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Branch: MCA (Data Science)	**Semester:** 2nd
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Subject Name: Technical Training - I Lab	**Subject Code**: 25CAP-652
Section/Group: 25MCD-1(A)	**Date of Performance:** 06-Jan-2026

Experiment No.: 1.1

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. **S/W Requirement:** Oracle Database Express Edition and PGAdmin
3. **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.
4. **Task to be done:**

Database Design:

- Create multiple tables such as **Department**, **Employee**, and **Project**.
- Define appropriate **PRIMARY KEY** and **FOREIGN KEY** constraints
- Enforce **NOT NULL**, **UNIQUE**, and **CHECK** constraints where necessary.

Data Manipulation:

- Insert sample records into all tables.
- Perform **UPDATE** operations to modify existing records.
- Perform **DELETE** operations while maintaining referential integrity.

Access Control & Security:

- Create a **role/user** for a reporting staff member.
- Grant **ONLY SELECT privilege** on required tables to this role/user.
- Explicitly **REVOKE CREATE privilege** so that the user cannot create any database objects.
- Ensure the user has **read-only access** to the database.

Schema Modification:

- Use **ALTER TABLE** to add or modify a column.
- Drop a table that is no longer required using **DROP TABLE**.

5. Code:

```
-- Create multiple tables such as Department, Employee, and Project.

-- Define appropriate PRIMARY KEY and FOREIGN KEY constraints.

CREATE TABLE TEST_TABLE (

        test_id INT PRIMARY KEY,

        test_value VARCHAR(20)

);

INSERT INTO TEST_TABLE VALUES

(1, 'Sample1'),

(2, 'Sample2');

CREATE TABLE DEPARTMENT (

        dept_id INT PRIMARY KEY,

        dept_name VARCHAR(30) NOT NULL UNIQUE CHECK(length(dept_name) > 0)

);

CREATE TABLE EMPLOYEE(

                emp_id INT PRIMARY KEY CHECK(emp_id > 0),

                emp_name VARCHAR(30) NOT NULL CHECK(length(emp_name) > 0),

                dept_id INT REFERENCES DEPARTMENT(dept_id)

 );
```

```
CREATE TABLE PROJECT(
        proj_id INT PRIMARY KEY CHECK(proj_id > 0),
        proj_name VARCHAR(30) NOT NULL UNIQUE CHECK(length(proj_name) > 0),
        dept_id INT REFERENCES DEPARTMENT(dept_id)
);
INSERT INTO DEPARTMENT (dept_id, dept_name) VALUES
(1, 'Human Resources'),
(2, 'Information Technology'),
(3, 'Finance'),
(4, 'Marketing');
INSERT INTO EMPLOYEE (emp_id, emp_name, dept_id) VALUES
(101, 'Amit Sharma', 2),
(102, 'Priya Verma', 1),
(103, 'Rahul Mehta', 2),
(104, 'Neha Singh', 3),
(105, 'Karan Patel', 4);
INSERT INTO PROJECT (proj_id, proj_name, dept_id) VALUES
(201, 'Payroll Automation', 1),
(202, 'Library Management System', 2),
(203, 'Budget Analysis 2025', 3),
(204, 'Digital Marketing Campaign', 4);
```

```
-- UPDATE:

UPDATE DEPARTMENT

SET dept_name = 'Information Technology'

WHERE dept_name = 'IT Services';

UPDATE EMPLOYEE

SET dept_id = 2

WHERE emp_name = 'Rahul Mehta';

-- DELETE:

INSERT INTO EMPLOYEE (emp_id, emp_name, dept_id) VALUES

(107, 'A. Sharma', 4);

DELETE FROM EMPLOYEE

WHERE emp_id = 107;

-- Role/User:

CREATE ROLE reporting_role;

CREATE ROLE report_user

LOGIN

PASSWORD 'report123';

-- User inherits the role:

GRANT reporting_role TO report_user;

-- Granting SELECT permissions:

GRANT SELECT ON DEPARTMENT, EMPLOYEE, PROJECT TO reporting_role;
```

```
-- Explicitly revoking CREATE permission (Not provided by default):

REVOKE CREATE ON "Exp1.1" TO reporting_role;

-- Schema Modification:

ALTER TABLE PROJECT

RENAME COLUMN "proj_id" TO "project_id";

DROP TABLE TEST_TABLE;
```

6. Tables:

	dept_id [PK] integer	dept_name character varying (30)
1	1	Human Resources
2	3	Finance
3	4	Marketing
4	2	Information Technology

	emp_id [PK] integer	emp_name character varying (30)	dept_id integer
1	101	Amit Sharma	2
2	102	Priya Verma	1
3	104	Neha Singh	3
4	105	Karan Patel	4
5	103	Rahul Mehta	2

	project_id [PK] integer	proj_name character varying (30)	dept_id integer
1	201	Payroll Automation	1
2	202	Library Management Syst...	2
3	203	Budget Analysis 2025	3
4	204	Digital Marketing Campai...	4

- **Learning Outcomes:**
  - Learned to design tables using primary keys, foreign keys, and constraints to maintain data integrity.
  - Understood how to modify and remove data safely using UPDATE, DELETE, and DROP operations.
  - Gained practical knowledge of PostgreSQL roles and privileges to implement secure, read-only access.