

Restore and Recovery Concepts

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Objectives

After completing this lesson, you should be able to:

- Explain how to employ the best Oracle Database recovery technology for your failure situation
- Describe instance or crash recovery
- Describe complete recovery
- Describe point-in-time recovery
- Describe recovery with `RESETLOGS`



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File Loss

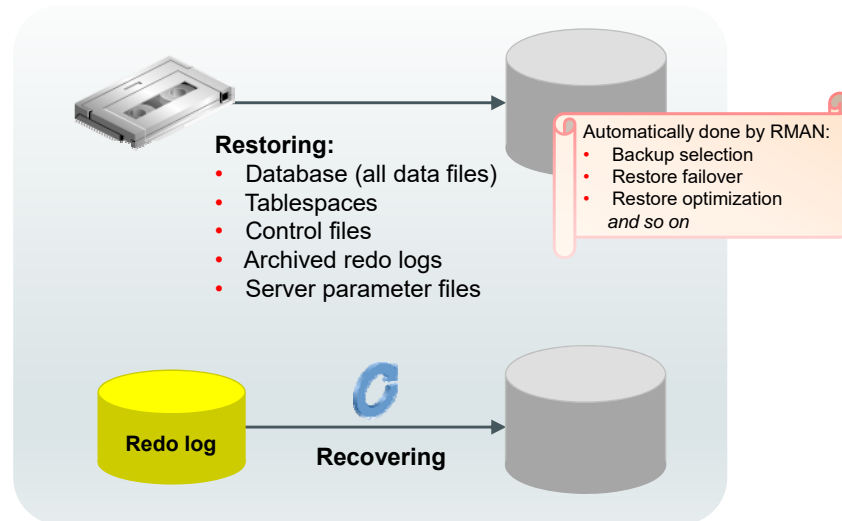
- File loss can be caused by:
 - User error
 - Application error
 - Media failure
- A *noncritical file* loss is one where the database remains open and available.
- The loss of a noncritical file can be addressed by:
 - Creating a new file
 - Rebuilding the file
 - Recovering the lost or damaged file

Data Repair Techniques

To respond to potential data loss:

- Physical failure (missing or corrupted data file):
 - Data Recovery Advisor
 - Data File Media Recovery
 - Block Recovery
- Logical failure (application or user error):
 - Logical Flashback Features
 - Oracle Flashback Database
 - Point-in-Time Recovery:
 - Database Point-in-Time Recovery (DBPITR)
 - Tablespace Point-in-Time Recovery (TSPITR)
 - Table Point-in-Time Recovery (TPITR)

Restoring and Recovering



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Using RMAN RESTORE and RECOVER Commands

- **RESTORE command:** Restores database files from backup
- **RECOVER command:** Recovers the restored files by applying changes recorded in incremental backups and redo log files

```
RMAN> ALTER TABLESPACE inv_tbs OFFLINE IMMEDIATE;  
RMAN> RESTORE TABLESPACE inv_tbs;  
RMAN> RECOVER TABLESPACE inv_tbs;  
RMAN> ALTER TABLESPACE inv_tbs ONLINE;
```

- The Enterprise Manager Cloud Control Recovery Wizard creates and runs an RMAN script to perform the recovery.

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Instance Failure

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

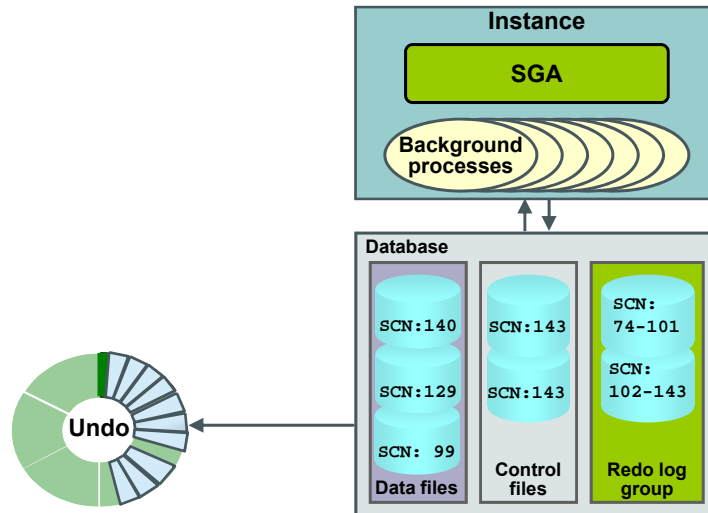
Instance Recovery

Automatic instance or crash recovery:

- Is caused by attempts to open a database whose files are not synchronized on shutdown
- Uses information stored in redo log groups to synchronize files
- Involves two distinct operations:
 - **Rolling forward:** Redo log changes (both committed and uncommitted) are applied to data files.
 - **Rolling back:** Changes that are made but not committed are returned to their original state.

Phases of Instance Recovery

1. Startup instance (data files are out of sync)
2. Roll forward (redo)
3. Committed and uncommitted data in files
4. Database opened
5. Roll back (undo)
6. Committed data in files



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Media Failure

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

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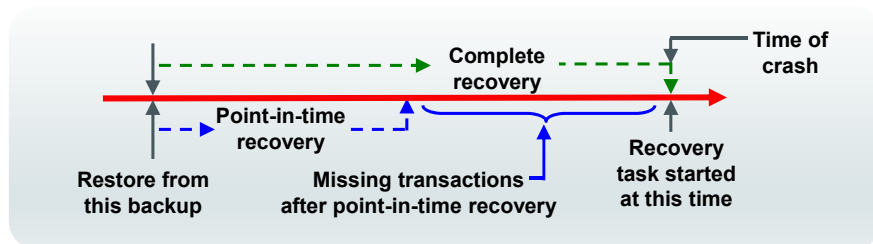
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Comparing Complete and Incomplete Recovery

Recovery can have two kinds of scope:

- **Complete recovery:** Brings the database or tablespace up to the point of failure, including all committed data changes made up to the point of failure
- **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

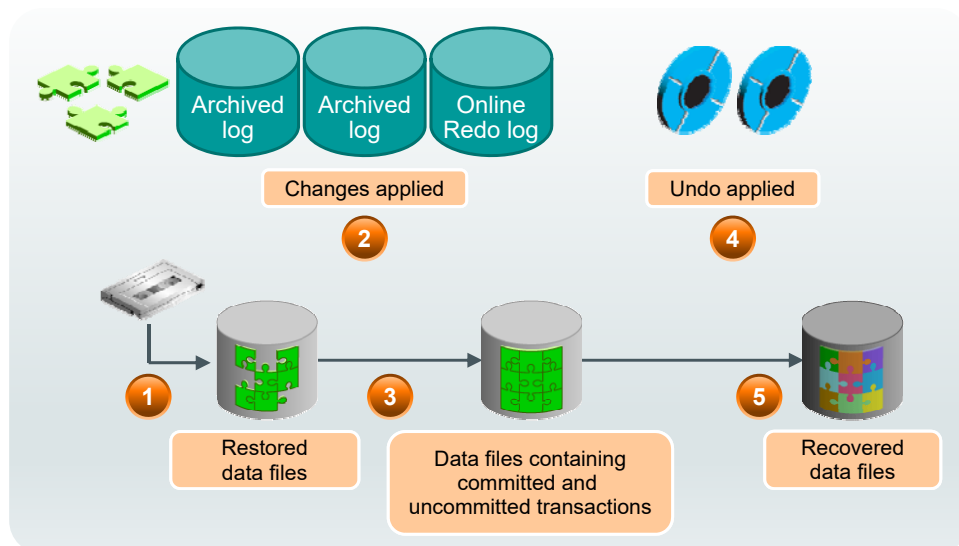


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Complete Recovery Process

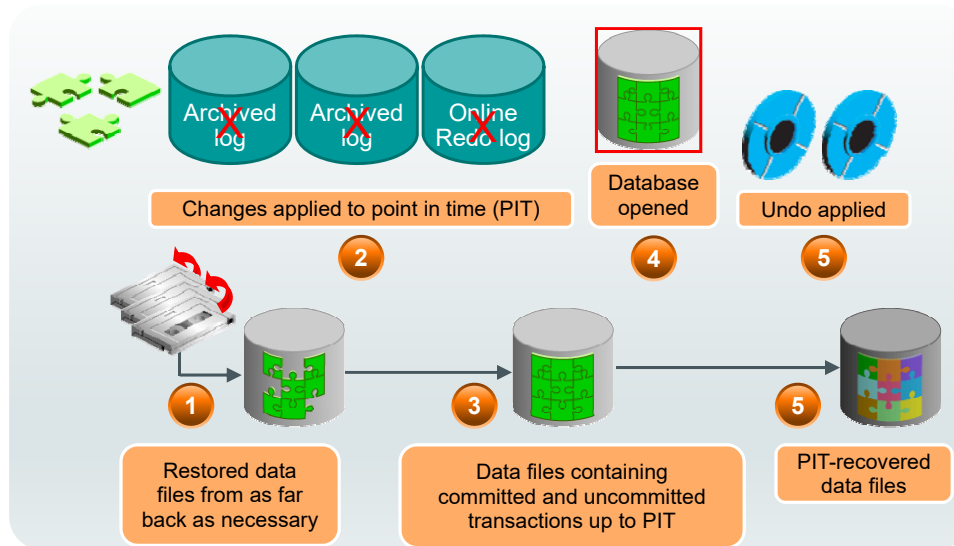


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Point-in-Time Recovery Process



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Recovery with the RESETLOGS Option

- Issue: Missing archive logs for target recovery SCN
- Workflow:
 1. Restore backups.
 2. Recover as far forward as the unbroken series of archive logs allows.
 3. Open the database with the RESETLOGS option.
A new **database incarnation** is automatically created to avoid confusion when two different redo streams have the same SCNs, but occurred at different times.

Note: Changes after the last applied archive log **are lost**.

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Summary

In this lesson, you should have learned how to:

- Determine the best Oracle Database recovery technology for your failure situation
- Describe instance or crash recovery
- Describe complete recovery
- Describe point-in-time recovery
- Describe recovery with RESETLOGS

