](#)".

- The password character string that the "cloracpass" 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, "@" signs and multibyte characters.
 - If it contain 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.

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. The procedure for deploying the tar file in the standby node is as follows.

1. Forward the /tmp/oracle.<\$ORACLE_SID>.tar from the operation node to the standby node.
2. Executed "tar xvfP /tmp/oracle.<\$ORACLE_SID>.tar" with root user.

Information

It is also possible to deploy with the Oracle user, if group of the files included in the tar file are Oracle user's initial group of all. Execute the following command, and if the execution result of the find command is all 0, it is possible to deploy with the Oracle user. If deploy with the Oracle user, executed "tar xvfPp /tmp/oracle.<\${ORACLE_SID}>.tar".

```
# su - <Oracle user>
$ id -a
$ find $ORACLE_HOME/dbs -not -group <Oracle user's initial group name> | wc -l
$ find $ORACLE_BASE/admin/${ORACLE_SID} -not -group <Oracle user's initial group name> | wc -l
$ find $ORACLE_HOME/network/admin -not -group <Oracle user's initial group name> | wc -l
$ find $ORACLE_BASE/diag -not -group <Oracle user's initial group name> | wc -l
```

It is an example as follows that Oracle user is "oracle", Oracle user's initial group name is "oinstall", the execution result of the find command is all "0", ORACLE_SID is "ora".

```
# su - oracle
$ id -a
uid=1001(oracle) gid=1005(oinstall) groups=1005(oinstall),1006(dba),1007(asmadmin),1008(asmdba)
context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023
$ find $ORACLE_HOME/dbs -not -group oinstall | wc -l
0
$ find $ORACLE_BASE/admin/${ORACLE_SID} -not -group oinstall | wc -l
0
$ find $ORACLE_HOME/network/admin -not -group oinstall | wc -l
0
$ find $ORACLE_BASE/diag -not -group oinstall | wc -l
0
$ tar xvfPp /tmp/oracle.ora.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, 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. "clgetoralog" command collects Oracle setup database information and log files on a PRIMECLUSTER system. The information will be collected in the "<hostname>_<yymmddHHMMSS>_clgetoralog.tar.Z" (or tar.gz) file.

The "clgetoralog" command collects

- Initialized parameter file
 - `$ORACLE_HOME/dbs/*.ora`
 - `$ORACLE_BASE/admin/$ORACLE_SID/pfile/*.ora`
- Oracle database alert log
 - `BACKGROUND_DUMP_DEST/*.log`
 - `$ORACLE_HOME/rdbms/log/*.log`
 - Some files under `$ORACLE_HOME/log/diag`
 - Some files under `$ORACLE_BASE/diag`
- listener.ora, tnsnames.ora
 - `$ORACLE_HOME/network/admin/*.ora`
- Listener log
 - `$ORACLE_HOME/network/log/*.log`
- 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)
 - `cat /proc/cpuinfo` (CPU information)
 - `cat /proc/version` (Linux version)
 - `sysctl -a` (kernel parameter)
 - `ipcs` (shared resources)
 - `cat /proc/swaps` (swap information)
 - `ptree -pal, ps -efw` (process information)
 - `ntpq -p` (NTP information)
 - `/var/log/messages` file
- UpdateSite(MW) information
 - `uam showup`

Information

"pclsnap" command can also be used to collect troubleshooting information. (When -a, -A or -h option is specified.)

Parameter

[-n *RMSconfiguration*]

Specify the RMS configuration name for *RMSconfiguration*.

If this option is specified, "clgetoralog" command will collect RMS configuration information in addition to the information described in "Function". You can check the RMS configuration name using the following command if RMS is running.

```
# /opt/SMAW/SMAWRrms/bin/hvdisp -a | grep Configuration
Configuration: /opt/SMAW/SMAWRrms/build/config.us
```

If this option is omitted, the command will collect information described in "Function" only.

[-d *output_directory*]

Specify the directory where information is collected.

Then, the command will store the "<hostname>_<yymmddHHMMSS>_clgetoralog.tar.Z" (or tar.gz) 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.Z" (or tar.gz) 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/log/messages (all generations)
- /etc/hosts
- /etc/passwd
- /etc/services
- /etc/fstab
- /etc/fstab.pcl

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 initialized parameter file or the server parameter file, and searches the Oracle database alert log and the 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 alert log and the listener log are not also collected.

To prevent it, define the alert log the listener log in /opt/FJSVclora/etc/clgetoralog.conf using the full path so that you can acquire them. Where the alert log and the listener log are stored is defined in BACKGROUND_DUMP_DEST parameter.

(BACKGROUND_DUMP_DEST / DIAGNOSTIC_DEST parameter can be found in the initialized 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 (an Oracle alert log)
COLLECTOBJ=/oracle/product/network/log/listener.log (a listener log)
```

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* is omitted, setup information of Wizard for Oracle resources that are currently active in the RMS configuration will be displayed.

-e

The option displays kernel parameter values and Oracle database setup information on the local node.

-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

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, refer to "Readme" 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 might not be output.
- 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 node, 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.
- The Oracle "TWO_TASK" environment variable cannot be used. For details, refer to "[2.2.6 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, refer to "[2.2.6 Oracle Database Creation and Setting](#)".
- 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 "[2.2.7.1 Oracle Resource Creation and Registration](#)" should belong to OSDBA group.
 - SQLNET.AUTHENTICATION_SERVICES parameter should not define in sqlnet.ora file.

The other connections (ex. 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 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, 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, 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.

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 table space. The size of the table is only a few bytes. The table data is periodically updated, so the REDO log is updated, and the archive 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.
- If a database failure is detected during Oracle instance startup, the database will automatically be recovered (END BACKUP, MEDIA RECOVERY). If the backup mode of database is detected during the startup of Oracle instances, it will automatically be canceled. If media failure is detected, they will automatically be recovered.
- MonitorOnly can be enabled in the following cases. For details, see "[2.2.7.1 Oracle Resource Creation and Registration](#)".
 - 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.

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, FaultScript.
For details, refer to "[2.3.1 Oracle resource Online/Offline Script](#)".
- Do not create multiple resources for the same an Oracle instance, an Oracle ASM instance or a Listener.
- In "[2.2.4.1 userApplication creation](#) userApplication creation", if you use Oracle resources in combination with PRIMECLUSTER Wizard for NAS, refer to "PRIMECLUSTER Wizard for NAS Configuration and Administration Guide".

Operations

The following items are notes about the operation of PRIMECLUSTER Wizard for Oracle.

- For information on how to change the Oracle SYSTEM user password while a cluster system is running, refer to "[3.3 Oracle SYSTEM user Password Change](#)". Register the changed Oracle SYSTEM user password to PRIMECLUSTER Wizard for Oracle. When the passwords of Oracle user, Grid user or Oracle SYS user are changed, it is not necessary to register the passwords to PRIMECLUSTER Wizard for Oracle.
- 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.
- When the Oracle instance, listener, or ASM is stopped and started manually while userApplication is Online for maintenance tasks, restart the userApplication including Oracle resources.

```
# hvutil -f <userApplication>  
# hvswitch <userApplication> <SysNode>
```

- If shutdown of the OS is started during startup of userApplication including Oracle resources, Oracle resources and userApplication may be in a Faulted state because the OS executes forced shutdown of the Oracle instance, listener, and ASM before Oracle resources execute stop procedure.
If userApplication is in the Faulted state after OS restart, clear the Faulted state of userApplication with the following command.

```
# hvutil -c <userApplication>
```

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 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 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 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 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 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 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 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 Oracle instance is properly running by referring to the Oracle instance alert log.

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]

If you modify the RMS configuration file manually, check the 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 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 disabled

[Content]

Monitoring resource was discontinued after the hvoradisable was executed.

[Corrective action]

None. Execute "hvoraenable" command to restart resource monitoring.



Information

For details, refer to "[4.1 hvoradisable - Discontinue Monitoring Resources](#)".

INFO: 0102: Fault Watching is enabled

[Content]

Resource monitoring was restarted after hvoraenable command was executed.

[Corrective action]

None.



Information

For details, refer to "[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 is no response from Oracle instance or Listener, timeout occurs.

[Corrective action]

Check if 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.

clgetoralog [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.

clgetoralog [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 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 clgetalog continue collecting information.

[Corrective action]

None.

clgetalog [WARN] Invalid RMS Configuration name! (*RMS_configuration*)

[Content]

Cannot get RMS configuration name, but clgetalog 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 userApplication (cluster application) 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 are no 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 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 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 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 system administrators.

command: ERROR: Failed to disable/enable resource monitoring - resource_name

[Content]

Cannot disable or enable monitoring.

[Corrective action]

Contact system administrators.

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 an 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 userApplication (cluster application) have been completed.

command: ERROR: No Wizard for Oracle resources belong to specified userApplication! - userApplication_name

[Content]

There are no 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 are no 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 are no 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
	AutoRecover or Failover	A.1.2
	Warning status	A.1.3
Oracle listeners	Startup/stop failure	A.2.1
	AutoRecover or Failover	A.2.2
PDBs	Startup/stop failure	A.3.1
	Message was output	A.3.2

A.1 Oracle Instances

A.1.1 Startup/stop failure

Oracle instance startup or stop failed.

[Case 1]

Oracle instance startup or stop fails when the PRIMECLUSTER RMS resource settings are invalid.

Check the resource setup information by executing "clorainfo -c" command. Refer to "[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. Refer to "[Chapter 2 Environment Setup](#)".

[Case 2]

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]

Oracle instance startup or stop fails when Oracle database settings are invalid.

