

RMAN Hands On

Alejandro Vargas
Principal Support Consultant
Oracle Israel Support Services

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RMAN Hands On

SUMMARY

This hands-on guide covers the basics of Backup, Restore and Recovery of Oracle Databases using RMAN.

Rman is a most powerful Backup tool for Oracle Databases. When using it in complex production environments it is advisable to have hands on knowledge of the whole backup, restore and recovery cycle, including predefined step-by-step 'how to' procedures for each possible restore and recovery scenario.

The DBA and Backup Administrators must be properly trained to implement and validate the backup policy, and to manage any possible event that may requires to perform restore and recovery.

This hands on practice is organized into 4 chapters

- CATALOG
- ADMINISTRATION
- BACKUP
- RESTORE AND RECOVERY

Each chapter contains a group of scripts that permits to implement the practice executing them one by one.

RMAN Hands On

RMAN Check List

This check list provides a quick overview of items that are important to consider when working with RMAN

- Define a backup retention policy
- Setup CONTROLFILE AUTOBACKUP ON
- Setup ARCHIVELOG DELETION POLICY to a number of 'backed up' times that satisfy your recovery needs
- Generate logs of backup jobs and monitor them for errors
- Execute periodically administrative scripts to clean up the backup repository from obsolete and expired backups
- Use a Flash Recovery Area to maintain an online staging area of your last backups. That will enable fast restore and recovery in case of need
- Use a change tracking file and incremental backups that satisfy your recovery needs.
- Prepare and test a complete set of recovery scenarios and train the DBA team on them, they should include at least the following scenarios:
 - System Tablespace loss
 - Online Redolog loss
 - Controlfile loss
 - Data Tablespace loss
 - Single/multiple datafile loss
 - Archived log sequences loss- Block corruptions recovery
 - Total loss (database)
 - Total loss (server = database/software/parameter files)

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The Hands-On Environment

- 11g RDBMS software
- 11g ASM storage configured with 2 disk groups:

- § DATADG, for the databases, and
- § FRADG, for the flash recovery area, for storing some of the backups and for archived log destination.

- 1 catalog database
- 1 test database
- 1 file system for storing other backups outside ASM

Two general setup scripts are used to set the environment, they are run from within most other scripts.

```
#!/usr/bin/tcsh
# set-environment
setenv ORACLE_HOME /oradisk/oracle/app/product/11.1.0/db_1
setenv PATH $ORACLE_HOME/bin:/usr/local/bin:/usr/bin:/bin
setenv rmanuser rman      # the rman catalog owner
setenv rmanpwd cat       # the rman catalog owner password
setenv dbauser sys       # the dba user
setenv dbapwd oracle     # the dba user password
setenv rmandb rmancat    # the rman catalog database
setenv datadb redpanda   # the test database
clear
echo
# eof script
```

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```
-- sqlenv.sql  
set echo off head off feed off  
alter session set nls_date_format='dd/mm/yy hh24:mi:ss';  
set pages 50000 lines 120 echo on head on veri on time on ti on  
-- eof script
```

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CATALOG

This chapter show how to create the Rman catalog, how to register a database with it and how to review some of the information contained in the catalog.

The Catalog chapter covers the following topics:

- 1-set-catalog
- 2-create-catalog
- 3-register-database
- 4-verify-registration
- 5-manual-backup-registration
- 6-create-scripts
- 7-export-catalog
- 8-query-catalog
- 9-get-catalog-version
- 10-upgrade-catalog
- 11-unregister-database
- 12-drop-catalog

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1-set-catalog

This script create the rman user that will be the owner of the rman catalog, on the catalog database. The catalog database is usually a small database it contains and maintains the metadata of all rman backups performed using the catalog.

```
#!/usr/bin/tcsh

source ./set-environment
sqlplus $dbauser/$dbapwd@$rmandb as sysdba<<eof
@sqlenv
set echo on

CREATE USER rman IDENTIFIED BY cat
    TEMPORARY TABLESPACE temp
    DEFAULT TABLESPACE users
    QUOTA UNLIMITED ON users;

GRANT RECOVERY_CATALOG_OWNER TO rman;

exit;
eof
exit
```


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2-create-catalog

Using the rman user created on step 1, this script connects to the catalog database using the rman command line interface, and creates the rman catalog.

The rman catalog is a set of database objects that will be used to store the rman backups metadata.

```
#!/usr/bin/tcsh

source ./set-environment
rman CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
CREATE CATALOG;
eof
exit
```

Script Output:

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 12:02:15 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to recovery catalog database
```

```
RMAN>
```

```
recovery catalog created
```

```
RMAN>
```

```
Recovery Manager complete.
```

RMAN Hands On

3-register-database

Once the rman catalog is set, the databases to be backed up need to be registered with it. In this case we execute rman connecting to the database to be registered, the TARGET and to the CATALOG database.

```
#!/usr/bin/tcsh

source ./set-environment
echo executing command : REGISTER DATABASE
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
REGISTER DATABASE;
eof
exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./3-register-database

executing command : REGISTER DATABASE

Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 12:25:00 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
```

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```
RMAN>  
database registered in recovery catalog  
starting full resync of recovery catalog  
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

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4-verify-registration

Once a databases is registered with rman, we can get information about it from the catalog. In this case we execute the report schema command to get information.

```
#!/usr/bin/tcsh

source ./set-environment
echo Executing Command : REPORT SCHEMA
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
REPORT SCHEMA;
eof

exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./4-verify-registration

Executing Command : REPORT SCHEMA
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 13:45:24 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
RMAN>
starting full resync of recovery catalog
```

RMAN Hands On

```
full resync complete
Report of database schema for database with db_unique_name REDPANDA
```

List of Permanent Datafiles

=====

File	Size(MB)	Tablespace	RB segs	Datafile Name
1	700	SYSTEM	YES	+DATADG/redpanda/datafile/system.268.654614821
2	1010	SYSAUX	NO	+DATADG/redpanda/datafile/sysaux.267.654614821
3	570	UNDOTBS1	YES	+DATADG/redpanda/datafile/undotbs1.269.654614823
4	5	USERS	NO	+DATADG/redpanda/datafile/users.270.654614823
5	100	DEV	NO	+DATADG/redpanda/datafile/dev.276.654704777

List of Temporary Files

=====

File	Size(MB)	Tablespace	Maxsize(MB)	Tempfile Name
1	20	TEMP	67108863	+DATADG/redpanda/tempfile/temp.273.654614997

```
RMAN>
```

```
Recovery Manager complete.
```

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5-manual-backup-registration

Manual backups, made using Rman without a recovery catalog or user scripts, can be cataloged and made available to the rman catalog.

In this example a controlfile backup is made using rman in NOCATALOG mode, afterwards the backup is cataloged.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing command : backup current controlfile
echo
rman TARGET $dbauser/$dbapwd@$datadb NOCATALOG <<eof
backup current controlfile;
list backup;
exit;
eof
echo
echo Type file name to catalog
set fname = $<
echo
echo Executing Command : CATALOG backuppiece '<filename>'
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
CATALOG backuppiece '$fname';
eof
exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./5-manual-backup-registration
```

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```
Executing command : backup current controlfile
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 13:53:06 2008  
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to target database: REDPANDA (DBID=3603176431)  
using target database control file instead of recovery catalog
```

```
RMAN>
```

```
Starting backup at 31-MAY-08  
allocated channel: ORA_DISK_1  
channel ORA_DISK_1: SID=118 device type=DISK  
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 31-MAY-08  
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
```

```
piece
```

```
handle=+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.65617  
1597 tag=TAG20080531T135308 comment=NONE
```

```
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
```

```
Finished backup at 31-MAY-08
```

```
Starting Control File and SPFILE Autobackup at 31-MAY-08
```

```
piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-  
20080531-00 comment=NONE
```

```
Finished Control File and SPFILE Autobackup at 31-MAY-08
```

```
RMAN>
```

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```
RMAN>
```

```
Recovery Manager complete.
```

```
Type file name to catalog
```

```
/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080531-00
```

```
Executing Command : CATALOG backuppiece <filename>
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 13:55:08 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to target database: REDPANDA (DBID=3603176431)
```

```
connected to recovery catalog database
```

```
RMAN>
```

```
cataloged backup piece
```

```
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-  
3603176431-20080531-00 RECID=60 STAMP=656171712
```

```
RMAN>
```

```
Recovery Manager complete.
```


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6-create-scripts

Rman tasks can be run using scripts, that can be stored on the rman catalog. Global scripts will be available to all databases, non-global scripts will be available only to the target database. This example shows how to create a global script.

```
#!/usr/bin/tcsh

source ./set-environment
echo Executing Command : CREATE GLOBAL SCRIPT
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
CREATE GLOBAL SCRIPT global_full_backup COMMENT 'use only with ARCHIVELOG mode
databases'
{ BACKUP DATABASE PLUS ARCHIVELOG;
  DELETE NOPROMPT OBSOLETE;
}

LIST GLOBAL SCRIPT NAMES;
eof
exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./6-create-scripts
Executing Command : CREATE GLOBAL SCRIPT
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:00:53 2008
```

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```
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
```

```
RMAN> 2> 3> 4>
created global script global_full_backup
RMAN>
RMAN>
```

List of Stored Scripts in Recovery Catalog

Global Scripts

Script Name

Description

global_full_backup

use only with ARCHIVELOG mode databases

```
RMAN>
Recovery Manager complete.
```

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7-export-catalog

The database holding the rman catalog should be protected against information loss, the minimum level of protection can be implemented by executing a full export of the catalog schema. In case of catalog loss an import of the schema on a new or existing database will make the catalog available again.

```
#!/usr/bin/tcsh

source ./set-environment
echo Executing Command : exp $rmanuser/$rmanpwd@$rmandb file=rman-catalog-export.dmp
echo
exp $rmanuser/$rmanpwd@$rmandb file=rman-catalog-export.dmp owner=rman feedback=100
exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./7-export-catalog

Executing Command : exp rman/cat@rmancat file=rman-catalog-export.dmp

Export: Release 11.1.0.6.0 - Production on Sat May 31 14:03:51 2008

Copyright (c) 1982, 2007, Oracle. All rights reserved.
Connected to: Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 -
Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

Export done in US7ASCII character set and AL16UTF16 NCHAR character set
server uses WE8MSWIN1252 character set (possible charset conversion)
```

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```
. exporting pre-schema procedural objects and actions
. exporting foreign function library names for user RMAN
. exporting PUBLIC type synonyms
. exporting private type synonyms
. exporting object type definitions for user RMAN
About to export RMAN's objects ...
. exporting database links
. exporting sequence numbers
. exporting cluster definitions
. about to export RMAN's tables via Conventional Path ...
. . exporting table                AL                28 rows exported
. . exporting table                BCB               0 rows exported

...
... (more lines)

. . exporting table                XCF               0 rows exported
. . exporting table                XDF               0 rows exported
. exporting synonyms
. exporting views
. exporting stored procedures
. exporting operators
. exporting referential integrity constraints
. exporting triggers
. exporting indextypes
. exporting bitmap, functional and extensible indexes
. exporting posttables actions
. exporting materialized views
. exporting snapshot logs
. exporting job queues
```

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```
. exporting refresh groups and children  
. exporting dimensions  
. exporting post-schema procedural objects and actions  
. exporting statistics  
Export terminated successfully with warnings.
```

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8-query-catalog

In some specific situations it may be useful to query directly the recovery catalog. to do so we need to know the Database ID (dbid) and the DB Key of the database we want to query data for on the recovery catalog.

```
#!/usr/bin/tcsh

source ./set-environment
clear
echo
echo Querying Catalog Views for the Target DB_KEY or DBID Values
echo DB_KEY is used only in the recovery catalog.
echo You can determine the DBID by looking at the output displayed when RMAN connects
to the database
echo or by querying a V\${DATABASE} view as in the following:
echo
echo select dbid from v\${database}
echo

set v_db=v\${database}
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba<<eof
@sqlenv
SELECT DBID FROM $v_db;
exit
eof
echo
echo You can then obtain the DB_KEY on the Catalog Database based on the DBID
echo Enter the DBID
set v_dbid = $<
```

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```
echo
echo select db_key from rc_database where dbid=$v_dbid;
sqlplus -s $rmanuser/$rmanpwd@$rmandb <<eof
@sqlenv
SELECT DB_KEY FROM RC_DATABASE WHERE DBID = $v_dbid;
eof
```

```
echo
echo Having the DB_KEY we can execute other queries on the catalog database
echo
echo Enter the DB_KEY
set v_dbkey = $<
echo
echo To obtain the backups per incarnation of a database you can execute the following
script:
```

```
echo
echo SELECT DBINC_KEY,BS_KEY, BACKUP_TYPE, COMPLETION_TIME
echo FROM RC_DATABASE_INCARNATION i, RC_BACKUP_SET b
echo WHERE i.DB_KEY = $v_dbkey
echo AND i.DB_KEY = b.DB_KEY ;
sqlplus -s $rmanuser/$rmanpwd@$rmandb <<eof
@sqlenv
SELECT DBINC_KEY,BS_KEY, BACKUP_TYPE, COMPLETION_TIME
FROM RC_DATABASE_INCARNATION i, RC_BACKUP_SET b
WHERE i.DB_KEY = $v_dbkey
AND i.DB_KEY = b.DB_KEY ;
eof
echo
```

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```
echo For querying RC_BACKUP_FILES you must call DBMS_RCVMAN.SETDATABASE , with the
DBID of a database
echo registered in the catalog, the fourth parameter must be DBID.
echo The other parameters must all be NULL.
echo
echo "CALL DBMS_RCVMAN.SETDATABASE(null,null,null,$v_dbid,null);"
echo
sqlplus -s $rmanuser/$rmanpwd@$rmandb <<eof
@sqlenv
CALL DBMS_RCVMAN.SETDATABASE(null,null,null,$v_dbid,null);
select BACKUP_TYPE,STATUS,TAG,BYTES,COMPLETION_TIME
from RC_BACKUP_FILES;
eof
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./8-query-catalog
```

```
Querying Catalog Views for the Target DB_KEY or DBID Values
```

```
DB_KEY is used only in the recovery catalog.
```

```
You can determine the DBID by looking at the output displayed when RMAN connects
to the database
```

```
or by querying a V$DATABASE view as in the following:
```

```
select dbid from v$database
```

```
          DBID
-----
3603176431
```


RMAN Hands On

You can then obtain the DB_KEY on the Catalog Database based on the DBID
Enter the DBID
3603176431

```
select db_key from rc_database where dbid=3603176431
```

```
      DB_KEY  
-----  
          1
```

