DATABASE ADMINISTRATION

Lab 6 – Backup and restore

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1. Fast Recovery Area is a directory on the computer disk or in ASM (Oracle Automatic Storage Management) in which the database stores archived redo logs (transaction logs), files flashback logs (files used by Oracle Flashback technology) and archive sets created by RMAN (Oracle RecoveryManager).

2. Check if the directory / home / oracle / app / oracle / flash_recovery_area (Oracle virtual machine) exists on the disk. If such directory does not exist, create a directory on the hard disk. If we do not use a virtual machine, we create any directory on the disk. This directory will serve as Fast Recovery Area for our database instance.

```
[oracle@localhost ~]$ ls /home/oracle/app/oracle/flash_recovery_area
orcl  ORCL
[oracle@localhost ~]$ ▊
```

3. In Enterprise Manager we enter the tab Availability and in section Backup/Recovery we choose an option Recovery Settings. At section Media Recovery select the ARCHIVELOG Mode option, which allows for automatic archiving of transaction logs. Then we check whether as Archived Redo Log Destination the value of USE_DB_RECOVERY_FILE_DEST is set, which assumes that archived copies of transaction log files will be placed in Fast Recovery Area.

Media Recovery

The database is currently in NOARCHIVELOG mode. In ARCHIVELOG mode, hot backups and recovery to the latest time are possible, but you must provide space for archived redo log files. If you change the database to ARCHIVELOG mode, you should perform a backup immediately. In NOARCHIVELOG mode, only cold backups are possible and data may be lost in the event of database corruption.

☑ ARCHIVELOG Mode*

Log Archive Filename Format* `%t_%s_%r.dbf`

Number	Archived Redo Log Destination	Status	Type
1	USE_DB_RECOVERY_FILE_DEST	VALID	Local

(Add Another Row)

☑ **TIP** It is recommended that archived redo log files be written to multiple locations spread across the different disks.
☑ **TIP** You can specify up to 10 archived redo log destinations.

☐ Enable Minimal Supplemental Logging
Minimal supplemental logging logs the minimal amount of information needed for LogMiner (and any product building on LogMiner technology) to identify, group, and merge the redo operations associated with DML changes.

Then select the option in the Fast Recovery section Enable Flashback Database allowing for quick restoration of the database to the state at a specific moment in time. We check if in the field Fast Recovery Area Location directory is set /home/oracle/app/oracle/flash_recovery_area or another one
created in step 2. We need to make sure that the option Apply initialization parameter changesto SPFILE only has not been selected. This option causes the changes to be saved only to the file SPFILE and will not be included in the running database instance. After completing the above steps, click the button Apply.

Fast Recovery

This database is using a fast recovery area. The chart shows space used by each file type that is not reclaimable by Oracle. Performing backups to tertiary storage is one way to make space reclaimable. Usable Fast Recovery Area includes free and reclaimable space.

Fast Recovery Area Location /home/oracle/app/oracle/flash_recovery_area

Fast Recovery Area Size 3852 MB
Fast Recovery Area Size must be set when the location is set.

Non-reclaimable Fast Recovery Area (B) 0

Reclaimable Fast Recovery Area (B) 0

Free Fast Recovery Area (GB) 3.76

☑ Enable Flashback Database*
Flashback database can be used for fast database point-in-time recovery, as it returns the database to a prior point-in-time without restoring files. Flashback is the preferred point-in-time recovery method in the recovery wizard when appropriate. The fast recovery area must be set to enable flashback database.
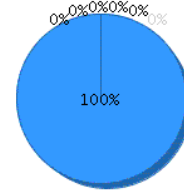
Flashback Retention Time 24 Hours

Current size of the flashback logs(GB) n/a
Lowest SCN in the flashback data n/a
Flashback Time n/a

☐ Apply initialization parameter changes to SPFILE only. If not checked, parameter changes will be made to both the SPFILE and the running instance.

* Changes to this setting or parameter require a database restart.

