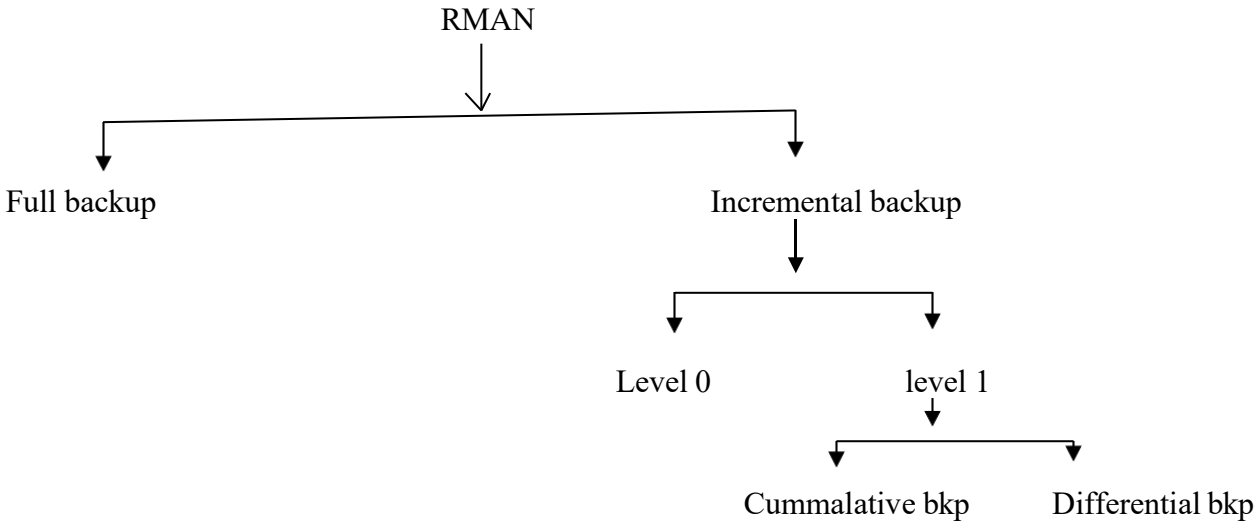
RMAN (RWECOVERY MANAGER)

RMAN (Recovery Manager) is a utility used for backup and recovery in Oracle. It allows you to back up the entire database, including critical physical files such as **control files, datafiles, and redo log files**, to protect the database in case of a crash or system failure.



It is introduced from oracle 8i

1) Full backup → Entire database backup
   Cannot apply Incremental backup on full db backup
2) Incremental backup → level 0 -full db backup
   Level 1- backup changes only last incremental level 1

Features of RMAN

1 . Supports full, incremental, and differential backups.

2. RMAN is faster because it perform block level bkp means Captures only changed blocks since the last backup

3. Uses parallelism to improve performance.

4. Block-Level Corruption Detection Detects corrupted blocks during backup and recovery. Can skip corrupted blocks or attempt to repair them.

5. Automated Backup Scheduling

6. validating backup (last backup ihave taken .can I recover my db or not)

7. Can perform complete and point-in-time recovery.

8. Supports backup encryption for security.

9. Recovery catalog.

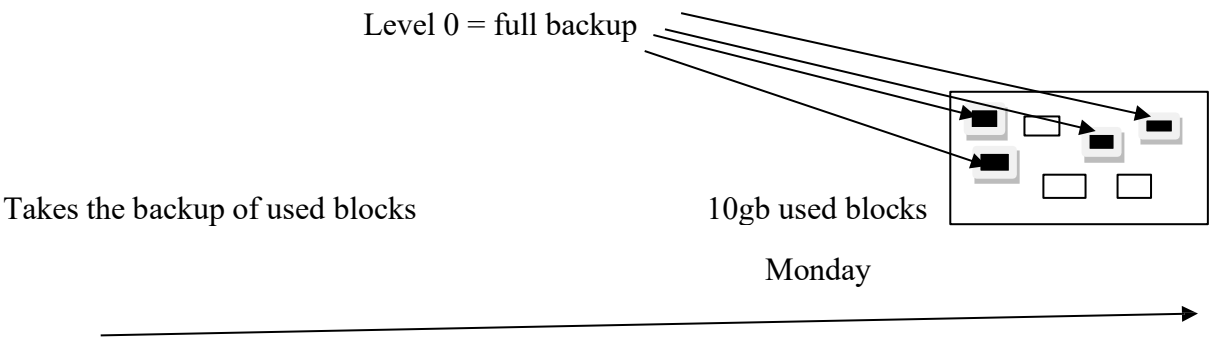
Key Features of RMAN:

1. **Backup Management:**
   - Supports full, incremental, and differential backups.

- Can back up the entire database, tablespaces, datafiles, control files, and archived redo logs.
- Uses block-level backup, making it faster and space-efficient.

2. **Recovery Operations:**
   - Can perform complete and point-in-time recovery.
   - Supports recovery from data loss, corruption, and system crashes.
   - Can restore specific tablespaces or datafiles instead of the entire database.
3. **Automated Backup Handling:**
   - Manages backup retention policies.
   - Deletes obsolete backups automatically.
   - Integrates with Oracle Enterprise Manager for centralized management.
4. **Block-Level Corruption Detection:**
   - Identifies and skips corrupted blocks during backup and restore.
   - Provides automatic validation and integrity checking.
5. **Incremental Backups:**
   - Copies only the changed blocks, reducing backup time and storage needs.
6. **Encrypted and Compressed Backups:**
   - Supports backup encryption for security.
   - Reduces storage space through backup compression.
7. **Integration with Oracle Data Guard:**
   - Works with Data Guard for disaster recovery and high availability.

Incremental backups



Level 1 =takes the backup only changed blocks from last bkp

1gb= changed blocks

Tuesday

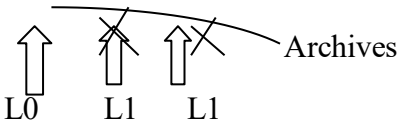
Total =11 gb in two days

** What is the different between Full backup and level 0 backup

When we are taking full backup trying to recover only applying archives .

If taking level 0 backup .no need apply archives .ican apply level 1 bkp fro recovery the db

We have another method we don't want apply level 1 bkp .we can apply archives also to recover the db



SUN	MON	TUES	WED	THU	FRI	SAT
L0	L1	L1				

- Every sunday takes Lo backup
- if wednes do is crashed
- restose from level 0 and recover, from 11, 11
- There is also failed: to restore L0, recover 11, 11, →apply archives

- Restore - Leve 0
- Recover-Level 1
- whith out level 0 we can't perform level 1 whitout restore we can't recover.