Having the DB_KEY we can execute other queries on the catalog database
Enter the DB_KEY
1

To obtain the backups per incarnation of a database you can execute the following script:

```
SELECT DBINC_KEY,BS_KEY, BACKUP_TYPE, COMPLETION_TIME  
FROM RC_DATABASE_INCARNATION i, RC_BACKUP_SET b  
WHERE i.DB_KEY = 1  
AND i.DB_KEY = b.DB_KEY
```

```
      DBINC_KEY      BS_KEY B COMPLETION_TIME  
-----  
          19          185 D 13/05/08 13:42:36  
          18          185 D 13/05/08 13:42:36
```

```
...  
... (more lines)
```

```
          15          249 D 31/05/08 13:53:24  
           2          249 D 31/05/08 13:53:24
```

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For querying RC_BACKUP_FILES you must call DBMS_RCVMAN.SETDATABASE , with the DBID of a database

registered in the catalog, the fourth parameter must be DBID. The other parameters must all be NULL.

```
CALL DBMS_RCVMAN.SETDATABASE(null,null,null,3603176431,null);
```

BACKUP_TYPE	STATUS	TAG	BYTES	COMPLETION_TIME
COPY	AVAILABLE		1385472	13/05/08 13:58:43
COPY	AVAILABLE		48145920	14/05/08 11:22:27
...				
... (more lines)				
COPY	AVAILABLE		48159744	31/05/08 11:06:50
COPY	AVAILABLE		48159744	31/05/08 11:06:50
BACKUP SET			686751744	13/05/08 13:42:36
BACKUP SET			662257664	13/05/08 13:42:16
...				
... (more lines)				
BACKUP SET			10092544	
BACKUP SET	AVAILABLE	TAG20080531T135317	10174464	31/05/08 13:56:42

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9-get-catalog-version

This example show how to get the catalog version on the rman catalog database

```
#!/usr/bin/tcsh
source ./set-environment
clear
echo
echo "SELECT * FROM rcver;"
echo

sqlplus -s $rmanuser/$rmanpwd@$rmandb <<eof
@sqlenv
SELECT * FROM rcver;
eof
echo
exit
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./9-get-catalog-version
SELECT * FROM rcver;
VERSION
-----
11.01.00.06
```

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10-upgrade-catalog

This example show how to upgrade the catalog to the last version, the upgrade command needs to be entered twice to get it executed.

```
#!/usr/bin/tcsh
source ./set-environment
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
UPGRADE CATALOG;
UPGRADE CATALOG;
eof
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./10-upgrade-catalog
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:28:40 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database

RMAN>

recovery catalog owner is RMAN
enter UPGRADE CATALOG command again to confirm catalog upgrade

RMAN>
recovery catalog upgraded to version 11.01.00.06
```

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```
DBMS_RCVMAN package upgraded to version 11.01.00.06  
DBMS_RCVCAT package upgraded to version 11.01.00.06
```

```
RMAN>  
Recovery Manager complete.
```

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11-unregister-database

If a database is not longer required on the rman catalog it can be unregistered. This command needs to be executed with the 'noprompt' option if run from within a script, otherwise it assumes NO as response to the confirmation request.

Note that rman metadata is always stored also on the controlfile, if a database is unregistered from the catalog, it can be afterwards registered again and all backups contained in the controlfile will be cataloged

```
#!/usr/bin/tcsh
source ./set-environment
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
UNREGISTER DATABASE;
eof
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./11-unregister-database
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:33:08 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database

RMAN>

database name is "REDPANDA" and DBID is 3603176431

Do you really want to unregister the database (enter YES or NO)?
```

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```
Error occurred getting response - assuming NO response
```

```
RMAN>
```

```
Recovery Manager complete.
```

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12-drop-catalog

An rman catalog can be removed with the drop catalog command. If executed from a script the command needs to be entered twice to get it run.

```
#!/usr/bin/tcsh

source ./set-environment
echo Executing Command : DROP CATALOG
echo

rman CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
DROP CATALOG;
eof
```

Script Output:

```
avargas-pc:~/scripts/CATALOG> ./12-drop-catalog

Executing Command : DROP CATALOG

Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:41:53 2008

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connected to recovery catalog database
```


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```
RMAN>
```

```
recovery catalog owner is RMAN  
enter DROP CATALOG command again to confirm catalog removal
```

```
RMAN>
```

```
Recovery Manager complete.
```

ADMINISTRATION

This chapter show how execute the most common administrative tasks within rman. They are important in order to maintain a catalog that reflects the real backups we have. maintaining a clean updated catalog will help to simplify restore operations.

The Administration chapter cover the following topics:

1-crosscheck

2-list

3-report

4-delete

RMAN Hands On

1-crosscheck

Crosscheck check that cataloged backups exist on disk or tape; if they don't exist they are marked as expired; if they exist but are no longer required to satisfy the redundancy policy, it mark the backups as obsolete.

Obsolete and expired backups can be removed from disk and the catalog later with the delete obsolete/expired commands.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : CROSSCHECK
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
CROSSCHECK BACKUP; # checks backup sets, proxy copies, and image copies
CROSSCHECK COPY OF DATABASE;
CROSSCHECK BACKUPSET;
CROSSCHECK ARCHIVELOG ALL;
eof
exit
```

Script Output:

```
avargas-pc:~/scripts/ADMINISTRATION> ./1-crosscheck
Executing Command : CROSSCHECK
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:54:00 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
RMAN>
allocated channel: ORA_DISK_1
```

RMAN Hands On

```
channel ORA_DISK_1: SID=152 device type=DISK
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629 RECID=48
STAMP=654615629
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/oradisk/backup/2gjjg996m_1_1 RECID=49 STAMP=654615771
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-09 RECID=50
STAMP=654615779
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-0a RECID=51
STAMP=654616784
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080514-00 RECID=52
STAMP=654704791
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583 RECID=53
STAMP=655117583
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603 RECID=54
STAMP=655117603
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/nnndf0_tag20080519t090644_0.278.655117611 RECID=55
STAMP=655117610
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090817_0.269.655117701 RECID=56
STAMP=655117701
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080519-00 RECID=57
STAMP=655117709
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.656171597 RECID=58
STAMP=656171596
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080531-00 RECID=60
STAMP=656171712
Crosschecked 12 objects
RMAN>

released channel: ORA_DISK_1
```

RMAN Hands On

```
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=152 device type=DISK

RMAN>

using channel ORA_DISK_1
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629 RECID=48
STAMP=654615629
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=/oradisk/backup/2gjjg996m_1_1 RECID=49 STAMP=654615771
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-09 RECID=50
STAMP=654615779
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-0a RECID=51
STAMP=654616784
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080514-00 RECID=52
STAMP=654704791
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583 RECID=53
STAMP=655117583
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603 RECID=54
STAMP=655117603
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/nnndf0_tag20080519t090644_0.278.655117611 RECID=55
STAMP=655117610
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090817_0.269.655117701 RECID=56
STAMP=655117701
crosschecked backup piece: found to be 'EXPIRED'
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080519-00 RECID=57
STAMP=655117709
crosschecked backup piece: found to be 'AVAILABLE'
backup piece handle=+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.656171597 RECID=58
STAMP=656171596
crosschecked backup piece: found to be 'AVAILABLE'
```

RMAN Hands On

```
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080531-00 RECID=60  
STAMP=656171712  
Crosschecked 12 objects
```

```
RMAN>
```

```
released channel: ORA_DISK_1  
allocated channel: ORA_DISK_1  
channel ORA_DISK_1: SID=152 device type=DISK  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf RECID=79  
STAMP=654616723  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf RECID=81  
STAMP=654693747  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf RECID=83  
STAMP=655014754  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_3_654616722.dbf RECID=85  
STAMP=655027274  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_4_654616722.dbf RECID=87  
STAMP=655117133  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654616722.dbf RECID=89  
STAMP=655117575  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_6_654616722.dbf RECID=91  
STAMP=655117695  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_7_654616722.dbf RECID=93  
STAMP=655994964  
validation succeeded for archived log  
archived log file name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_7.272.655994953 RECID=94  
STAMP=655994964  
validation succeeded for archived log  
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_8_654616722.dbf RECID=95  
STAMP=655996769  
validation succeeded for archived log
```

RMAN Hands On

```
archived log file name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_8.264.655996755 RECID=96
STAMP=655996769
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_9_654616722.dbf RECID=97
STAMP=656033212
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_9.284.656033199 RECID=98
STAMP=656033212
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_10_654616722.dbf RECID=99
STAMP=656095932
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_30/thread_1_seq_10.281.656095923 RECID=100
STAMP=656095932
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_11_654616722.dbf RECID=101
STAMP=656114531
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_30/thread_1_seq_11.280.656114431 RECID=102
STAMP=656114531
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_12_654616722.dbf RECID=103
STAMP=656121638
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_12.286.656121621 RECID=104
STAMP=656121638
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_13_654616722.dbf RECID=105
STAMP=656135809
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_13.287.656135801 RECID=106
STAMP=656135809
validation succeeded for archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_14_654616722.dbf RECID=107
STAMP=656147212
validation succeeded for archived log
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_14.288.656147205 RECID=108
STAMP=656147212
validation succeeded for archived log
```

RMAN Hands On

```
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_15_654616722.dbf RECID=109  
STAMP=656161610  
validation succeeded for archived log  
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_15.289.656161603 RECID=110  
STAMP=656161610  
Crosschecked 25 objects
```

```
RMAN>
```

```
Recovery Manager complete.
```

RMAN Hands On

2-list

List produces a report of existing backups, different kind of oracle files can be listed separately with the list command.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : LIST
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scrlog
<<eof
LIST ARCHIVELOG ALL;
LIST BACKUPSET;
LIST EXPIRED BACKUPSET;
LIST FAILURE;
LIST RECOVERABLE BACKUPSET;
eof
more scrlog
rm scrlog
exit
```

Script Output:

```
avargas-pc:~/scripts/ADMINISTRATION> ./2-list
Executing Command : LIST
RMAN> RMAN> RMAN> RMAN> RMAN> RMAN>
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 14:57:40 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```


RMAN Hands On

```
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
```

```
RMAN>
```

```
List of Archived Log Copies for database with db_unique_name REDPANDA
```

```
=====
```

```
Key      Thrd Seq      S Low Time
```

```
-----
```

```
435      1      5          A 13-MAY-08
```

```
Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf
```

```
436      1      1          A 13-MAY-08
```

```
Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf
```

```
437      1      2          A 14-MAY-08
```

```
Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf
```

```
...
```

```
... (more lines)
```

```
458      1     15          A 31-MAY-08
```

```
Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_15_654616722.dbf
```

```
459      1     15          A 31-MAY-08
```

```
Name: +FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_15.289.656161603
```

```
RMAN>
```

```
List of Backup Sets
```

```
=====
```

```
BS Key  Type LV Size          Device Type Elapsed Time Completion Time
```

```
-----
```

```
462     Incr 0  187.78M    DISK           00:02:12     13-MAY-08
```

```
BP Key: 474  Status: AVAILABLE  Compressed: YES  Tag: TAG20080513T134024
```

```
Piece Name:
```

```
+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
```

RMAN Hands On

```
List of Datafiles in backup set 462
File LV Type Ckp SCN      Ckp Time  Name
----- -- -
1      0  Incr 923651      13-MAY-08
+DATADG/redpanda/datafile/system.268.654614821
2      0  Incr 923651      13-MAY-08
+DATADG/redpanda/datafile/sysaux.267.654614821
3      0  Incr 923651      13-MAY-08
+DATADG/redpanda/datafile/undotbs1.269.654614823
4      0  Incr 923651      13-MAY-08 +DATADG/redpanda/datafile/users.270.654614823
BS Key  Size          Device Type Elapsed Time Completion Time
----- --
463    1010.50K     DISK          00:00:05      13-MAY-08
      BP Key: 475  Status: AVAILABLE Compressed: YES  Tag:
PROD_FLL_L0_PLS_ARC2DSK
      Piece Name: /oradisk/backup/2gjjg996m_1_1
```

```
List of Archived Logs in backup set 463
Thrd Seq      Low SCN      Low Time     Next SCN     Next Time
----- --
1      4          923617      13-MAY-08  923896      13-MAY-08
```

...

... (more lines)

```
List of Backup Sets
```

```
=====
```

```
BS Key  Type LV Size          Device Type Elapsed Time Completion Time
----- --
464    Full  9.70M     DISK          00:00:06      13-MAY-08
      BP Key: 476  Status: EXPIRED Compressed: NO  Tag: TAG20080513T134253
```

RMAN Hands On

```

        Piece Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-09
        SPFILE Included: Modification time: 13-MAY-08
        SPFILE db_unique_name: REDPANDA

        Control File Included: Ckp SCN: 923959          Ckp time: 13-MAY-08
BS Key  Type LV Size          Device Type Elapsed Time Completion Time
----- -- -
465     Full  9.70M          DISK          00:00:06      13-MAY-08
        BP Key: 477      Status: EXPIRED  Compressed: NO  Tag: TAG20080513T135938
        Piece Name: /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-0a
        SPFILE Included: Modification time: 13-MAY-08
        SPFILE db_unique_name: REDPANDA
        Control File Included: Ckp SCN: 945883          Ckp time: 13-MAY-08
...
... (more lines)
RMAN>
no failures found that match specification
RMAN>

List of Backup Sets
=====
BS Key  Type LV Size          Device Type Elapsed Time Completion Time
----- -- -
462     Incr 0  187.78M          DISK          00:02:12      13-MAY-08
        BP Key: 474      Status: AVAILABLE  Compressed: YES  Tag: TAG20080513T134024
        Piece Name:
+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
```

RMAN Hands On

```
List of Datafiles in backup set 462
File LV Type Ckp SCN    Ckp Time  Name
----- -- -
...
... (more lines)

RMAN>
Recovery Manager complete.
```

RMAN Hands On

3-report

Report produces a concise list of existing backups, including the full path to the backup files.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : REPORT
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scrlog <<eof
REPORT SCHEMA;
REPORT OBSOLETE;
REPORT NEED BACKUP;
REPORT UNRECOVERABLE;
REPORT SCHEMA AT TIME 'SYSDATE-1';
eof
more scrlog
rm scrlog
exit
```

Script Output:

```
avargas-pc:~/scripts/ADMINISTRATION> ./3-report

Executing Command : REPORT

RMAN> RMAN> RMAN> RMAN> RMAN> RMAN>
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 15:02:52 2008
```

RMAN Hands On

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connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database

RMAN>

Report of database schema for database with db_unique_name REDPANDA

List of Permanent Datafiles

=====

File	Size(MB)	Tablespace	RB segs	Datafile Name
1	700	SYSTEM	YES	+DATADG/redpanda/datafile/system.268.654614821
2	1010	SYSAUX	NO	+DATADG/redpanda/datafile/sysaux.267.654614821
3	570	UNDOTBS1	YES	+DATADG/redpanda/datafile/undotbs1.269.654614823
4	5	USERS	NO	+DATADG/redpanda/datafile/users.270.654614823
5	100	DEV	NO	+DATADG/redpanda/datafile/dev.276.654704777

List of Temporary Files

=====

File	Size(MB)	Tablespace	Maxsize(MB)	Tempfile Name
1	20	TEMP	67108863	+DATADG/redpanda/tempfile/temp.273.654614997

RMAN>

RMAN retention policy will be applied to the command

RMAN retention policy is set to redundancy 1

Report of obsolete backups and copies

Type	Key	Completion Time	Filename/Handle
Archive Log	435	13-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf
Archive Log	436	14-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf
Archive Log	437	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf
Archive Log	438	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_3_654616722.dbf

RMAN Hands On

```
Archive Log          439    19-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_4_654616722.dbf
Archive Log          440    19-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654616722.dbf
Backup Set           462    13-MAY-08
  Backup Piece       474    13-MAY-08
+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
Backup Set           463    13-MAY-08
  Backup Piece       475    13-MAY-08          /oradisk/backup/2gjjg996m_1_1
Backup Set           464    13-MAY-08
  Backup Piece       476    13-MAY-08          /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-09
Backup Set           465    13-MAY-08
  Backup Piece       477    13-MAY-08          /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-0a
Backup Set           466    14-MAY-08
  Backup Piece       478    14-MAY-08          /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080514-00
Backup Set           467    19-MAY-08
  Backup Piece       479    19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583
Backup Set           468    19-MAY-08
  Backup Piece       480    19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603
Backup Set           471    19-MAY-08
  Backup Piece       483    19-MAY-08          /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080519-00
Backup Set           472    31-MAY-08
  Backup Piece       484    31-MAY-08
+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.656171597
```

```
RMAN>
RMAN retention policy will be applied to the command
RMAN retention policy is set to redundancy 1
Report of files with less than 1 redundant backups
```

```
File #bkps Name
-----
```

```
RMAN>
```

RMAN Hands On

```
Report of files that need backup due to unrecoverable operations
File Type of Backup Required Name
-----
```

```
RMAN>
```

```
Report of database schema for database with db_unique_name REDPANDA
```

```
List of Permanent Datafiles
```

```
=====
```

File	Size(MB)	Tablespace	RB segs	Datafile Name
1	700	SYSTEM	YES	+DATADG/redpanda/datafile/system.268.654614821
2	1010	SYSAUX	YES	+DATADG/redpanda/datafile/sysaux.267.654614821
3	570	UNDOTBS1	YES	+DATADG/redpanda/datafile/undotbs1.269.654614823
4	5	USERS	YES	+DATADG/redpanda/datafile/users.270.654614823
5	100	DEV	YES	+DATADG/redpanda/datafile/dev.276.654704777

```
List of Temporary Files
```

```
=====
```

File	Size(MB)	Tablespace	Maxsize(MB)	Tempfile Name
1	20	TEMP	67108863	+DATADG/redpanda/tempfile/temp.273.654614997

```
RMAN>
```

```
RMAN retention policy will be applied to the command
```

```
RMAN retention policy is set to redundancy 1
```

```
Report of obsolete backups and copies
```

Type	Key	Completion Time	Filename/Handle
Archive Log	435	13-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf
Archive Log	436	14-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf
Archive Log	437	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf
Archive Log	438	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_3_654616722.dbf
Archive Log	439	19-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_4_654616722.dbf

RMAN Hands On

```
Archive Log          440    19-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654616722.dbf
Backup Set          462    13-MAY-08
  Backup Piece      474    13-MAY-08
+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
Backup Set          463    13-MAY-08
  Backup Piece      475    13-MAY-08      /oradisk/backup/2gjjg996m_1_1
Backup Set          464    13-MAY-08
  Backup Piece      476    13-MAY-08      /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-09
Backup Set          465    13-MAY-08
  Backup Piece      477    13-MAY-08      /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080513-0a
Backup Set          466    14-MAY-08
  Backup Piece      478    14-MAY-08      /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080514-00
Backup Set          467    19-MAY-08
  Backup Piece      479    19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583
Backup Set          468    19-MAY-08
  Backup Piece      480    19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603
Backup Set          471    19-MAY-08
  Backup Piece      483    19-MAY-08      /oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-
3603176431-20080519-00
Backup Set          472    31-MAY-08
  Backup Piece      484    31-MAY-08
+FRADG/redpanda/backupset/2008_05_31/ncnmf0_tag20080531t135308_0.290.656171597
```

```
RMAN>
RMAN retention policy will be applied to the command
RMAN retention policy is set to redundancy 1
Report of files with less than 1 redundant backups
```

```
File #bkps Name
-----
```

```
RMAN>
Report of files that need backup due to unrecoverable operations
File Type of Backup Required Name
```

RMAN Hands On

```
-----  
RMAN>  
Report of database schema for database with db_unique_name REDPANDA  
  
List of Permanent Datafiles  
=====
```

File	Size(MB)	Tablespace	RB segs	Datafile Name
1	700	SYSTEM	YES	+DATADG/redpanda/datafile/system.268.654614821
2	1010	SYSAUX	YES	+DATADG/redpanda/datafile/sysaux.267.654614821
3	570	UNDOTBS1	YES	+DATADG/redpanda/datafile/undotbs1.269.654614823
4	5	USERS	YES	+DATADG/redpanda/datafile/users.270.654614823
5	100	DEV	YES	+DATADG/redpanda/datafile/dev.276.654704777

```
-----  
List of Temporary Files  
=====
```

File	Size(MB)	Tablespace	Maxsize(MB)	Tempfile Name
1	20	TEMP	67108863	+DATADG/redpanda/tempfile/temp.273.654614997

```
-----  
RMAN>  
Recovery Manager complete.
```

RMAN Hands On

4-delete

Delete remove obsolete backups from disk; obsolete backups are not required to satisfy the retention policy. It does remove expired backups from the catalog also; expired backups exist on the catalog but were removed from disk.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : DELETE
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scrlog
<<eof
DELETE NOPROMPT OBSOLETE;
DELETE NOPROMPT EXPIRED BACKUPSET;
eof
more scrlog
rm scrlog
exit
```

Script Output:

```
avargas-pc:~/scripts/ADMINISTRATION> ./4-delete
Executing Command : DELETE
RMAN>
Executing Command : DELETE
RMAN> RMAN> RMAN>
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 15:43:16 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
```

RMAN Hands On

```
RMAN>
RMAN retention policy will be applied to the command
RMAN retention policy is set to redundancy 1
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=170 device type=DISK
Deleting the following obsolete backups and copies:
```

Type	Key	Completion Time	Filename/Handle
Archive Log	435	13-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf
Archive Log	436	14-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf
Archive Log	437	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf
Archive Log	438	18-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_3_654616722.dbf
Archive Log	439	19-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_4_654616722.dbf
Archive Log	440	19-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654616722.dbf
Backup Set	462	13-MAY-08	
Backup Piece	474	13-MAY-08	+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
Backup Set	463	13-MAY-08	
Backup Piece	475	13-MAY-08	/oradisk/backup/2gjjg996m_1_1
Backup Set	464	13-MAY-08	
Backup Piece	476	13-MAY-08	/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-09
Backup Set	465	13-MAY-08	

RMAN Hands On

```
Backup Piece      477      13-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080513-0a
Backup Set        466      14-MAY-08
Backup Piece      478      14-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080514-00
Backup Set        467      19-MAY-08
Backup Piece      479      19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583
Backup Set        468      19-MAY-08
Backup Piece      480      19-MAY-08
+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603
Backup Set        471      19-MAY-08
Backup Piece      483      19-MAY-08
/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080519-00
Backup Set        472      31-MAY-08
Backup Piece      484      31-MAY-08
+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.656171597
deleted archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654614978.dbf
RECID=79 STAMP=654616723
deleted archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_1_654616722.dbf
RECID=81 STAMP=654693747
deleted archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_2_654616722.dbf
RECID=83 STAMP=655014754
deleted archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_3_654616722.dbf
RECID=85 STAMP=655027274
deleted archived log
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_4_654616722.dbf
RECID=87 STAMP=655117133
deleted archived log
```

RMAN Hands On

```
archived log file name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_5_654616722.dbf
RECID=89 STAMP=655117575
deleted backup piece
backup piece
handle=+FRADG/redpanda/backupset/2008_05_13/nnndn0_tag20080513t134024_0.273.654615629
RECID=48 STAMP=654615629
deleted backup piece
backup piece handle=/oradisk/backup/2gjjg996m_1_1 RECID=49 STAMP=654615771
deleted backup piece
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080513-09 RECID=50 STAMP=654615779
deleted backup piece
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080513-0a RECID=51 STAMP=654616784
deleted backup piece
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080514-00 RECID=52 STAMP=654704791
deleted backup piece
backup piece
handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.282.655117583
RECID=53 STAMP=655117583
deleted backup piece
backup piece
handle=+FRADG/redpanda/backupset/2008_05_19/annnf0_tag20080519t090617_0.283.655117603
RECID=54 STAMP=655117603
deleted backup piece
backup piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080519-00 RECID=57 STAMP=655117709
deleted backup piece
backup piece
handle=+FRADG/redpanda/backupset/2008_05_31/ncnnf0_tag20080531t135308_0.290.656171597
RECID=58 STAMP=656171596
```

RMAN Hands On

Deleted 15 objects

```
RMAN>  
using channel ORA_DISK_1  
RMAN>
```

Recovery Manager complete.

RMAN Hands On

BACKUP

Rman provides numerous and flexible ways to backup a database or parts of a database, in this chapter a few of the several options are shown.

The following scrips are part of this chapter:

- 0-make-io
- 1-change_tracking
- 2-backup-backupset-compressed
- 3-backup-as-copy
- 4-incremental-backup-and-tags
- 5-backup-plus-archived-logs
- 6-backup-controlfile
- 7-incremental-for-backup-recover
- 8-incremental-for-quick-recover

RMAN Hands On

0-make-io

This script generates insert/update statements on a cyclic way in order to advance the archive log sequences and produce some test data.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : Masive Inserts into Test Table
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
-- create table tst as select * from dba_users;
delete from tst;
commit;
insert into tst select * from dba_users;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
insert into tst select * from tst;
commit;
eof
exit
Script Output:
```

```
avargas-pc:~/scripts/BACKUP> ./0-make-io
Executing Command : Masive Inserts into Test Table
```

RMAN Hands On

```
15360 rows deleted.  
Commit complete.  
30 rows created.  
30 rows created.  
60 rows created.  
120 rows created.  
240 rows created.  
480 rows created.  
960 rows created.  
1920 rows created.  
3840 rows created.  
7680 rows created.  
  
Commit complete.
```

RMAN Hands On

1-change_tracking

This script creates a change tracking file on the Flash Recovery Area ASM diskgroup +FRADG. A Change Tracking File keeps track of changed blocks, rman instead of scanning all datafiles for changes, read the pointers on the change tracking file, that greatly speeds up incremental backups.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command :
echo
echo ALTER DATABASE ENABLE BLOCK CHANGE TRACKING USING FILE '+fradg';
echo

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
ALTER DATABASE ENABLE BLOCK CHANGE TRACKING USING FILE '+fradg';
eof

set v_bct=V\BLOCK_CHANGE_TRACKING
echo
echo Executing Command :
echo
echo "SELECT * FROM $v_bct"
echo

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
col filename for a60
set lines 200
SELECT * FROM $v_bct;
eof
```

RMAN Hands On

exit

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./1-change_tracking
```

```
Executing Command :
```

```
ALTER DATABASE ENABLE BLOCK CHANGE TRACKING USING FILE +fradg  
block change tracking is enabled
```

```
Executing Command :
```

```
SELECT * FROM V$BLOCK_CHANGE_TRACKING  
STATUS      FILENAME  
BYTES
```

```
-----  
ENABLED    +FRADG/redpanda/changetracking/ctf.265.654310963      11599872
```

RMAN Hands On

2-backup-backupset-compressed

This script creates a compressed database backupset that includes also the archived logs. Once the backup complete successfully the original archived logs are removed from disk.

Rman compression saves around 80% of the space required to store a whole database backup.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : BACKUP AS COMPRESSED BACKUPSET
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=./scr.log <<eof
BACKUP AS COMPRESSED BACKUPSET DATABASE PLUS ARCHIVELOG DELETE INPUT;
eof
more ./scr.log
rm ./scr.log
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./2-backup-backupset-compressed
Executing Command : BACKUP AS COMPRESSED BACKUPSET
RMAN> RMAN>
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 16:22:27 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database

RMAN>
```

RMAN Hands On

```
Starting backup at 31-MAY-08
current log archived
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=104 device type=DISK
channel ORA_DISK_1: starting compressed archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=6 RECID=126 STAMP=656179887
input archived log thread=1 sequence=7 RECID=122 STAMP=656179857
input archived log thread=1 sequence=8 RECID=117 STAMP=656179795
input archived log thread=1 sequence=9 RECID=124 STAMP=656179873
input archived log thread=1 sequence=10 RECID=123 STAMP=656179866
input archived log thread=1 sequence=11 RECID=118 STAMP=656179807
input archived log thread=1 sequence=12 RECID=119 STAMP=656179819
input archived log thread=1 sequence=13 RECID=116 STAMP=656179783
input archived log thread=1 sequence=14 RECID=120 STAMP=656179831
input archived log thread=1 sequence=15 RECID=115 STAMP=656179771
input archived log thread=1 sequence=16 RECID=121 STAMP=656179844
input archived log thread=1 sequence=17 RECID=125 STAMP=656179881
input archived log thread=1 sequence=18 RECID=129 STAMP=656180161
input archived log thread=1 sequence=19 RECID=131 STAMP=656180550
channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
piece handle=+FRADG/redpanda/backupset/2008_05_31/annmf0_tag20080531t162232_0.292.656180559
tag=TAG20080531T162232 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:01:15
channel ORA_DISK_1: deleting archived log(s)
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_6.290.656179887 RECID=126
STAMP=656179887
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_7.291.656179851 RECID=122
STAMP=656179857
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_8.287.656179791 RECID=117
STAMP=656179795
```

