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SUBJECT	DBMS (Database Management System)
EXPERIMENT NO:	Experiment 8
DATE OF PERFORMANCE	17/11/22
DATE OF SUBMISSION:	24/11/22
AIM:	**To study TCL and DCL commands.**
THEORY:	**A] Data Control Language (DCL):** DCL (Data Controlling Language) is a query language that allows users to retrieve and edit data held in databases. The types of Data Controlling Language commands include Grant and Revoke. These are used to grant and take back authority from any database user. 1)GRANT: This command gives users access to the privileges. 2)REVOKE: This command withdraws the privileges given by 'Grant'. 3) ROLE: Roles in MYSQL Server helps to group the permissions to single object (Role) and then you can assign role to user instead of creating each user individually and then grant permissions. Instead of creating 50 different users and assigning them permissions individually, we can create a role, grant permission to role once and assign the role to the required users.

	B] Transaction Control Language (TCL): Transaction Control Language (TCL) instructions are used in the database to manage transactions. This command is used to handle the DML statements' modifications. TCL allows you to combine your statements into logical transactions. 1)<u>COMMIT</u>: Commits a transaction 2)<u>ROLLBACK</u>: Rollbacks a transaction in case of any error occurs. 3)<u>SAVEPOINT</u>: Sets a save point within a transaction
SQL QUERIES/ COMMANDS:	**A] Data Control Language (DCL):** **GRANT:** grant select on *.* to 'newUser'@'localhost'; grant ALL on *.* to 'newUser'@'localhost'; grant insert on coaching.student to 'newUser'@'localhost'; grant update(s_id) on coaching.student to 'newUser'@'localhost'; **REVOKE:** revoke select on *.* to 'newUser'@'localhost'; revoke insert on coaching.student to 'newUser'@'localhost'; **ROLE:** create role basic;

grant show databases on *.* to basic;

grant basic to 'admin'@'localhost';

B] Transaction Control Language (TCL):

COMMIT:
commit;

ROLLBACK:
rollback;

SAVEPOINT:
savepoint A;

rollback to A;

RESULT:
A] DCL (Data Control Language) Commands:

GRANT
Command to check the user:

```
mysql> select user();
+----------------+
| user()         |
+----------------+
| root@localhost |
+----------------+
1 row in set (0.00 sec)
```

Command to create a new user:

```
mysql>
mysql> create user 'newUser'@'localhost' identified by 'mysql';
Query OK, 0 rows affected (0.01 sec)
```

Command to grant permission to new user:

```
mysql> grant select on *.* to 'newUser'@'localhost';
Query OK, 0 rows affected (0.00 sec)

mysql> grant insert on coaching.student to 'newUser'@'localhost';
Query OK, 0 rows affected (0.00 sec)

mysql> grant update(s_id) on coaching.student to 'newUser'@'localhost';
Query OK, 0 rows affected (0.01 sec)

mysql> grant all on *.* to 'newUser'@'localhost';
Query OK, 0 rows affected (0.03 sec)
```

Command to check the privilege granted:

```
mysql>
mysql> show grants for 'newUser'@'localhost';
+--------------------------------------------------------------------------+
| Grants for newUser@localhost                                             |
+--------------------------------------------------------------------------+
| GRANT SELECT ON *.* TO `newUser`@`localhost`                             |
| GRANT INSERT, UPDATE (`s_id`) ON `coaching`.`student` TO `newUser`@`localhost` |
+--------------------------------------------------------------------------+
2 rows in set (0.00 sec)
```

