

# 15

## Performing Database Backups

# Objectives

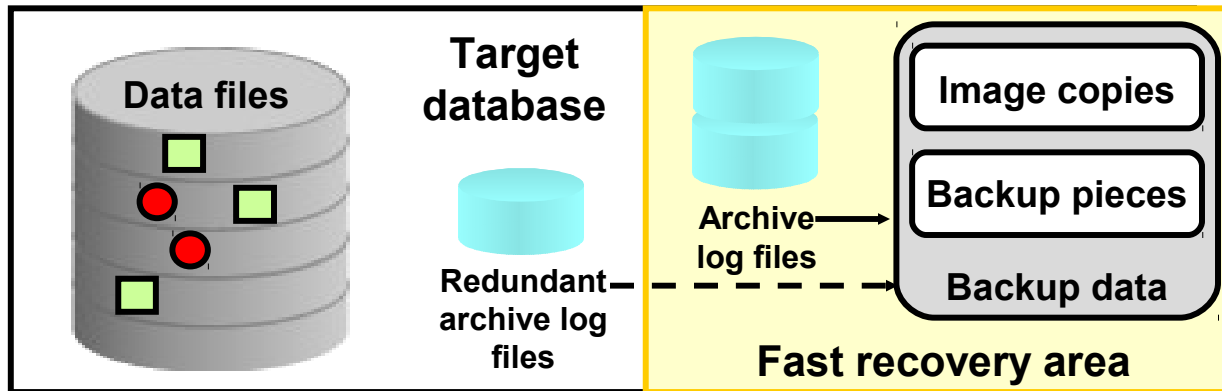
After completing this lesson, you should be able to:

- Create consistent database backups
- Back up your database without shutting it down
- Create incremental backups
- Automate database backups
- Manage backups and view backup reports
- Monitor the fast recovery area

# Backup Solutions: Overview

Backups can be performed by using:

- Recovery Manager
- Oracle Secure Backup
- User-managed backup



# Oracle Secure Backup

- Oracle Secure Backup and RMAN provide an end-to-end backup solution for Oracle environments:
  - Centralized tape backup management for file system data and the Oracle database
  - Most well-integrated media management layer for RMAN backups
  - Backup of any data anywhere on the network
- A single technical support resource for the entire backup solution expedites problem resolution.
- This ensures reliable data protection at lower cost and complexity.



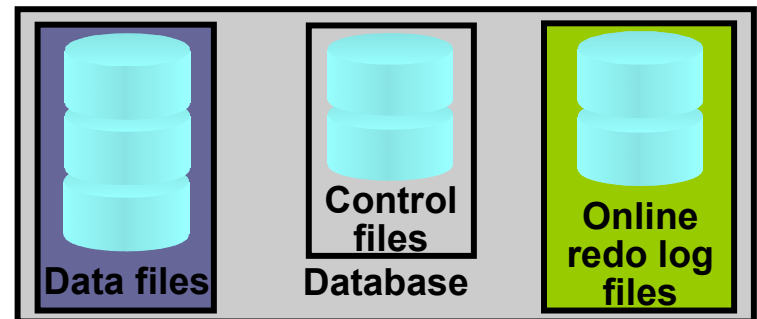
# User-Managed Backup

A user-managed scenario:

- Is a manual process of tracking backup needs and status
- Typically uses your own written scripts
- Requires that database files be put in the correct mode for backup
- Relies on operating system commands to make backups of files

# Terminology

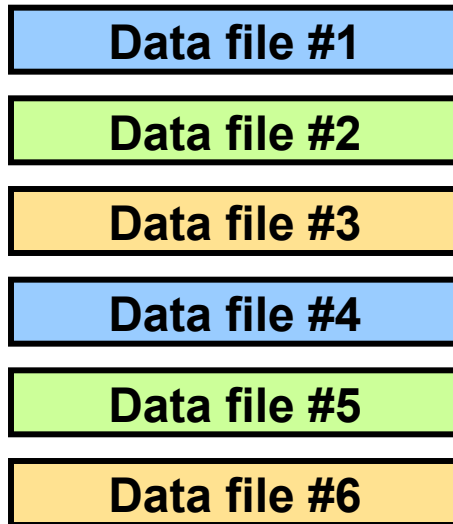
- Backup strategy may include:
  - Entire database (whole)
  - Portion of the database (partial)
- Backup type may indicate inclusion of:
  - All data blocks within your chosen files (full)
  - Only information that has changed since a previous backup (incremental)
    - Cumulative (changes since last level 0)
    - Differential (changes since last incremental)
- Backup mode may be:
  - Offline (consistent, cold)
  - Online (inconsistent, hot)