Check the Oracle database alertlog, 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. Refer to "[3.2.4.1 Oracle database must be stopped](#)".

A.1.2 AutoRecover or Failover

AutoRecover or a userApplication failover occurred because of an Oracle instance resource failure.

[Case 1]

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 node, because the space of shared disk is insufficient and the failover of userApplication fails on the standby node.

Check the Oracle database alertlog, so you might be able to detect the cause of the failure.

Also, backup archive logs then reserve enough disk space.

[Case 2]

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

Oracle instance has been activated, but an Oracle instance resource has entered Warning.

[Case 1]

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
- 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. Refer to "[3.3 Oracle SYSTEM user Password Change](#)".

[Case 2]

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 statement.

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 privilege 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. Refer to "[3.3 Oracle SYSTEM user Password Change](#)". Then, release account locking using the procedure above.

[Case 3]

An Oracle instance resource enters Warning when instance monitoring is discontinued.

Check the monitoring status by executing "clorainfo -m" command. Refer to "[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. Refer to "[4.2 hvoraenable - Restart Monitoring Resources](#)".

[Case 4]

In Oracle instance monitoring, an Oracle instance resource enters Warning if there is no reply from SQL statement(e.g. INSERT, UPDATE, etc.) within a specified time, but you can access Oracle instance, and the instance indicates OPEN.

Take corrective action on Oracle database.

In Oracle instance monitoring of PRIMECLUSTER Wizard for Oracle, if there is no reply from Oracle instance within a specified time, monitoring timeout will be considered and the following error message will also be output to syslog:

```
ERROR: 0226: Watch Timeout occurred
```

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]

In Oracle instance monitoring, an Oracle instance resource enters Warning if you cannot access 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.

[Case 6]

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](#)".



See

.....
For details refer to the Oracle Database manual.
.....

A.2 Oracle Listeners

A.2.1 Startup/stop failure

Oracle listener startup or stop failed.

[Case 1]

Oracle listener startup or stop fails when the PRIMECLUSTER RMS resource settings are invalid.

Check the following resource setup information by executing "clorainfo -c" command. Refer to "[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. Refer to "[Chapter 2 Environment Setup](#)".

[Case 2]

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. Refer to "[3.2.4.1 Oracle database must be stopped](#)".

A.2.2 AutoRecover or Failover

AutoRecover or a userApplication failover occurred because of Oracle listener resource failure.

[Case 1]

A userApplication failover occurs when the PRIMECLUSTER RMS resource settings (especially TNSName) are invalid.

Check the following resource setup information by executing "clorainfo -c" command. Refer to "[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. Refer to "[Chapter 2 Environment Setup](#)".

[Case 2]

A userApplication failover 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]

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]

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.

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 ["3.1.2 Oracle resources Monitoring"](#).

For details about the monitoring of PDB in the Oracle Data Guard/Oracle Active Data Guard environment, see ["F.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 RMS Wizard by executing "hvw -n <Configuration Name>" command on any node.
3. Select Application-Edit in the "Main configuration menu" screen.
4. Select userApplication name (displayed in capital letters) where resources are registered in the "Application selection menu" screen.
5. Select Oracle(Ora_XXX) in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
6. Select AdditionalXXX in the "Oracle (Ora_XXX:consistent)" screen.

Example

If you create and register an Oracle instance resource or an Oracle ASM instance resource, select AdditionalInstance here, and edit advanced settings of the resource according to the step "7" and "8" of "2.2.7.1 Oracle Resource Creation and Registration".

If you create and register a Listener resource, select AdditionalListener here, and edit advanced settings of the resource according to the step "10" and "11" of "2.2.7.1 Oracle Resource Creation and Registration".

```
Oracle (Ora_APP1:consistent)
1) HELP                                6) AdditionalListener
2) -                                    7) StartPriority=Same
3) SAVE+EXIT                            8) OracleInstanceName[0]='ora'
4) REMOVE+EXIT                          9) OracleListenerName[0]=LISTENER
5) AdditionalInstance
Choose the setting to process:
```

In the single-node cluster operation, 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. Repeat the step "6" if need to create and register resources else.
8. Select SAVE+EXIT in the "Oracle (Ora_XXX:consistent)" screen after completed.
9. Select SAVE+EXIT in the "Settings of turnkey wizard "WIZSTANDBY"" screen.

10. Select RETURN in the "Application selection menu" screen.
11. Execute Configuration-Generate and Configuration-Activate in the "Main configuration menu" screen.
12. Select QUIT in the "Main configuration menu" screen and terminate RMS 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.

Example

To create an Oracle instance resource and(or) a Listener resource newly and register them(it) to an existing userApplication including GDS, LFS and GLS resources already.

In the standby operation, it is the same as the procedure in ["2.2.7 userApplication Edit"](#).

1. Stop RMS on all nodes.
2. Start up RMS Wizard by executing "hvw -n <Configuration Name>" command on any node.
3. Select Application-Edit in the "Main configuration menu" screen.
4. Select userApplication name (displayed in capital letters) where resources are registered in the "Application selection menu" screen.
5. Select Oracle(-) in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
6. Select Additional.xxx in the "Oracle (Ora_XXX: not yet consistent)" screen.

Example

```
Oracle (Ora_APP1: not yet consistent)
1) HELP                               4) REMOVE+EXIT                       7) StartPriority=Same
2) -                                   5) AdditionalInstance
3) SAVE+EXIT                           6) AdditionalListener
Choose the setting to process:
```

If you create and register an Oracle instance resource or an Oracle ASM instance resource, select AdditionalInstance here, and edit advanced settings of the resource according to the step "7" and "8" of ["2.2.7.1 Oracle Resource Creation and Registration"](#).

If you create and register a Listener resource, select AdditionalListener here, and edit advanced settings of the resource according to the step "10" and "11" of ["2.2.7.1 Oracle Resource Creation and Registration"](#).

In the single-node cluster operation, 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. Select SAVE+EXIT in the "Oracle (Ora_XXX: consistent)" screen after completed.
8. Select SAVE+EXIT in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
9. Select RETURN in the "Application selection menu" screen.
10. Execute Configuration-Generate and Configuration-Activate in the "Main configuration menu" screen.
11. Select QUIT in the "Main configuration menu" screen and terminate RMS 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(e.g. changes it from 30 to 60).

1. Stop RMS on all nodes.
2. Start up RMS Wizard by executing "hvw -n <Configuration Name>" command on any node.
3. Select Application-Edit in the "Main configuration menu" screen.
4. Select userApplication name (displayed in capital letters) including target resources in the "Application selection menu" screen.
5. Select Oracle(Ora_XXX) in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
6. Select the target resource name in the "Oracle (Ora_XXX:consistent)" screen.

Example

If an Oracle instance resource, select OracleInstanceName[0]='*OracleSID*'.

If a Listener resource, select OracleListenerName[0]=*LISTENER*.

```
Oracle (Ora_APP1:consistent)
1) HELP                      6) AdditionalListener
2) -                          7) StartPriority=Same
3) SAVE+EXIT                 8) OracleInstanceName[0]='ora'
4) REMOVE+EXIT              9) OracleListenerName[0]=LISTENER
5) AdditionalInstance
Choose the setting to process:
```

Select a registered OracleSID or a registered Listener name in the next screen.

The following screen shot indicates the case of an Oracle instance.

```
Setting menu : OracleSID for Oracle instance
1) HELP                      5) SELECTED:'ora'
2) RETURN
3) NONE
4) FREECHOICE
Choose an Instance Name for Oracle:
```

7. Change settings in the "Detail setting for XXX" screen.
 - Oracle instance resource or Oracle ASM instance resource
Change advanced settings of the resource according to the step "7" of ["2.2.7.1 Oracle Resource Creation and Registration"](#).
 - Listener resource
Change advanced settings of the resource according to the step "10" of ["2.2.7.1 Oracle Resource Creation and Registration"](#).
8. Select SAVE+RETURN in the "Detail setting for XXX" screen after completed.
9. Repeat the step "6" and "7" if need to change resources else.
10. Select SAVE+EXIT in the "Oracle (Ora_XXX:consistent)" screen after completed.
11. Select SAVE+EXIT in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
12. Select RETURN in the "Application selection menu" screen.

13. Execute Configuration-Generate and Configuration-Activate in the "Main configuration menu" screen.
14. Select QUIT in the "Main configuration menu" screen and terminate RMS Wizard.

B.3 Resource Deletion

B.3.1 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 RMS Wizard by executing "hvw -n <Configuration Name>" command on any node.
3. Select Application-Edit in the "Main configuration menu" screen.
4. Select userApplication name (displayed in capital letters) including target resources in the "Application selection menu" screen.
5. Select Oracle(Ora_XXX) in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
6. Select the target resource in the "Oracle (Ora_XXX:consistent)" screen, and select NONE in the next screen.



Example

Oracle instance resource deletion

```
Oracle (Ora_APP1:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalInstance
6) AdditionalListener
7) StartPriority=Same
8) OracleInstanceName[0]='ora'
9) OracleListenerName[0]=LISTENER
Choose the setting to process: 8
```

```
Setting menu : OracleSID for Oracle instance
1) HELP
2) RETURN
3) NONE
4) FREECHOICE
5) SELECTED:'ora'
Choose an Instance Name for Oracle:3
```

```
Oracle (Ora_APP1:consistent)
1) HELP
2) -
3) SAVE+EXIT
4) REMOVE+EXIT
5) AdditionalInstance
6) AdditionalListener
7) StartPriority=Same
8) OracleListenerName[0]=LISTENER
Choose the setting to process:
```

7. Repeat the step "6" if need to delete resources else.
8. Select SAVE+EXIT in the "Oracle (Ora_XXX:consistent)" screen after completed.

