Experiment 1

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1. Aim of the Session:

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 to ensure data integrity and secure, read-only access for authorized users.

2. Objectives:

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

- Understand the use of DDL commands to create and modify database structures.
- Perform DML operations such as INSERT, UPDATE, DELETE, and SELECT.
- Implement relationships using primary and foreign keys.
- Apply DCL commands to manage roles and privileges.
- Analyze input and output of SQL queries in a real database environment.

3. Practical / Experiment steps:

- Design the database schema for Department, Employee, and Project tables.
- Create tables using appropriate constraints.

- Insert sample records into tables.
- Perform update and delete operations.
- Retrieve data using SELECT queries.
- Create a role and grant/revoke privileges.
- Alter and drop database objects.

4. Procedure of the Experiment:

    i.   **Start the system and log in to the computer.**

    ii.   **Open PostgreSQL software.**

    iii.   **Create database exp1.**

    iv.   **Create tables using DDL commands.**

Create table Department

create table Department

(

Deptid int PRIMARY KEY,

Deptname varchar(20) NOT NULL UNIQUE

);

Create table Employee

CREATE TABLE Employee (

Empid int PRIMARY KEY,

Empname varchar(20) NOT NULL,

Empemail varchar(30) UNIQUE NOT NULL,

Empphone varchar(10) UNIQUE NOT NULL,

Deptid int,

FOREIGN KEY (Deptid) REFERENCES Department(Deptid)

);

Create table Project

CREATE TABLE Project

(

Projid int PRIMARY KEY,

Projname varchar(40) NOT NULL,

ProjstartDate date NOT NULL,

ProjendDate date NOT NULL,

ProjAssignEmp int,

FOREIGN KEY (ProjAssignEmp) REFERENCES Employee(Empid)

);
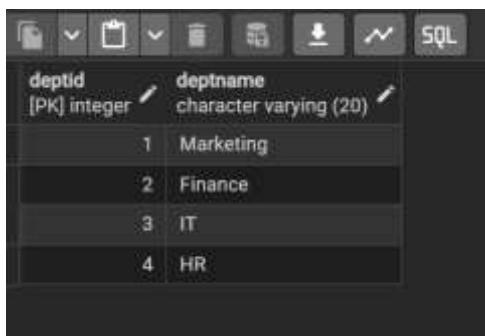
v.   Insert records using DML commands

Insert into Department

insert into Department (Deptid, Deptname) values

(1,'Marketing'),(2,'Finance'),(3,'IT'),(4,'HR');

deptid [PK] integer	deptname character varying (20)
1	Marketing
2	Finance
3	IT
4	HR

Insert into Employee
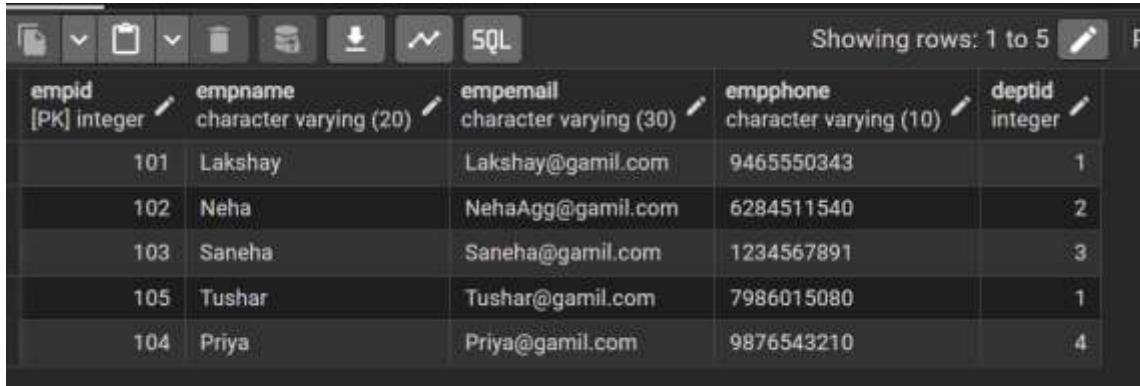
insert into Employee(Empid, Empname, Empemail, Empphone, Deptid) values

