

Assignment 6

Draft a brief report on the use of transaction logs for data recovery and create a hypothetical scenario where a transaction log is instrumental in data recovery after an unexpected shutdown.

ANS:

Brief Report on the Use of Transaction Logs for Data Recovery

Introduction

Transaction logs are essential in database management systems (DBMS) for recording all changes made to the database. They play a crucial role in maintaining data integrity and enabling recovery after system failures.

Importance of Transaction Logs

1. **Data Consistency:** Transaction logs ensure all transactions are fully and correctly executed.
2. **ACID Properties:** They help maintain the Atomicity, Consistency, Isolation, and Durability of transactions.
3. **Point-in-Time Recovery:** Logs allow databases to be restored to specific points before failures.
4. **Crash Recovery:** They help determine which transactions need to be committed or rolled back after a crash.
5. **Hypothetical Scenario: Data Recovery Using Transaction Logs**
6. **Scenario Overview:** RetailCo's database server crashes due to a power outage. Transactions were in various stages of completion.

Data Recovery Process:

1. **Crash Detection:** Upon reboot, the DBMS detects the crash and starts the recovery process using transaction logs.
2. **Analysis:** The DBMS identifies committed and uncommitted transactions at the time of the crash.
3. **Redo Phase:** The DBMS re-applies committed transactions not fully written to the database.
4. **Undo Phase:** The DBMS rollback uncommitted transactions to maintain consistency.
5. **Final State:** The database is restored to a consistent state, reflecting all committed transactions and excluding partial changes.