- when you try take level 1 blkup, RMAN checks you have level 0 backup or not. if not it well take level 0 backup

Examples:

STEP 1 :Connect to RMAN

```
[oracle@oracle ~]$ rman target /

Recovery Manager: Release 19.0.0.0.0 - Production on Fri Feb 7 06:28:40 2025
Version 19.3.0.0.0

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connected to target database: ORCL (DBID=1715186164)

RMAN>
```

STEP 2: RMAN configuration items (rman parameters)

RMAN> show all;

1. **CONFIGURE RETENTION POLICY TO REDUNDANCY 1**
   - Keeps only one backup; older backups are deleted.
2. **CONFIGURE BACKUP OPTIMIZATION OFF**
   - Takes backups even if identical backups exist.
3. **CONFIGURE DEFAULT DEVICE TYPE TO DISK**
   - Stores backups on disk (not tape).
4. **CONFIGURE CONTROLFILE AUTOBACKUP ON**
   - Automatically backs up control files and SPFILE after backup operations.
5. **CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%F'**
   - Sets a default filename format for control file backups.
6. **CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO BACKUPSET**
   - Uses **1** channel for backups (single process).
   - Uses **Backup Set** format (default RMAN backup format).
7. **CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1**
   - Saves only **one** copy of each datafile backup.
8. **CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE DISK TO 1**
   - Saves only **one** copy of each archived redo log backup.
9. **CONFIGURE MAXSETSIZE TO UNLIMITED**
   - No size limit on backup sets.
10. **CONFIGURE ENCRYPTION FOR DATABASE OFF**

- No encryption is applied to backups.

11. **CONFIGURE ENCRYPTION ALGORITHM 'AES128'**

- If encryption is enabled, it will use **AES 128-bit** encryption.

12. **CONFIGURE COMPRESSION ALGORITHM 'BASIC' AS OF RELEASE 'DEFAULT' OPTIMIZE FOR LOAD TRUE**

- Uses **Basic** compression for backups (reduces size).
- Default compression version is used.
- **Optimize for load** improves performance.

13. **CONFIGURE RMAN OUTPUT TO KEEP FOR 7 DAYS**

- RMAN logs (output) are kept for **7 days**.

14. **CONFIGURE ARCHIVELOG DELETION POLICY TO NONE**

- Does **not** delete archived logs automatically.

15. **CONFIGURE SNAPSHOT CONTROLFILE NAME TO '/u01/app/oracle/product/19c/dbhome1/dbs/snapcf_orcl.f'**

- Defines the location of the **snapshot control file** (used during backups).

STEP 3: RMAN automatically backup its backup files into FRA location

/u01/app/oracle/fast_recovery_area/ORCL/autobackup

Configuring a Custom Backup Location

```
[root@oracle ~]# mkdir -p /u02/rman_bkp
[root@oracle ~]# chown -R oracle:oinstall /u02/rman_bkp
[root@oracle ~]# chmod -R 775 /u02/rman_bkp
[root@oracle ~]#
```

STEP 4: CONFIGURE DEFAULT DEVICE TYPE TO DISK

Change this parameter to configure own location

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE DISK FORMAT '/u02/rman_bkp/%U.bkp';

new RMAN configuration parameters:
CONFIGURE CHANNEL DEVICE TYPE DISK FORMAT   '/u02/rman_bkp/%U.bkp';
new RMAN configuration parameters are successfully stored
released channel: ORA_DISK_1
```

Now check spfile backup to store we mention location or not

It is stored mentioned location only

```
RMAN> backup spfile;

Starting backup at 07-FEB-25
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=36 device type=DISK
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current SPFILE in backup set
channel ORA_DISK_1: starting piece 1 at 07-FEB-25
channel ORA_DISK_1: finished piece 1 at 07-FEB-25
piece handle=/u02/rman_bkp/0j3h6c81_1_1.bkp tag=TAG20250207T092104 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 07-FEB-25
```

Resetting to Default Location

RMAN> CONFIGURE CHANNEL DEVICE TYPE DISK CLEAR;

STEP 5: CONFIGURE CONTROLFILE AUTOBACKUP OFF;

Parameter OFF means Its not automatically every backup of control file and spfile.

```
RMAN> CONFIGURE CONTROLFILE AUTOBACKUP OFF;

new RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP OFF;
new RMAN configuration parameters are successfully stored
```

STEP 6: I kept ON because iwant every time while taking backup ,control file and spfile also backup

```
RMAN> CONFIGURE CONTROLFILE AUTOBACKUP ON;

old RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP OFF;
new RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP ON;
new RMAN configuration parameters are successfully stored

RMAN>
```

STEP 7: Iwant to autobackup of control file and spfile in my own location
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%F';

```
RMAN> CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u02/rman_bkp/%F';

new RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u02/rman_bkp/%F';
new RMAN configuration parameters are successfully stored

RMAN> SHOW CONTROLFILE AUTOBACKUP FORMAT;

RMAN configuration parameters for database with db_unique_name ORCL are:
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u02/rman_bkp/%F';
```

STEP 8: verify automatically backup into given location;
Yes it is automatically backup in to given location

```
RMAN> backup current controlfile;

Starting backup at 07-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current control file in backup set
channel ORA_DISK_1: starting piece 1 at 07-FEB-25
channel ORA_DISK_1: finished piece 1 at 07-FEB-25
piece handle=/u02/rman_bkp/0l3h6dd0_1_1.bkp tag=TAG20250207T094048 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 07-FEB-25

Starting Control File and SPFILE Autobackup at 07-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250207-02 comment=NONE
Finished Control File and SPFILE Autobackup at 07-FEB-25
```

If you want to **restore the default** location (Flash Recovery Area):

RMAN> CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK CLEAR;

STEP 9: Storing Backups in Multiple Locations
If you want **two copies** of each backup in different locations:

CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 1; # default

```
RMAN> CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 2;

new RMAN configuration parameters:
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 2;
new RMAN configuration parameters are successfully stored

RMAN> show DATAFILE BACKUP COPIES;

RMAN configuration parameters for database with db_unique_name ORCL are:
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 2;
```

Ex: RMAN> BACKUP DATABASE FORMAT '/backup1/db_%U.bkp', '/backup2/db_%U.bkp';

Iwill store 2 location each one copy

STEP 10: This controls the number of channels used by RMAN for each **backup device type** (e.g., disk, tape).
CONFIGURE DEVICE TYPE DISK PARALLELISM 1 BACKUP TYPE TO BACKUPSET;

Example: If you want to use 4 parallel channels for disk backups:

