TASK-4

DATABASE

BACKUP

AND

RECOVERY

Introduction

Database backup and recovery are crucial for ensuring data availability, integrity, and resilience in the event of hardware failures, corruption, or accidental deletions. Oracle Database provides multiple utilities to perform logical and physical backups, including SQL*Plus, Data Pump Export/Import, and RMAN (Recovery Manager). This document outlines step-by-step instructions for implementing robust backup and recovery processes using SQL*Plus and other Oracle tools.

Backup processes involve creating copies of database objects, schemas, or the entire database, while recovery ensures data can be restored to its original state after a failure. Logical backups (Data Pump) and physical backups (RMAN) serve different use cases, with logical backups offering schema-level granularity and RMAN enabling full database recovery.

Benefits of Backup and Recovery

1. **Data Safety:** Protects against data loss caused by human errors or system failures.

2. **Compliance:** Ensures adherence to industry regulations requiring data retention and recoverability.

3. **Operational Continuity:** Minimizes downtime by enabling efficient restoration of business-critical databases.

4. **Disaster Recovery:** Provides the ability to restore operations after catastrophic events.

Best Practices for Backup and Recovery

1. **Automate Backup Scheduling:** Use job schedulers like cron to run backup scripts periodically.

2. **Validate Backups:** Regularly test backups by performing trial recovery operations.

3. **Separate Backup Storage:** Store backup files in a different location or medium from the production database.

4. **Monitor Logs:** Regularly review log files generated during backup and recovery to detect issues early.

5. **Use Encryption:** Protect backup files using encryption to ensure data security.

Common Challenges and Solutions

1. **Insufficient Storage Space:** Monitor available storage to avoid failed backups due to space limitations.

Solution: Use Data Pump's FILESIZE parameter to split large dumps into smaller chunks.

2. **Backup Corruption:** Backups may become corrupted during transfer or storage.
   Solution: Implement checksum validation for backup files and maintain multiple copies.

3. **Downtime During Recovery:** Prolonged recovery times can impact business operations.
   Solution: Use RMAN's incremental backup strategy to speed up recovery.

4. **Permissions Issues:** Users may lack the necessary privileges to perform backup operations.
   Solution: Grant appropriate permissions using GRANT statements in SQL*Plus.

Example Use Cases

1. **Scenario 1:** A developer accidentally deletes critical table data.
   Solution: Use a logical backup created with Data Pump Export (expdp) to restore the affected schema.

2. **Scenario 2:** A hardware failure causes complete database corruption.
   Solution: Restore the database from a full physical backup created with RMAN.

Coding

#BACKUP PROCESS

Connected to: Oracle Database 19c Enterprise Edition Release
19.0.0.0.0

Starting "your_user"."SYS_EXPORT_FULL_01": your_user/********
DIRECTORY=backup_dir DUMPFILE=backup_%U.dmp FULL=Y
FILESIZE=1G

Processing object type
DATABASE_EXPORT/SCHEMA/TABLE/TABLE_DATA

. . exported "your_user"."table_name"   15.7 MB   1023 rows

Dump file set for your_user.SYS_EXPORT_FULL_01 is:

  /path/to/backup/directory/backup_01.dmp

  /path/to/backup/directory/backup_02.dmp

Job "your_user"."SYS_EXPORT_FULL_01" successfully completed at
DD-MMM-YYYY HH:MM:SS

#RESTORE PROCESS

Connected to: Oracle Database 19c Enterprise Edition Release
19.0.0.0.0

Starting "your_user"."SYS_IMPORT_FULL_01": your_user/********
DIRECTORY=backup_dir DUMPFILE=backup_%U.dmp FULL=Y

Processing object type

DATABASE_EXPORT/SCHEMA/TABLE/TABLE_DATA

. . imported "your_user"."table_name"   15.7 MB   1023 rows

Job "your_user"."SYS_IMPORT_FULL_01" successfully completed at

DD-MMM-YYYY HH:MM:SS

#SQL*PLUS BACKUP/RECOVERY

Backup Schema Data:

When you execute the SPOOL command in SQL*Plus, the output file

schema_backup.sql is generated.


```
CREATE TABLE "table_name" (

   "column1" NUMBER,

   "column2" VARCHAR2(100)

);

INSERT INTO "table_name" VALUES (1, 'Sample Data');

INSERT INTO "table_name" VALUES (2, 'More Data');
```


Restore Schema Data:

Executing @/path/to/backup/schema_backup.sql in SQL*Plus outputs:

Table created.

1 row inserted.

1 row inserted.

#RMAN BACKUP/RESTORE

RMAN Backup Output:

RMAN> BACKUP DATABASE PLUS ARCHIVELOG;

Starting backup at DD-MMM-YYYY HH:MM:SS

Using target database control file for backup

Finished backup at DD-MMM-YYYY HH:MM:SS

Backup complete.

RMAN Restore Output:

RMAN> RESTORE DATABASE;

Starting restore at DD-MMM-YYYY HH:MM:SS

Restoring control file from backup

Restoring datafiles from backup

Media recovery complete.

Finished restore at DD-MMM-YYYY HH:MM:SS

Output

✵✵✵✵✵✵✵✵✵✵✵✵✵✵✵✵✵✵