Manual Completion of a Failed RMAN Backup Based Duplicate (Doc ID 360962.1)

In this Document

APPLIES TO:

Gen 1 Exadata Cloud at Customer (Oracle Exadata Database Cloud Machine) - Version N/A and later
Oracle Cloud Infrastructure - Database Service - Version N/A and later
Oracle Database Exadata Express Cloud Service - Version N/A and later
Oracle Database Cloud Exadata Service - Version N/A and later
Oracle Database Cloud Schema Service - Version N/A and later
Information in this document applies to any platform.

PURPOSE

The purpose of this note is to provide details on how to resolve an incomplete RMAN duplicate.

For active RMAN duplicate, using FROM ACTIVE DATABASE, see:

Manual Completion of a Failed RMAN Duplicate FROM ACTIVE DATABASE (Doc ID 1602916.1)

For earlier RMAN versions, like 10g and 11.1, see:

Manual Completion of a Failed RMAN Backup based Duplicate 10g and Oracle 11.1 (Doc ID 2847672.1)

SCOPE

This article is meant for database administrators and backup and recovery specialists who are tasked
to complete a failed RMAN duplicate database.

> **NOTE: In the images and/or the document content below, the user information and environment data used
> represents fictitious data from the Oracle sample schema(s), Public Documentation delivered with
> an Oracle database product or other training material. Any similarity to actual environments, actual**

For the purposes of this document, the following fictitious environment is used as an example to describe the procedure:

Target (source) Database Name: PROD
Auxiliary (source) Database Name: AUX

DETAILS

Overview:

When running an RMAN duplicate in Oracle 11.2 and higher, RMAN will perform the following steps:

1. It restores a controlfile from the target into the auxiliary
2. It resets the db_name to the target so the controlfile can be mounted.
3. It restores the datafiles setting the auxiliary datafiles in the proper location using either db_file_name_convert or 'set newname', if specified.
4. It recovers the auxiliary datafiles to the 'until' clause specified or derived.
5. It recreates the controlfile with the system datafile (datafile #1)
6. It catalogs the auxiliary datafiles into the newly created datafiles.
7. Executes a 'switch datafile to copy' of all the datafiles.
8. It changes the DBID and opens the database with resetlogs.

When RMAN duplicate executes, it creates a _rm_dup_<auxilary SID>_<auxiliary_DB_NAME>.dat. file in the auxiliary $ORACLE_HOME/dbs directory. In earlier versions it is simply named _rm_dup_<auxiliary SID>.dat.
For the remainder of this note, this file will be referred to as '_rm_dup_.dat'.

This file is used to 'restart' a failed duplicate.

If this file exists, the recommendation for a failed duplicate is to re-execute the same duplicate command. Upon re-execution, RMAN will still restore the controlfile, but will use already restored auxiliary datafiles.
RMAN checks for an existing auxiliary datafile to use and if it finds such, RMAN will reuse the already restored datafile(s) and report something like:

```
database mounted
Using previous duplicated file /oracle/oradata/AUX/AUX/datafile/o1_mf_system_j7gvt61x_.dbf for
datafile 1 with checkpoint SCN of 30151499
Using previous duplicated file /oracle/oradata/AUX/AUX/datafile/o1_mf_sysaux_j7gvt61g_.dbf for
datafile 2 with checkpoint SCN of 30151499
Using previous duplicated file /oracle/oradata/AUX/AUX/datafile/o1_mf_undotbs1_j7gvt62q_.dbf for
datafile 3 with checkpoint SCN of 30151499
```

OR

```
skipping datafile 1; already restored to file /oracle/oradata/AUX/system01.dbf
skipping datafile 2; already restored to file /oracle/oradata/AUX/sysaux01.dbf
skipping datafile 3; already restored to file /oracle/oradata/AUX/undotbs01.dbf
```

NOTE: If recovery was applied to the auxiliary datafiles, it may NOT have the same SCN as the backup, so re-executing the duplicate may re-restore all the datafiles. This was found to be true in 11g.

NOTE: If auxiliary datafiles are Oracle Managed Files (OMF), see OMF section of this note.

Restarting the Auxiliary Instance

Before restarting the duplicate, the auxiliary instance must be shutdown and re-stared in nomount. Since RMAN changes the db_name parameter and creates an spfile, you must
confirm the db_name parameter is set to that of the auxiliary before re-executing duplicate.

