Branch: MCA (Data Science) Kargil	**Semester:** 2
Student Name: Sameer Shahi	**UID:** 25MCD10025
Subject Name: Technical Training - I Lab	**Subject Code**: 25CAP-652
Section/Group: A	**Date of Performance:** 06-01-2026

Experiment No. 1

1. **Aim/Overview of the practical:**

   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. **Software Requirement:** Oracle Database Express Edition and pgAdmin

3. **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.

4. **Task:**

   An organization wants to design a **sample database system** to manage **Departments, Employees, and Projects**. The database must ensure **data integrity**, **controlled access**, and **proper privilege management** for different users.

5. **Queries for experiment/Practical:**

```
-- 1. Data Definition Language
-- create department table
create table department (
```

```
        dept_id int primary key,
        dept_name varchar(50) unique,
        location varchar(50),
        budget int check(budget>0)
);

-- create employee table
create table employee (
        emp_id varchar(50) primary key,
        emp_name varchar(50) not null,
        email varchar(50) unique,
        salary decimal(10,2) not null,
        hire_date date not null,
        dept_id int,
        foreign key(dept_id) references department(dept_id)
);

-- create project table
create table project (
        proj_id varchar(50) primary key,
        proj_name varchar(50) unique,
        start_date date not null,
        end_date date not null,
        dept_id int,
        foreign key(dept_id) references department(dept_id)
);

-- 2. Data Manipulation Language
-- inserting data
insert into department values
        (10,'Human Resources','New Delhi',2500000),
        (20,'Engineering','Bengaluru',12000000),
```

```
        (30,'Finance','Mumbai',5000000),
        (40,'Marketing','Gurugram',3500000);

insert into employee values
        ('E101','Rajesh Sharma','sharmarajesh@comp.com',75000,'2021-06-15',20),
        ('E102','Ananya Verma','ananyaverma10@comp.com',68000,'2022-01-10',20),
        ('E103','Kartik Mctavish','mctavishk11@comp.com',90000,'2020-03-01',30),
        ('E104','Nina Martin','ninamart13@comp.com',55000,'2023-06-26',10),
        ('E105','Sheldon Nord','nordicsheldon45@comp.com',120000,'2022-10-09',40);

insert into project values
        ('P201','Payroll Automation','2023-01-01','2023-06-30',30),
        ('P202','Employee Onboarding App','2023-03-15','2023-09-15',10),
        ('P203','E-Commerce Platform','2022-08-01','2024-02-28',20),
        ('P204','Brand Awareness Campaign','2023-05-01','2023-10-31',40);

-- updating employee records
update employee
set email = 'vermaananya99@comp.com'
where emp_id = 'E102';

update project
set proj_name = 'Bargo 100k awareness'
where proj_id = 'P204';

-- deleting a project record
delete from project
where end_date<'2023-08-15';

-- 3. Data Control Language
-- create new role of Head Manager
create user Head_Manager
```

```
with password 'managerpassord123';

-- grant select permissions to Head Manager
grant select on department to Head_Manager;
grant select on employee to Head_Manager;
grant select on project to Head_Manager;

-- explicitly revoke create privilege
revoke create on schema public from Head_Manager;

-- 4. Schema Modification
-- Adding Column to employee table
alter table employee
add column phone_num varchar(10) unique;

-- Dropping project table
drop table project;
```

6. Output:

a) Data Definition Language outputs

- **Create Department table output**

  Query returned successfully in 36 msec.

- **Create Employee table output**

  Query returned successfully in 45 msec.

- **Create Project table output**

  Query returned successfully in 55 msec.

b) Data Manipulation Language outputs

- **Insert Department values outputs**

  INSERT 0 4

Query returned successfully in 12 msec.

- **Insert Employee values outputs**

  INSERT 0 5

  Query returned successfully in 14 msec.

- **Insert Project values outputs**

  INSERT 0 4

  Query returned successfully in 11 msec.

- **Update outputs**

  Employee email update

  UPDATE 1

  Query returned successfully in 9 msec.

- **Project name update**

  UPDATE 1

  Query returned successfully in 7 msec.