All the privileges are granted to 'newUser':

```
mysql> show grants for 'newUser'@'localhost';
+-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------+
| Grants for newUser@localhost



        |
+-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------+
| GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, RELOAD, SHUTDOWN, PROCESS, FILE, REFERENCES, INDEX, ALTER, SHOW DATABASES, SUPER, CREATE TEMPORARY TABLES, LOCK TABL
ES, EXECUTE, REPLICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW VIEW, CREATE ROUTINE, ALTER ROUTINE, CREATE USER, EVENT, TRIGGER, CREATE TABLESPACE, CREATE ROLE, DR
OP ROLE ON *.* TO `newUser`@`localhost`

        |
| GRANT APPLICATION_PASSWORD_ADMIN,AUDIT_ABORT_EXEMPT,AUDIT_ADMIN,AUTHENTICATION_POLICY_ADMIN,BACKUP_ADMIN,BINLOG_ADMIN,BINLOG_ENCRYPTION_ADMIN,CLONE_ADMIN,CONNECTION_ADM
IN,ENCRYPTION_KEY_ADMIN,FIREWALL_EXEMPT,FLUSH_OPTIMIZER_COSTS,FLUSH_STATUS,FLUSH_TABLES,FLUSH_USER_RESOURCES,GROUP_REPLICATION_ADMIN,GROUP_REPLICATION_STREAM,INNODB_REDO_
LOG_ARCHIVE,INNODB_REDO_LOG_ENABLE,PASSWORDLESS_USER_ADMIN,PERSIST_RO_VARIABLES_ADMIN,REPLICATION_APPLIER,REPLICATION_SLAVE_ADMIN,RESOURCE_GROUP_ADMIN,RESOURCE_GROUP_USER
,ROLE_ADMIN,SENSITIVE_VARIABLES_OBSERVER,SERVICE_CONNECTION_ADMIN,SESSION_VARIABLES_ADMIN,SET_USER_ID,SHOW_ROUTINE,SYSTEM_USER,SYSTEM_VARIABLES_ADMIN,TABLE_ENCRYPTION_ADM
IN,XA_RECOVER_ADMIN ON *.* TO `newUser`@`localhost` |
+-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------
-------------------------------------------+
2 rows in set (0.00 sec)
```

Command to change the current user:

```
mysql> system mysql -u newUser -p;
Enter password: ****
```

Select command by new user:

Query executed because new user was granted permission.

```
mysql> select * from student;
+----------+-------+-------------+-------------+----------+----------------------+
| S_NAME   | S_ID  | ADDRESS     | CONTACT_NO  | field_NO | Field_name           |
+----------+-------+-------------+-------------+----------+----------------------+
| DEEP     | 2001  | JAMMU       | 700606****  |        1 | Engineering Student  |
| DEEPAK   | 2002  | LUDHIANA    | 990628****  |        1 | Engineering Student  |
| TARAK    | 2003  | GUJRAT      | 98761****   |        1 | Engineering Student  |
| DHARA    | 2004  | WESTBENGAL  | 700606****  |        1 | Engineering Student  |
| ANKITA   | 2005  | AMRITSAR    | 785426****  |        2 | Medical Student      |
| VASUDHA  | 2006  | RAIGARH     | 659823****  |        2 | Medical Student      |
| TOMPER   | 2007  | MUMBAI      | 983467****  |        1 | Engineering Student  |
| VINEET   | 2008  | KOLABA      | 981167****  |        1 | Engineering Student  |
| JUSTIN   | 2009  | AMSTERDAM   | 663467****  |        1 | Engineering Student  |
+----------+-------+-------------+-------------+----------+----------------------+
9 rows in set (0.01 sec)
```

Insert command by new user:

Query executed because new user was granted permission.

```
mysql> insert into student values('CHEENU',2010,'DN Nagar','982343****',2,'Medical student');
Query OK, 1 row affected (0.01 sec)

mysql> select * from stduent;
ERROR 1146 (42S02): Table 'coaching.stduent' doesn't exist
mysql> select * from student;
+----------+-------+-------------+-------------+----------+----------------------+
| S_NAME   | S_ID  | ADDRESS     | CONTACT_NO  | field_NO | Field_name           |
+----------+-------+-------------+-------------+----------+----------------------+
| DEEP     | 2001  | JAMMU       | 700606****  |        1 | Engineering Student  |
| DEEPAK   | 2002  | LUDHIANA    | 990628****  |        1 | Engineering Student  |
| TARAK    | 2003  | GUJRAT      | 98761****   |        1 | Engineering Student  |
| DHARA    | 2004  | WESTBENGAL  | 700606****  |        1 | Engineering Student  |
| ANKITA   | 2005  | AMRITSAR    | 785426****  |        2 | Medical Student      |
| VASUDHA  | 2006  | RAIGARH     | 659823****  |        2 | Medical Student      |
| TOMPER   | 2007  | MUMBAI      | 983467****  |        1 | Engineering Student  |
| VINEET   | 2008  | KOLABA      | 981167****  |        1 | Engineering Student  |
| JUSTIN   | 2009  | AMSTERDAM   | 663467****  |        1 | Engineering Student  |
| CHEENU   | 2010  | DN Nagar    | 982343****  |        2 | Medical student      |
+----------+-------+-------------+-------------+----------+----------------------+
```