For example:

```
startup nomount;
show parameter db_name;
```

If the db_name parameter shows the name of the target (source) database, either change the db_name parameter or, if using a pfile, remove the existing spfile<AUX>.ora and re-start in nomount.

For example:

```
SQL> startup nomount;
ORACLE instance started.

Total System Global Area 4294963272 bytes
Fixed Size 8904776 bytes
Variable Size 805306368 bytes
Database Buffers 3472883712 bytes
Redo Buffers 7868416 bytes

SQL> show parameter db_name;

NAME TYPE VALUE
------------------------------------ ----------- -------------------------------

db_name string PROD             <== shows the name of the target (source) database

SQL> alter system set db_name=AUX scope=spfile;

System altered.

SQL> startup force nomount;
ORACLE instance started.

Total System Global Area 4294963272 bytes
Fixed Size 8904776 bytes
Variable Size 805306368 bytes
Database Buffers 3472883712 bytes
Redo Buffers 7868416 bytes

SQL> show parameter db_name

NAME TYPE VALUE
------------------------------------ ----------- -------------------------------

db_name string AUX

SQL>
```

Failure at the Controlfile Restore

If the failure occurs at the controlfile restore, resolve the error and re-execute the RMAN duplicate command.

See 'restarting the auxiliary instance' section.

Failure at the Auxiliary Database Restore - NON-OMF

WITH the existence of the $ORACLE_HOME/dbs/_rm_dup_.dat file:

1. Shutdown the auxiliary

2. Restart the auxiliary (see 'restarting the auxiliary' section)

3. Re-execute the same duplicate command.

Any previously restored files will show:

```
database mounted
Using previous duplicated file /oracle/oradata/AUX/sysaux01.dbf for datafile 2 with checkpoint
SCN of 56068043
Using previous duplicated file /oracle/oradata/AUX/users02.dbf for datafile 4 with checkpoint
SCN of 56068041
```

OR

```
skipping datafile 1; already restored to file /oracle/oradata/AUX/system01.dbf
skipping datafile 4; already restored to file /oracle/oradata/AUX/users02.dbf
```

Even with a missing $ORACLE_HOME/dbs/_rm_dup_.dat file, with explicitly named datafiles (NON-OMF) re-executing the RMAN duplicate will
skip already restored datafiles.

The recommendation would be to do this. However, monitor the initial re-execution. At the point RMAN starts to restore the database, the 'skipped' files will be reported. If a list of
"previously duplicated" or "skipping datafile" messages is not posted, kill the re-execution immediately and manually restore the necessary files.

See 'manually completing the restore' section.

Failure at the Auxiliary Database Restore - OMF

If using OMF and Oracle version 12.2 or higher, RMAN duplicate will use pre-restored datafiles. For Oracle version less than 12.2, the pre-restored datafiles will be not be re-used if a 'set newname' is
used with the duplicate command. If the source location doesn't exist and the auxiliary is relying on db_create_file_dest (without 'set newname') or if db_file_name_convert is being used to dictate the
auxiliary datafile locations, RMAN will skip pre-restored datafiles and will report such as:

```
Using previous duplicated file /oracle/oradata/AUX/sysaux01.dbf for datafile 2 with checkpoint
SCN of 56068043
Using previous duplicated file /oracle/oradata/AUX/users02.dbf for datafile 4 with checkpoint
SCN of 56068041
```

If the $ORACLE_HOME/dbs/_rm_dup_.dat is missing from the $ORACLE_HOME/dbs directory, consider manually restoring the remaining datafiles.

See 'manually completing the restore' section.

Manually Completing the Restore

The following steps are executed connected to the auxiliary instance as TARGET. I.e., with the environment set to the auxiliary instance, connect to RMAN like:

```
$ rman target /
```

1. With the database mounted, connect to RMAN:

```
$ rman target /
```

2. Determine what datafiles still need to be restored. HINT: The 'list copy of database' command executed within that RMAN session will report the datafiles restored.

3. Create a restore script which would ONLY 'set newname' of the datafiles needing restore AND restore by datafile number 'restore datafile n1, n2...;'.

> NOTE: 'restore database' may re-restore all the OMF files.

4. Restore the remaining files by executing the script created in #3 above.

> NOTE: you want to restore all the datafiles in one statement so multiple datafiles residing in the same backupset do not require multiple reads of that backupset.