RMAN Hands On

```
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_9.281.656179871 RECID=124
STAMP=656179873
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_10.272.656179863 RECID=123
STAMP=656179866
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_11.264.656179803 RECID=118
STAMP=656179807
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_12.280.656179815 RECID=119
STAMP=656179819
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_13.289.656179779 RECID=116
STAMP=656179783
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_14.286.656179827 RECID=120
STAMP=656179831
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_15.283.656179767 RECID=115
STAMP=656179771
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_16.288.656179839 RECID=121
STAMP=656179844
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_17.284.656179879 RECID=125
STAMP=656179881
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_18.273.656180161 RECID=129
STAMP=656180161
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_19.282.656180551 RECID=131
STAMP=656180550
Finished backup at 31-MAY-08
Starting backup at 31-MAY-08
using channel ORA_DISK_1
channel ORA_DISK_1: starting compressed full datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set
input datafile file number=00002 name=+DATADG/redpanda/datafile/sysaux.267.654614821
input datafile file number=00001 name=+DATADG/redpanda/datafile/system.268.654614821
input datafile file number=00003 name=+DATADG/redpanda/datafile/undotbs1.269.654614823
input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777
input datafile file number=00004 name=+DATADG/redpanda/datafile/users.270.654614823
channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
piece handle=+FRADG/redpanda/backupset/2008_05_31/nnndf0_tag20080531t162355_0.282.656180641
tag=TAG20080531T162355 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:02:25
Finished backup at 31-MAY-08
Starting backup at 31-MAY-08
current log archived
```

RMAN Hands On

```
using channel ORA_DISK_1
channel ORA_DISK_1: starting compressed archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=20 RECID=133 STAMP=656180786
channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
piece handle=+FRADG/redpanda/backupset/2008_05_31/annnf0_tag20080531t162630_0.284.656180795
tag=TAG20080531T162630 comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:02
channel ORA_DISK_1: deleting archived log(s)
archived log file name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_20.273.656180787 RECID=133
STAMP=656180786
Finished backup at 31-MAY-08
Starting Control File and SPFILE Autobackup at 31-MAY-08
piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080531-02 comment=NONE
Finished Control File and SPFILE Autobackup at 31-MAY-08
RMAN>
```

Recovery Manager complete.

RMAN Hands On

3-backup-as-copy

This script creates a bit by bit copy of the database files and archived logs, the backup destination is a file system. This backup type create files that can be used to create a clone or restore the database without using rman. In addition this kind of backup can be updated applying to it the changes recorded on future incremental backups.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : BACKUP AS COPY - to file system -
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
BACKUP AS COPY DEVICE TYPE DISK DATABASE FORMAT '/oradisk/backup/%U' TAG='FULL2RECOVER'
PLUS ARCHIVELOG DELETE INPUT;
eof
more ./scr.log
rm ./scr.log
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./2-backup-backupset-compressed
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 16:09:08 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database

RMAN> 2>
starting full resync of recovery catalog
full resync complete
```

RMAN Hands On

```
Starting backup at 31-MAY-08
current log archived
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=113 device type=DISK
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=15 RECID=110 STAMP=656161610
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_15.283.656179767
RECID=115 STAMP=656179771
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_15.289.656161603
RECID=110 STAMP=656161610
channel ORA_DISK_1: starting archived log copy

input archived log thread=1 sequence=13 RECID=106 STAMP=656135809

output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_13.289.656179779
RECID=116 STAMP=656179783

channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07

channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_13.287.656135801
RECID=106 STAMP=656135809
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=8 RECID=96 STAMP=655996769
```

RMAN Hands On

```
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_8.287.656179791 RECID=117
STAMP=656179795
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_8.264.655996755 RECID=96
STAMP=655996769
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=11 RECID=102 STAMP=656114531
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_11.264.656179803
RECID=118 STAMP=656179807
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_30/thread_1_seq_11.280.656114431
RECID=102 STAMP=656114531
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=12 RECID=104 STAMP=656121638
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_12.280.656179815
RECID=119 STAMP=656179819
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_12.286.656121621
RECID=104 STAMP=656121638
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=14 RECID=108 STAMP=656147212
```

RMAN Hands On

```
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_14.286.656179827
RECID=120 STAMP=656179831
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_14.288.656147205
RECID=108 STAMP=656147212
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=16 RECID=112 STAMP=656176140
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_16.288.656179839
RECID=121 STAMP=656179844
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_16.291.656176131
RECID=112 STAMP=656176140
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=7 RECID=94 STAMP=655994964
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_7.291.656179851 RECID=122
STAMP=656179857
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:07
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_7.272.655994953 RECID=94
STAMP=655994964
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=10 RECID=100 STAMP=656095932
```

RMAN Hands On

```
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_10.272.656179863
RECID=123 STAMP=656179866
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:03
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_30/thread_1_seq_10.281.656095923
RECID=100 STAMP=656095932
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=9 RECID=98 STAMP=656033212
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_9.281.656179871 RECID=124
STAMP=656179873
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:03
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_29/thread_1_seq_9.284.656033199 RECID=98
STAMP=656033212
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=17 RECID=114 STAMP=656179759
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_17.284.656179879
RECID=125 STAMP=656179881
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:03
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_17.290.656179755
RECID=114 STAMP=656179759
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=6 RECID=91 STAMP=655117695
```

RMAN Hands On

```
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_6.290.656179887 RECID=126
STAMP=656179887
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:01
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_6_654616722.dbf RECID=91
STAMP=655117695
Finished backup at 31-MAY-08
Starting backup at 31-MAY-08
using channel ORA_DISK_1
channel ORA_DISK_1: starting datafile copy
input datafile file number=00002
name=+DATADG/redpanda/datafile/sysaux.267.654614821
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-SYSAUX_FNO-
2_37jhp0lh tag=FULL2RECOVER RECID=23 STAMP=656179989
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:01:45
channel ORA_DISK_1: starting datafile copy
input datafile file number=00001
name=+DATADG/redpanda/datafile/system.268.654614821
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-SYSTEM_FNO-
1_38jhp0ou tag=FULL2RECOVER RECID=24 STAMP=656180068
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:01:05
channel ORA_DISK_1: starting datafile copy
input datafile file number=00003
name=+DATADG/redpanda/datafile/undotbs1.269.654614823
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-UNDOTBS1_FNO-
3_39jhp0r4 tag=FULL2RECOVER RECID=25 STAMP=656180128
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:55
channel ORA_DISK_1: starting datafile copy
```

RMAN Hands On

```
input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-DEV_FNO-
5_3ajhp0t0 tag=FULL2RECOVER RECID=26 STAMP=656180142
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:15
channel ORA_DISK_1: starting datafile copy
input datafile file number=00004
name=+DATADG/redpanda/datafile/users.270.654614823
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-USERS_FNO-
4_3bjhp0tk tag=FULL2RECOVER RECID=27 STAMP=656180153
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:01
Finished backup at 31-MAY-08
Starting backup at 31-MAY-08
current log archived
using channel ORA_DISK_1
channel ORA_DISK_1: starting archived log copy
input archived log thread=1 sequence=18 RECID=128 STAMP=656180155
output file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_18.273.656180161
RECID=129 STAMP=656180161
channel ORA_DISK_1: archived log copy complete, elapsed time: 00:00:01
channel ORA_DISK_1: deleting archived log(s)
archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_18.282.656180155
RECID=128 STAMP=656180155
Finished backup at 31-MAY-08
Starting Control File and SPFILE Autobackup at 31-MAY-08
piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080531-01 comment=NONE
Finished Control File and SPFILE Autobackup at 31-MAY-08
RMAN>
```

RMAN Hands On

Recovery Manager complete.

RMAN Hands On

4-incremental-backup-and-tags

This script creates a compressed incremental level 0 backupset and assigns to it a tag, that can be used to reference it on another rman command later.

The backup is create on the Flash Recovery Area because the parameter `db_recovery_file_dest` is set to ASM diskgroup `+FRADG`

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : BACKUP AS COMPRESSED BACKUPSET
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
BACKUP AS COMPRESSED BACKUPSET INCREMENTAL LEVEL 0 DATABASE TAG 'production_full_lv0';
eof
more ./scr.log
rm ./scr.log
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./4-incremental-backup-and-tags
RMAN> RMAN>
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 17:09:40 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
```

```
RMAN>
```

RMAN Hands On

```
Starting backup at 31-MAY-08
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=118 device type=DISK
channel ORA_DISK_1: starting compressed incremental level 0 datafile backup set
channel ORA_DISK_1: specifying datafile(s) in backup set

input datafile file number=00002
name=+DATADG/redpanda/datafile/sysaux.267.654614821

input datafile file number=00001
name=+DATADG/redpanda/datafile/system.268.654614821

input datafile file number=00003
name=+DATADG/redpanda/datafile/undotbs1.269.654614823

input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777

input datafile file number=00004
name=+DATADG/redpanda/datafile/users.270.654614823

channel ORA_DISK_1: starting piece 1 at 31-MAY-08

channel ORA_DISK_1: finished piece 1 at 31-MAY-08

piece
handle=+FRADG/redpanda/backupset/2008_05_31/nnndn0_production_full_lv0_0.273.6561
83389 tag=PRODUCTION_FULL_LV0 comment=NONE

channel ORA_DISK_1: backup set complete, elapsed time: 00:02:36
```

RMAN Hands On

```
Finished backup at 31-MAY-08
```

```
Starting Control File and SPFILE Autobackup at 31-MAY-08
```

```
piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-20080531-03 comment=NONE
```

```
Finished Control File and SPFILE Autobackup at 31-MAY-08
```

```
RMAN>
```

```
Recovery Manager complete.
```

RMAN Hands On

5-backup-plus-archived-logs

This script like the previous creates a compressed incremental level 0 backupset and assigns to it a tag, that can be used to reference it on another rman command later. In this case the destination is set to a file system with the FORMAT clause.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : BACKUP AS COMPRESSED BACKUPSET
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
BACKUP AS COMPRESSED BACKUPSET INCREMENTAL LEVEL 0
DATABASE PLUS ARCHIVELOG
TAG 'prod_f11_10_pls_arc2dsk'
FORMAT '/oradisk/backup/%U'
DELETE INPUT;
eof
more ./scr.log
rm ./scr.log
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./5-backup-plus-archived-logs
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 17:35:21 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
RMAN> 2> 3> 4> 5>
```

```
Starting backup at 31-MAY-08
```

RMAN Hands On

```
current log archived
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=120 device type=DISK
channel ORA_DISK_1: starting compressed archived log backup set
channel ORA_DISK_1: specifying archived log(s) in backup set

input archived log thread=1 sequence=7 RECID=93 STAMP=655994964

input archived log thread=1 sequence=8 RECID=95 STAMP=655996769

input archived log thread=1 sequence=9 RECID=97 STAMP=656033212

input archived log thread=1 sequence=10 RECID=99 STAMP=656095932

input archived log thread=1 sequence=11 RECID=101 STAMP=656114531

input archived log thread=1 sequence=12 RECID=103 STAMP=656121638

input archived log thread=1 sequence=13 RECID=105 STAMP=656135809

input archived log thread=1 sequence=14 RECID=107 STAMP=656147212

input archived log thread=1 sequence=15 RECID=109 STAMP=656161610

input archived log thread=1 sequence=16 RECID=111 STAMP=656176140

input archived log thread=1 sequence=17 RECID=113 STAMP=656179759

input archived log thread=1 sequence=18 RECID=127 STAMP=656180155
```

RMAN Hands On

```
input archived log thread=1 sequence=19 RECID=130 STAMP=656180550
input archived log thread=1 sequence=20 RECID=132 STAMP=656180786
input archived log thread=1 sequence=21 RECID=135 STAMP=656184927
channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
piece handle=/oradisk/backup/3ljhp5j1_1_1 tag=PROD_FLL_L0_PLS_ARC2DSK comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:55
channel ORA_DISK_1: deleting archived log(s)

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_7_654616722.dbf RECID=93
STAMP=655994964

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_8_654616722.dbf RECID=95
STAMP=655996769

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_9_654616722.dbf RECID=97
STAMP=656033212
```

RMAN Hands On

```
archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_10_654616722.dbf RECID=99
STAMP=656095932

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_11_654616722.dbf RECID=101
STAMP=656114531

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_12_654616722.dbf RECID=103
STAMP=656121638

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_13_654616722.dbf RECID=105
STAMP=656135809

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_14_654616722.dbf RECID=107
STAMP=656147212

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_15_654616722.dbf RECID=109
STAMP=656161610

archived log file
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_16_654616722.dbf RECID=111
STAMP=656176140
```

RMAN Hands On

```
archived log file  
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_17_654616722.dbf RECID=113  
STAMP=656179759
```

```
archived log file  
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_18_654616722.dbf RECID=127  
STAMP=656180155
```

```
archived log file  
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_19_654616722.dbf RECID=130  
STAMP=656180550
```

```
archived log file  
name=/oradisk/oracle/app/product/11.1.0/db_1/dbs/arch1_20_654616722.dbf RECID=132  
STAMP=656180786
```

```
archived log file  
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_21.288.656184925 RECID=135  
STAMP=656184927
```

```
Finished backup at 31-MAY-08
```

```
Starting backup at 31-MAY-08
```

```
using channel ORA_DISK_1
```

```
channel ORA_DISK_1: starting compressed incremental level 0 datafile backup set
```

```
channel ORA_DISK_1: specifying datafile(s) in backup set
```


RMAN Hands On

```
input datafile file number=00002 name=+DATADG/redpanda/datafile/sysaux.267.654614821
input datafile file number=00001 name=+DATADG/redpanda/datafile/system.268.654614821
input datafile file number=00003 name=+DATADG/redpanda/datafile/undotbs1.269.654614823
input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777
input datafile file number=00004 name=+DATADG/redpanda/datafile/users.270.654614823

channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08

piece
handle=+FRADG/redpanda/backupset/2008_05_31/nnndn0_tag20080531t173630_0.288.656184995
tag=TAG20080531T173630 comment=NONE

channel ORA_DISK_1: backup set complete, elapsed time: 00:02:26

Finished backup at 31-MAY-08

Starting backup at 31-MAY-08

current log archived

using channel ORA_DISK_1

channel ORA_DISK_1: starting compressed archived log backup set
```

RMAN Hands On