- **Delete output**

  DELETE 1

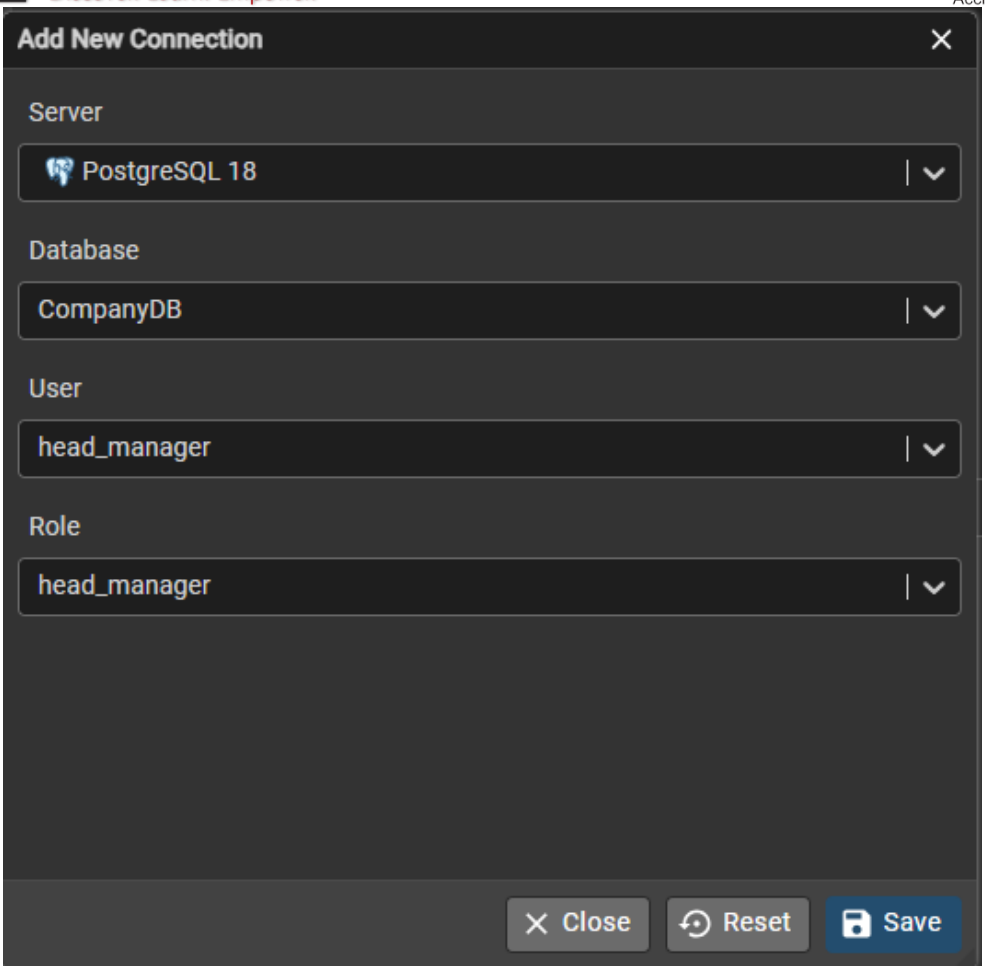
  Query returned successfully in 6 msec.

