Dataguard Setup

OverView :-

DataGuard is a feature in Oracle database that creates and maintains a standby database to ensure high availability and disaster recovery. Setting up DataGuard involves configuring a primary database and one or more standby databases to synchronize data and provide failover capability.

The aim of setting up DataGuard in the Oracle database is to enhance the availability and reliability of critical data by creating a standby database that mirrors the primary database.

This standby database serves as a backup that can quickly take over in case the primary database becomes unavailable due to hardware failure, software errors, or natural disasters.

By maintaining synchronized copies of data between primary and standby databases, DataGuard ensures minimal downtime and data loss, thus supporting business continuity and disaster recovery efforts.

A diagram of a computer

Description automatically generated

Figure 1:Dataguard Setup

Pre-requisites

Oracle 19c installed on both primary and standby servers.

Network connectivity established between primary and standby servers.

Sufficient disk space available on both servers.

Administrative privileges to perform database operations.

Procedure

Without shutting down primary, we need to create physical standby database using RMAN DUPLICATE

FROM ACTIVE DATABASE command.

**Note:** No need to take backup of primary database.

* 1. Infrastructure Setup

Step 1: Environment

Primary RAC cluster : rac-cluster

|  |  |  |
| --- | --- | --- |
| Platform | : | Linuxx86\_64 |
| Server Name | : |  |
| DB Version | : | Oracle 19.3.0.0.0 |
| File system | : | ASM |
| Disk Groups | : | +DATA,+FRA |
| Database Name | : | 22222PRIMARY |
| DB\_UNIQUE\_NAME | : | PRIMARY |
| INSTANCES | : | PRIMARY1,PRIMARY2 |
| Flashback | : | Disabled |
| Oracle Home Path | : | /u01/app/oracle/product/19.3.0/dbhome\_1 |

Primary Cluster Status:

[oracle@rac1 ~]$ crsctl check cluster -all

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

rac1:

CRS-4537: Cluster Ready Services is online

CRS-4529: Cluster Synchronization Services is online

CRS-4533: Event Manager is online

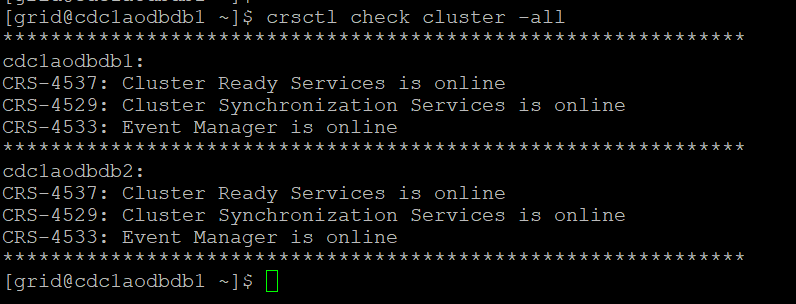
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

rac2:

CRS-4537: Cluster Ready Services is online

CRS-4529: Cluster Synchronization Services is online

CRS-4533: Event Manager is online



\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

[oracle@rac1 ~]$ crsctl stat res -t

-------------------------------------------------------------------------

A screenshot of a computer

Description automatically generated

A screen shot of a computer screen

Description automatically generated------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Standby RAC Cluster: racdg-cluster.

|  |  |  |
| --- | --- | --- |
| Platform | : | Linuxx86\_64 |
| Server Name | : |  |
| DB Version | : | Oracle 19.3.0.0.0 |
| File system | : | ASM |
| Disk Groups | : | +DATA,+FRA |
| Database Name | : | PRIMARY |
| DB\_UNIQUE\_NAME | : | PRIMARY |
| INSTANCES | : | PRIMARY1,PRIMARY2 |
| Flashback | : | Disabled |
| Oracle Home Path | : | /u01/app/oracle/product/19.3.0/dbhome\_1 |

**Standby Cluster Status**

[grid@racdg1 ~]$ crsctl check cluster -all

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

racdg1:

CRS-4537: Cluster Ready Services is online

CRS-4529: Cluster Synchronization Services is online

CRS-4533: Event Manager is online

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

racdg2:

CRS-4537: Cluster Ready Services is online

CRS-4529: Cluster Synchronization Services is online

CRS-4533: Event Manager is online

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

A screenshot of a computer

Description automatically generated

[grid@racdg1 ~]$ crsctl stat res -t

1. A screenshot of a computer

   Description automatically generated
2. A screenshot of a computer screen

   Description automatically generated
3. Primary Database Configuration

Step 2: Enable Forced Logging on Primary

Forced Logging ensures all changes made to the database are logged, which is crucial for maintaining consistency during DataGuard synchronization.

SQL> select name, open\_mode,cdb from v$database;

NAME OPEN\_MODE CDB

--------- -------------------- ---

PRIMARY READ WRITE NO

SQL> select force\_logging from v$database;

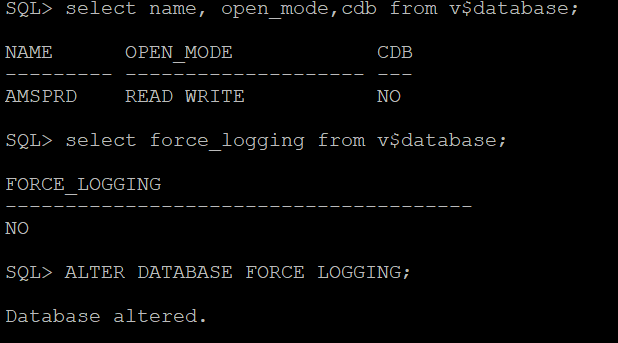
FORCE\_LOGGING

---------------------------------------

NO <---------

SQL> ALTER DATABASE FORCE LOGGING;

Database altered.



SQL> select force\_logging from v$database;

FORCE\_LOGGING

---------------------------------------

YES <-------

A screen shot of a computer error

Description automatically generated

Step 3: Copy Password File from Primary to Standby

Ensure that the standby database can authenticate with the same password file as the primary database.

ASMCMD> pwd

+data/primary/password

ASMCMD> **pwcopy pwdprimary.258.1000514183 /tmp**

**copying +data/primary/password/pwdprimary.258.1000514183 -> /tmp/pwdprimary.258.1000514183**

ASMCMD>

[root@rac2 ~]# cd /tmp

[root@rac2 tmp]# ls -ltr pwdprimary.258.1000514183

-rw-r-----. 1 grid oinstall 2048 Feb 20 13:16 pwdprimary.258.1000514183

[root@rac2 tmp]# chown oracle:oinstall pwdprimary.258.1000514183

[oracle@rac2 tmp]$ ls -ltr pwdprimary.258.1000514183

-rw-r-----. 1 oracle oinstall 2048 Feb 20 13:16 pwdprimary.258.1000514183

[oracle@rac2 tmp]$ scp -p pwdprimary.258.1000514183 oracle@racdg1:/u01/app/oracle/product/19.3.0/dbhome\_1/dbs/orapwSTANDBY1

[oracle@rac2 tmp]$ scp -p pwdprimary.258.1000514183 [oracle@racdg2:/u01/app/oracle/product/19.3.0/dbhome\_1/dbs/orapwSTANDBY2](mailto:oracle@racdg2:/u01/app/oracle/product/19.3.0/dbhome_1/dbs/orapwSTANDBY2)

Step 4: Configure Standby redo Log on Primary

Standby Redo Logs play a crucial role in ensuring that redo apply operates effectively on the standby database.

