**Physical Data Guard**

**A.Physical Data Guard**

**I. Before you get started:**

1. Make sure the operating system and platform architecture on the primary and standby systems are the same;

2. Install Oracle database software without the starter database on the standby server and patch it if necessary. Make sure the same Oracle software release is used on the Primary and Standby databases, and Oracle home paths are identical.

3. Test the Standby Database creation on a test environment first before working on the Production database.

4. Assume that

- ORACLE\_BASE is **D:\oracle**

- ORACLE\_HOME is **D:\oracle\product\11.2.0\dbhome\_1**

- ORACLE\_SID on Primary database is **ORCL**

5. Check port 1521 opened

**II. On the Primary Database Side:**

1. Enable forced logging on your primary database:  
SQL>alter database force logging;

alter profile default limit password\_life\_time UNLIMITED;

2. Create a password file if it doesn’t exist.

3. Configure a Standby Redo log.

1) *The size of the standby redo log files should****match the size****of the current Primary database online redo log files*. To find out the size of your online redo log files:  
SQL> select bytes from v$log;

BYTES

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52428800

52428800

52428800

2) Use the following command to determine your current log file groups:

SQL> select group#, member from v$logfile;

3) Create standby Redo log groups.

My primary database had 3 log file groups originally and I created 3 standby redo log groups using the following commands:

SQL>ALTER DATABASE ADD STANDBY LOGFILE GROUP 4 SIZE 50M;

SQL>ALTER DATABASE ADD STANDBY LOGFILE GROUP 5 SIZE 50M;

SQL>ALTER DATABASE ADD STANDBY LOGFILE GROUP 6 SIZE 50M;

4) To verify the results of the standby redo log groups creation, run the following query:  
SQL>select \* from v$standby\_log;

4. Enable Archiving on Primary.  
If your primary database is not already in Archive Log mode, enable the archive log mode:

SQL>shutdown immediate  
SQL>startup mount  
SQL>alter database archivelog;

SQL>alter database flashback on;

SQL>alter database open;

SQL> select log\_mode, flashback\_on, force\_logging from v$database;

LOG\_MODE FLASHBACK\_ON FOR

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ARCHIVELOG YES YES

SQL> archive log list;

5. Set Primary Database Initialization Parameters  
Create a text initialization parameter file (PFILE) from the server parameter file (SPFILE), to add the new primary role parameters.

1) Create pfile from spfile for the primary database:

SQL>create pfile='/u01/app/oracle/product/11.2.0/dbhome\_1/dbs/pfilePRIM.ora' from spfile;

2) Edit pfilePRIM.ora to add the new primary and standby role parameters: (Here the file paths are from a windows system. For UNIX system, specify the path accordingly)

**orcl**.\_\_db\_cache\_size=1107296256

**orcl**.\_\_java\_pool\_size=16777216

**orcl**.\_\_large\_pool\_size=16777216

**orcl**.\_\_oracle\_base='D:\oracle'

**orcl**.\_\_pga\_aggregate\_target=1040187392

**orcl**.\_\_sga\_target=1543503872

**orcl**.\_\_shared\_io\_pool\_size=0

**orcl**.\_\_shared\_pool\_size=369098752

**orcl**.\_\_streams\_pool\_size=0

\*.archive\_lag\_target=1800

\*.audit\_file\_dest='D:\oracle\admin\**orcl**\adump'

\*.audit\_trail='db'

\*.compatible='11.2.0.4.0'

\*.control\_files='D:\oracle\oradata\**orcl**\control01.ctl','D:\oracle\fast\_recovery\_area\**orcl**\control02.ctl'

\*.db\_block\_size=8192

\*.db\_domain=''

\*.db\_name='**orcl**'

\*.db\_unique\_name='**orcl**'

\*.log\_archive\_config='dg\_config=(**orcl**,**sorcl**)'

\*.log\_archive\_dest\_1='location=D:\oracle\fast\_recovery\_area\**orcl**\ARCHIVELOG valid\_for=(all\_logfiles,all\_roles) db\_unique\_name=**orcl**'