Update command by new user:

Query executed because new user was granted permission.

```
mysql> update student set s_id=2011 where s_name='cheenu';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> select * from student;
+---------+------+------------+------------+----------+----------------------+
| S_NAME  | S_ID | ADDRESS    | CONTACT_NO | field_NO | Field_name           |
+---------+------+------------+------------+----------+----------------------+
| DEEP    | 2001 | JAMMU      | 700606**** |        1 | Engineering Student  |
| DEEPAK  | 2002 | LUDHIANA   | 990628**** |        1 | Engineering Student  |
| TARAK   | 2003 | GUJRAT     | 98761****  |        1 | Engineering Student  |
| DHARA   | 2004 | WESTBENGAL | 700606**** |        1 | Engineering Student  |
| ANKITA  | 2005 | AMRITSAR   | 785426**** |        2 | Medical Student      |
| VASUDHA | 2006 | RAIGARH    | 659823**** |        2 | Medical Student      |
| TOMPER  | 2007 | MUMBAI     | 983467**** |        1 | Engineering Student  |
| VINEET  | 2008 | KOLABA     | 981167**** |        1 | Engineering Student  |
| JUSTIN  | 2009 | AMSTERDAM  | 663467**** |        1 | Engineering Student  |
| CHEENU  | 2011 | DN Nagar   | 982343**** |        2 | Medical student      |
+---------+------+------------+------------+----------+----------------------+
10 rows in set (0.00 sec)
```

Alter command by new user:

Query not executed because permission for ALTER is not granted.

```
mysql> alter table stduent add Toatl_Marks integer;
ERROR 1142 (42000): ALTER command denied to user 'newUser'@'localhost' for table 'stduent'
mysql>
```

REVOKE

We need to change the user from the new one to the existing super user, 'root' in this case.

```
mysql> revoke update(s_id) on coaching.student from 'newUser'@'localhost';
Query OK, 0 rows affected (0.01 sec)

mysql> revoke insert on coaching.student from 'newUser'@'localhost';
Query OK, 0 rows affected (0.00 sec)

mysql> show grants for 'newUser'@'localhost';
+---------------------------------------------+
| Grants for newUser@localhost                |
+---------------------------------------------+
| GRANT SELECT ON *.* TO `newUser`@`localhost` |
+---------------------------------------------+
1 row in set (0.00 sec)
```

```
mysql> insert into student values('Kareen',2012,'ANDHERI','987456****',2,'Medical student');
ERROR 1142 (42000): INSERT command denied to user 'newUser'@'localhost' for table 'student'
mysql>
```

ROLLS

Creating a role and granting permission to it.

```
mysql> create role basic;
Query OK, 0 rows affected (0.01 sec)

mysql> grant select on *.* to basic;
Query OK, 0 rows affected (0.00 sec)

mysql> grant insert on coaching.student to basic;
Query OK, 0 rows affected (0.00 sec)

mysql> grant show databases on *.* to basic;
Query OK, 0 rows affected (0.00 sec)
```

Creating a user and assigning a role to it.

```
mysql> create user 'admin'@'localhost' identified by 'admin123';
Query OK, 0 rows affected (0.00 sec)

mysql> grant basic to 'admin'@'localhost';
Query OK, 0 rows affected (0.00 sec)

mysql> show grants for 'admin'@'localhost';
+------------------------------------------+
| Grants for admin@localhost               |
+------------------------------------------+
| GRANT USAGE ON *.* TO `admin`@`localhost` |
| GRANT `basic`@`%` TO `admin`@`localhost`  |
+------------------------------------------+
2 rows in set (0.00 sec)
```

