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Worksheet 1.1

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Semester:2nd **Date of Performance:13/01/2026**
Subject Name:- Technical Training **Subject Code:25CAP-652**

1. Aim of the Session

To design and implement a sample database system using DDL, DML, and DCL commands for managing departments, employees, and projects, and to apply role-based access control for secure data handling.

2. Software Requirements

- PostgreSQL (Database Server)
- pgAdmin
- Windows Operating System

3. Objective of the Session

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.

4. 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.

5. Procedure of the Practical

(i) Start the system and log in to the computer.

(ii) Open PostgreSQL software.

(iii) create database CompanyDB;

(iv) Create tables using DDL commands.

(i) create table Department

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

(ii) create table Employee

```
CREATE TABLE Employee (
   emp_id       INT PRIMARY KEY,
   emp_name     VARCHAR(50) NOT NULL,
   email        VARCHAR(100) NOT NULL UNIQUE,
   salary       DECIMAL(10,2) NOT NULL,
   hire_date    DATE NOT NULL,
   dept_id      INT NOT NULL,
   CONSTRAINT fk_emp_dept
```

```
    FOREIGN KEY (dept_id)
    REFERENCES Department(dept_id),
  CONSTRAINT chk_salary
    CHECK (salary >= 10000)
);
```

(iii) create table Project

```
CREATE TABLE Project (
  proj_id     INT PRIMARY KEY,
  proj_name   VARCHAR(100) NOT NULL UNIQUE,
  start_date  DATE NOT NULL,
  end_date    DATE,
  dept_id     INT NOT NULL,
  CONSTRAINT fk_proj_dept
    FOREIGN KEY (dept_id)
    REFERENCES Department(dept_id),
  CONSTRAINT chk_dates
    CHECK (end_date IS NULL OR end_date >= start_date)
);
```

(iv) Insert records using DML commands.

insert into Department values

```
INSERT INTO Department (dept_id, dept_name, location) VALUES
(10, 'HR','Head Office'),
(20, 'IT','Head Office'),
(30, 'Finance','Branch A');
```

	dept_id [PK] integer	dept_name character varying (50)	location character varying (50)
1	10	HR	Head Office
2	20	IT	Head Office
3	30	Finance	Branch A

(v) insert into Employee values

INSERT INTO Employee (emp_id, emp_name, email, salary, hire_date, dept_id) VALUES

(1, 'Amit Kumar', 'amitkumar@gmail.com', 35000, '2023-04-10', 20),

(2, 'Priyanka chandwani', 'priyanka@gmail.com', 45000, '2022-11-01', 30),

(3, 'Rohit Singh', 'rohitsingh@gmail.com', 30000, '2024-02-15', 10);

	emp_id [PK] integer	emp_name character varying (50)	email character varying (100)	salary numeric (10,2)	hire_date date	dept_id integer
1	1	Amit Kumar	amitkumar@gmail.com	35000.00	2023-04-10	20
2	2	Priyanka chandwani	priyanka@gmail.com	45000.00	2022-11-01	30
3	3	Rohit Singh	rohitsingh@gmail.com	30000.00	2024-02-15	10

(vi) insert into Project values

INSERT INTO Project (proj_id, proj_name, start_date, end_date, dept_id) VALUES

(101, 'Payroll System', '2024-01-01', NULL, 30),

(102, 'Intranet Upgrade', '2024-03-01', '2024-09-30',20),

(103, 'Recruitment Portal', '2024-05-15', NULL, 10);

	proj_id [PK] integer	proj_name character varying (100)	start_date date	end_date date	dept_id integer
1	101	Payroll System	2024-01-01	[null]	30
2	102	Intranet Upgrade	2024-03-01	2024-09-30	20
3	103	Recruitment Portal	2024-05-15	[null]	10

(vii) Update and delete records.

