3

Using the RMAN Recovery Catalog

Objectives

After completing this lesson, you should be able to:

- Contrast the usage of a recovery catalog with that of the control file for the RMAN repository
- Create and configure a recovery catalog
- Register a database in the recovery catalog
- Synchronize the recovery catalog
- Use RMAN stored scripts
- Back up the recovery catalog
- Create a virtual private catalog

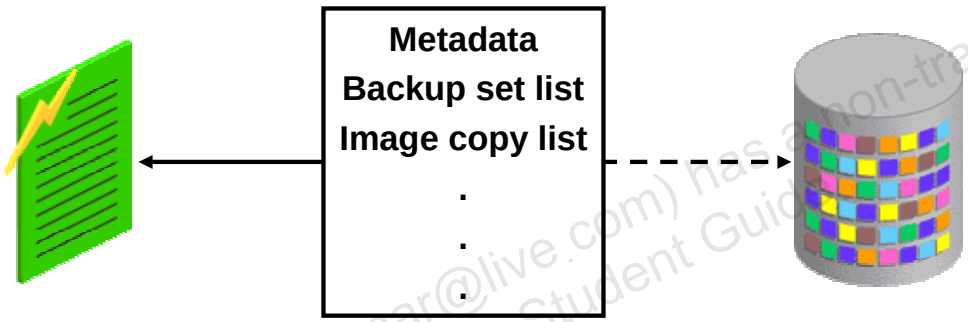
RMAN Repository Data Storage: Comparison of Options

Control file:

- Simpler administration
- Default

Recovery catalog:

- Replicates control file data
- Stores longer history of backups
- Services many targets
- Stores RMAN scripts



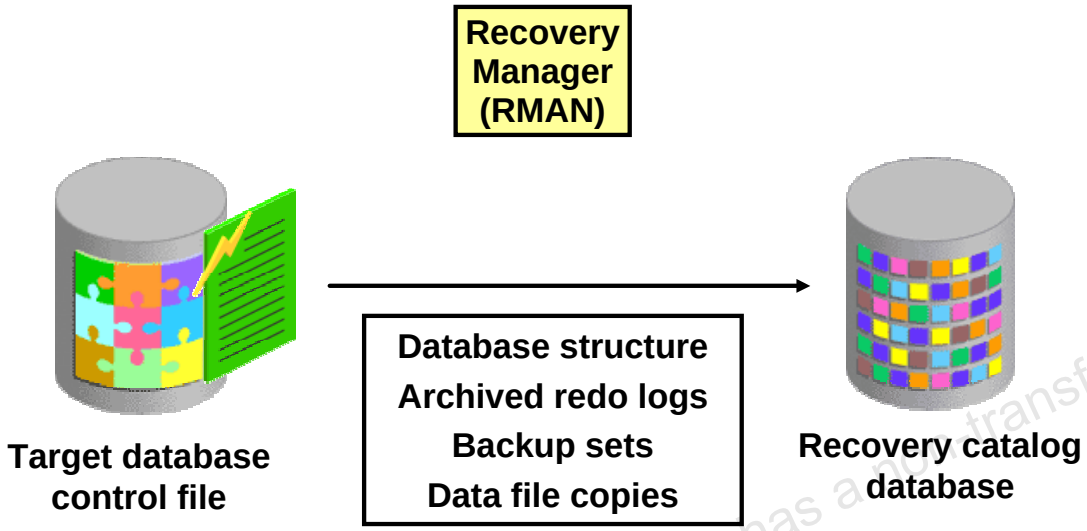
RMAN Repository Data Storage: Comparison of Options

The RMAN repository data is always stored in the control file of the target database. But it can also, additionally, be stored in a separate database called a recovery catalog.

A recovery catalog preserves backup information in a separate database, which is useful in the event of a lost control file. This allows you to store a longer history of backups than what is possible with a control file–based repository. A single recovery catalog is able to store information for multiple target databases. The recovery catalog can also hold RMAN stored scripts, which are sequences of RMAN commands.

If you have very simple backup management requirements, Oracle recommends that you use the control file option rather than a recovery catalog. Having a recovery catalog means you need to manage and back up another database. Therefore, use a recovery catalog only if you can take advantage of the benefits it offers, such as longer backup retention.

Storing Information in the Recovery Catalog



Storing Information in the Recovery Catalog

RMAN propagates information about the database structure, archived redo logs, backup sets, and data file copies into the recovery catalog from the target database's control file after any operation that updates the repository, and also before certain operations.

Reasons to Use a Recovery Catalog

- Stores more historical information than the control file
- Enables you to use RMAN stored scripts
- Enables you to create customized reports for all registered targets
- Enables you to use the KEEP FOREVER clause of the BACKUP command
- Allows you to list the data files and tablespaces that are or were in the target database *at a given time*