5. Execute the RMAN switch to update the mounted controlfile with the location/name of the datafiles.

```
RMAN> list copy of database;                    <== confirm all the datafiles are listed and their
location/name is what you see physically on disk.
RMAN> switch database to copy;
```

NOTE: If you receive a 'no copy of datafile n1' message, this is an indication that datafile was not restored.
To confirm execute a 'list copy of datafile' for that particular datafile number (the one reported in the error)

```
RMAN> list copy of datafile <n1>;
```

The following is an example of the steps to manually restore the auxiliary datafiles:

```
$ rman target /

Recovery Manager: Release 19.0.0.0.0 - Production on Sat Jan 29 20:52:30 2022
Version 19.8.0.0.0

Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights reserved.
connected to target database: OMF19C (DBID=452599572, not open)

RMAN> list copy of database;

using target database control file instead of recovery catalog

List of Datafile Copies
=======================

Key File S Completion Time Ckp SCN Ckp Time Sparse
------- ---- - --------------- ---------- --------------- ------

1 1 A 29-JAN-22 56071906 29-JAN-22 NO
Name: /data/oradata/AUX/AUX/datafile/o1_mf_system_jzc6c0v7_.dbf

2 2 A 29-JAN-22 56071898 29-JAN-22 NO
Name: /data/oradata/AUX/AUX/datafile/o1_mf_sysaux_jzc6c7x0_.dbf

3 3 A 29-JAN-22 56071909 29-JAN-22 NO
Name: /data/oradata/AUX/AUX/datafile/o1_mf_undotbs1_jzc6cgym_.dbf
```

In this example, only 3 of the total 5 datafiles were restored.

One option to finding the remaining datafiles is the following query
either in RMAN, Oracle 12.2 and higher or through Sql*Plus for Oracle 11g and 12.1:

```
RMAN> select a.file# || ','
2> from v$datafile
3> a where a.file# not in
4> (select file# from v$datafile_copy b where b.name is not null);

A.FILE#||','
---------------------------------------

4,
6,
```

NOTE: This query is one possibility for determining which files need restoring. However, it's accuracy is dependent on the existence of
the datafilecopy registration in the controlfile. Use whatever means necessary to determine which datafiles still need to be restored.

Continuing with this example, datafiles #4 and #6.

```
RMAN> run
```

```
2> {
3> set newname for datafile 4 to new;
4> set newname for datafile 6 to new;
5> restore datafile 4,6;                <== all datafiles are restored with one 'restore
datafile' command.
6> }

executing command: SET NEWNAME

executing command: SET NEWNAME

Starting restore at 29-JAN-22
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=389 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 00004 to /data/oradata/AUX/AUX/datafile
/o1_mf_users_%u_.dbf
channel ORA_DISK_1: reading from backup piece /oracle/auxdest/df_030kgfuc_1_1
channel ORA_DISK_1: piece handle=/oracle/auxdest/df_030kgfuc_1_1 tag=TAG20220129T131244
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:15
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 00006 to /data/oradata/AUX/AUX/datafile
/o1_mf_test_%u_.dbf
channel ORA_DISK_1: reading from backup piece /oracle/auxdest/df_070kgfuo_1_1
channel ORA_DISK_1: piece handle=/oracle/auxdest/df_070kgfuo_1_1 tag=TAG20220129T131244
channel ORA_DISK_1: restored backup piece 1
channel ORA_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 29-JAN-22

RMAN> switch database to copy;

datafile 1 switched to datafile copy "/data/oradata/AUX/AUX/datafile/o1_mf_system_jzc6c0v7_.dbf"
datafile 2 switched to datafile copy "/data/oradata/AUX/AUX/datafile/o1_mf_sysaux_jzc6c7x0_.dbf"
datafile 3 switched to datafile copy "/data/oradata/AUX/AUX/datafile
/o1_mf_undotbs1_jzc6cgym_.dbf"
datafile 4 switched to datafile copy "/data/oradata/AUX/AUX/datafile/o1_mf_users_jzcbdctb_.dbf"
datafile 6 switched to datafile copy "/data/oradata/AUX/AUX/datafile/o1_mf_test_jzcbdtw2_.dbf"
```

Failure at the Recovery of the Auxiliary Datafiles

With existence of the $ORACLE_HOME/dbs/_rm_dup_.dat file:

1. Shutdown the auxiliary

2. Restart the auxiliary. See the 'restarting the auxiliary' section.

3. Re-execute the same duplicate command.

With a MISSING $ORACLE_HOME/dbs/_rm_dup_.dat

1. Capture the 'until scn' used to recover the previous execution of the RMAN duplicate.

For example:

```
contents of Memory Script:
{
set until scn 56513074;
recover
clone database
delete archivelog
;
}
executing Memory Script
```