# Terminology

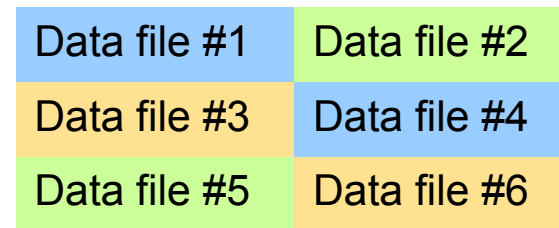
Backups may be stored as:

- Image copies
- Backup sets



**Image copies**

**(Duplicate data and log files in OS format)**

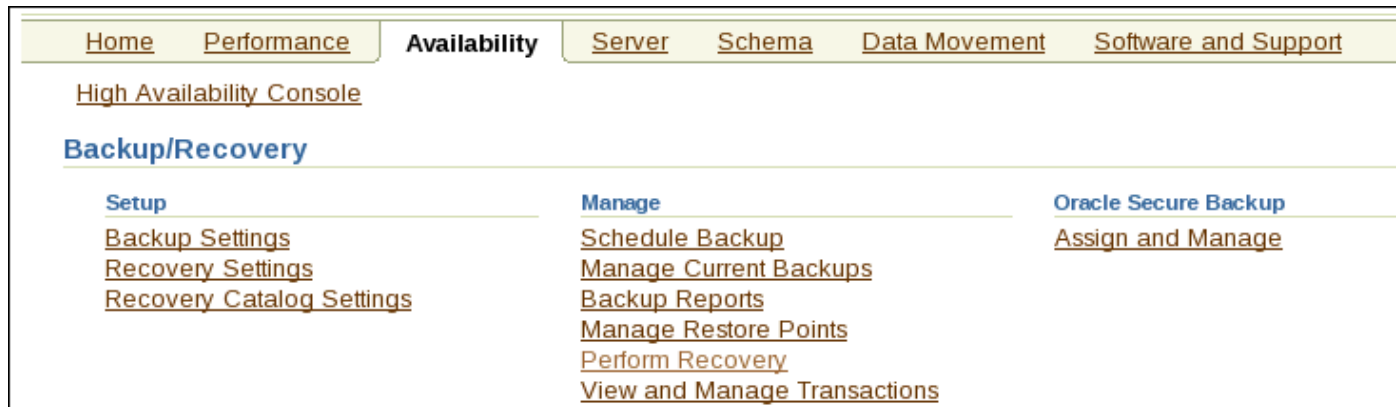


**Backup set**

**(Binary, compressed files in  
Oracle proprietary format)**

# Recovery Manager (RMAN)

- Powerful control and scripting language
- Integrated with Enterprise Manager
- Published API that enables interface with most popular backup software
- Backing up data, control, archived log, and server parameter files
- Backing up files to the disk or tape





# Configuring Backup Settings

**Backup Settings**

Device Backup Set Policy

**Disk Settings**

Parallelism  Test Disk Backup  
Concurrent streams to disk drives

Disk Backup Location   
The flash recovery area is the current disk backup location. If you would like to override the disk backup location, specify an existing directory or diskgroup.

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.

Device Backup Set Policy

Maximum Backup Piece (File) Size  MB   
Specify a value to restrict the size of each backup piece.

**Compression Algorithm**

Specify the compression algorithm that will be used for both disk and tape compressed backup sets.

☒ BZIP2  
Optimized for maximum compression. Consumes more CPU resources, but will usually produce more compact backups.

☐ ZLIB  
Optimized for CPU efficiency. Requires the Oracle Advanced Compression option.