Fast Recovery Area Usage

0%0%0%0%0%0%
100%

Control File – 0GB (0%)
Online Log – 0GB (0%)
Archived Redo Log – 0GB (0%)
Backup Piece – 0GB (0%)
Image Copy – 0GB (0%)
Flashback Log – 0GB (0%)
Usable – 3.76GB (100%)

[Show SQL] [Revert] [Apply]

Database | Setup | Preferences | Help | Logout

4. A window will appear in which you need to confirm the required database restart. The base goes into mode ARCHIVELOG requires a database restart. Click on the button Yes

ORACLE Enterprise Manager 11g
Database Control

Setup Preferences Help Logout

Database

Database Instance: orcl >

Logged in As SYS

Confirmation
The changes have been successfully applied. However, you must restart the database to implement the changes. Do you want to restart the database now? Oracle recommends that you make a whole database backup immediately after the database is restarted

[No] [Yes]

Database | Setup | Preferences | Help | Logout

5. In the next window, enter the id and password of an account belonging to the system administrators group (id: oracle, password: oracle), and then the data of the database user with SYSDBA privileges (id: sys, password: oracle, Connect as: SYSDBA). Click on the button OK.

ORACLE Enterprise Manager 11g
Database Control

Setup Preferences Help Logout

Database

Database Instance: orcl >

Logged in As SYS
[Cancel] [OK]

Restart Database:Specify Host and Target Database Credentials
Specify the following credentials in order to restart the database.

Host Credentials
Specify the OS user name and password to login to target database machine.
* Username oracle
* Password ••••••

Database Credentials
Specify the credentials for the target database.
To use OS authentication, leave the user name and password fields blank.
* Username sys
* Password ••••••
Database orcl
* Connect As SYSDBA
☐ Save as Preferred Credential
ⓘ Note that you need to login to the database as SYSDBA or SYSOPER in order to restart the database.

[Cancel] [OK]

Database | Setup | Preferences | Help | Logout

6. In the next window, click on the button Yes.

Restart Database:Confirmation

Operation **restart database after shutdown immediate**
Are you sure you want to perform this operation?

Initialization Parameter

spfile='/home/oracle/app/oracle/product/11.2.0/dbhome_2/dbs/spfileorcl.ora'

[Show SQL] [Advanced Options] [No] [Yes]

7. In the next window, click on the button Refresh.

Database Instance: orcl >   Logged in As SYS
Restart Database:Activity Information

The database is currently being shutdown and restarted, this operation may take some time. Once this operation is complete you can press refresh and be prompted to log back in to the database.

[Refresh]

7a. After the database has entered the ARCHIVELOG mode, a full backup is required database in mode offline. This is necessary because switching the base into ARCHIVELOG mode makes it impossible to restore the base until the moment before the base enters this mode. A full database copy assumes the creation of a copy of all database data files, control files, archived transaction log files and the SPFILE file. In order to perform a full database backup in Enterprise Manager, go to the tab Availability and in section Backup/Recovery we choose an option Schedule Backup. At section Customised Backup we choose an option Whole Database, at section Host Credentials enter the id and password of an account belonging to the group of system administrators (id: oracle, password: oracle) and click the button Schedule Customized Backup.

Database Instance: orcl >

Schedule Backup

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.

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

[Schedule Oracle-Suggested Backup]

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

Host Credentials

To perform a backup, supply operating system login credentials to access the target database.

* Username [oracle]

* Password [•••••]

☐ Save as Preferred Credential

Database | Setup | Preferences | Help | Logout

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8. In the next window in the section Backup Type we choose an option Full Backup and mark the option Use as the base of an incremental backup strategy. At section Backup mode we choose an option Offline Backup. At section Advanced all options remain unchecked. These options relate to backup management and are not required if you are using to create database backups from Fast Recovery Area. In this case, the database automatically manages the storage of backups.

Backup Type

- ● Full Backup
  - ☑ 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

Backup Mode

- ○ Online Backup
  Can be performed when the database is open.
- ● Offline Backup
  If the database is open at the time of backup, it will be shut down and mounted before the backup, then re-opened after the 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.

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9. In the window Schedule Customized Backup: Settings we choose an option Disk and we make sure that as Disk Backup Location the directory that we created in point 2 has been selected. Then click the button View Default Settings.

Schedule Customized Backup: Settings

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Select the destination media for this backup. You can also override the default backup settings.