```
channel ORA_DISK_1: specifying archived log(s) in backup set
input archived log thread=1 sequence=22 RECID=137 STAMP=656185140
channel ORA_DISK_1: starting piece 1 at 31-MAY-08
channel ORA_DISK_1: finished piece 1 at 31-MAY-08
piece handle=/oradisk/backup/3njhp5pm_1_1 tag=PROD_FLL_L0_PLS_ARC2DSK comment=NONE
channel ORA_DISK_1: backup set complete, elapsed time: 00:00:01
channel ORA_DISK_1: deleting archived log(s)

archived log file
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_22.283.656185141 RECID=137
STAMP=656185140

Finished backup at 31-MAY-08

Starting Control File and SPFILE Autobackup at 31-MAY-08

piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080531-04 comment=NONE

Finished Control File and SPFILE Autobackup at 31-MAY-08

RMAN>
```

RMAN Hands On

Recovery Manager complete.

RMAN Hands On

6-backup-controlfile

This script setup some of the basic configurable rman parameters. by setting AUTOBACKUP ON each time a backup is executed, or an structural change is made to the database, automatical a backup of the controlfile will be created.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : Controlfile Autobackup Settings

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
CONFIGURE CONTROLFILE AUTOBACKUP ON;
CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%d_%F';
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE; # delete obsolete and backed up 2 times
CONFIGURE SNAPSHOT CONTROLFILE NAME TO
'/oradisk/oracle/app/product/11.1.0/db_1/dbs/snapcf_redpanda.f'; # default
eof
more scr.log
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./6-backup-controlfile
Executing Command : Controlfile Autobackup Settings
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 17:44:43 2008
Copyright (c) 1982, 2007, Oracle. All rights reserved.
connected to target database: REDPANDA (DBID=3603176431)
connected to recovery catalog database
RMAN>
old RMAN configuration parameters:
```

RMAN Hands On

```
CONFIGURE CONTROLFILE AUTOBACKUP ON;

new RMAN configuration parameters:

CONFIGURE CONTROLFILE AUTOBACKUP ON;

new RMAN configuration parameters are successfully stored

starting full resync of recovery catalog

full resync complete

RMAN>

old RMAN configuration parameters:

CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%d_%F';

new RMAN configuration parameters:

CONFIGURE CONTROLFILE AUTOBACKUP FORMAT FOR DEVICE TYPE DISK TO '%d_%F';

new RMAN configuration parameters are successfully stored

starting full resync of recovery catalog

full resync complete
```

RMAN Hands On

```
RMAN>
```

```
old RMAN configuration parameters:
```

```
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE;
```

```
new RMAN configuration parameters:
```

```
CONFIGURE ARCHIVELOG DELETION POLICY TO NONE;
```

```
new RMAN configuration parameters are successfully stored
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
old RMAN configuration parameters:
```

```
CONFIGURE SNAPSHOT CONTROLFILE NAME TO  
'/oradisk/oracle/app/product/11.1.0/db_1/dbs/snapcf_redpanda.f';
```

```
new RMAN configuration parameters:
```

```
CONFIGURE SNAPSHOT CONTROLFILE NAME TO  
'/oradisk/oracle/app/product/11.1.0/db_1/dbs/snapcf_redpanda.f';
```

RMAN Hands On

```
new RMAN configuration parameters are successfully stored  
starting full resync of recovery catalog  
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

RMAN Hands On

7-incremental-for-backup-recover

This script when executed the first time look for a backup with tag 'INCREMENTAL_DAILY_UPDATED' that does not exist yet, so it creates it. The second time it will create an incremental backup level 1 to be used to recover the original backup, on the next run. From the third time on, the script will make recover the backup tag 'INCREMENTAL_DAILY_UPDATED' with the previous incremental and it will create a new incremental backup.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command INCREMENTAL DAILY BACKUP TO FILE SYSTEM
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
RUN
{
  ALLOCATE CHANNEL disk1 DEVICE TYPE DISK FORMAT '/oradisk/backup/%U';
  ALLOCATE CHANNEL disk2 DEVICE TYPE DISK FORMAT '/oradisk/backup/%U';
  RECOVER COPY OF DATABASE
  WITH TAG 'INCREMENTAL_DAILY_UPDATED' ;
  BACKUP
  INCREMENTAL LEVEL 1
  FOR RECOVER OF COPY WITH TAG 'INCREMENTAL_DAILY_UPDATED'
  DATABASE FORMAT '/oradisk/backup/%U'
  PLUS ARCHIVELOG FORMAT '/oradisk/backup/%U';
}
eof
more ./scr.log
exit
```

Script Output:

RMAN Hands On

```
avargas-pc:~/scripts/BACKUP> ./7-incremental-for-backup-recover  
Executing Command INCREMENTAL DAILY BACKUP TO FILE SYSTEM  
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 17:52:33 2008  
Copyright (c) 1982, 2007, Oracle. All rights reserved.  
connected to target database: REDPANDA (DBID=3603176431)  
connected to recovery catalog database  
RMAN> 2> 3> 4> 5> 6> 7> 8> 9> 10> 11> 12>  
allocated channel: disk1  
channel disk1: SID=104 device type=DISK  
  
allocated channel: disk2  
channel disk2: SID=120 device type=DISK  
  
Starting recover at 31-MAY-08  
no copy of datafile 1 found to recover
```

RMAN Hands On

```
no copy of datafile 2 found to recover
no copy of datafile 3 found to recover
no copy of datafile 4 found to recover
no copy of datafile 5 found to recover
Finished recover at 31-MAY-08
Starting backup at 31-MAY-08
current log archived
channel disk1: starting archived log backup set
channel disk1: specifying archived log(s) in backup set
input archived log thread=1 sequence=21 RECID=134 STAMP=656184927
channel disk1: starting piece 1 at 31-MAY-08
channel disk2: starting archived log backup set
channel disk2: specifying archived log(s) in backup set
input archived log thread=1 sequence=22 RECID=136 STAMP=656185140
input archived log thread=1 sequence=23 RECID=139 STAMP=656185958
```

RMAN Hands On

```
channel disk2: starting piece 1 at 31-MAY-08
channel disk1: finished piece 1 at 31-MAY-08
piece handle=/oradisk/backup/3pjhp6j8_1_1 tag=TAG20080531T175239 comment=NONE
channel disk1: backup set complete, elapsed time: 00:00:04
channel disk2: finished piece 1 at 31-MAY-08
piece handle=/oradisk/backup/3qjhp6jc_1_1 tag=TAG20080531T175239 comment=NONE
channel disk2: backup set complete, elapsed time: 00:00:01
Finished backup at 31-MAY-08
```

```
Starting backup at 31-MAY-08
no parent backup or copy of datafile 2 found
no parent backup or copy of datafile 1 found
no parent backup or copy of datafile 3 found
no parent backup or copy of datafile 5 found
no parent backup or copy of datafile 4 found
```

RMAN Hands On

```
channel disk1: starting datafile copy
```

```
input datafile file number=00002  
name=+DATADG/redpanda/datafile/sysaux.267.654614821
```

```
channel disk2: starting datafile copy
```

```
input datafile file number=00001  
name=+DATADG/redpanda/datafile/system.268.654614821
```

```
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-SYSTEM_FNO-  
1_3sjhp6jm tag=INCREMENTAL_DAILY_UPDATED RECID=28 STAMP=656186125
```

```
channel disk2: datafile copy complete, elapsed time: 00:02:36
```

```
channel disk2: starting datafile copy
```

```
input datafile file number=00003  
name=+DATADG/redpanda/datafile/undotbs1.269.654614823
```

```
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-SYSAUX_FNO-  
2_3rjhp6ji tag=INCREMENTAL_DAILY_UPDATED RECID=29 STAMP=656186152
```

```
channel disk1: datafile copy complete, elapsed time: 00:03:01
```

```
channel disk1: starting datafile copy
```

```
input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777
```

RMAN Hands On

```
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-DEV_FNO-5_3ujhp6pc tag=INCREMENTAL_DAILY_UPDATED RECID=30 STAMP=656186186
```

```
channel disk1: datafile copy complete, elapsed time: 00:00:36
```

```
channel disk1: starting datafile copy
```

```
input datafile file number=00004  
name=+DATADG/redpanda/datafile/users.270.654614823
```

```
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-USERS_FNO-4_3vjhp6ql tag=INCREMENTAL_DAILY_UPDATED RECID=31 STAMP=656186209
```

```
channel disk1: datafile copy complete, elapsed time: 00:00:15
```

```
output file name=/oradisk/backup/data_D-REDPANDA_I-3603176431_TS-UNDOTBS1_FNO-3_3tjhp6oo tag=INCREMENTAL_DAILY_UPDATED RECID=32 STAMP=656186224
```

```
channel disk2: datafile copy complete, elapsed time: 00:01:27
```

```
Finished backup at 31-MAY-08
```

```
Starting backup at 31-MAY-08
```

```
current log archived
```

```
channel disk1: starting archived log backup set
```

RMAN Hands On

```
channel disk1: specifying archived log(s) in backup set
input archived log thread=1 sequence=24 RECID=141 STAMP=656186228
channel disk1: starting piece 1 at 31-MAY-08
channel disk1: finished piece 1 at 31-MAY-08
piece handle=/oradisk/backup/40jhp6rm_1_1 tag=TAG20080531T175709 comment=NONE
channel disk1: backup set complete, elapsed time: 00:00:01
Finished backup at 31-MAY-08
```

```
Starting Control File and SPFILE Autobackup at 31-MAY-08

piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080531-05 comment=NONE

Finished Control File and SPFILE Autobackup at 31-MAY-08

released channel: disk1

released channel: disk2
```

```
RMAN>
```

RMAN Hands On

Recovery Manager complete.

RMAN Hands On

8-incremental-for-quick-recover

This script is similar to the previous one, the difference is that instead of applying each day the previous day incremental backup, it will wait for a week before starting to apply the incremental pieces.

When executed the first time it will look for a backup with tag 'INCREMENTAL_FAST_RECOVER' that does not exist yet, so it creates it.

From the second and until the seventh time it will create an incremental backup level 1 to be used to recover the backup with tag 'INCREMENTAL_FAST_RECOVER'.

From the eight time on, the script will recover the backup tagged 'INCREMENTAL_FAST_RECOVER' using the incremental produced a week ago.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Command : INCREMENTAL SEVEN DAY BACKUP
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb log=scr.log <<eof
RUN
{
RECOVER COPY OF DATABASE
WITH TAG 'INCREMENTAL_FAST_RECOVER'
UNTIL TIME 'SYSDATE - 7';
BACKUP
INCREMENTAL LEVEL 1
FOR RECOVER OF COPY WITH TAG 'INCREMENTAL_FAST_RECOVER'
DATABASE;
}
eof
```


RMAN Hands On

```
more scr.log  
exit
```

Script Output:

```
avargas-pc:~/scripts/BACKUP> ./8-incremental-for-quick-recover  
  
Executing Command : INCREMENTAL SEVEN DAY BACKUP  
  
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 18:01:41 2008  
  
Copyright (c) 1982, 2007, Oracle. All rights reserved.  
  
connected to target database: REDPANDA (DBID=3603176431)  
  
connected to recovery catalog database  
  
  
RMAN> 2> 3> 4> 5> 6> 7> 8> 9> 10>  
  
Starting recover at 31-MAY-08  
  
allocated channel: ORA_DISK_1  
  
channel ORA_DISK_1: SID=104 device type=DISK  
  
no copy of datafile 1 found to recover  
  
no copy of datafile 2 found to recover
```

RMAN Hands On

```
no copy of datafile 3 found to recover  
no copy of datafile 4 found to recover  
no copy of datafile 5 found to recover  
Finished recover at 31-MAY-08
```

```
Starting backup at 31-MAY-08  
using channel ORA_DISK_1  
no parent backup or copy of datafile 2 found  
no parent backup or copy of datafile 1 found  
no parent backup or copy of datafile 3 found  
no parent backup or copy of datafile 5 found  
no parent backup or copy of datafile 4 found  
channel ORA_DISK_1: starting datafile copy  
input datafile file number=00002  
name=+DATADG/redpanda/datafile/sysaux.267.654614821
```

RMAN Hands On

```
output file name=+FRADG/redpanda/datafile/sysaux.289.656186511  
tag=INCREMENTAL_FAST_RECOVER RECID=33 STAMP=656186675
```

```
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:02:56
```

```
channel ORA_DISK_1: starting datafile copy
```

```
input datafile file number=00001  
name=+DATADG/redpanda/datafile/system.268.654614821
```

```
output file name=+FRADG/redpanda/datafile/system.280.656186693  
tag=INCREMENTAL_FAST_RECOVER RECID=34 STAMP=656186852
```

```
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:02:46
```

```
channel ORA_DISK_1: starting datafile copy
```

```
input datafile file number=00003  
name=+DATADG/redpanda/datafile/undotbs1.269.654614823
```

```
output file name=+FRADG/redpanda/datafile/undotbs1.264.656186867  
tag=INCREMENTAL_FAST_RECOVER RECID=35 STAMP=656186981
```

```
channel ORA_DISK_1: datafile copy complete, elapsed time: 00:02:07
```

```
channel ORA_DISK_1: starting datafile copy
```

```
input datafile file number=00005 name=+DATADG/redpanda/datafile/dev.276.654704777
```

RMAN Hands On

```
output file name=+FRADG/redpanda/datafile/dev.272.656186997
tag=INCREMENTAL_FAST_RECOVER RECID=36 STAMP=656187020

channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:35

channel ORA_DISK_1: starting datafile copy

input datafile file number=00004
name=+DATADG/redpanda/datafile/users.270.654614823

output file name=+FRADG/redpanda/datafile/users.281.656187035
tag=INCREMENTAL_FAST_RECOVER RECID=37 STAMP=656187036

channel ORA_DISK_1: datafile copy complete, elapsed time: 00:00:04

Finished backup at 31-MAY-08
```

```
Starting Control File and SPFILE Autobackup at 31-MAY-08
```

```
piece handle=/oradisk/oracle/app/product/11.1.0/db_1/dbs/REDPANDA_c-3603176431-
20080531-06 comment=NONE
```

```
Finished Control File and SPFILE Autobackup at 31-MAY-08
```

```
RMAN>
```

RMAN Hands On

Recovery Manager complete.

RECOVERY

Restore and recovery are the critical ends of the Backup and Recovery policies, in this chapter we simulate critical failures and we execute the restore and recovery using the backups implemented on the previous chapter.

The following scenarios are implemented:

- | | |
|--------------------------|----------------------------------|
| 1-system-tablespace-loss | 1b-recover-system-tablespace |
| 2-user-datafile-loss | 2b-recover-users-tablespace |
| 3-online-redo-loss | 3b-recover-from-redo-loss |
| 4-controlfile-loss | 4b-recover-from-controlfile-loss |
| 5-database-loss | 5b-recover-from-total-loss |

RMAN Hands On

1-system-tablespace-loss

This script generates a crash that removes the system tablespace datafile, in order to be able to remove the datafile a crash of the ASM instance is produced. Once the system tablespace datafile is removed the database is brought up and the error messages

```
ORA-01157: cannot identify/lock data file 1 - see DBWR trace file
and
ORA-01110: data file 1: '+DATADG/redpanda/datafile/system.268.654614821'
```

are returned by Oracle.

