Session 17   OPEN (HOT) COMPLETE RECOVERY by RMAN
→ One of the NON-ESSENTIAL files is missing (corrupted)

```
The Oracle base remains unchanged with value /opt/oracle
[oracle@oracloud12c ~]$ sqlplus / as sysdba

SQL*Plus: Release 12.1.0.2.0 Production on Wed Apr 11 11:09:37 2018

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Connected to:
Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit
Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options

SQL> set pagesize 200
SQL> conn tom/cat
Connected.
```

← Let's create a table for Tom, add some rows – they will be stored in his default tbsp. MINE

```
SQL> CREATE TABLE play (a  DATE);

Table created.

SQL> INSERT INTO play VALUES (sysdate -7);

1 row created.

SQL> INSERT INTO play VALUES (sysdate - 3);

1 row created.

SQL> commit;

Commit complete.

SQL> SELECT * FROM tom.play;

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04-APR-18
08-APR-18

SQL> conn / as sysdba
Connected.

SQL> SELECT * FROM V$LOG;
```

```
     GROUP#    THREAD#  SEQUENCE#      BYTES  BLOCKSIZE    MEMBERS ARC
---------- ---------- ---------- ---------- ---------- ---------- ---
STATUS           FIRST_CHANGE# FIRST_TIM NEXT_CHANGE# NEXT_TIME
---------------- ------------- --------- ------------ --------- ------
         1          1       1573   52428800        512          1 YES
INACTIVE              31255458 11-APR-18     31273676 11-APR-18

         2          1       1574   52428800        512          1 NO
CURRENT              31273676 11-APR-18   2.8147E+14

         3          1       1572   52428800        512          1 YES
INACTIVE              31234874 11-APR-18     31255458 11-APR-18
```

* Let's mimic Junior DBA error, who removes in Linux Datafile mine01.dbf, which belongs to Tbsp MINE. This file is NON-ESSENTIAL, because it may be taken offline, unlike the files from tablespaces SYSTEM and UNDOTBS1. That fact and because we are in ARCHIVELOG mode, allow us to perform OPEN (HOT) Recovery. If we have collected ALL archived log files since the LAST FULL Backup of this Tablespace (or its Datafile), then this will be a COMPLETE Recovery (No Data Loss)*

```
SQL> HOST
[oracle@oracloud12c BACKUP]$ cd /opt/oracle/oradata/student
[oracle@oracloud12c student]$ ls -l
total 9689040
-rw-r-----. 1 oracle dba   10305536 Apr 11 11:12 control01.ctl
-rw-r-----. 1 oracle dba    5251072 Apr 11 11:06 indx01.dbf
-rw-r-----. 1 oracle dba    5251072 Apr 11 11:06 joke01.dbf
-rw-r-----. 1 oracle dba    3153920 Apr 11 11:06 joke02.dbf
-rw-r-----. 1 oracle dba  209723392 Apr 11 11:06 mgmt_ad4j.dbf
-rw-r-----. 1 oracle dba 5557460992 Apr 11 11:12 mgmt.dbf
-rw-r-----. 1 oracle dba   62922752 Apr 11 11:07 mgmt_depot.dbf
-rw-r-----. 1 oracle dba   10493952 Apr 11 11:06 mine01.dbf
-rw-r-----. 1 oracle dba   52429312 Apr 11 11:01 redo01.log
-rw-r-----. 1 oracle dba   52429312 Apr 11 11:12 redo02.log
-rw-r-----. 1 oracle dba   52429312 Apr 11 09:49 redo03.log
-rw-r-----. 1 oracle dba 2212503552 Apr 11 11:12 sysaux01.dbf
-rw-r-----. 1 oracle dba 1101012992 Apr 11 11:12 system01.dbf
-rw-r-----. 1 oracle dba   62922752 Apr 11 10:51 temp01.dbf
-rw-r-----. 1 oracle dba  524296192 Apr 11 11:12 undotbs01.dbf
-rw-r-----. 1 oracle dba    5251072 Apr 11 11:06 users01.dbf

[oracle@oracloud12c student]$ rm mine01.dbf
[oracle@oracloud12c student]$ ls -l mi*
ls: cannot access mi*: No such file or directory

[oracle@oracloud12c student]$ exit
exit

SQL> alter system switch logfile;
System altered.
```

```
SQL> alter system checkpoint;

System altered.

SQL> select * from tom.play;
select * from tom.play
                      *
ERROR at line 1:
ORA-01116: error in opening database file 8
ORA-01110: data file 8: '/opt/oracle/oradata/student/mine01.dbf'
ORA-27041: unable to open file
Linux-x86_64 Error: 2: No such file or directory
Additional information: 3

SQL> host
[oracle@oracloud12c BACKUP]$ rman target /

Recovery Manager: Release 12.1.0.2.0 - Production on Wed Apr 11
11:17:14 2018

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connected to target database: STUDENT (DBID=4285838094)

RMAN> report schema;

using target database control file instead of recovery catalog
Report of database schema for database with db_unique_name STUDENT

List of Permanent Datafiles
===========================
File Size(MB) Tablespace          RB segs Datafile Name
---- -------- ------------------- ------- -------------------------
1    1050     SYSTEM              YES
/opt/oracle/oradata/student/system01.dbf
2    5300     MGMT_TABLESPACE     NO
/opt/oracle/oradata/student/mgmt.dbf
3    2110     SYSAUX              NO
/opt/oracle/oradata/student/sysaux01.dbf
4    500      UNDOTBS1            YES
/opt/oracle/oradata/student/undotbs01.dbf
5    60       MGMT_ECM_DEPOT_TS   NO
/opt/oracle/oradata/student/mgmt_depot.dbf
6    5        USERS               NO
/opt/oracle/oradata/student/users01.dbf
7    200      MGMT_AD4J_TS        NO
/opt/oracle/oradata/student/mgmt_ad4j.dbf
8    0        MINE                NO
/opt/oracle/oradata/student/mine01.dbf
9    5        JOKE                NO
/opt/oracle/oradata/student/joke01.dbf
```

```
11   3      JOKE                NO
/opt/oracle/oradata/student/joke02.dbf
12   5      INDX                NO
/opt/oracle/oradata/student/indx01.dbf

List of Temporary Files
=======================
File Size(MB) Tablespace         Maxsize(MB) Tempfile Name
---- -------- ------------------- ----------- --------------------
1    60      TEMP                32767
/opt/oracle/oradata/student/temp01.dbf
2    20      MYTEMP              20
/opt/oracle/product/12.1.0/dbhome_1/dbs/mytemp01.dbf
```

