

Branch: MCA (Data Science)	Semester: 2 nd
Student Name: Chaitanya Sharma	UID: 25MCD10056
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

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

Database Design:

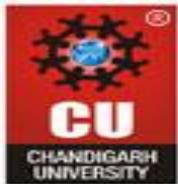
- Create multiple tables such as **Department**, **Employee**, and **Project**.
- Define appropriate **PRIMARY KEY** and **FOREIGN KEY** constraints
- Enforce **NOT NULL**, **UNIQUE**, and **CHECK** constraints where necessary.

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:

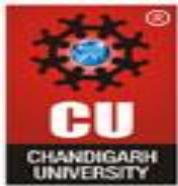
```
-- Create multiple tables such as Department, Employee, and Project.  
-- Define appropriate PRIMARY KEY and FOREIGN KEY constraints.
```

```
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
```

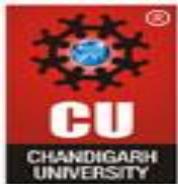
```
(1, 'Human Resources'),  
(2, 'Information Technology'),  
(3, 'Finance'),  
(4, 'Marketing');
```

```
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

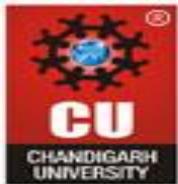
```
PASSWORD 'report123';
```

-- 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";
```

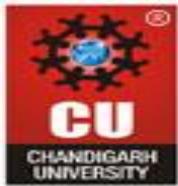
```
DROP TABLE TEST_TABLE;
```

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.