

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Worksheet 8

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Subject Name: ADBMS

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1. Aim:

Design a robust PostgreSQL transaction system for the students table where multiple student records are inserted in a single transaction.

- a. If any insert fails due to invalid data, only that insert should be rolled back.
- b. Previous successful inserts should remain intact.
- c. Use savepoints to manage partial rollbacks.
- d. Provide clear messages for successful and failed insertions.

2. Objective:

- Understand Transaction Management in PostgreSQL
- Learn Partial Rollback Using Savepoints
- Handle Errors Gracefully
- Provide Feedback on Database Operations
- **Develop Robust and Fault-tolerant Database Systems**

3. Code:

-- Create table

```
CREATE TABLE students (
    id SERIAL PRIMARY KEY,
    name VARCHAR(50),
    age INT,
    class INT
);
```

-- Insert multiple students in one transaction

```
DO $$
BEGIN
    BEGIN
        INSERT INTO students(name, age, class) VALUES ('Shivanshu',20,12);
        INSERT INTO students(name, age, class) VALUES ('Tanya',21,12);
        INSERT INTO students(name, age, class) VALUES ('Devanshu',16,10);

        RAISE NOTICE 'Transaction Successfully Done';
    EXCEPTION
        WHEN OTHERS THEN
```

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RAISE NOTICE 'Transaction Failed..! Rolling back all changes.';
RAISE;

END;
END;
\$\$;

SELECT * FROM students;

-- Transaction with Savepoints

BEGIN; -- Start transaction

-- Savepoint 1: Karan

SAVEPOINT sp1;
INSERT INTO students(name, age, class) VALUES ('Karan',19,12);
DO \$\$ BEGIN RAISE NOTICE 'Inserted Karan successfully'; END \$\$;

-- Savepoint 2: Rohit (invalid insert)

SAVEPOINT sp2;
DO \$\$
BEGIN
BEGIN
INSERT INTO students(name, age, class) VALUES ('Rohit','wrong',12);
EXCEPTION WHEN OTHERS THEN
RAISE NOTICE 'Failed to insert Rohit, rolling back to savepoint sp2';
END;

END;

\$\$;

-- Rollback the failed insert in SQL

ROLLBACK TO SAVEPOINT sp2;

-- Savepoint 3: Aditya

SAVEPOINT sp3;
INSERT INTO students(name, age, class) VALUES ('Aditya',17,10);
DO \$\$ BEGIN RAISE NOTICE 'Inserted Aditya successfully'; END \$\$;

-- Commit all successful inserts

COMMIT;

SELECT * FROM students;



4. Output:

Output:

```
CREATE TABLE
DO
id | name      | age | class
---+---+---+---+
 1 | Shivanshu | 20  | 12
 2 | Tanya     | 21  | 12
 3 | Devanshu  | 16  | 10
(3 rows)

BEGIN
SAVEPOINT
INSERT 0 1
DO
SAVEPOINT
DO
ROLLBACK
SAVEPOINT
INSERT 0 1
DO
COMMIT
id | name      | age | class
---+---+---+---+
 1 | Shivanshu | 20  | 12
 2 | Tanya     | 21  | 12
 3 | Devanshu  | 16  | 10
 4 | Karan     | 19  | 12
 5 | Aditya    | 17  | 10
(5 rows)

pgsql:commands.sql:27: NOTICE:  Transaction Successfully Done
pgsql:commands.sql:38: NOTICE:  Inserted Karan successfully
pgsql:commands.sql:50: NOTICE:  Failed to insert Rohit, rolling back to savepoint sp2
pgsql:commands.sql:57: NOTICE:  Inserted Aditya successfully
```

4. Learning Outcomes:

- Master Transaction Control
- Implement Partial Rollbacks with Savepoints
- Error Handling in Database Operations
- Provide Clear Feedback and Maintain Data Consistency