

Assignment7

- A. Demonstrate Rollback and Commit on Student table of University Database. (Show at least 2 examples for both Rollback and Commit)

ROLLBACK EXAMPLE1:

```
MariaDB [University]> SET AUTOCOMMIT = 0;
Query OK, 0 rows affected (0.001 sec)

MariaDB [University]> UPDATE student
  -> SET name = 'Vipul'
  -> WHERE name = 'Chavez';
Query OK, 1 row affected (0.001 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [University]> UPDATE student
  -> SET tot_cred = '200'
  -> WHERE name = 'Vipul';
Query OK, 1 row affected (0.000 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [University]> SELECT * FROM student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipul	Finance	200
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.000 sec)
```

```

MariaDB [University]> ROLLBACK;
Query OK, 0 rows affected (0.003 sec)

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name   | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang  | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | History    | 80       |
| 23121 | Chavez | Finance    | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy   | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Snow   | Physics    | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

```

Justification:

In the above example, changes are made to a row of the student table, particularly the row with the student name 'Chavez'. The name and tot_cred attributes are modified. But the changes are not committed, as the AUTOCOMMIT is turned off. So, before the commit if rollback is made, then the database returns to the previous commit state i.e. without the changes made.

COMMIT EXAMPLE1:

```
MariaDB [University]> UPDATE student  
  -> SET name = 'Vipul', dept_name = 'Comp. Sci.', tot_cred = 300  
  -> WHERE id = 23121;
```

Query OK, 1 row affected (0.001 sec)

Rows matched: 1 Changed: 1 Warnings: 0

```
MariaDB [University]> SELECT * FROM STUDENT;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipul	Comp. Sci.	300
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

13 rows in set (0.001 sec)

```
MariaDB [University]> COMMIT;
```

Query OK, 0 rows affected (0.001 sec)

```
MariaDB [University]> ROLLBACK;
```

Query OK, 0 rows affected (0.000 sec)

```
MariaDB [University]> SELECT * FROM STUDENT;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipul	Comp. Sci.	300
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

13 rows in set (0.001 sec)

Justification: Changes are made to the entire row with id as 23121. After the COMMIT the transaction is made permanent. And any rollback after that doesn't affect the state of the database.

ROLLBACK EXAMPLE2:

```
MariaDB [University]> UPDATE student
  -> SET name = 'Vipu1'
  -> WHERE name = 'Chavez';
Query OK, 1 row affected (0.001 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [University]> SELECT * FROM student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipu1	Finance	110
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.000 sec)
```

```

MariaDB [University]> UPDATE student
-> SET name = 'Vipu2'
-> WHERE name = 'Snow';
Query OK, 1 row affected (0.001 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name   | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang  | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | History    | 80       |
| 23121 | Vipu1  | Finance    | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy   | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Vipu2  | Physics    | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.001 sec)

```

```

MariaDB [University]> UPDATE student
-> SET tot_cred = 0
-> WHERE name = 'Williams';
Query OK, 1 row affected (0.000 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name   | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang  | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | History    | 80       |
| 23121 | Vipu1  | Finance    | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy   | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 0        |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Vipu2  | Physics    | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

```

```

MariaDB [University]> ROLLBACK;
Query OK, 0 rows affected (0.000 sec)

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name  | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | History    | 80       |
| 23121 | Chavez | Finance    | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy   | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Snow   | Physics    | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

```

COMMIT EXAMPLE2:

```

MariaDB [University]> UPDATE student
    -> SET dept_name = 'Comp. Sci.';
Query OK, 9 rows affected (0.005 sec)
Rows matched: 13  Changed: 9  Warnings: 0

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name  | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | Comp. Sci. | 80       |
| 23121 | Chavez | Comp. Sci. | 110      |
| 44553 | Peltier | Comp. Sci. | 56       |
| 45678 | Levy   | Comp. Sci. | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Comp. Sci. | 38       |
| 70557 | Snow   | Comp. Sci. | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Comp. Sci. | 60       |
| 98765 | Bourikas | Comp. Sci. | 98       |
| 98988 | Tanaka | Comp. Sci. | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

MariaDB [University]> COMMIT;
Query OK, 0 rows affected (0.001 sec)

