

Oracle Database 12c Backup and Recovery

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Our Websites

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Agenda

- *Introduction*
- *New Features & Enhancements*
- *Demonstrations ~ 30 min*



Introduction

Concepts

- *Whole database backup – all data files + control file*
- *Partial database backup – 0-n data files, 0-n tablespaces, may include control file*

Concepts

- *Full backup – copy of each data block that contains data (within files being backed up)*
- *Incremental backup*
 - *Level 0*
 - *Level 1*
 - *Cumulative*
 - *Differential*
- *Cold backups*
- *Hot backups*

Concepts

- *Backup sets*
 - *Oracle proprietary format*
 - *Empty data block are not stored*
 - *Can be compressed, encrypted*

- *Image copies*
 - *Backed up to disk*

Concepts

- *Recover types:*
 - *Complete*
 - *Incomplete (point-in-time recovery)*

(NO)ARCHIVELOG

- *In most production environments database is in ARCHIVELOG mode*
- *In NOARCHIVELOG database*
 - *is not open when you perform backup,*
 - *you must restore all database files before executing a recovery*
 - *recovery is limited to the time of last backup**

How to enable ARCHIVELOG mode

```
SQL> SHUTDOWN IMMEDIATE;  
SQL> STARTUP MOUNT;  
SQL> ALTER DATABASE ARCHIVELOG;  
SQL> ALTER DATABASE OPEN;
```



New Features & Enhancements

Multitenant environment

- *ARCHIVELOG can be set only at CDB level*

```
RMAN> BACKUP PLUGGABLE DATABASE pdb1,pdb2;
```

```
RMAN> BACKUP TABLESPACE pdb1:tbs1;
```

```
RMAN> RESTORE DATABASE;
```

```
RMAN> RECOVER DATABASE;
```

Multisection backups

- *Data file can be very large (up to 128 TB)*
- *Multisection backups of a data file:*
 - *Specify size*
 - *Backup sets*
 - *Full backups*
 - *In DB 12c:*
 - *Image copies*
 - *Incremental backups*

Multisection backups

➤ *Compatible=12.0*

```
RMAN> CONFIGURE DEVICE TYPE DISK PARALLELISM 2;
```

```
RMAN> BACKUP INCREMENTAL LEVEL 1 SECTION SIZE 25M  
DATAFILE 7;
```

```
RMAN> BACKUP AS COPY SECTION SIZE 25M DATAFILE 7;
```

Active Database Duplication

- *NOOPEN Option*
- *Backup sets (default)*
- *Choose:*
 - *Encryption*
 - *Compression*
 - *Size*
- *DUPLICATE command works in multitenant environment*

NOOPEN option

- *In Oracle Database 12c NOOPEN option allows you to finish the duplication process with database in mounted, but not open, state.*

More 12c New Features

- *SYSBACKUP*
- *SQL in RMAN:*
 - *SQL prefix and quotes are NOT required*
- *Transport data across platforms by using backup sets*
- *Create cross-platform inconsistent tablespace backups by using backup sets or image copies*



Encrypted backups

Schedule backup



Tablespace customized backup

Schedule Backup

Cancel

Oracle provides an automated backup strategy based on your disk and/or tape configuration. Alternatively, you can implement your own customized backup strategy.

Oracle-Suggested Backup

Schedule a backup using Oracle's automated backup strategy.

Schedule Oracle-Suggested Backup

This option will back up the entire database. The database will be backed up on daily and weekly intervals.

Customized Backup

Select the object(s) you want to back up.

Schedule Customized Backup

- Whole Database
- Tablespaces
- Datafiles
- Archived Logs
- All Recovery Files on Disk

Includes all archived logs and disk backups that are not already backed up to tape.

Backup Strategies

Oracle-suggested:

- Provides an out-of-the-box backup strategy based on the backup destination
- Sets up recovery window for backup management
- Schedules recurring and immediate backups
- Automates backup management

Customized:

- Specify the objects to be backed up
- Choose disk or tape backup destination
- Override the default backup settings
- Schedule the backup

Choosing tablespace

Progress bar: **Tablespaces** (selected), Options, Settings, Schedule, Review

Tablespaces: Available Tablespaces

Search

Tablespace Name

Search Results

Select All | Select None

Select	Tablespace Name	Tablespace Number	Status	Contents
<input type="checkbox"/>	SYSTEM	0	ONLINE	PERMANENT
<input type="checkbox"/>	SYSAUX	1	ONLINE	PERMANENT
<input type="checkbox"/>	UNDOTBS1	2	ONLINE	UNDO
<input type="checkbox"/>	USERS	4	ONLINE	PERMANENT
<input type="checkbox"/>	EXAMPLE	6	ONLINE	PERMANENT

Choosing encryption mode

- Use as the base of an incremental backup strategy
- Incremental Backup
A level 1 cumulative incremental backup includes all blocks changed since the most recent level 0 backup.
 - Refresh the latest datafile copy on disk to the current time using the incremental backup

Advanced

- Also back up all archived logs on disk
 - Delete all archived logs from disk after they are successfully backed up
- Delete obsolete backups
Delete backups that are no longer required to satisfy the retention policy.
- Use proxy copy supported by media management software to perform a backup
If proxy copy of the selected files is not supported, a conventional backup will be performed.