\*.log\_archive\_dest\_2='service=stan lgwr async valid\_for=(online\_logfiles,primary\_role) db\_unique\_name=stan'#not broker

#\*.log\_archive\_dest\_2='service="**sorcl"**lgwr sync affirm delay=0 optional compression=disable max\_failure=0 max\_connections=1 reopen=300net\_timeout=180db\_unique\_name="**sorcl"**valid\_for=(all\_logfiles,primary\_role)'

\*.log\_archive\_dest\_state\_1='ENABLE'

\*.log\_archive\_dest\_state\_2='ENABLE'

\*.log\_archive\_max\_processes=30

\*.fal\_server='**stan**'

\*.db\_recovery\_file\_dest='D:\oracle\fast\_recovery\_area'

#\*.db\_file\_name\_convert='D:\oracle\oradata\**sorcl**','D:\oracle\oradata\**orcl**'**#10G**

\*.db\_file\_name\_convert='**sorcl**','**orcl**'

#\*.log\_file\_name\_convert='E:\oracle\oradata\**sorcl**','E:\oracle\oradata\**orcl**','D:\oracle\fast\_recovery\_area\**sorcl**\ONLINELOG','D:\oracle\fast\_recovery\_area\**orcl**\ONLINELOG'**#10G**

\*.log\_file\_name\_convert='**sorcl**','**orcl**'

\*.db\_recovery\_file\_dest\_size=5218762752

#\*.db\_flashback\_retention\_target=2880

\*.diagnostic\_dest='D:\oracle'

\*.dispatchers='(PROTOCOL=TCP) (SERVICE=**orcl**XDB)'

\*.log\_archive\_format='ARC%S\_%R.%T'

\*.log\_archive\_min\_succeed\_dest=1

\*.log\_archive\_trace=0

\*.memory\_target=12884901888#12G#10737418240

\*.open\_cursors=1000

\*.processes=500

\*.remote\_login\_passwordfile='EXCLUSIVE'

\*.undo\_tablespace='UNDOTBS1'

\*.standby\_file\_management='AUTO'

#\*.dg\_broker\_config\_file1='D:\oracle\product\11.2.0\dbhome\_1\database\broker\_**orcl**\_1.dat'

#\*.dg\_broker\_config\_file2='D:\oracle\product\11.2.0\dbhome\_1\database\broker\_**orcl**\_2.dat'

#\*.dg\_broker\_start=true

6. Create spfile from pfile, and restart primary database using the new spfile.

First, create directoryD:\oracle\fast\_recovery\_area\orcl\ARCHIVELOG,D:\oracle\fast\_recovery\_area\orcl\ONLINELOG

Data Guard must use SPFILE. Create the SPFILE and restart database.

SQL>shutdown immediate

SQL>startup nomount pfile='D:\oracle\product\11.2.0\dbhome\_1\database\initorcl.ora';

SQL>create spfile from pfile='D:\oracle\product\11.2.0\dbhome\_1\database\initorcl.ora';

SQL>shutdown immediate

SQL>startup

7. Backup entire database and currentcontrol filefor standby database

RMAN> CONFIGURE CHANNEL DEVICE TYPE DISK FORMAT 'F:\oracle\backupset\full\_%u\_%s\_%p';

RMAN> backup database;

RMAN>backup current controlfile for standby format 'F:\oracle\backupset\control.ctl';

8. Copy folderF:\oracle\backupset to standby database

**III. On the Standby Database Site:**

1. Create directory for data files,**D:\oracle\oradata\sorcl**

2. Create directory (multiplexing) for online logs:**D:\oracle\flash\_recovery\_area\sorcl\ONLINELOG**

3.On Standby server, create all required directories for dump and archived log destination:

Create directories adump, bdump, cdump, udump, and archived log destinations for the standby database:**D:\oracle\admin\stan\adump,D:\oracle\flash\_recovery\_area\sorcl\ARCHIVELOG**

4. Copy the Primary DB pfile to Standby server and rename/edit the file.

a) Copy initorcl.ora from Primary server to Standby server, to database folder on Windows or dbs folder on UNIX under the Oracle home path.

b) Rename it to initsorcl.ora, and modify the file as follows. : (Here the file paths are from a windows system. For UNIX system, specify the path accordingly)