The standby redo logs must be the same size as the primary database online logs. The recommended number of standby redo logs is:

(maximum # of logfile groups +1) \* maximum # of threads

This example uses two online log file groups for each thread. Thus, the number of standby redo logs should be (2 + 1) \* 2 = 6.

That is, one more standby redo log file group for each thread.

-- Standy Redo logs created in the primary and RMAN will create them in standby automatically while running duplicate command.

-- Standy Redo logs files come into picture only when protection mode is Maximum Availability and Maximum Protection.

SQL>

col MEMBER for a60;

set lines 200 pages 200;

select b.thread#, a.group#, a.member, b.bytes FROM v$logfile a, v$log b WHERE a.group# = b.group#;

THREAD# GROUP# MEMBER BYTES

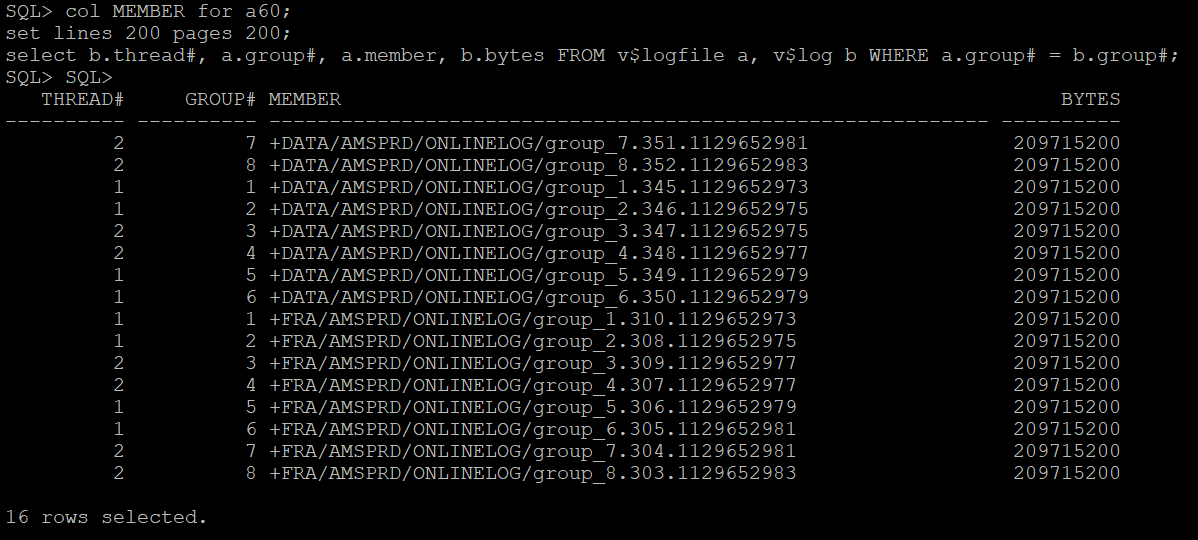
---------- ---------- ----------------------------------------------------------

1 2 +DATA/PRIMARY/redo02.log 209715200

1 1 +DATA/PRIMARY/redo01.log 209715200

2 3 +DATA/PRIMARY/redo03.log 209715200

2 4 +DATA/PRIMARY/redo04.log 209715200



SQL>

ALTER DATABASE ADD STANDBY LOGFILE THREAD 1

GROUP 5 ('+DATA/PRIMARY/redo05.log') SIZE 200M,

GROUP 6 ('+DATA/PRIMARY/redo06.log') SIZE 200M,

GROUP 7 ('+DATA/PRIMARY/redo07.log') SIZE 200M;

Database altered.

SQL> ALTER DATABASE ADD STANDBY LOGFILE THREAD 2

GROUP 8 ('+DATA/PRIMARY/redo08.log') SIZE 200M,

GROUP 9 ('+DATA/PRIMARY/redo09.log') SIZE 200M,

GROUP 10 ('+DATA/PRIMARY/redo10.log') SIZE 200M;

Database altered.

SQL> select \* from v$logfile order by 1;

