RMAN BACKUP BASED CLONING

ACTIVE DATABASE CLONING:

1. What is RMAN Cloning?

Active Database Duplication is an RMAN feature that lets you clone a live database over the network—no need for existing backups. It copies data blocks directly from the running source database to the new (auxiliary) database, making it fast and efficient for creating dev /test environments.

2. Steps to follow:

a) Entries of both listener and tnsnames entries in source and target server.
b) Check both the server can be connected using tnsping.
c) Copy pfile, password file to the target database.
d) Edit the database name and location for adump, datafile and logfiles.
e) Create a directory for adump, datafile and logfiles.
f) Set the parameters - log_file_name_convert, db_file_name_convert.
g) In target database, connect target and auxiliary database.

3. Details:

Detail	Source Database	Target Database
Database SID	PROD	CLONE
IP	192.168.72.133	192.168.72.143

Steps:

- **Copy the pfile and password file to target server:**

```
[oracle@oracle dbs]$ scp orapwPROD initPROD.ora oracle@192.168.72.143:/u01/apps/oracle/server/19.3/home/dbs
The authenticity of host '192.168.72.143 (192.168.72.143)' can't be established.
ECDSA key fingerprint is SHA256:5kU8Jzn+6hAHl/+ucK49oS2pjPfT9Q5DWX7lucB00xw.
ECDSA key fingerprint is MD5:ab:f3:5a:c7:04:4d:98:70:cc:27:f0:b9:f8:a0:99:e3.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.72.143' (ECDSA) to the list of known hosts.
oracle@192.168.72.143's password:
orapwPROD                                     100% 2048   911.7KB/s   00:00
initPROD.ora                                  100% 1070   765.1KB/s   00:00
[oracle@oracle dbs]$
```

- **Edit the PFile:**

```
CLONE.__data_transfer_cache_size=0
CLONE.__db_cache_size=1828716544
CLONE.__inmemory_ext_roarea=0
CLONE.__inmemory_ext_rwarea=0
CLONE.__java_pool_size=0
CLONE.__large_pool_size=16777216
CLONE.__oracle_base='/u01/apps/oracle/server/19.3'#ORACLE_BASE set from environment
CLONE.__pga_aggregate_target=838860800
CLONE.__sga_target=2516582400
CLONE.__shared_io_pool_size=134217728
CLONE.__shared_pool_size=520093696
CLONE.__streams_pool_size=0
CLONE.__unified_pga_pool_size=0
*.audit_file_dest='/u01/apps/oracle/server/19.3/admin/CLONE/adump'
*.audit_trail='db'
*.compatible='19.0.0'
*.control_files='/u01/apps/oracle/server/19.3/oradata/CLONE/control01.ctl','/u01/apps/oracle/server/19.3/oradata/CLONE/control02.ctl'
*.db_block_size=8192
*.db_name='CLONE'
*.diagnostic_dest='/u01/apps/oracle/server/19.3'
*.dispatchers='(PROTOCOL=TCP) (SERVICE=PRODXDB)'
*.local_listener='LISTENER_PROD'
*.nls_language='AMERICAN'
*.nls_territory='AMERICA'
*.open_cursors=300
*.pga_aggregate_target=797m
*.processes=300
*.remote_login_passwordfile='EXCLUSIVE'
*.sga_target=2389m
*.undo_tablespace='UNDOTBS1'
```

- **Create adump and oradata directory:**

```
[oracle@rmanclone 19.3]$ cd /u01/apps/oracle/server/19.3/admin/CLONE/adump
[oracle@rmanclone adump]$
[oracle@rmanclone adump]$ pwd
/u01/apps/oracle/server/19.3/admin/CLONE/adump
[oracle@rmanclone adump]$
[oracle@rmanclone adump]$
[oracle@rmanclone adump]$
[oracle@rmanclone adump]$ cd /u01/apps/oracle/server/19.3/oradata/CLONE/
[oracle@rmanclone CLONE]$
[oracle@rmanclone CLONE]$
[oracle@rmanclone CLONE]$ pwd
/u01/apps/oracle/server/19.3/oradata/CLONE
```