Reasons to Use a Recovery Catalog

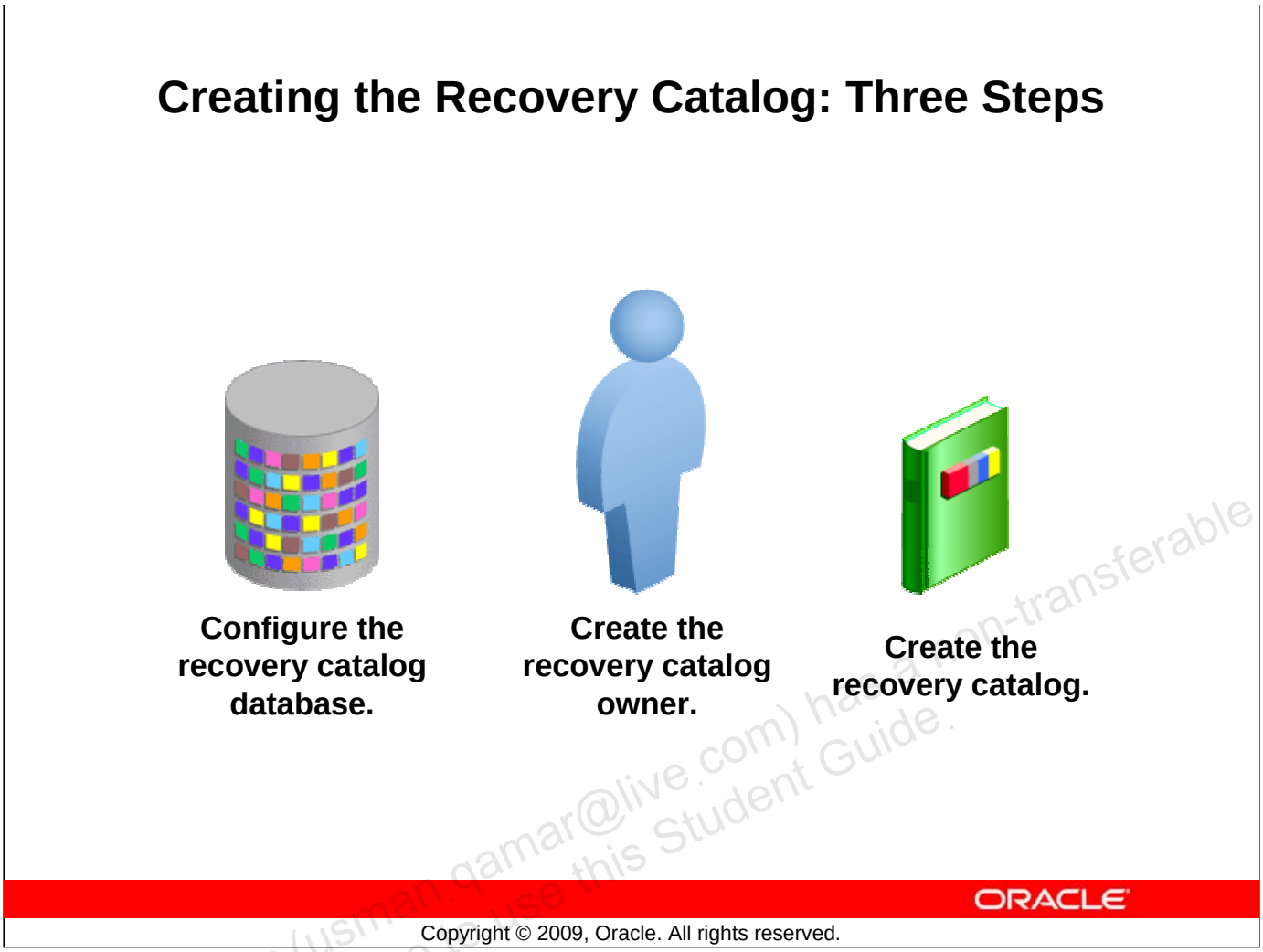
Although you can use the control file as the sole repository for RMAN, it has finite space for records of backup activities. When you use a recovery catalog, you can store a much longer history of backups. This enables you to perform a recovery that goes back further in time than the history in the control file.

If you want to use RMAN stored scripts, you must use a recovery catalog.

When you use a recovery catalog, the backup and recovery information for all registered targets is contained in one place allowing you to create customized reports by connecting as the recovery catalog owner and querying the various RC_ views. If you do not use a recovery catalog, you must connect to each target database instance separately and query the V$ views for the RMAN information in the target control file.

You can use the BACKUP . . . KEEP command to create a backup that is retained for a different period of time from that specified by the configured retention policy. The KEEP FOREVER clause specifies that the backup or copy never expires and requires the use of a recovery catalog so that the backup records can be maintained indefinitely.

The REPORT SCHEMA command lists the tablespaces and data files in the target database. If you add the option of AT [*time*|*scn*|*logseq*], you can see that information at some time in the past. You can use the AT option only if you are using a recovery catalog.



Creating the Recovery Catalog: Three Steps

To create a recovery catalog, perform the following three steps:

1. Configure the database in which you want to store the recovery catalog.
2. Create the recovery catalog owner.
3. Create the recovery catalog.

Configuring the Recovery Catalog Database

- Allocate space for the recovery catalog. Consider:
  - Number of databases supported by the recovery catalog
  - Number of archived redo log files and backups recorded
  - Use of RMAN stored scripts
- Create a tablespace for the recovery catalog, which becomes the default tablespace for the recovery catalog owner.

```
SQL> CREATE TABLESPACE rcat_ts DATAFILE SIZE 15M;
```

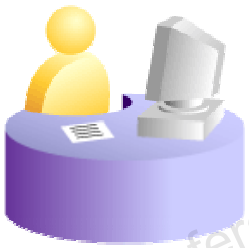

Configuring the Recovery Catalog Database

Determine the database in which you will install the recovery catalog schema. Be sure to consider your backup and recovery procedures for this database. Backing up the recovery catalog is covered later in this lesson.

The amount of space required by the recovery catalog schema depends on the number of databases monitored by the catalog. The space increases as the number of archived redo log files and backups for each database increases. If you use RMAN stored scripts, space must be allocated for those scripts. The sample space requirement is 15 MB for each database registered in the recovery catalog.

Creating the Recovery Catalog Owner

- Create the recovery catalog owner.
- Grant the RECOVERY_CATALOG_OWNER role.



```
SQL> CREATE USER rcowner IDENTIFIED BY rcpass
  2  TEMPORARY TABLESPACE temp
  3  DEFAULT TABLESPACE rcat_ts
  4  QUOTA UNLIMITED ON rcat_ts;
SQL> GRANT recovery_catalog_owner TO rcowner;
```

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Creating the Recovery Catalog Owner

Create a user to serve as the recovery catalog owner. Set the default tablespace for this user to the tablespace you created for the recovery catalog. Be sure to provide `UNLIMITED` quota on this tablespace for the user. After you have created the user, grant the `RECOVERY_CATALOG_OWNER` role to the user. The `RECOVERY_CATALOG_OWNER` role provides privileges for the owner of the recovery catalog. The role includes the following system privileges: `ALTER SESSION`, `CREATE CLUSTER`, `CREATE DATABASE LINK`, `CREATE PROCEDURE`, `CREATE SEQUENCE`, `CREATE SESSION`, `CREATE SYNONYM`, `CREATE TABLE`, `CREATE TRIGGER`, `CREATE TYPE`, and `CREATE VIEW`.

You can use SQL commands or Enterprise Manager to create the user and grant the role.

Creating the Recovery Catalog

- Connect to the recovery catalog database as the catalog owner:

```
$ rman
RMAN> CONNECT CATALOG username/password@net_service_name
```

- Execute the CREATE CATALOG command:

```
RMAN> CREATE CATALOG;
```


Creating the Recovery Catalog

After creating the catalog owner, use the RMAN CREATE CATALOG command to create the catalog tables in the default tablespace of the catalog owner.

Note: As with any database, if the ORACLE_SID environment variable is set to the SID for the recovery catalog database, then there is no need to supply the net_service_name in the CONNECT statement.

Managing Target Database Records in the Recovery Catalog

- Registering a target database in the recovery catalog
- Cataloging additional backup files
- Unregistering a target database from the recovery catalog

Managing Target Database Records in the Recovery Catalog

Although most information is automatically propagated from the control file to the recovery catalog, there are a few operations you may need to perform to maintain target database records in the recovery catalog.

