

LAB-11

Transaction

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1. Transaction management

- a. Study system variable 'autocommit' and 'in_transaction' [what value they can have]
- b. Report current values of these two system variables. What does it means.

```
MariaDB [university]> show variables like 'autocommit';
+-----+-----+
| Variable_name | Value |
+-----+-----+
| autocommit    | ON    |
+-----+-----+
1 row in set (0.01 sec)

MariaDB [university]> show variables like 'in_transaction';
+-----+-----+
| Variable_name | Value |
+-----+-----+
| in_transaction | 0     |
+-----+-----+
1 row in set (0.00 sec)

MariaDB [university]> 
```

- c. If autocommit is ON then set it OFF and verify the change. Use transactions (create, insert, update) on student table to demonstrate. For demonstration, show outcome before and after autocommit is OFF.

```

MariaDB [university]> set autocommit=0;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> select @@autocommit;
+-----+
| @@autocommit |
+-----+
|             0 |
+-----+
1 row in set (0.00 sec)

```

Before auto commit is on(insertion when it is off)

```

MariaDB [university]> select @@autocommit;
+-----+
| @@autocommit |
+-----+
|             0 |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> insert into student values("99979","baskey","Math","100");
Query OK, 1 row affected (0.00 sec)

MariaDB [university]>

```

9947	Bouzeghoub	Biology	38
9953	Wilks	Biology	45
99553	Strader	Languages	6
99611	Schrefl	Pol. Sci.	22
99647	Bellman	English	106
99660	OMalley	Civil Eng.	128
99694	Beckert	Statistics	119
99710	Savolainen	Languages	126
99711	Deshpande	Pol. Sci.	24
99719	Bennett	Accounting	70
99730	Courtney	English	99
99754	Califieri	Cybernetics	55
99760	Sakamoto	Athletics	75
99764	Lv	Marketing	104
99775	Epley	Athletics	116
99780	Bravo	English	100
9993	Won	Math	40
99949	Samo	Astronomy	125
99977	Englund	Psychology	93

```

+-----+
2000 rows in set (0.01 sec)

MariaDB [university]>

```

```

MariaDB [university]> select @@autocommit;
+-----+
| @@autocommit |
+-----+
|             1 |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> insert into student values("99979","surendra","Math","100"
);
ERROR 1062 (23000): Duplicate entry '99979' for key 'PRIMARY'
MariaDB [university]> insert into student values("99980","surendra","Math","100"
);
Query OK, 1 row affected (0.01 sec)

MariaDB [university]>

```

9953	Wilks	Biology	45
99553	Strader	Languages	6
99611	Schrefl	Pol. Sci.	22
99647	Bellman	English	106
99660	OMalley	Civil Eng.	128
99694	Beckert	Statistics	119
99710	Savolainen	Languages	126
99711	Deshpande	Pol. Sci.	24
99719	Bennett	Accounting	70
99730	Courtney	English	99
99754	Califieri	Cybernetics	55
99760	Sakamoto	Athletics	75
99764	Lv	Marketing	104
99775	Epley	Athletics	116
99780	Bravo	English	100
9993	Won	Math	40
99949	Samo	Astronomy	125
99977	Englund	Psychology	93
99979	baskey	Math	100
99980	surendra	Math	100

```

-----+-----+-----+-----+
002 rows in set (0.00 sec)

```

There is insertion of new data to student table when autocommit is on

Update::


```

MariaDB [university]> set auto commit=0;
ERROR 1193 (HY000): Unknown system variable 'auto'
MariaDB [university]> set autocommit=0;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> update student
-> set tot_cred=110 where name="surendra";
Query OK, 1 row affected (0.03 sec)
Rows matched: 1  Changed: 1  Warnings: 0

```

9953	Wilks	Biology	45
99553	Strader	Languages	6
99611	Schrefl	Pol. Sci.	22
99647	Bellman	English	106
99660	OMalley	Civil Eng.	128
99694	Beckert	Statistics	119
99710	Savolainen	Languages	126
99711	Deshpande	Pol. Sci.	24
99719	Bennett	Accounting	70
99730	Courtney	English	99
99754	Califieri	Cybernetics	55
99760	Sakamoto	Athletics	75
99764	Lv	Marketing	104
99775	Epley	Athletics	116
99780	Bravo	English	100
9993	Won	Math	40
99949	Samo	Astronomy	125
99977	Englund	Psychology	93
99979	baskey	Math	100
99980	surendra	Math	100

-----+-----+-----+-----+
002 rows in set (0.00 sec)

No change update operation.

```

MariaDB [university]> set autocommit=1;
Query OK, 0 rows affected (0.03 sec)

MariaDB [university]> update student set tot_cred=120 where name="baskey";
Query OK, 1 row affected (0.02 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [university]>