Command to set a default role to a user:

```
mysql> set default role basic to 'admin'@'localhost';
Query OK, 0 rows affected (0.01 sec)
```

Command to check the role:

```
mysql> select current_role();
+----------------+
| current_role() |
+----------------+
| `basic`@`%`    |
+----------------+
1 row in set (0.00 sec)
```

Command to change the role:
This can happen only when the new role is granted to user, otherwise we have to grant the role first and then change.

```
mysql> select current_role;
ERROR 1054 (42S22): Unknown column 'current_role' in 'field list'
mysql> select current_role();
+----------------+
| current_role() |
+----------------+
| `basic`@`%`    |
+----------------+
1 row in set (0.00 sec)

mysql> set role imp_roles;
Query OK, 0 rows affected (0.00 sec)

mysql> select current_role();
+-----------------+
| current_role()  |
+-----------------+
| `imp_roles`@`%` |
+-----------------+
1 row in set (0.00 sec)
```

B] TCL (Transaction Control Language) Commands:

COMMIT

```
mysql> insert into courses values(1016,32,'CET',8900,125000);
Query OK, 1 row affected (0.00 sec)

mysql> insert into courses values(1017,56,'GCET',4340,189000);
Query OK, 1 row affected (0.01 sec)

mysql> select * from courses;
+-------------+-------------+--------------+-----------+--------+
| Course_Code | Total_Seats | Course_Name  | StartDate | Fee    |
+-------------+-------------+--------------+-----------+--------+
|        1011 |          60 | JEE          | 1042      | 150000 |
|        1012 |          60 | JEE ADVANCED | 1242      | 180000 |
|        1013 |          70 | NEET         | 842       | 130000 |
|        1014 |          70 | NEET PG      | 1042      | 170000 |
|        1015 |         120 | GATE         | 472       | 100000 |
|        1016 |          32 | CET          | 8900      | 125000 |
|        1017 |          56 | GCET         | 4340      | 189000 |
+-------------+-------------+--------------+-----------+--------+
7 rows in set (0.00 sec)

mysql> commit;
Query OK, 0 rows affected (0.00 sec)
```

ROLLBACK

```
mysql> set autocommit=0;
Query OK, 0 rows affected (0.00 sec)

mysql> start transaction;
Query OK, 0 rows affected (0.00 sec)
```

```
mysql>  insert into courses values(1019,78,'GATE',6521,156000);
Query OK, 1 row affected (0.00 sec)

mysql> select * from courses;
+-------------+-------------+--------------+-----------+--------+
| Course_Code | Total_Seats | Course_Name  | StartDate | Fee    |
+-------------+-------------+--------------+-----------+--------+
|        1011 |          60 | JEE          | 1042      | 150000 |
|        1012 |          60 | JEE ADVANCED | 1242      | 180000 |
|        1013 |          70 | NEET         | 842       | 130000 |
|        1014 |          70 | NEET PG      | 1042      | 170000 |
|        1015 |         120 | GATE         | 472       | 100000 |
|        1016 |          32 | CET          | 8900      | 125000 |
|        1017 |          56 | GCET         | 4340      | 189000 |
|        1018 |          23 | CAT          | 7890      | 250000 |
|        1019 |          78 | GATE         | 6521      | 156000 |
+-------------+-------------+--------------+-----------+--------+
9 rows in set (0.00 sec)

mysql> rollback;
Query OK, 0 rows affected (0.00 sec)

mysql> select * from courses;
+-------------+-------------+--------------+-----------+--------+
| Course_Code | Total_Seats | Course_Name  | StartDate | Fee    |
+-------------+-------------+--------------+-----------+--------+
|        1011 |          60 | JEE          | 1042      | 150000 |
|        1012 |          60 | JEE ADVANCED | 1242      | 180000 |
|        1013 |          70 | NEET         | 842       | 130000 |
|        1014 |          70 | NEET PG      | 1042      | 170000 |
|        1015 |         120 | GATE         | 472       | 100000 |
|        1016 |          32 | CET          | 8900      | 125000 |
|        1017 |          56 | GCET         | 4340      | 189000 |
|        1018 |          23 | CAT          | 7890      | 250000 |
+-------------+-------------+--------------+-----------+--------+
8 rows in set (0.00 sec)
```

