New York Oracle Users Group

Reporting from the RMAN repository

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Agenda

- Shifting the mind-set
  - It’s not about “doing backups”
    - It’s about populating the repository -- the recovery catalog
- What is the recovery catalog?
  - Control files
  - Optionally, a “recovery catalog” database schema
- Standard RMAN commands
- Some example reports

What is RMAN?

- A set of PL/SQL packages that access internal packages to perform file I/O and manipulate tape subsystems
- Two standard interfaces:
  - “rman” executable
  - Oracle Enterprise Manager “backup manager” forms
- These PL/SQL procedures can also be called from SQL*Plus or any other command interpreter
  - Some scenarios, such as the complete loss of all control files on disk, require this scenario…
- Glossary of terms:
  - Target database - a.k.a. database being protected
  - Catalog database - a.k.a. optional repository of RMAN information
  - Auxiliary database - a.k.a. cloned database during duplication

Shifting the mind-set

Using Recovery Manager is not just about new backup scripts…

The repository, also sometimes called the "*recovery catalog*", is ***EVERYTHING***

- All actions by RMAN populate entries into the repository which are used in a recovery situation
  - Backups
  - Media Management Layer (i.e. tape storage subsystems)
    - Software external to Oracle, integrated via a published API using "shared libraries"
  - Crosschecks, changes, and deletes
  - Validations and database duplications
  - Incomplete recoveries and RESETLOGS
  - "Manual" manipulation of the catalog information due to external actions

Shifting the mind-set

- Think about backups not just as “backups”, but as adding information to the repository
  - In addition to inserting these entries, they must be checked periodically, validated occasionally, and eventually deleted when appropriate
  - If no effort is made to check, maintain, and validate the information in the repository, then RMAN recoveries will “*experience challenges*”
- Schedule:
  - Backups of datafiles and archived redo logs
  - Crosschecks, validations, and duplications
  - Purges of the repository and deletions of backupsets

What is the repository?

- Stored in the database control files
  - Also known as NOCATALOG mode
  - Amount of information stored is configured using the initialization parameter CONTROL_FILE_RECORD_KEEP_TIME
    - Default = 7 days
    - Recommendation = <greater-than-expected-retention-time>
      - 21 days?
      - 30 days max?
      - Be aware that the control files are not designed to grow very large!!!
- NOCATALOG mode offers almost all of the functionality of RMAN except for a few:
  - Stored scripts
  - Recoveries across RESETLOGS
  - Some catalog manipulation actions

What is the repository?

- Using RMAN in NOCATALOG mode has some advantages:
  - Simple and low-cost to implement
  - Easy to maintain and configure
- Some obvious disadvantages:
  - Single point-of-failure
  - Limited storage capacity
  - Control file can be a busy place on a busy database!
- Case in point:
  - Running in NOCATALOG mode, you schedule backups, crosschecks, validations, duplications, and purges
    - But leave CONTROL_FILE_RECORD_KEEP_TIME = 7?
- Piece of advice:
  - Squirrel away controlfile backups on disk on lots of servers
  - Don’t be shy about having lots of easily-accessible controlfile backups in lots of locations!

What is the repository?

- So, as an option, RMAN's repository can also be replicated to a schema in a database
  - a.k.a. recovery catalog
  - a.k.a. running CATALOG mode
- Data is replicated between controlfile-based repository and "recovery catalog" repository
  - Implicitly, during commands such as BACKUP, CHANGE, RESTORE, RECOVER, and other commands
  - Explicitly, using the RESYNCH command
    - Good idea: schedule RESYNCH commands on a regular basis
- Piece of advice:
  - Don't create this repository within the TARGET database!
    - Yes, it does happen! A LOT!
    - What is wrong with this scenario?

What is the repository?

- Options for organizing schemas for “catalog databases”:

1. Store “recovery catalogs” from multiple target databases within one catalog schema
   - Example: username = RMAN
     - Contains recovery catalogs for all target databases
2. Store “recovery catalogs” from multiple target databases within one catalog schema per RDBMS version of target databases
   - Example: username = RMAN_920
     - Contains recovery catalogs for all target databases using v9.2.0.x

- Store “recovery catalogs” from each target database within it’s own individual catalog schema
  - Example: username = RMAN_ERPPRD
    - Contains recovery catalogs for target database ERPPRD only

What is the repository?

- Protecting the recovery catalog database(s)?
  1. Back ‘em up using NOCATALOG?
  2. Create a “recovery catalog” in one of the protected target databases?
  3. Replicate somewhere else using Data Guard or Streams?
  4. Exports?