```

9953	Wilks	Biology	45
99553	Strader	Languages	6
99611	Schrefl	Pol. Sci.	22
99647	Bellman	English	106
99660	OMalley	Civil Eng.	128
99694	Beckert	Statistics	119
99710	Savolainen	Languages	126
99711	Deshpande	Pol. Sci.	24
99719	Bennett	Accounting	70
99730	Courtney	English	99
99754	Califieri	Cybernetics	55
99760	Sakamoto	Athletics	75
99764	Lv	Marketing	104
99775	Epley	Athletics	116
99780	Bravo	English	100
9993	Won	Math	40
99949	Samo	Astronomy	125
99977	Englund	Psychology	93
99979	baskey	Math	120
99980	surendra	Math	110

-----+-----+-----+-----+
2002 rows in set (0.00 sec)

Change in update operation. Write an SQL statement to show who is locking whom.

d. Write a transaction containing following tasks, and commit after that

i. Create a Table avg_sal with one column asalary (numeric)

ii. Update avg_sal.asalary = average(instructors.salary)

```
MariaDB [university]> create table avg_sal
-> (asalary numeric);
Query OK, 0 rows affected (0.02 sec)

MariaDB [university]> insert into avg_sal(asalary) select avg(salary) from instr
uctor;
Query OK, 1 row affected, 1 warning (0.02 sec)
Records: 1 Duplicates: 0 Warnings: 1

MariaDB [university]> commit;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> 
```

e. Redo 'd.' (drop Table avg_sal)but before it commit, check the system variable in_transaction value. What does this variable store?

```

MariaDB [university]> start transaction;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> drop table avg_sal;
Query OK, 0 rows affected (0.02 sec)

MariaDB [university]> create table avg_sal (asalary numeric);
Query OK, 0 rows affected (0.04 sec)

MariaDB [university]> insert into avg_sal(asalary) select avg(salary) from instructor;
Query OK, 1 row affected, 1 warning (0.00 sec)
Records: 1 Duplicates: 0 Warnings: 1

MariaDB [university]> select @@in_transaction;
+-----+
| @@in_transaction |
+-----+
| 1 |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> 

```

[In_transaction](#) is holding value 1.

f. Write a transaction which is rolled back before commit

i. Execute the following statements

1. start transaction
2. create a Table avg_sal_rollback with one column asalary
3. insert Avg_sal_rollback.asalary = average(instructors.salary)
4. rollback

ii. Report if 'avg_sal_rollback' has been created and what value asalary has.

Does it match with your expectation? If not read about implicit commit.

```

MariaDB [university]> start transaction;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> create table avg_sal_rollback (asalary numeric);
Query OK, 0 rows affected (0.04 sec)

MariaDB [university]> insert into avg_sal_rollback(asalary) select avg(salary) from instructor;
Query OK, 1 row affected, 1 warning (0.00 sec)
Records: 1 Duplicates: 0 Warnings: 1

MariaDB [university]> rollback;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> select *from avg_sal_rollback;
Empty set (0.00 sec)

MariaDB [university]> desc avg_sal_rollback;
+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+
| asalary | decimal(10,0) | YES | | NULL | |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> 

```


Create table command is implicit command which creates table even if autocommit is off/rollback was used.so we are able to create table even rollback is used.but not able to insert data because of rollback.

iii.Which kinds of statements have implicit commit even when autocommit mode is off?

Statement that modify or define table in database have implicit commit.

2. Transaction isolation

a. State the different kind of isolations in MariaDB .b.

What is current isolation method in use (report all three types of transaction isolation levels, i.e, global, session and current)

```
MariaDB [university]> SELECT @@global.tx_isolation,@@SESSION.tx_isolation, @@tx_isolation;
+-----+-----+-----+
| @@global.tx_isolation | @@SESSION.tx_isolation | @@tx_isolation |
+-----+-----+-----+
| REPEATABLE-READ      | REPEATABLE-READ      | REPEATABLE-READ |
+-----+-----+-----+
1 row in set (0.00 sec)

MariaDB [university]> █
```

c. Execute the following statements and report effect of each of them

1. start transaction;
2. set global transaction isolation level serializable;
3. set transaction isolation level serializable;
4. Commit;

```

MariaDB [university]> start transaction;
Query OK, 0 rows affected (0.03 sec)

MariaDB [university]> set @@global.tx_isolation=serializable;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> select @@global.tx_isolation;
+-----+
| @@global.tx_isolation |
+-----+
| SERIALIZABLE          |
+-----+
1 row in set (0.00 sec)

MariaDB [university]> set @@session.tx_isolation=serializable;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> commit;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> SELECT @@global.tx_isolation, @@SESSION.tx_isolation, @@tx_isolation;
+-----+-----+-----+
| @@global.tx_isolation | @@SESSION.tx_isolation | @@tx_isolation |
+-----+-----+-----+
| SERIALIZABLE          | SERIALIZABLE           | SERIALIZABLE    |
+-----+-----+-----+
1 row in set (0.00 sec)

MariaDB [university]> █

```

d. Validate transaction isolation

i. Create user '<yourname>_dummy' with all privileges in your database.

```

MariaDB [university]> create user dummy identified by 'iamdummy';
Query OK, 0 rows affected (0.02 sec)

MariaDB [university]> grant all privileges on university to dummy;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> grant all on *.* to dummy;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> █
no active metadata locks.