2. Catalog the backups, specifically those containing archivelog files.

3. Connect RMAN to the auxiliary instance and recover the auxiliary database.

For example:

```
run {
set until scn 56513074;
recover clone database;
}
```

If the recovery returns an error like the following, the controlfile must be recreated. See 'failure at recreating the controlfile' section.

```
starting media recovery
media recovery failed
RMAN-00571: ===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS ===============
RMAN-00571: ===========================================================
RMAN-03002: failure of recover command at 01/29/2022 21:05:52
ORA-00283: recovery session canceled due to errors
RMAN-11003: failure during parse/execution of SQL statement: alter database recover
if needed start until change 56513074 using backup controlfile
ORA-00283: recovery session canceled due to errors
ORA-19856: cannot use clone mounted control file to recover database
```

4. Open the auxiliary database:

```
RMAN> alter clone database open resetlogs;
```

If the open returns an error like the following, the controlfile must be recreated. See 'failure at recreating the

```
RMAN> alter clone database open resetlogs;

RMAN-00571: ===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS ===============
RMAN-00571: ===========================================================
RMAN-03002: failure of alter db command at 01/22/2022 19:20:31
RMAN-06136: Oracle error from auxiliary database: ORA-19838: cannot use this control file to
mount or open database
```

Failure at the Recreating the Controlfile

To recreate the controlfile:

1. In Sql*Plus, issue:

```
SQL> alter session set tracefile_identifier='control_create';
SQL> alter database backup controlfile to trace resetlogs;
```

2. In the diag trace directory, locate the trace file created by command in #1. It will have 'control_create' as part of it's name.

3. Edit the trace file in #2 and remove all information except the 'create controlfile' command. Save the changes to a SQL file. I.e., create_aux_controlfile.sql
By saving the changes to a different name, the original trace file contents are preserved.   Alternatively, copy the trace file before editing.

4. Edit the SQL file, create_aux_controlfile.sql, making the following changes:

   a. change the 'create controlfile' statement o include 'set database':

   'CREATE CONTROLFILE REUSE set DATABASE "<name of auxiliary database>"'.

   The 'set database' will rename the database along with the controlfile creation.

   For example:

```
CREATE CONTROLFILE REUSE set DATABASE "AUX"
```

b. confirm that the auxiliary datafiles' names and location are correct for the auxiliary and that all the datafiles listed physically exist.

c. **<u>IMPORTANT</u>**: edit the location and name (if desired) of the online redo log files to the desired auxiliary location.

d. save the changes. NOTE: the create controlfile SQL command should contain:

- only the 'create controlfile' statement
- the command should include 'set database'
- all datafiles should exist in the name and location specified.
- all online redo log file location and name should be valid for the auxiliary database

5. Shutdown the auxiliary database

6. Start the auxiliary instance in nomount. See 'restarting auxiliary instance' section.

7. Execute the .sql saved in #4d above:

```
SQL> @create_aux_controlfile.sql
```

8. Check the datafiles using the following:

```
alter session set nls_date_format = 'DD-MON-RRRR HH24:MI:SS';
select status,checkpoint_change#,checkpoint_time, count(*),
fuzzy from v$datafile_header
group by status,checkpoint_change#,checkpoint_time, fuzzy;
```

9. Confirm:

- the datafiles' date/time is what is expected
- only one row is returned with the total count of datafiles
- the FUZZY column contains a value of NO

For example:

```
SQL> alter session set nls_date_format = 'DD-MON-RRRR HH24:MI:SS';
SQL> select status,checkpoint_change#,checkpoint_time, count(*),
2 fuzzy from v$datafile_header
3 group by status,checkpoint_change#,checkpoint_time, fuzzy;

STATUS CHECKPOINT_CHANGE# CHECKPOIN COUNT(*) FUZ
------- ------------------ --------- ---------- ---
ONLINE 8977735 29-JAN-22 15:11:21  7 NO
```

Assuming all checks within #9 are true, skip the recovery (step #10) and proceed to opening the database (step #11) . Otherwise, if recovery is needed, continue to recovery of the auxiliary database (step #10 below).

10. Recover the auxiliary database:

a. capture the 'until scn' used to recover the previous execution of the RMAN duplicate.

