Lab Session 07

7. Implementation of Transaction in SQL Server

Aim: The aim of implementing transactions in SQL Server is to ensure the atomicity, consistency, isolation, and durability (ACID) properties of database operations.

Description: Transactions in SQL Server provide a mechanism to group multiple database operations into a single logical unit, ensuring that they are executed as a whole or not at all. Transactions ensure the atomicity, consistency, isolation, and durability (ACID) properties of database operations. In SQL Server, transactions are managed using the BEGIN TRANSACTION, COMMIT, and ROLLBACK statements.

Pre-Requisites: This Section contains the list of Software/Tools or required knowledge (Glossary) to complete the task under the Laboratory Session.

Pre Lab-Task:

1) What are the Transactions?

A transaction is a sequence of database operations that performs a single logical unit of work. It must be completed entirely or not at all.

2) Explain ACID properties?

- **A – Atomicity:** All operations in a transaction complete or none do.
- **C – Consistency:** Maintains database integrity.
- **I – Isolation:** Transactions don't interfere with each other.
- **D – Durability:** Changes stay even after a system crash.

3) List the transaction states.

- Active
- Partially Committed
- Committed
- Failed
- Aborted

4) Difference between commit and roll back operations.

- **Commit:** Saves all changes made by the transaction.
- **Rollback:** Undoes all changes made by the transaction.

In Lab Task:

1) Create user and implement the following commands on relation (Emp and Dept)

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```
CREATE TABLE Emp (
    name VARCHAR(100),
    age INT,
    department VARCHAR(50)
);

CREATE TABLE Dept (
    dept_name VARCHAR(50),
    location VARCHAR(100)
);

INSERT INTO Emp (name, age, department) VALUES
('Alice Johnson', 20, 'Teacher'),
('Bob Smith', 25, 'Finance'),
('Charlie Brown', 30, 'IT'),
('Diana Prince', 35, 'Sales');

INSERT INTO Dept (dept_name, location) VALUES
('HR', 'New York'),
('Finance', 'San Francisco'),
('IT', 'Chicago'),
('Sales', 'Los Angeles');
```

2) Delete those records from the table which have age = 20 and then ROLLBACK the changes in the database.

```
BEGIN TRANSACTION;
DELETE FROM Emp WHERE age = 20;
ROLLBACK;
SELECT *FROM Emp;
```

3) Update those records from the table which have age = 30 and then ROLLBACK the changes in the database.

```
BEGIN TRANSACTION;
UPDATE Emp SET age = age + 1 WHERE age = 30;
ROLLBACK;
SELECT *FROM Emp;
```

4) Insert the records from the table Employees ('Tom Harris'**,** 28**,** 'Sales'**), (**'Sara Parker'**,** 22**,** 'HR'**).**

```
INSERT INTO Emp (name, age, department) VALUES
('Tom Harris', 28, 'Sales'),
('Sara Parker', 22, 'HR');
SELECT *FROM Emp;
```

5) Delete those records from the table which have age = 25 and then COMMIT the changes and then try to use ROLLBACK to the previous save point. What have you observed at this stage?

```
BEGIN TRANSACTION;
DELETE FROM Emp WHERE age = 25;
COMMIT;
ROLLBACK;
SELECT *FROM Emp;
CREATE USER admin WITH PASSWORD 'admin';
GRANT ALL PRIVILEGES ON DATABASE test TO admin;
```

6) Develop a query to grant all privileges of employees table into departments table.

```
GRANT ALL PRIVILEGES ON Emp TO admin;
```

7) Develop a query to grant some privileges of employees table into departments table.

```
GRANT SELECT, UPDATE ON Emp TO admin;
```

8) Develop a query to revoke all privileges of employees table from departments table.

```
REVOKE ALL PRIVILEGES ON Emp FROM Departments;
```

9) Develop a query to revoke some privileges of employees table from departments table.

REVOKE SELECT, UPDATE ON Emp FROM Dept;

REVOKE SELECT, UPDATE ON Emp FROM emp;

Students Signature

(For Evaluator's use only)

Comment of the Evaluator (if Any)	Evaluator's Observation Marks Secured:_____ out of _____ Full Name of the Evaluator: Signature of the Evaluator Date of Evaluation: