Experiment No.7
Perform DCL and TCL commands
Date of Performance:
Date of Submission:

Aim :- Write a query to implement Data Control Language(DCL) and Transaction Control Language(TCL) commands

Objective :- To learn DCL commands like Grant and Revoke privileges to the user and TCL commands to commit the transactions and recover it using rollback and save points.

Theory:

Data Control Language:

DCL commands are used to grant and take back authority from any database user.

- Grant
- Revoke

a. Grant: It is used to give user access privileges to a database.

Example

1. GRANT SELECT, UPDATE ON MY_TABLE TO SOME_USER, ANOTHER_USER;

b. Revoke: It is used to take back permissions from the user.

Example

1. REVOKE SELECT, UPDATE ON MY_TABLE FROM USER1, USER2;

Transaction Control Language

TCL commands can only use with DML commands like INSERT, DELETE and UPDATE only.

These operations are automatically committed in the database that's why they cannot be used while creating tables or dropping them.

Here are some commands that come under TCL:

- COMMIT
- ROLLBACK
- SAVEPOINT

a. Commit: Commit command is used to save all the transactions to the

database. Syntax:

1. COM

MIT; Example:

1. DELETE FROM CUSTOMERS
2. WHERE AGE = 25;
3. COMMIT;

b. Rollback: Rollback command is used to undo transactions that have not already been saved to the database.

Syntax:

1. ROLLBA
CK;

Example:

1. DELETE FROM CUSTOMERS
2. WHERE AGE = 25;
3. ROLLBACK;

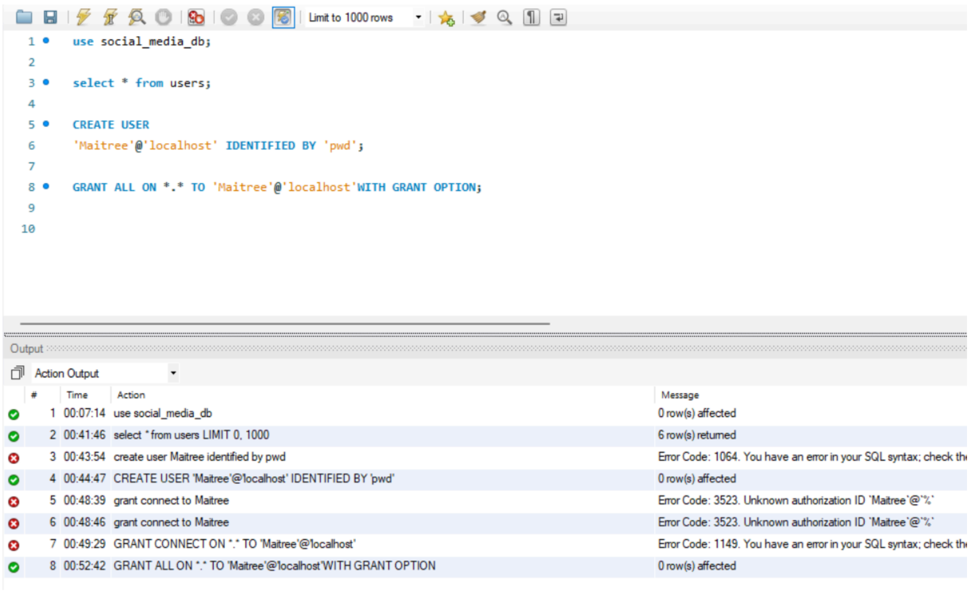
c. SAVEPOINT: It is used to roll the transaction back to a certain point without rolling back the entire transaction.

Syntax:

2. SAVEPOINT SAVEPOINT_NAME;

Implementation

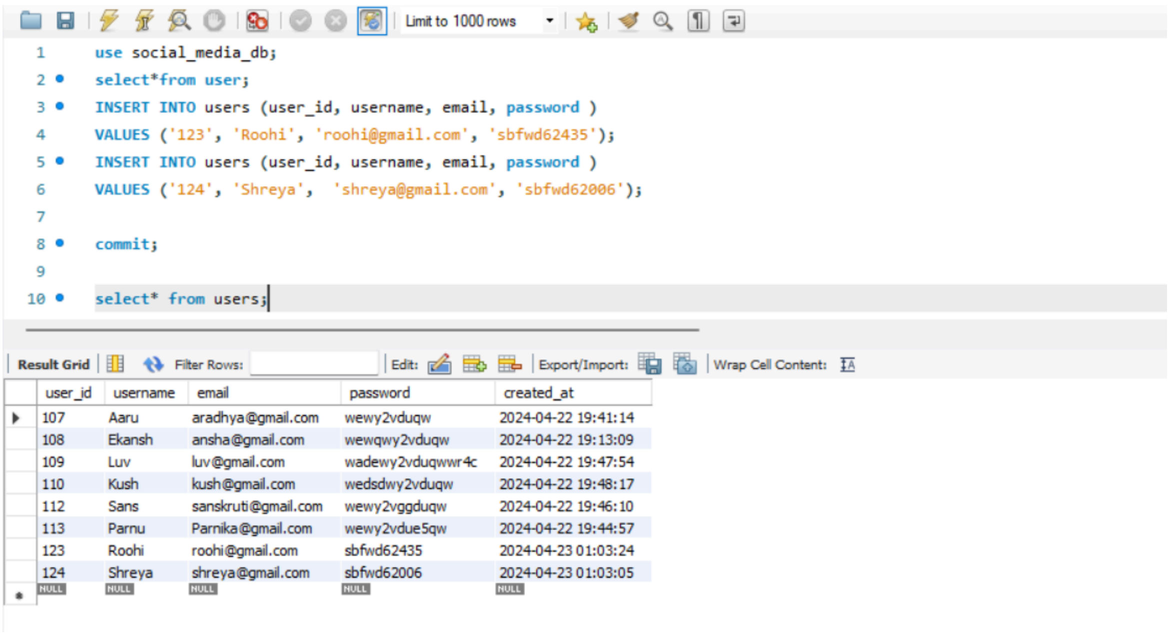
GRANT :-



```sql
use social_media_db;

select * from users;

CREATE USER
'Maitree'@'localhost' IDENTIFIED BY 'pwd';

GRANT ALL ON *.* TO 'Maitree'@'localhost'WITH GRANT OPTION;
```

```
Output
Action Output
   #  Time      Action                                                    Message
✓  1  00:07:14  use social_media_db                                       0 row(s) affected
✓  2  00:41:46  select * from users LIMIT 0, 1000                         6 row(s) returned
✗  3  00:43:54  create user Maitree identified by pwd                     Error Code: 1064. You have an error in your SQL syntax; check th
✓  4  00:44:47  CREATE USER 'Maitree'@'localhost' IDENTIFIED BY 'pwd'    0 row(s) affected
✗  5  00:48:39  grant connect to Maitree                                  Error Code: 3523. Unknown authorization ID 'Maitree'@'%'
✗  6  00:48:46  grant connect to Maitree                                  Error Code: 3523. Unknown authorization ID 'Maitree'@'%'
✗  7  00:49:29  GRANT CONNECT ON *.* TO 'Maitree'@'localhost'             Error Code: 1149. You have an error in your SQL syntax; check th
✓  8  00:52:42  GRANT ALL ON *.* TO 'Maitree'@'localhost'WITH GRANT OPTION 0 row(s) affected
```

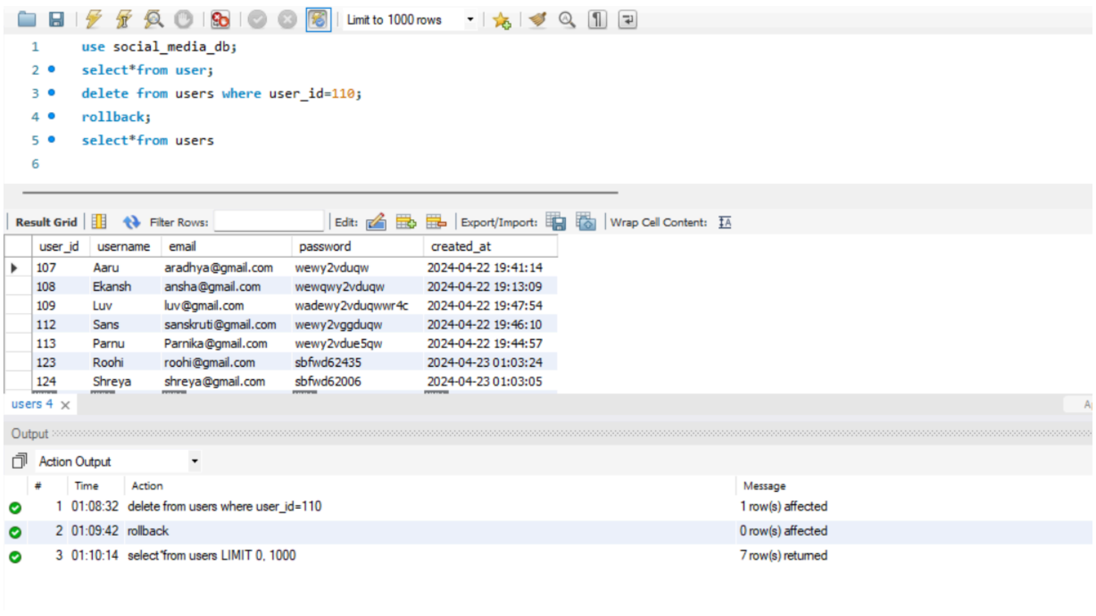
COMMIT:-



```
use social_media_db;
select*from user;
INSERT INTO users (user_id, username, email, password )
VALUES ('123', 'Roohi', 'roohi@gmail.com', 'sbfwd62435');
INSERT INTO users (user_id, username, email, password )
VALUES ('124', 'Shreya',  'shreya@gmail.com', 'sbfwd62006');

commit;

select* from users;
```

