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Performing Complete Recovery

Objectives

After completing this lesson, you should be able to:

- Perform the appropriate type of restore and recovery operation based on the nature of your database failure
- Recover from media failures in data files
- Perform complete recovery

Ensuring Backups Are Available

RMAN Command	Action
RESTORE PREVIEW	RMAN reports the backups and archived redo log files that RMAN uses to restore and recover the database to the specified time.
RESTORE VALIDATE	RMAN determines which backup sets, data file copies, and archived redo log files need to be restored and then validates them.
RECOVER VALIDATE HEADER	Reports and validates the backups that RMAN could use to restore files needed for the recovery

Restoring in NOARCHIVELOG Mode

If the database is in NOARCHIVELOG mode and if any data file is lost, perform the following tasks:

1. Shut down the instance if it is not already down.
2. Restore the entire database, including all data and control files from a backup.
3. Start the instance and open the database (CDB and all PDBs).
4. Inform users that they must reenter all changes that were made since the last backup.

If the database is in NOARCHIVELOG mode and an incremental backup strategy is implemented, RMAN restores the most recent level 0 backup and then RMAN recovery applies the incremental backups.

Recovery with Incremental Backups in NOARCHIVELOG Mode

Use incremental backups to perform limited recovery of a database in NOARCHIVELOG mode.

```
STARTUP FORCE NOMOUNT;
RESTORE CONTROLFILE;
ALTER DATABASE MOUNT;
RESTORE DATABASE;
RECOVER DATABASE NOREDO;
ALTER DATABASE OPEN RESETLOGS;
```


Performing Complete Recovery

Loss of a noncritical data file in ARCHIVELOG mode:

- If a data file is lost or corrupted, and if that file does not belong to the SYSTEM or UNDO tablespace, you restore and recover the missing data file while the database is open.
- Recovery is possible up to the time of the last commit, and users are not required to reenter any data.

Performing Complete Recovery

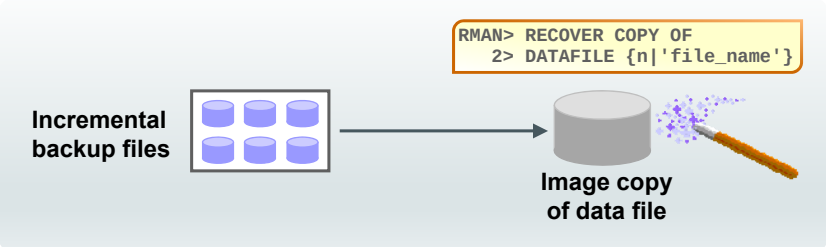
Loss of a critical data file in ARCHIVELOG mode:

1. The instance may or may not shut down automatically. If it does not, use SHUTDOWN ABORT to bring the instance down.
2. Mount the database.
3. Restore and recover the missing data file.
4. Open the database.

Review: Recovering Image Copies

RMAN can recover image copies by using incremental backups:

- Image copies are updated with all changes up to the incremental backup SCN.
- Incremental backup reduces the time required for media recovery.
- There is no need to perform an image copy after the incremental restoration.



Recovering Image Copies: Example

If you run these commands daily:

```
RMAN> recover copy of database with tag 'daily_inc';
RMAN> backup incremental level 1 for recover of copy
   2> with tag 'daily_inc' database;
```

This is the result:

	RECOVER	BACKUP
Day 1	Nothing	Create image copies
Day 2	Nothing	Create incremental level 1
Day 3 and onward	Recover copies based on incremental	Create incremental level 1

Performing a Fast Switch to Image Copies

Perform fast recovery by performing the following steps:

1. Take data files offline.
2. Use the `SWITCH TO ... COPY` command to switch to image copies.
3. Recover data files.
4. Bring data files online.

Now the data files are recovered and usable in their new location.