```

```

MariaDB [University]> ROLLBACK;
Query OK, 0 rows affected (0.000 sec)

MariaDB [University]> SELECT * FROM student;
+-----+-----+-----+-----+
| ID    | name   | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang  | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt  | Comp. Sci. | 80       |
| 23121 | Chavez  | Comp. Sci. | 110      |
| 44553 | Peltier | Comp. Sci. | 56       |
| 45678 | Levy    | Comp. Sci. | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Comp. Sci. | 38       |
| 70557 | Snow    | Comp. Sci. | 0        |
| 76543 | Brown   | Comp. Sci. | 58       |
| 76653 | Aoi     | Comp. Sci. | 60       |
| 98765 | Bourikas | Comp. Sci. | 98       |
| 98988 | Tanaka  | Comp. Sci. | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

```

B. Create a user and do the following on 'Student' Table

```

MariaDB [mysql]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.001 sec)

MariaDB [mysql]> CREATE USER user1 IDENTIFIED BY 'user1pass';
Query OK, 0 rows affected (0.017 sec)

MariaDB [mysql]> SELECT user FROM mysql.User;
+-----+
| User |
+-----+
| user1 |
| mariadb.sys |
| root |
| vipul |
+-----+
4 rows in set (0.002 sec)

```

a. Login as User and use 'SELECT'

```
🍏 ~ > mariadb -u user1 -puser1pass
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 41
Server version: 10.5.8-MariaDB Homebrew

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> USE University;
ERROR 1044 (42000): Access denied for user 'user1'@ '%' to database 'University'
MariaDB [(none)]> SELECT * FROM University.student;
ERROR 1142 (42000): SELECT command denied to user 'user1'@ 'localhost' for table 'student'
MariaDB [(none)]> SELECT user FROM mysql.User;
ERROR 1142 (42000): SELECT command denied to user 'user1'@ 'localhost' for table 'user'
MariaDB [(none)]> █
```

Justification: The error message says that the SELECT command was denied to the user. This is because the user is not granted the SELECT statement privilege. So, the user cannot use the select statement on the student table.

b. Grant Select permission to the user

```
MariaDB [University]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [University]> GRANT SELECT ON University.student TO user1;
Query OK, 0 rows affected (0.015 sec)
```


c. Now again try using 'SELECT' as a user

```
🍏 ~ > mariadb -u user1 -puser1pass
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 43
Server version: 10.5.8-MariaDB Homebrew

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> SELECT * FROM University.student;
+-----+-----+-----+-----+
| ID    | name  | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt | History    | 80       |
| 23121 | Chavez | Finance    | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy   | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Snow   | Physics    | 0        |
| 76543 | Brown  | Comp. Sci. | 58       |
| 76653 | Aoi    | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.001 sec)
```

Justification: After the SELECT privilege is granted to the user, the user can execute a SELECT statement on the student table.

d. Give update permission to the user

```
MariaDB [university]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.001 sec)

MariaDB [university]> GRANT UPDATE ON University.student TO user1;
Query OK, 0 rows affected (0.014 sec)
```

e. Try using 'UPDATE' as a user

```
MariaDB [university]> SELECT CURRENT_USER();
```

CURRENT_USER()
user1@%

```
1 row in set (0.000 sec)
```



```
MariaDB [university]> UPDATE student  
-> SET name = 'Vipul'  
-> WHERE name = 'Chavez';
```

Query OK, 1 row affected (0.004 sec)
Rows matched: 1 Changed: 1 Warnings: 0


```
MariaDB [university]> SELECT * FROM student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipul	Finance	110
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.001 sec)
```

Justification: In the same way as SELECT statement privilege, UPDATE statement privilege also needs to be granted to a user, to allow him to execute UPDATE statements on the student table.

f. Drop the user

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> DROP USER user1;
Query OK, 0 rows affected (0.019 sec)

MariaDB [(none)]> SELECT user, host FROM mysql.User;
+-----+-----+
| User      | Host      |
+-----+-----+
| mariadb.sys | localhost |
| root       | localhost |
| vipul      | localhost |
+-----+-----+
3 rows in set (0.002 sec)
```

Justification: mysql.User has the list of all users in the database management system.

C. Use Role to solve the tasks given in Q2

Creating a user and a role and granting him the role.