user_id	username	email	password	created_at
107	Aaru	aradhya@gmail.com	wewy2vduqw	2024-04-22 19:41:14
108	Ekansh	ansha@gmail.com	wewqwy2vduqw	2024-04-22 19:13:09
109	Luv	luv@gmail.com	wadewy2vduqwwr4c	2024-04-22 19:47:54
110	Kush	kush@gmail.com	wedsdwy2vduqw	2024-04-22 19:48:17
112	Sans	sanskruti@gmail.com	wewy2vggduqw	2024-04-22 19:46:10
113	Parnu	Parnika@gmail.com	wewy2vdue5qw	2024-04-22 19:44:57
123	Roohi	roohi@gmail.com	sbfwd62435	2024-04-23 01:03:24
124	Shreya	shreya@gmail.com	sbfwd62006	2024-04-23 01:03:05
NULL	NULL	NULL	NULL	NULL

ROLLBACK:-



```
use social_media_db;
select*from user;
delete from users where user_id=110;
rollback;
select*from users
```

user_id	username	email	password	created_at
107	Aaru	aradhya@gmail.com	wewy2vduqw	2024-04-22 19:41:14
108	Ekansh	ansha@gmail.com	wewqwy2vduqw	2024-04-22 19:13:09
109	Luv	luv@gmail.com	wadewy2vduqwwr4c	2024-04-22 19:47:54
112	Sans	sanskruti@gmail.com	wewy2vggduqw	2024-04-22 19:46:10
113	Parnu	Parnika@gmail.com	wewy2vdue5qw	2024-04-22 19:44:57
123	Roohi	roohi@gmail.com	sbfwd62435	2024-04-23 01:03:24
124	Shreya	shreya@gmail.com	sbfwd62006	2024-04-23 01:03:05