- **TNS and Listener entries in Target and Source database:**

Listener :

```
LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.133)(PORT = 1521))
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))
    )
  )

SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
```

```
    (GLOBAL_DBNAME = PROD)
    (ORACLE_HOME = /u01/apps/oracle/server/19.3/home)
    (SID_NAME = PROD)
   )
  )

LISTENER_CLONE =
  (DESCRIPTION_LIST =
   (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.143)(PORT = 1524))
    (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1524))
   )
  )

SID_LIST_LISTENER_CLONE =
  (SID_LIST =
   (SID_DESC =
    (GLOBAL_DBNAME = CLONE)
    (ORACLE_HOME = /u01/apps/oracle/server/19.3/home)
    (SID_NAME = CLONE)
   )
  )
```

TNS Name:

```
PROD =
  (DESCRIPTION =
   (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.133)(PORT = 1521))
   (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = PROD)
   )
  )

CLONE =
  (DESCRIPTION =
   (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.143)(PORT = 1524))
   (CONNECT_DATA =
    (SERVER = DEDICATED)
    (SERVICE_NAME = CLONE)
   )
  )
```

- **Check tnsping on both target and source servers:**

Source DB:

```
[oracle@oracle admin]$ tnsping CLONE

TNS Ping Utility for Linux: Version 19.0.0.0.0 - Production on 13-APR-2025 05:00:22

Copyright (c) 1997, 2019, Oracle.  All rights reserved.

Used parameter files:
/u01/apps/oracle/server/19.3/home/network/admin/sqlnet.ora


Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.143)(PORT = 1524)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = CLONE)))
OK (10 msec)
[oracle@oracle admin]$ tnsping prod

TNS Ping Utility for Linux: Version 19.0.0.0.0 - Production on 13-APR-2025 05:00:25

Copyright (c) 1997, 2019, Oracle.  All rights reserved.

Used parameter files:
/u01/apps/oracle/server/19.3/home/network/admin/sqlnet.ora


Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.133)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = PROD)))
OK (0 msec)
```

Target DB:

```
[oracle@rmanclone admin]$ tnsping prod

TNS Ping Utility for Linux: Version 19.0.0.0.0 - Production on 13-APR-2025 05:01:00

Copyright (c) 1997, 2019, Oracle.  All rights reserved.

Used parameter files:


Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.133)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = PROD)))
OK (0 msec)
[oracle@rmanclone admin]$
[oracle@rmanclone admin]$ tnsping CLONE

TNS Ping Utility for Linux: Version 19.0.0.0.0 - Production on 13-APR-2025 05:01:02

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Used parameter files:


Used TNSNAMES adapter to resolve the alias
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST = 192.168.72.143)(PORT = 1524)) (CONNECT_DATA = (SERVER = DEDICATED) (SERVICE_NAME = CLONE)))
OK (0 msec)
```

- **Set the parameter for db_file_name_convert and log_file_name_convert in Source DB before that create a spfile from pfile:**

```
SQL> alter system set db_file_name_convert = '/u01/apps/oracle/server/19.3/oradata/PROD/','/u01/apps/oracle/server/19.3/oradata/CLONE/' scope=spfile;

System altered.

SQL>
SQL>
SQL>
SQL>  alter system set log_file_name_convert = '/u01/apps/oracle/server/19.3/oradata/PROD/','/u01/apps/oracle/server/19.3/oradata/CLONE/' scope=spfile;

System altered.
```

```
SQL> show parameter db_file_name_convert;

NAME                                 TYPE                                 VALUE
------------------------------------ ------------------------------------ ------------------------------
db_file_name_convert                 string                               /u01/apps/oracle/server/19.3/o
                                                                          radata/PROD/, /u01/apps/oracle
                                                                          /server/19.3/oradata/CLONE/
pdb_file_name_convert                string
SQL>
SQL>
SQL>  show parameter log_file_name_convert;

NAME                                 TYPE                                 VALUE
------------------------------------ ------------------------------------ ------------------------------
log_file_name_convert                string                               /u01/apps/oracle/server/19.3/o
                                                                          radata/PROD/, /u01/apps/oracle
                                                                          /server/19.3/oradata/CLONE/
SQL>
```