```
MariaDB [(none)]> CREATE USER user2 IDENTIFIED BY 'user2pass';
Query OK, 0 rows affected (0.012 sec)

MariaDB [(none)]> CREATE ROLE role2;
Query OK, 0 rows affected (0.016 sec)

MariaDB [(none)]> GRANT role2 TO user2;
Query OK, 0 rows affected (0.014 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)
```

a. Login as User and use 'SELECT'

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| user2@%         |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> SET ROLE role2;
Query OK, 0 rows affected (0.000 sec)

MariaDB [(none)]> SELECT * FROM University.student;
ERROR 1142 (42000): SELECT command denied to user 'user2'@'localhost' for table 'student'
```

Justification: The role assigned to the user does not have SELECT privilege in the student table, so the user cannot execute a SELECT statement on the student table.

b. Grant Select permission to the role.

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> GRANT SELECT ON University.* TO role2;
Query OK, 0 rows affected (0.012 sec)

MariaDB [(none)]> SHOW GRANTS FOR role2;
+-----+
| Grants for role2 |
+-----+
| GRANT USAGE ON *.* TO `role2` |
| GRANT SELECT ON `university`.* TO `role2` |
+-----+
2 rows in set (0.000 sec)
```

c. Now again try using 'SELECT' as a user

```
MariaDB [(none)]> SELECT CURRENT_USER();
```

CURRENT_USER()
user2@%

```
1 row in set (0.000 sec)
```



```
MariaDB [(none)]> SET ROLE role2;
```

Query OK, 0 rows affected (0.000 sec)


```
MariaDB [(none)]> SELECT * FROM University.student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Chavez	Finance	110
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.001 sec)
```

Justification: After the permission is granted to the role, the user who has that role can execute a SELECT statement on the student table.

d. Give update permission to the role

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> GRANT UPDATE ON University.student TO role2;
Query OK, 0 rows affected (0.017 sec)

MariaDB [(none)]> SHOW GRANTS FOR role2;
+-----+-----+
| Grants for role2 |
+-----+-----+
| GRANT USAGE ON *.* TO `role2` |
| GRANT SELECT ON `university`.* TO `role2` |
| GRANT UPDATE ON `university`.`student` TO `role2` |
+-----+-----+
3 rows in set (0.001 sec)
```

e. Try using 'UPDATE' as a user

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| user2@% |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> SET ROLE role2;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> UPDATE University.student
    -> SET name = 'Vipul'
    -> WHERE name = 'Chavez';
Query OK, 1 row affected (0.002 sec)
Rows matched: 1 Changed: 1 Warnings: 0
```

```
MariaDB [(none)]> SELECT * FROM University.student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Vipul	Finance	110
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.000 sec)
```

Justification: In the similar way, as SELECT statement, role must be granted with an UPDATE privilege before the user assigned with that role can execute an UPDATE statement.

f. Drop the user and role

```
MariaDB [(none)]> DROP USER user2;
Query OK, 0 rows affected (0.019 sec)

MariaDB [(none)]> DROP ROLE role2;
Query OK, 0 rows affected (0.013 sec)
```

Combining all the above steps(a,b,c,d,e,f) into one

```
MariaDB [(none)]> CREATE USER user2 IDENTIFIED BY 'user2pass';
Query OK, 0 rows affected (0.015 sec)

MariaDB [(none)]> CREATE ROLE role2;
Query OK, 0 rows affected (0.013 sec)

MariaDB [(none)]> GRANT SELECT, UPDATE ON University.student TO role2;
Query OK, 0 rows affected (0.013 sec)

MariaDB [(none)]> GRANT role2 TO user2;
Query OK, 0 rows affected (0.013 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)
```

```
MariaDB [(none)]> SELECT CURRENT_USER();
```

CURRENT_USER()
user2@%

```
1 row in set (0.000 sec)
```

```
MariaDB [(none)]> SET ROLE role2;
```

```
Query OK, 0 rows affected (0.000 sec)
```

```
MariaDB [(none)]> SELECT * FROM University.student;
```

ID	name	dept_name	tot_cred
00128	Zhang	Comp. Sci.	102
12345	Shankar	Comp. Sci.	32
19991	Brandt	History	80
23121	Chavez	Finance	110
44553	Peltier	Physics	56
45678	Levy	Physics	46
54321	Williams	Comp. Sci.	54
55739	Sanchez	Music	38
70557	Snow	Physics	0
76543	Brown	Comp. Sci.	58
76653	Aoi	Elec. Eng.	60
98765	Bourikas	Elec. Eng.	98
98988	Tanaka	Biology	120