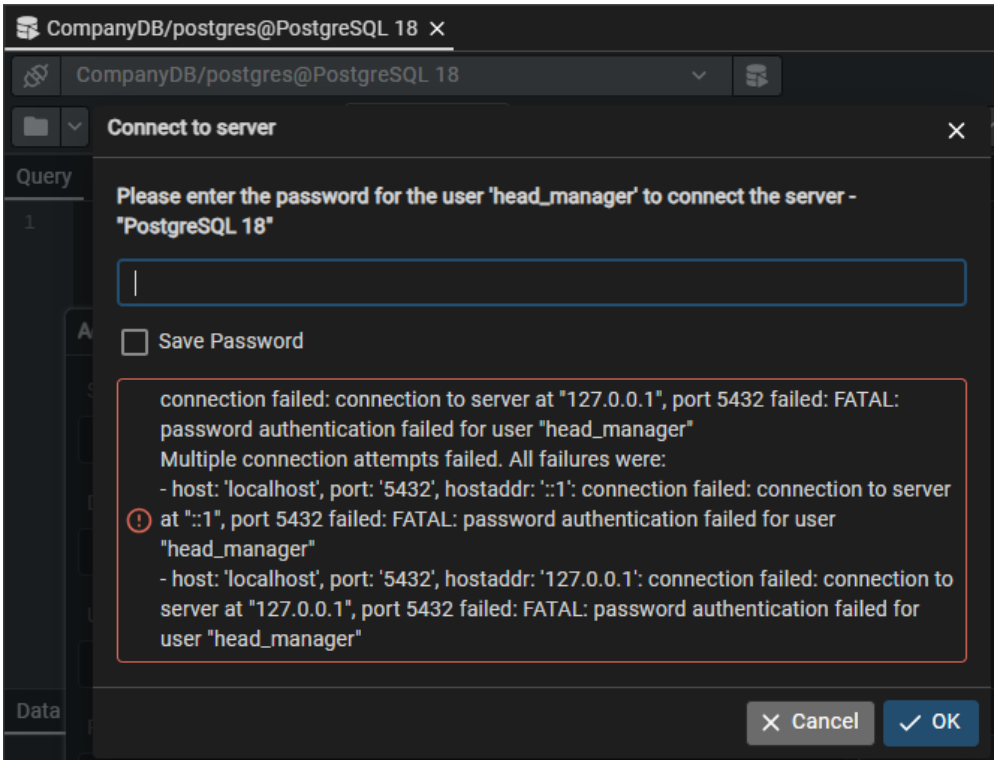
c) Data Control Language outputs

- **Create User output**

  CREATE ROLE

  Query returned successfully in 10 msec.


Add New Connection
Server
PostgreSQL 18
Database
CompanyDB
User
head_manager
Role
head_manager
Close
Reset
Save


CompanyDB/postgres@PostgreSQL 18
CompanyDB/postgres@PostgreSQL 18
Connect to server
Query
Please enter the password for the user 'head_manager' to connect the server - "PostgreSQL 18"
Save Password
connection failed: connection to server at "127.0.0.1", port 5432 failed: FATAL: password authentication failed for user "head_manager"
Multiple connection attempts failed. All failures were:
- host: 'localhost', port: '5432', hostaddr: '::1': connection failed: connection to server at "::1", port 5432 failed: FATAL: password authentication failed for user "head_manager"
- host: 'localhost', port: '5432', hostaddr: '127.0.0.1': connection failed: connection to server at "127.0.0.1", port 5432 failed: FATAL: password authentication failed for user "head_manager"
Data
Cancel
OK

- **Grant outputs**

  GRANT

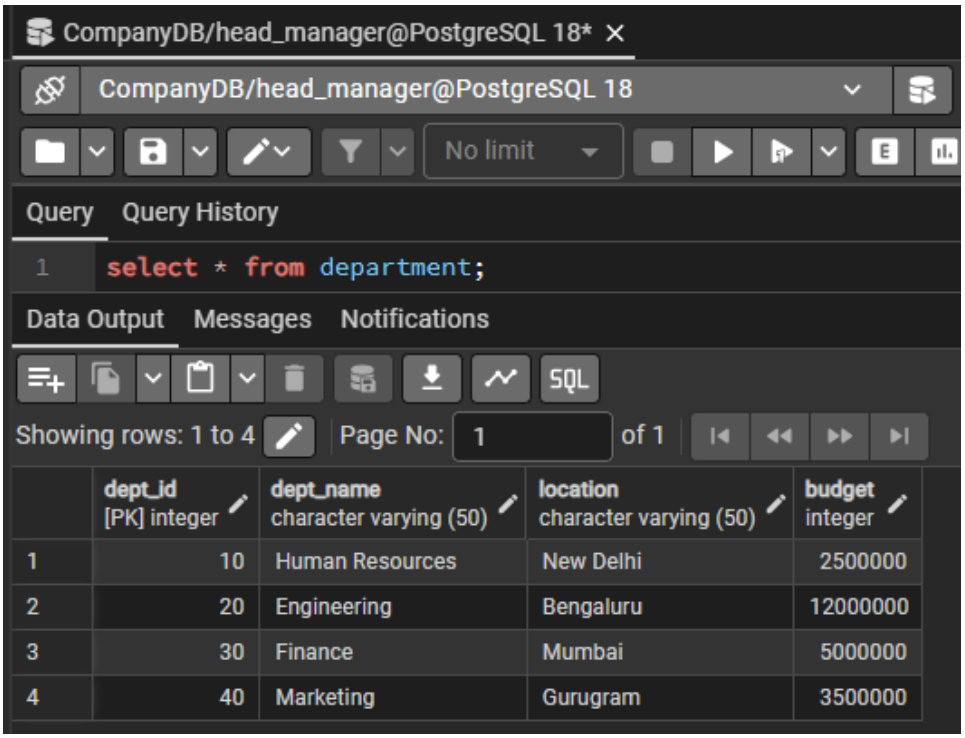
  Query returned successfully in 4 msec.