⦿ Disk

Disk Backup Location **/home/oracle/app/oracle/flash_recovery_area**

○ Tape

Media Management Vendor (MMV) Library Parameters **Not specified**

(View Default Settings) (Override Default Settings)
Changed settings will only apply to the current backup.

10. In the next window, the section Disk settings we mark the option Backup Set (this option saves disk space as it copies only the database data; option Image Copy also reserves an empty space in the backup files similar to what it looks like in the database files, which causes the backup to take up more space).

Disk Settings

Parallelism [1]   (Test Disk Backup)
Concurrent streams to disk drives

Disk Backup Location **Fast Recovery Area**
Database files will be backed up to the fast recovery area location.

Disk Backup Type   ⦿ Backup Set
An Oracle backup file format that allows for more efficient backups by interleaving multiple backup files into one output file.

○ Compressed Backup Set
An Oracle backup set in which the data is compressed to reduce its size.

○ Image Copy
A bit-by-bit copy of database files that can be used as-is to perform recovery.

Then click the Test Disk Backup button, which allows you to test whether the user account data has been entered correctly and whether there is enough space on the disk to perform a backup. The testing process takes some time and cannot be interrupted.

⊕ Processing: Test Disk Backup

Testing backup to disk.

Test Disk Backup in progress.

☑ TIP This operation cannot be canceled. It will continue even if the browser window is closed.

11. After returning to the window Disk Settings after receiving the message Disk Backup Test Succesful click the Ok button and return to the window Schedule Customized Backup: Settings. In this window, press the button Next

Backup Settings

Device | Backup Set | Policy

ⓘ **Disk Backup Test Successful**

Disk Settings

		Test Disk Backup
Parallelism	1	

Concurrent streams to disk drives

Disk Backup Location **Fast Recovery Area**
Database files will be backed up to the fast recovery area location.

Disk Backup Type ⦿ Backup Set
An Oracle backup file format that allows for more efficient backups by interleaving multiple backup files into one output file.

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A bit-by-bit copy of database files that can be used as-is to perform recovery.

12. In the next window in the section Job we change field values Job Name and Job Description giving the name and description of our backup task, and then in the section Schedule wybieramy opcję One Time (Immediately) and click the button Next.

Schedule Customized Backup: Schedule

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Cancel | Back | Step 3 of 4 | Next

Job

* Job Name `FIRST_BACKUP`

Job Descripton `COPY AFTER ARCHIVELOG MODE ON`

Schedule

Type ⦿ One Time (Immediately) ○ One Time (Later) ○ Repeating

Return to Schedule Backup

Cancel | Back | Step 3 of 4 | Next

Database | Setup | Preferences | Help | Logout

13. In the next window, we can read the message that in order to perform a backup in the mode offline the base will be closed and in the section RMAN Script view the script generated by EM. Click on the button Submit job.

⚠ **Warning**

Offline Backup - If the database is open at the time of backup, it will be shut down and mounted before the backup, then re-opened after the backup.

Schedule Customized Backup: Review

Database **orcl**
Backup Strategy **Customized Backup**
Object Type **Whole Database**

Cancel | Edit RMAN Script | Back | Step 4 of 4 | Submit Job

Settings

Destination **Disk**
Backup Type **Use as the base of an incremental backup strategy**
Backup Mode **Offline Backup**
Fast Recovery Area **/home/oracle/app/oracle/flash_recovery_area**

RMAN Script

The RMAN script below is generated based on previous input.

```
backup incremental level 0 cumulative device type disk tag '%TAG' database;
run {
allocate channel oem_backup_disk1 type disk  maxpiecesize 1000 G;
backup tag '%TAG' current controlfile;
release channel oem_backup_disk1;
}
```

Return to Schedule Backup

Cancel | Edit RMAN Script | Back | Step 4 of 4 | Submit Job

Database | Setup | Preferences | Help | Logout

14. In the next window, click the OK button.

ⓘ **The job has been successfully submitted.**

Status

The job has been successfully submitted.
The database will be shutdown and mounted to perform this job. Please wait for this operation to complete. Click View Job to be redirected to the job status page. You may be prompted to login.

View Job | OK

15. After making a backup in Enterprise Manager, go to the Availability tab and select Jobs in the Related Links section. In the Job Activity window, select our backup order and click the View Results button.