```
#!/usr/bin/tcsh
source ./set-environment
echo Generating database crash ...
echo
set v_rmf=`echo 'select file_name from dba_data_files where file_id=1;' | sqlplus -s / as
sysdba | grep system`
setenv ORACLE_SID +ASM
sqlplus -s $dbauser/$dbapwd@+ASM as sysdba <<eof
shutdown abort;
eof
sqlplus -s $dbauser/$dbapwd@+ASM as sysdba <<eof
startup
eof
echo
echo Generating system tablespace loss ...
echo
asmcmd lsdg
```

RMAN Hands On

```
echo
asmcmd ls +datadg/redpanda/datafile
echo
asmcmd rm -rf $v_rmf
echo
asmcmd lsdg
echo
asmcmd ls +datadg/redpanda/datafile
echo

echo Trying to restart the database after the crash ...
echo

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
startup
eof

exit
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./1-system-tablespace-loss

Generating database crash ...

ASM instance shutdown

ASM instance started

Total System Global Area 284565504 bytes

Fixed Size 1299428 bytes
```

RMAN Hands On

Variable Size 258100252 bytes

ASM Cache 25165824 bytes

ASM diskgroups mounted

Generating system tablespace loss ...

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB
Req_mir_free_MB		Usable_file_MB		Offline_disks		Name	
MOUNTED	EXTERN	N	512	4096	1048576	11452	6901
0	6901			0	DATADG/		
MOUNTED	EXTERN	N	512	4096	1048576	11452	7157
0	7157			0	FRADG/		
MOUNTED	NORMAL	N	512	4096	1048576	22904	15054
5726		4664		0	NRDATADG/		
MOUNTED	NORMAL	N	512	4096	1048576	22904	21518
5726		7896		0	NRFRAADDG/		

DEV.276.654704777
SYSAUX.267.654614821
SYSTEM.268.654614821
UNDOTBS1.269.654614823
USERS.270.654614823

RMAN Hands On

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB
MOUNTED	EXTERN	N	512	4096	1048576	11452	7603
0	7603			0	DATADG/		
MOUNTED	EXTERN	N	512	4096	1048576	11452	7157
0	7157			0	FRADG/		
MOUNTED	NORMAL	N	512	4096	1048576	22904	15054
5726	4664			0	NRDATADG/		
MOUNTED	NORMAL	N	512	4096	1048576	22904	21518
5726	7896			0	NRFRAADDG/		

DEV.276.654704777
SYSAUX.267.654614821
UNDOTBS1.269.654614823
USERS.270.654614823

Trying to restart the database after the crash ...
ORACLE instance started.

Total System Global Area 318046208 bytes
Fixed Size 1299652 bytes
Variable Size 285215548 bytes
Database Buffers 25165824 bytes
Redo Buffers 6365184 bytes

RMAN Hands On

```
Database mounted.
```

```
ORA-01157: cannot identify/lock data file 1 - see DBWR trace file
```

```
ORA-01110: data file 1: '+DATADG/redpanda/datafile/system.268.654614821'
```

RMAN Hands On

1b-recover-system-tablespace

This script starts the catalog database, that was down as result of the crash on the previous scenario, then mounts the production database, restores and recover datafile 1 and opens the database.

```
#!/usr/bin/tcsh
source ./set-environment
echo Restarting RMAN Catalog Database
echo
setenv ORACLE_SID rmancat
sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba<<eof
startup
exit
eof

echo
echo Executing Command : RESTORE and RECOVER SYSTEM DATAFILE
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
startup mount;
restore datafile 1;
recover datafile 1;
alter database open;
eof
sqlplus $dbauser/$dbapwd@$datadb as sysdba <<eof
select file_name from dba_data_files;
exit
eof
exit
```

RMAN Hands On

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./lb-recover-system-tablespace
```

```
Restarting RMAN Catalog Database
```

```
ORACLE instance started.
```

```
Total System Global Area 313860096 bytes  
Fixed Size                 1299624 bytes  
Variable Size             226495320 bytes  
Database Buffers         79691776 bytes  
Redo Buffers              6373376 bytes  
Database mounted.
```

```
Database opened.
```

```
Executing Command : RESTORE and RECOVER SYSTEM DATAFILE
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 18:35:18 2008  
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to target database: REDPANDA (DBID=3603176431, not open)
```

```
connected to recovery catalog database
```

```
RMAN>
```

```
starting full resync of recovery catalog
```

RMAN Hands On

```
full resync complete
```

```
database is already started
```

```
RMAN>
```

```
Starting restore at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=170 device type=DISK
```

```
channel ORA_DISK_1: restoring datafile 00001
```

```
input datafile copy RECID=34 STAMP=656186852 file  
name=+FRADG/redpanda/datafile/system.280.656186693
```

```
destination for restore of datafile 00001:  
+DATADG/redpanda/datafile/system.268.654614821
```

```
channel ORA_DISK_1: copied datafile copy of datafile 00001
```

```
output file name=+DATADG/redpanda/datafile/system.268.656188537 RECID=0 STAMP=0
```

```
Finished restore at 31-MAY-08
```

RMAN Hands On

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
Starting recover at 31-MAY-08
```

```
using channel ORA_DISK_1
```

```
starting media recovery
```

```
media recovery complete, elapsed time: 00:00:16
```

```
Finished recover at 31-MAY-08
```

```
RMAN>
```

```
database opened
```

RMAN Hands On

```
RMAN>
```

```
Recovery Manager complete.
```

```
SQL*Plus: Release 11.1.0.6.0 - Production on Sat May 31 18:37:55 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 - Production
```

```
With the Partitioning, OLAP, Data Mining and Real Application Testing options
```

```
SQL>
```

```
FILE_NAME
```

```
-----
```

RMAN Hands On

```
+DATADG/redpanda/datafile/system.268.656188537  
+DATADG/redpanda/datafile/sysaux.267.654614821  
+DATADG/redpanda/datafile/undotbs1.269.654614823  
+DATADG/redpanda/datafile/users.270.654614823  
+DATADG/redpanda/datafile/dev.276.654704777
```

```
SQL> Disconnected from Oracle Database 11g Enterprise Edition Release 11.1.0.6.0  
- Production  
With the Partitioning, OLAP, Data Mining and Real Application Testing options
```


RMAN Hands On

2-user-datafile-loss

This script creates a apps.customers table on tablespace users, then the datafile is removed and the reference table is accessed the following errors are then returned:

```
select username from apps.customers
```

```
*
```

```
ERROR at line 1:
```

```
ORA-00376: file 4 cannot be read at this time
```

```
ORA-01110: data file 4: '+DATADG/redpanda/datafile/users.270.654614823'
```

```
#!/usr/bin/tcsh
source ./set-environment
setenv ORACLE_SID redpanda
clear
echo
echo Preparing User Application ...
echo
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
drop user apps cascade;
create user apps identified by apps default tablespace users temporary tablespace temp;
grant dba to apps;
connect apps/apps@$datadb
create table customers as select * from dba_users;
update customers set username='CUSTOMER_' || USERNAME;
commit;
select username from customers;
exit
eof
```

RMAN Hands On

```
echo
echo Generating user datafile remove ...
echo

set v_rmf=`echo "select file_name from dba_data_files where tablespace_name='USERS';" |
sqlplus -s / as sysdba | grep users`

echo
echo Setting tablespace users offline ...
echo
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
alter tablespace users offline;
eof

echo
echo Removing tablespace users datafile ...
echo

setenv ORACLE_SID +ASM
asmcmd lsdg
echo
asmcmd ls +datadg/redpanda/datafile
echo
asmcmd rm -rf $v_rmf
echo
asmcmd ls +datadg/redpanda/datafile
echo
asmcmd lsdg

echo
echo Checking application ...
echo
```

RMAN Hands On

```
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
select username from apps.customers;
exit
eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./2-user-datafile-loss

Preparing User Application ...

drop user apps cascade

          *

ERROR at line 1:

ORA-01918: user 'APPS' does not exist
User created.

Grant succeeded.

Table created.

31 rows updated.

Commit complete.
```

RMAN Hands On

```
USERNAME
-----
CUSTOMER_APPS
CUSTOMER_SYSMAN
...
... (more data)
CUSTOMER_OWBSYS
CUSTOMER_WKSYS
```

31 rows selected.

Generating user datafile remove ...

Setting tablespace users offline ...

Tablespace altered.

Removing tablespace users datafile ...

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB	Offline_disks	Name
MOUNTED	EXTERN	N	512	4096	1048576	11452	6901	0	6901	0	DATADG/
MOUNTED	EXTERN	N	512	4096	1048576	11452	7150	0	7150	0	FRADG/
MOUNTED	NORMAL	N	512	4096	1048576	22904	15054	5726	4664	0	NRDATADG/
MOUNTED	NORMAL	N	512	4096	1048576	22904	21518	5726	7896	0	NRFRADDG/

```
DEV.276.654704777
SYSAUX.267.654614821
SYSTEM.268.656188537
```

RMAN Hands On

```
UNDOTBS1.269.654614823  
USERS.270.654614823 <<<< to be removed
```

```
DEV.276.654704777  
SYS_AUX.267.654614821  
SYSTEM.268.656188537  
UNDOTBS1.269.654614823
```

State	Type	Rebal	Sector	Block	AU	Total_MB	Free_MB	Req_mir_free_MB	Usable_file_MB	Offline_disks	Name
MOUNTED	EXTERN	N	512	4096	1048576	11452	6907	0	6907	0	DATADG/
MOUNTED	EXTERN	N	512	4096	1048576	11452	7150	0	7150	0	FRADG/
MOUNTED	NORMAL	N	512	4096	1048576	22904	15054	5726	4664	0	NRDATADG/
MOUNTED	NORMAL	N	512	4096	1048576	22904	21518	5726	7896	0	NRFRAADDG/

```
Checking application ...  
select username from apps.customers
```

*

```
ERROR at line 1:
```

```
ORA-00376: file 4 cannot be read at this time
```

```
ORA-01110: data file 4: '+DATADG/redpanda/datafile/users.270.654614823'
```

RMAN Hands On

2b-recover-users-tablespace

This script restore the missing datafile of tablespace users, in this case the database did not crash when the datafile was removed, the restore and recover can be done online.

```
#!/usr/bin/tcsh
source ./set-environment
echo Restoring and Recovering Tablespace Users ...
echo
rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
restore datafile 4;
recover datafile 4;
sql 'alter tablespace users online' ;
eof

echo
echo Checking application ...
echo

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
select username from apps.customers;
exit
eof
exit
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./2b-recover-users-tablespace
```

```
Restoring and Recovering Tablespace Users ...
```

RMAN Hands On

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 18:51:54 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to target database: REDPANDA (DBID=3603176431)
```

```
connected to recovery catalog database
```

```
RMAN>
```

```
Starting restore at 31-MAY-08
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=114 device type=DISK
```

```
channel ORA_DISK_1: restoring datafile 00004
```

```
input datafile copy RECID=37 STAMP=656187036 file  
name=+FRADG/redpanda/datafile/users.281.656187035
```

```
destination for restore of datafile 00004:  
+DATADG/redpanda/datafile/users.270.654614823
```

```
channel ORA_DISK_1: copied datafile copy of datafile 00004
```

RMAN Hands On

```
output file name=+DATADG/redpanda/datafile/users.270.656189521 RECID=0 STAMP=0
```

```
Finished restore at 31-MAY-08
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
Starting recover at 31-MAY-08
```

```
using channel ORA_DISK_1
```

```
starting media recovery
```

```
media recovery complete, elapsed time: 00:00:09
```

```
Finished recover at 31-MAY-08
```

```
RMAN>
```


RMAN Hands On

```
sql statement: alter tablespace users online
starting full resync of recovery catalog
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

```
Checking application ...
```

```
USERNAME
-----
CUSTOMER_APPS
CUSTOMER_SYSMAN
CUSTOMER_DBSNMP
CUSTOMER_SYSTEM
CUSTOMER_SYS
CUSTOMER_MGMT_VIEW
```

RMAN Hands On

```
CUSTOMER_SPATIAL_WFS_ADMIN_USR  
CUSTOMER_SPATIAL_CSW_ADMIN_USR  
CUSTOMER_APEX_PUBLIC_USER  
CUSTOMER_DIP  
CUSTOMER_MDDATA  
CUSTOMER_XS$NULL  
CUSTOMER_TSMSYS  
CUSTOMER_ORACLE_OCM  
CUSTOMER_OLAPSYS  
CUSTOMER_SI_INFORMTN_SCHEMA  
CUSTOMER_OWBSYS  
CUSTOMER_FLOWS_030000  
CUSTOMER_ORDPLUGINS  
CUSTOMER_WKPROXY  
CUSTOMER_XDB  
CUSTOMER_ANONYMOUS  
CUSTOMER_CTXSYS  
CUSTOMER_WK_TEST  
CUSTOMER_WMSYS  
CUSTOMER_EXFSYS  
CUSTOMER_ORDSYS  
CUSTOMER_MDSYS  
CUSTOMER_FLOWS_FILES  
CUSTOMER_OUTLN  
CUSTOMER_WKSYS
```

```
31 rows selected.
```

RMAN Hands On

3-online-redo-loss

This script simulates a database crash that lead to a missing online redo log, when the database is restarted the following errors are displayed:

```
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1:
'+DATADG/redpanda/onlinelog/group_1.271.654616725'
ORA-00312: online log 1 thread 1:
'+FRADG/redpanda/onlinelog/group_1.285.654616725'
```

```
#!/usr/bin/tcsh
source ./set-environment
echo Generating database crash ...
echo

set v_logf=v\logfile
set v_logs=v$log
set v_logh=v$log_history

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
set pages 50000 lines 120 echo off head off veri off flush off ti off
spool rmonlnlog.sh
select 'asmcmd rm '|member|'|' from $v_logf where group#=1;

spool off
set echo on head on veri on
set pages 50000 lines 120
```

RMAN Hands On

```
spool redolog_miss_status-before_crash.log
archive log list;
select SEQUENCE# from $v_logh where FIRST_TIME=(select max(FIRST_TIME) from $v_logh);
select * from $v_logs;
spool off

SHUTDOWN ABORT;

eof

sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
SHUTDOWN ABORT;
eof

echo
echo Removing online redo log group ...
echo

setenv ORACLE_SID +ASM

sqlplus -s sys/oracle as sysdba <<eof
SHUTDOWN ABORT;
STARTUP;
eof

chmod 700 ./rmonlnlog.sh
./rmonlnlog.sh
rm ./rmonlnlog.sh

echo
echo Starting databases after the crash ...
echo
```

RMAN Hands On

```
sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
STARTUP
eof
```

```
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
STARTUP
eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./3-online-redo-loss
```

```
Generating database crash ...
```

```
asmcmd rm +DATADG/redpanda/onlinelog/group_1.271.654616725
asmcmd rm +FRADG/redpanda/onlinelog/group_1.285.654616725
```

Database log mode	Archive Mode
Automatic archival	Enabled
Archive destination	USE_DB_RECOVERY_FILE_DEST
Oldest online log sequence	25
Next log sequence to archive	27
Current log sequence	27

```
SEQUENCE#
-----
          26
```

RMAN Hands On

GROUP#	THREAD#	SEQUENCE#	BYTES	MEMBERS	ARC	STATUS
FIRST_CHANGE#	FIRST_TIM					
1	1	25	52428800	2	YES	INACTIVE
1342671	31-MAY-08					
2	1	26	52428800	2	YES	INACTIVE
1351977	31-MAY-08					
3	1	27	52428800	2	NO	CURRENT
1373684	31-MAY-08					

ORACLE instance shut down.
ORACLE instance shut down.

Removing online redo log group ...

ASM instance shutdown
ASM instance started

Total System Global Area 284565504 bytes
Fixed Size 1299428 bytes
Variable Size 258100252 bytes
ASM Cache 25165824 bytes
ASM diskgroups mounted

Starting databases after the crash ...

RMAN Hands On

ORACLE instance started.

