Practice

Duplicating Databases and PDBs using RMAN

Practice Target

In this practice you will perform multiple techniques to duplicate the database `oradb` in `srv1` to another database in the same host.

Practice Overview

In this practice, you will perform the following database duplication techniques:

- Active database duplication
- Database duplication from backup files with a target connection
- Database duplication from backup files without connection to the target nor to a recovery catalog
- Active PDB duplication

Assumptions

This practice assumes that `srv1` appliance is up and running and its database **CDB** database is running.

A. Practice Preparation Steps

Perform the following steps to prepare the environment for this practice.

1. Start Putty and connect to `srv1` as `oracle`

2. Create directory named as `backup` in the staging folder.

```
mkdir /media/sf_staging/backup
```

3. Start RMAN and connect to the local database as target

```
rman target "'/ as SYSBACKUP'"
```

4. Take full backup of the target database

```
run
{
 ALLOCATE CHANNEL C1 DEVICE TYPE DISK;
 ALLOCATE CHANNEL C2 DEVICE TYPE DISK;
 BACKUP
 FORMAT '/media/sf_staging/backup/oradb%U.bck'
 DATABASE TAG 'oradb_DB'
 CURRENT CONTROLFILE TAG 'oradb_CTL' FORMAT '/media/sf_staging/backup/oradbCTL.bck'
 SPFILE TAG 'oradb_SPFILE' FORMAT '/media/sf_staging/backup/oradbSPFILE.bck'
 PLUS ARCHIVELOG TAG 'oradb_ARC' FORMAT '/media/sf_staging/backup/oradbARC%U.bck';
 DELETE NOPROMPT ARCHIVELOG ALL BACKED UP 1 TIMES TO DISK;
}
```

5. Exit from RMAN

```
exit
```

B. Preparing the Auxiliary Database

In this section of the practice, you will perform the actions required to prepare the auxiliary database (`oradb2`).

6. Create the directories where the database files will be saved for `oradb2`.

Database file locations should be different from the source database.

```
mkdir -p /u01/app/oracle/oradata/oradb2/datafile
mkdir -p /u01/app/oracle/fra/oradb2
mkdir ~/temp
```

7. Create an initialization parameter file for the auxiliary instance and add just the `DB_NAME` parameter in it.

```
vi $ORACLE_HOME/dbs/initoradb2.ora
```

```
DB_NAME='oradb2'
```

8. Establish Oracle net connectivity between the databases in `tnsnames.ora` file by adding the following entry to it. Do not copy the code from the PDF file. Copy it from the attached `tnsnames.ora` file.

Observe that this connection descriptor points to the instance SID, not the database service.

```
vi $TNS_ADMIN/tnsnames.ora
```

```
oradb2 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = srv1.localdomain)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SID = oradb2)
    )
  )
```

9. Create a static entry of the auxiliary instance in the listener. Do not copy the code from the PDF file. Copy it from the attached `listener.ora` file.

```
vi $TNS_ADMIN/listener.ora
```

```
# add the following to the file:
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (GLOBAL_DBNAME = oradb2.WORLD)
      (ORACLE_HOME = /u01/app/oracle/product/19.0.0/db_1)
      (SID_NAME = oradb2)
    )
  )
```

10. Reload the listener configuration file.

```
lsnrctl reload
```

11. Create password file for the auxiliary database by copying the existing password file.

In my opinion, this is better than creating a password file from scratch. The copy includes all the users that are granted administrative privileges.

```
cp $ORACLE_HOME/dbs/orapworadb $ORACLE_HOME/dbs/orapworadb2
```

12. Startup the auxiliary instance.

It is a must to set the `ORACLE_SID` variable before invoking the SQL*Plus.

The auxiliary database will automatically read from the PFILE created earlier because its name is set to the default name and it is saved in the default location.

```
export ORACLE_SID=oradb2
sqlplus / as sysdba
STARTUP NOMOUNT
```

13. Take snapshot of `srv1`. Give the snapshot the name "**Auxiliary Database Prepared**".

Do **not** delete the snapshot "oracle cdb database". Keep it.