GROUP# STATUS TYPE MEMBER IS\_ CON\_ID

---------- ------- ------- -------------------------- --- ----------

2 ONLINE +DATA/PRIMARY/redo02.log NO 0

1 ONLINE +DATA/PRIMARY/redo01.log NO 0

3 ONLINE +DATA/PRIMARY/redo03.log NO 0

4 ONLINE +DATA/PRIMARY/redo04.log NO 0

**5 STANDBY +DATA/PRIMARY/redo05.log NO 0**

**6 STANDBY +DATA/PRIMARY/redo06.log NO 0**

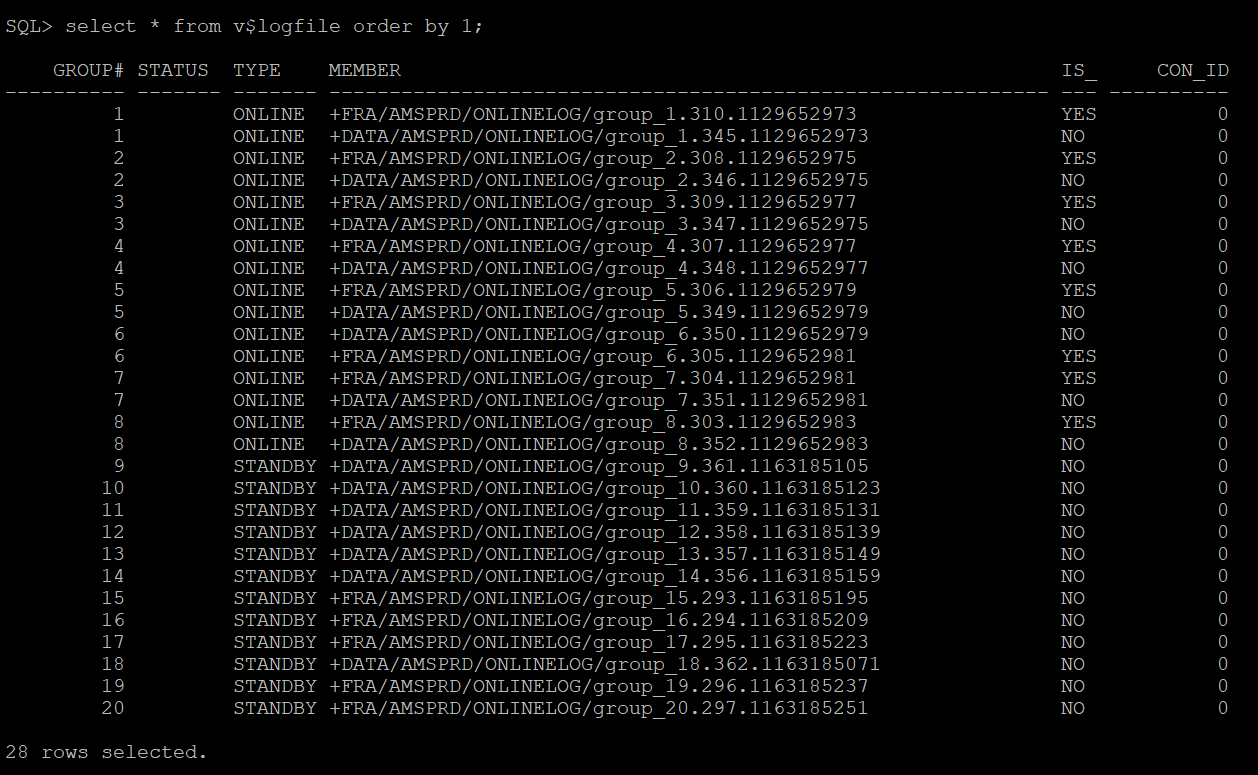
**7 STANDBY +DATA/PRIMARY/redo07.log NO 0**

**8 STANDBY +DATA/PRIMARY/redo08.log NO 0**

**9 STANDBY +DATA/PRIMARY/redo09.log NO 0**

**10 STANDBY +DATA/PRIMARY/redo10.log NO 0**

10 rows selected.



SQL>

select b.thread#,a.group#, a.member, b.bytes FROM v$logfile a, v$standby\_log b WHERE a.group# = b.group#;

THREAD# GROUP# MEMBER BYTES

---------- ---------- --------------------------------------------------

1 5 +DATA/PRIMARY/redo05.log 209715200

1 6 +DATA/PRIMARY/redo06.log 209715200

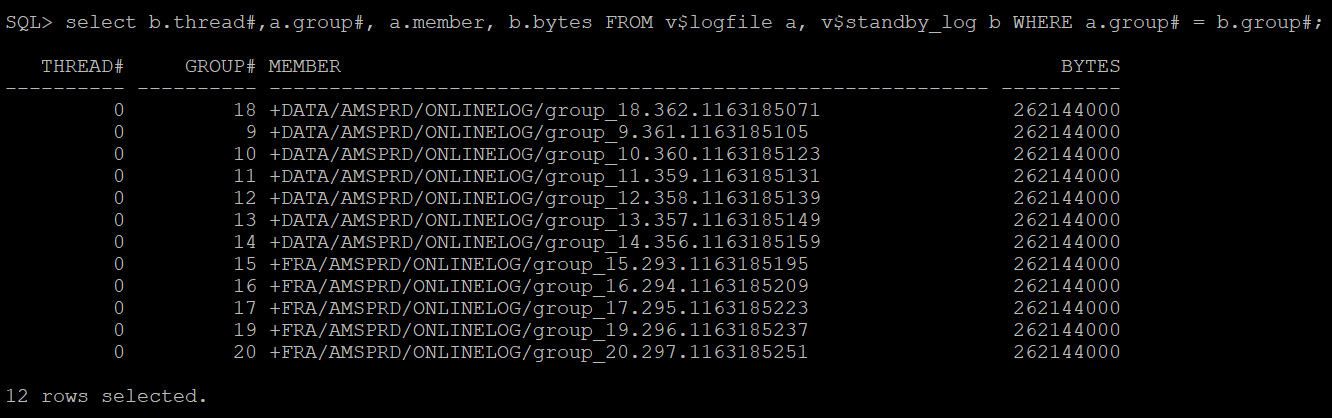
1 7 +DATA/PRIMARY/redo07.log 209715200

2 8 +DATA/PRIMARY/redo08.log 209715200

2 9 +DATA/PRIMARY/redo09.log 209715200

2 10 +DATA/PRIMARY/redo10.log 209715200

6 rows selected.



Step 5:Verify Archive Mode Enabled on Primary

Archive mode must be enabled to generate archived redo logs for standby database synchronization.

SQL> archive log list

A black screen with white text

Description automatically generated

Step 6: Set Primary Database Initialization Parameters

Configure primary database initialization parameters to ensure proper operation of DataGuard.

SQL> create pfile='/home/oracle/initPRIMARY.ora.bkp' from spfile;

File created.

SQL> alter system set db\_unique\_name='PRIMARY' scope=spfile sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_ARCHIVE\_CONFIG='DG\_CONFIG=(PRIMARY,STANDBY)' scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_ARCHIVE\_DEST\_1='LOCATION=+FRA VALID\_FOR=(ALL\_LOGFILES,ALL\_ROLES) DB\_UNIQUE\_NAME=PRIMARY' scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_ARCHIVE\_DEST\_2='SERVICE=STANDBY LGWR ASYNC VALID\_FOR=(ONLINE\_LOGFILES,PRIMARY\_ROLE) DB\_UNIQUE\_NAME=STANDBY' scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_ARCHIVE\_DEST\_STATE\_1=ENABLE scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_ARCHIVE\_DEST\_STATE\_2=ENABLE scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET fal\_client=PRIMARY scope=both sid='\*';

System altered.

SQL>

Please note: The FAL\_CLIENT database initialization parameter is no longer required from 11gR2

SQL> ALTER SYSTEM SET fal\_server=STANDBY scope=both sid='\*';

System altered.

SQL> ALTER SYSTEM SET DB\_FILE\_NAME\_CONVERT='+DATA\_DG','+DATA' SCOPE=SPFILE sid='\*';

System altered.

SQL> ALTER SYSTEM SET LOG\_FILE\_NAME\_CONVERT='+DATA\_DG','+DATA' SCOPE=SPFILE sid='\*';

System altered.