Maximum Files per Backup Set

Section Size KB ▾



Backs up large files in parallel, using sections of the specified size. (Cannot be used if Maximum Backup Piece Size is set in Backup Settings.)


Encryption

Encrypt the backup using the Oracle Encryption Wallet, a user-supplied password, or both, to protect sensitive data.

- Use Recovery Manager encryption

Encryption Algorithm

Encryption Mode Backups will be encrypted using the Oracle Encryption Wallet  

Backups will be encrypted using the following password  **Password-mode is selected**

 **TIP** Checking both encryption modes will provide the flexibility of restoring a backup using either the Oracle Encryption Wallet or a password.

Password

Confirm Password

 Dual mode

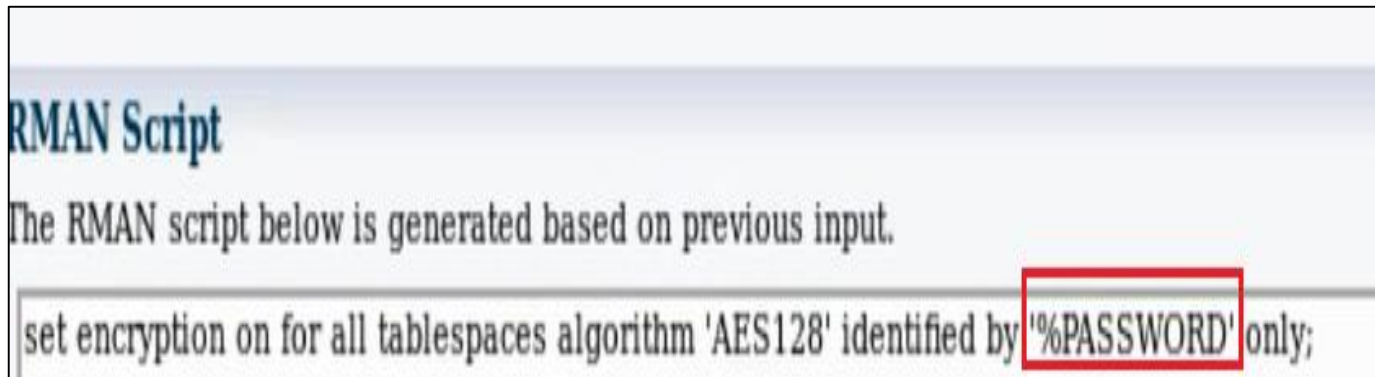
 Transparent mode

[Return to Schedule Backup](#)

[Cancel](#) [Back](#) Step 2 of 5 [Next](#)

RMAN script

- Password in RMAN script is NOT stored in plain text



The screenshot shows a window titled "RMAN Script". Below the title, it says "The RMAN script below is generated based on previous input." The script content is "set encryption on for all tablespaces algorithm 'AES128' identified by '%PASSWORD' only;". The text "%PASSWORD" is enclosed in a red rectangular box, highlighting that the password is not stored in plain text.

Good job 😊

ORACLE Enterprise Manager Cloud Control 12c

 **The job has been successfully submitted.**

Status
The job has been successfully submitted.
You can view the status of the job by clicking on the [View Job](#) button.

Verify Unified Auditing is enabled

```
SQL> SELECT PARAMETER, VALUE  
2   from v$option  
3   where PARAMETER = 'Unified Auditing' ;
```

PARAMETER	VALUE
-----	-----
Unified Auditing	TRUE

Standard Edition - Verify Unified Auditing is enabled

```
SQL> SELECT PARAMETER, VALUE
       2  from v$option
       3  where PARAMETER = 'Unified Auditing' ;
```

PARAMETER	VALUE
-----	-----
Unified Auditing	FALSE

- **Bug 17466854** – Cannot set Unified Auditing in Standard Edition (MOS)

Fixed in Product Version 12.2

Audit RMAN operations

- *RMAN events are automatically audited (you don't create audit policy)*



Audit RMAN operations

```
SQL> SELECT DBUSERNAME, RMAN_OPERATION  
2 FROM UNIFIED_AUDIT_TRAIL  
3 WHERE RMAN_OPERATION IS NOT NULL;
```

DBUSERNAME	RMAN_OPERATION
-----	-----
SYSBACKUP	Backup

Demos





Thank you!