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Backup and Recovery: Concepts

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Objectives

After completing this lesson, you should be able to:

- Identify the types of failure that can occur in an Oracle database
- Describe instance recovery
- Describe complete and incomplete recovery

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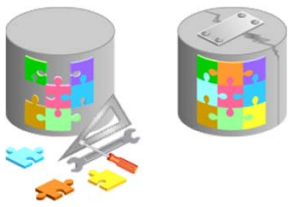
DBA Responsibilities

- Protect the database from failure wherever possible
- Increase the mean time between failures (MTBF)
- Protect critical components by using redundancy
- Decrease the mean time to recover (MTTR)
- Minimize the loss of data

Categories of Failure

Failures can generally be divided into the following categories:

- Statement failure
- User process failure
- Network failure
- User error
- Instance failure
- Media failure



Statement Failure

Typical Problems	Possible Solutions
Attempts to enter invalid data into a table	Work with users to validate and correct data.
Attempts to perform operations with insufficient privileges	Provide appropriate object or system privileges.
Attempts to allocate space that fail	• Enable resumable space allocation. • Increase owner quota. • Add space to tablespace.
Logic errors in applications	Work with developers to correct program errors.

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User Process Failure

Typical Problems	Possible Solutions
A user performs an abnormal disconnect.	A DBA's action is not usually needed to resolve user process failures. Instance background processes roll back uncommitted changes and release locks. Watch for trends. 
A user's session is abnormally terminated.	
A user experiences a program error that terminates the session.	

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Network Failure

Typical Problems	Possible Solutions
Listener fails.	Configure a backup listener and connect-time failover.
Network Interface Card (NIC) fails.	Configure multiple network cards.
Network connection fails.	Configure a backup network connection.

User Error

Typical Causes	Possible Solutions
User inadvertently deletes or modifies data.	Roll back transaction and dependent transactions or rewind table.
User drops a table.	Recover table from recycle bin. Recover table from a backup.

Flashback Technology

Use Flashback technology for:

- Viewing past states of data
- Winding data back and forth in time
- Assisting users in error analysis and recovery

For error analysis:
Oracle Flashback Query
Oracle Flashback Versions Query
Oracle Flashback Transaction Query

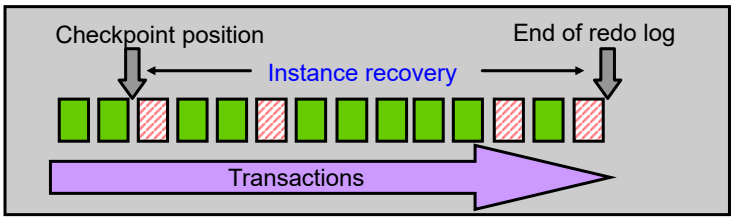
For error recovery:
Oracle Flashback Transaction Backout
Oracle Flashback Table
Oracle Flashback Drop
Oracle Flashback Database

Instance Failure

Typical Causes	Possible Solutions
Power outage	Restart the instance by using the STARTUP command. Recovering from instance failure is automatic, including rolling forward changes in the redo logs and then rolling back any uncommitted transactions. Investigate the causes of failure by using the alert log, trace files, and Enterprise Manager.
Hardware failure	
Failure of one of the critical background processes	
Emergency shutdown procedures	

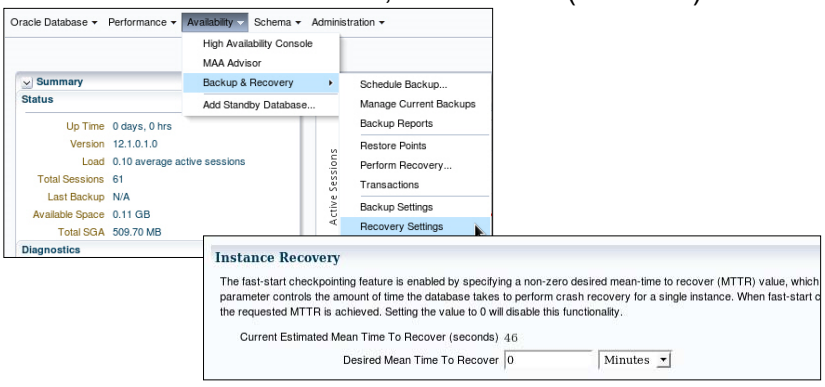
Tuning Instance Recovery

- During instance recovery, the transactions between the checkpoint position and the end of redo log must be applied to data files.
- You tune instance recovery by controlling the difference between the checkpoint position and the end of redo log.



