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EXPERIMENT 1

Student Name: Jatin Tasoria **UID: 25MCC20054**

Branch: MCA-Cloud Computing **Section/Group: MCC 101-A**

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Subject Name: Technical Training-I **Subject Code: 25CAP-652**

1. Aim

To design and implement a sample database system using DDL, DML, and DCL commands, including database creation, data manipulation, schema modification, and role-based access control.

2. Objective:

After completing this practical, the learner will be able to:

- Implement DDL commands to create and modify database objects
- Use DML commands to insert, update, and delete data
- Apply DCL commands for access control and security
- Enforce data integrity using constraints
- Provide read-only access to authorized users

3. Practical / Experiment Steps

a. Analyze database requirements

b. Create tables using DDL commands

c. Insert and manipulate data using DML commands

d. Apply access control using DCL commands

e. Modify database schema using ALTER TABLE

f. Drop unnecessary tables

4. Procedure of the Practical

1) Start the system and log in
2) Start the PostgreSQL service
3) Open PostgreSQL client (psql / pgAdmin)
4) Create a new database
5) Create the required table
6) Insert sample records
7) Update and delete records using UPDATE and DELETE
8) Create role and grant SELECT privileges
9) Modify table structure using ALTER TABLE
10) Drop unused table using DROP TABLE

5. SQL Queries Used in the Experiment

a. Database Creation

```
CREATE DATABASE Empolyee_Management;
```

b. Table Creation

```
CREATE TABLE Department (
    dept_id INT PRIMARY KEY,
    dept_name VARCHAR(50) UNIQUE NOT NULL,
    location VARCHAR(50)
);
```

```
CREATE TABLE Employee (
    emp_id INT PRIMARY KEY,
    emp_name VARCHAR(50) NOT NULL,
    salary NUMBER CHECK (salary > 0),
    dept_id INT,
    FOREIGN KEY (dept_id) REFERENCES Department(dept_id)
);

CREATE TABLE Project (
    project_id INT PRIMARY KEY,
    project_name VARCHAR(50) NOT NULL,
    dept_id INT,
    FOREIGN KEY (dept_id) REFERENCES Department(dept_id)
);
```

c. Inserting Sample Records

```
INSERT INTO Department VALUES (1, 'IT', 'Bangalore');
INSERT INTO Department VALUES (2, 'HR', 'Delhi');

INSERT INTO Employee VALUES (101, 'Rahul', 50000, 1);
INSERT INTO Employee VALUES (102, 'Anita', 45000, 2);

INSERT INTO Project VALUES (201, 'Cloud Migration', 1);
INSERT INTO Project VALUES (202, 'Recruitment System', 2);
```

d. Update & Delete Data

```
UPDATE Employee
SET salary = 55000
WHERE emp_id = 101;

DELETE FROM Employee
WHERE emp_id = 102;
```

e. Access Control

```
CREATE ROLE Manager;

GRANT SELECT ON Department TO Manager;
GRANT SELECT ON Employee TO Manager;
GRANT SELECT ON Project TO Manager;

REVOKE CREATE FROM Manager;
```

f. Modification

```
ALTER TABLE Employee ADD email VARCHAR(50);
```

g. Drop Table

```
DROP TABLE project;
```

6. Input / Output Analysis (I/O Analysis)

SQL queries for:

- Table creation

```
CREATE TABLE

Query returned successfully in 63 msec.
```

- Data insertion

```
INSERT 0 1

Query returned successfully in 49 msec.
```

- TABLE employee

	emp_id [PK] integer	emp_name character varying (50)	salary integer	dept_id integer
1	101	Rahul	50000	1
2	102	Anita	45000	2

- TABLE department

	dept_id [PK] integer	dept_name character varying (50)	location character varying (50)
1	1	IT	Bangalore
2	2	HR	Delhi

- TABLE project

	project_id [PK] integer	project_name character varying (50)	dept_id integer
1	201	Cloud Migration	1
2	202	Recruitment System	2

- Updating Value

```
UPDATE 1

Query returned successfully in 38 msec.
```

  - After Updating Value

	emp_id [PK] integer	emp_name character varying (50)	salary integer	dept_id integer
1	101	Rahul	55000	1
2	102	Anita	45000	2