```
13 rows in set (0.001 sec)
```



```

MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| user2@%        |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> UPDATE University.student
    -> SET name = 'Vipul'
    -> WHERE name = 'Chavez';
Query OK, 1 row affected (0.002 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [(none)]> SELECT * FROM University.student;
+-----+-----+-----+-----+
| ID    | name    | dept_name | tot_cred |
+-----+-----+-----+-----+
| 00128 | Zhang   | Comp. Sci. | 102      |
| 12345 | Shankar | Comp. Sci. | 32       |
| 19991 | Brandt  | History   | 80       |
| 23121 | Vipul   | Finance   | 110      |
| 44553 | Peltier | Physics    | 56       |
| 45678 | Levy    | Physics    | 46       |
| 54321 | Williams | Comp. Sci. | 54       |
| 55739 | Sanchez | Music      | 38       |
| 70557 | Snow    | Physics    | 0        |
| 76543 | Brown   | Comp. Sci. | 58       |
| 76653 | Aoi     | Elec. Eng. | 60       |
| 98765 | Bourikas | Elec. Eng. | 98       |
| 98988 | Tanaka  | Biology    | 120      |
+-----+-----+-----+-----+
13 rows in set (0.000 sec)

```

Justification: The role can be granted all the privileges at once and this role can be granted to a user. Indirectly the user will have all the privileges granted to the role.

D. Do the following tasks

- a. Create a user 'abc' and grant all permissions to it

```
MariaDB [(none)]> CREATE USER abc IDENTIFIED BY 'abcpass';
Query OK, 0 rows affected (0.023 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO abc;
Query OK, 0 rows affected (0.015 sec)

MariaDB [(none)]> GRANT GRANT OPTION ON *.* TO abc;
Query OK, 0 rows affected (0.013 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> SHOW GRANTS FOR abc;
+-----+
| Grants for abc@% |
+-----+
| GRANT ALL PRIVILEGES ON *.* TO `abc`@`%` IDENTIFIED BY PASSWORD '*B20610912ACF3931B177A50ADD95B10C78A25F01' WITH GRANT OPTION |
+-----+
1 row in set (0.000 sec)
```

Justification: All the privileges of a user can be seen in the SHOW GRANTS result.

- b. Login as 'abc' and create another user 'def'

```
🍏 ~ > mariadb -u abc -pabcpass
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 68
Server version: 10.5.8-MariaDB Homebrew

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE USER def IDENTIFIED BY 'defpass';
Query OK, 0 rows affected (0.016 sec)

MariaDB [(none)]> SELECT user, host FROM mysql.User;
+-----+-----+
| User      | Host      |
+-----+-----+
| abc       | %         |
| def       | %         |
| mariadb.sys | localhost |
| root      | localhost |
| vipul     | localhost |
+-----+-----+
5 rows in set (0.002 sec)
```

- c. User 'abc' will assign permissions to 'def' to view and update data of student table

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| abc@%          |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> GRANT SELECT, UPDATE ON University.student TO def;
Query OK, 0 rows affected (0.016 sec)

MariaDB [(none)]> SHOW GRANTS FOR def;
+-----+-----+
| Grants for def@%          |
+-----+-----+
| GRANT USAGE ON *.* TO `def`@`%` IDENTIFIED BY PASSWORD '*8E1754AF5EE406AA7012C5CC567ACAEAA2D0748E' |
| GRANT SELECT, UPDATE ON `university`.`student` TO `def`@`%` |
+-----+-----+
2 rows in set (0.000 sec)
```

- d. Login as 'def' and use the permissions given to 'def'

```
🍏 ~ > mariadb -u def -pdefpass
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 69
Server version: 10.5.8-MariaDB Homebrew

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> SELECT * FROM University.student;
+----+-----+-----+-----+
| ID  | name  | dept_name | tot_cred |
+----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102 |
| 12345 | Shankar | Comp. Sci. | 32 |
| 19991 | Brandt | History | 80 |
| 23121 | Chavez | Finance | 110 |
| 44553 | Peltier | Physics | 56 |
| 45678 | Levy | Physics | 46 |
| 54321 | Williams | Comp. Sci. | 54 |
| 55739 | Sanchez | Music | 38 |
| 70557 | Snow | Physics | 0 |
| 76543 | Brown | Comp. Sci. | 58 |
| 76653 | Aoi | Elec. Eng. | 60 |
| 98765 | Bourikas | Elec. Eng. | 98 |
| 98988 | Tanaka | Biology | 120 |
+----+-----+-----+-----+
13 rows in set (0.001 sec)
```

```

MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| def@%          |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> UPDATE University.student
    -> SET name = 'Vipul'
    -> WHERE name = 'Chavez';
Query OK, 1 row affected (0.002 sec)
Rows matched: 1  Changed: 1  Warnings: 0

