

Backup and Recovery

Protecting your data is extremely important, your job could depend on it, making sure that your data is backed up and that you are able to restore it in a disaster goes without saying. There are many methods to backing up your data

- Unix backup tools such as tar, dd cpio
- SAN backup utilities
- Tape backup
- 3rd Party backup software such as netbackup
- Oracle's RMAN

In this section I will only be covering Oracle RMAN which I have also covered in a previous Oracle article called [RMAN](#), so if you need to brush up on your RMAN skills then take a look. Below is the terminology that I will be using

- **Target database** - the database against which RMAN commands are run
- **Catalog database** - the database that houses the recovery catalog schema
- **Auxiliary database** - when cloning a database, represents the name of the actual clone database
- **Recovery Catalog** - the catalog that contains metadata information about the backups
- **Backup piece** - the file that contains the backup of a control file, archived logs or a datafile
- **Backupset** - one or more backup pieces
- **Image copy** - the copy of a datafile, or archive log that is similar to copies made with the *cp* or *dd* operating system command
- **Channel** - the server session used to perform backups and recoveries; identifies a disk or tape device that will be used for backup or recovery

You can now set persistent RMAN configurations for a primary or physical standby databases, this enables you to use backups made on one database for the restore and recovery of another database in your Data Guard configuration, also metadata on the primary and standby databases can be managed from the same recovery catalog.

You can now enable block change tracking on a physical standby database which will allow you to quickly identify the blocks that have changed since the last incremental backup

enable block change tracking	<pre>sql> alter database enable block change tracking using file '/u01/block_change/prod1dr/chgtrack.log'; sql> select filename, status, bytes from v\$block_change_tracking;</pre>
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Backups of controlfiles are interchangeable between a primary database and its physical standby database. You can restore a standby controlfile on a primary and a primary controlfile on a standby. You do not need to backup the controlfile on your standby databases, RMAN will now automatically synchronize the control file information with the standby databases when using an RMAN catalog.

You can now resynchronize the RMAN catalog from a remote database using the *resync catalog* command with the *connect identifier* clause.

resync RMAN remotely	<pre>rman> configure db_unique_name prod1dr connect identifier 'prod1dr'; ## can resync from specific site or all sites rman> resync catalog from db_unique_name prod1dr; rman> resync catalog from db_unique_name all;</pre>
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RMAN Configuration in Data Guard

RMAN uses the *db_unique_name* parameter to identify one database from another, only the primary database must be explicitly registered using the *register database* command. Physical standby databases are registered automatically in the catalog when you use RMAN to connect to them as the *target* while connected to the recovery catalog. You can change the associated backup files with a different database using the *change* command with the *reset db_unique_name* option.

associate backup files with different database	<pre>rman> changebackup tag='standby_backup_1' for db_unique_name prod1dr reset db_unique_name;</pre>
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There are a number of configuration options I only list the ones that are appropriate with Data Guard

RMAN config for primary	<pre>## keep all backups for at least 7 days rman> configure retention policy to recovery window of 7 days; ## chose one of the following depending on when you want the archives to be deleted after shipping or after being applied rman> configure archivelog deletion policy to shipped to all standby; rman> configure archivelog deletion policy to applied on all standby; ## configure the connect identifiers for all databases rman> configure db_unique_name prod1 connect identifier 'prod1';</pre>
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	<pre>rman> configure db_unique_name prodldr connect identifier 'prodldr'; rman> list db_unique_name of database;</pre>
RMAN config for standby	<pre>## enable automatic backups of the control file and server parameters rman> configure controlfile autobackup on; ## skip backing up datafiles which a valid backup already exists with the same checkpoint rman> configure backup optimization; ## configure tape or disk channels as required by the media software rman> configure channel device type sbt params '<channel parameters>'; ## Since the logs are backed up at the standby you can specify none rman> configure deletion policy to none; ## delete the archive logs once they have been applied rman> configure archivelog deletion policy to applied to standby;</pre>

Backups and Recovery

I am not going to talk about all the different backup scenarios (full, incremental, backup copies, backups of flash recovery area, archive) as I have also discussed this in another section called [RMAN](#). I have also discuss how to create a standby database by cloning the primary database using the [duplicate](#) command.