- **Revoke outputs**

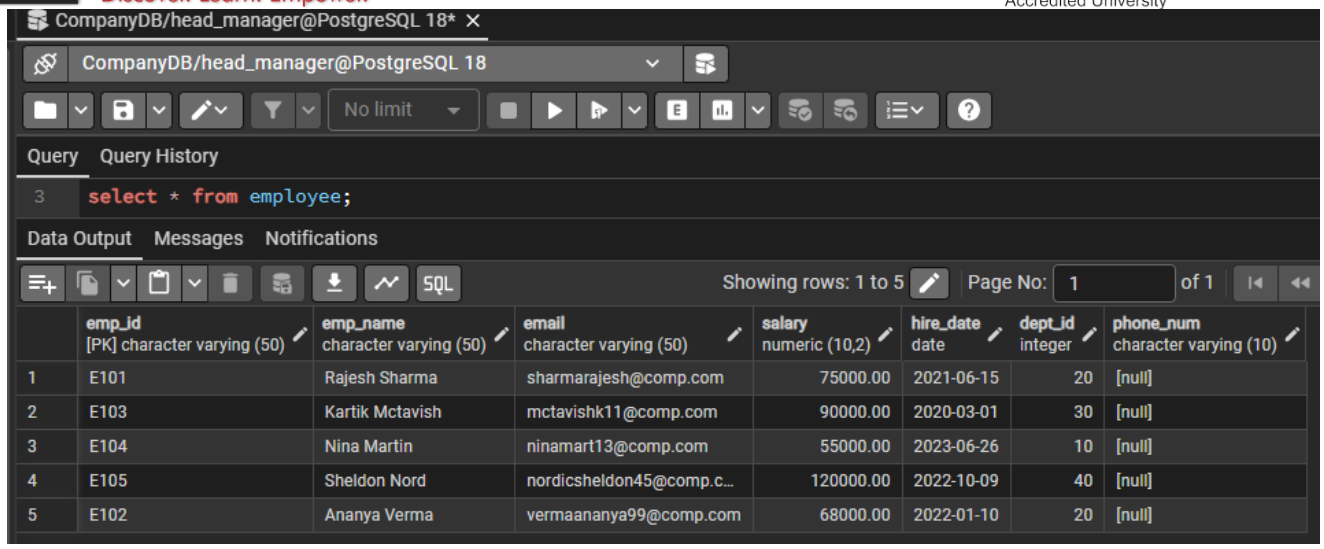
  REVOKE

  Query returned successfully in 3 msec.