**Tape Settings**

The following parameters require additional configuration on different media pools.

Copies of Datafile Backups   
Specify the number of identical copies for datafile backups.

Copies of Archivelog Backups   
Specify the number of identical copies for archivelog backups.

**Host Credentials**

To save the backup settings, supply operating system login credentials to access the target database.

\* Username

\* Password

☐ Save as Preferred Credential

# Configuring Backup Settings

**Backup Settings**

Device Backup Set Policy

**Backup Policy**

☒ Automatically backup the control file and server parameter file (SPFILE) with every backup and database structural change

Autobackup Disk Location   
An existing directory or diskgroup name where the control file and server parameter file will be backed up. If you do not specify a location, the files will be backed up to the flash recovery area location.

☐ Optimize the whole database backup by skipping unchanged files such as read-only and offline datafiles that have been backed up

☐ Enable block change tracking for faster incremental backups

Block Change Tracking File   
Specify a location and file, otherwise an Oracle managed file will be created in the database area.

**Tablespaces Excluded From Whole Database Backup**  
 Populate this table with the tablespaces you want to exclude from a whole database backup. Use the Add button to add tablespace.

Select	Tablespace Name	Tablespace Number	Status	Contents
<input type="checkbox"/>	No Items Selected			

☒ **TIP** These tablespaces can be backed up separately using tablespace backup.

**Retention Policy**

☐ Retain All Backups  
You must manually delete any backups

☐ Retain backups that are necessary for a recovery to any time within the specified number of days (point-in-time recovery) Days   
Recovery Window

☒ Retain at least the specified number of full backups for each datafile Backups   
Redundancy

**Archived Redo Log Deletion Policy**  
 Specify the deletion policy for archived redo log files. The archived redo log files will be eligible for deletion if the flash recovery area becomes full.

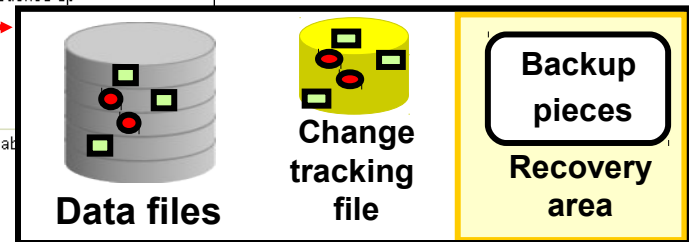
☒ None  
If a flash recovery area is set, archived redo log files that have been backed up to a tertiary device and are obsolete based on the retention policy will be deleted.

☐ Delete archived redo log files after they have been backed up the specified number of times Backups

**Host Credentials**  
 To save the backup settings, supply operating system login credentials to access the target database.

\* Username   
 \* Password   
☐ Save as Preferred Credential

**Best practice**



# Scheduling Backups: Strategy

## 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.

[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

### Host Credentials

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

\* Username

\* Password

☐ Save as Preferred Credential

# Scheduling Backups: Options

Options

Settings

Schedule

Review

---

## Schedule Customized Backup: Options

Database **orcl.oracle.com** Cancel Step 1 of 4 Next

Backup Strategy **Customized Backup**

Object Type **Whole Database**

---

### 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.

Maximum Files per Backup Set

Section Size  KB

Backs up large files in parallel, using sections of the specified size. (This parameter overrides Maximum Backup Piece Size in Backup Settings.)

[Encryption](#)

# Scheduling Backups: Settings

Options Settings Schedule Review

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### Schedule Customized Backup: Settings

Database **orcl.oracle.com** Cancel Back Step 2 of 4 Next

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 **+FRA**

☐ Tape

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

View Default Settings Override Default Settings

Changed settings will only apply to the current backup.