**sorcl**.\_\_db\_cache\_size=1124073472

**sorcl**.\_\_java\_pool\_size=16777216

**sorcl**.\_\_large\_pool\_size=16777216

**sorcl**.\_\_oracle\_base='D:\oracle'

**sorcl**.\_\_pga\_aggregate\_target=1040187392

**sorcl**.\_\_sga\_target=1543503872

**sorcl**.\_\_shared\_io\_pool\_size=0

**sorcl**.\_\_shared\_pool\_size=352321536

**sorcl**.\_\_streams\_pool\_size=0

\*.archive\_lag\_target=1800

\*.audit\_file\_dest='D:\oracle\admin\**sorc**\adump'

\*.audit\_trail='db'

\*.compatible='11.2.0.4.0'

\*.control\_files='D:\oracle\oradata\**sorc**\control01.ctl','D:\oracle\fast\_recovery\_area\**sorc**\control02.ctl'

\*.db\_block\_size=8192

\*.db\_domain=''

\*.db\_name='**orcl**'

\*.db\_unique\_name='**sorcl**'

\*.log\_archive\_config='dg\_config=(**orcl**,**sorcl**)'

\*.log\_archive\_dest\_1='location=D:\oracle\fast\_recovery\_area\**sorcl**\ARCHIVELOG valid\_for=(all\_logfiles,all\_roles) db\_unique\_name=**sorcl**'

\*.log\_archive\_dest\_2='service="**orcl**", lgwr sync affirm delay=0 optional compression=disable max\_failure=0 max\_connections=1 reopen=300 db\_unique\_name="**orcl**" net\_timeout=180,valid\_for=(all\_logfiles,primary\_role)'

\*.log\_archive\_dest\_state\_1='ENABLE'

\*.log\_archive\_dest\_state\_2='ENABLE'

\*.log\_archive\_max\_processes=30

\*.fal\_server='**orcl**'

\*.db\_recovery\_file\_dest='D:\oracle\fast\_recovery\_area'

#\*.db\_file\_name\_convert='D:\oracle\oradata\**orcl**','D:\oracle\oradata\**sorcl**'**#10G**

\*.db\_file\_name\_convert='**orcl**','**sorcl**'

#\*.log\_file\_name\_convert='D:\oracle\oradata\**orcl**','D:\oracle\oradata\**sorcl**','D:\oracle\fast\_recovery\_area\**orcl**\ONLINELOG','D:\oracle\fast\_recovery\_area\**sorcl**\ONLINELOG'**#10G**

\*.log\_file\_name\_convert='**orcl**','**sorcl**'

\*.db\_recovery\_file\_dest\_size=5218762752

\*.db\_flashback\_retention\_target=2880

\*.diagnostic\_dest='D:\oracle'

\*.dispatchers='(PROTOCOL=TCP) (SERVICE=**orcl**XDB)'

\*.log\_archive\_format='ARC%S\_%R.%T'

\*.log\_archive\_min\_succeed\_dest=1

\*.log\_archive\_trace=0

\*.memory\_target=5368709120#5G

\*.open\_cursors=300

\*.processes=150

\*.remote\_login\_passwordfile='EXCLUSIVE'

\*.undo\_tablespace='UNDOTBS1'

\*.standby\_file\_management='AUTO'

\*.dg\_broker\_config\_file1='D:\oracle\product\11.2.0\dbhome\_1\database\broker\_**sorcl**\_1.dat'

\*.dg\_broker\_config\_file2='D:\oracle\product\11.2.0\dbhome\_1\database\broker\_**sorcl**\_2.dat'

\*.dg\_broker\_start=true

5. Copy the Primary password file in folder D:\oracle\product\11.2.0\dbhome\_1\database to standby and rename it to pwdsorcl.ora.