```
RMAN> CONFIGURE DEVICE TYPE DISK PARALLELISM 4 BACKUP TYPE TO BACKUPSET;

new RMAN configuration parameters:
CONFIGURE DEVICE TYPE DISK PARALLELISM 4 BACKUP TYPE TO BACKUPSET;
new RMAN configuration parameters are successfully stored
released channel: ORA_DISK_1
```

STEP 11: Configuring RMAN Channel Parallelism

You can also configure the number of **channels** RMAN uses during specific backup operations. This can be done by specifying the **CHANNEL** parameter in your RMAN command.

Example:

To specify parallelism for a backup job using 4 channels:

RMAN> BACKUP DATABASE PARALLELISM 4;

STEP 12: Resetting Parallelism Configuration

If you want to **reset parallelism** for a device type to the default value, you can clear it:

RMAN> CONFIGURE DEVICE TYPE DISK PARALLELISM CLEAR;

STEP 13: CONFIGURE BACKUP OPTIMIZATION ON;

The `CONFIGURE BACKUP OPTIMIZATION ON;` command in RMAN enables a feature that helps to **optimize backups** by **avoiding redundant backups** of data files that have not changed since the last backup.

When backup optimization is enabled, RMAN will **skip** backing up data files that haven't changed and have already been backed up with a **valid backup**. This helps to reduce the amount of storage required for backups and improves backup performance.

```
RMAN> CONFIGURE BACKUP OPTIMIZATION ON;

new RMAN configuration parameters:
CONFIGURE BACKUP OPTIMIZATION ON;
new RMAN configuration parameters are successfully stored
```

NOTE: RMAN will restore all data files from the backup (including those skipped due to optimization) and apply the archive logs to recover the database to the point of failure.

WE completed 6 configurations real time

CONFIGURE BACKUP OPTIMIZATION ON;
CONFIGURE CONTROLFILE AUTOBACKUP ON;
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '/u02/rman_bkp/%F.bkp';
CONFIGURE DEVICE TYPE DISK PARALLELISM 4 BACKUP TYPE TO BACKUPSET;
CONFIGURE DATAFILE BACKUP COPIES FOR DEVICE TYPE DISK TO 2;
CONFIGURE CHANNEL DEVICE TYPE DISK FORMAT '/u02/rman_bkp/%U.bkp';

BACKUP SPFILE AND CONTROL FILE RECOVERY

```
RMAN> backup spfile;

Starting backup at 08-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current SPFILE in backup set
channel ORA_DISK_1: starting piece 1 at 08-FEB-25
channel ORA_DISK_1: finished piece 1 at 08-FEB-25
piece handle=/u02/rman_bkp/2t3h8sbj_1_1.bkp tag=TAG20250208T080819 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 08-FEB-25

Starting Control File and SPFILE Autobackup at 08-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250208-04.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 08-FEB-25
```

Backup control file

```
RMAN> backup current controlfile;

Starting backup at 08-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
including current control file in backup set
channel ORA_DISK_1: starting piece 1 at 08-FEB-25
channel ORA_DISK_1: finished piece 1 at 08-FEB-25
piece handle=/u02/rman_bkp/2v3h8sfa_1_1.bkp tag=TAG20250208T081017 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 08-FEB-25

Starting Control File and SPFILE Autobackup at 08-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250208-05.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 08-FEB-25
```

Ihave taken spfile and controlfile manually

Now recovery
First simulate old spfile and pfile

```
[oracle@oracle dbs]$ mv initorcl.ora initorcl.ora.bkp
[oracle@oracle dbs]$ mv spfileorcl.ora spfileorcl.ora.bkp
[oracle@oracle dbs]$
```

Connect and check

```
[oracle@oracle dbs]$ sqlplus / as sysdba

SQL*Plus: Release 19.0.0.0.0 - Production on Sat Feb 8 08:16:51 2025
Version 19.3.0.0.0

Copyright (c) 1982, 2019, Oracle.  All rights reserved.

Connected to an idle instance.

SQL> startup nomount
ORA-01078: failure in processing system parameters
LRM-00109: could not open parameter file '/u01/app/oracle/product/19c/dbhome1/dbs/initorcl.ora'
```

Now restore spfile and check

```
RMAN> startup nomount

startup failed: ORA-01078: failure in processing system parameters
LRM-00109: could not open parameter file '/u01/app/oracle/product/19c/dbhome1/dbs/initorcl.ora'

starting Oracle instance without parameter file for retrieval of spfile
Oracle instance started

Total System Global Area    1073737800 bytes

Fixed Size                     8904776 bytes
Variable Size                276824064 bytes
Database Buffers             784334848 bytes
Redo Buffers                   3674112 bytes

RMAN> restore spfile from '/u02/rman_bkp/2t3h8sbj_1_1.bkp';

Starting restore at 08-FEB-25
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=38 device type=DISK

channel ORA_DISK_1: restoring spfile from AUTOBACKUP /u02/rman_bkp/2t3h8sbj_1_1.bkp
channel ORA_DISK_1: SPFILE restore from AUTOBACKUP complete
Finished restore at 08-FEB-25
```

Now startup mount

```
SQL> startup nomount
ORACLE instance started.

Total System Global Area 1509945616 bytes
Fixed Size                  8896784 bytes
Variable Size            1124073472 bytes
Database Buffers          369098752 bytes
Redo Buffers                7876608 bytes
```

YES db is opened nomount state
Now recover control file

First remove current control file

```
[root@oracle ORCL]# rm -rf *.ctl
[root@oracle ORCL]# ll
total 2513536
-rw-r-----. 1 oracle oinstall   2170880 Feb  8 07:58 memorial_01.dbf
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 08:11 redo01.log
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 07:58 redo02.log
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 07:58 redo03.log
-rw-r-----. 1 oracle oinstall   6561792 Feb  8 07:58 sonata_tbs_01.dbf
-rw-r-----. 1 oracle oinstall 681582592 Feb  8 08:09 sysaux01.dbf
-rw-r-----. 1 oracle oinstall 964698112 Feb  8 08:09 system01.dbf
-rw-r-----. 1 oracle oinstall  20979712 Feb  8 07:59 temp01.dbf
-rw-r-----. 1 oracle oinstall 283123712 Feb  8 08:09 undotbs01.dbf
-rw-r-----. 1 oracle oinstall   5251072 Feb  8 07:58 users01.dbf
[root@oracle ORCL]# ll
```

Now try to connect DB mount state it shows error

