Experiment 2

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➢ Aim:

Department-Course Subquery and Access Control

1. To create two tables- Departments and courses
2. To insert values into Departments and Courses and display the table
3. Retrieve Departments Offering More Than Two Courses Using Subquery
4. Grant SELECT Access on Courses Table Using DCL

➢ Theory:

- A **subquery** is a SELECT statement nested inside another query. It runs first, and its result is used by the outer query, often in the WHERE clause for dynamic filtering. For instance, you could find all employees in the same department as 'John' without first looking up his department.

- **Access control** manages database security by defining user permissions. Administrators use the GRANT command to assign privileges like SELECT or UPDATE on tables and REVOKE to remove them. This prevents unauthorized access and protects data integrity.

➢ SQL Queries:

1. To create two tables- Departments and courses:

```
create table departments(dept_id int primary
key,dept_name varchar(50));

create table courses(course_id int primary key,
course_name varchar(100), dept_id int, foreign
key(dept_id) references departments(dept_id));
```

2. To insert values into Departments and Courses and display the table:

```
insert into departments values(1,’Computer Science’),
(2,’Electrical’),(3,’Mechanical’),(4,’Civil’),(5,’Electro
nics’);

insert into courses values(101,'DBMS',1),(102,'Operating
Systems',1),(103,'Power Systems',2),(104,'Digital
Circuits',2),(105,'Thermodynamics',3),(106,'Fluid
Mechanics',3),(107,'Structural
Engineering',3),(108,'Surveying',4),(109,'Embedded
Systems',5),(110,'VLSI Design',5);

select * from departments;

select * from courses;
```

3. Retrieve Departments Offering More Than Two Courses Using Subquery:

```
select dept_name from departments where dept_id in
(select dept_id from courses group by dept_id having
count(course_name)>2);
```

4. Grant SELECT Access on Courses Table Using DCL

```
create user viewer_user with password '123';

grant select on courses to viewer_user;
```

- Result:

```
postgres=# select * from departments;
 dept_id |    dept_name
---------+------------------
       1 | Computer Science
       2 | Electrical
       3 | Mechanical
       4 | Civil
       5 | Electronics
(5 rows)
```

```
postgres=# select * from courses;
 course_id |      course_name        | dept_id
-----------+-------------------------+---------
       101 | DBMS                    |       1
       102 | Operating Systems       |       1
       103 | Power Systems           |       2
       104 | Digital Circuits        |       2
       105 | Thermodynamics          |       3
       106 | Fluid Mechanics         |       3
       107 | Structural Engineering  |       3
       108 | Surveying               |       4
       109 | Embedded Systems        |       5
       110 | VLSI Design             |       5
(10 rows)
```

```
postgres=# select dept_name from departments where dept_id i
n (select dept_id from courses group by dept_id having count
(course_name)>2);
 dept_name
------------
 Mechanical
(1 row)
```

```
postgres=# create user viewer_user with password '123';
CREATE ROLE
postgres=# grant select on courses to viewer_user;
GRANT
```

```
You are now connected to database "postgres" as user "viewer_user".
postgres=> create table part(roll_no int);
ERROR:  permission denied for schema public
LINE 1: create table part(roll_no int);
                      ^
postgres=> select * from courses;
 course_id |       course_name         | dept_id
-----------+---------------------------+---------
       101 | DBMS                      |       1
       102 | Operating Systems         |       1
       103 | Power Systems             |       2
       104 | Digital Circuits          |       2
       105 | Thermodynamics            |       3
       106 | Fluid Mechanics           |       3
       107 | Structural Engineering    |       3
       108 | Surveying                 |       4
       109 | Embedded Systems          |       5
       110 | VLSI Design               |       5
(10 rows)


postgres=> insert into courses values(111,'Networking',5);
ERROR:  permission denied for table courses
postgres=>
```