C. Performing Active Database Duplication

In this section of the practice, you will duplicate `oradb` using active database duplication method.

14. Invoke RMAN with connecting to the source database (`oradb`) and the auxiliary database (`oradb2`).

```
rman TARGET sys/ABcd##1234@oradb AUXILIARY sys/ABcd##1234@oradb2
```

15. Perform the active database duplication.

Less memory is granted to the duplicate database in our case to reduce the burden on the server resources by having two database instances running at the same time in the same machine.

```
run
{
 DUPLICATE DATABASE TO oradb2
   FROM ACTIVE DATABASE
   SPFILE
 SET CONTROL_FILES
'/u01/app/oracle/oradata/oradb2/datafile/control1.ctl','/u01/app/oracle/fra/oradb2/contro
l2.ctl'
 SET DB_CREATE_FILE_DEST '/u01/app/oracle/oradata'
 SET DB_RECOVERY_FILE_DEST '/u01/app/oracle/fra/oradb2'
 SET DB_RECOVERY_FILE_DEST_SIZE '42949672960'
 SET AUDIT_FILE_DEST '/u01/app/oracle/audit'
 SET PGA_AGGREGATE_TARGET '210m'
 SET SGA_TARGET '900m';
}

exit
```

Note: If the duplicate fails. Restore `srv1` from it's the snapshot created in the previous practice section, resolve the root cause, and try the duplicate again.

16. Verify that the databases are up and running.

```
# you should see two pmon processes
ps -ef | grep pmon

export ORACLE_SID=oradb2
sqlplus / as sysdba
ALTER SESSION SET CONTAINER=PDB1;
SELECT COUNT(*) FROM SOE.ORDERS;
exit

export ORACLE_SID=oradb
sqlplus / as sysdba
ALTER SESSION SET CONTAINER=PDB1;
SELECT COUNT(*) FROM SOE.ORDERS;
```

Clean Up

17. Shutdown the appliance `srv1`.

18. Restore `srv1` from the snapshot "**Auxiliary Database Prepared**".

D. Performing Database Duplication from Backup Files with a Target Connection

In this section of the practice, you will duplicate `oradb` from backup files with connection to the target database.

19. Start Putty and connect to `srv1` as `oracle`.

20. Invoke RMAN with connecting to the source database (`oradb`) and the auxiliary database (`oradb2`).

```
rman TARGET sys/ABcd##1234@oradb AUXILIARY sys/ABcd##1234@oradb2
```

21. Perform the database duplication from the backup files.

The only difference between this command and the command that you used in the previous section is that the clause "`FROM ACTIVE DATABASE`" is omitted.

RMAN uses the backup files to restore the auxiliary database and it obtains their names and locations from the source database control file.

```
run {
DUPLICATE DATABASE TO oradb2
  SPFILE
SET CONTROL_FILES
'/u01/app/oracle/oradata/oradb2/datafile/control1.ctl','/u01/app/oracle/fra/oradb2/contro
l2.ctl'
 SET DB_CREATE_FILE_DEST '/u01/app/oracle/oradata'
 SET DB_RECOVERY_FILE_DEST '/u01/app/oracle/fra/oradb2'
 SET DB_RECOVERY_FILE_DEST_SIZE '42949672960'
 SET AUDIT_FILE_DEST '/u01/app/oracle/audit'
 SET PGA_AGGREGATE_TARGET '210m'
 SET SGA_TARGET '900m';
}

exit
```

22. Verify that the databases are up and running.

```
ps -ef | grep pmon

set ORACLE_SID=oradb2
sqlplus / as sysdba
ALTER SESSION SET CONTAINER=PDB1;
STARTUP
SELECT COUNT(*) FROM SOE.ORDERS;
```

Clean Up

23. Shutdown the appliance `srv1`.

24. Restore `srv1` from the snapshot "**Auxiliary Database Prepared**".

E. Performing Database Duplication from Backup Files without Connection to the Target nor to a Recovery Catalog

In this section of the practice, you will duplicate `oradb` from backup files without connecting to the target database and without connecting to a recovery catalog database.

