Experiment 1

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

2. Objective:

To gain practical experience in implementing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) operations in a real database environment. This will also include implementing role-based privileges to secure data.

3. Implementation/Code:

```
-- QUERY FROM postgres
-- DDL
-- DEPARTMENT TABLE
CREATE TABLE department(
department_id INT PRIMARY KEY,
department_name VARCHAR(20) NOT NULL UNIQUE,
salary FLOAT CHECK(salary>=0)
);

-- EMPLOYEE TABLE
CREATE TABLE employee(
```

```
employee_id INT PRIMARY KEY,
employee_name VARCHAR(20) NOT NULL,
department_id INT NOT NULL REFERENCES department(department_id),
employee_contact VARCHAR(20),
join_date DATE NOT NULL,
end_date DATE CHECK(end_date>=join_date)
);

ALTER TABLE employee ADD work_location VARCHAR(20);
ALTER TABLE employee DROP work_location;
ALTER TABLE employee ADD status VARCHAR(20) DEFAULT 'active';

-- PROJECT TABLE
CREATE TABLE project(
project_id INT PRIMARY KEY,
project_name VARCHAR(20) NOT NULL UNIQUE,
department_id INT NOT NULL REFERENCES department(department_id),
start_date DATE NOT NULL,
end_date DATE CHECK(end_date>=start_date)
);

-- DML
INSERT INTO department
VALUES
(101,'Manager',90000),
(102,'HR',70000),
(103,'EMPLOYEE',50000);

UPDATE department SET salary=80000 WHERE department_id=101;

UPDATE department SET department_name='Employee' WHERE
department_id=103;
```

```
INSERT INTO department
VALUES
(104,'DEVELOPER',-30000);

INSERT INTO department
VALUES
(104,'DEVELOPER',30000);

DELETE FROM department WHERE department_id=104;

INSERT INTO employee
VALUES
(1,'Rahul',101,8888888888,'2001-04-12','2010-07-13'),
(2,'Anuj',102,7777777777,'2003-06-10','2004-05-11'),
(3,'Aman',103,6666666666,'2006-05-20','2009-09-11'),
(4,'Naman',103,5555555555,'2006-06-25','2009-08-11'),
(5,'Karan',103,4444444444,'2006-03-12','2009-05-11');

DELETE FROM employee WHERE employee_id=3;

INSERT INTO project
VALUES
(11,'P1',103,'2025-08-14','2025-09-14'),
(12,'P2',103,'2025-08-14','2025-08-30');

-- DQL
SELECT * FROM department;
SELECT * FROM employee;
SELECT * FROM project;

-- DCL
CREATE ROLE reporting_user
LOGIN
```

PASSWORD
'user123';

GRANT SELECT ON department TO reporting_user;
REVOKE SELECT ON department FROM reporting_user;
GRANT SELECT ON project TO reporting_user;
REVOKE CREATE ON SCHEMA PUBLIC FROM reporting_user;

-- QUERY FROM reporting_user
SELECT * FROM project;

4. Output:

```
53  VALUES
54  (1,'Rahul',101,8888888888,'2001-04-12','2010-07-13'),
55  (2,'Anuj',102,7777777777,'2003-06-10','2004-05-11'),
56  (3,'Aman',103,6666666666,'2006-05-20','2009-09-11'),
57  (4,'Naman',103,5555555555,'2006-06-25','2009-08-11'),
58  (5,'Karan',103,4444444444,'2006-03-12','2009-05-11');
59
60  DELETE FROM employee WHERE employee_id=3;
61
62  INSERT INTO project
63  VALUES
64  (11,'P1',103,'2025-08-14','2025-09-14'),
65  (12,'P2',103,'2025-08-14','2025-08-30');
66
```

Data Output | Messages | Notifications

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	employee_id [PK] integer	employee_name character varying (20)	department_id integer	employee_contact character varying (20)	join_date date	end_date date	status character varying (20)
1	1	Rahul	101	8888888888	2001-04-12	2010-07-13	active
2	2	Anuj	102	7777777777	2003-06-10	2004-05-11	active
3	4	Naman	103	5555555555	2006-06-25	2009-08-11	active
4	5	Karan	103	4444444444	2006-03-12	2009-05-11	active

5. Learning Outcomes:

1. About query writing in PostgreSQL.
2. About various DDL, DML and DCL commands.
3. About the application of CHECK constraint.
4. About role-based privileges to secure data.