RMAN> **list backup of datafile 8;**

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

BS Key  Type LV Size       Device Type Elapsed Time Completion Time
------- ---- -- ---------- ----------- ------------ ---------------
11      Full   32.35M     DISK         00:00:04     04-APR-18
        BP Key: 11   Status: AVAILABLE  Compressed: NO  Tag:
TAG20180404T180827
        Piece Name: /home/oracle/BACKUP/full_0bsvgssu_11_1
  List of Datafiles in backup set 11
  File LV Type Ckp SCN    Ckp Time  Name
  ---- -- ---- ---------- --------- ----
  8      Full 28472490   04-APR-18
/opt/oracle/oradata/student/mine01.dbf

BS Key  Type LV Size       Device Type Elapsed Time Completion Time
------- ---- -- ---------- ----------- ------------ ---------------
30      Incr 0  2.62G     DISK         00:00:55     06-APR-18
        BP Key: 30   Status: AVAILABLE  Compressed: NO  Tag:
TAG20180406T090625
        Piece Name: /home/oracle/BACKUP/full_0vsvl5oh_31_1
  List of Datafiles in backup set 30
  File LV Type Ckp SCN    Ckp Time  Name
  ---- -- ---- ---------- --------- ----
  8    0  Incr 29153195   06-APR-18
/opt/oracle/oradata/student/mine01.dbf

BS Key  Type LV Size       Device Type Elapsed Time Completion Time
------- ---- -- ---------- ----------- ------------ ---------------
```
33   Incr 0 5.64M   DISK   00:00:00   06-APR-18
```
        BP Key: 33   Status: AVAILABLE  Compressed: NO  Tag:
TAG20180406T091111
```
        Piece Name: /home/oracle/BACKUP/full_12svl61g_34_1
```
  List of Datafiles in backup set 33
  File LV Type Ckp SCN    Ckp Time  Name
  ---- -- ---- ---------- --------- ----
```

```
     8     0  Incr 29154309    06-APR-18
/opt/oracle/oradata/student/mine01.dbf

BS Key   Type LV Size        Device Type Elapsed Time Completion Time
-------  ---- -- ---------- ----------- ------------ ---------------
37       Incr 1  32.00K      DISK         00:00:00     06-APR-18
         BP Key: 37   Status: AVAILABLE  Compressed: NO  Tag:
TAG20180406T091219
         Piece Name: /home/oracle/BACKUP/full_16svl63k_38_1
   List of Datafiles in backup set 37
   File LV Type Ckp SCN    Ckp Time   Name
   ---- -- ---- ---------- --------- ----
    8   1  Incr 29154584    06-APR-18
/opt/oracle/oradata/student/mine01.dbf
```

Step One – Place Tablespace OFFLINE and Inspect file for RECOVERY

RMAN> **alter tablespace mine offline;**

