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. Objectives:

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:

```
CREATE TABLE Department (
dept_id int PRIMARY KEY,
dept_name VARCHAR(50) UNIQUE NOT NULL,
location VARCHAR(50) NOT NULL
);
```

```
CREATE TABLE Employee (
emp_id int PRIMARY KEY,
emp_name VARCHAR(50) NOT NULL,
email VARCHAR(50) UNIQUE NOT NULL,
salary int CHECK (salary > 0),
dept_id int,
CONSTRAINT fk_dept FOREIGN KEY (dept_id)
REFERENCES Department(dept_id)
);

CREATE TABLE Project (
project_id int PRIMARY KEY,
project_name VARCHAR(50) NOT NULL,
dept_id int,
CONSTRAINT fk_project_dept FOREIGN KEY (dept_id)
REFERENCES Department(dept_id)
);

INSERT INTO Department VALUES (1, 'HR', 'Mumbai');
INSERT INTO Department VALUES (2, 'IT', 'Pune');
INSERT INTO Department VALUES (3, 'Finance', 'Delhi');
INSERT INTO Department VALUES (4, 'Marketing', 'Bangalore');
INSERT INTO Department VALUES (5, 'Operations', 'Chennai');
```

```
INSERT INTO Employee VALUES (101, 'Amit', 'amit@org.com', 40000, 2);
INSERT INTO Employee VALUES (102, 'Neha', 'neha@org.com', 35000, 1);
INSERT INTO Employee VALUES (103, 'Rohit', 'rohit@org.com', 50000, 2);
INSERT INTO Employee VALUES (104, 'Pooja', 'pooja@org.com', 38000, 3);
INSERT INTO Employee VALUES (105, 'Karan', 'karan@org.com', 42000, 4);
INSERT INTO Employee VALUES (106, 'Sneha', 'sneha@org.com', 36000, 5);
INSERT INTO Employee VALUES (107, 'Anjali', 'anjali@org.com', 47000, 2);

INSERT INTO Project VALUES (201, 'Payroll System', 1);
INSERT INTO Project VALUES (202, 'Web Portal', 2);
INSERT INTO Project VALUES (203, 'Accounting Software', 3);
INSERT INTO Project VALUES (204, 'Ad Campaign', 4);
INSERT INTO Project VALUES (205, 'Inventory System', 5);
INSERT INTO Project VALUES (206, 'Mobile App', 2);

Select * from Department;
Select * from Employee;
Select * from Project;

UPDATE Employee
SET salary = 45000
WHERE emp_id = 101;
```

```
DELETE FROM Project
WHERE project_id = 201;

CREATE ROLE report_user LOGIN PASSWORD 'report123';

GRANT SELECT ON Department TO report_user;
GRANT SELECT ON Employee TO report_user;
GRANT SELECT ON Project TO report_user;

REVOKE CREATE ON SCHEMA public FROM report_user;

ALTER TABLE Employee
ADD phone_number VARCHAR(15);

ALTER TABLE Employee
MODIFY emp_name VARCHAR(100);

DROP TABLE Project;
```

Output:

Department table:

	dept_id [PK] integer	dept_name character varying (50)	location character varying (50)
1	1	HR	Mumbai
2	2	IT	Pune
3	3	Finance	Delhi
4	4	Marketing	Bangalore
5	5	Operations	Chennai

Employee table:

	emp_id [PK] integer	emp_name character varying (50)	email character varying (50)	salary integer	dept_id integer
1	101	Amit	amit@org.com	40000	2
2	102	Neha	neha@org.com	35000	1
3	103	Rohit	rohit@org.com	50000	2
4	104	Pooja	pooja@org.com	38000	3
5	105	Karan	karan@org.com	42000	4
6	106	Sneha	sneha@org.com	36000	5
7	107	Anjali	anjali@org.com	47000	2

Project table:

	project_id [PK] integer	project_name character varying (50)	dept_id integer
1	201	Payroll System	1
2	202	Web Portal	2
3	203	Accounting Software	3
4	204	Ad Campaign	4
5	205	Inventory System	5
6	206	Mobile App	2

Data after updating employee table:

	emp_id [PK] integer	emp_name character varying (50)	email character varying (50)	salary integer	dept_id integer
1	102	Neha	neha@org.com	35000	1
2	103	Rohit	rohit@org.com	50000	2
3	104	Pooja	pooja@org.com	38000	3
4	105	Karan	karan@org.com	42000	4
5	106	Sneha	sneha@org.com	36000	5
6	107	Anjali	anjali@org.com	47000	2
7	101	Amit	amit@org.com	45000	2

Project table after deleting single data:

	project_id [PK] integer	project_name character varying (50)	dept_id integer
1	202	Web Portal	2
2	203	Accounting Software	3
3	204	Ad Campaign	4
4	205	Inventory System	5
5	206	Mobile App	2

Employee table after adding the column using ALTER command:

	emp_id [PK] integer	emp_name character varying (50)	email character varying (50)	salary integer	dept_id integer	phone_number character varying (15)
1	102	Neha	neha@org.com	35000	1	[null]
2	103	Rohit	rohit@org.com	50000	2	[null]
3	104	Pooja	pooja@org.com	38000	3	[null]
4	105	Karan	karan@org.com	42000	4	[null]
5	106	Sneha	sneha@org.com	36000	5	[null]
6	107	Anjali	anjali@org.com	47000	2	[null]
7	101	Amit	amit@org.com	45000	2	[null]

4. Learning Outcomes (What I have learned):

- Create database tables using DDL commands with appropriate constraints to ensure data integrity.
- Perform DML operations such as INSERT, UPDATE, and DELETE on database records.
- Establish relationships between tables using PRIMARY KEY and FOREIGN KEY constraints.
- Implement role-based access control using DCL commands to provide secure, read-only access.
- Modify and manage database schemas using ALTER TABLE and DROP TABLE commands.