It’s not the end of the world if you lose this database, because you’ve set CONTROL_FILE_RECORD_KEEP_TIME appropriately and kept lots of control file backups squirreled away, right? :-)

Quick tour of the repository

- All documentation downloadable in HTML and PDF from http://otn.oracle.com

- Oracle8i
  - "Recovery Manager Users Guide and Reference", part #B76990
    - Chapter 11: Recovery Catalog views
      - Does not include a listing of the V$ views comprising the repository in the control files
- Oracle9i
  - "Recovery Manager Reference", part number B96565
    - Chapter 3: Recovery Catalog views
      - Includes the corresponding V$ views comprising the repository in the control files
- Oracle10g
  - "Backup and Recovery Reference", part number B14194
    - Chapter 3: Recovery Catalog views
      - Includes the corresponding V$ views comprising the repository in the control files

CATALOG command

- Add backup pieces and image copies on disk to repository so they can be used
- Record backup images as level-0 backups

CHANGE command

- To change the status of backups, copies, and archived logs in the repository to AVAILABLE or UNAVAILABLE.
  - This feature is useful when a previously unavailable file is made available again, or you do not want a specific backup or copy to be eligible to be restored but also do not want to delete it.
- To alter the repository status of usable backups and copies from prior incarnations (i.e. prior to RESETLOGS)
- To remove catalog records for backups and copies, and update the corresponding records in the target control file to status DELETED.
  - This feature is useful when you remove a file by using an operating system command rather than the RMAN CHANGE command, and want to remove its repository record as well.

DELETE command

- To delete backupsets and/or image-copies on disk or tape, as well as do the following:
  - Update their repository records in the target control file to status DELETED
  - Remove their repository records from the recovery catalog (if you use a catalog)

CROSSCHECK command

- Verify the status of backups and copies recorded in the RMAN repository against media such as disk or tape
  1. Read entries in the repositories
     - Connect NOCATALOG or CATALOG
  2. Try to “touch” each relevent entry on the allocated channel
     - Allocate channel for DISK or SBT_TAPE

RESYNCH command

- Synchronize information between control files and “recovery catalog”
  - Can also be used to completely repopulate the “recovery catalog” from a *backup controlfile*, if desired

- When you run RESYNC CATALOG, RMAN creates a *snapshot control file* in order to obtain a read-consistent view of the control file, then updates the recovery catalog with any new information from the snapshot.

LIST command

- To display information about backup sets, proxy copies, and image copies recorded in the repository
  - Displays files against which you can run CROSSCHECK and DELETE commands
- Use this command to list:
  - Backups and copies that do not have the status AVAILABLE in the RMAN repository
  - Backups and copies of datafiles that are AVAILABLE and can possibly be used in a RESTORE operation
  - Specified archived logs, backup sets, backup pieces, control file copies, datafile copies, and proxy copies
  - Backups and copies restricted by tag, completion time, recoverability, or device
  - Incarnations of a specified database or of all databases known to the repository
  - Stored scripts in the recovery catalog

REPORT command

- Use the REPORT command to answer questions such as the following:
  - Which datafiles need a backup?
  - Which datafiles have not had a backup for some time?
  - Which datafiles are not recoverable due to unrecoverable operations?
  - Which backupset and image-copy files can be deleted?
  - What was the physical schema of the database at a previous time?

Sample custom reports

- Can I recover the target database to a specified point-in-time?
  - Download from http://www.EvDBT.com/tools.htm
    - PL/SQL DDL scripts “rman_chk_catalog.sql” and “rman_chk_nocatalog.sql”
    - Test SQL*Plus script “rman_chk_test.sql”
    - Shell script “rman_chk.sh”, runnable from UNIX “cron” utility, is available via email, emails when procedur RMAN_CHK fails…
- How long would it take me to restore the entire database?
  - RMAN records elapsed time of backups
  - It is not a valid assumption that restores take the same amount of time as a backup
    - But it is better than a guess… :-)

Sample custom reports

- When is the last time these databases were backed up?
  - The “REPORT NEEDS BACKUP” command that is part of RMAN only lists datafiles within a database that needs to be backed up
  - This query, used on a “recovery catalog” database (can’t be used in NOCATALOG mode) lists databases by when they were last backed up…
  - Downloadable from http://www.EvDBT.com/tools.htm
    - Written by Brian Minor

Questions? Discussion?

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Scripts and presentation can be downloaded from
http://www.EvDBT.com/papers.htm
http://www.EvDBT.com/tools.htm
Else, email me… :-)