25. Start Putty and connect to `srv1` as `oracle`.

26. Invoke RMAN with connecting only to the auxiliary database (`oradb2`).

```
rman AUXILIARY sys/ABcd##1234@oradb2
```

27. Perform the database duplication from the backup files.

Because RMAN is not connected to the target database nor to the recovery catalog, you have to specify the backup files location, using the clause `BACKUP LOCATION`. It should come after the `SET` commands.

```
run
{
DUPLICATE DATABASE TO oradb2
  SPFILE
SET CONTROL_FILES
'/u01/app/oracle/oradata/oradb2/datafile/control1.ctl','/u01/app/oracle/fra/oradb2/contro
l2.ctl'
 SET DB_CREATE_FILE_DEST '/u01/app/oracle/oradata'
 SET DB_RECOVERY_FILE_DEST '/u01/app/oracle/fra/oradb2'
 SET DB_RECOVERY_FILE_DEST_SIZE '42949672960'
 SET AUDIT_FILE_DEST '/u01/app/oracle/audit'
 SET PGA_AGGREGATE_TARGET '210m'
 SET SGA_TARGET '900m'
BACKUP LOCATION '/media/sf_staging/backup';
}

exit
```

28. Verify that the databases are up and running.

```
ps -ef | grep pmon

set ORACLE_SID=oradb2
sqlplus / as sysdba
ALTER SESSION SET CONTAINER=PDB1;
SELECT COUNT(*) FROM SOE.ORDERS;
```

Clean Up

29. Shutdown the appliance `srv1`.

30. Restore `srv1` from the snapshot "**Auxiliary Database Prepared**".

F. Performing Active PDB Duplication

In this section of the practice, you will duplicate `pdb1` in `oradb` online by connecting to the target database.

31. Start Putty and connect to `srv1` as `oracle`.

32. Invoke RMAN with connecting to the source database (`oradb`) and the auxiliary database (`oradb2`).

```
rman TARGET sys/ABcd##1234@oradb AUXILIARY sys/ABcd##1234@oradb2
```

33. Perform the active database duplication.

This is the same statement that you executed to implement active database duplication except that it has the option `PLUGGABLE DATABASE` to specify which PDBs we want to duplicate in the new instance.

```
run
{
 DUPLICATE DATABASE TO oradb2
 PLUGGABLE DATABASE pdb1
  FROM ACTIVE DATABASE
  SPFILE
 SET CONTROL_FILES
'/u01/app/oracle/oradata/oradb2/datafile/control1.ctl','/u01/app/oracle/fra/oradb2/contro
l2.ctl'
 SET DB_CREATE_FILE_DEST '/u01/app/oracle/oradata'
 SET DB_RECOVERY_FILE_DEST '/u01/app/oracle/fra/oradb2'
 SET DB_RECOVERY_FILE_DEST_SIZE '42949672960'
 SET AUDIT_FILE_DEST '/u01/app/oracle/audit'
 SET PGA_AGGREGATE_TARGET '210m'
 SET SGA_TARGET '900m';
}
```

34. Verify that the databases are up and running.

```
ps -ef | grep pmon

set ORACLE_SID=oradb2
sqlplus / as sysdba
ALTER SESSION SET CONTAINER=PDB1;
SELECT COUNT(*) FROM SOE.ORDERS;
```

Clean Up

35. Shutdown `srv1`

36. Delete the snapshot "Auxiliary Database Prepared".

37. Restore `srv1` from the snapshot "**oradb cdb database**".

38. Delete the backup files in the shared folder.

Summary

RMAN provides options in its `DUPLICATE` command to perform the following:

- Active database duplication
- Database duplication from backup files with a target connection
- Database duplication from backup files without connection to the target nor to a recovery catalog
- Active PDB duplication