```
Total System Global Area 313860096 bytes
Fixed Size                 1299624 bytes
Variable Size              243272536 bytes
Database Buffers          62914560 bytes
Redo Buffers               6373376 bytes
Database mounted.
Database opened.
ORACLE instance started.
```

```
Total System Global Area 318046208 bytes
Fixed Size                 1299652 bytes
Variable Size              281021244 bytes
Database Buffers          29360128 bytes
Redo Buffers               6365184 bytes
Database mounted.
```

```
ORA-00313: open failed for members of log group 1 of thread 1
ORA-00312: online log 1 thread 1:
'+DATADG/redpanda/onlinelog/group_1.271.654616725'
ORA-00312: online log 1 thread 1:
'+FRADG/redpanda/onlinelog/group_1.285.654616725'
```

RMAN Hands On

3b-recover-from-redo-loss

This script performs the recovery of the database on the online redolog miss scenario. When a redolog is missing a full database restore must be done.

The script request the sequence # to recover using the until sequence clause. This sequence can be obtained from the database alert.log

```
#!/usr/bin/tcsh
source ./set-environment
set v_logf=v\logfile
set v_log=v\log
echo Executing Full Database Restore ...
echo
echo Please check the last archived sequence of the database.
echo please enter sequence number to restore to ...
set v_seq = $<
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
STARTUP MOUNT;
RESTORE DATABASE;
RECOVER DATABASE UNTIL SEQUENCE $v_seq THREAD 1;
ALTER DATABASE OPEN RESETLOGS;
eof

echo Checking Database after online redolog loss and database restore and recover
echo
```


RMAN Hands On

```
sqlplus $dbauser/$dbapwd@$datadb <<eof

set pages 50000 lines 200
col member for a55

select * from $v_log;

select member from $v_logf;

exit

eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./3b-recover-from-redo-loss
```

```
Executing Full Database Restore ...
```

```
Please check the last archived sequence of the database.
```

```
please enter sequence number to restore to ...
```

```
26
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 19:16:40 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
connected to target database: REDPANDA (DBID=3603176431, not open)
```

```
connected to recovery catalog database
```

```
RMAN>
```

```
database is already started
```

RMAN Hands On

```
RMAN>
Starting restore at 31-MAY-08
allocated channel: ORA_DISK_1
channel ORA_DISK_1: SID=145 device type=DISK
channel ORA_DISK_1: restoring datafile 00001

input datafile copy RECID=34 STAMP=656186852 file
name=+FRADG/redpanda/datafile/system.280.656186693

destination for restore of datafile 00001:
+DATADG/redpanda/datafile/system.268.656188537

channel ORA_DISK_1: copied datafile copy of datafile 00001

output file name=+DATADG/redpanda/datafile/system.268.656188537 RECID=0 STAMP=0

channel ORA_DISK_1: restoring datafile 00002

input datafile copy RECID=33 STAMP=656186675 file
name=+FRADG/redpanda/datafile/sysaux.289.656186511

destination for restore of datafile 00002:
+DATADG/redpanda/datafile/sysaux.267.654614821

channel ORA_DISK_1: copied datafile copy of datafile 00002

output file name=+DATADG/redpanda/datafile/sysaux.267.654614821 RECID=0 STAMP=0

channel ORA_DISK_1: restoring datafile 00003
```

RMAN Hands On

```
input datafile copy RECID=35 STAMP=656186981 file
name=+FRADG/redpanda/datafile/undotbs1.264.656186867

destination for restore of datafile 00003:
+DATADG/redpanda/datafile/undotbs1.269.654614823

channel ORA_DISK_1: copied datafile copy of datafile 00003

output file name=+DATADG/redpanda/datafile/undotbs1.269.654614823 RECID=0 STAMP=0

channel ORA_DISK_1: restoring datafile 00004

input datafile copy RECID=37 STAMP=656187036 file
name=+FRADG/redpanda/datafile/users.281.656187035

destination for restore of datafile 00004:
+DATADG/redpanda/datafile/users.270.656189521

channel ORA_DISK_1: copied datafile copy of datafile 00004

output file name=+DATADG/redpanda/datafile/users.270.656189521 RECID=0 STAMP=0

channel ORA_DISK_1: restoring datafile 00005

input datafile copy RECID=36 STAMP=656187020 file
name=+FRADG/redpanda/datafile/dev.272.656186997

destination for restore of datafile 00005:
+DATADG/redpanda/datafile/dev.276.654704777
```

RMAN Hands On

```
channel ORA_DISK_1: copied datafile copy of datafile 00005  
output file name=+DATADG/redpanda/datafile/dev.276.654704777 RECID=0 STAMP=0  
Finished restore at 31-MAY-08
```

```
RMAN>
```

```
Starting recover at 31-MAY-08
```

```
using channel ORA_DISK_1
```

```
starting media recovery
```

```
archived log for thread 1 with sequence 25 is already on disk as file  
+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_25.287.656187249
```

```
archived log file  
name=+FRADG/redpanda/archivelog/2008_05_31/thread_1_seq_25.287.656187249 thread=1  
sequence=25
```

```
media recovery complete, elapsed time: 00:00:18
```

```
Finished recover at 31-MAY-08
```

RMAN Hands On

```
RMAN>
```

```
database opened
```

```
new incarnation of database registered in recovery catalog
```

```
RPC call appears to have failed to start on channel default
```

```
RPC call OK on channel default
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

```
Checking Database after online redolog loss and database restore and recover
```

```
GROUP#      THREAD#  SEQUENCE#    BYTES  MEMBERS ARC STATUS           FIRST_CHANGE# FIRST_TIME
```

```
-----
```

RMAN Hands On

```
1          1          1  52428800          2 NO  CURRENT          1351978 31/05/08 19:20:58
2          1          0  52428800          2 YES UNUSED              0
3          1          0  52428800          2 YES UNUSED              0
```

```
GROUP# STATUS TYPE MEMBER IS_
-----
```

1	ONLINE		+DATADG/redpanda/onlinelog/group_1.271.656191261	NO
1	ONLINE		+FRADG/redpanda/onlinelog/group_1.290.656191263	YES
2	ONLINE		+DATADG/redpanda/onlinelog/group_2.272.656191267	NO
2	ONLINE		+FRADG/redpanda/onlinelog/group_2.262.656191269	YES
3	ONLINE		+DATADG/redpanda/onlinelog/group_3.274.656191271	NO
3	ONLINE		+FRADG/redpanda/onlinelog/group_3.263.656191273	YES

RMAN Hands On

4-controlfile-loss

This script simulates a database crash that lead to a missing controlfile, when the database is restarted the following error is displayed:

ORA-00205: error in identifying control file, check alert log for more info

```
#!/usr/bin/tcsh
source ./set-environment
echo Generating database crash ...
echo
set v_ctf=v\${controlfile}
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
set pages 50000 lines 120 echo off head off veri off flush off ti off

spool rmctlfl.sh
select 'asmcmd rm '||name||'' from $v_ctf ;
spool off
SHUTDOWN ABORT
eof

sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
SHUTDOWN ABORT
eof

echo Checking databases up ...
ps -efa | grep smon | grep -v grep
echo
echo Removing controlfiles ...
echo
setenv ORACLE_SID +ASM
```

RMAN Hands On

```
sqlplus -s / as sysdba <<eof
SHUTDOWN ABORT
STARTUP
eof

chmod 700 ./rmctlfl.sh
./rmctlfl.sh
rm rmctlfl.sh

echo
echo Starting databases after the crash ...
echo
sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
STARTUP
eof

sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
STARTUP
eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./4-controlfile-loss
Generating database crash ...
asmcmd rm +DATADG/redpanda/controlfile/current.266.654614799
asmcmd rm +FRADG/redpanda/controlfile/current.260.654392655

ORACLE instance shut down.
ORACLE instance shut down.
Checking databases up ...
oracle      483      1  0 18:58 ?          00:00:00 asm_smon_+ASM
Removing controlfiles ...
```


RMAN Hands On

```
ASM instance shutdown  
ASM instance started
```

```
Total System Global Area 284565504 bytes  
Fixed Size                 1299428 bytes  
Variable Size             258100252 bytes  
ASM Cache                 25165824 bytes  
ASM diskgroups mounted
```

```
Starting databases after the crash ...  
ORACLE instance started.  
Total System Global Area 313860096 bytes  
Fixed Size                 1299624 bytes  
Variable Size             243272536 bytes  
Database Buffers          62914560 bytes  
Redo Buffers              6373376 bytes  
Database mounted.  
Database opened.  
ORACLE instance started.
```

```
Total System Global Area 318046208 bytes  
Fixed Size                 1299652 bytes  
Variable Size             289409852 bytes  
Database Buffers          20971520 bytes  
Redo Buffers              6365184 bytes
```

```
ORA-00205: error in identifying control file, check alert log for more info
```

RMAN Hands On

4b-recover-from-controlfile-loss

This script restore the missing controlfile from an autobackup, then mounts and recover the database. After a controlfile restore the database must be opened using the resetlogs option.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Controlfile Restore
echo
echo Please check the DBID from any backup file, i.e.:
echo
echo in this controlfile backup dbid=3603176431
echo
echo   cf_D-REDPANDA_id-3603176431_objg00fq
echo   -----^^^^^^^^^^^^-----
echo
echo please enter DBID number of the database to restore the controlfile
set v_dbid = $<
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
SET DBID $v_dbid;
STARTUP NOMOUNT;
RESTORE CONTROLFILE FROM AUTOBACKUP;
ALTER DATABASE MOUNT;
RECOVER DATABASE;
ALTER DATABASE OPEN RESETLOGS;
eof

set v_ctlf=v\${controlfile}
echo Checking Database after controlfile loss and restore
```

RMAN Hands On

```
echo

sqlplus $dbauser/$dbapwd@$datadb as sysdba<<eof
set pages 50000 lines 120
select name from $v_ctlf
;
exit

eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./4b-recover-from-controlfile-loss

Executing Controlfile Restore

Please check the DBID from any backup file, i.e.:

in this controlfile backup dbid=3603176431

cf_D-REDPANDA_id-3603176431_0bjg00fq
-----^^^^^^^^^^^^-----
please enter DBID number of the database to restore the controlfile
3603176431
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 21:20:20 2008

Copyright (c) 1982, 2007, Oracle. All rights reserved.

connected to target database: REDPANDA (not mounted)

connected to recovery catalog database
```

RMAN Hands On

```
RMAN>
```

```
executing command: SET DBID
```

```
database name is "REDPANDA" and DBID is 3603176431
```

```
RMAN>
```

```
database is already started
```

```
RMAN>
```

```
Starting restore at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=157 device type=DISK
```

```
recovery area destination: +FRADG
```

```
database name (or database unique name) used for search: REDPANDA
```

```
channel ORA_DISK_1: no AUTOBACKUPS found in the recovery area
```

```
channel ORA_DISK_1: looking for AUTOBACKUP on day: 20080531
```

RMAN Hands On

```
channel ORA_DISK_1: AUTOBACKUP found: REDPANDA_c-3603176431-20080531-09  
channel ORA_DISK_1: restoring control file from AUTOBACKUP REDPANDA_c-3603176431-  
20080531-09  
channel ORA_DISK_1: control file restore from AUTOBACKUP complete  
output file name=+DATADG/redpanda/controlfile/current.266.656198431  
output file name=+FRADG/redpanda/controlfile/current.260.656198431  
Finished restore at 31-MAY-08
```

```
RMAN>
```

```
database mounted
```

```
released channel: ORA_DISK_1
```

```
RMAN>
```

```
Starting recover at 31-MAY-08
```

```
Starting implicit crosscheck backup at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=157 device type=DISK
```

RMAN Hands On

```
Crosschecked 40 objects
Finished implicit crosscheck backup at 31-MAY-08

Starting implicit crosscheck copy at 31-MAY-08
using channel ORA_DISK_1
Crosschecked 29 objects
Finished implicit crosscheck copy at 31-MAY-08

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

using channel ORA_DISK_1

starting media recovery
```

RMAN Hands On

```
archived log for thread 1 with sequence 1 is already on disk as file  
+DATADG/redpanda/onlinelog/group_1.271.656191261
```

```
archived log file name=+DATADG/redpanda/onlinelog/group_1.271.656191261 thread=1  
sequence=1
```

```
media recovery complete, elapsed time: 00:00:16
```

```
Finished recover at 31-MAY-08
```

```
RMAN>
```

```
database opened
```

```
new incarnation of database registered in recovery catalog
```

```
RPC call appears to have failed to start on channel default
```

```
RPC call OK on channel default
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

RMAN Hands On

```
Checking Database after controlfile loss and restore
```

```
SQL*Plus: Release 11.1.0.6.0 - Production on Sat May 31 21:24:01 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
Checking Database after controlfile loss and restore
```

```
SQL*Plus: Release 11.1.0.6.0 - Production on Sat May 31 21:26:24 2008
```

```
Copyright (c) 1982, 2007, Oracle. All rights reserved.
```

```
Connected to:
```

```
Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 - Production  
With the Partitioning, OLAP, Data Mining and Real Application Testing options
```

```
SQL> SQL>
```

```
NAME
```

```
-----  
+DATADG/redpanda/controlfile/current.266.656198431
```

```
+FRADG/redpanda/controlfile/current.260.656198431
```


RMAN Hands On

5-database-loss

This script simulates a crash that lead to the complete loss of the database, the whole database directory is wiped off the ASM diskgroup DATADG, all online logs, controlfiles, spfile and datafiles are lost.

