E/16/156

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CO527 Advanced Database Systems

Lab Task :

1. **I of ACID**
   - I. **Issue a select query to view the current status of the departments table in both sessions.**

```
MariaDB [(none)]> USE company;
Database changed
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
+---------+--------------------+
9 rows in set (0.05 sec)
```

S1

```
MariaDB [(none)]> USE company;
Database changed
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
+---------+--------------------+
9 rows in set (0.00 sec)
```

S2

   - II. **Now, start transaction running start transaction in both sessions.**

```
MariaDB [company]> START TRANSACTION;
Query OK, 0 rows affected (0.01 sec)
```

S1

```
MariaDB [company]> START TRANSACTION;
Query OK, 0 rows affected (0.00 sec)
```

S2

   - III. **Insert a new row into the departments table from the 1st session and check if the changes are visible in the second session.**

```
MariaDB [company]> INSERT INTO departments
    -> VALUES ('d010', 'Mechanical');
Query OK, 1 row affected (0.06 sec)

MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Mechanical         |
+---------+--------------------+
10 rows in set (0.00 sec)
```

```
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
+---------+--------------------+
9 rows in set (0.00 sec)
```

S1 S2

New row is not shown in the session 2, but in session 1 it is shown.

IV. Commit changes in the 1st command window and check if you can see the updates done at 1st window in 2nd command window.

```
MariaDB [company]> COMMIT;
Query OK, 0 rows affected (0.06 sec)

MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Mechanical         |
+---------+--------------------+
10 rows in set (0.00 sec)
```

```
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
+---------+--------------------+
9 rows in set (0.00 sec)
```

S1 S2

New row is not shown in the session 2, but in session 1 it is shown.

V. Explain your observations before and after running the commit in the 1st window.

Before committing the 1st window, updates are not visible in the 2nd window, because updates are not saved to the database by committing. After committing the 1st window, still updates are

not visible in the 2nd window, because 2nd window is still in the middle of the transaction process.

2. **Concurrent Updates**
    I. **Try to do a concurrent update to the same row in departments table during two transactions**

```
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Mechanical         |
+---------+--------------------+
10 rows in set (0.00 sec)

MariaDB [company]> UPDATE departments
    -> SET dept_name="Computer"
    -> WHERE dept_no='d010';
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Computer           |
+---------+--------------------+
10 rows in set (0.00 sec)

MariaDB [company]>
```

```
MariaDB [company]> UPDATE departments
    -> SET dept_name="Civil"
    -> WHERE dept_no='d010';
ERROR 1205 (HY000): Lock wait timeout exceeded; try restarting transaction
MariaDB [company]>
```

S2

II. Explain what happens before ending any of the transactions.

S1 update: (‘d010’, ‘Computer’)

S2 update: (‘d010’, ‘Civil’)

Before committing the transaction in S1, we cannot update S2.

III. What happens when you commit your changes in the 1st session?

```
MariaDB [company]> COMMIT;
Query OK, 0 rows affected (0.08 sec)

MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Computer           |
+---------+--------------------+
10 rows in set (0.00 sec)
```

S1

```
MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Computer           |
+---------+--------------------+
10 rows in set (0.00 sec)

MariaDB [company]> UPDATE departments
    -> SET dept_name="Civil"
    -> WHERE dept_no='d010';
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [company]> SELECT * FROM departments;
+---------+--------------------+
| dept_no | dept_name          |
+---------+--------------------+
| d001    | Marketing          |
| d002    | Finance            |
| d003    | Human Resources    |
| d004    | Production         |
| d005    | Development        |
| d006    | Quality Management |
| d007    | Sales              |
| d008    | Research           |
| d009    | Customer Service   |
| d010    | Civil              |
+---------+--------------------+
10 rows in set (0.00 sec)
```

S2

S1 update: (‘d010’, ‘Computer’)
S2 update: (‘d010’, ‘Civil’)
After committing the transaction in S1, we can update S2 and here we can see the updated tables.

3. **Use your imagination and words to write a scenario where using transactions is essential and then create the required tables and test how the transaction will effect your tables,**

Let’s create a simple database for a bookshop. Here is the ‘books’ table of the dataset.

```
MariaDB [(none)]> CREATE DATABASE book_shop;
Query OK, 1 row affected (0.06 sec)

MariaDB [(none)]> USE book_shop;
Database changed
```

```
MariaDB [book_shop]> CREATE TABLE books (book_ID int,book_code char(15),book_name varchar(40),book_price DECIMAL(10,2),p
rimary key (book_ID));
Query OK, 0 rows affected (0.23 sec)

MariaDB [book_shop]> INSERT INTO books VALUES (001,'NOVEL',"Pilgrim's Progress",500.00),(002,'NOVEL','Robinson Crusoe',1
500.00),(003,'NOVEL','Clarissa',1300.00),(004,'NOVEL','Tom Jones',2500.00);
Query OK, 4 rows affected (0.05 sec)
Records: 4  Duplicates: 0  Warnings: 0

MariaDB [book_shop]> SELECT * FROM books;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
|       2 | NOVEL     | Robinson Crusoe    |    1500.00 |
|       3 | NOVEL     | Clarissa           |    1300.00 |
|       4 | NOVEL     | Tom Jones          |    2500.00 |
+---------+-----------+--------------------+------------+
4 rows in set (0.00 sec)
```

I. **during the transaction execution.**

```
MariaDB [book_shop]> update books set book_price = 1.5*book_price where book_ID=001;
Query OK, 1 row affected (0.06 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     750.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.02 sec)
```

S1

Updates can be seen

```
MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.00 sec)
```

S2

Updates can’t be seen

II. after rollback statement.

```
MariaDB [book_shop]> ROLLBACK;
Query OK, 0 rows affected (0.06 sec)

MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.00 sec)
```

S1

Updates have been reversed

```
MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.00 sec)
```

S2

No changes

III. after the commit statement.

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

MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.00 sec)
```

S1

No updates

```
MariaDB [book_shop]> select * from books where book_ID=001;
+---------+-----------+--------------------+------------+
| book_ID | book_code | book_name          | book_price |
+---------+-----------+--------------------+------------+
|       1 | NOVEL     | Pilgrim's Progress |     500.00 |
+---------+-----------+--------------------+------------+
1 row in set (0.00 sec)
```

S2

No changes

IV. during 2 concurrent transactions, both of them update a record and both of them commit it.

```
MariaDB [book_shop]> update books set book_price = 1.7*book_price where book_ID=002;
Query OK, 1 row affected (0.05 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [book_shop]> COMMIT;
Query OK, 0 rows affected (0.00 sec)

MariaDB [book_shop]> select * from books where book_ID=002;
+---------+-----------+-----------------+------------+
| book_ID | book_code | book_name       | book_price |
+---------+-----------+-----------------+------------+
|       2 | NOVEL     | Robinson Crusoe |    2550.00 |
+---------+-----------+-----------------+------------+
1 row in set (0.00 sec)
```

S1

```
MariaDB [book_shop]> update books set book_price = 2.7*book_price where book_ID=002;
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [book_shop]> COMMIT;
Query OK, 0 rows affected (0.05 sec)

MariaDB [book_shop]> select * from books where book_ID=002;
+---------+-----------+-----------------+------------+
| book_ID | book_code | book_name       | book_price |
+---------+-----------+-----------------+------------+
|       2 | NOVEL     | Robinson Crusoe |   11704.50 |
+---------+-----------+-----------------+------------+
1 row in set (0.00 sec)
```

S2

New values were updated