9. Select SAVE+EXIT in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
10. Select RETURN in the "Application selection menu" screen.
11. Execute Configuration-Generate and Configuration-Activate in the "Main configuration menu" screen.
12. Select QUIT in the "Main configuration menu" screen and terminate RMS Wizard.

B.3.2 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.



Example

To delete an Oracle resource and a Listener resources in a group from an existing userApplication including them already in standby operation.

1. Stop RMS on all nodes.
2. Start up RMS Wizard by executing "hvw -n <Configuration Name>" command on any node.
3. Select Application-Edit in the "Main configuration menu" screen.
4. Select userApplication name (displayed in capital letters) including target resources in the "Application selection menu" screen.
5. Select Oracle(Ora_xxx) to be deleted in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
6. Select REMOVE+EXIT in the "Oracle (Ora_xxx:consistent)" screen, and reply "yes" for the reply message.
7. Select SAVE+EXIT in the "Settings of turnkey wizard "WIZSTANDBY"" screen.
8. Select RETURN in the "Application selection menu" screen.
9. Execute Configuration-Generate and Configuration-Activate in the "Main configuration menu" screen.
10. Select QUIT in the "Main configuration menu" screen and terminate RMS 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.

Point

When Oracle ASM is used in standby operation, it is necessary to install Oracle Grid Infrastructure.

Note

- In order to use Oracle ASM , 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 procedure for 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/sysctl.conf 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.

(bash_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:/bin:/usr/bin/X11:/usr/local/bin; export PATH
```

Example

The example of setting Grid user's environment variable.

(bash_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=$ORACLE_HOME/bin:/usr/bin:/bin:/usr/bin/X11:/usr/local/bin; export PATH
TNS_ADMIN=$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 operating node
The disk should have a size of 300MB.
- Disk for Oracle ASM on 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 Configuration](#)
- [2.2.4 userApplication Creation \(without Oracle Resources\)](#)
- [2.2.5 userApplication Operation Check](#)

5. userApplication startup on operation node

Start userApplication on operation node, and verify the shared disk units and the takeover IP address are enabled.

6. Install Oracle Grid Infrastructure on operation node

Install Oracle Grid Infrastructure to the local disks on operation 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 operating node.

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

7. Create diskgroup for the database on operation 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 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 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 operating node> ,
<Diskgroup for the database> SCOPE=BOTH;
```

Specify the diskgroup made at step 6 for <Diskgroup for Oracle ASM on 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 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 operation node

Execute the following commands as a Grid user on operation 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 operation node

Execute the following commands as a Grid user on operation 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 operation node

Execute the following commands as a Grid user on operation node to stop Oracle High Availability Services.

```
# su - <Grid user>
$ crsctl stop has
```

11. Switch userApplication to 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 standby node

Install Oracle Grid Infrastructure to the local disks on 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 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 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 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 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 standby node> ,
<Diskgroup for the database> SCOPE=BOTH;
```

Specify the diskgroup made at step 12 for <Diskgroup for Oracle ASM on 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 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 standby node

Execute the following commands as a Grid user on 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 standby node

Execute the following commands as a Grid user on standby node.

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

16. Restart Oracle High Availability Services on standby node

Execute the following commands as a Grid user on standby node.

```
# su - <Grid user>  
$ crsctl stop has  
$ crsctl start has
```

17. After restart, check all services status of Oracle Grid Infrastructure on standby node

Execute the following commands as a Grid user on standby node.

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

18. Stop Oracle High Availability Services on standby node

Execute the following commands as a Grid user on standby node to stop Oracle High Availability Services.

```
# su - <Grid user>  
$ crsctl stop has
```

19. Switch userApplication to operation node

Switch userApplication to the operation node, and verify the shared disk units and the takeover IP address are enabled.

20. Start Oracle High Availability Services on operation node

Execute the following commands as a Grid user on operation node to start Oracle High Availability Services..

```
# su - <Grid user>  
$ crsctl start has
```

21. Check all services status of Oracle Grid Infrastructure on operation node

Execute the following commands as a Grid user on operation node.

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

22. Install Oracle Database on operation node

Install Oracle Database to the local disks on operation 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 operation node

On operation node, create Oracle Database on diskgroup for the database made at step 7.

24. Check the database status on operation node

Execute the following commands as a Grid user on operation 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.orcl.db
NAME=ora.orcl.db
TYPE=ora.database.type
TARGET=ONLINE
STATE=ONLINE on dbsv1
```

25. Restart Oracle High Availability Services on operation node

Execute the following commands as a Grid user on operation node.

```
# su - <Grid user>
$ crsctl stop has
$ crsctl start has
```

26. Check all services status of Oracle Grid Infrastructure on operation node

After restart, wait for about five seconds, and execute the following commands as a Grid user on operation 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 tnsping, 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 Oracle Database Creation and Setting".

28. Check parameter file of the database

Execute the following command as a Grid user on operation 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 operation node

Execute the following commands as a Grid user on operation node to stop Oracle High Availability Services.

```
# su - <Grid user>
$ crsctl stop has
```

31. Switch userApplication to 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 standby node

Execute the following commands as a Grid user on standby node to start Oracle High Availability Services..

```
# su - <Grid user>
$ crsctl start has
```

33. Check all services status of Oracle Grid Infrastructure on standby node

Execute the following commands as a Grid user on standby node.

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

34. Install Oracle Database on standby node

Install Oracle Database to the local disks on 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 standby node

1. Copy the following directory of the operation 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 operation 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 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 standby node

Execute the following command as an Oracle user on 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 standby node

Execute the following command as a Grid user on 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 "[2.3.2.1 Environment configuration](#)".

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 Configuration](#)
 - [2.2.4 userApplication Creation \(without Oracle Resources\)](#)

- [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](#)



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 operation 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.



```
$ mkdir -p $ORACLE_BASE/product/11.2.0/db_1/oraInventory
```

Create oraInst.loc on the shared disk.



```
$ 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 the 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).



```
$ 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.

- In "Select Installation Option " screen, select the "Install database software only".

10. Create Oracle listener

Create listener and set up Net Service Name by Network Configuration Assistant (netca). Specify the logical IP address for the IP address of the listener. Start up the listener.

The files are allocated as follows:

Files	Locations	Note
listener.ora	Share	-
tnsnames.ora	Share	-
<LISTENER>.log	Share	-

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	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 node, 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)
 - Operation 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.

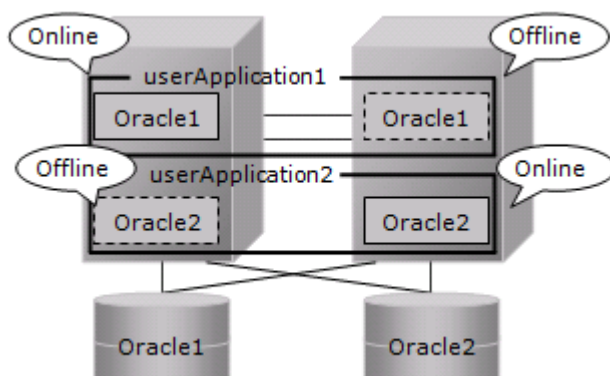
Note

Do not use "cloracpy" command in PRIMECLUSTER Wizard for Oracle if Oracle Database software is located on the shared disk.

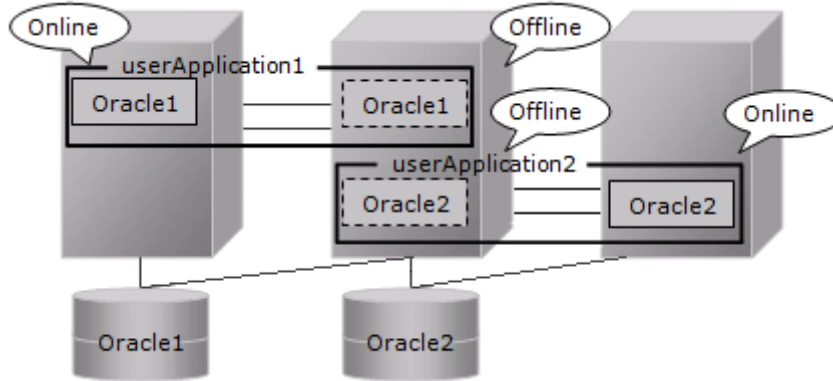
Example

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 operation 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 operation node.

```
# su - oracle
$ sqlplus / as sysdba
SQL> SHUTDOWN IMMEDIATE
SQL> EXIT
$ lsnrctl stop LISTENER
$ 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 checking operation, stop Oracle Database and listener.

```
# su - oracle
$ lsnrctl start LISTENER
$ sqlplus / as sysdba
SQL> STARTUP

Check 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 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. Configure it by the following procedures according to your environment.

- 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 “[E.1 Oracle ASM not used](#)”.

- Oracle ASM 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
10	Create and set up an Oracle Database
11	Edit userApplication
12	Check Operation of userApplication

For details, see “[E.2 Oracle ASM used](#)”.

Note

- In order to use Oracle ASM , 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 , 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](#)".

E.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 Creation \(without Oracle Resources\)](#)
 - [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 database and Oracle listener 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. 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](#)".

E.2 Oracle ASM 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. 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 Creation \(without Oracle Resources\)](#)
 - [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 operation 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](#)".
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 G 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 database and Oracle listener 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. See "[4.5 clgetalog - 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

Register Oracle instance resources, the Oracle ASM resource and Oracle listener resources to userApplication that is created at the step 3. See "[2.3.2.1 Environment configuration](#)".

