

## 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:

-- 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)  
);
```

```
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
```

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;

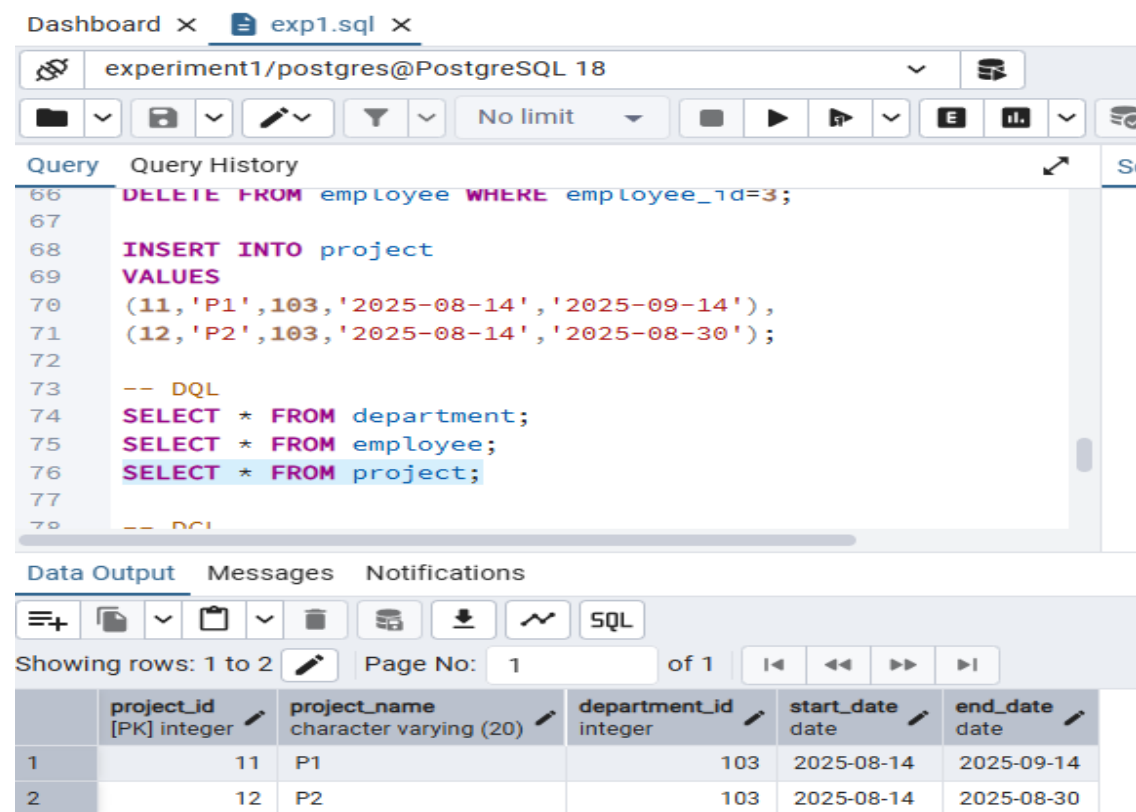
GRANT SELECT ON project TO reporting\_user;

REVOKE CREATE ON SCHEMA PUBLIC FROM reporting\_user;

-- QUERY FROM reporting\_user

SELECT \* FROM project;

## 4. Output:



The screenshot shows a PostgreSQL IDE interface. The top bar indicates the connection is 'experiment1/postgres@PostgreSQL 18'. The main query editor contains the following SQL code:

```

66 DELETE FROM employee WHERE employee_id=3;
67
68 INSERT INTO project
69 VALUES
70 (11, 'P1', 103, '2025-08-14', '2025-09-14'),
71 (12, 'P2', 103, '2025-08-14', '2025-08-30');
72
73 -- DQL
74 SELECT * FROM department;
75 SELECT * FROM employee;
76 SELECT * FROM project;
77
78 -- DCL

```

Below the query editor, the 'Data Output' tab is active, showing the results of the queries. The first query (DELETE) has no output. The second query (INSERT) has no output. The third query (SELECT \* FROM department) has no output. The fourth query (SELECT \* FROM employee) has no output. The fifth query (SELECT \* FROM project) has two rows of output:

	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.