```
RMAN-00571:
===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS
===============
RMAN-00571:
===========================================================
RMAN-03002: failure of sql statement command at 04/11/2018 11:18:36
ORA-01116: error in opening database file 8
ORA-01110: data file 8: '/opt/oracle/oradata/student/mine01.dbf'
ORA-27041: unable to open file
Linux-x86_64 Error: 2: No such file or directory
Additional information: 3
```
       ➔ You must use IMMEDIATE option

RMAN> **alter tablespace mine offline immediate;**

```
Statement processed
```

RMAN> **SELECT * FROM V$RECOVER_FILE;**

```
    FILE# ONLINE  ONLINE_ ERROR              CHANGE# TIME
---------- ------- ------- ----------------- ---------- --------- ---
        8 OFFLINE OFFLINE FILE NOT FOUND            0
```

Step Two – Restore Missing (Corrupted) Tablespace in RMAN

RMAN> **RESTORE TABLESPACE MINE;**

```
Starting restore at 11-APR-18
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=23 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 00008 to
```
/opt/oracle/oradata/student/mine01.dbf
channel ORA_DISK_1: reading from backup piece
/home/oracle/BACKUP/full_12svl61g_34_1
```
channel ORA_DISK_1: piece
handle=/home/oracle/BACKUP/full_12svl61g_34_1 tag=TAG20180406T091111
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 11-APR-18
```

→ **Notice that RMAN used piece# 34. This is Last Full=Level 0 Backup of Tablespace Mine, taken on April 06th – 5 days ago.**

Step Three – Recover Missing (Corrupted) Tablespace in RMAN

RMAN> **RECOVER TABLESPACE MINE;**

```
Starting recover at 11-APR-18
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 00008:
/opt/oracle/oradata/student/mine01.dbf
channel ORA_DISK_1: reading from backup piece
/home/oracle/BACKUP/full_16svl63k_38_1
channel ORA_DISK_1: piece
handle=/home/oracle/BACKUP/full_16svl63k_38_1 tag=TAG20180406T091219
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01

starting media recovery

archived log for thread 1 with sequence 1417 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1417.log
archived log for thread 1 with sequence 1418 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1418.log
archived log for thread 1 with sequence 1419 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1419.log
archived log for thread 1 with sequence 1420 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1420.log
                    ETC ..

archived log for thread 1 with sequence 1571 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1571.log
archived log for thread 1 with sequence 1572 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1572.log
archived log for thread 1 with sequence 1573 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1573.log
```

```
archived log for thread 1 with sequence 1574 is already on disk as
file /home/oracle/ARCHIVE/arch_950182417_1_1574.log


archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1417.log
thread=1 sequence=1417
archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1418.log
thread=1 sequence=1418
archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1419.log
thread=1 sequence=1419
archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1420.log
thread=1 sequence=1420
                    ETC ..

archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1570.log
thread=1 sequence=1570
archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1571.log
thread=1 sequence=1571
archived log file name=/home/oracle/ARCHIVE/arch_950182417_1_1572.log
thread=1 sequence=1572
media recovery complete, elapsed time: 00:00:44
Finished recover at 11-APR-18
```

* We see that this recovery needed more than 150 Archived logs, because the Most Recent Full Backup of tablespace MINE was taken about five days ago. *

Step Four – Place Tablespace ONLINE

RMAN> **ALTER TABLESPACE MINE ONLINE;**

```
Statement processed
```

Step Five – Inspect file for RECOVERY an Verify there was NO DATA LOSS

RMAN> **SELECT * FROM V$RECOVER_FILE;**

no rows selected

RMAN> **exit**

```
Recovery Manager complete.
[oracle@oracloud12c BACKUP]$ exit
exit
```

SQL> **SELECT * FROM tom.play;**

```
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---------
```
04-APR-18
08-APR-18   → **Notice that our Table and its rows are back (No Data Loss)**

```
SQL> select * from v$log;

    GROUP#     THREAD#   SEQUENCE#       BYTES  BLOCKSIZE    MEMBERS ARC
---------- ---------- ---------- ---------- ---------- ---------- ---
STATUS            FIRST_CHANGE# FIRST_TIM NEXT_CHANGE# NEXT_TIME
---------------- ------------- --------- ------------ --------- ------
         1          1       1573   52428800        512          1 YES
INACTIVE              31255458 11-APR-18     31273676 11-APR-18

         2          1       1574   52428800        512          1 YES
INACTIVE              31273676 11-APR-18     31278551 11-APR-18

         3          1       1575   52428800        512          1 NO
CURRENT              31278551 11-APR-18   2.8147E+14

SQL> exit
Disconnected from Oracle Database 12c Enterprise Edition Release
12.1.0.2.0 - 64bit Production
With the Partitioning, OLAP, Advanced Analytics and Real Application
Testing options
[oracle@oracloud12c BACKUP]$ exit
logout
```