Introduction to Recovery Manager (RMAN)

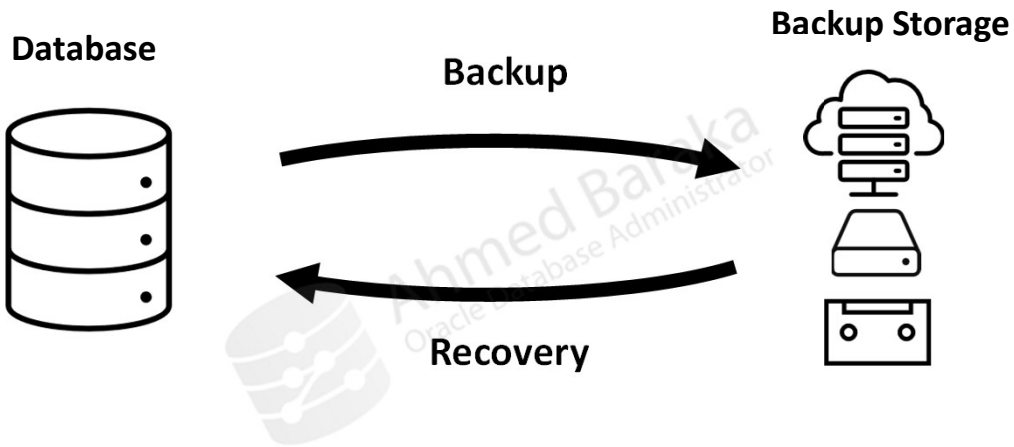
By Ahmed Baraka

Objectives

In this lecture, you should learn how to perform the following:

- Describe the Recovery Manager (RMAN) and its benefits
- Describe RMAN architecture components
- Start RMAN and connect to a target database
- Understand RMAN command types
- Configure RMAN persistent settings
- Understand the modes of issuing commands to RMAN

Backup and Recovery Strategy Target



- Protect the data from data loss
- Recover the data after data loss

About Oracle Recovery Manager (RMAN)

- A database utility to perform database backup and recovery activities
- No separate license is needed
- Provides command prompt interface
- Can be called by executable scripts
- Can be called by Oracle Enterprise Manager Cloud Control and third-party software
- Supports taking backup to the cloud

RMAN Benefits and Features

- Takes backup at database block level
- Supports incremental backup
- Its commands are English-like
- Supports working on databases running on different platforms
- Supports encrypting the backup files
- Can be used to clone a database offline and online
- Can be integrated with tape management solutions, such as: Oracle Secure Backup (OSB), Symantec NetBackup, IBM Tivoli Storage Manager (TSM), HP Data Protector, and many others
- Can take backup into cloud storage