```

e. Drop user 'abc'

```

MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> DROP USER abc;
Query OK, 0 rows affected (0.017 sec)

MariaDB [(none)]> SELECT user, host FROM mysql.User;
+-----+-----+
| User      | Host      |
+-----+-----+
| def       | %         |
| mariadb.sys | localhost |
| root      | localhost |
| vipul     | localhost |
+-----+-----+
4 rows in set (0.002 sec)

```

- f. Login as 'def' and check if it has the permissions specified or not.
Justify your answer

```
🍏 ~ > mariadb -u def -pdefpass
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 73
Server version: 10.5.8-MariaDB Homebrew

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> SHOW GRANTS FOR def;
+-----+
| Grants for def@% |
+-----+
| GRANT USAGE ON *.* TO `def`@`%` IDENTIFIED BY PASSWORD '*8E1754AF5EE406AA7012C5CC567ACAEAA2D0748E' |
| GRANT SELECT, UPDATE ON `university`.`student` TO `def`@`%` |
+-----+
2 rows in set (0.000 sec)
```

Justification: User abc granted permissions to user def. Even after the removal of the user abc, the permission will remain with def.

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| def@% |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> SELECT * FROM University.student;
+----+-----+-----+-----+
| ID  | name  | dept_name | tot_cred |
+----+-----+-----+-----+
| 00128 | Zhang | Comp. Sci. | 102 |
| 12345 | Shankar | Comp. Sci. | 32 |
| 19991 | Brandt | History | 80 |
| 23121 | Vipul | Finance | 110 |
| 44553 | Peltier | Physics | 56 |
| 45678 | Levy | Physics | 46 |
| 54321 | Williams | Comp. Sci. | 54 |
| 55739 | Sanchez | Music | 38 |
| 70557 | Snow | Physics | 0 |
| 76543 | Brown | Comp. Sci. | 58 |
| 76653 | Aoi | Elec. Eng. | 60 |
| 98765 | Bourikas | Elec. Eng. | 98 |
| 98988 | Tanaka | Biology | 120 |
+----+-----+-----+-----+
13 rows in set (0.001 sec)
```

g. Drop user 'def'

```
MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| root@localhost |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> DROP USER def;
Query OK, 0 rows affected (0.025 sec)

MariaDB [(none)]> SELECT user, host FROM mysql.User;
+-----+-----+
| User      | Host      |
+-----+-----+
| mariadb.sys | localhost |
| root       | localhost |
| vipul      | localhost |
+-----+-----+
3 rows in set (0.003 sec)
```

h. Create user 'def' and check if it have the permissions specified or not

```
MariaDB [(none)]> CREATE USER def IDENTIFIED BY 'defpass';
Query OK, 0 rows affected (0.019 sec)

MariaDB [(none)]> SHOW GRANTS FOR def;
+-----+-----+
| Grants for def@% |
+-----+-----+
| GRANT USAGE ON *.* TO `def`@`%` IDENTIFIED BY PASSWORD '*8E1754AF5EE406AA7012C5CC567ACAEAA2D0748E' |
+-----+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> SELECT CURRENT_USER();
+-----+
| CURRENT_USER() |
+-----+
| def@%          |
+-----+
1 row in set (0.000 sec)

MariaDB [(none)]> SELECT * FROM University.student;
ERROR 1142 (42000): SELECT command denied to user 'def'@'localhost' for table 'student'
MariaDB [(none)]> UPDATE University.student
    -> SET name = 'Vipul'
    -> WHERE name = 'Chavez';
ERROR 1142 (42000): UPDATE command denied to user 'def'@'localhost' for table 'student'
```

Justification: Earlier permissions are granted to a user def, after the user is deleted all his privileges also are erased. Newly, created user with the same name is entirely a different user, with no permissions as the earlier user.