# Scheduling Backups: Schedule

Options

Settings

Schedule

Review

---

## Schedule Customized Backup: Schedule

Database **orcl.oracle.com** Cancel Back Step 3 of 4 Next

Backup Strategy **Customized Backup**

Object Type **Whole Database**

---

### Job

\* Job Name

Job Description

---

### Schedule

Type ☐ One Time (Immediately) ☐ One Time (Later) ☒ Repeating

Frequency Type

Repeat Every  Minutes

Time Zone

Start Date

Start Time  :  ☒ AM ☐ PM

Repeat Until ☒ Indefinite ☐ Specified Date

Date

(example: Jun 18, 2009)

Time  :  ☒ AM ☐ PM

# Scheduling Backups: Review

Options

Settings

Schedule

Review

---

## Schedule Customized Backup: Review

Database

orcl.oracle.com

Backup Strategy

Customized Backup

Object Type

Whole Database

Cancel

Edit RMAN Script

Back

Step 4 of 4

Submit Job

---

### Settings

Destination	Disk
Backup Type	Full Backup
Backup Mode	Online Backup
Flash Recovery Area	+FRA

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### RMAN Script

The RMAN script below is generated based on previous input.

```
backup device type disk tag '%TAG' database;  
backup device type disk tag '%TAG' archivelog all not backed up;
```

# Backing Up the Control File to a Trace File

Control files have an additional backup option.

**Control Files**

**General** Advanced Record Section

**Backup To Trace**

**Control File Mirror Images**

Oracle strongly recommends that your database has a minimum of two control files and that they are located on separate disks. If a control file is damaged due to a disk failure, it could be restored using the intact copy of the control file from the other disk. You can specify their location in the database's initialization parameter file.

Valid	File Name	File Directory
VALID	current.260.689752023	+DATA/orcl/controlfile/
VALID	current.256.689752023	+FRA/orcl/controlfile/

**General** Advanced Record Section

Control file trace backups may be used to recover from loss of all control files.

**Control Files**

General **Advanced** Record Section

**Control File Information**

Control files store the status of the database physical structure. It is crucial to database operation.

Database ID **1217532758**

Control File Type **CURRENT**

Control File Creation Date **June 17, 2009 5:47:05 AM**

Control File Sequence Number **1557**

Last Change Number **1025918**

Date Last Modified **June 18, 2009 12:13:30 PM**

Control File AutoBackup **Enabled** [Click here to disable](#)



# Managing Backups

## Manage Current Backups

[Catalog Additional Files](#)[Crosscheck All](#)[Delete All Obsolete](#)[Delete All Expired](#)

This backup data was retrieved from the database control file.

**Backup Sets**[Image Copies](#)

### Search

Status Contents ☒ Datafile ☒ Archived Redo Log ☒ SPFILE ☒ Control FileCompletion Time 

### Results

[Crosscheck](#) [Change to Unavailable](#) [Delete](#) [Validate](#)[Select All](#) | [Select None](#)

Select	Key	Tag	Completion Time ▾	Contents	Device Type	Status	Keep	Pieces
<input type="checkbox"/>	4	<a href="#">TAG20090618T121325</a>	Jun 18, 2009 12:13:27 PM	CONTROLFILE, SPFILE	DISK	AVAILABLE	NO	1
<input type="checkbox"/>	3	<a href="#">BACKUP_ORCL.ORACLE_061809120854</a>	Jun 18, 2009 12:13:21 PM	ARCHIVED LOG	DISK	AVAILABLE	NO	1
<input type="checkbox"/>	2	<a href="#">TAG20090618T121228</a>	Jun 18, 2009 12:12:56 PM	CONTROLFILE, SPFILE	DISK	AVAILABLE	NO	1
<input type="checkbox"/>	1	<a href="#">BACKUP_ORCL.ORACLE_061809120854</a>	Jun 18, 2009 12:12:20 PM	DATAFILE	DISK	AVAILABLE	NO	1

# Viewing Backup Reports

## View Backup Report

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

### Search

Status  Start Time  Type

### Results

Total 1 ( Completed ☒ 1 )

Backup Name	Status	Start Time	Time Taken	Type	Output Devices	Input Size	Output Size	Output Rate (Per Sec)
BACKUP_ORCL_ORACLE_061809120854	COMPLETED	Jun 18, 2009 12:09:16 PM GMT+07:00	00:04:14	DB FULL	DISK	1.64G	1.34G	5.42M

☒ TIP \* in Output

### Related Links

[Manage Current](#)

