Using RMAN in Oracle Multitenant Databases

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Objectives

In this lecture, you will learn how to perform the following:

- Describe the difference between performing backup and recovery in a CDB and a non-CDB
- Use RMAN to take backup of a CDB or a PDB
- Use RMAN to perform a complete recovery in a CDB and in a PDB
- Use RMAN to perform an incomplete recovery in a CDB and in a PDB
- Use LIST and REPORT commands in a multitenant database

About Backing up a CDB

- Same RMAN commands for taking backup of a non-CDB apply in taking backup of the CDB.
- Backup of the ROOT and all the PDBs will be taken.
- The procedure to enable the ARCHIVELOG mode did not change

Taking CDB Backup Example

```
run
{
  BACKUP AS BACKUPSET
   FORMAT '/backups/cdb%U' DATABASE TAG='FULLCDB';
  BACKUP AS BACKUPSET
   FORMAT '/backups/arc%U' ARCHIVELOG ALL TAG='FULLCDB';
  BACKUP FORMAT '/backups/c%U' CURRENT CONTROLFILE
TAG='FULLCDB';
}
```

Taking Backups of the PDBs

- You can connect to the root and take backup of specific PDB

```
BACKUP AS BACKUPSET PLUGGABLE DATABASE pdb1, pdb2;
BACKUP AS COPY PLUGGABLE DATABASE pdb1, pdb2;
BACKUP COPIES 2 PLUGGABLE DATABASE pdb1 FORMAT '..','..';
```

- Connect to the PDB and perform normal RMAN backups

```
rman target "'pdb1admin/ABcd##1234@PDB1 AS SYSBACKUP'"
BACKUP DATABASE;
```

- List backup of PDBs

```
LIST BACKUPSET OF PLUGGABLE DATABASE pdb1;
LIST COPY OF PLUGGABLE DATABASE pdb1;
```

Restrictions When Connected to a PDB

In RMAN, when connected to PDB as target:

- You cannot back up, restore, or delete archived logs
- You cannot update the default RMAN configuration

Taking Backup of Tablespaces

- Taking backup of a tablespace in the connected container:

```
BACKUP TABLESPACE users;
```

- Taking backup of a tablespace in a specific container:

```
BACKUP TABLESPACE pdb1:users;
```

- Taking backup of both:

```
BACKUP TABLESPACE users, pdb1:users;
```

Performing a Complete CDB Recovery

- Similar non-CDB recovery procedure

```
RMAN> STARTUP MOUNT
RMAN> RESTORE DATABASE;
RMAN> RECOVER DATABASE;
RMAN> ALTER DATABASE OPEN;
RMAN> ALTER PLUGGABLE DATABASE ALL OPEN;
```

Performing a Complete Recovery of CDB$ROOT

- If only **CDB$ROOT** needs to restore:

```
RMAN> STARTUP MOUNT
RMAN> RESTORE DATABASE "CDB$ROOT";
RMAN> RECOVER DATABASE "CDB$ROOT";
RMAN> ALTER DATABASE OPEN;
RMAN> ALTER PLUGGABLE DATABASE ALL OPEN;
```

- **RESTORE DATABASE ROOT** is acceptable.
- Recovering all the PDBs is recommended

Performing a Complete PDB Recovery

- When connected to the root:

```
RMAN> ALTER PLUGGABLE DATABASE pdb1 CLOSE;
RMAN> RESTORE PLUGGABLE DATABASE pdb1;
RMAN> RECOVER PLUGGABLE DATABASE pdb1;
RMAN> ALTER PLUGGABLE DATABASE pdb1 OPEN;
```

Recover from a Lost PDB Non-system Datafile

- If connected to a PDB:

```
RMAN> CONNECT TARGET sys@pdb1
RMAN> ALTER DATABASE DATAFILE 5 OFFLINE
RMAN> RESTORE  DATAFILE 5;
RMAN> RECOVER  DATAFILE 5;
RMAN> ALTER DATABASE DATAFILE 5  ONLINE;
```

- Alternative solutions: recover the entire PDB, recover the tablespace, recover the CDB

Performing a Complete Recovery of the Seed PDB

- If one or more seed files are lost:

```
RMAN> ALTER PLUGGABLE DATABASE "PDB$SEED" CLOSE;
RMAN> RESTORE PLUGGABLE DATABASE "PDB$SEED";
RMAN> RECOVER PLUGGABLE DATABASE "PDB$SEED";
RMAN> ALTER PLUGGABLE DATABASE "PDB$SEED" OPEN READ ONLY;
```

About Incomplete Recoveries (PITR) of PDBs

- Auxiliary instance is used
  - By default, its datafiles are created in FRA. Otherwise, define their location in **`RECOVER`** command.
- When PITR is performed on a PDB, the other PDBs are not impacted

Performing Incomplete Recoveries (PITR) of PDBs

```
ALTER PLUGGABLE DATABASE pdb1 CLOSE;
RESTORE PLUGGABLE DATABASE pdb1 UNTIL TIME
"TO_DATE('2022:10:01:07:00:00','yyyy:mm:dd:hh24:mi:ss')";
RECOVER PLUGGABLE DATABASE pdb1 UNTIL TIME " ... "
AUXILIARY DESTINATION '/u01/disk1';
ALTER PLUGGABLE DATABASE pdb1 OPEN RESETLOGS;
```

```
run {
 SET UNTIL TIME
"TO_DATE('2022:10:01:07:00:00','yyyy:mm:dd:hh24:mi:ss')"
 ALTER PLUGGABLE DATABASE pdb1 CLOSE;
 RESTORE PLUGGABLE DATABASE pdb1 ;
 RECOVER PLUGGABLE DATABASE pdb1 AUXILIARY DESTINATION
'/u01/disk1';
 ALTER PLUGGABLE DATABASE pdb1 OPEN RESETLOGS; }
```

RMAN Reporting in CDBs and PDBs

- **Reporting in CDBs:**
  - Same steps as in a non-CDB
  - You must connect to the root as a common user with the common **`SYSBACKUP`** or common **`SYSDBA`** privilege
- **Reporting in PDBs:**
  - When connected to the root:

```
LIST BACKUP OF PLUGGABLE DATABASE pdb1;
```

  - When connected to the PDB:

```
LIST BACKUP OF DATABASE;
```

Summary

In this lecture, you should have learnt how to perform the following:

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- Use LIST and REPORT commands in a multitenant database