



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 1

Student Name: RAVI RANJAN KUMAR

Branch: MCA general

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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:

```
-- 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,
```



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```
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)  
);
```

```
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 salary=60000 WHERE department_id=102;  
UPDATE department set salary=100000 WHERE department_id=103;
```

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

```
INSERT INTO department
```



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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
```



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```
'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:

The screenshot shows the pgAdmin 4 interface. The top part is a query editor window titled 'exp1.sql' with the connection set to 'experiment1/postgres@PostgreSQL 18'. The code in the editor is:

```
Dashboard × exp1.sql ×  
experiment1/postgres@PostgreSQL 18  
Query History  
66 DELETE FROM employee WHERE employee_id=3;  
67  
68 INSERT INTO project  
VALUES  
69 (11, 'P1', 103, '2025-08-14', '2025-09-14'),  
70 (12, 'P2', 103, '2025-08-14', '2025-08-30');  
71  
72 -- DQL  
73 SELECT * FROM department;  
74 SELECT * FROM employee;  
75 SELECT * FROM project;  
76  
77 -- DCL  
78
```

The bottom part is a results grid titled 'Data Output' showing the data from the 'project' table:

	project_id [PK] integer	project_name character varying (20)	department_id integer	start_date date	end_date date
1	11	P1	103	2025-08-14	2025-09-14
2	12	P2	103	2025-08-14	2025-08-30

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.