Registering a Database in the Recovery Catalog

RMAN performs the following actions:

- Creates rows in the recovery catalog tables for the target database
- Copies data from the target database control file to the recovery catalog tables
- Synchronizes the recovery catalog with the control file

```
$ rman TARGET / CATALOG
   username/password@net_service_name
RMAN> REGISTER DATABASE;
```


Registering a Database in the Recovery Catalog

After creating the recovery catalog, you must register the target databases in the recovery catalog. To register your target database, perform the following steps:

1. Invoke RMAN and connect to the recovery catalog database and to the target database as shown in the following example:
   ```
   % rman TARGET / CATALOG rman/rman@reccatdb
   ```
2. Ensure that the target database is mounted or open.
3. Issue the `REGISTER` command to register the target database in the recovery catalog:
   ```
   RMAN> REGISTER DATABASE;
   ```

Using Enterprise Manager to Register a Database

To register a database with a recovery catalog, perform the following steps in Enterprise Manager (EM):

1. Run EM against the target database and navigate to the Recovery Catalog Settings page.
2. Add the recovery catalog to the configuration, if not already listed there.
3. Specify that the target database is to use the recovery catalog chosen in the list.

The EM method of registration also causes EM to use the recovery catalog for backup and recovery–related operations.

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Using Enterprise Manager to Register a Database

To register a database with a recovery catalog in EM, you must first add the recovery catalog to the EM configuration. Running EM on the target database, you select that recovery catalog to be the recovery catalog for the target database.

If you use RMAN to register the database, and do not perform the steps in the slide, then any backup and recovery operations performed using EM will not use the recovery catalog. So, if you plan to use EM, perform the registration steps described here even if you have executed the RMAN `REGISTER DATABASE` command.

In Enterprise Manager:

1. From the EM Database home page, navigate to Availability > Recovery Catalog Settings. Click Add Recovery Catalog to specify the host, port, and SID of a database with an existing recovery catalog.
2. After you have defined the recovery catalog database, select “Use Recovery Catalog” on the Recovery Catalog Setting page to register the database in the recovery catalog database. When you click OK, the database is registered with the catalog.

Unregistering a Target Database from the Recovery Catalog

- This removes information about the target database from the recovery catalog.
- Use this when you no longer want the target database to be defined in the recovery catalog.

```
$ rman TARGET / CATALOG
   username/password@net_service_name
RMAN> UNREGISTER DATABASE;
```


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Unregistering a Target Database from the Recovery Catalog

When you unregister a database from the recovery catalog, all RMAN repository records in the recovery catalog are lost. You can reregister the database. The recovery catalog records for that database are then based on the contents of the control file at the time of re-registration.

Typically, you would unregister a target database only if you no longer want to use the recovery catalog for that database or the database no longer exists.

Note: If you have used Enterprise Manager Database Control to register your database, you must use it again to unregister your database.

Cataloging Additional Backup Files

- CATALOG can be used to catalog existing backup files that are no longer listed in the control file.
- This enables RMAN to use the files during a restore operation.
- Use the CATALOG command to add the following types of backup files to the recovery catalog:
  - Control file copies
  - Data file copies
  - Backup pieces
  - Archived redo log files

```
RMAN> CATALOG BACKUPPIECE 'file_name';
```

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Cataloging Additional Backup Files

If you have additional control file copies, data file copies, backup pieces, or archived redo log files on disk, you can catalog them in the recovery catalog by using the CATALOG command. If backups have aged out of the control file, you can catalog them so that RMAN can use them during a restore operation.

Examples of cataloging a control file, data file, archived redo log file, and backup piece follow:

```
RMAN> CATALOG CONTROLFILECOPY
'/disk1/controlfile_bkup/2009_01_01/control01.ctl';
RMAN> CATALOG DATAFILECOPY
'/disk1/datafile_bkup/2009_01_01/users01.dbf';
RMAN> CATALOG ARCHIVELOG '/disk1/arch_logs/archive1_731.log',
'/disk1/arch_logs/archive1_732.log';
RMAN> CATALOG BACKUPPIECE '/disk1/backups/backup_820.bkp';
```

You can catalog all files in the currently enabled Fast Recovery Area as follows:

```
RMAN> CATALOG RECOVERY AREA NOPROMPT;
```

START WITH Option

Use the START WITH option to catalog all files found in the directory tree specified. Provide a prefix that indicates the directory and possibly a file prefix to look for. You cannot use wildcards; this is only a prefix.

Cataloging Additional Backup Files (continued)

All types of backup files that are found in the specified directory and subdirectories are cataloged. Suppose you have several backup files in the `/tmp/arch_logs` directory. The following command catalogs all of them:

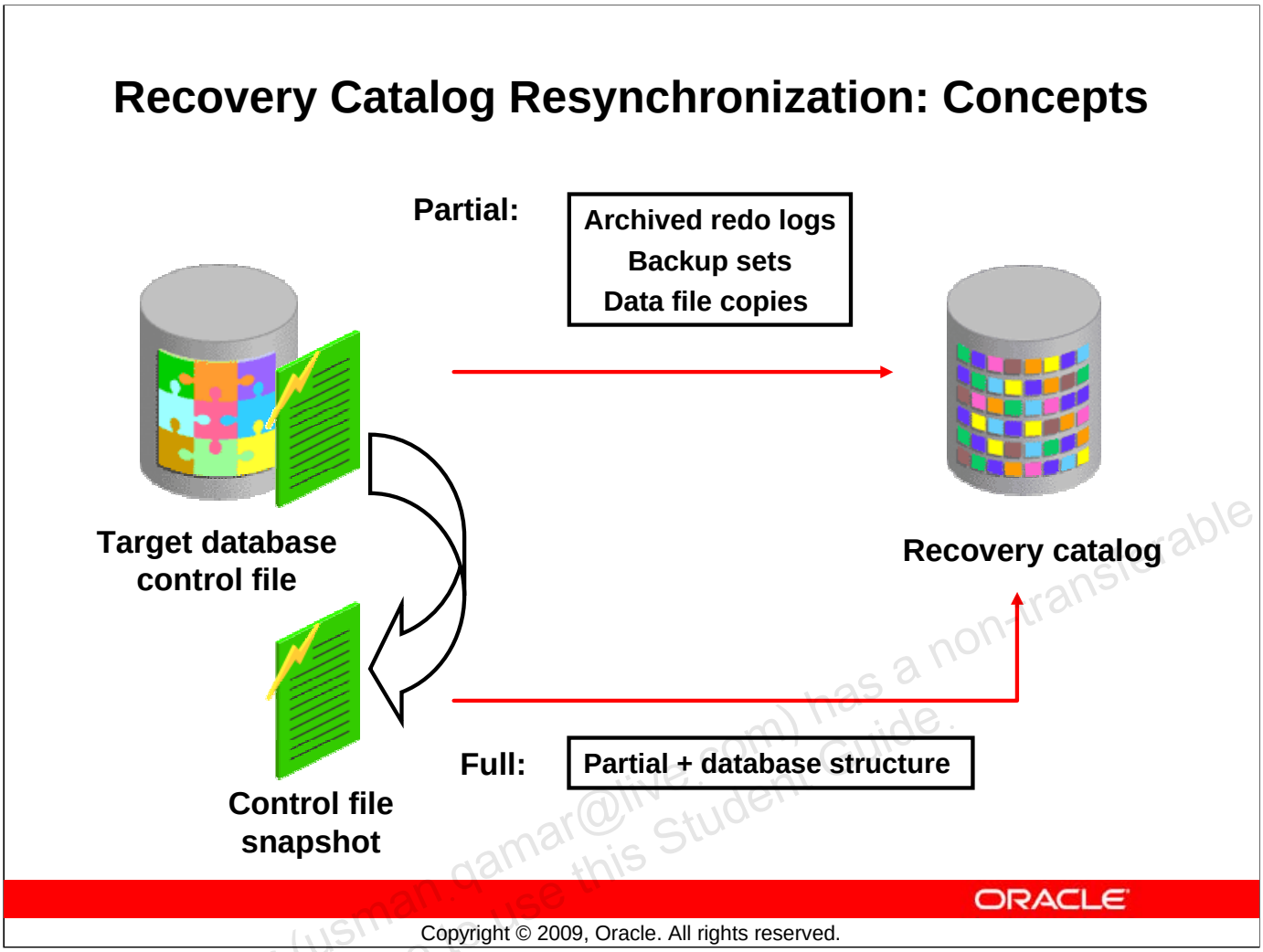
```
RMAN> CATALOG START WITH '/tmp/arch_logs/';
```

