Fundamentals of Data Base Security

Database security:

- The SECURITY upon databases is applied by defining and describing separate SCHEMA OBJECTS and GRANTING required PRIVILEGES upon them.

- In Oracle the privilege can be granted as well as revoked.

GRANT command:

Syntax:

```
Sql> grant  <privilegename 1>, <privilegename 2>,
On <objectname>
To  <username>;
```

- GRANT command is used when we want the database to be shared with other users.

- GRANT command can be issued not only on table object, but also on views, synonyms, indexes, sequences etc.

```
Sql> GRANT  SELECT  ON  EMP  TO  ENDUSERS;
```

```
Sql> GRANT  INSERT, SELECT, DELETE  ON  EMP  TO  OPERATORS;
```

```
Sql> GRANT  INSERT (Empno, Ename, Job) ON  Emp  To  Endusers;
```

REVOKE command:

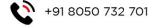Syntax:

```
Sql> revoke <privilegename 1>, <privilegename 2>, on <objectname>  from
<username>;
```

- REVOKE is used when we want one database to stop sharing the information with other users.

- REVOKE privileges is assigned not only on table object, but also on VIEWS, SYNONYMS, INDEXES etc.

```
SQL> REVOKE  INSERT, DELETE
        ON  EMP
         FROM  OPERATORS;
```

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Types of privileges:

i. System privileges:

- They allow a user to perform certain actions within the database.

ii. Object privileges:

- An object privilege allows a user to perform certain actions on database objects.

Checking the object privileges granted:

- The schema object that stores the information about the privileges granted is USER_TAB_PRIVS_MADE

- The columns of USER_TAB_PRIVS_MADE

    - GRANTEE

    - TABLE_NAME

    - GRANTOR

    - PRIVILEGE

    - GRANTABLE
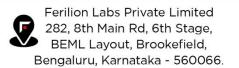
    - HIERARCHY

```
SQL> SELECT
        GRANTEE,
        TABLE_NAME  "TABLE",
        GRANTOR,
        PRIVILEGE
        FROM  USER_TAB_PRIVS_MADE;
```

Checking the object privileges received:

- The schema object that stores the information about the privileges that are received is USER_TAB_PRIVS_RECD.

- The columns of USER_TAB_PRIVS_RECD

    - OWNER

    - TABLE_NAME

    - GRANTOR

    - PRIVILEGE

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- PRIVILEGE

- GRANTABLE

- HIERARCHY

```
SQL>SELECT  OWNER, TABLE_NAME "TABLE", GRANTOR,  PRIVILEGE  FROM
USER_TAB_PRIVS_RECD;
```

Making use of object privileges:

- Once a particular user has been granted an object privilege, the specific user can perform the tasks as granted by the privilege.

Steps to be performed:

- Connect to the required user using the user name and password.

- Execute the required sql statement using the object hierarchy.

```
SQL> SELECT * FROM  SCOTT.EMP;
```

Working with roles:

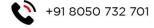- A role is a group of privileges that can be assigned to a user or another role.

Advantages:

- Rather than assigning privileges one at a time directly to a user, we can create a role, assign privileges to that role, and then grant that role to multiple users and roles.

- When you add or delete a privilege from a role, all users and roles assigned that role automatically receive or lose those privileges.

- We can assign multiple roles to a single user or one role to another role.

- A role can be assigned with a password.

ROLE's creation:

- To create a Role we should have the CREATE ROLE SYSTEM privilege.

- The steps in implementing the roles

    - Role creation

    - Granting privileges to roles

    - Granting ROLES TO USERS OR OBJECTS

Syntax:

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```
SQL> CREATE  ROLE <Role Name>  [IDENTIFIED  BY  <password>];

SQL> CREATE  ROLE  Sales_Manager  IDENTIFIED  BY  SalesAudit;
```

Granting privileges to role:

- The ROLES are granted privileges using the GRANT statement.

- A Role can be granted both system as well as object privileges at a time.

```
SQL> GRANT  SELECT , INSERT, UPDATE, DELETE  ON  EMP  TO  Sales_manager;
```

Granting a ROLE to a user:

```
SQL> GRANT  Sales_Manager  to  SCOTT;
```

Granting multiple roles to another role:
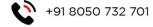
```
SQL> GRANT  ROLE1, ROLE2,…TO <TARGET_ROLE_NAME>;
```

Checking ROLES granted to a user:

- The schema object USER_ROLE_PRIVS specifies the roles granted to a user.

- The columns of USER_ROLE_PRIVS

    - USERNAME

    - GRANTED_ROLE

    - ADMIN_OPTION

    - DEFAULT_ROLE

    - OS_GRANTED

```
SQL> SELECT  USERNAME, GRANTED_ROLE  FROM  USER_ROLE_PRIVS;
```

SYSTEM privileges granted to a role:

- The schema object ROLE_SYS_PRIVS specifies the system privileges granted to a role.

- The columns of ROLE_SYS_PRIVS

    - ROLE

    - OWNER

    - TABLE_NAME

    - COLUMN_NAME

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- PRIVILEGE
- GRANTABLE

```
SQL> SELECT ROLE, PRIVILEGE FROM ROLE_TAB_PRIVS;
```

Revoking a ROLE:

```
SQL> REVOKE  SALES_MANAGER  FROM  SCOTT;
```

Revoking all privileges from a role:

```
SQL> REVOKE  ALL  ON  EMP  FROM  Sales_Manager;
```

Dropping A Role:

Syntax:

```
DROP  ROLE  <Role  Name>;

SQL>  DROP  ROLE  Sales_Manager;
```

Working with SYNONYMS:

- A Synonym is a schema object, which acts as an alternate name for an existing schema object.
- By using a synonym, we can avoid the entry of the SCHEMA name, when referencing upon OBJECTS that belong to other SCHEMA.
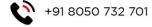- The create synonym privilege is necessary to execute the creation of a synonym.

Syntax:

```
SQL> CREATE  [PUBLIC]  SYNONYM  <SynonymName>  For  <SchemaName>,
<ObjectName>;
```

Illustration:

Sql> create synonym empinfo for scott emp;

Synonym types:

- The synonyms are practically of two types
  - PRIVATE SYNONYM
  - PUBLIC SYNONYM

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- We should have CREATE PUBLIC SYNONYM privilege, which can be accessed by all USERS in the data base.

```
SQL> CREATE PUBLIC SYNONY EmpInfo  FOR  SCOTT.Emp;
```

Dropping a synonym:

Syntax:

```
DROP [PUBLIC] SYNONYM <SynonymName>;
```

Illustration:

```
SQL> DROP  SYNONYM  EmpInfo;
```

```
SQL> DROP PUBLIC  SYNONYM  EmpInfo;
```

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