



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 1

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Subject Name: Technical Training

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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(
```



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```
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 department_name='Employee' WHERE  
department_id=103;
```

```
INSERT INTO department  
VALUES
```



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```
(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';
```



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```
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. In the left sidebar, 'Object Explorer' shows a connection to 'PostgreSQL 18' with 'Servers (1)', 'Databases', 'Login/Group Roles', and 'Tablespaces'. The main area has tabs for 'Query', 'Query History', and 'Scratch Pad'. The 'Query' tab contains the following SQL code:

```
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
linear-123.
```

Below the code, the 'Data Output' tab displays a table with three rows of department data:

department_id	department_name	salary
1	101 Manager	90000
2	102 HR	70000
3	103 Employee	50000

At the bottom, the status bar shows 'Total rows: 3' and 'Query complete 00:00:00.371'. The taskbar at the very bottom includes icons for search, file explorer, and various applications.

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.