➢ Connect RMAN with Target and Auxiliary server in the Target server:

```
[oracle@rmanclone oradata]$ rman target sys/welcome1@PROD auxiliary sys/welcome1

Recovery Manager: Release 19.0.0.0.0 - Production on Sun Apr 13 05:21:50 2025
Version 19.3.0.0.0

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

connected to target database: PROD (DBID=604147643)
connected to auxiliary database: CLONE (not mounted)
```

➢ Execute the Duplicate Command from the Target Database:

```
RMAN> duplicate target database to 'CLONE' from active database NOFILENAMECHECK;

Starting Duplicate Db at 13-APR-25
using target database control file instead of recovery catalog
allocated channel: ORA_AUX_DISK_1
channel ORA_AUX_DISK_1: SID=36 device type=DISK
current log archived

contents of Memory Script:
{
   sql clone "create spfile from memory";
}
executing Memory Script

sql statement: create spfile from memory

contents of Memory Script:
{
   shutdown clone immediate;
   startup clone nomount;
}
executing Memory Script
```

RMAN> duplicate target database to 'CLONE' from active database nofilenamecheck;

Starting Duplicate Db at 13-APR-25
using target database control file instead of recovery catalog
allocated channel: ORA_AUX_DISK_1
channel ORA_AUX_DISK_1: SID=38 device type=DISK
current log archived

contents of Memory Script:
{
  sql clone "create spfile from memory";
}
executing Memory Script