When trying to open the database the following errors are returned:

```
ORA-01078: failure in processing system parameters
ORA-01565: error in identifying file '+DATADG/redpanda/spfileredpanda.ora'
ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-15056: additional error message
ORA-17503: ksfopn:DGOpenFile05 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-15173: entry 'redpanda' does not exist in directory '/'
ORA-06512: at line 4
```

```
#!/usr/bin/tcsh
source ./set-environment
echo Generating database crash ...
echo
set v_par=v\${parameter}
set v_dba=v\${database}
set v_logs=v\${log}
set v_logh=v\${log_history}
sqlplus -s ${dbauser}/${dbapwd}@${datadb} as sysdba <<eof
set echo on head on veri on pages 50000 lines 120
spool redolog_miss_status-before_crash.log
archive log list;
select SEQUENCE# from ${v_logh} where FIRST_TIME=(select max(FIRST_TIME) from ${v_logh});
select * from ${v_logs};
```

RMAN Hands On

```
spool off
set pages 50000 lines 120 echo off head off veri off flush off ti off
spool rmdbs.sh
select 'asmcmd rm -rf '||a.value||'/'||b.name
from   $v_par a, $v_dba b
where  a.name='db_create_file_dest';
spool off
SHUTDOWN ABORT
eof

sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
SHUTDOWN ABORT
eof

echo
echo Preparing to crash and burn database ...
echo

setenv ORACLE_SID +ASM
sqlplus -s / as sysdba <<eof
SHUTDOWN ABORT
STARTUP
eof
chmod 700 ./rmdbs.sh
./rmdbs.sh
rm rmdbs.sh
echo
echo Starting databases after the crash ...
echo

sqlplus -s $dbauser/$dbapwd@$rmandb as sysdba <<eof
STARTUP
eof
```

RMAN Hands On

```
sqlplus -s $dbauser/$dbapwd@$datadb as sysdba <<eof
STARTUP
eof

echo
echo Evaluating damage ...
echo
echo Listing directories on ASM Data diskgroup
echo
asmcmd ls +datadg
echo
echo Listing directories on ASM Flash Recovery Area diskgroup
echo
asmcmd ls +fradg
echo
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./5-database-loss
Generating database crash ...
Database log mode                Archive Mode

Automatic archival                Enabled

Archive destination                USE_DB_RECOVERY_FILE_DEST

Oldest online log sequence        1

Next log sequence to archive      3

Current log sequence              3
```

RMAN Hands On

```
SEQUENCE#  
-----  
2
```

GROUP#	THREAD#	SEQUENCE#	BYTES	MEMBERS	ARC	STATUS	FIRST_CHANGE#
1	1	1	52428800	2	YES	INACTIVE	1409399
2	1	2	52428800	2	YES	ACTIVE	1410694
3	1	3	52428800	2	NO	CURRENT	1410918

```
asmcmd rm -rf +DATADG/REDPANDA
```

```
ORACLE instance shut down.  
ORACLE instance shut down.
```

```
Preparing to crash and burn database ...  
ASM instance shutdown  
ASM instance started
```

```
Total System Global Area 284565504 bytes  
Fixed Size 1299428 bytes  
Variable Size 258100252 bytes  
ASM Cache 25165824 bytes  
ASM diskgroups mounted
```

RMAN Hands On

Starting databases after the crash ...

ORACLE instance started.

```
Total System Global Area 313860096 bytes
Fixed Size                 1299624 bytes
Variable Size             243272536 bytes
Database Buffers         62914560 bytes
Redo Buffers              6373376 bytes
Database mounted.
Database opened.
```

```
ORA-01078: failure in processing system parameters
ORA-01565: error in identifying file '+DATADG/redpanda/spfileredpanda.ora'
ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-15056: additional error message
ORA-17503: ksfopn:DGOpenFile05 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora
ORA-15173: entry 'redpanda' does not exist in directory '/'
ORA-06512: at line 4
```

Evaluating damage ...

```
Listing directories on ASM Data diskgroup
RMANCAT/
```

```
Listing directories on ASM Flash Recovery Area diskgroup
NRDE/
REDPANDA/
RMANCAT/
```

RMAN Hands On

5b-recover-from-total-loss

This script executes the restore after a total database loss.

In first term it creates the missing database directory on the ASM diskgroup DATADG, this is necessary to be able to restore the spfile and controlfile on the first stages of the restore procedure.

The instance is initially started by rman with dummy parameters, once the spfile is restored the instance is restarted nomount using the spfile.

Once the controlfile is successfully restored from autobackup the database can be restored, recovered and open with the restlogs option.

```
#!/usr/bin/tcsh
source ./set-environment
echo Executing Controlfile Restore
echo Please check the DBID from any backup file, i.e.:
echo
echo in this controlfile backup dbid=3603176431
echo
echo   cf_D-REDPANDA_id-3603176431_0bjg00fq
echo   -----^-----
echo
echo please enter DBID number of the database to restore the controlfile
set v_dbid = <
echo
echo Please check the last archived sequence of the database.
echo please enter sequence number to restore to ...
```

RMAN Hands On

```
set v_seq = $<
echo
echo Rebuilding Database Directory on Data Diskgroup
echo
setenv ORACLE_SID +ASM
asmcmd mkdir +DATADG/REDPANDA
asmcmd ls +DATADG
echo
echo Executing Rman Restore and Recovery Steps
echo

rman TARGET $dbauser/$dbapwd@$datadb CATALOG $rmanuser/$rmanpwd@$rmandb <<eof
SET DBID $v_dbid;
STARTUP NOMOUNT;
RESTORE SPFILE FROM AUTOBACKUP ;
STARTUP FORCE NOMOUNT;
RESTORE CONTROLFILE FROM AUTOBACKUP;
ALTER DATABASE MOUNT;
run {
set until sequence $v_seq thread 1;
restore database;
recover database;
}
ALTER DATABASE OPEN RESETLOGS;
eof
set v_log=v\log
set v_logf=v\logfile
set v_dbs=v\database
echo Checking Database after total database loss, restore and recover
echo
sqlplus $dbauser/$dbapwd@$datadb as sysdba <<eof
set pages 50000 lines 120
select * from $v_log;
```

RMAN Hands On

```
select member from $v_logf;  
select name from $v_dbs;  
exit  
eof
```

Script Output:

```
avargas-pc:~/scripts/RECOVERY> ./5b-recover-from-total-loss
```

```
Executing Controlfile Restore
```

```
Please check the DBID from any backup file, i.e.:  
in this controlfile backup dbid=3603176431
```

```
cf_D-REDPANDA_id-3603176431_0bjg00fq  
-----^-----
```

```
please enter DBID number of the database to restore the controlfile  
3603176431
```

```
Please check the last archived sequence of the database.
```

```
please enter sequence number to restore to ...  
3
```

```
Rebuilding Database Directory on Data Diskgroup
```

```
REDPANDA/  
RMANCAT/
```

```
Executing Rman Restore and Recovery Steps
```

```
Recovery Manager: Release 11.1.0.6.0 - Production on Sat May 31 21:59:21 2008
```


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connected to target database (not started)

connected to recovery catalog database

RMAN>

executing command: SET DBID

database name is "REDPANDA" and DBID is 3603176431

RMAN>

startup failed: ORA-01078: failure in processing system parameters

ORA-01565: error in identifying file '+DATADG/redpanda/spfileredpanda.ora'

ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora

ORA-15056: additional error message

ORA-17503: ksfopn:DGOpenFile05 Failed to open file +DATADG/redpanda/spfileredpanda.ora

ORA-17503: ksfopn:2 Failed to open file +DATADG/redpanda/spfileredpanda.ora

ORA-15173: entry 'spfileredpanda.ora' does not exist in directory 'redpanda'

ORA-06512: at line 4

starting Oracle instance without parameter file for retrieval of spfile

Oracle instance started

Total System Global Area 159019008 bytes

RMAN Hands On

```
Fixed Size          1298584 bytes
Variable Size       67112808 bytes
Database Buffers    83886080 bytes
Redo Buffers        6721536 bytes
```

```
RMAN>
```

```
Starting restore at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=99 device type=DISK
```

```
channel ORA_DISK_1: looking for AUTOBACKUP on day: 20080531
```

```
channel ORA_DISK_1: AUTOBACKUP found: REDPANDA_c-3603176431-20080531-0b
```

```
channel ORA_DISK_1: restoring spfile from AUTOBACKUP REDPANDA_c-3603176431-20080531-0b
```

```
channel ORA_DISK_1: SPFILE restore from AUTOBACKUP complete
```

```
Finished restore at 31-MAY-08
```

```
RMAN>
```

```
Oracle instance started
```

RMAN Hands On

```
Total System Global Area      318046208 bytes
Fixed Size                     1299652 bytes
Variable Size                  285215548 bytes
Database Buffers               25165824 bytes
Redo Buffers                   6365184 bytes
```

```
RMAN>
```

```
Starting restore at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=152 device type=DISK
recovery area destination: +FRADG
```

```
database name (or database unique name) used for search: REDPANDA
```

```
channel ORA_DISK_1: no AUTOBACKUPS found in the recovery area
```

```
channel ORA_DISK_1: looking for AUTOBACKUP on day: 20080531
```

```
channel ORA_DISK_1: AUTOBACKUP found: REDPANDA_c-3603176431-20080531-0b
```

```
channel ORA_DISK_1: restoring control file from AUTOBACKUP REDPANDA_c-3603176431-
20080531-0b
```

```
channel ORA_DISK_1: control file restore from AUTOBACKUP complete
```

```
output file name=+DATADG/redpanda/controlfile/current.273.656200773
```

```
output file name=+FRADG/redpanda/controlfile/current.260.656198431
```

RMAN Hands On

```
Finished restore at 31-MAY-08
```

```
RMAN>
```

```
database mounted
```

```
released channel: ORA_DISK_1
```

```
RMAN> 2> 3> 4> 5>
```

```
executing command: SET until clause
```

```
Starting restore at 31-MAY-08
```

```
Starting implicit crosscheck backup at 31-MAY-08
```

```
allocated channel: ORA_DISK_1
```

```
channel ORA_DISK_1: SID=152 device type=DISK
```

```
Crosschecked 46 objects
```

```
Finished implicit crosscheck backup at 31-MAY-08
```

RMAN Hands On

```
Starting implicit crosscheck copy at 31-MAY-08  
using channel ORA_DISK_1  
Crosschecked 29 objects  
Finished implicit crosscheck copy at 31-MAY-08
```

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

```
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  
+DATADG/redpanda/datafile/system.268.656188537
```

```
channel ORA_DISK_1: restoring datafile 00002 to  
+DATADG/redpanda/datafile/sysaux.267.654614821
```

RMAN Hands On

```
channel ORA_DISK_1: restoring datafile 00003 to
+DATADG/redpanda/datafile/undotbs1.269.654614823

channel ORA_DISK_1: restoring datafile 00004 to
+DATADG/redpanda/datafile/users.270.656189521

channel ORA_DISK_1: restoring datafile 00005 to
+DATADG/redpanda/datafile/dev.276.654704777

channel ORA_DISK_1: reading from backup piece
+FRADG/redpanda/backupset/2008_05_31/nnndf0_tag20080531t213007_0.294.656199013

channel ORA_DISK_1: piece
handle=+FRADG/redpanda/backupset/2008_05_31/nnndf0_tag20080531t213007_0.294.656199013
tag=TAG20080531T213007

channel ORA_DISK_1: restored backup piece 1

channel ORA_DISK_1: restore complete, elapsed time: 00:02:55

Finished restore at 31-MAY-08

Starting recover at 31-MAY-08

using channel ORA_DISK_1

starting media recovery
```

RMAN Hands On

```
archived log for thread 1 with sequence 2 is already on disk as file
+FRADG/redpanda/onlinelog/group_2.262.656191269

archived log file name=+FRADG/redpanda/onlinelog/group_2.262.656191269 thread=1
sequence=2

media recovery complete, elapsed time: 00:00:02

Finished recover at 31-MAY-08
```

```
RMAN>
```

```
database opened
```

```
new incarnation of database registered in recovery catalog
```

```
RPC call appears to have failed to start on channel default
```

```
RPC call OK on channel default
```

```
starting full resync of recovery catalog
```

```
full resync complete
```

```
RMAN>
```

```
Recovery Manager complete.
```

```
Checking Database after total database loss, restore and recover
```

RMAN Hands On

SQL*Plus: Release 11.1.0.6.0 - Production on Sat May 31 22:05:52 2008

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Connected to:

Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 - Production

With the Partitioning, OLAP, Data Mining and Real Application Testing options

```
SQL>
  GROUP#    THREAD#  SEQUENCE#    BYTES    MEMBERS ARC STATUS          FIRST_CHANGE# FIRST_TIM
-----
         1         1         1  52428800         2 NO  CURRENT          1410919 31-MAY-08
         2         1         0  52428800         2 YES UNUSED              0
         3         1         0  52428800         2 YES UNUSED              0
```

MEMBER

```
-----
+DATADG/redpanda/onlinelog/group_1.269.656200987
+FRADG/redpanda/onlinelog/group_1.290.656200989
+DATADG/redpanda/onlinelog/group_2.268.656200991
+FRADG/redpanda/onlinelog/group_2.262.656200995
+DATADG/redpanda/onlinelog/group_3.267.656200997
+FRADG/redpanda/onlinelog/group_3.263.656200999
```

6 rows selected.

SQL>

NAME

```
-----
REDPANDA
```


RMAN Hands On

```
SQL> Disconnected from Oracle Database 11g Enterprise Edition Release 11.1.0.6.0 -  
Production
```

With the Partitioning, OLAP, Data Mining and Real Application Testing options

End of Document