SQL> ALTER SYSTEM SET STANDBY\_FILE\_MANAGEMENT=AUTO scope=both sid='\*';

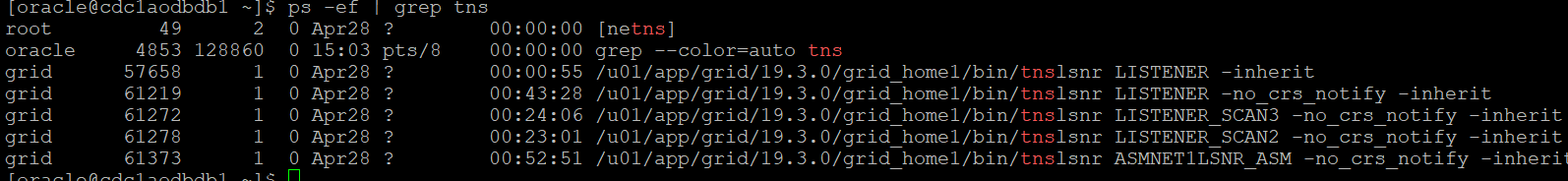
System altered.

SQL> create pfile='/home/oracle/initPRIMARY.ora' from spfile;

Step 7: Configure LISTENER Entries on Primary

Ensure the primary database listener is configured to communicate with the standby.

[oracle@rac1 ~]$ ps -ef | grep tns



[oracle@rac1 ~]$ lsnrctl status LISTENER

A screenshot of a computer

Description automatically generated

[oracle@rac1 ~]$

Cat /u01/app/19.3.0/grid/network/admin/listener.ora

LISTENER\_SCAN3=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN3)))) # line added by Agent

LISTENER\_SCAN2=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN2)))) # line added by Agent

# listener.ora Network Configuration File: /u01/app/19.3.0/grid/network/admin/listener.ora

# Generated by Oracle configuration tools.

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN1 = ON

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN1 = OFF

VALID\_NODE\_CHECKING\_REGISTRATION\_ASMNET1LSNR\_ASM = SUBNET

ASMNET1LSNR\_ASM =

(DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = IPC)(KEY = ASMNET1LSNR\_ASM))

)

)

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER = SUBNET

LISTENER =

(DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER))

)

)

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_ASMNET1LSNR\_ASM = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER = ON

LISTENER\_SCAN1 =

(DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER\_SCAN1))

)

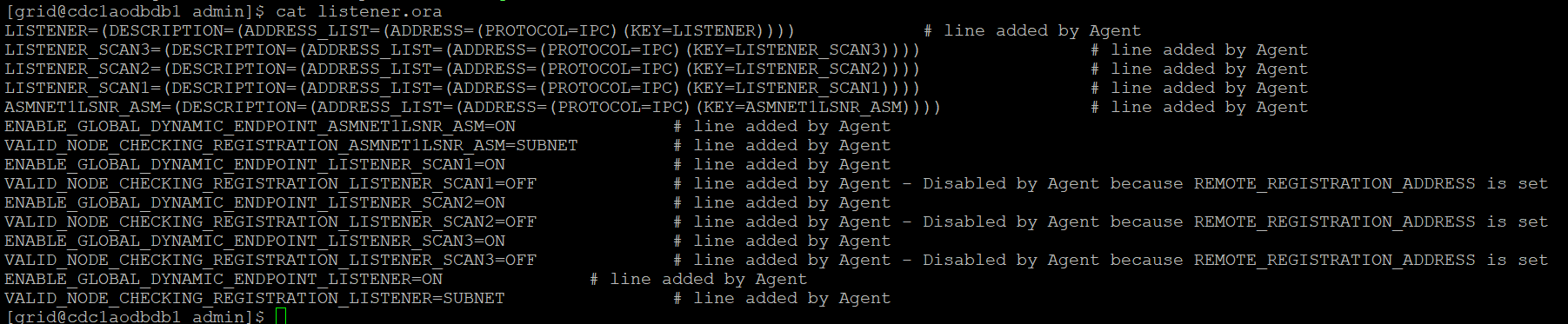
)

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN2=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN2=OFF # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN3=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN3=OFF # line added by Agent



[grid@rac2 admin]$ **cat listener.ora <--- 2nd node of Primary**

LISTENER\_SCAN3=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN3)))) # line added by Agent

LISTENER\_SCAN2=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN2)))) # line added by Agent

LISTENER\_SCAN1=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN1)))) # line added by Agent

LISTENER=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER)))) # line added by Agent

ASMNET1LSNR\_ASM=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=ASMNET1LSNR\_ASM)))) # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_ASMNET1LSNR\_ASM=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_ASMNET1LSNR\_ASM=SUBNET # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER=SUBNET # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN1=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN1=OFF # line added by Agent

REGISTRATION\_INVITED\_NODES\_LISTENER\_SCAN1=() # line added by Agent

REGISTRATION\_INVITED\_NODES\_LISTENER=() # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN2=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN2=OFF # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN3=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN3=OFF # line added by Agent

A black screen with many small squares

Description automatically generated with medium confidence

Step 8: Configure TNS Entries on Primary

Set up TNS entries on the primary database to establish connectivity with the standby.

[oracle@rac1 admin]$ cat tnsnames.ora

# tnsnames.ora Network Configuration File: /u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/tnsnames.ora

# Generated by Oracle configuration tools.

PRIMARY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = PRIMARY)

)

)

STANDBY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = racdg-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = STANDBY)(UR=A)

)

)

[oracle@rac2 admin]$ cat tnsnames.ora <--- 2nd node of Primary

# tnsnames.ora Network Configuration File: /u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/tnsnames.ora

# Generated by Oracle configuration tools.

PRIMARY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = PRIMARY)

)

)

STANDBY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = racdg-scan)(PORT = ####))

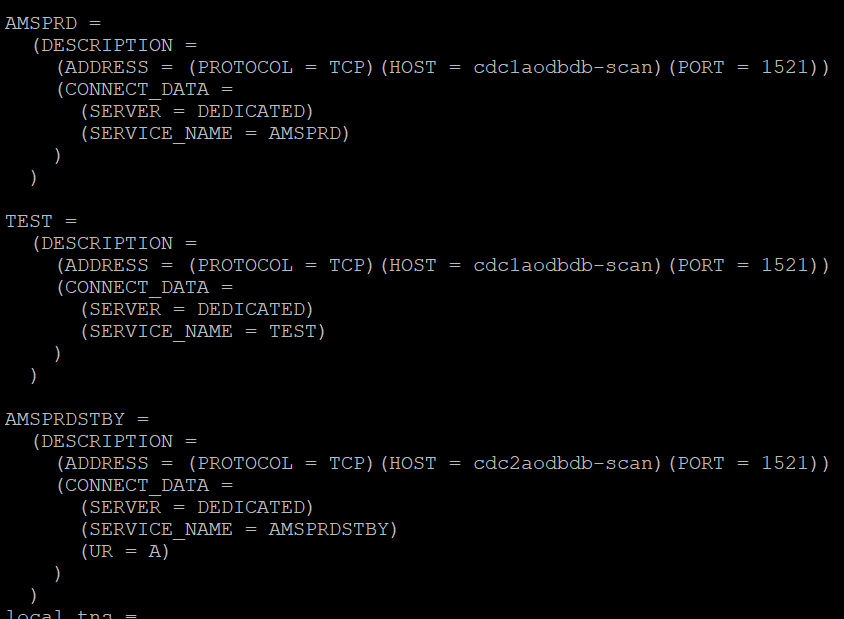
(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = STANDBY)(UR=A)

)

)



[oracle@rac1 ~]$ tnsping primary

TNS Ping Utility for Linux: Version 19.3.0.0.0 - Production on 20-FEB-2019 15:24:20

Copyright (c) 1997, 2016, Oracle. All rights reserved.