```

ii. Check if table avg_sal exists. If not, create it with one column asalary (numeric)

iii. Confirm that the current and global transaction isolation level is SERIALIZABLE.


```

dbms@dbms-VirtualBox:~$ mysql -u dummy -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.1.38-MariaDB-0ubuntu0.18.04.1 Ubuntu 18.04

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;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> show tables;
+-----+
| Tables_in_university |
+-----+
| advisor               |
| avg_sal               |
| avg_sal_rollback      |
| classroom             |
| course               |
| department            |
| instructor            |
| prereq               |
| section              |
| student              |
| takes                |
| takes_hash            |
| teaches              |
| time_slot             |
+-----+
14 rows in set (0.00 sec)

MariaDB [university]> SELECT @@global.tx_isolation,@@SESSION.tx_isolation, @@tx_isolation;
+-----+-----+-----+
| @@global.tx_isolation | @@SESSION.tx_isolation | @@tx_isolation |
+-----+-----+-----+
| SERIALIZABLE         | SERIALIZABLE           | SERIALIZABLE    |
+-----+-----+-----+
1 row in set (0.00 sec)

MariaDB [university]> 

```

iv.You as your old username start the following transaction

1. start transaction
2. insert into avg_sal values (2);

```

Database changed
MariaDB [university]> start transaction;
Query OK, 0 rows affected (0.00 sec)

MariaDB [university]> insert into avg_sal values(2);
Query OK, 1 row affected (0.00 sec)

MariaDB [university]> 

```

v. Open another session of MariaDB and login as user '`<yourname>_dummy`' and execute following statement

1. alter table avg_sal add column b int;

```
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> alter table avg_sal add column b int;
```

vi. Report your observation.

Dummy user is waiting for indefinite time.

vii. Find out how long '`<yourname>_dummy`' needs to wait if other user forgot to complete the current transaction?

Indefinite time.

3. There is a table in MariaDB which shows active metadata locks. The table will be empty if there are no active metadata locks.

a. Table can be read by using following plugins

1. install SONAME 'metadata_lock_info';

2. Select * from

information_schema.metadata_lock_info;

```
MariaDB [(none)]> install SONAME 'metadata_lock_info';
Query OK, 0 rows affected (0.051 sec)

MariaDB [(none)]> Select * from
-> information_schema.metadata_lock_info;
Empty set (0.001 sec)
```

b. Write an SQL statement to show who is locking whom. [hints: Need to know the schema of both table PROCESSLIST P and METADATA_LOCK_INFO]

```
MariaDB [university]> SELECT
-> CONCAT('Thread ', P.ID, ' executing "', P.INFO, '" IS LOCKED BY Thread
-> M.THREAD_ID) WhoLocksWho
-> FROM INFORMATION_SCHEMA.PROCESSLIST P,
-> INFORMATION_SCHEMA.METADATA_LOCK_INFO M
-> WHERE LOCATE(lower(LOCK_TYPE), lower(STATE))>0;
Empty set (0.04 sec)
```

4. Locking a table.

a. Create 2 users A and B with a privilege for "lock table" also study various kind of privilege one user may have.

```

MariaDB [university]> create user A identified by 'A';
Query OK, 0 rows affected (0.001 sec)

MariaDB [university]> grant all privileges on *.* to A;
Query OK, 0 rows affected (0.001 sec)

MariaDB [university]> create user B identified by 'B';
Query OK, 0 rows affected (0.001 sec)

MariaDB [university]> grant all privileges on *.* to B;
Query OK, 0 rows affected (0.001 sec)

MariaDB [university]> █

```

b. Login as A

i. Lock table student with option 'wait'. [lock table is a command to put a lock in table]

```

surendra@baskey:~$ mysql -u A -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 41
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic-log mariadb.org binary distribution

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 univesity;
ERROR 1049 (42000): Unknown database 'univesity'
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> lock table student write wait 1000;
Query OK, 0 rows affected (0.000 sec)

MariaDB [university]> █

