DBMS LAB 11

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Lab Report

1. Transaction management
b. Report current values of system variable 'autocommit' and 'in_transaction'

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

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

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.

When autocommit is ON


```
                              dbms@dbms-VirtualBox: ~

File  Edit  View  Search  Terminal  Help
MariaDB [university]> set @@autocommit = 1;
Query OK, 0 rows affected (0.01 sec)

MariaDB [university]> create table student1 as select * from student;
Query OK, 2000 rows affected (0.08 sec)
Records: 2000  Duplicates: 0  Warnings: 0

MariaDB [university]> insert into student values ('99988', 'Sachin', 'Comp. Sci.', '123');
Query OK, 1 row affected (0.04 sec)

MariaDB [university]> select * from student where name = 'Englund';
+-------+---------+------------+----------+
| ID    | name    | dept_name  | tot_cred |
+-------+---------+------------+----------+
| 11126 | Englund | Pol. Sci.  |       76 |
| 99977 | Englund | Psychology |       93 |
+-------+---------+------------+----------+
2 rows in set (0.01 sec)

MariaDB [university]> update student set tot_cred = '100' where name = 'Englund';
Query OK, 2 rows affected (0.06 sec)
Rows matched: 2  Changed: 2  Warnings: 0
```

```
                              dbms@dbms-VirtualBox: ~

File  Edit  View  Search  Terminal  Help
MariaDB [university]> desc student1;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| ID        | varchar(5)  | NO   |     |         |       |
| name      | varchar(20) | NO   |     | NULL    |       |
| dept_name | varchar(20) | YES  |     | NULL    |       |
| tot_cred  | decimal(3,0)| YES  |     | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
4 rows in set (0.02 sec)

MariaDB [university]> select * from student where name = 'Sachin';
+-------+--------+------------+----------+
| ID    | name   | dept_name  | tot_cred |
+-------+--------+------------+----------+
| 99988 | Sachin | Comp. Sci. |      123 |
+-------+--------+------------+----------+
1 row in set (0.00 sec)

MariaDB [university]> select * from student where name = 'Englund';
+-------+---------+------------+----------+
| ID    | name    | dept_name  | tot_cred |
+-------+---------+------------+----------+
| 11126 | Englund | Pol. Sci.  |      100 |
| 99977 | Englund | Psychology |      100 |
```

When autocommit is OFF

```
dbms@dbms-VirtualBox: ~

File  Edit  View  Search  Terminal  Help

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

MariaDB [university]> insert into student values ('99999', 'Surendra', 'Comp. Sci.', '123');
Query OK, 1 row affected (0.00 sec)

MariaDB [university]> create table student2 as select * from student;
Query OK, 2002 rows affected (0.07 sec)
Records: 2002  Duplicates: 0  Warnings: 0

MariaDB [university]> select * from student where name = 'Sachin';
+-------+--------+------------+----------+
| ID    | name   | dept_name  | tot_cred |
+-------+--------+------------+----------+
| 99988 | Sachin | Comp. Sci. |      123 |
+-------+--------+------------+----------+
1 row in set (0.00 sec)

MariaDB [university]> update student set tot_cred = '150' where name = 'Sachin';
Query OK, 1 row affected (0.02 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

```
dbms@dbms-VirtualBox: ~

File  Edit  View  Search  Terminal  Help

MariaDB [university]> desc student2;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| ID        | varchar(5)  | NO   |     |         |       |
| name      | varchar(20) | NO   |     | NULL    |       |
| dept_name | varchar(20) | YES  |     | NULL    |       |
| tot_cred  | decimal(3,0)| YES  |     | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
4 rows in set (0.01 sec)

MariaDB [university]> select * from student where name = 'Surendra';
+-------+----------+------------+----------+
| ID    | name     | dept_name  | tot_cred |
+-------+----------+------------+----------+
| 99999 | Surendra | Comp. Sci. |      123 |
+-------+----------+------------+----------+
1 row in set (0.01 sec)

MariaDB [university]> select * from student where name = 'Sachin';
+-------+--------+------------+----------+
| ID    | name   | dept_name  | tot_cred |
+-------+--------+------------+----------+
| 99988 | Sachin | Comp. Sci. |      123 |
```

d. Write a transaction containing following tasks, and commit after that
i. Create a Table avg_sal with one column asalary (numeric)

```
MariaDB [university]> create table avg_sal (asalary numeric);
Query OK, 0 rows affected (0.05 sec)

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

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

```
MariaDB [university]> insert into avg_sal(asalary) select avg(salary) from instructor;
Query OK, 1 row affected, 1 warning (0.11 sec)
Records: 1  Duplicates: 0  Warnings: 1

Note (Code 1265): Data truncated for column 'asalary' at row 51
MariaDB [university]> commit;
Query OK, 0 rows affected (0.00 sec)
```

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

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

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

Note (Code 1265): Data truncated for column 'asalary' at row 51
MariaDB [university]> select @@in_transaction;
+------------------+
| @@in_transaction |
+------------------+
|                1 |
+------------------+
1 row in set (0.00 sec)

MariaDB [university]> commit;
Query OK, 0 rows affected (0.02 sec)
```

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

```
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 (0.08 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

Note (Code 1265): Data truncated for column 'asalary' at row 51
MariaDB [university]> rollback;
Query OK, 0 rows affected (0.02 sec)
```

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]> select * from avg_sal_rollback;
Empty set (0.00 sec)
```

Yes, the table has been created but it is empty as create table is implicit commit command.