- Deleting

```
DELETE 0

Query returned successfully in 39 msec.
```

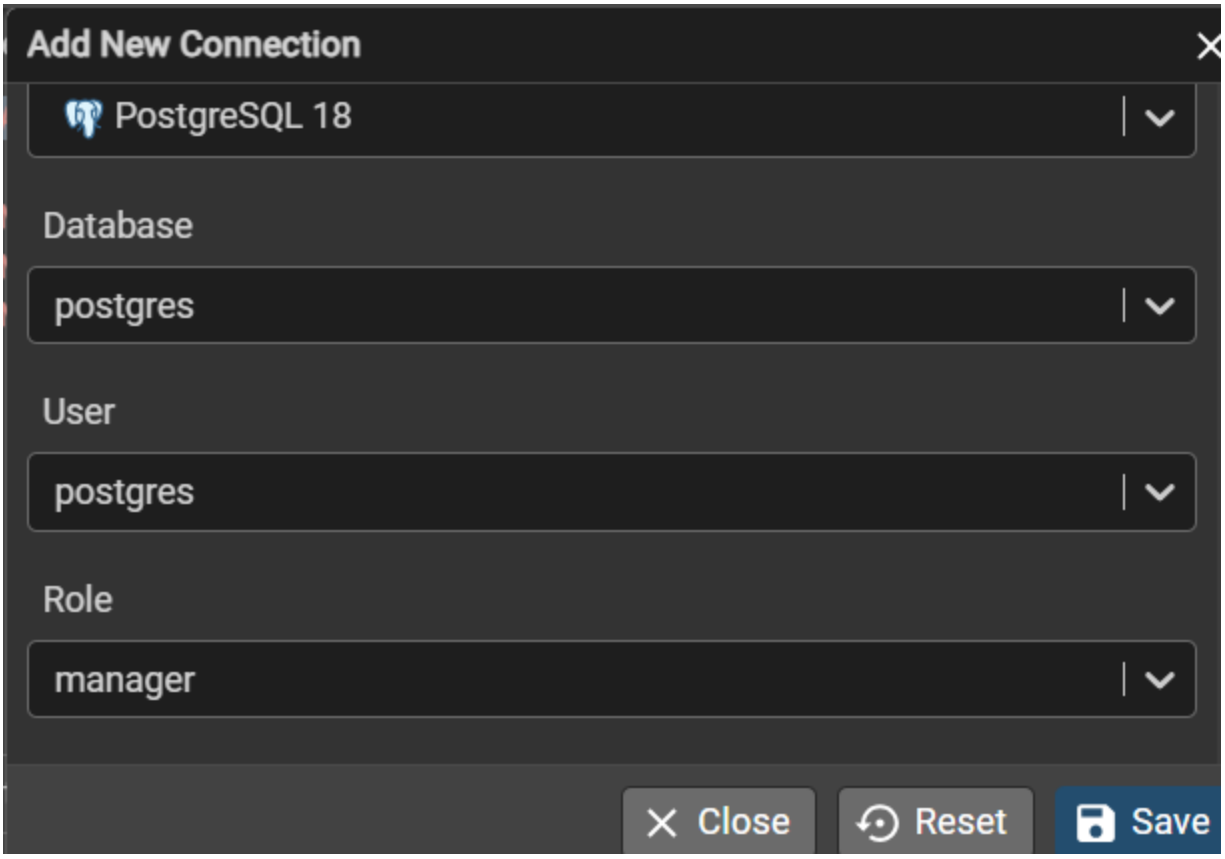
  - After Deleting Value

	emp_id [PK] integer	emp_name character varying (50)	salary integer	dept_id integer
1	101	Rahul	55000	1

- Access Control

```
CREATE ROLE

Query returned successfully in 59 msec.
```



- GRANT & REVOKE

```
GRANT

Query returned successfully in 38 msec.
```

```
REVOKE

Query returned successfully in 40 msec.
```

- Alter table

```
ALTER TABLE

Query returned successfully in 41 msec.
```

- After altering the table

	emp_id [PK] integer	emp_name character varying (50)	salary integer	dept_id integer	email character varying (50)
1	101	Rahul	55000	1	[null]

- Drop Table

```
DROP TABLE

Query returned successfully in 83 msec.
```

7. Learning Outcome

- Practical understanding of DDL, DML, and DCL commands
- Experience with constraints and referential integrity
- Knowledge of role-based access control
- Hands-on exposure to schema modification
- Improved database design and security skills