TCL Commands in SQL

Overview

TCL (Transaction Control Language) is used to manage transactions in a database. Transactions ensure that a series of SQL operations are executed reliably and can be committed or rolled back in case of failure.

Commands Covered

Command	Description
`START TRANSACTION`	Begins a new transaction
`COMMIT`	Saves all changes made in the current transaction permanently
`ROLLBACK`	Reverts all changes made in the current transaction
`SAVEPOINT`	Creates a point in a transaction to which you can roll back later
`ROLLBACK TO SAVEPOINT`	Undoes changes made after a specific savepoint without affecting prior operations

---

SQL File: `tcl_commands.sql`

1. Create a Database and Table

```sql
 CREATE DATABASE CompanyDB;
USE CompanyDB;

CREATE TABLE Employees (
    EmpID INT PRIMARY KEY,
    Name VARCHAR(50),
    Age INT,
    Department VARCHAR(50),
    Salary DECIMAL(10,2)
);
```

Creates a database `CompanyDB` and an `Employees` table.

---

2. Start a Transaction and Insert Data

```sql
 START TRANSACTION;

INSERT INTO Employees (EmpID, Name, Age, Department, Salary) VALUES
(1, 'Alice', 30, 'HR', 60000),
(2, 'Bob', 28, 'IT', 70000),
(3, 'Charlie', 35, 'Finance', 75000);

COMMIT;
```

- `START TRANSACTION` begins a transaction.
- Data is inserted into the table.
- `COMMIT` saves the changes permanently.

3. Start Another Transaction and Update Data

```
START TRANSACTION;

UPDATE Employees SET Salary = 80000 WHERE EmpID = 3;

ROLLBACK;
```

- Updates Charlie's salary to `80000` .
- `ROLLBACK` reverts this update, restoring the previous salary.

To verify, run:

```
SELECT * FROM Employees;
```

The salary remains unchanged due to the rollback.

4. Using SAVEPOINT and ROLLBACK

```
START TRANSACTION;

DELETE FROM Employees WHERE EmpID = 2;

SAVEPOINT BeforeDeletion;

DELETE FROM Employees WHERE EmpID = 1;

ROLLBACK TO BeforeDeletion;

COMMIT;
```

- Deletes Bob from the table.
- `SAVEPOINT BeforeDeletion` creates a rollback point.
- Deletes Alice, but later `ROLLBACK TO BeforeDeletion` undoes this action.
- `COMMIT` saves the final changes.

To verify, run:

```
SELECT * FROM Employees;
```

Bob remains deleted, but Alice's record is restored.

Summary

- TCL commands manage transactions to ensure reliable database operations.
- `START TRANSACTION` begins a transaction.
- `COMMIT` saves changes permanently.
- `ROLLBACK` undoes all changes since the transaction began.
- `SAVEPOINT` allows rolling back to a specific point within a transaction.
- `ROLLBACK TO SAVEPOINT` undoes changes made after a savepoint without affecting previous changes.

Next Step

Run the SQL file in **MySQL** or **PostgreSQL** to understand how transaction control works.