Lab 10

Data Control Language (DCL)

Learning Objective

After completing this lab the student should be able to:

- What is data control Language?
- Grant and Revoke command.
- System Level privileges and Object Level privileges.
- Practical example and exercise.

Tools and Technologies

- Oracle Database 11g Express Edition/Enterprise Edition.

Oracle Credentials for Lab

Enter the Url in your browser **http:\\172.168.8.16:8080\apex**

Username **hr**

Password **hr**

Data Control Language

A data control language (DCL) is a syntax similar to a computer programming language used to control access to data stored in a database (Authorization). In particular, it is a component of Structured Query Language (SQL).

Commands Include in DCL

GRANT: Allows users to read/write on certain database objects

REVOKE: Keeps users from read/write permission on database objects

Privileges

Privileges are the right to execute particular SQL statements. The database administrator is a high level user with the ability to grant users access to the database and its objects. The users require system privileges to gain access to the database and object privileges to manipulate the content of the objects in the database. Users can also be given the privilege to grant additional privileges to other users or to roles, which are named groups of related privileges**.**

System Privilege	Operations Authorized
CREATE USER	Allows grantee to create other Oracle users (a privilege required for a DBA role)
DROP USER	Drops another user
DROP ANY TABLE	Drops a table in any schema
BACKUP ANY TABLE	Backs up any table in any schema with the export utility

Schema

A schema is a collection of objects, such as tables, views, and sub queries. The schema is owned by a database user and has the same name as that user.

Creating Users

The DBA creates the user by executing the CREATE USER statement. The user does not have any privileges at this point. The DBA can then grant a number of privileges to that user. These privileges determine what the user can do at the database level.

Syntax

```
Create User username
Identified by password
```

Example

```
Create user UniversityPortal
Identified by abc;
```

User Privileges

Once a user is created, the DBA can grant specific system privileges to a user.

System Privilege	Operations Authorized
CREATE SESSION	Connect to the database
CREATE TABLE	Create tables in the user's schema
CREATE SEQUENCE	Create a sequence in the user's schema
CREATE VIEW	Create a view in the user's schema
CREATE PROCEDURE	Create a stored procedure, function, or package in the user's schema

Syntax:

```
GRANT   privilege, [privilege…]
TO      user, [user…];
```

In the syntax:

privilege	is the system privilege to be granted
user	is the name of the user

Granting System Privileges

The DBA uses the GRANT statement to allocate system privileges to the user. Once the user has been granted the privileges, the user can immediately use those privileges.

Granting rights

Without any rights, the newly created user won't even be able to log on to the Oracle database. Among others creating tables is also a very important privilege to have. Typing 'help grant' will only refer you to the Oracle server reference so I'll give a quick rundown of the important privileges.

```
GRANT CREATE SESSION TO university_portal;
```

The session privilege will allow the user to connect to the database.

```
GRANT CREATE TABLE TO university_portal;
```

The table privilege will allow the user to create tables in the database.

```
GRANT CREATE VIEW TO University_portal;
```

The view privilege will allow the user to create views of tables in the database.

```
GRANT CREATE SEQUENCE TO University_portal
```

The sequence privilege will allow the user to create sequences for making unique ids for his tables.

What is a Role?

A role is a named group of related privileges that can be granted to the user. This method makes granting and revoking privileges easier to perform and maintain.

A user can have access to several roles, and several user can be assigned the same role. Roles typically are created for a database application.

Creating and Assigning a Role

First, the DBA must create the role. Then the DBA can assign privileges to the role and users to the role.

Syntax

```
Create Role role_name;
```

Where: role_name is the name of the role to be created

Now that the role is created, the DBA can use the GRANT statement to assign users to the role as well as assign privileges to the role.

Example

```
CREATE ROLE manager;

Grant create table, create view
to manager;

create user blake;
create user clark;

Grant manager to blake, Clark;
```

Explanation of Example
The example above creates a role manager and then allows the managers to create table and views. It then grants Blake and Clark the role of managers. Now Blake and Clark can create tables and views.

How to change User password?

The DBA creates an account and initializes a password for every user. You can change your password by using the ALTER USER statement.

Syntax

```
ALTER USER user_name IDENTIFIED BY password;
```

Example

Alter user Blake identified by 123;

Object privileges

Object Privilege	Table	View	Sequence	Procedure
ALTER	√		√	
DELETE	√	√		
EXECUTE				√
INDEX	√			
INSERT	√	√		
REFERENCES	√			
SELECT	√	√	√	
UPDATE	√	√		

Granting Object Privileges

Different object privileges are available for different types of schema objects. A user automatically has all object privileges for schema objects contained in the user's schema.

A user can grant any object privilege on any schema object that the user owns to any other user or role. If the grant includes the ADMIN OPTION, the grantee can further grant the object privileges to other users, otherwise, the grantee can use the privilege but cannot grant to other users.

Syntax

```
GRANT object_priv [(columns)]
ON object
TO {user|role|PUBLIC}
[WITH GRANT OPTION];
```

Explanation of syntax

- **object_priv** is an object privilege to be granted
- **ALL** specifies all object privileges
- Columns specifies the column from a table or view on which privileges are granted
- **ON object**is the object on which the privileges are granted
- **TO**identifies to whom the privilege is granted
- **PUBLIC**grants object privileges to all users
- WITH grant OPTION allows the grantee to grant the object privileges to other users and roles

Example

```
GRANT select, insert
ON    car
TO    Car_rental;
```

```
Grant update(car_name)
on car
To car_rental;
```

Guidelines

- To grant privileges on an object, the object must be in your own schema or you must have been granted the object privileges WITH GRANT OPTION
- An object owner can grant any object privilege on the object to any other user or role of the database.
- The owner of an object automatically acquires all objects privileges on that object.

PUBLIC Keyword

An owner of a table can grant access to all users by using the PUBLIC keyword E.g

```
GRANT       select
ON      car
TO      PUBLIC;
```

Here it allows all users on the system to query data from car on car_rental table.

How to revoke object privileges

Remove privileges granted to other users by using the REVOKE statement. When you use the REVOKE statement, the privileges that you specify are revoked from the users that you name and from any other users to whom those privileges may have been granted through the WITH ADMIN OPTION clause.

Syntax

```
REVOKE {privilege [, privilege…]|ALL}
ON      object
FROM {user[, user….]|role|PUBLIC}
[CASCADE CONSTRAINTS];
```

In the syntax:

CASCADE is required to remove any referential integrity constraints.
CONSTRAINTS made to the object by means of the REFERENCES privilege.

Example

```
Revoke select, insert
on car
From car_rental;
```

In above example we can revoke the select and insert privileges on car table from car_rental user.

Lab Exercise

Q1 Create a user Hospital management system (Username HMS).

Q2 Give System level privileges to HMs.

Q3 Create table hospital, patient, doctors.

Q4 Assign object level privileges to hospital. Patient and doctors.

Q5 Revoke all system level privileges to hms .

CS2134-Introduction to Database System
Introduction to Oracle,Sql

Lab Instructor:

Qazi Shuja Ud Din (Teaching Fellow) (Riphah International University)
Email: qazi.shujauddin@riphah.edu.pk