```
SQL> alter database mount;
alter database mount
*
ERROR at line 1:
ORA-00205: error in identifying control file, check alert log for more info
```

NOW restor the control file

```
RMAN> restore controlfile from '/u02/rman_bkp/c-1715186164-20250208-05.bkp';

Starting restore at 08-FEB-25
using channel ORA_DISK_1

channel ORA_DISK_1: restoring control file
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
output file name=/u01/app/oracle/oradata/ORCL/control01.ctl
output file name=/u01/app/oracle/oradata/ORCL/control02.ctl
Finished restore at 08-FEB-25
```

Check restored or not

```
[root@oracle ORCL]# ll
total 2534496
-rw-r-----. 1 oracle oinstall  10731520 Feb  8 08:25 control01.ctl
-rw-r-----. 1 oracle oinstall  10731520 Feb  8 08:25 control02.ctl
-rw-r-----. 1 oracle oinstall   2170880 Feb  8 07:58 memorial_01.dbf
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 08:11 redo01.log
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 07:58 redo02.log
```

After try to connect db mount state

```
SQL> alter database mount;

Database altered.

SQL> select name,open_mode from v$database;

NAME      OPEN_MODE
--------- --------------------
ORCL      MOUNTED
```

Yes control file restored succusfully

```
RMAN> list backup of controlfile summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
91      B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T080820
92      B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T081017

RMAN> list backup of spfile summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
90      B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T080819
91      B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T080820
```

```
RMAN> recover database;

Starting recover at 08-FEB-25
Starting implicit crosscheck backup at 08-FEB-25
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=36 device type=DISK
Crosschecked 3 objects
Finished implicit crosscheck backup at 08-FEB-25

Starting implicit crosscheck copy at 08-FEB-25
using channel ORA_DISK_1
Finished implicit crosscheck copy at 08-FEB-25

searching for all files in the recovery area
cataloging files...
no files cataloged

using channel ORA_DISK_1

starting media recovery

archived log for thread 1 with sequence 1 is already on disk as file /u01/app/oracle/oradata/ORCL/redo01.log
archived log file name=/u01/app/oracle/oradata/ORCL/redo01.log thread=1 sequence=1
media recovery complete, elapsed time: 00:00:01
Finished recover at 08-FEB-25
```

```
SQL> alter database open resetlogs;

Database altered.
```

TAKING FULL BACKUP

Check one table

```
SQL> select * from sonata.regions;

 REGION_ID REGION_NAME
---------- -------------------------
         1 Europe
         2 Americas
         3 Asia
         4 Middle East and Africa
```

TAKE full db backup with archives

```
RMAN> backup database plus archivelog format '/u02/rman_bkp/%u';


Starting backup at 08-FEB-25
current log archived
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=63 device type=DISK
channel ORA_DISK_1: starting archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=2 RECID=29 STAMP=1192347701
input archived log thread=1 sequence=3 RECID=12 STAMP=1191800915
input archived log thread=1 sequence=4 RECID=13 STAMP=1191825022
input archived log thread=1 sequence=5 RECID=14 STAMP=1191830414
```

Check list backup database it shows level F means full db backup

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
```

Now failover the db .remove all datafiles

```
[oracle@oracle ORCL]$ rm -rf *.dbf
[oracle@oracle ORCL]$ ll
total 635372
-rw-r-----. 1 oracle oinstall  10731520 Feb  8 09:05 control01.ctl
-rw-r-----. 1 oracle oinstall  10731520 Feb  8 09:05 control02.ctl
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 08:59 redo01.log
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 09:00 redo02.log
-rw-r-----. 1 oracle oinstall 209715712 Feb  8 09:01 redo03.log
[oracle@oracle ORCL]$
```

Now recover

Shut abort

Startup mount

Rman target /

```
RMAN> restore database from tag=TAG20250208T090015;

Starting restore at 08-FEB-25
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=45 device type=DISK

channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00001 to /u01/app/oracle/oradata/ORCL/system01.dbf
channel ORA_DISK_1: restoring datafile 00002 to /u01/app/oracle/oradata/ORCL/memorial_01.dbf
channel ORA_DISK_1: restoring datafile 00003 to /u01/app/oracle/oradata/ORCL/sysaux01.dbf
channel ORA_DISK_1: restoring datafile 00004 to /u01/app/oracle/oradata/ORCL/undotbs01.dbf
channel ORA_DISK_1: restoring datafile 00005 to /u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
channel ORA_DISK_1: restoring datafile 00007 to /u01/app/oracle/oradata/ORCL/users01.dbf
channel ORA_DISK_1: reading from backup piece /u02/rman_bkp/3i3h8vd0_1_1.bkp
channel ORA_DISK_1: piece handle=/u02/rman_bkp/3i3h8vd0_1_1.bkp tag=TAG20250208T090015
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:07
Finished restore at 08-FEB-25

RMAN> recover database;

Starting recover at 08-FEB-25
using channel ORA_DISK_1

starting media recovery
media recovery complete, elapsed time: 00:00:00

Finished recover at 08-FEB-25
```

Restore and recovery completed now check the db opening or not and table also

```
SQL> startup mount
ORACLE instance started.

Total System Global Area 1509945616 bytes
Fixed Size                  8896784 bytes
Variable Size            1124073472 bytes
Database Buffers          369098752 bytes
Redo Buffers                7876608 bytes
Database mounted.
SQL> alter database open;

Database altered.

SQL> select name,open_mode from v$database;

NAME      OPEN_MODE
--------- --------------------
ORCL      READ WRITE

SQL> select * from sonata.regions;

 REGION_ID REGION_NAME
---------- -------------------------
         1 Europe
         2 Americas
         3 Asia
         4 Middle East and Africa
```

How to delete backup tag?