6. For Windows, create a Windows-based services (optional):

C:\>oradim -NEW -SID sorcl -STARTMODE manual

7. Configure listeners for the primary and standby databases.

1) On Primary system: use Oracle Net Manager to configure a listener for ORCL, becauseData Guard Broker is attempting to connect to a service called< sid >\_DGMGRL, add a static registration for < sid >\_DGMMGRL to*ORACLE\_HOME/network/admin/listener.ora,* this case isORCL\_DGMGRL. If not, when switchover to standby database error occurs:*ORA-12514: TNS:listener does not currently know of service requested in connect descriptor*

The file listener.ora looks like this:

*SID\_LIST\_LISTENER =*

*(SID\_LIST =*

*(SID\_DESC =*

*(GLOBAL\_DBNAME =* **ORCL***\_DGMGRL)*

*(ORACLE\_HOME =*D:\*oracle\product\11.2.0\dbhome\_1)*

*(SID\_NAME =***ORCL***)*

*)*

*)*

*LISTENER =*

*(DESCRIPTION\_LIST =*

*(DESCRIPTION =*

*(ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))*

*(ADDRESS = (PROTOCOL = TCP)(HOST =* *SERVER\_ORCL)(PORT = 1521))*

*)*

*)*

*ADR\_BASE\_LISTENER =*D:\*oracle*

Add this parameter to file sqlnet.ora

*SQLNET.EXPIRE\_TIME=15*

Then restart the listener:

C:\>lsnrctl stop  
C:\>lsnrctl start

*Listening Endpoints Summary...*

*(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(PIPENAME=\\.\pipe\EXTPROC1521ipc)))*

*(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=SERVER\_ORCL)(PORT=1521)))*

*Services Summary...*

*Service "ORCL\_DGMGRL" has 1 instance(s).*

*Instance "ORCL", status UNKNOWN, has 1 handler(s) for this service...*

*Service "orcl" has 1 instance(s).*

*Instance "orcl", status READY, has 1 handler(s) for this service...*

*Service "orclXDB" has 1 instance(s).*

*Instance "orcl", status READY, has 1 handler(s) for this service...*

*Service "orcl\_DGB" has 1 instance(s).*

*Instance "orcl", status READY, has 1 handler(s) for this service...*

*The command completed successfully*

**Note**: Use SQLPLUS connect to database, pass username and password to make sure it is connected

2) On Standby server: use Net Manager to configure a listener for SORCL.

The file listener.ora looks like this:

*SID\_LIST\_LISTENER =*

*(SID\_LIST =*

*(SID\_DESC =*

*(GLOBAL\_DBNAME =****SORCL****\_DGMGRL)*

*(ORACLE\_HOME =*D:\*oracle\product\11.2.0\dbhome\_1)*

*(SID\_NAME =****SORCL****)*

*)*

*)*

*LISTENER =*

*(DESCRIPTION\_LIST =*

*(DESCRIPTION =*

*(ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))*

*(ADDRESS = (PROTOCOL = TCP)(HOST =* *SERVER\_SORCL)(PORT = 1521))*

*)*

*)*

*ADR\_BASE\_LISTENER =*D:\*oracle*

Add this parameter to file sqlnet.ora

*SQLNET.EXPIRE\_TIME=15*

Then restart the listener:

C:\>lsnrctl stop  
C:\>lsnrctl start

**Note**: Use SQLPLUS connect to database, pass username and password to make sure it is connected

9. Create Oracle Net service names.

1) On Primary system: use Oracle Net Manager to create network service names for ORCL and SORCL. Check tnsping to both services:

C:\>tnsping ORCL

C:\>tnsping SORCL

2) On Standby system: use Oracle Net Manager to create network service names for ORCL and SORCL. Check tnsping to both services:

C:\>tnsping ORCL

C:\>tnsping SORCL

10. On **Primary** and **Standby** server, setup the environment variables to point to the database.

Set up ORACLE\_HOME and ORACLE\_SID on both servers or you fail to start standby database

11. Restore database on standby database

D:\ rman target /

RMAN> startup nomount

RMAN> restore standby controlfile from 'F:\oracle\backupset\control.ctl';

RMAN> alter database mount;

RMAN> restore database;

12. On standby database, start up nomount the standby database and generate a spfile.

sqlplus / as sysdba

#SQL> shutdown immediate

#SQL>startup nomount pfile='D:\oracle\product\11.2.0\dbhome\_1\database\initsorcl.ora';