#### Inputs

##### Datafiles

Datafile Number	Output Type	Output Key	File Size	Tablespace	Checkpoint Time	Incremental Level	Compression Ratio	Corrupted Blocks	File Creation Time	File Checkpoint SCN	Resetlogs SCN
1	BACKUPSET	1	750.01M	SYSTEM	Jun 18, 2009 12:09:18 PM GMT+07:00		1.158		0 Apr 24, 2009 10:31:11 AM GMT+07:00	1025302	740137
2	BACKUPSET	1	651.26M	SYSAUX	Jun 18, 2009 12:09:18 PM GMT+07:00		1.43		0 Apr 24, 2009 10:31:17 AM GMT+07:00	1025302	740137
3	BACKUPSET	1	100.01M	UNDOTBS1	Jun 18, 2009 12:09:18 PM GMT+07:00		11.595		0 Apr 24, 2009 11:29:42 AM GMT+07:00	1025302	740137
4	BACKUPSET	1	148.20M	USERS	Jun 18, 2009 12:09:18 PM GMT+07:00		1.102		0 Apr 24, 2009 10:31:30 AM GMT+07:00	1025302	740137
5	BACKUPSET	1	100.01M	EXAMPLE	Jun 18, 2009 12:09:18 PM GMT+07:00		1.442		0 Jun 17, 2009 5:49:29 AM GMT+07:00	1025302	740137

##### Control Files

Output Type	Output Key	Checkpoint Time	File Size	File Checkpoint SCN	Resetlogs SCN
BACKUPSET	2	Jun 18, 2009 12:12:28 PM GMT+07:00	9.30M	1025706	740137
BACKUPSET	4	Jun 18, 2009 12:13:25 PM GMT+07:00	9.30M	1025894	740137

##### SPFile

Backup Set	Modification Time	File Size
4	Jun 18, 2009 11:21:10 AM GMT+07:00	0.00K
2	Jun 18, 2009 11:21:10 AM GMT+07:00	0.00K

##### Archived Logs

Output Type	Output Key	Thread Number	Sequence Number	File Size	Low Time	High Time	Compression Ratio	Resetlogs SCN
BACKUPSET	3	1	14	42.14M	Jun 18, 2009 6:41:27 AM GMT+07:00	Jun 18, 2009 12:13:04 PM GMT+07:00	1	740137

# Monitoring the Fast Recovery Area

## Flash Recovery

This database is using a flash 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 Flash Recovery Area includes free and reclaimable space.

Flash Recovery Area Location  

Flash Recovery Area Size

Flash Recovery Area Size must be set when the location is set.

Non-reclaimable Flash  
Recovery Area (GB) 1.5

Reclaimable Flash Recovery  
Area (MB) 53

Free Flash Recovery Area  
(GB) 2.8

☐ 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 flash recovery area must be set to enable flashback database.

