

CO527 – Advanced Database Systems

Lab 4 – Transaction Processing

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E/17/153

SQL window: e17153_lab2, e17153lab3, e17153lab4*

```

1 • start transaction;
2 • update salaries set salary = 1.1*salary where emp_no=43624;
3 • select * from salaries where emp_no=43624;

```

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid: emp_no, salary, from_date, to_date

Output: Action Output

#	Time	Action	Message	Duration / Fetch
✓ 1	18:37:11	start transaction	0 row(s) affected	0.000 sec
✓ 2	18:40:59	update salaries set salary = 1.1*salary where emp_no=43624	0 row(s) affected Rows matched: 0 Changed: 0 Warnings: 0	3.859 sec
✓ 3	18:41:04	select * from salaries where emp_no=43624 LIMIT 0, 1000	0 row(s) returned	0.234 sec / 0.000 sec

SQL window: e17153_lab2, e17153lab3, e17153lab4*

```

4
5 • rollback;
6 • select * from salaries where emp_no=43624;

```

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Result Grid: emp_no, salary, from_date, to_date

salaries 2 x Apply Revert

Output: Action Output

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✓ 3	18:41:04	select * from salaries where emp_no=43624 LIMIT 0, 1000	0 row(s) returned	0.234 sec / 0.000 sec
✓ 4	18:42:56	rollback	0 row(s) affected	0.000 sec
✓ 5	18:43:22	select * from salaries where emp_no=43624 LIMIT 0, 1000	0 row(s) returned	0.000 sec / 0.000 sec

Concurrent Accesses

I of ACID

- I. Issue a select query to view the current status of the department table in both sessions.

```
Command Prompt - mysql.exe -u root -p
13 rows in set (0.001 sec)

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 (0.013 sec)

MariaDB [company]> _
```

```
Command Prompt - mysql.exe -u root -p
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 (0.000 sec)

MariaDB [company]> _
```

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

```
Command Prompt - mysql.exe -u root -p
9 rows in set (0.013 sec)

MariaDB [company]> start transaction;
Query OK, 0 rows affected (0.000 sec)

MariaDB [company]> _
```

```
Command Prompt - mysql.exe -u root -p
MariaDB [company]> start transaction;
Query OK, 0 rows affected (0.000 sec)

MariaDB [company]> _
```

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

INSERT INTO departments (dept_no,dept_name) VALUES ("d010","Accounting");

Session 1

```
Command Prompt - mysql.exe -u root -p

MariaDB [company]> INSERT INTO departments (dept_no,dept_name) VALUES ("d010","Accounting");
Query OK, 1 row affected (0.045 sec)

MariaDB [company]> _
```

Session 2

```
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 (0.001 sec)

MariaDB [company]>
```

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

Session 1

```
Command Prompt - mysql.exe -u root -p

MariaDB [company]> commit;
Query OK, 0 rows affected (0.887 sec)

MariaDB [company]> _
```

Session 2

```
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 (0.001 sec)

MariaDB [company]>
```

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

There was no change in the session 02 output.

Before committing the changes in session 01, session 02 changes were not visible.

After committing the changes in session 01 also the changes were not visible in session 02.

This was because the session 2 was still in progress. (Didn't end the transaction yet.)

After the commit of session 02, the changes could be seen.

```

MariaDB [company]> commit;
Query OK, 0 rows affected (0.000 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    | Accounting |
+-----+-----+
10 rows in set (0.000 sec)

MariaDB [company]>

```

Concurrent Updates

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

Session 1

```

C:\ Command Prompt - mysql.exe -u root -p

MariaDB [company]> update departments set dept_name = "Technical" where dept_no = "d010";
Query OK, 1 row affected (0.016 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [company]>

```

Session 2

```

C:\ Command Prompt - mysql.exe -u root -p

MariaDB [company]> start transaction;
Query OK, 0 rows affected (0.000 sec)

MariaDB [company]> update departments set dept_name = "Technical" where dept_no = "d010";
ERROR 1205 (HY000): Lock wait timeout exceeded; try restarting transaction
MariaDB [company]> _

```

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

An UPDATE statement locks a field, so the session 01 locked the field to be updated, and made the session 02 wait in a queue.

When a session 01 row is updated. Then this row is locked until the commit is done. So, the session 02 does not have permission to update the same row unless session 01 commits.

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

Session 1

```
MariaDB [company]> commit;  
Query OK, 0 rows affected (0.095 sec)  
  
MariaDB [company]>
```

Session 2

```
MariaDB [company]> update departments set dept_name = "Technical" where dept_no = "d010";  
Query OK, 0 rows affected (0.001 sec)  
Rows matched: 1 Changed: 0 Warnings: 0  
  
MariaDB [company]>
```

After committing the session 01, it is possible to update the same row in the session 02.