Using the MTTR Advisor

- Specify the desired time in seconds or minutes.
- The default value is 0 (disabled).
- The maximum value is 3,600 seconds (one hour).



Media Failure

Typical Causes	Possible Solutions
Failure of disk drive	1. Restore the affected file from backup. 2. Inform the database about a new file location (if necessary). 3. Recover the file by applying redo information (if necessary).
Failure of disk controller	
Deletion or corruption of a file needed for database operation	

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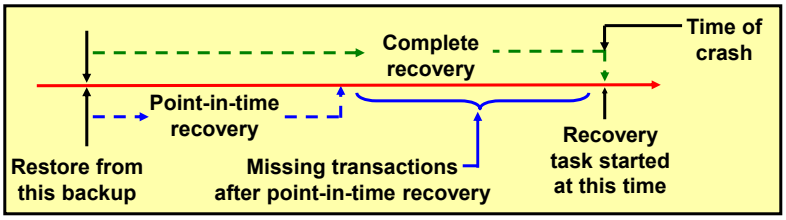
Comparing Complete and Incomplete Recovery

Recovery can have two kinds of scope:

- Complete recovery: Brings the database or tablespace up to the present, including all committed data changes made to the point in time when the recovery was requested
- Incomplete or point-in-time recovery (PITR): Brings the database or tablespace up to a specified point in time in the past, before the recovery operation was requested



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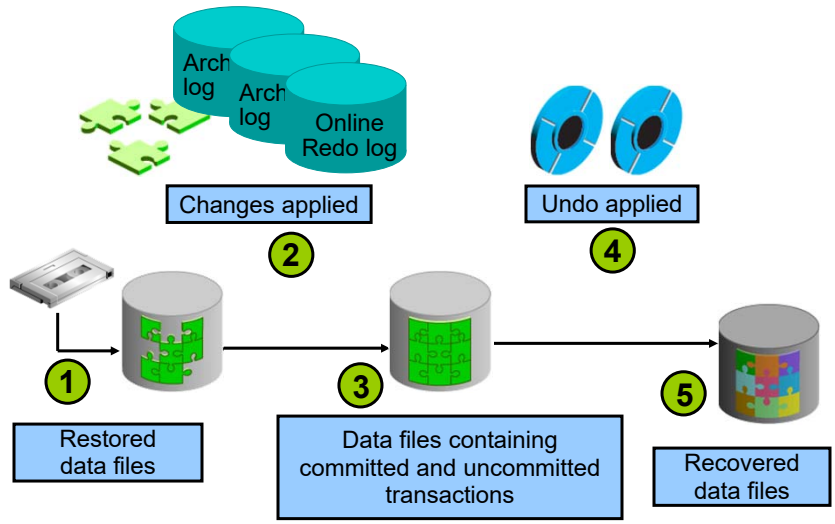
Complete Recovery Process



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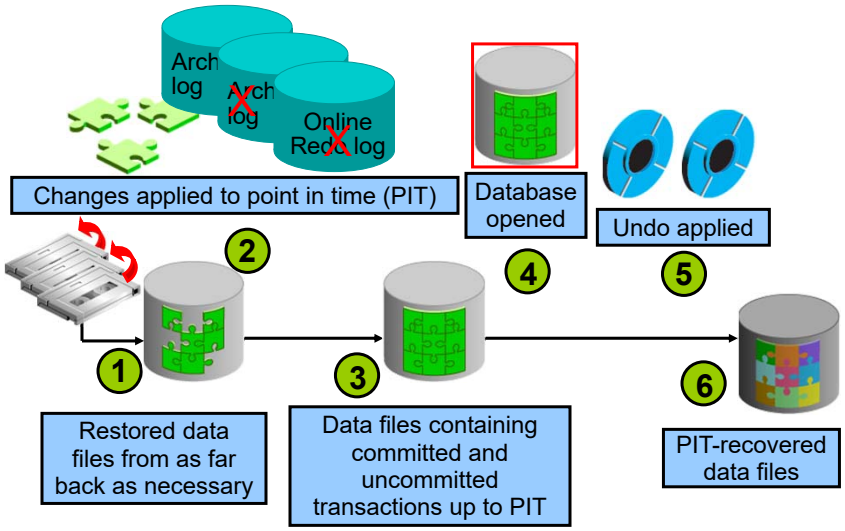
Point-in-Time Recovery Process



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Summary

In this lesson, you should have learned how to:

- Identify the types of failure that can occur in an Oracle database
- Describe instance recovery
- Describe complete and incomplete recovery