SQL>create spfile from pfile='D:\oracle\product\11.2.0\dbhome\_1\database\initsorcl.ora';

SQL>shutdown immediate  
SQL>startup mount

SQL>alter database flashback on;

13. Start Redo apply

1) On the standby database, to start redo apply:

SQL>alter database recover managed standby database disconnect from session;

2) If you ever need to stop log apply services:

SQL>alter database recover managed standby database cancel;

14. Verify the standby database is performing properly:

1) On Standby perform a query:  
SQL> select sequence#, first\_time, next\_time from v$archived\_log;

2) On Primary, force a logfile switch:  
SQL>alter system switch logfile;

3) On Standby, verify the archived redo log files were applied:  
SQL>select sequence#, applied from v$archived\_log order by sequence#;

15. If you want the redo data to be applied as it is received without waiting for the current standby redo log file to be archived, enable the real-time apply.

To start real-time apply:  
SQL> alter database recover managed standby database using current logfile disconnect;

16. To create multiple standby databases, repeat this procedure.

**IV. Notice to prevent errors**

*1. Directories on both Primary and Standby must be the same and identical to the config file, other wise unable to Start Redo apply (13)*

*2. Listener must be add static registration GLOBAL\_DBNAME*

**B.Broker Fast-Start FailOver**

**I. Before get start**

1. Make sure that Data Guard works perfectly

2. Archivelog and log sequence are fully enough and applied

On Primary, force a logfile switch:

SQL>alter system switch logfile;

On Standby, verify the archived redo log files were applied:

SQL>select sequence#, applied from v$archived\_log order by sequence#;

3. Make sure FlashBack is ON on **Primary** and **Standby**

SQL> **select log\_mode, flashback\_on, force\_logging from v$database;**

LOG\_MODE FLASHBACK\_ON FOR

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ARCHIVELOG YES YES

**II. Config Broker**

1. Create configuration

On primary server from command prompt run **dgmgrl**

C:\>dgmgrl

In the DGMGRLprompt run the below commands.

DGMGRL> connect sys/oracle

Connected.

DGMGRL>create configuration ORCL\_PRIM as primary database isORCLconnect identifier is ORCL;

Configuration "orcl\_prim" created with primary database "orcl"

*Nếu báo lỗi không tạo được hãy kiểm tra đường dẫn của****dg\_broker\_config\_file1,dg\_broker\_config\_file2***

*SQL> show parameter dg\_broker\_config\_file*

DGMGRL>add database **sorcl** as connect identifier is **sorcl** maintained as physical;

Database "sorcl" added

DGMGRL> show configuration

*Configuration -*orcl*\_prim*

*Protection Mode: MaxPerformance*

*Databases:*

orcl*- Primary database*

*sorcl - (\*) Physical standby database*

*Fast-Start Failover: DISABLED*

*Configuration Status:*

*DISABLED*

DGMGRL>enable configuration;

Enabled.

DGMGRL> show configuration

*Configuration -*orcl*\_prim*

*Protection Mode: MaxPerformance*

*Databases:*

orcl*- Primary database*

*sorcl - (\*) Physical standby database*

*Fast-Start Failover: DISABLED*

*Configuration Status:*

*SUCCESS*

2.Enable Fast-Start failover and configure observer.

On Primary system

In the DGMGRL prompt run the below commands.

DGMGRL>edit database**orcl** set property LogXptMode='SYNC';

Property "logxptmode" updated

DGMGRL>edit database **sorcl** set property LogXptMode='SYNC';

Property "logxptmode" updated

When changes happens on primary side, those redo changes are shipped on physical standby database. If physical standby database is down or if standby server is not reachable, we need to have some time limit on how much time primary should wait for standby to respond (and then move ahead without try to ship redo changes to standby). This limit is defined by **NetTimeout** parameter.

DGMGRL>edit databaseorclset property NetTimeout=180;

Property "nettimeout" updated

DGMGRL>edit database **sorcl** set property NetTimeout=180;

Property "nettimeout" updated

Database must be Maximum Availability to config Broker  
DGMGRL>edit configuration set protection mode as maxavailability;

Succeeded.