You can use images copies to create a standby database, however the primary database must be shutdown cleanly and opened in mount mode to perform the backup, once complete the primary can be restarted and the image copy copied to the standby server, after fixing the parameters as usual, mounted using the standby control file.

Backups are pretty much the same as in any other database, apart from the deletion of archive log files there is not much to say.

Recovery can come in in the following scenarios

- Block Corruption - these corruptions occur in files as a result of memory corruptions that are written to the files as well as I/O errors.
- Media Failure - the database is unable to read or write to a datafile, due to hardware failure, file missing, etc

You can use RMAN to check for block corruptions and dbverify to identify corrupt data files, I have section regarding [database corruptions](#).

check for block corruptions	rman> backup validate database archivelog all;
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Also you have the [flashback technologies](#) to recover a number of accidents, drop tables, etc.

Here is a small table with the most common recovery scenarios, but have a look at my [database recovery](#) section which goes in to great detail on database recovery.

Loss of a data file on a primary database	<ol style="list-style-type: none"> 1. connect to the primary database as the target # rman target / catalog rman/<password>@RCAT 2. alter the datafile online rman> sql "alter database datafile 1 offline"; 3. restore and recover the datafile rman> restore datafile 1; rman> recover datafile 1; rman> sql "alter database datafile 1 online";
Using a standby database to recover the data file	<ol style="list-style-type: none"> 1. connect to the standby database as the target database and to the primary as the auxiliary database # rman target sys/<pwd>@prodldr catalog rman/<pwd>@RCAT auxiliary / 2. backup the datafile on the standby and transfer it to the primary rman> backup as copy datafile 1 auxiliary format '/u01/oradata/prodldr/users.dbf'; 3. start rman and connect to the primary database as the target and to the recovery catalog # rman target / catalog rman/<pwd>@RCAT 4. using the catalog datafilecopy command to catalog this datafile so that rman can use it rman> catalog datafilecopy '/u01/oradata/prodldr/users.dbf'; 5. use the switch datafile command to switch the datafile copy so that this file becomes the current datafile run { set newname for datafile 1 to '/u01/oradata/prod1/users.dbf'; switch datafile 1; }
Loss of a datafile on a standby database	<ol style="list-style-type: none"> 1. stop the SQL Apply using the alter database command sql> alter database recover managed standby database cancel; 2. start rman and connect both to the standby and the recovery catalog # rman target / catalog rman/<pwd>@RCAT 3. issue the following command to restore and recover the data files rman> restore datafile 1; rman> recover datafile 1; 4. restart SQL Apply sql> alter database recover managed standby database using current logfile disconnect;
Loss of a standby	<ol style="list-style-type: none"> 1. start rman and connect both to the standby and the recovery catalog

controlfile	<pre># rman target / catalog rman/<pwd>@RCAT 2. Choose one of the below, the last option is the most recent rman> restore controlfile from autobackup; rman> restore controlfile from '/backup_dir/piece_name'; rman> restore controlfile;</pre>
Loss of a primary controlfile	You can restore the control file from a backup by executing the <i>restore controlfile</i> and the <i>database recover</i> commands.
Loss of a online redo	<pre>1. shutdown the database 2. copy the existing multiplexed member over the missing or damaged member # cp red03a.rdo red03b.rdo 3. startup the database</pre>
incomplete recovery of a primary database	<pre>1. Mount the database exclusive sql> startup mount exclusive 2. flash back the database sql> flashback database to '<timestamp>'; 3. open the database reset logs; sql> alter database open resetlogs;</pre>
Recovering from a dropped table	<pre>1. drop the table sql> drop table test; 2. flashback the table sql> flashback table test to before drop;</pre>