Used parameter files:

/u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias

Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = ####)) (CONNECT\_DATA = (SERVER = DEDICATED) (SERVICE\_NAME = PRIMARY)))

OK (10 msec)

A black background with many small colored lines

Description automatically generated with medium confidence

[oracle@rac1 ~]$ tnsping standby

TNS Ping Utility for Linux: Version 19.3.0.0.0 - Production on 20-FEB-2019 16:26:23

Copyright (c) 1997, 2016, Oracle. All rights reserved.

Used parameter files:

/u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/sqlnet.ora

Used TNSNAMES adapter to resolve the alias

Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = racdg-scan)(PORT = ####)) (CONNECT\_DATA = (SERVER = DEDICATED) (SERVICE\_NAME = STANDBY)(UR=A)))

OK (0 msec)



* 1. Standby Database Configuration

Step 9: Set Standby Database Initialization Parameters

Configure standby database initialization parameters for synchronization with the primary.

[oracle@racdg1 dbs]$ cat initSTANDBY1.ora

STANDBY1.\_\_data\_transfer\_cache\_size=0

STANDBY1.\_\_db\_cache\_size=520093696

STANDBY1.\_\_inmemory\_ext\_roarea=0

STANDBY1.\_\_inmemory\_ext\_rwarea=0

STANDBY1.\_\_java\_pool\_size=4194304

STANDBY1.\_\_large\_pool\_size=8388608

STANDBY1.\_\_oracle\_base='/u01/app/oracle'#ORACLE\_BASE set from environment

STANDBY1.\_\_pga\_aggregate\_target=301989888

STANDBY1.\_\_sga\_target=905969664

STANDBY1.\_\_shared\_io\_pool\_size=37748736

STANDBY1.\_\_shared\_pool\_size=322961408

STANDBY1.\_\_streams\_pool\_size=0

\*.audit\_file\_dest='/u01/app/oracle/admin/STANDBY/adump'

\*.audit\_trail='db'

\*.cluster\_database=false

\*.compatible='19.3.0'

\*.control\_files=’+DATA\_DG/STANDBY/control01.ctl’,’+DATA\_DG/STANDBY/control02.ctl’

\*.db\_block\_size=8192

\*.db\_file\_name\_convert='+DATA/PRIMARY','+DATA\_DG/STANDBY'

\*.db\_name='PRIMARY'

\*.db\_recovery\_file\_dest='+DATA\_DG'

\*.db\_recovery\_file\_dest\_size=8016m

\*.db\_unique\_name=’STANDBY’

\*.diagnostic\_dest='/u01/app/oracle'

\*.dispatchers='(PROTOCOL=TCP) (SERVICE=STANDBYXDB)'

\*.fal\_client='STANDBY'

\*.fal\_server='PRIMARY'

family:dw\_helper.instance\_mode='read-only'

\*.instance\_name=’STANDBY1’

STANDBY1.instance\_number=1

\*.log\_archive\_config='DG\_CONFIG=(PRIMARY,STANDBY)'

\*.log\_archive\_dest\_1='LOCATION=+DATA\_DG VALID\_FOR=(ALL\_LOGFILES,ALL\_ROLES) DB\_UNIQUE\_NAME=STANDBY'

\*.log\_archive\_dest\_2='SERVICE=PRIMARY LGWR ASYNC VALID\_FOR=(ONLINE\_LOGFILES,PRIMARY\_ROLE) DB\_UNIQUE\_NAME=PRIMARY'

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

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

\*.log\_archive\_format='%t\_%s\_%r.dbf'

\*.log\_file\_name\_convert='+DATA/PRIMARY','+DATA\_DG/STANDBY'

\*.nls\_language='AMERICAN'

\*.nls\_territory='AMERICA'

\*.open\_cursors=300

\*.pga\_aggregate\_target=288m

\*.processes=300

\*.remote\_listener='racdg-scan:####'

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

\*.sga\_target=864m

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

STANDBY1.thread=1

STANDBY1.undo\_tablespace='UNDOTBS1'

Step 10: Create required directories on Standby

Create necessary directories on standby for file storage.

[oracle@racdg1 ~]$ mkdir -p /u01/app/oracle/admin/STANDBY/adump

[oracle@racdg2 ~]$ mkdir -p /u01/app/oracle/admin/STANDBY/adump

Step 11: Add below entry in ORATAB on Standby

ORATAB entry is required for automatic database startup/shutdown.

[oracle@racdg1 ~]$ echo

"PRIMARY:/u01/app/oracle/product/19.3.0/dbhome\_1:N" >> /etc/oratab

[oracle@racdg1 ~]$ echo "STANDBY1:/u01/app/oracle/product/19.3.0/dbhome\_1:N" >> /etc/oratab

[oracle@racdg2 ~]$ echo "PRIMARY:/u01/app/oracle/product/19.3.0/dbhome\_1:N" >> /etc/oratab

[oracle@racdg2 ~]$ echo "STANDBY2:/u01/app/oracle/product/19.3.0/dbhome\_1:N" >> /etc/oratab

Step 12: Startup nomount

Start the standby database in NOMOUNT mode for further configuration.

SQL> startup nomount

pfile='/u01/app/oracle/product/19.3.0/dbhome\_1/dbs/initSTANDBY1.ora';

ORACLE instance started.

Total System Global Area 905969664 bytes

Fixed Size 8627008 bytes

Variable Size 348130496 bytes

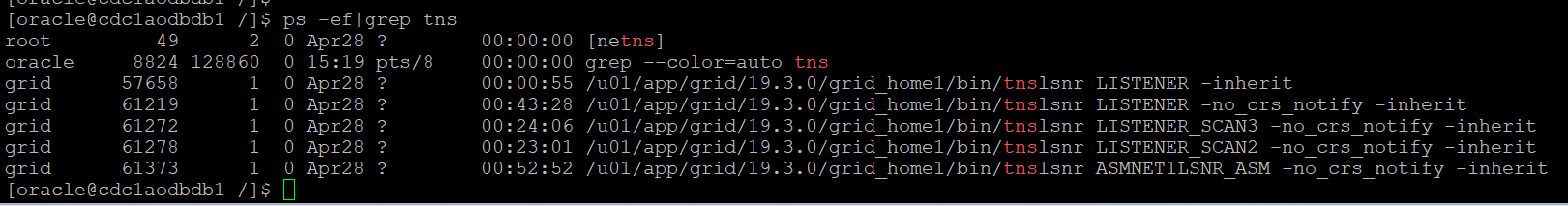
Database Buffers 545259520 bytes

Redo Buffers 3952640 bytes

Step 13: Configure LISTENER Entries on Standby

Configure listener entries on standby to facilitate communication with the primary.