SAVEPOINT <name>

After first three records, savepoint A

After another three, savepoint B was created so 6 inputs

Savepoint C has 9 records.

```
mysql> set autocommit=0;
Query OK, 0 rows affected (0.00 sec)

mysql> start transaction;
Query OK, 0 rows affected (0.00 sec)

mysql> INSERT INTO student VALUES("DEEP",2001,"JAMMU","700606****",1);
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("DEEPAK",2002,"LUDHIANA","990628****",1);
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("TARAK",2003,"GUJRAT","98761****",1);
Query OK, 1 row affected (0.00 sec)

mysql> SAVEPOINT A;
Query OK, 0 rows affected (0.00 sec)

mysql> INSERT INTO student VALUES("DHARA",2004,"WESTBENGAL","700606****",1);

Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("ANKITA",2005,"AMRITSAR","785426****",2);
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("VASUDHA",2006,"RAIGARH","659823****",2);
Query OK, 1 row affected (0.00 sec)

mysql> SAVEPOINT B;
Query OK, 0 rows affected (0.00 sec)
```

```
mysql> INSERT INTO student VALUES("TOMPER",2007,"MUMBAI","983467****",1);
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("VINEET",2008,"KOLABA","981167****",1);
Query OK, 1 row affected (0.00 sec)

mysql> INSERT INTO student VALUES("JUSTIN",2009,"AMSTERDAM","663467****",1);
Query OK, 1 row affected (0.00 sec)

mysql> SAVEPOINT C;
Query OK, 0 rows affected (0.00 sec)

mysql> select * from student;
+---------+------+------------+------------+----------+
| S_NAME  | S_ID | ADDRESS    | CONTACT_NO | field_NO |
+---------+------+------------+------------+----------+
| DEEP    | 2001 | JAMMU      | 700606**** |        1 |
| DEEPAK  | 2002 | LUDHIANA   | 990628**** |        1 |
| TARAK   | 2003 | GUJRAT     | 98761****  |        1 |
| DHARA   | 2004 | WESTBENGAL | 700606**** |        1 |
| ANKITA  | 2005 | AMRITSAR   | 785426**** |        2 |
| VASUDHA | 2006 | RAIGARH    | 659823**** |        2 |
| TOMPER  | 2007 | MUMBAI     | 983467**** |        1 |
| VINEET  | 2008 | KOLABA     | 981167**** |        1 |
| JUSTIN  | 2009 | AMSTERDAM  | 663467**** |        1 |
+---------+------+------------+------------+----------+
9 rows in set (0.00 sec)

mysql> rollback to B;
Query OK, 0 rows affected (0.00 sec)

mysql> select * from student;
+---------+------+------------+------------+----------+
| S_NAME  | S_ID | ADDRESS    | CONTACT_NO | field_NO |
+---------+------+------------+------------+----------+
| DEEP    | 2001 | JAMMU      | 700606**** |        1 |
| DEEPAK  | 2002 | LUDHIANA   | 990628**** |        1 |
| TARAK   | 2003 | GUJRAT     | 98761****  |        1 |
| DHARA   | 2004 | WESTBENGAL | 700606**** |        1 |
| ANKITA  | 2005 | AMRITSAR   | 785426**** |        2 |
| VASUDHA | 2006 | RAIGARH    | 659823**** |        2 |
+---------+------+------------+------------+----------+
6 rows in set (0.00 sec)

mysql> rollback to A;
Query OK, 0 rows affected (0.00 sec)

mysql> select * from student;
+---------+------+------------+------------+----------+
| S_NAME  | S_ID | ADDRESS    | CONTACT_NO | field_NO |
+---------+------+------------+------------+----------+
| DEEP    | 2001 | JAMMU      | 700606**** |        1 |
| DEEPAK  | 2002 | LUDHIANA   | 990628**** |        1 |
| TARAK   | 2003 | GUJRAT     | 98761****  |        1 |
+---------+------+------------+------------+----------+
3 rows in set (0.00 sec)
```

CONCLUSION:	By performing the experiment, I understood the DCL and TCL commands.