sql statement: create spfile from memory

contents of Memory Script:
{
  shutdown clone immediate;

```
  startup clone nomount;
}
executing Memory Script

Oracle instance shut down

connected to auxiliary database (not started)
Oracle instance started

Total System Global Area    2516581464 bytes

Fixed Size                  8899672 bytes
Variable Size               536870912 bytes
Database Buffers            1962934272 bytes
Redo Buffers                7876608 bytes

contents of Memory Script:
{
  sql clone "alter system set  db_name =
 ''PROD'' comment=
 ''Modified by RMAN duplicate'' scope=spfile";
  sql clone "alter system set  db_unique_name =
 ''CLONE'' comment=
 ''Modified by RMAN duplicate'' scope=spfile";
  shutdown clone immediate;
  startup clone force nomount
  restore clone from service  'PROD' primary controlfile;
  alter clone database mount;
}
executing Memory Script

sql statement: alter system set  db_name =  ''PROD'' comment= ''Modified by RMAN duplicate'' scope=spfile

sql statement: alter system set  db_unique_name =  ''CLONE'' comment= ''Modified by RMAN duplicate'' scope=spfile

Oracle instance shut down

Oracle instance started

Total System Global Area    2516581464 bytes

Fixed Size                  8899672 bytes
Variable Size               536870912 bytes
Database Buffers            1962934272 bytes
Redo Buffers                7876608 bytes

Starting restore at 13-APR-25
allocated channel: ORA_AUX_DISK_1
channel ORA_AUX_DISK_1: SID=35 device type=DISK

channel ORA_AUX_DISK_1: starting datafile backup set restore
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: restoring control file
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:01
output file name=/u01/apps/oracle/server/19.3/oradata/CLONE/control01.ctl
output file name=/u01/apps/oracle/server/19.3/oradata/CLONE/control02.ctl
Finished restore at 13-APR-25

database mounted
```

```
RMAN-05158: WARNING: auxiliary (logfile) file name /u01/apps/oracle/server/19.3/oradata/PROD/redo01.log conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (logfile) file name /u01/apps/oracle/server/19.3/oradata/PROD/redo02.log conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (logfile) file name /u01/apps/oracle/server/19.3/oradata/PROD/redo03.log conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (datafile) file name /u01/apps/oracle/server/19.3/oradata/PROD/system01.dbf conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (datafile) file name /u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (datafile) file name /u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (datafile) file name /u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf conflicts with a file used by the target database
RMAN-05158: WARNING: auxiliary (tempfile) file name /u01/apps/oracle/server/19.3/oradata/PROD/temp01.dbf conflicts with a file used by the target database

contents of Memory Script:
{
   set newname for datafile  1 to
 "/u01/apps/oracle/server/19.3/oradata/PROD/system01.dbf";
   set newname for datafile  3 to
 "/u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf";
   set newname for datafile  4 to
 "/u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf";
   set newname for datafile  7 to
 "/u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf";
   restore
   from  nonsparse   from service
 'PROD'   clone database
   ;
   sql 'alter system archive log current';
}
executing Memory Script

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

executing command: SET NEWNAME

Starting restore at 13-APR-25
using channel ORA_AUX_DISK_1

channel ORA_AUX_DISK_1: starting datafile backup set restore
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_DISK_1: restoring datafile 00001 to /u01/apps/oracle/server/19.3/oradata/PROD/system01.dbf
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:15
channel ORA_AUX_DISK_1: starting datafile backup set restore
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_DISK_1: restoring datafile 00003 to /u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:16
channel ORA_AUX_DISK_1: starting datafile backup set restore
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_DISK_1: restoring datafile 00004 to /u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf
```

```
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:03
channel ORA_AUX_DISK_1: starting datafile backup set restore
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: specifying datafile(s) to restore from backup set
channel ORA_AUX_DISK_1: restoring datafile 00007 to /u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 13-APR-25

sql statement: alter system archive log current
current log archived

contents of Memory Script:
{
  restore clone force from service  'PROD'
        archivelog from scn  3292645;
  switch clone datafile all;
}
executing Memory Script

Starting restore at 13-APR-25
using channel ORA_AUX_DISK_1

channel ORA_AUX_DISK_1: starting archived log restore to default destination
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: restoring archived log
archived log thread=1 sequence=25
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:01
channel ORA_AUX_DISK_1: starting archived log restore to default destination
channel ORA_AUX_DISK_1: using network backup set from service PROD
channel ORA_AUX_DISK_1: restoring archived log
archived log thread=1 sequence=26
channel ORA_AUX_DISK_1: restore complete, elapsed time: 00:00:01
Finished restore at 13-APR-25

datafile 1 switched to datafile copy
input datafile copy RECID=1 STAMP=1198302807 file