[oracle@racdg1 ~]$ ps -ef | grep tns



[grid@racdg1 ~]$ lsnrctl status LISTENER

LSNRCTL for Linux: Version 19.3.0.0.0 - Production on 23-FEB-2019 23:55:46

Copyright (c) 1991, 2016, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER)))

STATUS of the LISTENER

------------------------

Alias LISTENER

Version TNSLSNR for Linux: Version 19.3.0.0.0 - Production

Start Date 23-FEB-2019 12:52:44

Uptime 0 days 11 hr. 3 min. 2 sec

Trace Level off

Security ON: Local OS Authentication

SNMP OFF

Listener Parameter File /u01/app/19.3.0/grid/network/admin/listener.ora

Listener Log File /u01/app/grid/diag/tnslsnr/racdg1/listener/alert/log.xml

Listening Endpoints Summary...

(DESCRIPTION=(ADDRESS=(PROTOCOL=ipc)(KEY=LISTENER)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=###.###.#.###)(PORT=####)))

(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=###.###.#.###)(PORT=####)))

Services Summary...

Service "+ASM" has 1 instance(s).

Instance "+ASM1", status READY, has 1 handler(s) for this service...

Service "+ASM\_DATA" has 1 instance(s).

Instance "+ASM1", status READY, has 1 handler(s) for this service...

Service "+ASM\_DATA\_DG" has 1 instance(s).

Instance "+ASM1", status READY, has 1 handler(s) for this service...

Service "STANDBY" has 1 instance(s).

Instance "STANDBY1", status UNKNOWN, has 1 handler(s) for this service...

The command completed successfully

[grid@racdg1 ~]$ cat

/u01/app/19.3.0/grid/network/admin/listener.ora

# listener.ora Network Configuration File: /u01/app/19.3.0/grid/network/admin/listener.ora

# Generated by Oracle configuration tools.

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN3 = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN2 = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN1 = ON

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN3 = OFF

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN2 = OFF

SID\_LIST\_LISTENER =

(SID\_LIST =

(SID\_DESC =

(GLOBAL\_DBNAME = STANDBY)

(ORACLE\_HOME = /u01/app/oracle/product/19.3.0/dbhome\_1)

(SID\_NAME = STANDBY)

)

)

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN1 = OFF

VALID\_NODE\_CHECKING\_REGISTRATION\_ASMNET1LSNR\_ASM = SUBNET

ASMNET1LSNR\_ASM =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = ASMNET1LSNR\_ASM))

)

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER = SUBNET

LISTENER =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER))

)

ADR\_BASE\_LISTENER = /u01/app/grid

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_ASMNET1LSNR\_ASM = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER = ON

ADR\_BASE\_ASMNET1LSNR\_ASM = /u01/app/grid

LISTENER\_SCAN3 =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER\_SCAN3))

)

LISTENER\_SCAN2 =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER\_SCAN2))

)

ADR\_BASE\_LISTENER\_SCAN3 = /u01/app/grid

LISTENER\_SCAN1 =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER\_SCAN1))

)

ADR\_BASE\_LISTENER\_SCAN2 = /u01/app/grid

ADR\_BASE\_LISTENER\_SCAN1 = /u01/app/grid

[grid@racdg1 ~]$

[grid@racdg2 admin]$ cat listener.ora <--- 2nd of standby

LISTENER\_SCAN2=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN2)))) # line added by Agent

LISTENER\_SCAN3=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN3)))) # line added by Agent

LISTENER\_SCAN1=(DESCRIPTION=(ADDRESS\_LIST=(ADDRESS=(PROTOCOL=IPC)(KEY=LISTENER\_SCAN1)))) # line added by Agent

# listener.ora Network Configuration File: /u01/app/19.3.0/grid/network/admin/listener.ora

# Generated by Oracle configuration tools.

VALID\_NODE\_CHECKING\_REGISTRATION\_ASMNET1LSNR\_ASM = SUBNET

ASMNET1LSNR\_ASM =

(DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = IPC)(KEY = ASMNET1LSNR\_ASM))

)

)

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER = SUBNET

LISTENER =

(DESCRIPTION =

(ADDRESS\_LIST =

(ADDRESS = (PROTOCOL = IPC)(KEY = LISTENER))

)

)

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_ASMNET1LSNR\_ASM = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER = ON

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN1=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN1=OFF # line added by Agent

REGISTRATION\_INVITED\_NODES\_LISTENER\_SCAN1=() # line added by Agent

REGISTRATION\_INVITED\_NODES\_LISTENER=() # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN3=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN3=OFF # line added by Agent

ENABLE\_GLOBAL\_DYNAMIC\_ENDPOINT\_LISTENER\_SCAN2=ON # line added by Agent

VALID\_NODE\_CHECKING\_REGISTRATION\_LISTENER\_SCAN2=OFF # line added by Agent

[grid@racdg2 admin]$

Step 14: Configure TNS Entries on Standby

Set up TNS entries on standby for connectivity with the primary.

[oracle@racdg1 admin]$ cat tnsnames.ora

# tnsnames.ora Network Configuration File: /u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/tnsnames.ora

# Generated by Oracle configuration tools.

PRIMARY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = PRIMARY)

)

)

STANDBY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = racdg-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = STANDBY) (UR=A)

)

)

[oracle@racdg1 admin]$

[oracle@racdg2 admin]$ cat tnsnames.ora <--- 2nd node of Standby

# tnsnames.ora Network Configuration File: /u01/app/oracle/product/19.3.0/dbhome\_1/network/admin/tnsnames.ora

# Generated by Oracle configuration tools.

PRIMARY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = rac-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = PRIMARY)

)

)

STANDBY =

(DESCRIPTION =

(ADDRESS = (PROTOCOL = TCP)(HOST = racdg-scan)(PORT = ####))

(CONNECT\_DATA =

(SERVER = DEDICATED)

(SERVICE\_NAME = STANDBY) (UR=A)

)

)

[oracle@racdg2 admin]$

Step 15: Verify TNS connectivity

Ensure TNS connectivity between the primary and standby databases.