Suppose you want to be sure to catalog only those files in the `/tmp` directory whose file names start with the string `bset`. The following accomplishes that:

```
RMAN> CATALOG START WITH '/tmp/bset';
```

This command also catalogs any backup files that are found in directory trees that begin with `/tmp/bset`.

The `CATALOG` command can be used without being connected to a recovery catalog.



Recovery Catalog Resynchronization: Concepts

When RMAN performs a *resynchronization*, it compares the recovery catalog to either the current control file of the target database or a backup/standby control file and updates the recovery catalog with information that is missing or changed.

There are two types of resynchronization: partial and full. For partial resynchronization, RMAN compares the control file to the recovery catalog and updates the recovery catalog with any metadata concerning backups, archived redo logs, data file copies, and so on. For a full synchronization, RMAN first creates a control file snapshot, which is simply a temporary copy of the control file. It uses the snapshot to make the comparison to the recovery catalog. It compares and updates all the data that a partial resynchronization does, but it also includes any database structure changes. For example, database schema changes or new tablespaces are included in a full resynchronization.

Note: The database schema includes names and locations of data files, redo log files, archive log files, undo segments, and other information found in the control file.

If the only changes to the control file are those records that are governed by `CONTROL_FILE_RECORD_KEEP_TIME`, then a partial resynchronization is done. Otherwise, a full resynchronization is done. A full resynchronization is also done when you issue the `RESYNC CATALOG` command, which is described in the next slide.

Manually Resynchronizing the Recovery Catalog

Manually resynchronize the recovery catalog in the following situations:

- After the recovery catalog was unavailable for RMAN to automatically resynchronize it
- When you perform infrequent backups of your target database
- After making changes to the physical structure of the target database

```
RMAN> RESYNC CATALOG;
```


Manually Resynchronizing the Recovery Catalog

Perform a manual resynchronization of the recovery catalog in the following situations:

- If the recovery catalog was unavailable when you issued RMAN commands that cause a partial resynchronization
- If you perform infrequent backups of your target database because the recovery catalog is not updated automatically when a redo log switch occurs or when a redo log is archived
- After making any change to the physical structure of the target database

Note: Refer to the *Backup and Recovery User's Guide* for detailed information about records that are updated during resynchronization.

Using RMAN Stored Scripts

Stored scripts are:

- An alternative to command files
- Available to any RMAN client that can connect to the target database and recovery catalog
- Of two types:
  - Local: Associated with the target database to which RMAN is connected when the script is created
  - Global: Can be executed against any database registered in the recovery catalog
- Created from a text file (additional option)

```
CREATE SCRIPT script_name
{ <RMAN commands>}
```

```
CREATE GLOBAL SCRIPT script_name
{ <RMAN commands> }
```

```
CREATE [GLOBAL] SCRIPT script_name FROM FILE 'file_name';
```

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Using RMAN Stored Scripts

You can use RMAN stored scripts as an alternative to command files for managing frequently used sequences of RMAN commands. Unlike command files that are available only on the system on which they are stored, a stored script is always available to any RMAN client that can connect to the target database and recovery catalog.

Stored scripts can be defined as global or local. A local stored script is associated with the target database to which RMAN is connected when the script is created, and can be executed only when you are connected to that target database. A global stored script can be executed against any database registered in the recovery catalog, if the RMAN client is connected to the recovery catalog and a target database.

Creating RMAN Stored Scripts

Connect to the desired target database and the recovery catalog and execute the `CREATE SCRIPT` command to create a stored script.

Executing RMAN Stored Scripts

- Executing a script:

```
RUN { EXECUTE SCRIPT
script_name
; }
```

- Executing a global script:

```
RUN { EXECUTE GLOBAL SCRIPT
script_name
; }
```


Executing RMAN Stored Scripts

Connect to the target database and recovery catalog, and use the EXECUTE SCRIPT command to execute a stored script. Note that the EXECUTE SCRIPT command requires a RUN block. If an RMAN command in the script fails, subsequent RMAN commands in the script do not execute.

When you execute the script, it uses the automatic channels configured at the time. Use ALLOCATE CHANNEL commands in the script if you need to override the configured channels as shown in the following example:

```
RMAN> RUN
{
  ALLOCATE CHANNEL ch1 DEVICE TYPE DISK;
  ALLOCATE CHANNEL ch2 DEVICE TYPE DISK;
  ALLOCATE CHANNEL ch3 DEVICE TYPE DISK;
  EXECUTE SCRIPT full_backup;
}
```

Maintaining RMAN Stored Scripts

- Displaying a script:

```
PRINT [GLOBAL] SCRIPT script_name;
```

- Sending the contents of a script to a file:

```
PRINT [GLOBAL] SCRIPT script_name TO FILE 'file_name';
```

- Displaying the names of defined scripts:

```
LIST [GLOBAL] SCRIPT NAMES;
```

- Displaying a script:

```
REPLACE [GLOBAL] SCRIPT script_name
{ <RMAN commands> ; }
```

- Updating a script from a file:

```
REPLACE [GLOBAL] SCRIPT script_name FROM FILE
   'file_name';
```