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
130     B  0  A DISK        08-FEB-25       1       1       NO         LEVEL0_BACKUP

RMAN> delete backup tag LEVEL0_BACKUP;

using channel ORA_DISK_1

List of Backup Pieces
BP Key  BS Key  Pc# Cp# Status      Device Type Piece Name
------- ------- --- --- ----------- ----------- ----------
133     130     1   1   AVAILABLE   DISK        /u02/rman_bkp/full_level0_473h92og_1_1.bkp

Do you really want to delete the above objects (enter YES or NO)? YES
deleted backup piece
backup piece handle=/u02/rman_bkp/full_level0_473h92og_1_1.bkp RECID=133 STAMP=1192528656
Deleted 1 objects
```

INCREMNATL BACKUP (LEVEL 0,1)

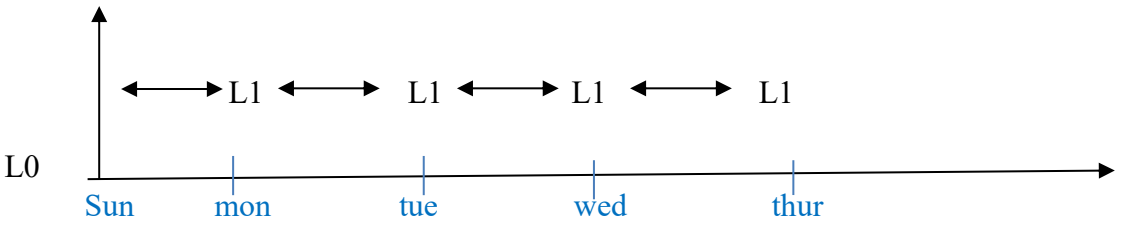
Level 0 Incremental Backup

- A full backup of the entire database (similar to a full backup but categorized as level 0).
- Used as the baseline for future incremental backups.

Level 1 Incremental Backup

- Backs up only the blocks that changed since the last level 0 or level 1 backup.
- Can be **differential** (changes since the last level 0) or **cumulative** (changes since the last level 0 backup).

1.DIFFRENTIAL (default) :backup changes from only last level 0 0r level 1 (changed blocks)



Taking level 0 backup

```
RMAN> BACKUP INCREMENTAL LEVEL 0 DATABASE FORMAT '/u02/rman_bkp/level0_%U.bkp' TAG 'LEVEL0_BEFORE_USER';

Starting backup at 09-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental level 0 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001 name=/u01/app/oracle/oradata/ORCL/system01.dbf
input datafile file number=00003 name=/u01/app/oracle/oradata/ORCL/sysaux01.dbf
input datafile file number=00004 name=/u01/app/oracle/oradata/ORCL/undotbs01.dbf
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
input datafile file number=00007 name=/u01/app/oracle/oradata/ORCL/users01.dbf
input datafile file number=00002 name=/u01/app/oracle/oradata/ORCL/memorial_01.dbf
channel ORA_DISK_1: starting piece 1 at 09-FEB-25
channel ORA_DISK_1: finished piece 1 at 09-FEB-25
piece handle=/u02/rman_bkp/level0_493hd7jd_1_1.bkp tag=LEVEL0_BEFORE_USER comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:07
Finished backup at 09-FEB-25

Starting Control File and SPFILE Autobackup at 09-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250209-00.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 09-FEB-25
```

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
132     B  0  A DISK        09-FEB-25       1       1       NO         LEVEL0_BEFORE_USER

RMAN>
```

Level 1 backup

CREATE USER AND TABLE

```
SQL> create user testuser identified by testuser;

User created.

SQL> GRANT CONNECT, RESOURCE TO testuser;

Grant succeeded.
```

Give all permissons to user

```
SQL> GRANT ALL PRIVILEGES TO testuser;

Grant succeeded.

SQL> connect testuser/testuser;
Connected.
SQL> create table testtable (id int,name varchar(10),salary number);

Table created.

SQL> insert into testtable values (1,'ritwik',2000);

1 row created.

SQL> insert into testtable values (2,'omkar',5000);

1 row created.

SQL> insert into testtable values (3,'methew',8000);

1 row created.

SQL> select * from testtable;

        ID NAME           SALARY
---------- ---------- ----------
         1 ritwik           2000
         2 omkar            5000
         3 methew           8000
```

Take Level 1 Incremental Backup:

After creating the user and table, take an **incremental level 1 backup** to capture these changes.

Run Level 1 Backup in RMAN

```
RMAN> BACKUP INCREMENTAL LEVEL 1 DATABASE TAG 'LEVEL1_AFTER_USER' FORMAT '/u02/rman_bkp/level1_%U.bkp';

Starting backup at 10-FEB-25
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=43 device type=DISK
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001 name=/u01/app/oracle/oradata/ORCL/system01.dbf
input datafile file number=00003 name=/u01/app/oracle/oradata/ORCL/sysaux01.dbf
input datafile file number=00004 name=/u01/app/oracle/oradata/ORCL/undotbs01.dbf
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
input datafile file number=00007 name=/u01/app/oracle/oradata/ORCL/users01.dbf
input datafile file number=00002 name=/u01/app/oracle/oradata/ORCL/memorial_01.dbf
channel ORA_DISK_1: starting piece 1 at 10-FEB-25
channel ORA_DISK_1: finished piece 1 at 10-FEB-25
piece handle=/u02/rman_bkp/level1_4b3hd8lp_1_1.bkp tag=LEVEL1_AFTER_USER comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:03
Finished backup at 10-FEB-25

Starting Control File and SPFILE Autobackup at 10-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250210-00.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 10-FEB-25
```

We have level 0 and level 1 backups now restore and recover

```
List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
132     B  0  A DISK        09-FEB-25       1       1       NO         LEVEL0_BEFORE_USER
134     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
```

This will store **only the changed blocks** (i.e., the new user and table).

Restore Level 0 Backup (Simulating Data Loss)

Restore from Level 0 Backup
This brings back the database **without** the new user and table (since they were created after this backup).

```
RMAN> RESTORE DATABASE FROM TAG=LEVEL0_BEFORE_USER;

Starting restore at 10-FEB-25
```

Recover Using Level 1 Backup

Now, apply the **level 1 incremental backup** to recover the user and table.

RECOVER DATABASE; (applying archives)

OR

RECOVER DATABASE FROM TAG=LEVEL1_AFTER_USER;

```
RMAN> RECOVER DATABASE FROM TAG=LEVEL1_AFTER_USER;

Starting recover at 10-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
destination for restore of datafile 00001: /u01/app/oracle/oradata/ORCL/system01.dbf
destination for restore of datafile 00002: /u01/app/oracle/oradata/ORCL/memorial_01.dbf
destination for restore of datafile 00003: /u01/app/oracle/oradata/ORCL/sysaux01.dbf
destination for restore of datafile 00004: /u01/app/oracle/oradata/ORCL/undotbs01.dbf
destination for restore of datafile 00005: /u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
destination for restore of datafile 00007: /u01/app/oracle/oradata/ORCL/users01.dbf
channel ORA_DISK_1: reading from backup piece /u02/rman_bkp/level1_4b3hd8lp_1_1.bkp
channel ORA_DISK_1: piece handle=/u02/rman_bkp/level1_4b3hd8lp_1_1.bkp tag=LEVEL1_AFTER_USE
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:03

starting media recovery
media recovery complete, elapsed time: 00:00:00

Finished recover at 10-FEB-25
```