(101,'Lakshay','Lakshay@gamil.com',9465550343,1),

(102,'Neha','NehaAgg@gamil.com',6284511540,2),

(103,'Saneha','Saneha@gamil.com',1234567891,3),

(104,'Priya','Priya@gamil.com',9876543210,4),

(105,'Tushar','Tushar@gamil.com',7986015080,1);

empid [PK] integer	empname character varying (20)	empemail character varying (30)	empphone character varying (10)	deptid integer
101	Lakshay	Lakshay@gamil.com	9465550343	1
102	Neha	NehaAgg@gamil.com	6284511540	2
103	Saneha	Saneha@gamil.com	1234567891	3
105	Tushar	Tushar@gamil.com	7986015080	1
104	Priya	Priya@gamil.com	9876543210	4

Insert into Project

insert into Project(Projid, Projname, ProjstartDate, ProjendDate, ProjAssignEmp)values

(501,'Festive Promotion Campaign','2026-01-01','2026-01-31',105),

(502,'Payout Maintainence','2026-01-28','2026-01-31',104),

(503,'ERP Development','2026-01-01','2026-01-15',103),

(504,'Tax Auditng for month','2026-01-20','2026-01-29',102),

(505,'Market Funnet Analysis','2026-01-21','2026-01-30',101),

(506,'Brand Perception Analysis','2026-01-01','2026-01-31',101);

	project_id [PK] integer	project_name character varying (50)	dept_id integer
1	201	Payroll System	1
2	202	Web Portal	2
3	203	Accounting Software	3
4	204	Ad Campaign	4
5	205	Inventory System	5
6	206	Mobile App	2

vi.   Update and delete records

UPDATE Employee

SET Empphone = 9999888800

WHERE Empid = 104;

empid [PK] integer	empname character varying (20)	empemail character varying (30)	empphone character varying (10)	deptid integer
101	Lakshay	Lakshay@gamil.com	9465550343	1
102	Neha	NehaAgg@gamil.com	6284511540	2
103	Saneha	Saneha@gamil.com	1234567891	3
105	Tushar	Tushar@gamil.com	7986015080	1
104	Priya	Priya@gamil.com	9999888800	4

DELETE FROM Project

WHERE ProjAssignEmp = 104;

projid [PK] integer	projname character varying (40)	projstartdate date	projenddate date	projassignemp integer
501	Festive Promotion Campai...	2026-01-01	2026-01-31	105
503	ERP Development	2026-01-01	2026-01-15	103
504	Tax Auditrg for month	2026-01-20	2026-01-29	102
505	Market Funnel Analysis	2026-01-21	2026-01-30	101
506	Brand Perception Analysis	2026-01-01	2026-01-31	101

vii. Create role and assign privileges.

CREATE ROLE Auditor LOGIN PASSWORD 'Audit@2020';

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exp1/auditor@PostgreSQL 18
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GRANT SELECT ON Department, Employee, Project TO Auditor;

REVOKE SELECT ON Project FROM Auditor;

```
62    GRANT SELECT ON Department, Employee, Pr
63    REVOKE SELECT ON Project FROM Auditor;
```

Data Output   Messages   Notifications

REVOKE

5. Learning Outcomes (What I have learned):

- Create database tables using DDL commands with appropriate constraints to ensure data integrity.
- Perform DML operations such as INSERT, UPDATE, and DELETE on database records.
- Establish relationships between tables using PRIMARY KEY and FOREIGN KEY constraints.
- Implement role-based access control using DCL commands to provide secure, read-only access.
- Modify and manage database schemas using ALTER TABLE and DROP TABLE commands.