- Deleting a script:

```
DELETE SCRIPT script_name;
```

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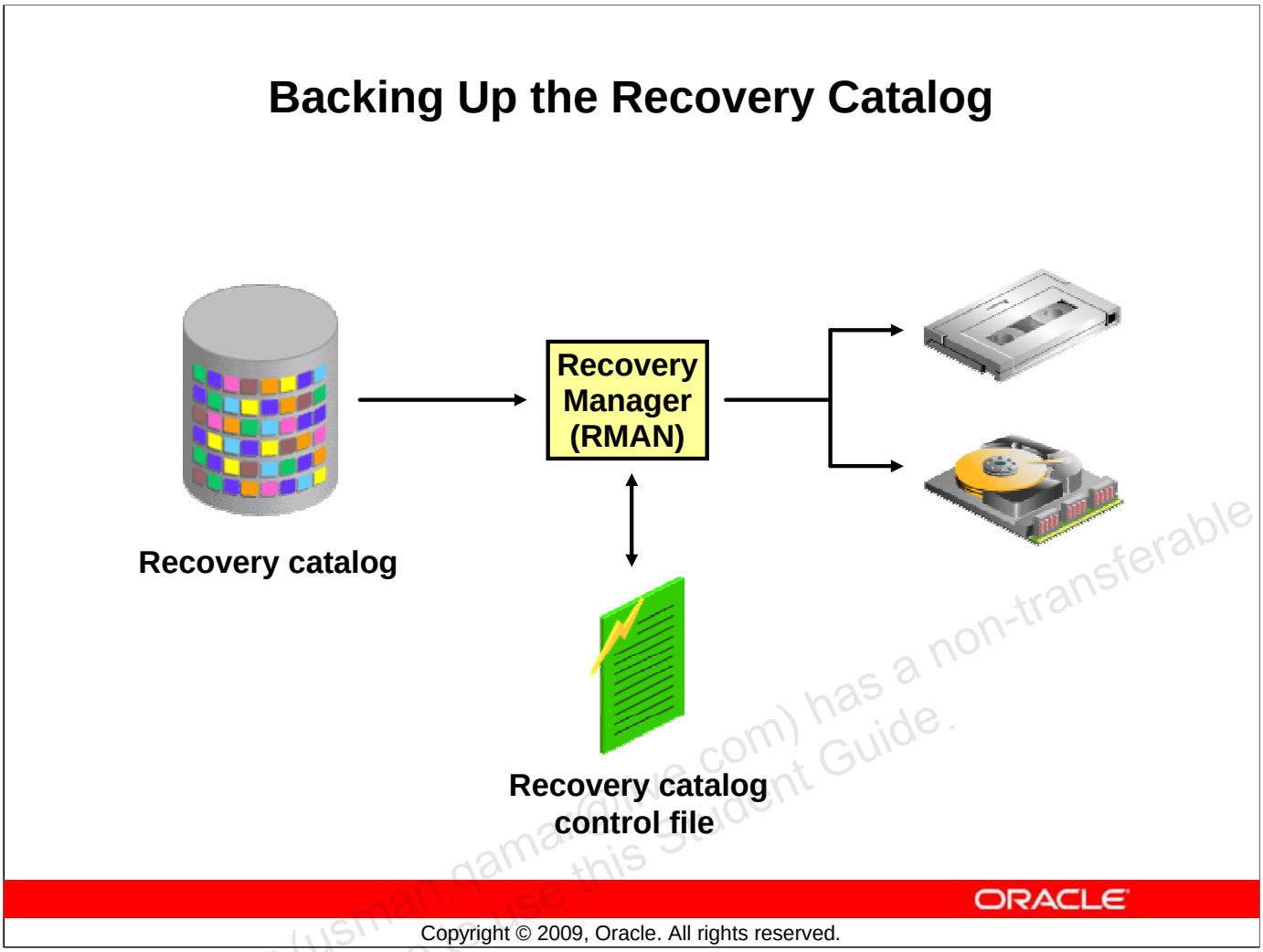
Displaying RMAN Stored Script Information

Connect to the target database and recovery catalog and use the `PRINT SCRIPT` command to display a stored script or write it out to a file.

Use the `LIST SCRIPT NAMES` command to display the names of scripts defined in the recovery catalog. This command displays the names of all stored scripts, both global and local, that can be executed for the target database to which you are currently connected.

Connect to the target database and recovery catalog and use the `REPLACE SCRIPT` command to update stored scripts. RMAN creates the script if it does not exist.

To delete a stored script from the recovery catalog, connect to the catalog and a target database, and use the `DELETE SCRIPT` command.



Backing Up the Recovery Catalog

The recovery catalog is an Oracle database, so it needs to be backed up as any database should. Oracle recommends using RMAN to back it up and, of course, use the control file as the RMAN repository, instead of a recovery catalog. Never store a recovery catalog containing the RMAN repository for a database in the same database as the target database or on the same disks as the target database. A recovery catalog is effective only if it is separated from the data that it is designed to protect.

Configure control file autobackup so that the control file is backed up every time a backup is made of the recovery catalog. Any time you make a backup in the target database, back up the recovery catalog right afterward. This protects the record of the latest backup.

Below is a summary of how to configure the backup and recovery environment for your recovery catalog:

- Run the recovery catalog in `ARCHIVELOG` mode.
- Set the retention policy to a `REDUNDANCY` value greater than one.
- Back up the recovery catalog to disk and tape.
- To make the backups, use the `BACKUP DATABASE PLUS ARCHIVELOG` command.
- Use the control file (`NOCATALOG`), not another recovery catalog, as the RMAN repository.
- Configure control file autobackup to be `ON`.

Re-Creating an Unrecoverable Recovery Catalog

To partially re-create the contents of a lost recovery catalog, use the following commands:

- `RESYNC CATALOG` command: Updates the recovery catalog with any RMAN repository information from the control file of the target database or a control file copy
- `CATALOG START WITH` command: Recatalogs any available backups