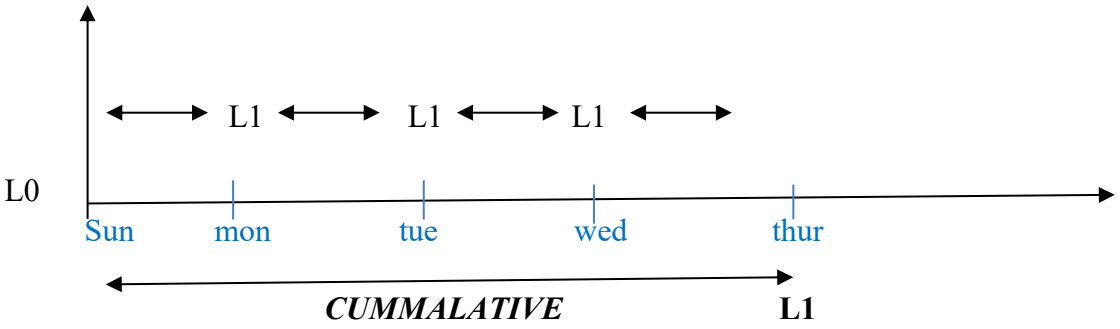
Open the Database
After recovery, open the database.

```
SQL> ALTER DATABASE OPEN;

Database altered.

SQL> select name,open_mode from v$database;

NAME      OPEN_MODE
--------- --------------------
ORCL      READ WRITE
```

Verify the User and Table

```
SQL> select * from testuser.testtable;

        ID NAME           SALARY
---------- ---------- ----------
         1 ritwik           2000
         2 omkar            5000
         3 methew           8000
```

1.CUMMALATIVE LEVEL 1 : Backup takes from level 0 (what are the changes since level 0)



TAKING AGAIN LEVEL 1 backup

I created user and table

```
SQL> create user testuser1 identified by testtabl2;
```

```
SQL> insert into testtable1 values (3,'raviteja',9000);

1 row created.

SQL> select * from testtable1;

        ID NAME           SALARY
---------- ---------- ----------
         1 mahesh           4000
         2 croyant          5000
         3 raviteja         9000
```

```
RMAN> BACKUP INCREMENTAL LEVEL 1 DATABASE TAG 'LEVEL1_AFTER_USER' FORMAT '/u02/rman_bkp/level1_%U.bkp';

Starting backup at 10-FEB-25
```

We have level 0 and level 1 ,level 1

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
132     B  0  A DISK        09-FEB-25       1       1       NO         LEVEL0_BEFORE_USER
134     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
136     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
```

TAKING CUMMALATIVE BACKUP :

```
RMAN> BACKUP INCREMENTAL LEVEL 1 CUMULATIVE DATABASE FORMAT '/u02/rman_bkp/level_cumulative.blp' TAG 'LEVEL1_CUMULATIVE_1';

Starting backup at 10-FEB-25
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=45 device type=DISK
channel ORA_DISK_1: starting incremental level 1 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00001 name=/u01/app/oracle/oradata/ORCL/system01.dbf
input datafile file number=00003 name=/u01/app/oracle/oradata/ORCL/sysaux01.dbf
input datafile file number=00004 name=/u01/app/oracle/oradata/ORCL/undotbs01.dbf
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
input datafile file number=00007 name=/u01/app/oracle/oradata/ORCL/users01.dbf
input datafile file number=00002 name=/u01/app/oracle/oradata/ORCL/memorial_01.dbf
channel ORA_DISK_1: starting piece 1 at 10-FEB-25
channel ORA_DISK_1: finished piece 1 at 10-FEB-25
piece handle=/u02/rman_bkp/level_cumulative.blp tag=LEVEL1_CUMULATIVE_1 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:03
Finished backup at 10-FEB-25

Starting Control File and SPFILE Autobackup at 10-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250210-02.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 10-FEB-25

RMAN> list backup of database summary;
```

Now we have level 0,level 1,level 1 and level 1 cummalative

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
132     B  0  A DISK        09-FEB-25       1       1       NO         LEVEL0_BEFORE_USER
134     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
136     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
138     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_CUMULATIVE_1
```

Now restore cummaltive level 1 backup

Shut abort
Startup mount
Rman target /

Restore database from level 0

```
RMAN> RESTORE DATABASE FROM TAG 'LEVEL0_BEFORE_USER';

Starting restore at 10-FEB-25
using channel ORA_DISK_1

channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00001 to /u01/app/oracle/oradata/ORCL/system01.dbf
channel ORA_DISK_1: restoring datafile 00002 to /u01/app/oracle/oradata/ORCL/memorial_01.dbf
channel ORA_DISK_1: restoring datafile 00003 to /u01/app/oracle/oradata/ORCL/sysaux01.dbf
channel ORA_DISK_1: restoring datafile 00004 to /u01/app/oracle/oradata/ORCL/undotbs01.dbf
channel ORA_DISK_1: restoring datafile 00005 to /u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
channel ORA_DISK_1: restoring datafile 00007 to /u01/app/oracle/oradata/ORCL/users01.dbf
channel ORA_DISK_1: reading from backup piece /u02/rman_bkp/level0_493hd7jd_1_1.bkp
channel ORA_DISK_1: piece handle=/u02/rman_bkp/level0_493hd7jd_1_1.bkp tag=LEVEL0_BEFORE_USER
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:07
Finished restore at 10-FEB-25
```

Recover database from level cummalative

```
RMAN> RECOVER DATABASE FROM TAG 'LEVEL1_CUMULATIVE_1';

Starting recover at 10-FEB-25
using channel ORA_DISK_1
channel ORA_DISK_1: starting incremental datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
destination for restore of datafile 00001: /u01/app/oracle/oradata/ORCL/system01.dbf
destination for restore of datafile 00002: /u01/app/oracle/oradata/ORCL/memorial_01.dbf
destination for restore of datafile 00003: /u01/app/oracle/oradata/ORCL/sysaux01.dbf
destination for restore of datafile 00004: /u01/app/oracle/oradata/ORCL/undotbs01.dbf
destination for restore of datafile 00005: /u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
destination for restore of datafile 00007: /u01/app/oracle/oradata/ORCL/users01.dbf
channel ORA_DISK_1: reading from backup piece /u02/rman_bkp/level_cumulative.blp
channel ORA_DISK_1: piece handle=/u02/rman_bkp/level_cumulative.blp tag=LEVEL1_CUMULATIVE_1
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:03

starting media recovery
media recovery complete, elapsed time: 00:00:00

Finished recover at 10-FEB-25
```

Now connect and check two tabes are there are not one table creted 1st level 1 and 2nd table created 2nd level 1 backup

```
SQL> alter database open;

Database altered.
```

```
SQL> select * from testuser.testtable;

        ID NAME           SALARY
---------- ---------- ----------
         1 ritwik           2000
         2 omkar            5000
         3 methew           8000

SQL> select * from testuser1.testtable1;

        ID NAME           SALARY
---------- ---------- ----------
         1 mahesh           4000
         2 croyant          5000
         3 raviteja         9000
```

We got two tables
Succuss full complted full backup ,level 0,level 1,level 1 cummalative.

