**Lab Exercise 4- Understanding PostgreSQL Roles and Privileges**

**Objective**

Learn how to create roles (users and groups), assign privileges, and control access to databases and tables in PostgreSQL.

**Part 1: Creating Roles**

1. Connect to PostgreSQL as a superuser using command prompt  
   Example:  
   psql -U postgres
2. Create a user role (a login role)  
   Command:  
   CREATE ROLE alice LOGIN PASSWORD 'alicepass';  
   Meaning: This creates a user named alice with login access and the password alicepass.
3. Create a group role (a role without login)  
   Command:  
   CREATE ROLE readonly;  
   Meaning: This creates a group role called readonly that cannot log in directly.
4. Add the user to the group  
   Command:  
   GRANT readonly TO alice;  
   Meaning: This allows alice to inherit all privileges granted to the readonly group.

**Part 2: Create a Test Database and Table**

1. Create a database  
   Command:  
   CREATE DATABASE testdb;
2. Connect to the database  
   Command:  
   \c testdb  
   This changes your session to use the testdb database.
3. Create a sample table  
   Command:

CREATE TABLE employees (

id SERIAL PRIMARY KEY,

name TEXT,

salary NUMERIC

);

**Part 3: Granting Privileges**

1. Grant read-only access to the group  
   Command:  
   GRANT SELECT ON employees TO readonly;  
   Meaning: Members of the readonly group can now read data from the employees table.
2. Grant write access to a specific user  
   Command:  
   GRANT INSERT, UPDATE ON employees TO alice;  
   Meaning: alice can now insert new data and update existing data in the employees table.

**Part 4: Testing Privileges**

1. Connect as alice  
   From a new command prompt, type:  
   psql -U alice -d testdb  
   This connects to the testdb database as the alice user.
2. Try a SELECT query  
   Command:  
   SELECT \* FROM employees;  
   If permissions are correct, you will see the table contents.
3. Try inserting data  
   Command:  
   INSERT INTO employees (name, salary) VALUES ('John', 50000);  
   This adds a new row to the table.

**Part 5: Revoking Privileges**

1. Remove insert and update access from alice  
   Command:  
   REVOKE INSERT, UPDATE ON employees FROM alice;
2. Remove read access from the group  
   Command:  
   REVOKE SELECT ON employees FROM readonly;  
   This revokes read access from all members of the readonly group.