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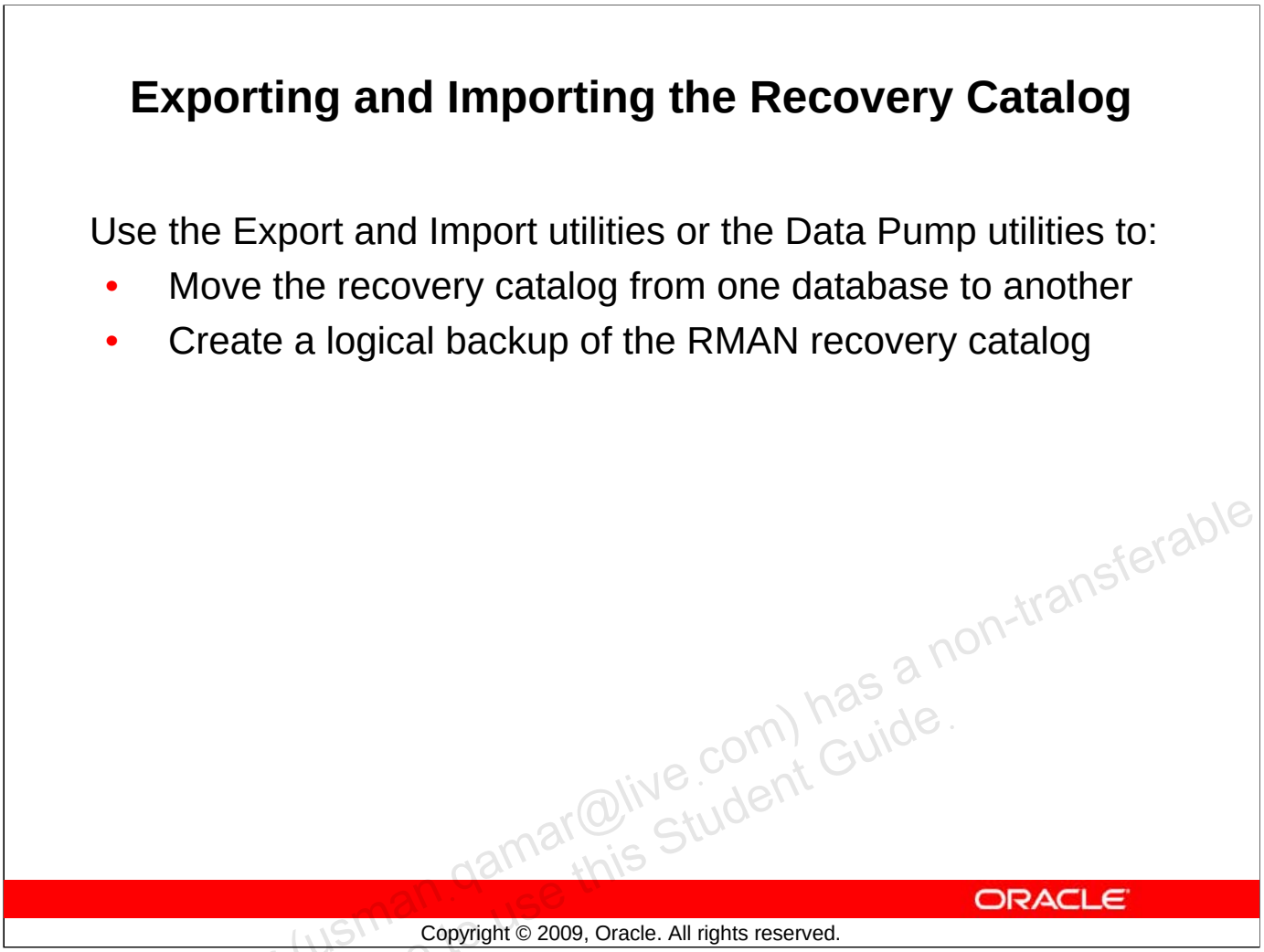
Re-Creating an Unrecoverable Recovery Catalog

If the recovery catalog database is lost or damaged, and recovery of the recovery catalog database through the normal Oracle recovery procedures is not possible, then you must re-create the catalog.

You can use the following commands to partially repopulate the contents of the recovery catalog:

- **`RESYNC CATALOG`:** Use this command to update the recovery catalog with any RMAN repository information from the control file of the target database or a control file copy. Note that any metadata from control file records that aged out of the control file is lost.
- **`CATALOG START WITH...`:** Use this command to recatalog any available backups.



Exporting and Importing the Recovery Catalog

You can use Export and Import to move the recovery catalog from one database to another.

You can also create an export of the recovery catalog to serve as a logical backup.

Perform the following steps to export a recovery catalog from one database and import the catalog into a second database:

1. Use one of the Oracle Export utilities to export the catalog data from the database.
2. Create a recovery catalog user on the database you are exporting to and grant the user necessary privileges.
3. Use the corresponding Import utility to import the catalog data into the schema created in step 2.

You should not execute the `CREATE CATALOG` command before or after importing the catalog into the database. The import operation creates the catalog in the second database.

Note: The recovery catalog can be backed up and moved to another database as a transportable tablespace by using Export and Import or Data Pump, as well as using logical methods.

Upgrading and Dropping the Recovery Catalog

To upgrade the recovery catalog to the version required by the RMAN client, use the UPGRADE CATALOG command:

```
UPGRADE CATALOG;
```

To drop the recovery catalog schema, use the DROP CATALOG command:

```
DROP CATALOG;
```


Upgrading and Dropping the Recovery Catalog

If you use a version of the recovery catalog that is older than that required by the RMAN client, then you must upgrade it by executing the UPGRADE CATALOG command.

- To install the new recovery catalog schema, the recovery catalog user must have the CREATE TYPE privilege.
- You must be connected to the catalog database, and the catalog database must be open. You do not have to be connected to the target database.
- You must enter the UPGRADE command a second time to confirm the upgrade. You receive an error if the recovery catalog is already at a version greater than that needed by the RMAN executable. However, RMAN permits the command to be run if the recovery catalog is current, so that the packages can be re-created if necessary.
- RMAN displays all error messages generated during the upgrade in the message log.

If you no longer want to maintain a recovery catalog, you can drop the recovery catalog schema from the tablespace with the DROP CATALOG command. Dropping the catalog deletes the recovery catalog record of backups for all target databases registered in the catalog.

- Execute this command only at the RMAN prompt.
- You must be connected to the recovery catalog database through the CATALOG command-line option or the CONNECT CATALOG command. The catalog database must be open. You do not have to be connected to the target database.
- Enter the command twice to confirm that you want to drop the schema.

IMPORT CATALOG Command

1. Connecting to the destination recovery catalog:

```
CONNECT CATALOG cat111/oracle@destdb;
```

2. Importing metadata for all registered databases:

```
IMPORT CATALOG cat102/oracle@srcdb;
```

3. Importing metadata for two registered databases:

```
IMPORT CATALOG cat92/oracle@catdb DBID=1423241, 1423242;
```

4. Importing metadata from multiple catalogs:

```
IMPORT CATALOG cat102/rman@srcdb;
IMPORT CATALOG cat101/rman@srcdb;
IMPORT CATALOG cat92/rman@srcdb NO UNREGISTER;
```

Must be equal to the current version of the RMAN executable

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IMPORT CATALOG Command

With the `IMPORT CATALOG` command, you can import the metadata from one recovery catalog schema into a different catalog schema. If you created catalog schemas of different versions to store metadata for multiple target databases, this command enables you to maintain a single catalog schema for all databases.

```
IMPORT CATALOG <connectStringSpec>
[DBID = <dbid> [, <dbid>,…]]
[DB_NAME=<dbname>[, <dbname,…]]
[ NO UNREGISTER ];
```

<connectStringSpec> is the source recovery catalog connect string. The version of the source recovery catalog schema must be equal to the current version of the RMAN executable. If needed, upgrade the source catalog to the current RMAN version.

DBID: You can specify the list of database IDs whose metadata should be imported from the source catalog schema. When not specified, RMAN merges metadata for all database IDs from the source catalog schema into the destination catalog schema. RMAN issues an error if the database whose metadata is merged is already registered in the recovery catalog schema.