**On Primary**

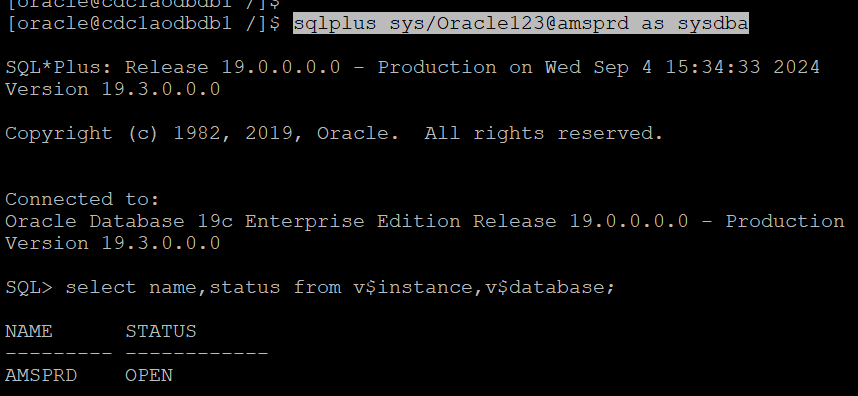
[oracle@rac1 ~]$ sqlplus sys/sys@primary as sysdba

SQL\*Plus: Release 19.3.0.0.0 Production on Wed Feb 20 16:28:46 2019

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 19.3.0.0.0 - 64bit Production



[oracle@rac1 ~]$ sqlplus sys/sys@standby as sysdba

SQL\*Plus: Release 19.3.0.0.0 Production on Wed Feb 20 16:28:54 2019

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 19.3.0.0.0 - 64bit Production

A screenshot of a computer

Description automatically generated

**On Standby**

[oracle@racdg1 ~]$ sqlplus sys/sys@primary as sysdba

SQL\*Plus: Release 19.3.0.0.0 Production on Wed Feb 20 16:29:28 2019

Copyright (c) 1982, 2016, Oracle. All rights reserved.

Connected to:

Oracle Database 12c Enterprise Edition Release 19.3.0.0.0 - 64bit Production

A screenshot of a computer

Description automatically generated

[oracle@racdg1 ~]$ sqlplus sys/sys@standby as sysdba

SQL\*Plus: Release 19.3.0.0.0 Production on Wed Feb 20 16:29:35 2019

Copyright (c) 1982, 2016, Oracle. All rights reserved.

A screenshot of a computer

Description automatically generated

Step 16: Run the duplicate command

Use the “DUPLICATE” command to create a standby database from the primary.

Please note DB\_CREATE\_FILE\_DEST parameter cannot be set together with DB\_FILE\_NAME\_CONVERT during RMAN active duplication.

[oracle@racdg1 ~]$ rman target sys/sys@PRIMARY auxiliary sys/sys@STANDBY

Recovery Manager: Release 19.3.0.0.0 - Production on Sat Feb 23 23:41:12 2019

Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved.

connected to target database: PRIMARY (DBID=3971311101)

connected to auxiliary database: PRIMARY (not mounted)

A computer screen with text on it

Description automatically generated

RMAN> duplicate target database for standby from active database nofilenamecheck;

Step 17: Verify Standby redo logs

Ensure standby redo logs are properly configured for redo apply on standby.

SQL> select \* from v$logfile;

GROUP# STATUSTYPE MEMBER IS\_ CON\_ID

---------- ------- ------- ---------------------------------------------

2 ONLINE +DATA\_DG/STANDBY/redo02.log NO 0

1 ONLINE +DATA\_DG/STANDBY/redo01.log NO 0

3 ONLINE +DATA\_DG/STANDBY/redo03.log NO 0

4 ONLINE +DATA\_DG/STANDBY/redo04.log NO 0

5 STANDBY +DATA\_DG/STANDBY/redo05.log NO 0

6 STANDBY +DATA\_DG/STANDBY/redo06.log NO 0

7 STANDBY +DATA\_DG/STANDBY/redo07.log NO 0

8 STANDBY +DATA\_DG/STANDBY/redo08.log NO 0

9 STANDBY +DATA\_DG/STANDBY/redo09.log NO 0

10 STANDBY +DATA\_DG/STANDBY/redo10.log NO 0

10 rows selected.

SQL> select b.thread#,a.group#, a.type, a.member, b.bytes FROM v$logfile a, v$standby\_log b WHERE a.group# = b.group#;

THREAD# GROUP# TYPE MEMBER BYTES

---------- ---------- ------- ------------------------------------------

1 5 STANDBY +DATA\_DG/STANDBY/redo05.log 209715200

1 6 STANDBY +DATA\_DG/STANDBY/redo06.log 209715200

1 7 STANDBY +DATA\_DG/STANDBY/redo07.log 209715200

2 8 STANDBY +DATA\_DG/STANDBY/redo08.log 209715200

2 9 STANDBY +DATA\_DG/STANDBY/redo09.log 209715200

2 10 STANDBY +DATA\_DG/STANDBY/redo10.log 209715200

6 rows selected.

Step 18: Create a spfile

Create a SPFILE for standby database operation.

SQL> create spfile='+DATA\_DG/STANDBY/PARAMETERFILE/spfileSTANDBY.ora' from pfile='/u01/app/oracle/product/19.3.0/dbhome\_1/dbs/initSTANDBY1.ora';

File created.

SQL> shut immediate;

ORA-01109: database not open

Database dismounted.

ORACLE instance shut down.

SQL>

[oracle@racdg1 ~]$ cd $ORACLE\_HOME/dbs

[oracle@racdg1 dbs]$ ls -ltr initSTANDBY1.ora

-rw-r--r--. 1 oracle oinstall 1802 Feb 23 23:40 initSTANDBY1.ora

[oracle@racdg1 dbs]$ mv initSTANDBY1.ora initSTANDBY1.ora.bkp

[oracle@racdg1 dbs]$ echo "SPFILE='+DATA\_DG/STANDBY/PARAMETERFILE/spfileSTANDBY.ora'" > initSTANDBY1.ora

[oracle@racdg1 dbs]$ scp initSTANDBY1.ora oracle@racdg2:/u01/app/oracle/product/19.3.0/dbhome\_1/dbs/initSTANDBY2.ora

initSTANDBY1.ora 100% 58 0.1KB/s 00:00

SQL> startup mount;

ORACLE instance started.

Total System Global Area 1269366784 bytes

Fixed Size 2252864 bytes

Variable Size 805310400 bytes

Database Buffers 452984832 bytes

Redo Buffers 8818688 bytes

Database mounted.

Step 19: Add init parameters for Instance 2

Add initialization parameters for standby instance 2.

SQL> alter system set undo\_tablespace=UNDOTBS2 sid='STANDBY2' scope=spfile;

System altered.

SQL> alter system set instance\_number=1 sid='STANDBY1' scope=spfile;

System altered.

SQL> alter system set instance\_number=2 sid='STANDBY2' scope=spfile;

System altered.