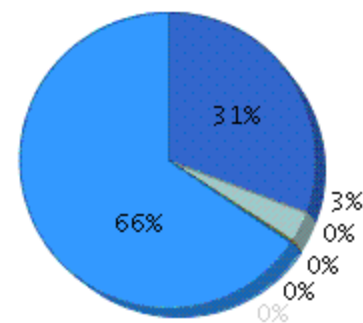
Flashback Retention Time

Current size of the flashback logs(GB) n/a

Lowest SCN in the flashback data n/a

Flashback Time n/a

## Flash Recovery Area Usage

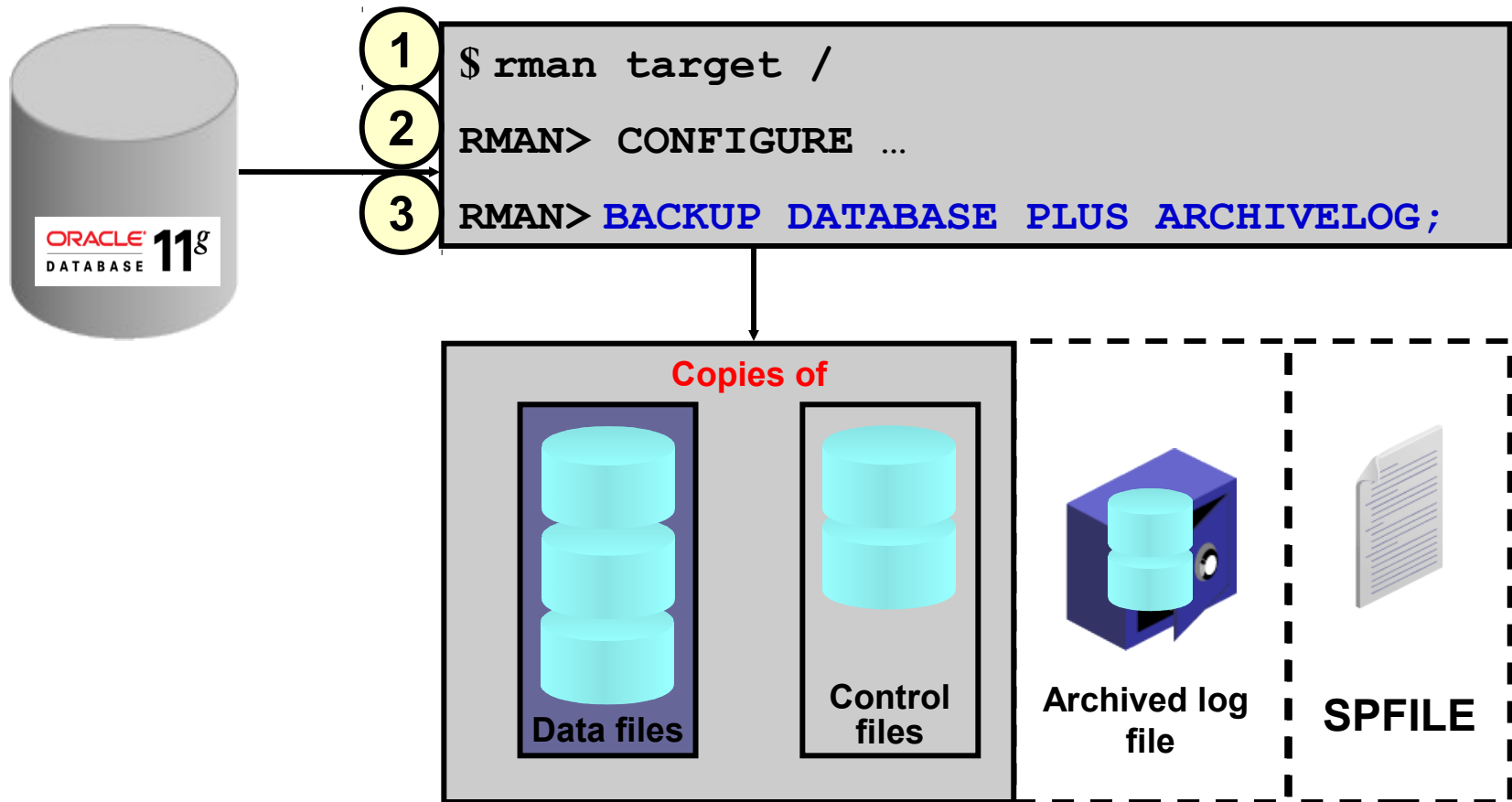


Backup Piece - 1.34GB (30.8%)  
Online Log - 0.15GB (3.4%)  
Control File - 0.01GB (0.2%)  
Archived Redo Log - 0GB (0%)  
Image Copy - 0GB (0%)  
Flashback Log - 0GB (0%)  
Usable - 2.85GB (65.6%)

☐ 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.

# Using the RMAN Command Line



# Quiz

Using the change-tracking feature, an image copy backup performed by RMAN can skip blocks that have not changed since the last backup.

1. True
2. False

# Summary

In this lesson, you should have learned how to:

- Create consistent database backups
- Back up your database without shutting it down
- Create incremental backups
- Automate database backups
- Manage backups and view backup reports
- Monitor the fast recovery area

# Practice 15 Overview: Creating Database Backups

This practice covers the following topics:

- Backing up your database while the database is open for user activity
- Scheduling automatic nightly incremental backups for your database