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 F 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

- Standby operation using Oracle Data Guard/Oracle Active Data Guard is supported in Oracle Database 12c R1 or later though it is not supported in Oracle Database 11g R2.

F.1 Feature Outline

The standby site of Oracle Data Guard/Oracle Active Data Guard can be operated on the cluster system by using PRIMECLUSTER Wizard for Oracle.

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 "[F.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 "[F.3 Operation](#)".

- Oracle instance Monitoring

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](#)".

- Process Monitoring

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

- Table Monitoring

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).

- Listener Monitoring

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

- The daemon process cyclically executes the tnsping command to check that Oracle Net Services are running.

- Monitoring CDB and PDB

The monitoring of the CDB is the same as "Monitoring Oracle instances".

In the monitoring of the PDB, the management table of PDB gotten from 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 "[F.3 Operation](#)".

Start and Stop Control

PRIMECLUSTER Wizard for Oracle provides scripts to start up and stop Oracle instances and Listeners automatically, according to the state transition of userApplication. For details, refer to "[F.3 Operation](#)".

- Oracle instance Start and Stop

- 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 "OPEN" status.

- 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 "MOUNTED" or "OPEN" status, and start apply service. Apply service 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 service is stopped.

- Listener Start and Stop

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](#)".

- In standby operation, the script starts up and stops the Listener with "lsnrctl start/stop" command, checking the state.

- 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 "[F.3 Operation](#)".

Setup and Operation Commands

PRIMECLUSTER Wizard for Oracle provides auxiliary commands for setup and operation. For details, refer to "[Chapter 4 Command](#)".

For the operating environment of standby operation using Oracle Data Guard refer to "[1.2 Operating Environment](#)".

F.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

- Configure the primary site referring to "[2.2 Standby Operation](#)".

- Standby Site

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.

Setting of REDO Apply

Setting of REDO Apply on the standby database can be set at the step "7" of "2.2.7.1 Oracle Resource Creation and Registration". 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.)
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 "Detail setting for Oracle instance" screen.

```
Setting menu : Detail setting for Oracle instance
1) HELP                               11) WatchTimeout=300
2) NO-SAVE+RETURN                     12) REDOApply=NormalApply
3) SAVE+RETURN                         13) UsePDB=no
```

```

4) OracleUser=oracle          14) (PreOnlineScript=)
5) StartTimeout=600          15) (PostOnlineScript=)
6) StopTimeout=180           16) (PreOfflineScript=)
7) AbortTimeout=60           17) (PostOfflineScript=)
8) StopModeStop=immediate    18) (FaultScript=)
9) StopModeFail=abort        19) (Flags=)
10) Interval=30
Choose the setting to process: 12

```

F.3 Operation

F.3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle

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.

Oracle instance Monitoring

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/Monitoring

Listener Startup/Shutdown/Monitoring is same as does not use Oracle Data Guard.
For details, see "3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle".

Oracle ASM instance Startup/Shutdown/Monitoring

Oracle ASM instance Startup/Shutdown/Monitoring is same as does not use Oracle Data Guard.
For details, see "3.1 Oracle database Control through PRIMECLUSTER Wizard for Oracle".

F.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 "F.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

F.4.1 Example of switch procedure of database role

An example of the switch procedure of database role is as follows.

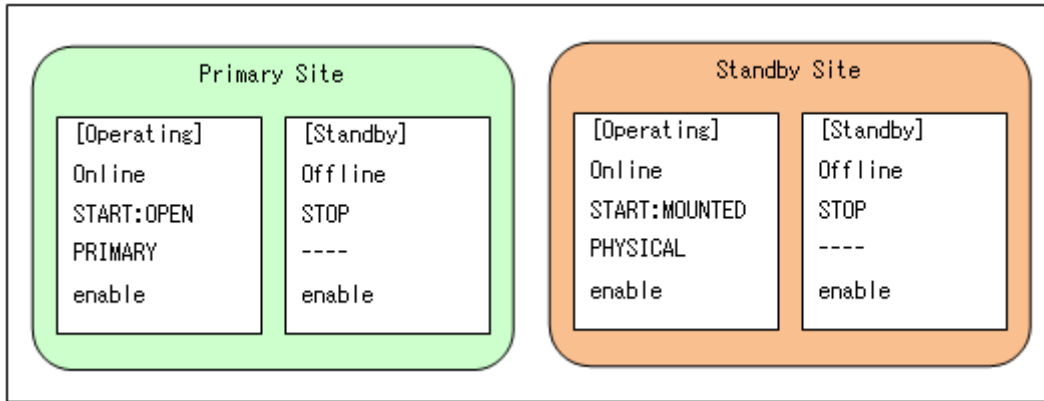
The state of the userApplication, the Oracle database, the database roll, and the Oracle resource has been described respectively of the node that composes the cluster.

		[Operating]	[Standby]
State of userApplication	→	Online	Offline
State of Oracle Database	→	START : OPEN	STOP
State of database role	→	PRIMARY	----
State of Oracle resources	→	enable	enable

F.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

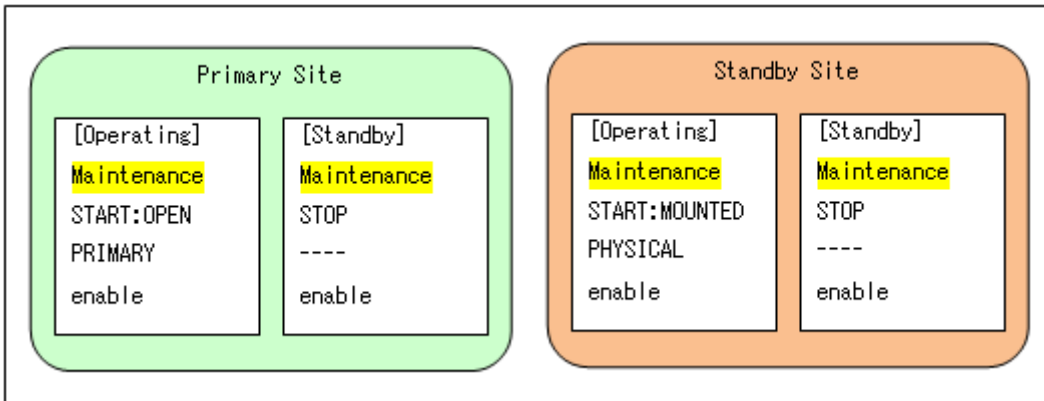
For further details, refer to the Oracle Database manual.

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".



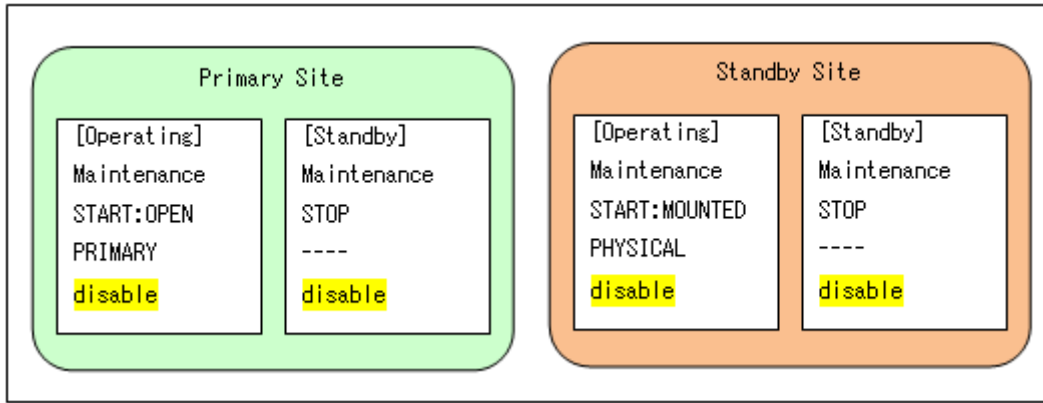
4. Monitoring disruption of Oracle resource.

