Worksheet No- 1

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Branch – MCA

Section – MAM-1(A)

Semester – 2nd

Date of performance – 6th Jan,2026

Subject - Technical Training

Subject Code - 25CAP-652

Aim / Overview of the Practical

To design and implement a sample organizational database system using SQL commands, including Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL).
The practical demonstrates database creation, table relationships using foreign keys, data insertion and modification, schema alteration, and role-based access control to ensure data integrity and secure access for authorized users.

Software Requirements

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

Objective

- To understand and apply DDL commands such as CREATE, ALTER, and DROP
- To perform DML operations like INSERT, UPDATE, DELETE, and SELECT
- To implement DCL commands including CREATE ROLE, GRANT, and REVOKE
- To enforce referential integrity using primary keys and foreign keys
- To provide controlled and secure access using role-based privileges
- To gain hands-on experience using PostgreSQL in a real database environment

Input / Apparatus Used

- PostgreSQL (Database Server)

- pgAdmin (Graphical User Interface)
- SQL Queries (DDL, DML, DCL commands)

procedure for experiemnt

```
CREATE TABLE Department
(
dept_id INT PRIMARY KEY,  dept_name
VARCHAR(30) UNIQUE NOT NULL
);
CREATE TABLE Employee (     emp_id INT
PRIMARY KEY,     emp_name VARCHAR(30) NOT
NULL,     emp_email VARCHAR(40) UNIQUE NOT
NULL,     emp_phone VARCHAR(15) UNIQUE NOT
NULL,     emp_address VARCHAR(50),
   dept_id INT,
   FOREIGN KEY (dept_id) REFERENCES Department(dept_id)
      ON UPDATE CASCADE
      ON DELETE SET NULL
);
CREATE TABLE Project (     project_id INT
PRIMARY KEY,     project_name
VARCHAR(30) NOT NULL,     start_date
DATE NOT NULL,     end_date DATE NOT
NULL,     assigned_emp INT,
   FOREIGN KEY (assigned_emp) REFERENCES Employee(emp_id)
      ON UPDATE CASCADE
      ON DELETE SET NULL
);
INSERT INTO Department VALUES
(10, 'Research'),
(20, 'Development'),
(30, 'Sales'),
(40, 'Operations');
INSERT INTO Employee VALUES
```

(201, 'Arjun Das', 'arjun@gmail.com', '9001112222', 'Kolkata', 20),

(202, 'Meera Roy', 'meera@gmail.com', '9003334444', 'Delhi', 20),

(203, 'Sahil Khan', 'sahil@gmail.com', '9005556666', 'Mumbai', 30),

(204, 'Nina Paul', 'nina@gmail.com', '9007778888', 'Chennai', 10), (205, 'Vikram Jain', 'vikram@gmail.com', '9009990000', 'Pune', 40);

INSERT INTO Project VALUES

(1, 'Inventory System', '2026-01-05', '2026-06-30', 201),

(2, 'CRM Software', '2026-02-10', '2026-07-15', 202),

(3, 'Sales Dashboard', '2026-03-01', '2026-05-31', 203),

(4, 'Research Portal', '2026-01-20', '2026-04-25', 204),

(5, 'Ops Automation', '2026-02-01', '2026-08-01', 205);

SELECT * FROM Department;

Data Output Messages Notifications

	dept_id [PK] integer	dept_name character varying (30)
1	101	Research
2	102	Operations
3	103	Design
4	104	Customer Support

SELECT * FROM Employee;

	emp_id [PK] integer	emp_name character varying (30)	emp_email character varying (40)	emp_phone character varying (15)	dept_id integer
1	301	Arnab Lala	arnab.l@gmail.com	8111111111	101
2	302	Pooja	pooja.@gmail.com	8222222222	102
3	304	Anwesha	anshu.s@gmail.com	8444444444	103
4	303	Nitin Kr	nitin.k@gmail.com	8333333333	102

SELECT * FROM Project;

	proj_id [PK] integer	proj_name character varying (40)	proj_startdate date	proj_enddate date	proj_assign_emp integer
1	21	Data Analysis Tool	2026-01-05	2026-06-05	301
2	22	Process Automation	2026-02-10	2026-07-15	302
3	23	UX Redesign	2026-03-01	2026-05-30	304
4	24	Helpdesk System	2026-01-20	2026-04-25	[null]

UPDATE Employee

SET dept_id = 40

WHERE emp_id = 203;

SELECT * FROM Department;

SELECT * FROM Employee;

SELECT * FROM Project;

DELETE FROM Employee WHERE emp_id = 205;

CREATE ROLE HR LOGIN PASSWORD 'HR';

GRANT SELECT, INSERT, UPDATE ON Employee TO HR;

```
GRANT

Query returned successfully in 100 msec.
```

GRANT SELECT ON Department TO HR;

```
GRANT

Query returned successfully in 100 msec.
```

GRANT SELECT, INSERT, UPDATE ON Project TO HR;

REVOKE INSERT ON Employee FROM HR;

REVOKE UPDATE ON Department FROM HR;

Revoke permissions:

```
ERROR:  permission denied for schema public
LINE 1: create table manager
                     ^

SQL state: 42501
Character: 14
```

Learning Outcomes:

- Understand how to design a relational database using multiple tables with proper relationships.
- Learn to apply constraints to maintain data integrity and consistency.
- Perform basic data manipulation operations such as INSERT, UPDATE, and DELETE.
- Implement database security by managing users, roles, and access privileges.