DATAFILE RECOVERY

First check datafiles

```
SQL> SELECT FILE_ID, FILE_NAME, TABLESPACE_NAME FROM DBA_DATA_FILES;

FILE_ID FILE_NAME                      TABLESPACE_NAME
------- ------------------------------ ------------------------------
      1 /u01/app/oracle/oradata/ORCL/s SYSTEM
        ystem01.dbf

      3 /u01/app/oracle/oradata/ORCL/s SYSAUX
        ysaux01.dbf

      4 /u01/app/oracle/oradata/ORCL/u UNDOTBS1
        ndotbs01.dbf

      7 /u01/app/oracle/oradata/ORCL/u USERS
        sers01.dbf

      5 /u01/app/oracle/oradata/ORCL/s SONATA_TBS
        onata_tbs_o1.dbf

      2 /u01/app/oracle/oradata/ORCL/m MEMORIAL
        emorial_01.dbf
```

In sonata_tbs tablespace we have total 9 tables. Lets backup and simulate after recovery

```
SQL> select OWNER,TABLE_NAME,TABLESPACE_NAME from all_tables where OWNER='SONATA';

OWNER                TABLE_NAME                     TABLESPACE_NAME
-------------------- ------------------------------ ------------------------------
SONATA               DEPARTMENTS                    SONATA_TBS
SONATA               EMP                            SONATA_TBS
SONATA               EMPLOYEES                      SONATA_TBS
SONATA               JOB_HISTORY                    SONATA_TBS
SONATA               LOCATIONS                      SONATA_TBS
SONATA               REGIONS                        SONATA_TBS
SONATA               RUBI                           SONATA_TBS
SONATA               COUNTRIES
SONATA               JOBS                           SONATA_TBS

9 rows selected.
```

Backup datafile 5

```
RMAN> backup datafile 5;

Starting backup at 10-FEB-25
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=71 device type=DISK
channel ORA_DISK_1: starting full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00005 name=/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
channel ORA_DISK_1: starting piece 1 at 10-FEB-25
channel ORA_DISK_1: finished piece 1 at 10-FEB-25
piece handle=/u02/rman_bkp/4h3hdlfv_1_1.bkp tag=TAG20250210T034150 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
Finished backup at 10-FEB-25

Starting Control File and SPFILE Autobackup at 10-FEB-25
piece handle=/u02/rman_bkp/c-1715186164-20250210-03.bkp comment=NONE
Finished Control File and SPFILE Autobackup at 10-FEB-25
```

Check backup or not details

LIST BACKUP OF DATAFILE 5;

```
RMAN> list backup of database summary;


List of Backups
===============
Key     TY LV S Device Type Completion Time #Pieces #Copies Compressed Tag
------- -- -- - ----------- --------------- ------- ------- ---------- ---
109     B  F  A DISK        08-FEB-25       1       1       NO         TAG20250208T090015
132     B  0  A DISK        09-FEB-25       1       1       NO         LEVEL0_BEFORE_USER
134     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
136     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_AFTER_USER
138     B  1  A DISK        10-FEB-25       1       1       NO         LEVEL1_CUMULATIVE_1
140     B  F  A DISK        10-FEB-25       1       1       NO         TAG20250210T034150
```

Now failover the datafile or rename

```
[oracle@oracle ORCL]$ cd /u01/app/oracle/oradata/ORCL/
[oracle@oracle ORCL]$ ll
total 2565956
-rw-r-----. 1 oracle oinstall  11026432 Feb 10 04:05 control01.ctl
-rw-r-----. 1 oracle oinstall  11026432 Feb 10 04:05 control02.ctl
-rw-r-----. 1 oracle oinstall   2170880 Feb 10 04:05 memorial_01.dbf
-rw-r-----. 1 oracle oinstall 209715712 Feb 10 01:02 redo01.log
-rw-r-----. 1 oracle oinstall 209715712 Feb 10 01:02 redo02.log
-rw-r-----. 1 oracle oinstall 209715712 Feb 10 04:05 redo03.log
-rw-r-----. 1 oracle oinstall   6561792 Feb 10 04:05 sonata_tbs_o1.dbf
-rw-r-----. 1 oracle oinstall 713039872 Feb 10 04:05 sysaux01.dbf
-rw-r-----. 1 oracle oinstall 964698112 Feb 10 04:05 system01.dbf
-rw-r-----. 1 oracle oinstall  20979712 Feb 10 03:00 temp01.dbf
-rw-r-----. 1 oracle oinstall 283123712 Feb 10 04:05 undotbs01.dbf
-rw-r-----. 1 oracle oinstall   5251072 Feb 10 04:05 users01.dbf
[oracle@oracle ORCL]$ mv sonata_tbs_o1.dbf sonata_tbs_o1.dbf.backup
[oracle@oracle ORCL]$ ll
```

Database not yet starting because loss of datafile

```
SQL> startup
ORACLE instance started.

Total System Global Area 1509945616 bytes
Fixed Size                  8896784 bytes
Variable Size            1124073472 bytes
Database Buffers          369098752 bytes
Redo Buffers                7876608 bytes
Database mounted.
ORA-01157: cannot identify/lock data file 5 - see DBWR trace file
ORA-01110: data file 5: '/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf'
```

Now recover the loss of datafile.