SQL> alter system set instance\_name='STANDBY1' sid='STANDBY1' scope=spfile;

System altered.

SQL> alter system set instance\_name='STANDBY2' sid='STANDBY2' scope=spfile;

System altered.

SQL> alter system set thread=1 sid='STANDBY1' scope=spfile;

System altered.

SQL> alter system set thread=2 sid='STANDBY2' scope=spfile;

System altered.

SQL> alter system set cluster\_database=TRUE scope=spfile;

System altered.

SQL> alter system set remote\_listener='racdg-scan:####' scope=spfile;

System altered.

SQL> shut immediate;

ORA-01109: database not open

Database dismounted.

ORACLE instance shut down.

SQL> startup mount;

ORACLE instance started.

Total System Global Area 1269366784 bytes

Fixed Size 2252864 bytes

Variable Size 805310400 bytes

Database Buffers 452984832 bytes

Redo Buffers 8818688 bytes

Database mounted.

SQL> select name,open\_mode,database\_role,cdb from v$database;

NAME OPEN\_MODE DATABASE\_ROLE CDB

--------- -------------------- ---------------- ---

PRIMARY MOUNTED PHYSICAL STANDBY NO

Step 20: Add database to OCR

Add the standby database to Oracle Cluster Registry (OCR) for high availability configurations.

[oracle@racdg1 dbs]$ srvctl add database -db STANDBY -oraclehome /u01/app/oracle/product/19.3.0/dbhome\_1 -role physical\_standby -startoption mount -spfile +DATA\_DG/STANDBY/PARAMETERFILE/spfileSTANDBY.ora

[oracle@racdg1 dbs]$ srvctl add instance -db STANDBY -instance STANDBY1 -node racdg1

[oracle@racdg1 dbs]$ srvctl add instance -db STANDBY -instance STANDBY2 -node racdg2

[oracle@racdg1 dbs]$ srvctl start database -d STANDBY

[oracle@racdg1 dbs]$ srvctl status database -d STANDBY

Instance STANDBY1 is running on node racdg1

Instance STANDBY2 is running on node racdg2

[grid@racdg1 trace]$ crsctl stat res -t

------------------------------------------------------------------------

Name Target State Server State details

------------------------------------------------------------------------

Local Resources

------------------------------------------------------------------------

ora.ASMNET1LSNR\_ASM.lsnr

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.DATA.dg

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.DATA\_DG.dg

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.LISTENER.lsnr

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.net1.network

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.ons

ONLINE ONLINE racdg1 STABLE

ONLINE ONLINE racdg2 STABLE

ora.proxy\_advm

OFFLINE OFFLINE racdg1 STABLE

OFFLINE OFFLINE racdg2 STABLE

------------------------------------------------------------------------

Cluster Resources

------------------------------------------------------------------------

ora.LISTENER\_SCAN1.lsnr

1 ONLINE ONLINE racdg2 STABLE

ora.LISTENER\_SCAN2.lsnr

1 ONLINE ONLINE racdg1 STABLE

ora.LISTENER\_SCAN3.lsnr

1 ONLINE ONLINE racdg1 STABLE

ora.asm

1 ONLINE ONLINE racdg1 Started,STABLE

2 ONLINE ONLINE racdg2 Started,STABLE

3 OFFLINE OFFLINE STABLE

ora.cvu

1 ONLINE ONLINE racdg1 STABLE

ora.standby.db

1 ONLINE INTERMEDIATE racdg1 Mounted (Closed),HOM

E=/u01/app/oracle/pr

oduct/19.3.0/dbhome\_

1,STABLE

2 ONLINE INTERMEDIATE racdg2 Mounted (Closed),HOM

E=/u01/app/oracle/product/19.3.0/dbhome\_

1,STABLE

ora.qosmserver

1 OFFLINE OFFLINE STABLE

ora.racdg1.vip

1 ONLINE ONLINE racdg1 STABLE

ora.racdg2.vip

1 ONLINE ONLINE racdg2 STABLE

ora.scan1.vip

1 ONLINE ONLINE racdg2 STABLE

ora.scan2.vip

1 ONLINE ONLINE racdg1 STABLE

ora.scan3.vip

1 ONLINE ONLINE racdg1 STABLE

--------------------------------------------------------------------------------

Step 21: Enable MRP on Standby

Start Managed Recovery Process (MRP) on the standby database for redo apply.

SQL> select name,open\_mode,database\_role,cdb from v$database;

NAME OPEN\_MODE DATABASE\_ROLE CDB

--------- -------------------- ---------------- ---

PRIMARY MOUNTED PHYSICAL STANDBY NO

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

Database altered.

* 1. Verification

Step 22: Verify Sync

Confirm synchronization between primary and standby databases.

**On Primary**

SQL> select thread#,max(sequence#) from v$archived\_log where archived='YES' group by thread#;

THREAD# MAX(SEQUENCE#)

---------- --------------

1 65 <----

2 49 <----

**On Primary Instance 1:**

SQL> alter system switch logfile;

System altered.

SQL> /

System altered.

SQL> /

System altered.

SQL>

**On Primary Instance 2:**

SQL> alter system switch logfile;

System altered.

SQL> /

System altered.

SQL> /

System altered.

SQL>

SQL> select thread#,max(sequence#) from v$archived\_log where archived='YES' group by thread#;

THREAD# MAX(SEQUENCE#)

---------- --------------

1 69 <----

2 53 <----

SQL>

**On Standby**

SQL> select thread#,max(sequence#) from v$archived\_log where applied='YES' group by thread#;

THREAD# MAX(SEQUENCE#)

---------- --------------

1 68 <------

2 53 <------

SQL> SELECT ARCH.THREAD# "Thread", ARCH.SEQUENCE# "Last Sequence Received", APPL.SEQUENCE# "Last Sequence Applied", (ARCH.SEQUENCE# - APPL.SEQUENCE#) "Difference" FROM (SELECT THREAD# ,SEQUENCE# FROM V$ARCHIVED\_LOG WHERE (THREAD#,FIRST\_TIME ) IN (SELECT THREAD#,MAX(FIRST\_TIME) FROM V$ARCHIVED\_LOG GROUP BY THREAD#)) ARCH,(SELECT THREAD# ,SEQUENCE# FROM V$LOG\_HISTORY WHERE (THREAD#,FIRST\_TIME ) IN (SELECT THREAD#,MAX(FIRST\_TIME) FROM V$LOG\_HISTORY GROUP BY THREAD#)) APPL WHERE ARCH.THREAD# = APPL.THREAD# ORDER BY 1;

Thread Last Sequence Received Last Sequence Applied Difference

---------- ---------------------- --------------------- ----------

1 69 69 0 <---

2 53 53 0 <---

######################################################################################################################################################