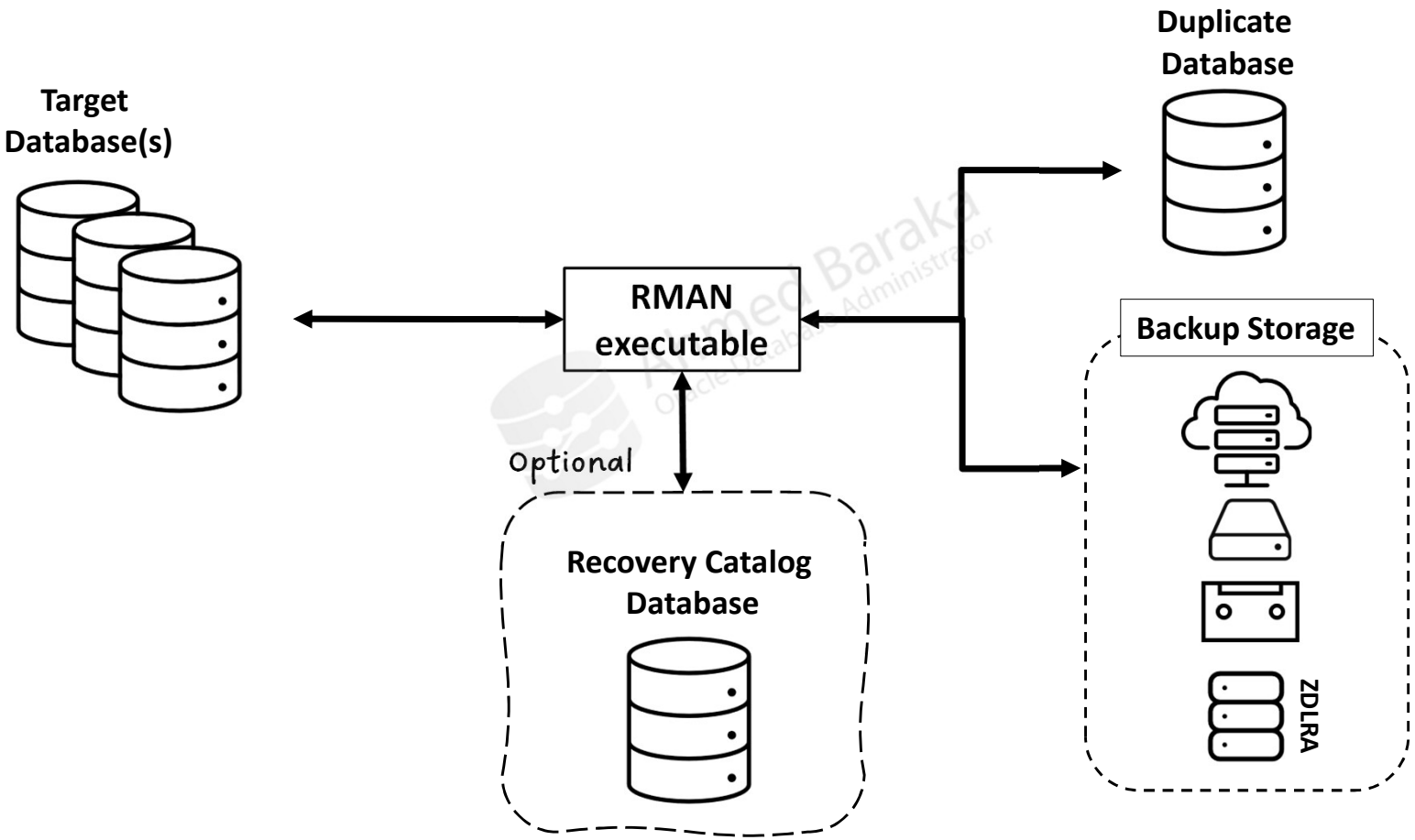
RMAN Benefits and Features

- Supports backup advanced compression
- Detect corrupted blocks during backup
- Can make an online copy of a database
- Can seamlessly operate with ASM

Backup and Recovery Techniques

- Recovery Manager (RMAN)
  - Simplifies database backup administration
  - Fully integrated with Oracle Enterprise Manager and Tape Library management software
- User-Managed backup and recovery techniques:
  - Fully supported by Oracle
  - RMAN capabilities (like online backup) are not available with this method
  - Not recommended
  - Not covered in this course