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

Ans: statements that define or modify database objects

2. Transaction isolation

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;
+-----------------------+
| @@global.tx_isolation |
+-----------------------+
| REPEATABLE-READ       |
+-----------------------+
1 row in set (0.00 sec)

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

MariaDB [university]> select @@current.tx_isolation;
ERROR 1272 (HY000): Variable 'tx_isolation' is not a va
sed as XXXX.variable_name)
MariaDB [university]> select @@tx_isolation;
+----------------+
| @@tx_isolation |
+----------------+
| REPEATABLE-READ |
+----------------+
1 row in set (0.00 sec)
```

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 (0.00 sec)

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

d. Validate transaction isolation

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

```
MariaDB [university]> create user sachin_dummy;
Query OK, 0 rows affected (0.02 sec)

MariaDB [university]> grant all on university to sachin_dummy;
Query OK, 0 rows affected (0.01 sec)
```

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

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

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

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

iv.You as your old username start the following transaction

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

```
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)
```

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;

```
dbms@dbms-VirtualBox:~$ mysql -u sachin_dummy
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 9
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;
Database changed
MariaDB [university]> alter table avg_sal add column b int;
```

vi.Report your observation.
Ans: It is waiting for older transaction to end.

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

**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 [university]> install SONAME 'metadata_lock_info';
Query OK, 0 rows affected (0.06 sec)

MariaDB [university]> Select * from
    -> information_schema.metadata_lock_info;
Empty set (0.00 sec)
```

b. Write an SQL statement to show who is locking whom.

```
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(lcase(LOCK_TYPE), lcase(STATE))>0;
Empty set (0.04 sec)
```

4. Locking a table
a. Create 2 users A and B with a privilege for "lock table"

```
MariaDB [university]> create user A identified by 'userA';
Query OK, 0 rows affected (0.96 sec)

MariaDB [university]> grant all privileges on *.* to A;
Query OK, 0 rows affected (0.07 sec)

MariaDB [university]> create user B identified by 'userB';
Query OK, 0 rows affected (0.01 sec)

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

b. Login as A
i.Lock table student with option 'wait'.

```
sachin@sachin-VirtualBox:~$ mysql -u A -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 13
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic mariadb.org binary distr
bution

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]> lock table student write wait 1000;
Query OK, 0 rows affected (0.051 sec)
```

c. Login as B
i.Lock table instructor
ii.Insert a new data in student . What happens and why ?

```
sachin@sachin-VirtualBox:~$ mysql -u B -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 14
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic mariadb.org binary distri
bution

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]> lock table instructor write;
Query OK, 0 rows affected (0.044 sec)

MariaDB [university]> insert into student values('99999', 'sachin', 'Comp. Sci.'
, '140');
ERROR 1100 (HY000): Table 'student' was not locked with LOCK TABLES
MariaDB [university]> 
```

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

```
MariaDB [university]> insert into instructor values('98798', 'sachin', 'Math', '
50000');
ERROR 1100 (HY000): Table 'instructor' was not locked with LOCK TABLES
MariaDB [university]>
```

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

```
MariaDB [university]> insert into student values('99956', 'Sachin', 'Comp. Sci.'
, '132');
ERROR 1100 (HY000): Table 'student' was not locked with LOCK TABLES
MariaDB [university]>
```

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')

```
sachin@sachin-VirtualBox:~$ mysql -u A -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 17
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic mariadb.org binary distri
bution

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 (0.050 sec)

MariaDB [(none)]> set global innodb_print_all_deadlocks=ON;
Query OK, 0 rows affected (0.051 sec)

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 (1.997 sec)

MariaDB [university]> create table dl2(pk int primary key, pk1 int not null, con
straint dl2_fk foreign key(pk1) references dl1(pk), data varchar(100));
Query OK, 0 rows affected (0.185 sec)

MariaDB [university]> set autocommit=off;
Query OK, 0 rows affected (0.048 sec)

MariaDB [university]> insert into dl1 values(1, 'a');
Query OK, 1 row affected (0.099 sec)
```

ii.Open session 2: login as 'B'
----
1. set autocommit=off;
2. insert into dl2(pk, pk1, data) values(10, 1, 'a0');

```
sachin@sachin-VirtualBox:~$ mysql -u B -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 18
Server version: 10.3.13-MariaDB-1:10.3.13+maria~bionic mariadb.org binary distri
bution

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 (0.112 sec)

MariaDB [university]> insert into dl2 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');

```
MariaDB [university]> insert into dl2 values(10, 1, 'a0');
```