To kill the session to Oracle, stop monitoring the Oracle instance and Listener resources on the both nodes of both sites.

```
# /opt/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> 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.

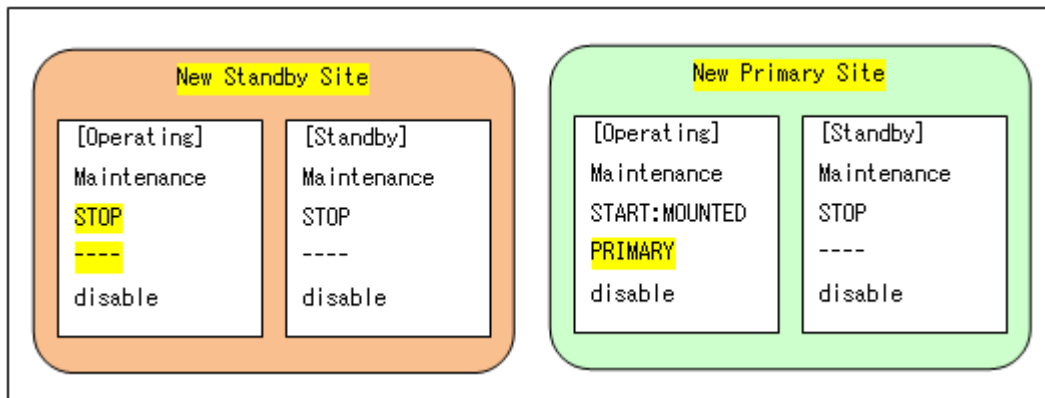
2. Initiate the switchover.

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".

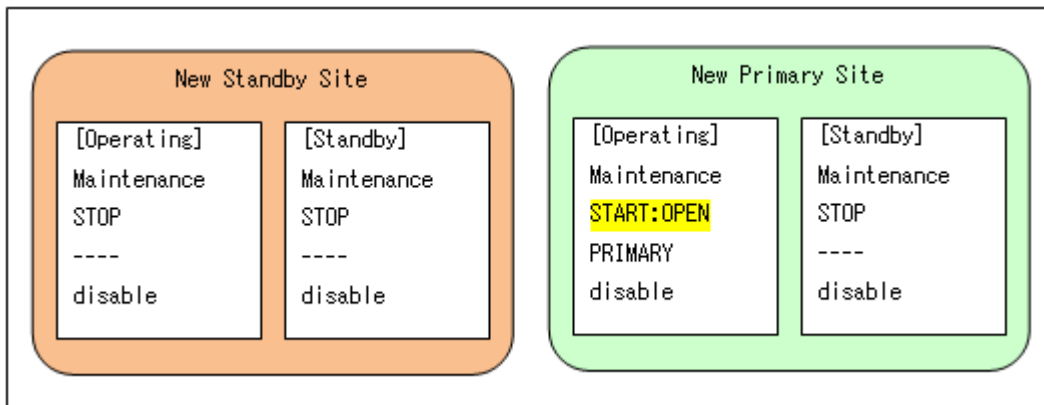


3. Open the new primary database.

Issue the following SQL statement on a new primary database.

If UsePDB of Oracle instance resource is set to yes, start the PDBs.

```
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.

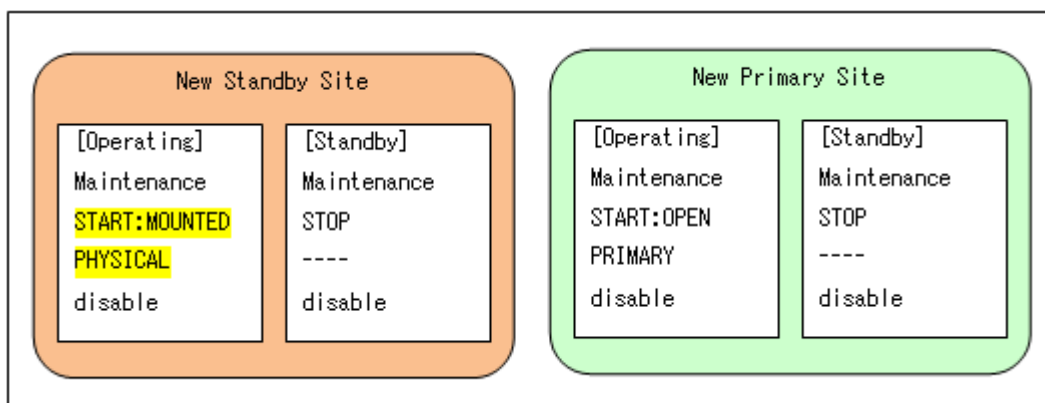
Issue the following SQL statement on a new standby database.

```
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;
```

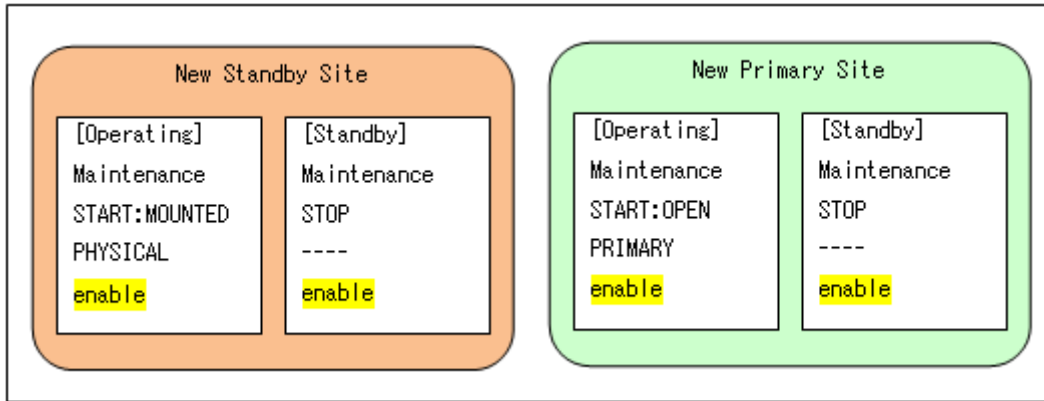
- ReceiveOnly, ReadOnlyOPEN
No procedure.

6. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of both sites.

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

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

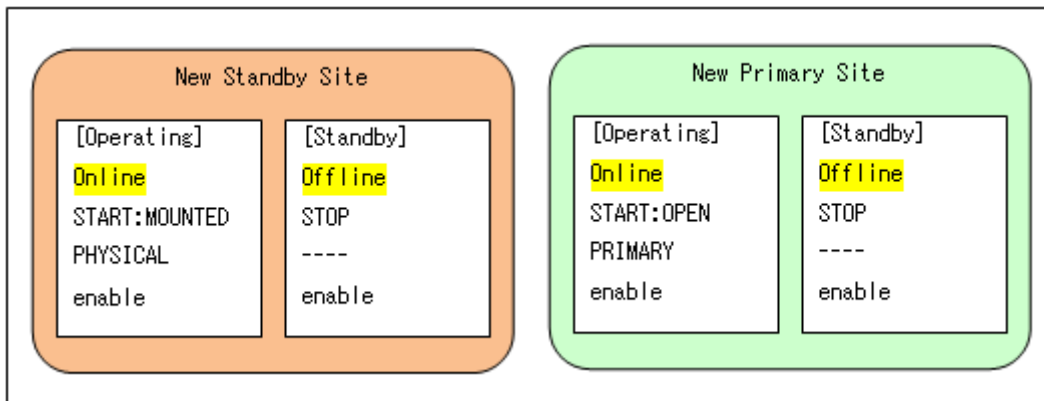


7. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of both sites.

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

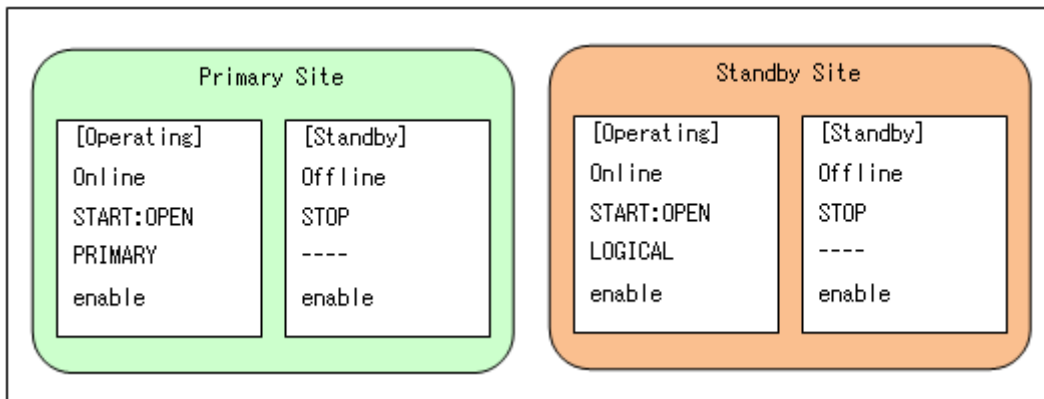
Confirm the state of userApplication becomes "Online" or "Offline".



F.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

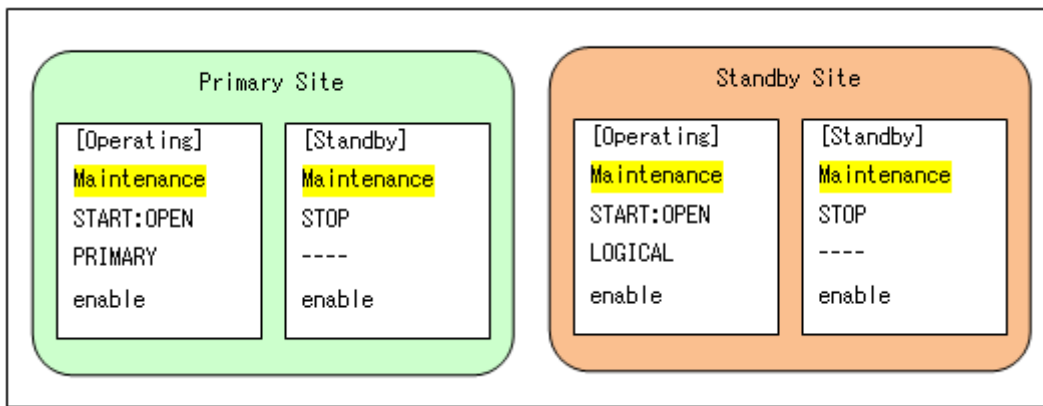
For further details, refer to the Oracle Database manual.

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".