Advanced Search

Name	[ ]	Job Type	All ⬍
Owner	All ⬍	Target Type	Database Instance ⬍
Status	All ⬍	Target Name	"orcl"
Scheduled Start	Last 7 days ⬍		☐ Show all jobs on the specified target regardless of my access to the jobs
	Show jobs scheduled to start during or after the selected period.		Applicable when exactly one target is specified.
	(Go) Simple Search		

View [Runs ⬍]

(View Results) (Edit) (Create Like) (Copy To Library)   (Suspend) (Resume) (Stop) (Delete) | Create Job   [OS Command ⬍]

Select	Name	Status (Executions)	Scheduled ▽	Targets	Target Type	Owner	Job Type
⦿	FIRST_BACKUP	1 Running	Nov 28, 2021 12:21:17 PM (UTC-08:00)	orcl	Database Instance	SYS	Database Bac

16. In the Job Run: NAME OF OUR TASK window, we can view the details of our job.

Summary

The Stop and Suspend operations will wait for the current step to complete. A suspended job can be resumed later, at the next step.   (Stop) (Suspend)

Status	**Running**	Type	**Database Backup**
Scheduled	**Nov 28, 2021 12:21:17 PM (UTC-08:00)**	Owner	**SYS**
Started	**Nov 28, 2021 12:21:17 PM (UTC-08:00)**	Description	**COPY AFTER ARCHIVELOG MODE ON**
Ended		Oracle Home	/home/oracle/app/oracle/product/...
Elapsed Time		Oracle SID	**orcl**
Notification	**No**	Host Username	**oracle**
		Database Username	**SYS**
		Database Role	******
		Backup Strategy	**advanced**
		Version 10g or higher	**YES**
		Database Connect String	(DESCRIPTION=(ADDRESS_LIST=(ADDR...
		Database Name	**ORCL**
		Blackout	**NO**
		Encryption Mode	**None**
		Offline Backup	**YES**
		Backup Script	Show

Targets [   ]
Status [All ⬍]
(Go)

Expand All | Collapse All

Name	Targets	Status	Started	Ended	Elapsed Time (seconds)
▼ Execution: orcl	orcl	Running	Nov 28, 2021 12:21:17 PM (UTC-08:00)		612
Step: Backup	orcl	Scheduled			
Step: Prebackup	orcl	Succeeded	Nov 28, 2021 12:21:37 PM (UTC-08:00)	Nov 28, 2021 12:21:39 PM (UTC-08:00)	2

17. By clicking on Step: Backup, we can learn the details of this step in our task. Please note that this is
the script that the RMAN command line program must execute.

Step: Backup

Page Refreshed   **Nov 28, 2021 12:31:45 PM PST**

View Data   [Manual Refresh ⬍]

Status	**Scheduled**
Step ID	**1295**
Targets	**orcl**

☑ **TIP** Management Service from which the job step was dispatched.

Error Log
Error communicating with agent

18. Then, in Enterprise Manager, go to the Availability tab and select the Backup Reports option in the Backup / Recovery section. In the View Backup Report window.

View Backup Report

The following backup jobs are known to the database. The data is retrieved from the database control file.

Search

Status [All ⇕]   Start Time [Within 1 month ⇕]   Type [All ⇕]   (Go)

Results

Total **2** (Completed ✓ **2**)

Backup Name	Status	Start Time ▽	Time Taken	Type	Output Devices	Input Size	Output Size	Output Rate (Per Sec)
2021-11-28T12:18:45	COMPLETED	Nov 28, 2021 12:18:47 PM PST	00:00:08	CONTROLFILE	DISK	9.28M	9.33M	1.17M

19. A window appears in which we can view the details of our backup.

Database Instance: orcl > View Backup Report >   Logged in As S

Backup Report: Job 2021-11-28T12:18:45

The data is retrieved from the database control file.

Search

By Job   **By Date**

Backup Job [2021-11-28T12:18:45.5]   ✏ (Go)   Start Date [ ] 📅   End Date [ ] 📅   (Go)

Results

No data is found for the job. The output of the job may have been deleted.

Related Links

Manage Current Backups

Database | Setup | Preferences | Help | Logout