The IMPORT CATALOG Command (continued)

DB_NAME: You can specify the list of database names whose metadata should be imported. If the database name is ambiguous, RMAN issues an error.

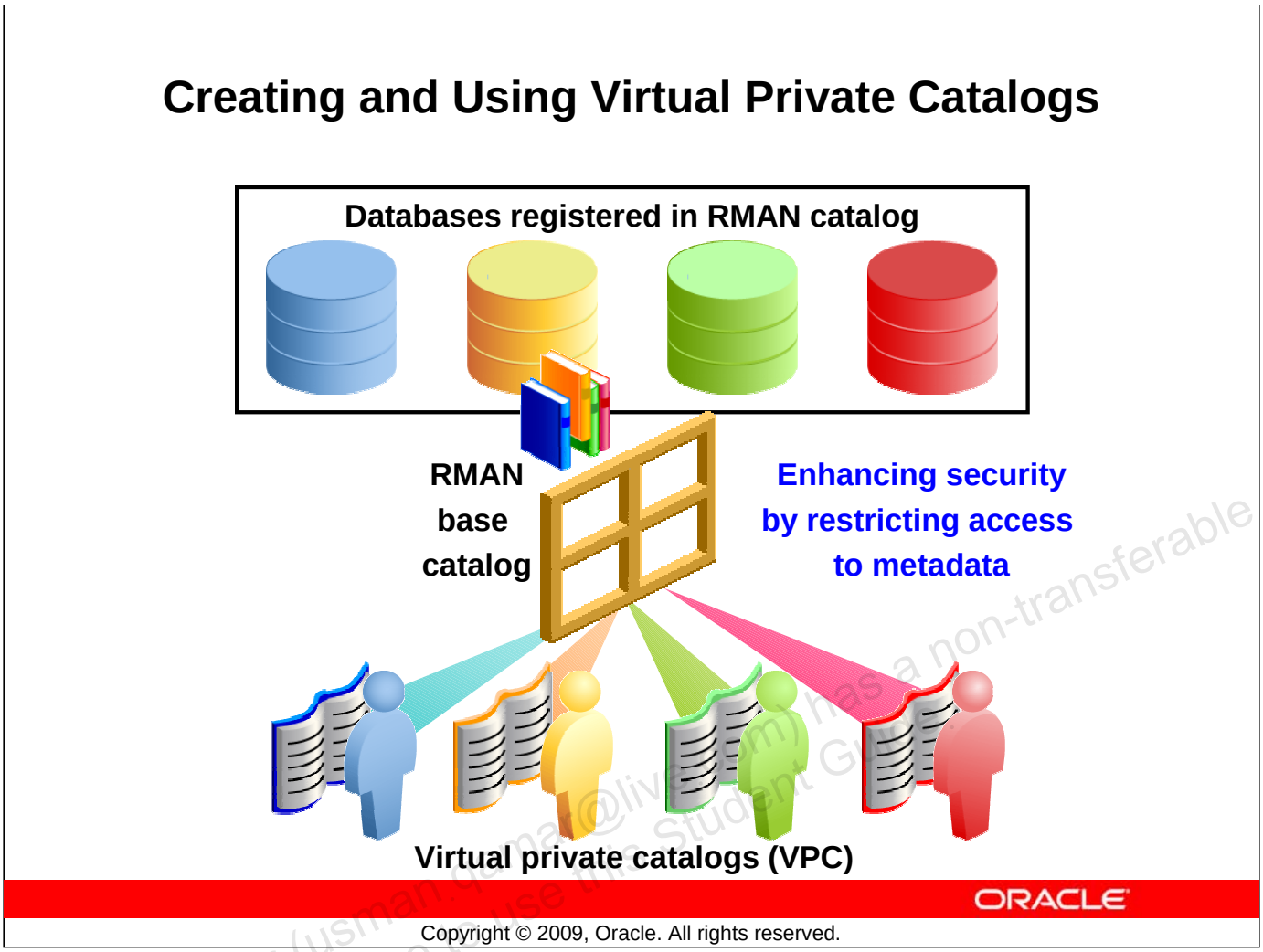
NO UNREGISTER: By default, the imported database IDs are unregistered from the source recovery catalog schema after a successful import. By using the `NO UNREGISTER` option, you can force RMAN to keep the imported database IDs in the source catalog schema.

Import Examples (continued)

1. RMAN must be connected to the destination recovery catalog—for example, the cat111 schema—which is the catalog into which you want to import catalog data. This is the first step in all examples given in the slide.
   Note: The version of the source recovery catalog schema must be equal to the current version of the RMAN executable. Before you import catalogs of earlier versions, you must upgrade them to the version of your RMAN executable.
2. In this example, the `cat102` user owns an RMAN catalog in the `srcdb` database. You want RMAN to import all registered databases and unregister them in the source catalog.
3. The `cat92` user owns an RMAN catalog in the `srcdb` database. You want RMAN to import the databases with the `DBID` `1423241` and `1423242`, and unregister them in the source catalog.
4. The `srcdb` database contains three different recovery catalogs. RMAN imports metadata for all database IDs (registered in these catalogs) into the `cat111` schema in the `destdb` database. All imported target databases are unregistered from their source catalogs except for the databases registered in the `cat92` schema.

Additional Usage Details

- Ensure that no target database is registered in both the source catalog schema and the destination catalog schema. If a target database is registered in both schemas, then unregister this database from the source catalog and retry the import.
- If the operation fails in the middle of the import, then the import is rolled back. There is never a state of partial import.
- When stored scripts in the source and destination catalog schemas have name conflicts, RMAN renames the stored script of the source catalog schema.



Creating and Using Virtual Private Catalogs

This feature allows a consolidation of RMAN repositories and maintains a separation of responsibilities, which is a basic security requirement.

The RMAN catalog has been enhanced to create virtual private RMAN catalogs for groups of databases and users. The catalog owner creates the base catalog and grants the `RECOVERY_CATALOG_OWNER` privilege to the owner of the virtual catalog. The catalog owner can either grant access to a registered database or grant the `REGISTER` privilege to the virtual catalog owner. The virtual catalog owner can then connect to the catalog for a particular target or register a target database. After this configuration, the VPC owner uses the virtual private catalog just like a standard base catalog.

As the catalog owner, you can access all the registered database information in the catalog. You can list all databases registered with the SQL*Plus command:

```
SELECT DISTINCT db_name FROM DBINC;
```

As the virtual catalog owner, you can see only the databases to which you have been granted access.

Note: If a catalog owner has not been granted `SYSDBA` or `SYSOPER` on the target database, most RMAN operations cannot be performed.