name=/u01/apps/oracle/server/19.3/oradata/PROD/system01.dbf
datafile 3 switched to datafile copy
input datafile copy RECID=2 STAMP=1198302807 file name=/u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf
datafile 4 switched to datafile copy
input datafile copy RECID=3 STAMP=1198302807 file
name=/u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf
datafile 7 switched to datafile copy
input datafile copy RECID=4 STAMP=1198302807 file name=/u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf

contents of Memory Script:
{
  set until scn  3292833;
  recover
  clone database
   delete archivelog
  ;
}
executing Memory Script

executing command: SET until clause

Starting recover at 13-APR-25
using channel ORA_AUX_DISK_1
```

```
starting media recovery

archived log for thread 1 with sequence 25 is already on disk as file
/u01/apps/oracle/server/19.3/home/dbs/arch1_25_1192309309.dbf
archived log for thread 1 with sequence 26 is already on disk as file
/u01/apps/oracle/server/19.3/home/dbs/arch1_26_1192309309.dbf
archived log file name=/u01/apps/oracle/server/19.3/home/dbs/arch1_25_1192309309.dbf thread=1 sequence=25
archived log file name=/u01/apps/oracle/server/19.3/home/dbs/arch1_26_1192309309.dbf thread=1 sequence=26
media recovery complete, elapsed time: 00:00:00
Finished recover at 13-APR-25

contents of Memory Script:
{
  delete clone force archivelog all;
}
executing Memory Script

released channel: ORA_AUX_DISK_1
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=66 device type=DISK
deleted archived log
archived log file name=/u01/apps/oracle/server/19.3/home/dbs/arch1_25_1192309309.dbf RECID=1
STAMP=1198302805
deleted archived log
archived log file name=/u01/apps/oracle/server/19.3/home/dbs/arch1_26_1192309309.dbf RECID=2
STAMP=1198302806
Deleted 2 objects

Oracle instance started

Total System Global Area    2516581464 bytes

Fixed Size                  8899672 bytes
Variable Size             536870912 bytes
Database Buffers         1962934272 bytes
Redo Buffers               7876608 bytes

contents of Memory Script:
{
  sql clone "alter system set  db_name =
 ''CLONE'' comment=
 ''Reset to original value by RMAN'' scope=spfile";
  sql clone "alter system reset  db_unique_name scope=spfile";
}
executing Memory Script

sql statement: alter system set  db_name =  ''CLONE'' comment= ''Reset to original value by RMAN'' scope=spfile

sql statement: alter system reset  db_unique_name scope=spfile
Oracle instance started

Total System Global Area    2516581464 bytes

Fixed Size                  8899672 bytes
Variable Size             536870912 bytes
Database Buffers         1962934272 bytes
Redo Buffers               7876608 bytes
sql statement: CREATE CONTROLFILE REUSE SET DATABASE "CLONE" RESETLOGS ARCHIVELOG
  MAXLOGFILES    16
  MAXLOGMEMBERS     3
```

```
 MAXDATAFILES     100
 MAXINSTANCES     8
 MAXLOGHISTORY     292
LOGFILE
 GROUP     1 ( '/u01/apps/oracle/server/19.3/oradata/PROD/redo01.log' ) SIZE 200 M  REUSE,
 GROUP     2 ( '/u01/apps/oracle/server/19.3/oradata/PROD/redo02.log' ) SIZE 200 M  REUSE,
 GROUP     3 ( '/u01/apps/oracle/server/19.3/oradata/PROD/redo03.log' ) SIZE 200 M  REUSE
DATAFILE
 '/u01/apps/oracle/server/19.3/oradata/PROD/system01.dbf'
CHARACTER SET AL32UTF8


contents of Memory Script:
{
  set newname for tempfile  1 to
 "/u01/apps/oracle/server/19.3/oradata/PROD/temp01.dbf";
  switch clone tempfile all;
  catalog clone datafilecopy  "/u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf",
 "/u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf",
 "/u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf";
  switch clone datafile all;
}
executing Memory Script

executing command: SET NEWNAME

renamed tempfile 1 to /u01/apps/oracle/server/19.3/oradata/PROD/temp01.dbf in control file

cataloged datafile copy
datafile copy file name=/u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf RECID=1 STAMP=1198303004
cataloged datafile copy
datafile copy file name=/u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf RECID=2 STAMP=1198303004
cataloged datafile copy
datafile copy file name=/u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf RECID=3 STAMP=1198303004

datafile 3 switched to datafile copy
input datafile copy RECID=1 STAMP=1198303004 file name=/u01/apps/oracle/server/19.3/oradata/PROD/sysaux01.dbf
datafile 4 switched to datafile copy
input datafile copy RECID=2 STAMP=1198303004 file
name=/u01/apps/oracle/server/19.3/oradata/PROD/undotbs01.dbf
datafile 7 switched to datafile copy
input datafile copy RECID=3 STAMP=1198303004 file name=/u01/apps/oracle/server/19.3/oradata/PROD/users01.dbf

contents of Memory Script:
{
  Alter clone database open resetlogs;
}
executing Memory Script

database opened
Cannot remove created server parameter file
Finished Duplicate Db at 13-APR-25
```

- **The Database has been cloned.**

```
SQL> select name, open_mode from v$database;

NAME      OPEN_MODE
--------- --------------------
CLONE     READ WRITE
```

- **Source Database:**

```
SQL> archive log list
Database log mode              Archive Mode
Automatic archival             Enabled
Archive destination            /u01/prod
Oldest online log sequence     22
Next log sequence to archive   24
Current log sequence           24
SQL>
```

- **Target Database:**

```
SQL> archive log list
Database log mode              Archive Mode
Automatic archival             Enabled
Archive destination            /u01/apps/oracle/server/19.3/home/dbs/arch
Oldest online log sequence     1
Next log sequence to archive   2
Current log sequence           2
SQL>
```