WHAT IS RMAN ?

Recovery Manager is a tool that: manages the process of creating backups and also manages the process of restoring and recovering from them.

WHY USE RMAN ?

- No extra costs …Its available free
- RMAN introduced in Oracle 8 it has become simpler with newer versions and easier than user managed backups
- Proper security
- You are 100% sure your database has been backed up.
- Its contains detail of the backups taken etc in its central repository
  Facility for testing validity of backups also commands like crosscheck to check the status of backup.
- Faster backups and restores compared to backups without RMAN
  RMAN is the only backup tool which supports incremental backups.
  Oracle 10g has got further optimized incremental backup which has resulted in improvement of performance during backup and recovery time
- Parallel operations are supported
- Better querying facility for knowing different details of backup
- No extra redo generated when backup is taken..compared to online backup without RMAN which results in saving of space in hard disk
- RMAN an intelligent tool
  Maintains repository of backup metadata
  Remembers backup set location
  Knows what need to backed up
  Knows what is required for recovery
  Knows what backup are redundant

UNDERSTANDING THE RMAN ARCHITECTURE

An oracle RMAN comprises of

RMAN EXECUTABLE This could be present and fired even through client side

TARGET DATABASE This is the database which needs to be backed up .

RECOVERY CATALOG Recovery catalog is optional otherwise backup details are stored in target database controlfile .

It is a repository of information queried and updated by Recovery Manager
It is a schema or user stored in Oracle database
One schema can support many databases
It contains information about physical schema of target database
datafile and archive log ,backup sets and pieces

Recovery catalog is a must in following scenarios

- In order to store scripts
- For tablespace point in time recovery

Media Management Software

Media Management software is a must if you are using RMAN for storing backup in tape drive directly.

Backups in RMAN

Oracle backups in RMAN are of the following type
RMAN complete backup
OR RMAN incremental backup
These backups are of RMAN proprietary nature

IMAGE COPY

The advantage of uing Image copy is its not in RMAN proprietary format..

Backup Format

RMAN backup is not in oracle format but in RMAN format.
Oracle backup comprises of backup sets and it consists of backup pieces.
Backup sets are logical entity
In oracle 9i it gets stored in a default location
There are two type of backup sets
Datafile backup sets, Archivelog backup sets
One more important point of data file backup sets is it do not include empty blocks. A backup set would contain many backup pieces.
A single backup piece consists of physical files which are in RMAN proprietary format.

Example of taking backup using RMAN

Taking RMAN Backup

In non archive mode in dos prompt type
RMAN
-- You get the RMAN prompt
RMAN > Connect Target
Connect to target database : Magic <Dbid=129283912>
using target database controlfile instead of recovery catalog

Lets take a simple backup of database in non archive mode
shutdown immediate ; - - Shutdowns the database
startup mount
backup database ;- its start backing the database
alter database open;

We can fire the same command in archive log mode
And whole of datafiles will be backed
Backup database plus archivelog;

Restoring database
Restoring database has been made very simple in 9i .
It is just
Restore database..
RMAN has become intelligent to identify which datafiles has to be restored and the location of backuped up file.

Oracle Enhancement for RMAN in 10 G
Flash Recovery Area
Right now the price of hard disk is falling. Many dba are taking oracle database backup inside the hard disk itself since it results in lesser mean time between recoverability.

The new parameter introduced is
DB_RECOVERY_FILE_DEST = /oracle/flash_recovery_area

By configuring the RMAN RETENTION POLICY the flash recovery area will automatically delete obsolete backups and archive logs that are no longer required based on that configuration

Oracle has introduced new features in incremental backup
Change Tracking File
Oracle 10g has the facility to deliver faster incrementals with the implementation of changed tracking file feature.This will results in faster backups lesser space consumption and also reduces the time needed for daily backups

Incrementally Updated Backups

Oracle database 10g Incrementally Updates Backup features merges the image copy of a datafile with RMAN incremental backup. The resulting image copy is now updated with block changes captured by incremental backups.The merging of the image copy and incremental backup is initiated with RMAN recover command.
This results in faster recovery.

Binary compression technique reduces backup space usage by 50-75%.
With the new DURATION option for the RMAN BACKUP command, DBAs can weigh backup performance against system service level requirements. By specifying a duration, RMAN will automatically calculate the appropriate backup rate; in addition, DBAs can optionally specify whether backups should minimize time or system load.

New Features in Oem to identify RMAN related backup like backup pieces, backup sets and image copy

Oracle 9i New features
Persistent RMAN Configuration
A new configure command has been introduced in Oracle 9i ,
that lets you configure various features including automatic channels, parallelism ,backup options, etc.
These automatic allocations and options can be overridden by commands in a RMAN command file.

Controlfile Auto backups
Through this new feature RMAN will automatically perform a controlfile auto backup. after every backup or copy command.

Block Media Recovery
If we can restore a few blocks rather than an entire file we only need few blocks. We even dont need to bring the data file offline.
Syntax for it as follows
Block Recover datafile 8 block 22;

Configure Backup Optimization

Prior to 9i whenever we backed up database using RMAN our backup also used take backup of read only table spaces which had already been backed up and also the same with archive log too.

Now with 9i backup optimization parameter we can prevent repeat backup of read only tablespace and archive log.
The command for this is as follows
Configure backup optimization on

Archive Log failover
If RMAN cannot read a block in an archived log from a destination. RMAN automatically attempts to read from an alternate location this is called as archive log failover

There are additional commands like
backup database not backed up since time '31-jan-2002 14:00:00'
Do not backup previously backed up files
(say a previous backup failed and you want to restart from where it left off).
Similar syntax is supported for restores

backup device sbt backup set all Copy a disk backup to tape
(backing up a backup

Additionally it supports

- Backup of server parameter file
- Parallel operation supported
- Extensive reporting available
- Scripting
- Duplex backup sets
- Corrupt block detection
- Backup archive logs

Pitfalls of using RMAN

Previous to version Oracle 9i backups were not that easy which means you had to allocate a channel compulsorily to take backup You had to give a run etc .
The syntax was a bit complex …RMAN has now become very simple and easy to use..

If you changed the location of backup set it is compulsory for you to register it using RMAN or while you are trying to restore backup It resulted in hanging situations

There is no method to know whether during recovery database restore is going to fail because of missing archive log file.

Compulsory Media Management only if using tape backup

Incremental backups though used to consume less space used to be slower since it used to read the entire database to find the changed blocks and also They have difficult time streaming the tape device. .
Considerable improvement has been made in 10g to optimize the algorithm to handle changed block.

Observation
Introduced in Oracle 8 it has become more powerful and simpler with newer version of Oracle 9 and 10 g.
So if you really don't want to miss something critical please start using RMAN.

Paul Johny
DATABASE CONSULTANT
OCP 8 8I 9I DBA
DBAATCALL.COM