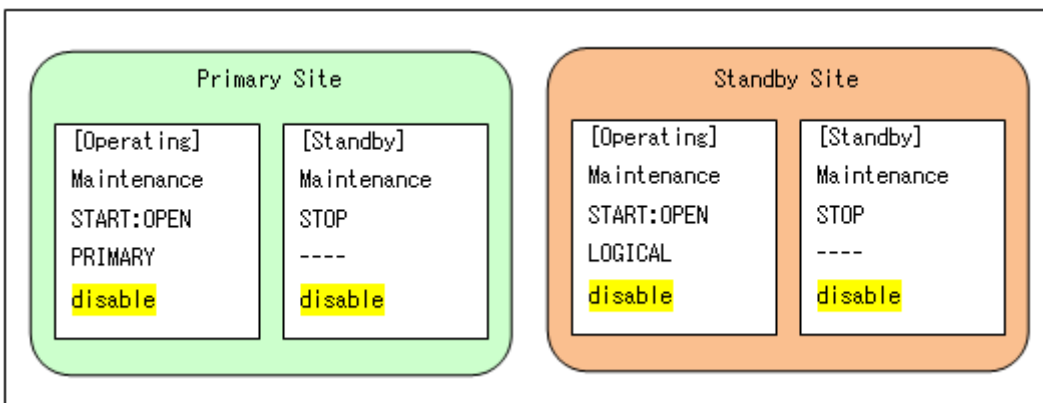
4. Monitoring disruption of Oracle resource.

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.



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> 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.

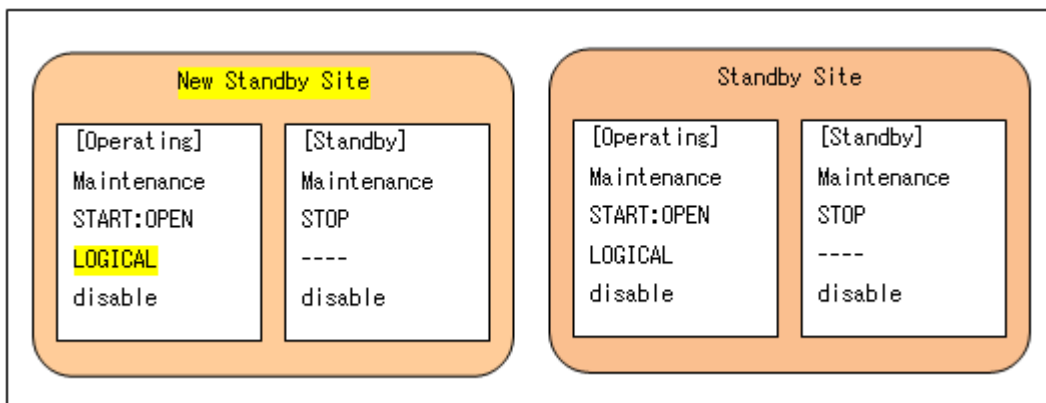
```
SQL> SELECT SWITCHOVER_STATUS FROM V$DATABASE;
```

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.

Issue the following SQL statement on a primary database.

```
SQL> ALTER DATABASE COMMIT TO SWITCHOVER TO LOGICAL STANDBY;
```



6. Confirm whether the logical standby database is ready to switch to the primary database.

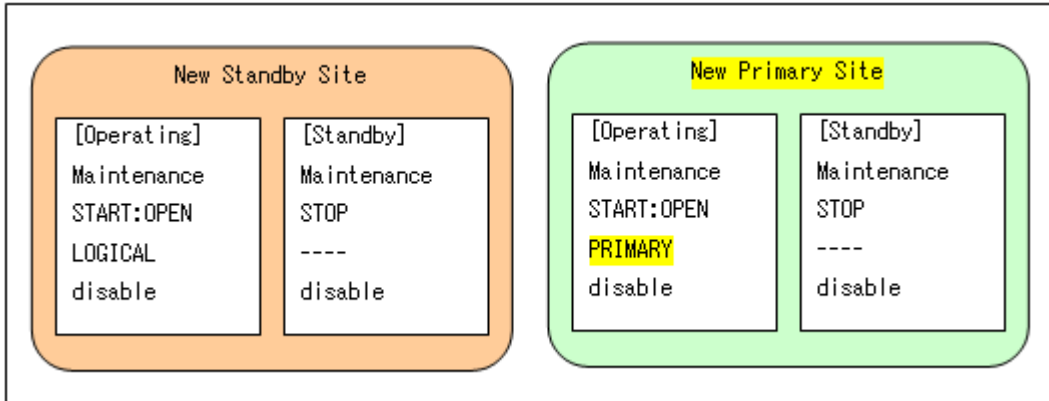
Issue the following SQL statement on a logical standby database.

```
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.

- 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;
```



- 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 or RealTimeQueryR
No procedure.
- NormalApply

```
SQL> ALTER DATABASE START LOGICAL STANDBY APPLY;
```

- RealTimeApply

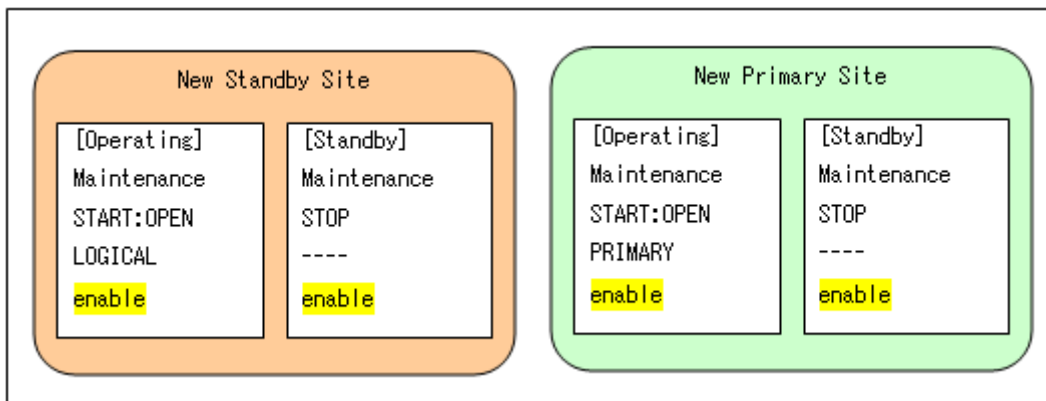
```
SQL> ALTER DATABASE START LOGICAL STANDBY APPLY IMMEDIATE;
```

- 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".)

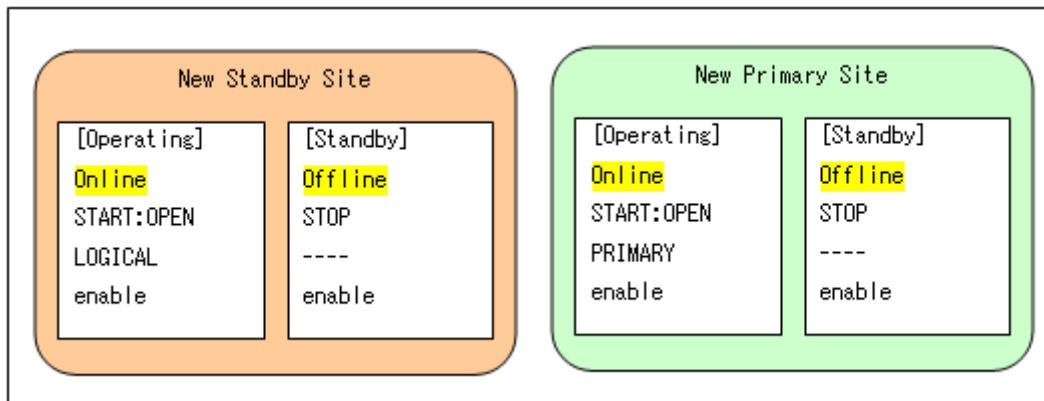


- Stop maintenance mode of PRIMECLUSTER.

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".



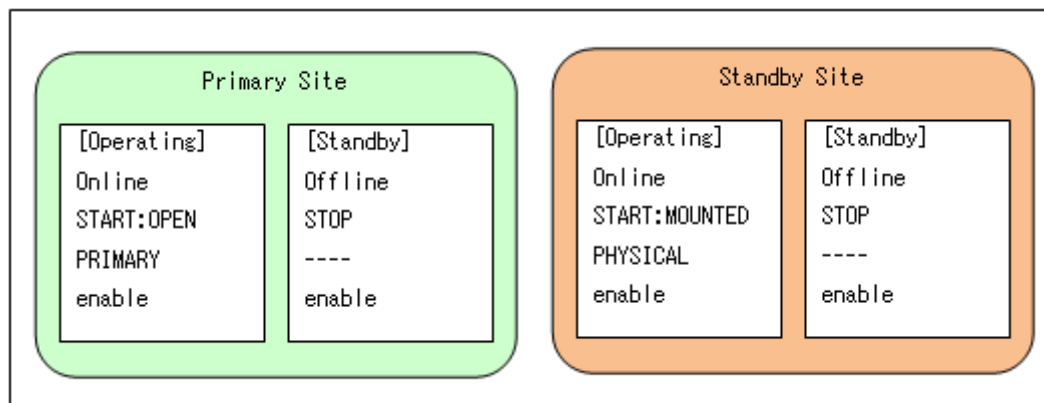
F.4.4 Converting a Physical Standby Database into a Snapshot Standby Database

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.