What to Turn In

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,

1. during the transaction execution.
2. after rollback statement.
3. after the commit statement.
4. during 2 concurrent transactions, both of them update a record and both of them commit it.

Let's create a simple database for a stationary company.

Here is the 'product' table of the dataset, 'stationery shop'.

```
MariaDB [stationery_shop]> select * from products;  
+-----+-----+-----+-----+  
| productID | product_code | name      | price |  
+-----+-----+-----+-----+  
| 1001 | PEN          | pen red   | 20.00 |  
| 1002 | PEC          | pencil 2H | 10.50 |  
| 1003 | PEC          | pencil 2B | 15.50 |  
+-----+-----+-----+-----+  
3 rows in set (0.134 sec)  
  
MariaDB [stationery_shop]>
```

1.Transaction

In the session 01, an update was done.

```
MariaDB [stationery_shop]> start transaction;
Query OK, 0 rows affected (0.000 sec)

MariaDB [stationery_shop]> update products set price = price + 5.00 where product_code = "PEC";
Query OK, 2 rows affected (0.392 sec)
Rows matched: 2  Changed: 2  Warnings: 0

MariaDB [stationery_shop]>
```

Session 01 before committing (Updates can be seen)

```
MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
| 1001      | PEN          | pen red   | 20.00 |
| 1002      | PEC          | pencil 2H | 15.50 |
| 1003      | PEC          | pencil 2B | 20.50 |
+-----+-----+-----+-----+
3 rows in set (0.001 sec)

MariaDB [stationery_shop]> _
```

Session 02 (Updates are not yet applied)

```
MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
| 1001      | PEN          | pen red   | 20.00 |
| 1002      | PEC          | pencil 2H | 10.50 |
| 1003      | PEC          | pencil 2B | 15.50 |
+-----+-----+-----+-----+
3 rows in set (0.001 sec)
```

2.Rollback

Session 01 (Updates have been reversed)

```
MariaDB [stationery_shop]> rollback;
Query OK, 0 rows affected (0.091 sec)

MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
| 1001      | PEN          | pen red   | 20.00 |
| 1002      | PEC          | pencil 2H | 10.50 |
| 1003      | PEC          | pencil 2B | 15.50 |
+-----+-----+-----+-----+
3 rows in set (0.000 sec)
```

Session 02 (No changes)

```
MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
|      1001 | PEN          | pen red   | 20.00 |
|      1002 | PEC          | pencil 2H | 10.50 |
|      1003 | PEC          | pencil 2B | 15.50 |
+-----+-----+-----+-----+
3 rows in set (0.001 sec)
```

3. Commit

Session 01 (In the previous status- no updates)

```
MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
|      1001 | PEN          | pen red   | 20.00 |
|      1002 | PEC          | pencil 2H | 10.50 |
|      1003 | PEC          | pencil 2B | 15.50 |
+-----+-----+-----+-----+
3 rows in set (0.000 sec)

MariaDB [stationery_shop]> _
```

Session 02 (No changes)

```
MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
|      1001 | PEN          | pen red   | 20.00 |
|      1002 | PEC          | pencil 2H | 10.50 |
|      1003 | PEC          | pencil 2B | 15.50 |
+-----+-----+-----+-----+
3 rows in set (0.001 sec)
```

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

Session 01 – update the prices of “PEC” items

```
MariaDB [stationery_shop]> update products set price = price + 15.00 where product_code = "PEC";
Query OK, 2 rows affected (0.037 sec)
Rows matched: 2  Changed: 2  Warnings: 0
```

Session 01- commit


```

MariaDB [stationery_shop]> commit;
Query OK, 0 rows affected (0.082 sec)

MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
|      1001 | PEN          | pen red   | 20.00 |
|      1002 | PEC          | pencil 2H | 25.50 |
|      1003 | PEC          | pencil 2B | 30.50 |
+-----+-----+-----+-----+
3 rows in set (0.000 sec)

MariaDB [stationery_shop]> _

```

Session 02- update the same row

```

MariaDB [stationery_shop]> update products set price = price + 25.00 where product_code = "PEC";
Query OK, 2 rows affected (0.024 sec)
Rows matched: 2  Changed: 2  Warnings: 0

```

Session 02- commit (New values were updated)

```

MariaDB [stationery_shop]> commit;
Query OK, 0 rows affected (0.077 sec)

MariaDB [stationery_shop]> select * from products;
+-----+-----+-----+-----+
| productID | product_code | name      | price |
+-----+-----+-----+-----+
|      1001 | PEN          | pen red   | 20.00 |
|      1002 | PEC          | pencil 2H | 50.50 |
|      1003 | PEC          | pencil 2B | 55.50 |
+-----+-----+-----+-----+
3 rows in set (0.000 sec)

```