UPDATE Employee

SET salary = salary * 1.10

WHERE dept_id = 20;

	emp_id [PK] integer	emp_name character varying (50)	email character varying (100)	salary numeric (10,2)	hire_date date	dept_id integer
1	2	Priyanka chandwani	priyanka@gmail.com	45000.00	2022-11-01	30
2	3	Rohit Singh	rohitsingh@gmail.com	30000.00	2024-02-15	10
3	1	Amit Kumar	amitkumar@gmail.com	38500.00	2023-04-10	20

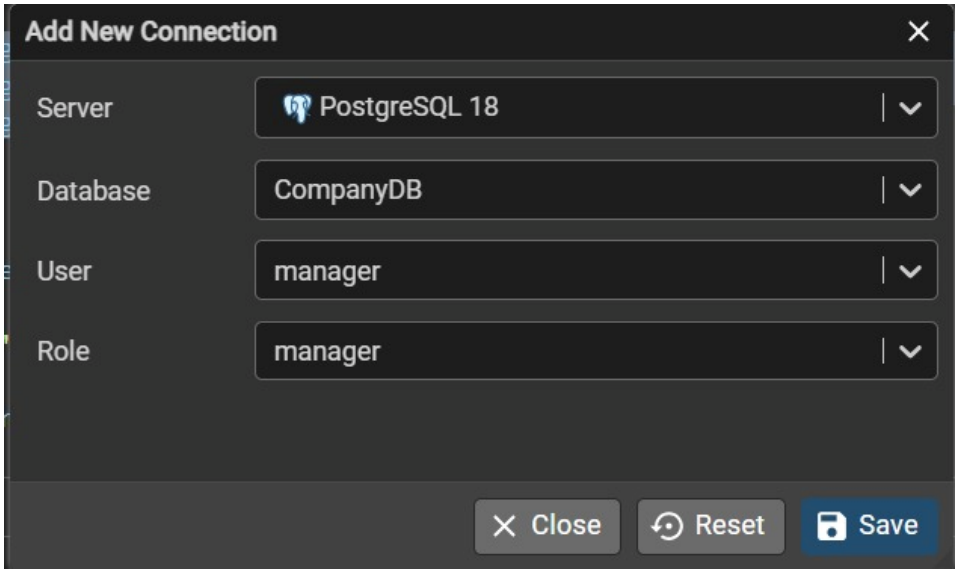
DELETE FROM Employee

WHERE dept_id = 10;

	emp_id [PK] integer	emp_name character varying (50)	email character varying (100)	salary numeric (10,2)	hire_date date	dept_id integer
1	2	Priyanka chandwani	priyanka@gmail.com	45000.00	2022-11-01	30
2	1	Amit Kumar	amitkumar@gmail.com	38500.00	2023-04-10	20

(viii) Create role and assign privileges.

CREATE USER manager WITH PASSWORD 'manager@123';



GRANT SELECT ON Department TO manager;

GRANT SELECT ON Employee TO manager;

GRANT SELECT ON Project TO manager;

REVOKE CREATE ON SCHEMA public FROM manager;

REVOKE INSERT, UPDATE, DELETE ON ALL TABLES IN SCHEMA public FROM manager;

```
ERROR:  permission denied for table employee

SQL state: 42501
```

SELECT * FROM Department;

SELECT * FROM Employee;

SELECT * FROM Project;

(ix) Alter and drop table.

ALTER TABLE Employee

ADD phone_no VARCHAR(15);

	emp_id [PK] integer	emp_name character varying (50)	email character varying (100)	salary numeric (10,2)	hire_date date	dept_id integer	phone_no character varying (15)
1	2	Priyanka chandwani	priyanka@gmail.com	45000.00	2022-11-01	30	[null]
2	1	Amit Kumar	amitkumar@gmail.com	38500.00	2023-04-10	20	[null]

(x) drop table Project;

DROP TABLE Project

```
DROP TABLE

Query returned successfully in 437 msec.
```

---

6. I/O Analysis (Input / Output)

Input:

• Department, Employee, and Project table creation queries
• Records inserted into all tables using INSERT commands
• Update query to modify employee department
• Delete queries to remove project and employee records
• Role creation and privilege assignment queries
• ALTER and DROP table commands

Output:

• Department, Employee, and Project tables created successfully
• Records inserted, updated, and deleted correctly
• Referential integrity maintained between tables
• Data displayed correctly using SELECT queries
• Role-based access verified using GRANT and REVOKE
• Table structure modified and project table dropped successfully

Screenshots of execution and obtained results are attached.

7.Learning Outcomes

- Understood the basics of relational database design using tables, keys, and relationships.
- Learned to apply primary and foreign key constraints to maintain data integrity.
- Gained hands-on experience with INSERT, UPDATE, and DELETE operations.

- Understood role-based access control using GRANT and REVOKE.
- Learned how to create read-only users for secure data access.
- Practiced ALTER TABLE and DROP TABLE commands for schema management.