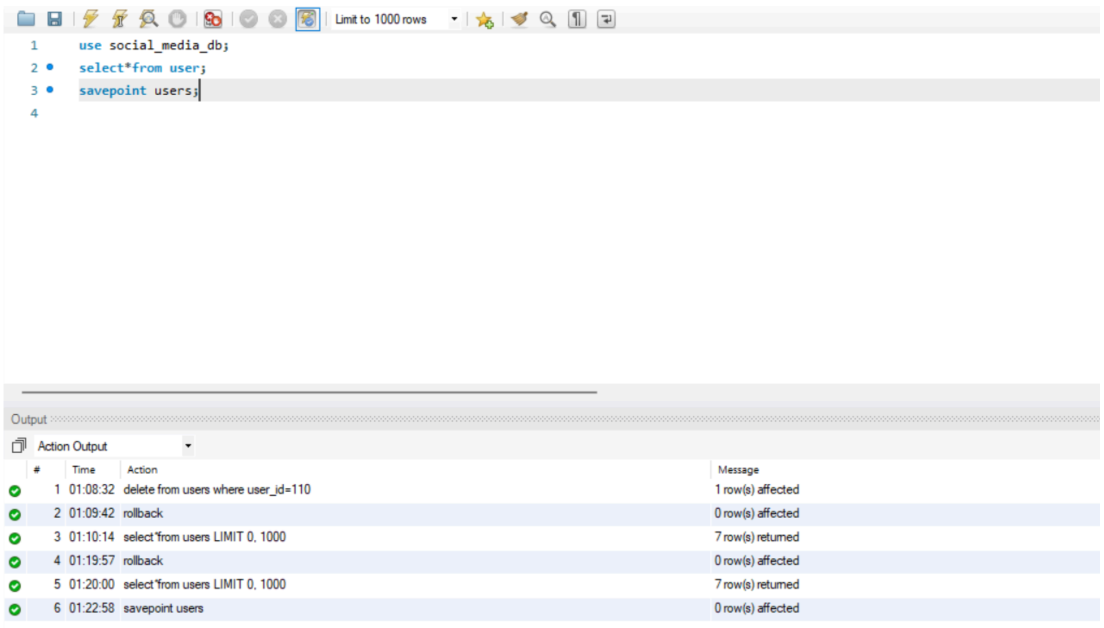
users 4

Output

Action Output

	#	Time	Action	Message
✓	1	01:08:32	delete from users where user_id=110	1 row(s) affected
✓	2	01:09:42	rollback	0 row(s) affected
✓	3	01:10:14	select*from users LIMIT 0, 1000	7 row(s) returned

SAVEPOINT:-



```
use social_media_db;
select*from user;
savepoint users;
```

Limit to 1000 rows

Output

Action Output

```
#   Time      Action                                   Message
1   01:08:32  delete from users where user_id=110      1 row(s) affected
2   01:09:42  rollback                                 0 row(s) affected
3   01:10:14  select*from users LIMIT 0, 1000          7 row(s) returned
4   01:19:57  rollback                                 0 row(s) affected
5   01:20:00  select*from users LIMIT 0, 1000          7 row(s) returned
6   01:22:58  savepoint users                          0 row(s) affected
```

Conclusion:

1. **Explain about issues faced during rollback in mysql and how it got resolved.**

In MySQL, rollback operations can encounter several issues, primarily related to the management of transactions and the handling of locks. Here are some common issues and their resolutions:

Deadlocks:

a) Issue: Deadlocks can occur when two or more transactions are waiting for each other to release locks on resources, resulting in a deadlock situation where none of the transactions can proceed.

b) Resolution: MySQL's InnoDB engine automatically detects and resolves deadlocks by rolling back the transaction that is less likely to be committed. Additionally, application-level deadlock detection and retry mechanisms can be implemented to handle deadlocks gracefully.

c) Lock Wait Timeout:

d) Issue: If a transaction is waiting for a lock on a resource for too long, it may encounter a lock wait timeout error, indicating that the transaction has been waiting for a lock for longer than the specified timeout period.

e) Resolution: Adjust the innodb_lock_wait_timeout parameter in MySQL configuration to increase the timeout period if necessary. Alternatively, optimize queries and transactions to reduce lock contention and minimize the likelihood of lock wait timeouts.

Resource Limit Exceeded:

a) Issue: Rollback operations may encounter resource limits, such as maximum undo log size or transaction size limits, especially for large transactions or in high-load environments.

b) Resolution: Increase the relevant resource limits in MySQL configuration, such as innodb_undo_log_truncate or innodb_undo_tablespaces, to accommodate larger transactions. Additionally, consider breaking down large transactions into smaller units to reduce resource usage.

Transaction Aborted:

a) Issue: Transactions may be aborted due to various reasons, such as deadlock resolution, lock wait timeouts, or resource limits being exceeded.

b) Resolution: Implement error handling and retry mechanisms in application code to handle transaction aborts gracefully. Retry the transaction or provide appropriate feedback to users, depending on the specific scenario.

2. Explain how to create a user in sql.

To create a user in SQL, you typically use the CREATE USER statement. However, the exact syntax and options available may vary depending on the specific database management system (DBMS) you
are using. Here's a general overview of how to create a user in SQL:

Syntax:
In most SQL databases, the syntax for creating a user is similar to the following:

```
CREATE USER username IDENTIFIED BY 'password';
```

Parameters:
username: Specifies the name of the user you want to create.
password: Specifies the password for the user account. Note that in some databases, password-related options may vary or additional security measures like hashing may be required.
Example (using MySQL syntax):

```
CREATE USER 'newuser'@'localhost' IDENTIFIED BY 'password';
```

This example creates a new user named 'newuser' who can connect from the 'localhost' host, identified by the password 'password'.

Privileges:
After creating a user, you may need to grant specific privileges to the user to allow them to perform certain actions, such as accessing databases or executing queries. Privileges can be granted using the GRANT statement.

Additional Options:
Depending on the DBMS you are using, there may be additional options available when creating a user, such as specifying resource limits, setting default roles, or defining authentication mechanisms. It's important to note that creating users and managing user permissions typically requires administrative privileges in the database. Additionally, it's essential to follow best practices for user management, such as using strong passwords and granting only the necessary privileges to users based on their roles and responsibilities.