Introduction to database administration

Database
A database is a collection of schemas (user accounts)
A database is created by a database administrator after installation of a database server
A schema is a logical container for the database objects such as relational tables, relational views, indexes, clusters, materialized views, etc, owned by a database user.
A schema is created by a database administrator after creation of a database

Database users
A user account also commonly called as user name is a name given to a schema when it is created by a database administrator
A password is a string of characters provided by a database administrator when a user account is created and used by the system for the authentication purposes.
CREATE USER statement
CREATE USER CSCI315 IDENTIFIED BY DDI;
DROP USER statement
DROP USER CSCI315 CASCADE;
Properties of database users

The properties of a user account include an account (user) name, password, default tablespace, temporary tablespace, disk quotas, object and system privileges.

A tablespace is a logical level storage container used by the database users to store the database objects, e.g. relational tables.

At a physical level a tablespace consists of one or more data files.

A default tablespace is a tablespace used by the system to store a database object when a destination tablespace for the object is not explicitly provided in statement that creates an object.

A temporary tablespace is a tablespace used by the system to store the intermediate results of data processing, e.g. the intermediate results created during query processing.

Disk quotas

A disk quota is a number that determines the total amount of persistent storage available to a user account.

For example undergraduate students enrolled in the 2nd year database subject CSCI235 usually obtain a disk quota that allows for the allocation of 5 megabytes of persistent storage.

A statement below blocks access to a tablespace CSCI317 by a user CSCI315:

ALTER USER CSCI315 QUOTA 0M ON CSCI317;
An object privilege is a right of a database user to perform an operation on a given database object. For example, a user `sys` grants an object privilege to a user `CSCI315` to read the contents of a relational view `DBA_TABLESPACES`:

```sql
GRANT SELECT ON DBA_TABLESPACES TO CSCI315;
```

An object privilege can be revoked with `REVOKE` statement:

```sql
REVOKE SELECT ON DBA_TABLESPACES FROM CSCI315;
```

An object privilege is a right of a database user to perform a given operation. For example, a user `SYSTEM` grants a system privilege to a user `CSCI315` to create relational tables; then a user `CSCI315` is allowed to use `CREATE TABLE` statement of SQL:

```sql
GRANT CREATE TABLE TO CSCI315;
```

An system privilege can be revoked with `REVOKE` statement:

```sql
REVOKE CREATE TABLE FROM CSCI315;
```

When a new user account is created with `CREATE USER` statement, the new account has no system and object privileges. Roles are important system privileges that must be granted to a new user. For example, a user `SYSTEM` grants the `CREATE SESSION` privilege; it allows a new user to connect to a database server:

```sql
GRANT CREATE SESSION TO CSCI315;
```

A typical collection of privileges that should be granted to an ordinary database user are grouped within the roles `CONNECT` and `RESOURCE`:

```sql
GRANT CONNECT, RESOURCE TO CSCI315;
```

For example, the `RESOURCE` role includes the `UNLIMITED TABLESPACE` system privilege that overwrites all disk quotas.
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Resource limits

Certain characteristics of user accounts (schemas) are determined through the values of so called resource limits. For example, a resource limit called as IDLE_TIME determines an amount of time after which the system automatically logs off an idle user.

The other more important resource limits include: CONNECT_TIME, CPU_PER_CALL, CPU_PER_SESSION, FAILED_LOGIN_ATTEMPTS, IDLE_TIME, LOGICAL_READS_PER_CALL, LOGICAL_READS_PER_SESSION, PASSWORD_LIFE_TIME, SESSIONS_PER_USER.

Profiles

Resource limits are grouped within so called profiles; a profile is a named collection of resource limits that can be assigned to a valid user account (schema). Following the system installation there is only one profile called as DEFAULT. The values of all resources included in DEFAULT profile are set to UNLIMITED. A profile DEFAULT is a starting point for the construction of user defined profiles.

CREATE PROFILE statement:

```
CREATE PROFILE NEWPROF LIMIT IDLE_TIME 3;
```

ALTER PROFILE statement changes the values of resource limits that belong to an already existing profile.

```
ALTER PROFILE NEWPROF LIMIT IDLE_TIME 5;
```

ALTER USER statement assigns a given profile to a given user account.

```
ALTER USER CSCI315 PROFILE NEWPROF;
```
A standard procedure to create an ordinary user, to grant quotas, object and system privileges, and to assign profile is as follows:

```
CREATE USER JANUSZ IDENTIFIED BY JAN;
GRANT RESOURCE, CONNECT TO JANUSZ;
REVOKE UNLIMITED TABLESPACE FROM JANUSZ;
ALTER USER JANUSZ DEFAULT TABLESPACE USERS;
ALTER USER JANUSZ TEMPORARY TABLESPACE TEMP;
ALTER USER JANUSZ QUOTA 10M ON USERS;
ALTER USER JANUSZ QUOTA 0M ON SYSTEM;
ALTER USER JANUSZ PROFILE NEWPROF;
```