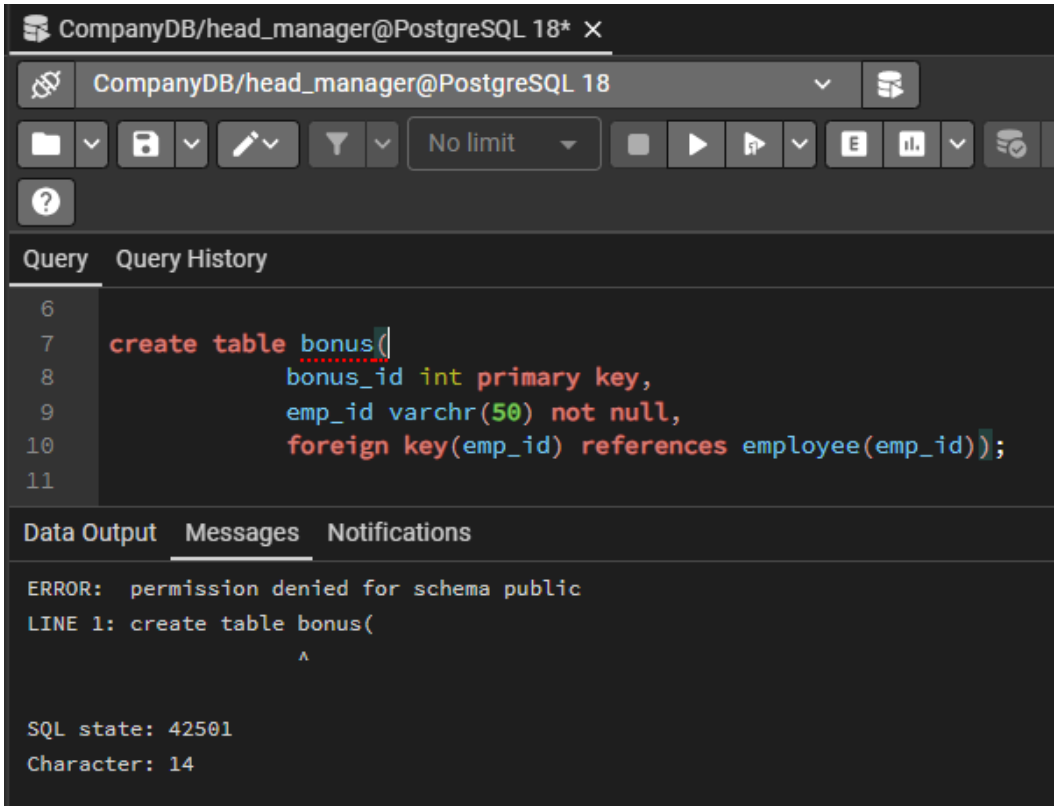
- **head_manager queries**



	dept_id [PK] integer	dept_name character varying (50)	location character varying (50)	budget integer
1	10	Human Resources	New Delhi	2500000
2	20	Engineering	Bengaluru	12000000
3	30	Finance	Mumbai	5000000
4	40	Marketing	Gurugram	3500000



	emp_id [PK] character varying (50)	emp_name character varying (50)	email character varying (50)	salary numeric (10,2)	hire_date date	dept_id integer	phone_num character varying (10)
1	E101	Rajesh Sharma	sharmarajesh@comp.com	75000.00	2021-06-15	20	[null]
2	E103	Kartik Mctavish	mctavishk11@comp.com	90000.00	2020-03-01	30	[null]
3	E104	Nina Martin	ninamart13@comp.com	55000.00	2023-06-26	10	[null]
4	E105	Sheldon Nord	nordicsheldon45@comp.c...	120000.00	2022-10-09	40	[null]
5	E102	Ananya Verma	vermaananya99@comp.com	68000.00	2022-01-10	20	[null]



d) Schema Modification outputs

- **Alter table outputs**

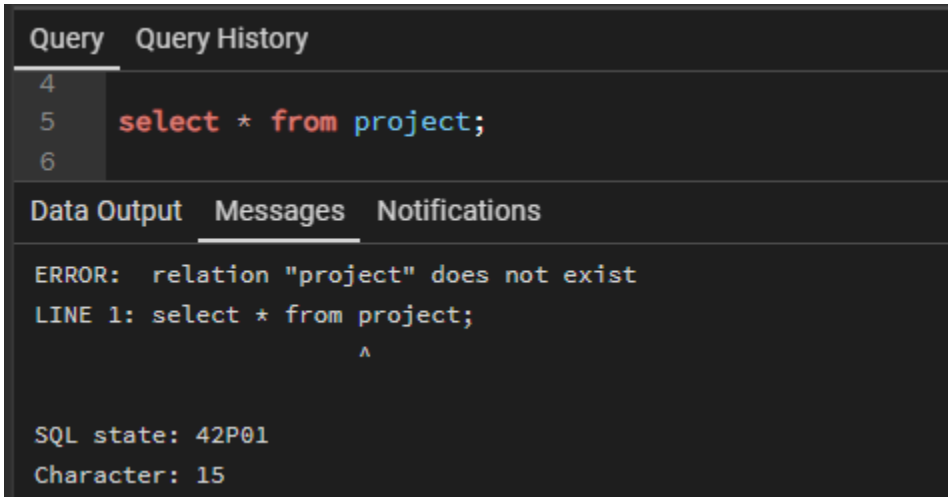
  ALTER TABLE

  Query returned successfully in 8 msec.

- **Drop Table outputs**

DROP TABLE

Query returned successfully in 6 msec.



7. Learning outcomes (What I have learnt):

- Designed relational tables using **DDL** with primary key, foreign key, and check constraints.
- Performed **DML operations** including insert, update, delete, and select on related tables.
- Implemented **role-based access control** using GRANT and REVOKE commands.
- Modified database schema using **ALTER TABLE** and **DROP TABLE** commands.