For example:

```
contents of Memory Script:
{
set until scn 56513074;
recover
clone database
delete archivelog
;
}
executing Memory Script
```

b. catalog the backups, specifically those containing archivelog files.

c. connect RMAN to the auxiliary instance as target and recover the auxiliary database using the until clause

captured above.

```
$ rman target /
RMAN>  recover database until scn 56513074;
```

d. check the datafiles using the following:

```
alter session set nls_date_format = 'DD-MON-RRRR HH24:MI:SS';
select status,checkpoint_change#,checkpoint_time, count(*),
fuzzy from v$datafile_header
group by status,checkpoint_change#,checkpoint_time, fuzzy;
```

e. Confirm:

- the datafiles' date/time is what is expected
- only one row is returned with the total count of datafiles
- the FUZZY column contains a value of NO

For example:

```
SQL> alter session set nls_date_format = 'DD-MON-RRRR HH24:MI:SS';
SQL> select status,checkpoint_change#,checkpoint_time, count(*),
2 fuzzy from v$datafile_header
3 group by status,checkpoint_change#,checkpoint_time, fuzzy;

STATUS CHECKPOINT_CHANGE# CHECKPOIN COUNT(*) FUZ
------- ----------------- --------- ---------- ---
ONLINE 8977735 29-JAN-22 15:11:21  7 NO
```

11. Open the database.

```
RMAN> alter database open resetlogs;

Statement processed
```

12. Change the DBID using NID. See 'running NID' section.

Failure at Opening the auxiliary database

If the controlfile has not been recreated, the following error(s) may be returned when attempting to open the auxiliary database:

```
SQL> alter database open resetlogs;
alter database open resetlogs
*
ERROR at line 1:
ORA-19838: cannot use this control file to mount or open database
```

OR

```
RMAN> alter clone database open resetlogs;
RMAN-00571: ===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS ===============
RMAN-00571: ===========================================================
RMAN-03002: failure of alter db command at 01/22/2022 19:20:31
RMAN-06136: Oracle error from auxiliary database: ORA-19838: cannot use this control file to
mount or open database
```

To open the database, you must recreate the controlfile. See 'recreating the controlfile' section.

Running NID

1. Shutdown the database and startup mount.

2. Run NID at the OS level using:

```
$ nid target=/
```

For example:

```
$ nid target=/

DBNEWID: Release 19.0.0.0.0 - Production on Sat Jan 22 19:06:44 2022

Copyright (c) 1982, 2019, Oracle and/or its affiliates. All rights reserved.

Connected to database AUX (DBID=4224832520)

Connected to server version 19.6.2

Control Files in database:

/oracle/oradata/AUX/control01.ctl

Change database ID of database AUX? (Y/[N]) => Y

Proceeding with operation
Changing database ID from 4224832520 to 2392811972
Control File /oracle/oradata/AUX/control01.ctl - modified
Datafile /oracle/oradata/AUX/system01.db - dbid changed
Datafile /oracle/oradata/AUX/sysaux01.db - dbid changed
Datafile /oracle/oradata/AUX/undotbs01.db - dbid changed
Datafile /oracle/oradata/AUX/users02.db - dbid changed
Datafile /oracle/oradata/AUX/test01.db - dbid changed
Control File /oracle/oradata/AUX/control01.ctl - dbid changed
Instance shut down

Database ID for database AUX changed to 2392811972.
All previous backups and archived redo logs for this database are unusable.
Database is not aware of previous backups and archived logs in Recovery Area.
Database has been shutdown, open database with RESETLOGS option.
Succesfully changed database ID.
DBNEWID - Completed succesfully.
```

3. As instructed by NID, open the database with resetlogs:

```
$ sqlplus / as sysdba

SQL*Plus: Release 19.0.0.0.0 - Production on Sat Jan 22 19:07:30 2022
Version 19.6.2.0.0

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

Connected to an idle instance.

SQL> startup mount;
ORACLE instance started.

Total System Global Area 1543500144 bytes
Fixed Size 8896880 bytes
Variable Size 369098752 bytes
Database Buffers 1157627904 bytes
Redo Buffers 7876608 bytes
Database mounted.

SQL> alter database open resetlogs;

Database altered.

SQL>
```

REFERENCES

NOTE:224266.1 - How to Change the DBID and the DBNAME by using NID
BUG:3202107 - RESTORE OPTIMIZATION IS NOT ACTIVE AFTER FAILED AND RETRIED DUPLICATE COMMAND

NOTE:1058332.6 - How to Unregister Oracle Release 8 and 9 Target Databases when Using RMAN
Didn't find what you are looking for?