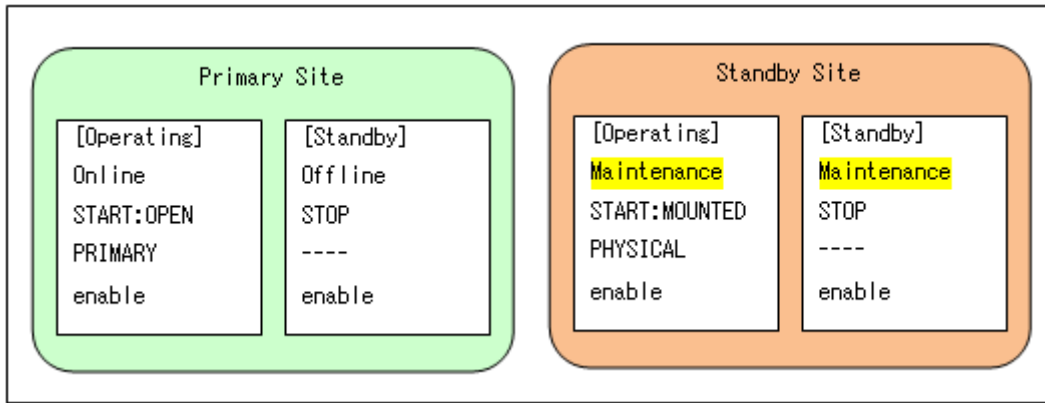


2. Start maintenance mode of PRIMECLUSTER.

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".



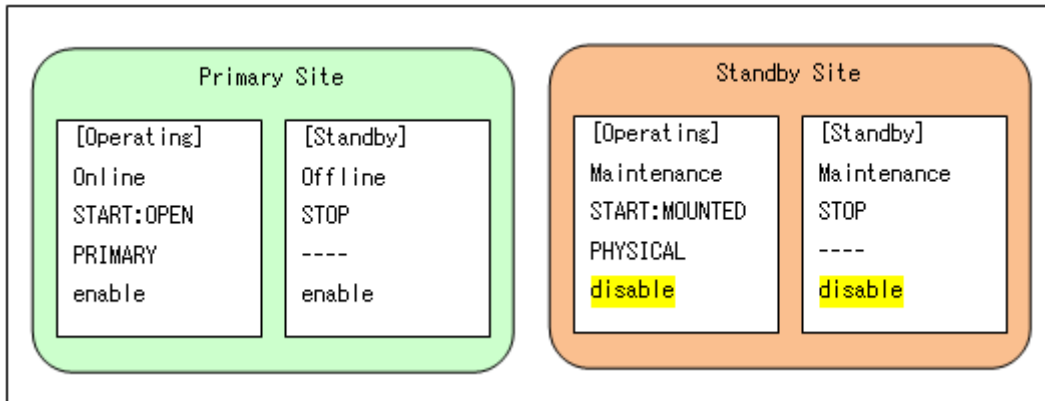
3. Monitoring disruption of Oracle resource.

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.

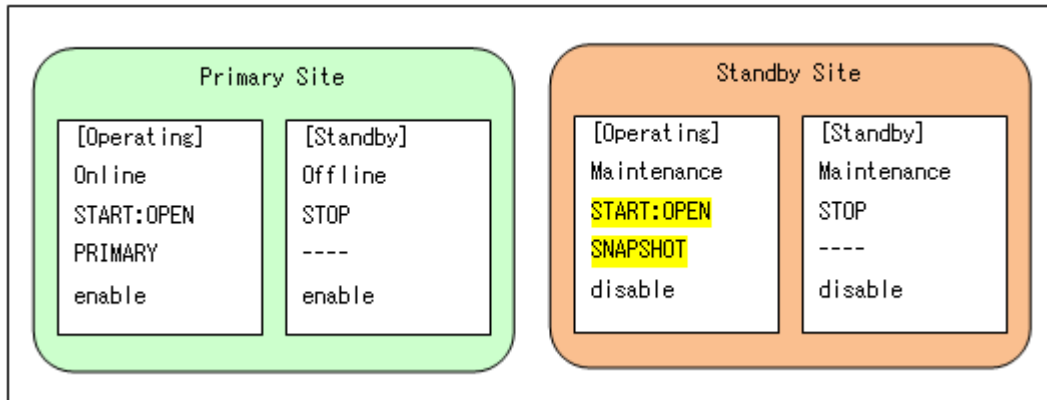
```
SQL> ALTER DATABASE CONVERT TO SNAPSHOT STANDBY;
```

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.



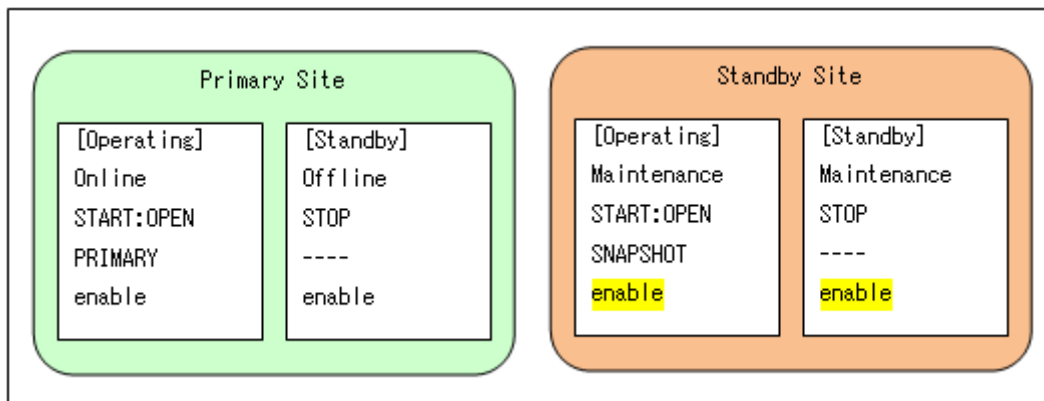
5. Restart Oracle resource monitoring.

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".)

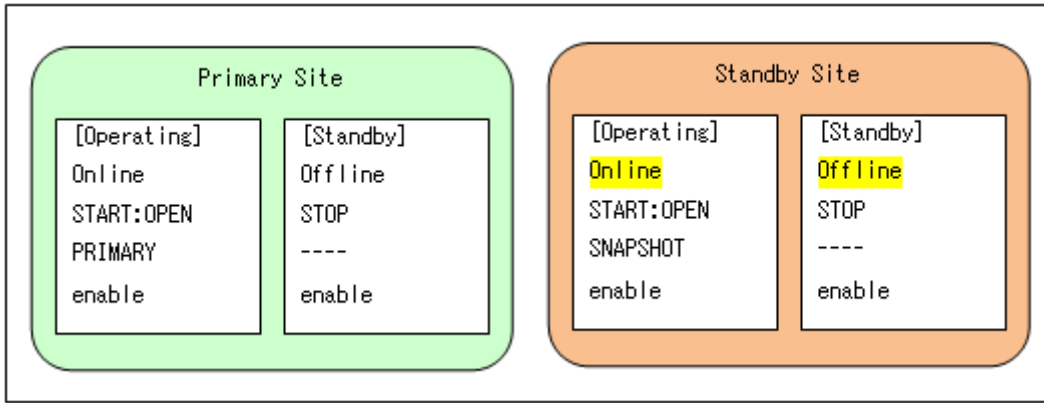


6. Stop maintenance mode of PRIMECLUSTER.

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".



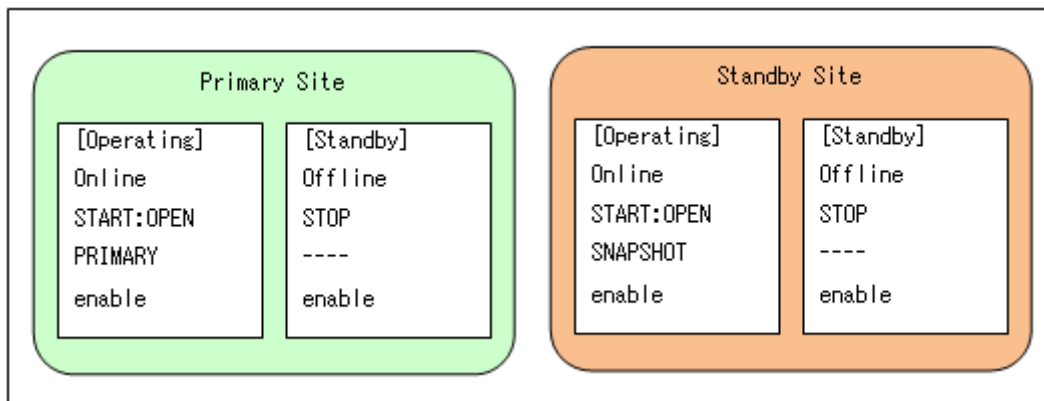
F.4.5 Converting a Snapshot Standby Database into a Physical Standby Database

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.

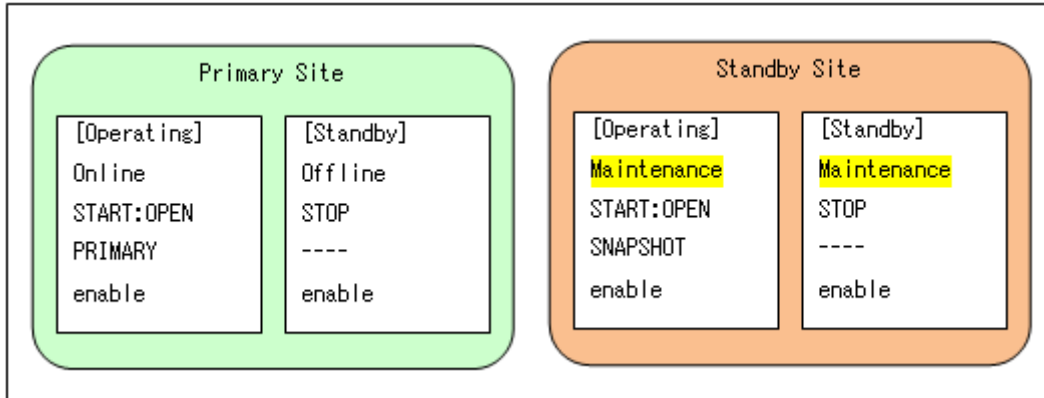


2. Start maintenance mode of PRIMECLUSTER.

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".