Using RMAN Virtual Private Catalogs

1. Create an RMAN base catalog:

```
RMAN> CONNECT CATALOG catowner/oracle@catdb
RMAN> CREATE CATALOG;
```

2. Grant RECOVERY_CATALOG_OWNER to VPC owner:

```
SQL> CONNECT SYS/oracle@catdb AS SYSDBA
SQL> GRANT RECOVERY_CATALOG_OWNER to vpcowner;
```

3a. Grant REGISTER to the VPC owner:

```
RMAN> CONNECT CATALOG catowner/oracle@catdb
RMAN> GRANT REGISTER DATABASE TO vpcowner;
```

3b. Or, grant CATALOG FOR DATABASE to the VPC owner:

```
RMAN>GRANT CATALOG FOR DATABASE db10g TO vpcowner;
```

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Using RMAN Virtual Private Catalogs

You create virtual private RMAN catalogs for groups of databases and users.

1. The catalog owner creates the base catalog.
2. The DBA on the catalog database creates the user that will own the virtual private catalog (VPC) and grants him or her the RECOVERY_CATALOG_OWNER privilege.
3. The base catalog owner can grant access for previously registered databases to the VPC owner or grant REGISTER to the VPC owner. The GRANT CATALOG command is:

   ```
   GRANT CATALOG FOR DATABASE prod1, prod2 TO vpcowner;
   ```

   The GRANT REGISTER command is:

   ```
   GRANT REGISTER DATABASE TO vpcowner;
   ```

   The virtual catalog owner can then connect to the catalog for a particular target or register a target database. After the VPC is configured, the VPC owner uses it just like a standard base catalog.

Using RMAN Virtual Private Catalogs

4a. Create a virtual catalog for 11*g* clients:

```
RMAN> CONNECT CATALOG vpcowner/oracle@catdb
RMAN> CREATE VIRTUAL CATALOG;
```

4b. Or, create a virtual catalog for pre-11*g* clients:

```
SQL> CONNECT vpcowner/oracle@catdb
SQL> exec catowner.dbms_rcvcat.create_virtual_catalog;
```

5. Register a new database in the catalog:

```
RMAN> CONNECT TARGET / CATALOG vpcowner/oracle@catdb
RMAN> REGISTER DATABASE;
```

6. Use the virtual catalog:

```
RMAN> CONNECT TARGET / CATALOG vpcowner/oracle@catdb;
RMAN> BACKUP DATABASE;
```

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Using RMAN Virtual Private Catalogs (continued)

4. Create a virtual private catalog.
   a. If the target database is an Oracle Database 11*g* database and the RMAN client is an 11*g* client, you can use the RMAN command:
      `CREATE VIRTUAL CATALOG;`
   b. If the target database is Oracle Database 10*g* Release 2 or earlier (using a compatible client), you must execute the supplied procedure from SQL*Plus:
      `BASE_CATALOG_OWNER.DBMS_RCVCAT.CREATE_VIRTUAL_CATALOG;`
5. Connect to the catalog using the VPC owner login, and use it as a normal catalog.
6. The virtual catalog owner can see only those databases that privileges have been granted for. For most RMAN operations, you additionally need the SYSDBA or SYSOPER privileges on the target database.

Recovery Catalogs Summary

Managing recovery catalogs:

1. Create the recovery catalog.
2. Register your target databases in the recovery catalog.
3. If desired, merge recovery catalogs using the new `IMPORT CATALOG` command.
4. If needed, catalog any older backups.
5. If needed, create new virtual recovery catalogs for specific users.
6. Protect the recovery catalog.

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Recovery Catalogs Summary

The basic workflow of managing recovery catalogs is not new. However, it has been enhanced by two important features: the consolidation of RMAN repositories and virtual private catalogs, which allow a separation of responsibilities.

1. Create the recovery catalog.
2. Register your target databases in the recovery catalog. This step enables RMAN to store metadata for the target databases in the recovery catalog.
3. If desired, you can also use the `IMPORT CATALOG` command to merge recovery catalogs.
4. If needed, catalog any older backups, whose records are no longer stored in the target control file.
5. If needed, create virtual recovery catalogs for specific users and determine the metadata to which they are permitted access.
6. Protect the recovery catalog by including it in your backup and recovery strategy.

Recovery Catalogs Summary (continued)

The recovery catalog contains metadata about RMAN operations for each registered target database. The catalog includes the following types of metadata:

- Data file and archived redo log backup sets and backup pieces
- Data file copies
- Archived redo logs and their copies
- Tablespaces and data files on the target database
- Stored scripts, which are named user-created sequences of RMAN commands
- Persistent RMAN configuration settings

The enrolling of a target database in a recovery catalog for RMAN use is called registration. The recommended practice is to register all your target databases in a single recovery catalog. For example, you can register the `prod1`, `prod2`, and `prod3` databases in a single catalog owned by the `catowner` schema in the `catdb` database.

The owner of a centralized recovery catalog, which is also called the base recovery catalog, can grant or revoke restricted access to the catalog to other database users. All metadata is stored in the base catalog schema.

Each restricted user has full read-write access to his or her own metadata, which is called a virtual private catalog.

The recovery catalog obtains crucial RMAN metadata from the control file of each registered target database. The resynchronization of the recovery catalog ensures that the metadata that RMAN obtains from the control files is current.

You can use a stored script as an alternative to a command file for managing frequently used sequences of RMAN commands. The script is stored in the recovery catalog rather than on the file system. A local stored script is associated with the target database to which RMAN is connected when the script is created, and can be executed only when you are connected to this target database. A global stored script can be run against any database registered in the recovery catalog.

You can use a recovery catalog in an environment in which you use or have used different versions of the database. As a result, your environment can have different versions of the RMAN client, recovery catalog database, recovery catalog schema, and target database. **You can merge one recovery catalog (or metadata for specific databases in the catalog) into another recovery catalog for ease of management.**

Quiz

Select all statements that are true about the Oracle recovery catalog:

1. The recovery catalog allows you to store a longer history of backups than what is possible with a control file–based repository.
2. Oracle recommends that you use the recovery catalog for all databases without exception.
3. You must use the EM method of registration in order to use the recovery catalog for backup and recovery–related operations within EM.

Answer: 1, 3

Quiz

The RMAN catalog schema may be backed up by using Data Pump Export.

1. True
2. False

Answer: 1

Summary

In this lesson, you should have learned how to:

- Contrast the usage of a recovery catalog with that of the control file for the RMAN repository
- Create and configure a recovery catalog
- Register a database in the recovery catalog
- Synchronize the recovery catalog
- Use RMAN stored scripts
- Back up the recovery catalog
- Create a virtual private catalog

Practice 3 Overview: Using the RMAN Recovery Catalog

This practice covers the following topics:

- Creating the RCAT recovery catalog instance with the dbca utility
- Creating the Recovery catalog owner and granting privileges
- Creating a recovery catalog in RMAN
- Registering the ORCL database
- Backing up the RCAT recovery catalog