Establish how long the Fast-Start Failover Observer should wait until it decides that the primary database is unreachable by setting a value of seconds for the **FastStartFailoverThreshold** parameter. After this timeout, failover will start

DGMGRL>edit configuration set property FastStartFailoverThreshold = '30';

DGMGRL> show configuration FastStartFailoverThreshold

FastStartFailoverThreshold = '300'

DGMGRL>showfast\_startfailover

*Fast-Start Failover: DISABLED*

*Threshold: 180 seconds*

*Target: (none)*

*Observer: (none)*

*Lag Limit: 30 seconds*

*Shutdown Primary: TRUE*

*Auto-reinstate: TRUE*

*Configurable Failover Conditions*

*Health Conditions:*

*Corrupted Controlfile YES*

*Corrupted Dictionary YES*

*Inaccessible Logfile NO*

*Stuck Archiver NO*

*Datafile Offline YES*

*Oracle Error Conditions:*

*(none)*

Note: **ReopenSecs** parameter specifies the minimum number of seconds before the archiver process (ARCn, foreground, or log writer process) should try again to access a standby site that had previously failed.

DGMGRL>show database verbose orcl

DGMGRL> show configuration

*Configuration -*orcl*\_prim*

*Protection Mode:*MaxAvailability

*Databases:*

orcl*- Primary database*

*sorcl - (\*) Physical standby database*

*Fast-Start Failover: DISABLED*

*Configuration Status:*

*SUCCESS*

3.Start the Observer from a different dgmgrl session, Observer should connect to Primary database

C:\>dgmgrl

DGMGRL>connect sys/oracle

Connected  
DGMGRL>start observer

You will not be able to get to the command prompt again from this session and this is normal. From another linux session start dgmgrl prompt for the rest of operations.

On console observer may be out put:

[S002 05/07 15:24:50.37] Authentication failed.

[S002 05/07 15:25:20.79] Authentication failed.

To prevent this, fromDGMGRLconnect to database with account authentication, for example: **connect sys@orcl**, this will prompt you to input the sys password.

Only one observer start on a Data Guard system

4.Enable FAST\_START FAILOVER

C:\>dgmgrl

DGMGRL>connect sys/oracle

Connected

DGMGRL>enable fast\_start failover;  
Enabled.

Nếu báo lỗiError: ORA-16651: requirements not met for enabling fast-start failover: kiểm tra FLASHBASCK ON trên cả 2 server

DGMGRL>show configuration

*Configuration -*orcl*\_prim*

*Protection Mode: MaxAvailability*

*Databases:*

orcl*- Primary database*

*sorcl - (\*) Physical standby database*

*Fast-Start Failover: ENABLED*

*Configuration Status:*

*SUCCESS*

DGMGRL> show database verbose sorcl

5.Perform SwitchOver and FailOver.

1)Switchover is usually a planned outage so there's no data loss.

DGMGRL>show configuration

*Configuration -*orcl*\_prim*

*Protection Mode: MaxAvailability*

*Databases:*

orcl*- Primary database*

*sorcl - (\*) Physical standby database*

*Fast-Start Failover: ENABLED*

*Configuration Status:*

*SUCCESS*

DGMGRL>switchover to sorcl

*Performing switchover NOW, please wait...*

*New primary database "stan" is opening...*

*Operation requires shutdown of instance "*orcl*" on database "*orcl*"*

*Shutting down instance "*orcl*"...*

*ORA-01109: database not open*

*Database dismounted.*

*ORACLE instance shut down.*

*Operation requires startup of instance "*orcl*" on database "*orcl*"*

*Starting instance "*orcl*"...*

*ORACLE instance started.*

*Database mounted.*

*Database opened.*

*Switchover succeeded, new primary is "sorcl"*

DGMGRL>

Show configuration, the primary database now is 'SORCL'

DGMGRL> show configuration

*Configuration -*orcl*\_prim*

*Protection Mode: MaxAvailability*

*Databases:*

*sorcl - Primary database*

orcl*- (\*) Physical standby database*

*Fast-Start Failover: ENABLED*

*Configuration Status:*

*SUCCESS*