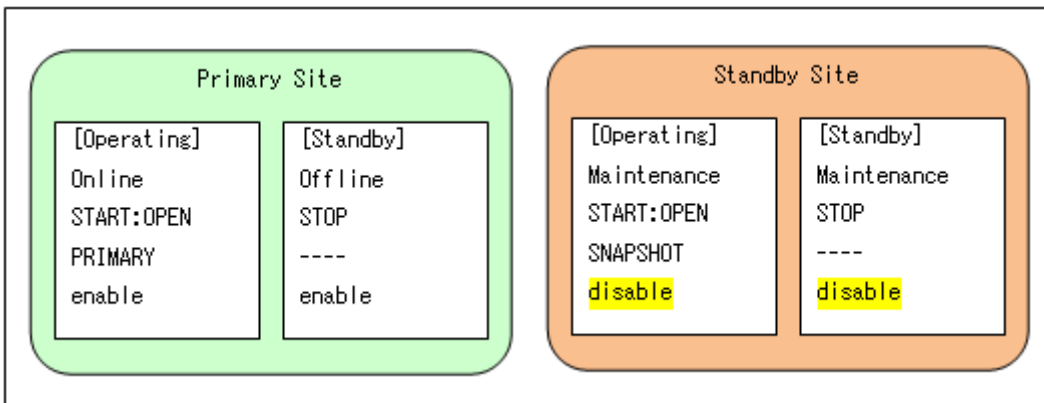
3. Monitoring disruption of Oracle resource.

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 or 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

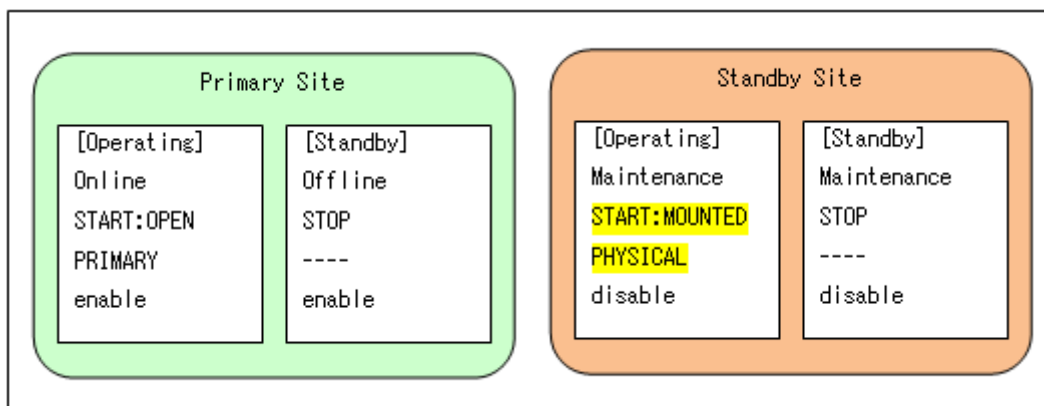
```
SQL> ALTER DATABASE RECOVER MANAGED STANDBY DATABASE USING ARCHIVED LOGFILE DISCONNECT;
```

- 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.)

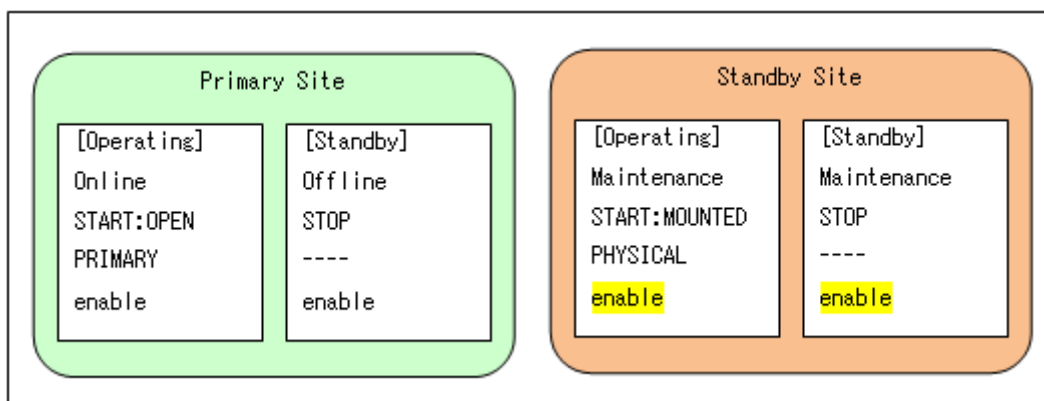


5. Restart Oracle resource monitoring.

Start monitoring the Oracle instance and Listener resources on the both nodes of standby site.

```
# /opt/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".)

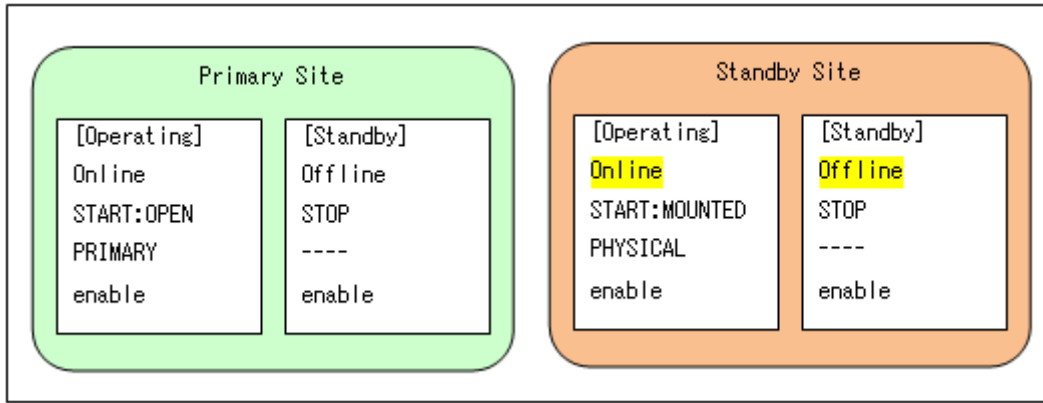


6. Stop maintenance mode of PRIMECLUSTER.

Stop the maintenance mode of PRIMECLUSTER on the operation node of standby site.

```
# /opt/SMW/SMWRrms/bin/hvutil -M off
```

Confirm the state of userApplication becomes "Online" or "Offline".



F.5 Notice

Particular attention must be given to the operation of PRIMECLUSTER Wizard for Oracle in the Oracle Data Guard environment.

- Such as Oracle Data Guard Broker, operation that automatically executes failover from the primary database to the standby database is not supported.
- You can change the apply service 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 "F.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 service 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 2015
ALTER DATABASE RECOVER AUTOMATIC DATABASE
Media Recovery Start
  started logmerger process
Sun Jul 24 01:14:28 2015
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 service 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 Oracle resource Online/Offline Script](#)".
 - \$1 : \$ORACLE_HOME
 - \$2 : \$ORACLE_SID
 - \$3 : Oracle user name
 - \$4 : Database role (DATABASE_ROLE column in V\$DATABASE view)

Appendix G Using Oracle Database 18c/19c

This section explains procedure for using Oracle Database 18c/19c.

G.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 Dec  4 14:30 libclntsh.so -> libclntsh.so.18.1
lrwxrwxrwx 1 oracle oinstall     12 Dec  4 14:29 libclntsh.so.10.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall     12 Dec  4 14:29 libclntsh.so.11.1 -> libclntsh.so
lrwxrwxrwx 1 oracle oinstall     12 Dec  5 13:49 libclntsh.so.12.1 -> libclntsh.so
-rwxr-xr-x 1 oracle oinstall 78347996 Dec  4 14:30 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 Dec  4 14:30 libclntshcore.so -> libclntshcore.so.18.1
lrwxrwxrwx 1 oracle oinstall     16 Dec  5 13:51 libclntshcore.so.12.1 -> libclntshcore.so
-rwxr-xr-x 1 oracle oinstall 8357321 Dec  4 14:30 libclntshcore.so.18.1
```

G.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 Dec  5 19:12 libclntsh.so -> libclntsh.so.19.1
lrwxrwxrwx. 1 oracle oinstall     12 Dec  5 19:11 libclntsh.so.10.1 -> libclntsh.so
lrwxrwxrwx. 1 oracle oinstall     12 Dec  5 19:11 libclntsh.so.11.1 -> libclntsh.so
lrwxrwxrwx. 1 oracle oinstall     12 Dec  5 19:11 libclntsh.so.12.1 -> libclntsh.so
```



```
lrwxrwxrwx. 1 oracle oinstall      12 Dec  5 19:11 libclntsh.so.18.1 -> libclntsh.so
-rwxr-xr-x. 1 oracle oinstall 80092424 Dec  5 19:12 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 Dec  5 19:12 libclntshcore.so -> libclntshcore.so.19.1
lrwxrwxrwx. 1 oracle oinstall      16 Dec  9 10:40 libclntshcore.so.12.1 -> libclntshcore.so
-rwxr-xr-x. 1 oracle oinstall 8044832 Dec  5 19:12 libclntshcore.so.19.1
```

Appendix H (Information) Action Definition File

The Oracle instance-monitoring detector of PRIMECLUSTER 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 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

Message indicates text of the error code.



Note

- 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.
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