Restore datafile 5

Or

Restore datafile 5 from tag =TAG;

0r

Restore datafile 5 from backup set 234;

```
RMAN> restore datafile 5;

Starting restore at 10-FEB-25
using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=45 device type=DISK

channel ORA_DISK_1: starting datafile backup set restore
channel ORA_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_DISK_1: restoring datafile 00005 to /u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf
channel ORA_DISK_1: reading from backup piece /u02/rman_bkp/4h3hdlfv_1_1.bkp
channel ORA_DISK_1: piece handle=/u02/rman_bkp/4h3hdlfv_1_1.bkp tag=TAG20250210T034150
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 10-FEB-25

RMAN> recover datafile 5;

Starting recover at 10-FEB-25
using channel ORA_DISK_1

starting media recovery
media recovery complete, elapsed time: 00:00:00

Finished recover at 10-FEB-25
```

Now open

```
Database mounted.
ORA-01157: cannot identify/lock data file 5 - see DBWR trace file
ORA-01110: data file 5: '/u01/app/oracle/oradata/ORCL/sonata_tbs_o1.dbf'


SQL> alter database open;

Database altered.

SQL> select name,open_mode from v$database;

NAME      OPEN_MODE
--------- --------------------
ORCL      READ WRITE
```

```
SQL> SELECT FILE_ID, FILE_NAME, TABLESPACE_NAME FROM DBA_DATA_FILES;

FILE_ID FILE_NAME                     TABLESPACE_NAME
------- ----------------------------- ------------------------------
      1 /u01/app/oracle/oradata/ORCL/s SYSTEM
        ystem01.dbf

      3 /u01/app/oracle/oradata/ORCL/s SYSAUX
        ysaux01.dbf

      4 /u01/app/oracle/oradata/ORCL/u UNDOTBS1
        ndotbs01.dbf

      7 /u01/app/oracle/oradata/ORCL/u USERS
        sers01.dbf

      5 /u01/app/oracle/oradata/ORCL/s SONATA_TBS
        onata_tbs_o1.dbf

      2 /u01/app/oracle/oradata/ORCL/m MEMORIAL
```

```
SQL> select OWNER,TABLE_NAME,TABLESPACE_NAME from all_tables where OWNER='SONATA';

OWNER                TABLE_NAME                     TABLESPACE_NAME
-------------------- ------------------------------ ------------------------------
SONATA               DEPARTMENTS                    SONATA_TBS
SONATA               EMP                            SONATA_TBS
SONATA               EMPLOYEES                      SONATA_TBS
SONATA               JOB_HISTORY                    SONATA_TBS
SONATA               LOCATIONS                      SONATA_TBS
SONATA               REGIONS                        SONATA_TBS
SONATA               RUBI                           SONATA_TBS
SONATA               COUNTRIES
SONATA               JOBS                           SONATA_TBS

9 rows selected.
```

→If you want take backup of tablespace

RMAN> backup tablespace USERS;

→To take incremental level 0 backup of tablespace
RMAN> backup incremental level 0 tablespace USERS;

→To take incremental level 1 backup of tablespace

RMAN> backup incremental level 1 tablespace USERS;

→To take incremental level 1 CUMMALATIVE backup of tablespace

RMAN> backup incremental level 1 cummalative tablespace USERS;

RECOVER

RMAN> ALTER DATABASE TABLESPACE USERS OFFLINE IMMEDIATE;

RMAN> RESTORE TABLESPACE USERS;

RMAN> RECOVER TABLESPACE USERS;

Bring the tablespace back online

RMAN> ALTER DATABASE TABLESPACE USERS ONLINE;

DATAFILE BACKUP AND RECOVERY INCREMENTAL

RMAN>BACKUP INCREMENTAL LEVEL 0 DATAFILE 5;
RMAN> BACKUP INCREMENTAL LEVEL 1 DATAFILE 5;
RMAN> BACKUP INCREMENTAL LEVEL 1 CUMMALATIVE DATAFILE 5;

ARCHIVE LOGS BACKUP AND RECOVERY

If you want take backup of all archives

RMAN>backup archivelog all;

To see the archive log backups
List backup of archivelog all;

To restore archive logs

Restore archivelog all;

CROSS CHECK COMMAND

Crosscheck command in Rman command to check backup piece is available at OS level .if it is is not available shows "EXPIRED"

```
RMAN> crosscheck backup;

using target database control file instead of recovery catalog
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=80 device type=DISK
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/u02/rman_bkp/2t3h8sbj_1_1.bkp RECID=93 STAMP=1192522099
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/u02/rman_bkp/c-1715186164-20250208-04.bkp RECID=94 STAMP=1192522100
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/u02/rman_bkp/2v3h8sfa_1_1.bkp RECID=95 STAMP=1192522219
crosschecked backup piece: found to be 'AVAILABLE'
```

Just now ideleted backup at os level that's why shows expired.

```
RMAN> crosscheck backup;

using channel ORA_DISK_1
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/u02/rman_bkp/2t3h8sbj_1_1.bkp RECID=93 STAMP=1192522099
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/u02/rman_bkp/c-1715186164-20250208-04.bkp RECID=94 STAMP=1192522100
```

How to see list of expired backup

```
RMAN> list expired backup;


List of Backup Sets
===================


BS Key  Type LV Size       Device Type Elapsed Time Completion Time
------- ---- -- ---------- ----------- ------------ ---------------
91      Full    10.23M     DISK        00:00:00     08-FEB-25
        BP Key: 94   Status: EXPIRED  Compressed: NO  Tag: TAG20250208T080820
        Piece Name: /u02/rman_bkp/c-1715186164-20250208-04.bkp
  SPFILE Included: Modification time: 08-FEB-25
  SPFILE db_unique_name: ORCL
  Control File Included: Ckp SCN: 3797278      Ckp time: 08-FEB-25
```

How to delete expired backup

```
RMAN> delete expired backup;

using channel ORA_DISK_1

List of Backup Pieces
BP Key  BS Key  Pc# Cp# Status      Device Type Piece Name
------- ------- --- --- ----------- ----------- ----------
94      91      1   1   EXPIRED     DISK        /u02/rman_bkp/c-1715186164-20250208-04.bkp

Do you really want to delete the above objects (enter YES or NO)? YES
deleted backup piece
backup piece handle=/u02/rman_bkp/c-1715186164-20250208-04.bkp RECID=94 STAMP=1192522100
Deleted 1 EXPIRED objects


RMAN> list expired backup;

specification does not match any backup in the repository
```

We can delete separate one expired backup piece also

RMAN> delete expired backup piece ‘mention location’;

When junior dba unexpectedly delete or move the backup file another location .

To overcome this problem .find that file again move that file into original backup location .then only it shows available

Instead of moving backup piece to its original backup location we have another way

Catalog backup piece:

We specify the current location as for backup location by using catalog backup piece command

RMAN> catalog backuppiece ‘new location’;

Now crosscheck command

RMAN> CROSSCHECK BACKUP;

It shows available

RMAN BACKUP AND RECOVERY COMPLETED