```

c. Login as B

i. Lock table instructor


```

surendra@baskey:~$ mysql -u B -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 40
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic-log mariadb.org binary distribution

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 univesity;
ERROR 1049 (42000): Unknown database 'univesity'
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> lock table instructor write ;
Query OK, 0 rows affected (0.000 sec)

MariaDB [university]> █

```

ii. Insert a new data in student . What happens and why ?

```

surendra@baskey:~$ sudo mysql -u B -p;
[sudo] password for surendra:
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 42
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic-log mariadb.org binary distribution

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 univrsty;
ERROR 1049 (42000): Unknown database 'univrsty'
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> insert into student values("99991","surendra","Math",120);
█

```

Student table has been locked by A for 1000 sec.so B is in waiting state to write

d. As 'A' insert a new data in instructor. What happens and why?


```

MariaDB [university]> desc instructor;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| ID         | varchar(5)    | NO   | PRI |          |       |
| name       | varchar(20)   | NO   |     | NULL    |       |
| dept_name  | varchar(20)   | YES  | MUL | NULL    |       |
| salary     | decimal(8,2)  | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.001 sec)

MariaDB [university]> insert into instructor values("99990","baskey","Math",12000);
ERROR 1100 (HY000): Table 'instructor' was not locked with LOCK TABLES
MariaDB [university]> █

```

Instructor table has been locked by B .so A is in waiting state to write IN instructor table

e. As 'B' insert a new data in student. What happens and why ?

```

surendra@baskey:~$ sudo mysql -u B -p;
[sudo] password for surendra:
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 42
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic-log mariadb.org binary distribution

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 univrsity;
ERROR 1049 (42000): Unknown database 'univrsity'
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> insert into student values("99991","surendra","Math",120);
^C^C -- query killed. Continuing normally.
ERROR 1317 (70100): Query execution was interrupted
MariaDB [university]> insert into student values("99991","surendra","Math",120);
█

```

Student table has been locked by A for 1000 sec.so B is in waiting state to write

5. DeadLock

f.Execute the following statement and report the outcome and also the causes

i.Open session 1: login as 'A'

1. set global innodb_deadlock_detect=OFF . Study what is "innodb_deadlock_detect"
2. set global innodb_print_all_deadlocks=ON. Study the variable.
3. set innodb_lock_wait_timeout =120; [Study it]
4. create table dl1(pk int primary key, data varchar(100));
5. create table dl2(pk int primary key, pk1 int not null, constraint

dl2_fk foreign key(pk1) references dl1(pk), data varchar(100));

6. set autocommit=off;

7. insert into dl1 values(1, 'a');

```
surendra@baskey:~$ mysql -u A -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 44
Server version: 10.3.13-MariaDB-1:10.3.13+maria-bionic-log mariadb.org binary distribution

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)]> set global innodb_deadlock_detect=OFF;
Query OK, 0 rows affected (0.000 sec)

MariaDB [(none)]> set global innodb_print_all_deadlocks=ON;
Query OK, 0 rows affected (0.000 sec)

MariaDB [(none)]> set innodb_lock_wait_timeout =120;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> create table dl1(pk int primary key, data varchar(100));
ERROR 1046 (3D000): No database selected
MariaDB [(none)]> use university;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> create table dl1(pk int primary key, data varchar(100));
Query OK, 0 rows affected (0.281 sec)

MariaDB [university]> create table dl2(pk int primary key, pk1 int not null, constraint
-> dl2_fk foreign key(pk1) references dl1(pk), data varchar(100));
Query OK, 0 rows affected (0.258 sec)

MariaDB [university]> set autocommit=off;
Query OK, 0 rows affected (0.000 sec)

MariaDB [university]> insert into dl1 values(1, 'a');
```

```
MariaDB [university]> set autocommit=off;
Query OK, 0 rows affected (0.000 sec)

MariaDB [university]> insert into dl1 values(1, 'a');
Query OK, 1 row affected (0.001 sec)

MariaDB [university]> █
```

ii. Open session 2: login as 'B'

1. set autocommit=off;

2. insert into dl2(pk, pk1, data) values(10, 1, 'a0'); [What happens and why?]

```

surendra@baskey:~$ sudo mysql -u B -p;
[sudo] password for surendra:
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 45
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic-log mariadb.org binary distribution

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;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [university]> set autocommit=off;
Query OK, 0 rows affected (0.000 sec)

MariaDB [university]> insert into dl2(pk, pk1, data) values(10, 1, 'a0');
ERROR 1205 (HY000): Lock wait timeout exceeded; try restarting transaction
MariaDB [university]> █

```

iii.

Go back to session 2:

1. insert into dl2(pk, pk1, data) values(10, 1, 'a0'); [What happens and why?]

```

MariaDB [university]> insert into dl2(pk, pk1, data) values(10, 1, 'a0');
█

```

iv.

Study how to see current deadlocks