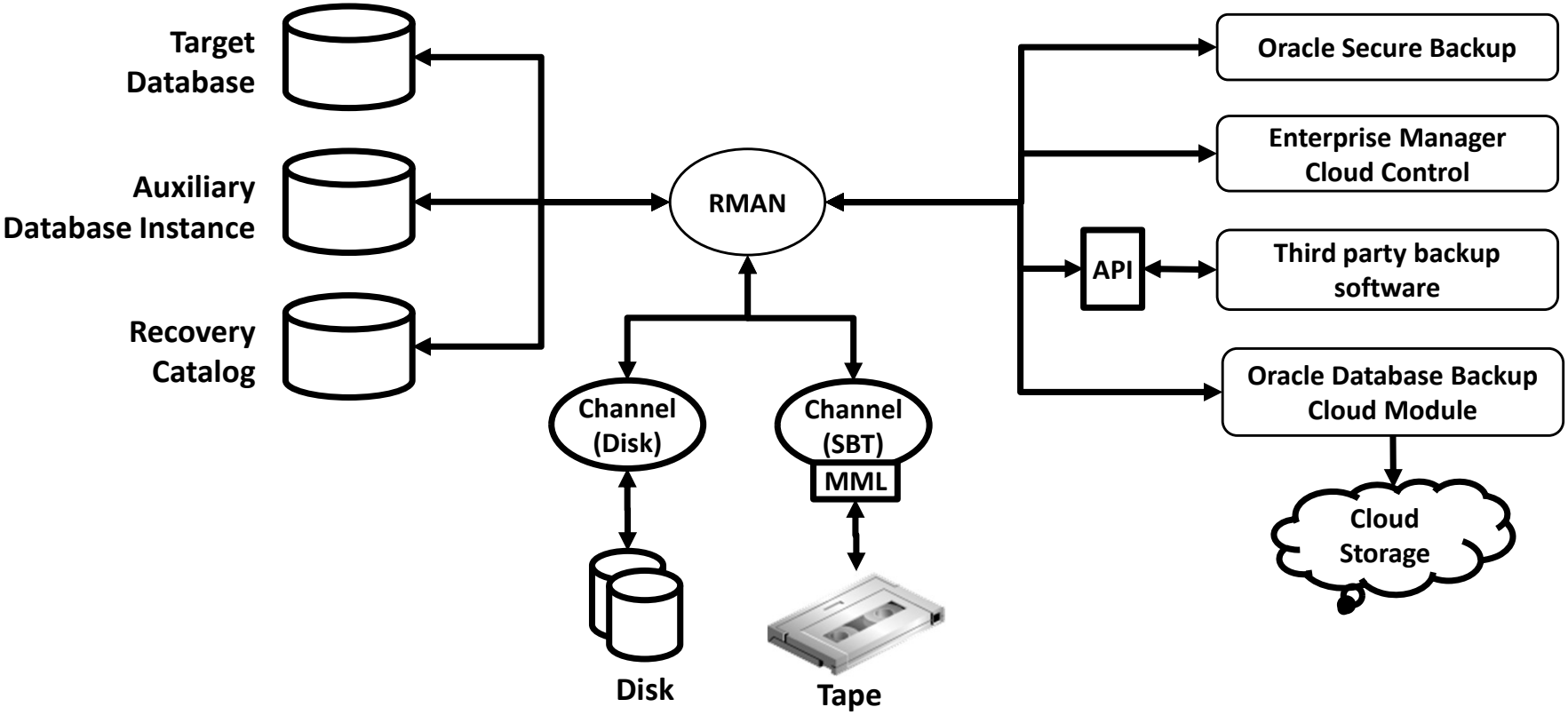
RMAN Environment Components



Database Physical vs Logical Backup

- RMAN is a physical backup solution
  - The standard backup solution
- Data Pump is used by some clients as a logical backup solution
  - Not recommended, it is not meant for backup

RMAN Architecture Components



RMAN Architecture Components

Component	Description
Target Database	The database to backup or recover
Auxiliary Database Instance	A transient database instance created by RMAN in certain recovery scenarios
Recovery Catalog	An Oracle database that serves as RMAN repository. Not mandatory.
Channel	A communication stream between RMAN and the storage (disk or tape)
API	Programmable interface to allow third party products communicate with RMAN
Cloud Module	A small program that RMAN needs to communicate with cloud storage

Starting RMAN and Connecting to a Target Database

- Connect to a local target database:

```
export ORACLE_SID=orcl
rman target /
```

```
rman
RMAN> CONNECT TARGET /
```


- Connect to a remote target database:

```
rman target sys@oradb
```

```
rman target sys/oracle@oradb
```

```
rman
RMAN> CONNECT TARGET sys/oracle@oradb
```

Connecting to a Target as SYSBACKUP

- Includes permissions for backup and recovery, including connect to a closed database
- Does not include data access privileges
- Can be explicitly used in RMAN connections by a **SYSBACKUP** privileged user

```
rman target "'/ as sysbackup'"
```

```
rman target "'backupuser/hispass as sysbackup'"
```

More RMAN Command-line Arguments

- Writing RMAN output to a log file

```
rman TARGET / LOG=~/logs/rman/rman.log APPEND
```

- Executing a command file when RMAN is invoked

```
rman TARGET / CMDFILE=~/scripts/my_rman_script.rcvd
```

- Executing a command file in RMAN command line:

```
RMAN>@~/scripts/my_rman_script.rcvd
```

Types of RMAN Commands

- **Stand-alone** command:
  - Is executed individually at the RMAN prompt
- **Job** command:
  - Must be within the braces of a RUN command
  - Is executed as a group
- Some commands can be executed as both types

Stand-alone command: Examples

```
BACKUP DATABASE;
```

```
BACKUP
  DATABASE
;
```

```
# run this command once each day
BACKUP INCREMENTAL LEVEL 1
  FOR RECOVER OF COPY         # using incrementally updated
backups
  WITH TAG "DAILY_BACKUP"  # daily backup routine
  DATABASE;
```

Job Commands: Example

```
RMAN> RUN
2> {
3>   ALLOCATE CHANNEL c1 DEVICE TYPE DISK
4>   FORMAT "/disk2/%U";
5>   BACKUP AS BACKUPSET DATABASE;
6>   SQL 'alter system archive log current';
7> }
```

RMAN Configuring Persistent Settings

- Persistent settings control the behavior of RMAN
- Configurable by DBA or Backup Administrator
- They have default values
- Always saved in the control file and in the recovery catalog database
- Examples:
  - Channel parameters
  - Parallelism
  - Default device type
  - Backup retention policy

Viewing Persistent Settings

- Using RMAN command prompt:

```
SHOW ALL;
SHOW CONTROLFILE AUTOBACKUP FORMAT;
SHOW EXCLUDE;
```

- Using SQL, query the view **V$RMAN_CONFIGURATION**

Modifying Persistent Settings

- Use **CONFIGURE** command

```
CONFIGURE DEVICE TYPE sbt PARALLELISM 3;
```

- Use the **CLEAR** option of the **CONFIGURE** command to reset any persistent setting to its default value:

```
CONFIGURE BACKUP OPTIMIZATION CLEAR;
```

Issuing Commands to RMAN Modes

- **Interactive client**
  - One time operations like performing analysis, running reports, make specific backup or recovery, or running stored scripts
- **Batch mode**
  - Specify a command file when starting RMAN
  - Specify the log file name to capture session log
  - Used with automated jobs
- **Pipe interface**
  - Specify the PIPE command-line argument
  - Use to communicate data between sessions or between RMAN and an external application

Summary

In this lecture, you should have learnt how to perform the following:

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- Configure RMAN persistent settings
- Understand the modes of issuing commands to RMAN