Optionally, do the following to put the files back into their original location:

5. Create an image copy of the data file in the original location.
6. Take data files offline.
7. `SWITCH TO ... COPY`
8. Recover data files.
9. Bring data files online.

```
SQL> SWITCH DATAFILE 'filename' TO COPY;
```

Using SET NEWNAME for Switching Files

- Use the SET NEWNAME command in a RUN block to restore to a nondefault location.

```
RUN
{ ALLOCATE CHANNEL dev1 DEVICE TYPE DISK;
  ALLOCATE CHANNEL dev2 DEVICE TYPE sbt;
  SQL "ALTER TABLESPACE users OFFLINE IMMEDIATE";
  SET NEWNAME FOR DATAFILE '/disk1/oradata/prod/users01.dbf'
                        TO '/disk2/users01.dbf';
  RESTORE TABLESPACE users;
  SWITCH DATAFILE ALL;
  RECOVER TABLESPACE users;
  SQL "ALTER TABLESPACE users ONLINE";
}
```

- Instead of individual names, specify a default name format for all files in a database or in a named tablespace.
- The default name is used for DUPLICATE, RESTORE, and SWITCH commands in the RUN block.

Using Restore Points

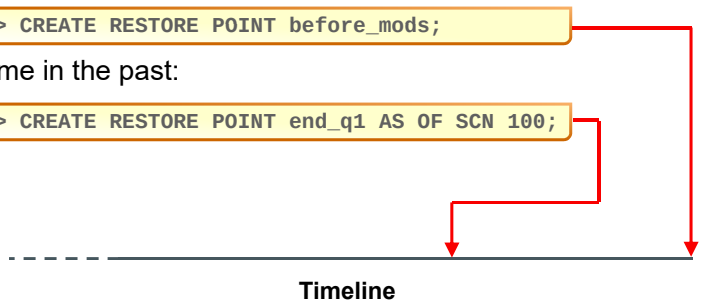
A restore point provides a name to a point in time:

- Now:

```
SQL> CREATE RESTORE POINT before_mods;
```

- Some time in the past:

```
SQL> CREATE RESTORE POINT end_q1 AS OF SCN 100;
```



PDB Tempfile Recovery

- SQL statements that require temporary space to execute may fail if one of the tempfiles is missing.

```
SQL> CONNECT local_user@HR_PDB
SQL> select * from my_table order by 1,2,3,4,5,6,7,8,9,10,11,12,13;
select * from my_table order by 1,2,3,4,5,6,7,8,9,10,11,12,13
              *
ERROR at line 1:
ORA-01565: error in identifying file
'/u01/app/oracle/oradata/CDB1/HR_PDB/temp2_01.dbf'
ORA-27037: unable to obtain file status
Linux Error: 2: No such file or directory
```

- Temporary files are automatically re-created at PDB startup.
- Manual re-creation is also possible.

PDB SYSTEM or UNDO Tablespace Recovery

- The CDB and all other PDBs can be left open.
- Perform these steps:
  1. Connect to the PDB.
  2. Shut down the PDB with the ABORT option if it is not automatically done.

```
$ sqlplus sys@sales_pdb as sysdba
SQL> SHUTDOWN ABORT
```

```
SQL> ALTER PLUGGABLE DATABASE CLOSE ABORT;
```

  3. Restore and recover the PDB or the missing tablespace or the damaged datafile.

```
$ rman target sys@sales_pdb
RMAN> RESTORE DATABASE;
RMAN> RECOVER DATABASE;
RMAN> ALTER PLUGGABLE DATABASE sales_pdb OPEN;
```

PDB Non-SYSTEM Tablespace Recovery

- It is similar to recovery in non-CDBs.
- Perform the recovery within the PDB.
  1. Connect to the PDB.
  2. Take the tablespace offline.
- Other PDBs are not impacted.
- You can also use the REPAIR command.

```
SQL> CONNECT system@sales_pdb
SQL> ALTER TABLESPACE tbs2 OFFLINE IMMEDIATE;
RMAN> CONNECT TARGET /
RMAN> RESTORE TABLESPACE sales_pdb:tbs2;
RMAN> RECOVER TABLESPACE sales_pdb:tbs2;

SQL> ALTER TABLESPACE tbs2 ONLINE;
```


Summary

In this lesson, you should have learned how to:

- Perform the appropriate type of restore and recovery operation based on the nature of your database failure
- Recover from media failures in data files
- Perform complete recovery

Practice Overview

- Recovering from the Loss of a System-Critical Data File
- Recovering from the Loss of an Application Data File