

TP5 : Transaction et contrôle de concurrence

Dans ce TP, nous avons utiliser **MariaDB**. On peut modéliser une situation de concurrence, car on voit que qu'on peut accéder à la même BDD, mais avec deux connexion différentes (Connection id)

Exercice n° 1 Atomicité d'une transaction

```
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC: ~  
File Edit View Search Terminal Help  
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC:~$ mariadb -u ing-mustang -p  
Enter password:  
ERROR 1045 (28000): Access denied for user 'ing-mustang'@'localhost' (using password: YES)  
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC:~$ mariadb -u ing-mustang -p  
Enter password:  
Welcome to the MariaDB monitor. Commands end with ; or \g.  
Your MariaDB connection id is 32  
Server version: 10.6.21-MariaDB-0ubuntu0.22.04.2 Ubuntu 22.04  
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 TP5_BDA;  
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 [TP5_BDA]>  
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC: ~  
File Edit View Search Terminal Help  
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC:~$ mariadb -u ing-mustang -p  
Enter password:  
Welcome to the MariaDB monitor. Commands end with ; or \g.  
Your MariaDB connection id is 33  
Server version: 10.6.21-MariaDB-0ubuntu0.22.04.2 Ubuntu 22.04  
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 TP5_BDA;  
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 [TP5_BDA]>
```

Q1) Session S1(id = 32)

```
MariaDB [TP5_BDA]> SET AUTOCOMMIT = 0;
Query OK, 0 rows affected (0,001 sec)

MariaDB [TP5_BDA]> CREATE TABLE transaction (
    -> idTransaction VARCHAR(44) ,
    -> valTransaction DECIMAL(10) ) ;
Query OK, 0 rows affected (0,026 sec)

MariaDB [TP5_BDA]>
MariaDB [TP5_BDA]>
MariaDB [TP5_BDA]> SELECT * FROM transaction;
Empty set (0,001 sec)

MariaDB [TP5_BDA]> select * from transaction
    -> ;
Empty set (0,000 sec)

MariaDB [TP5_BDA]> █
```

Q2) Session S2(id = 33)

```
MariaDB [TP5_BDA]> insert into transaction (
Display all 764 possibilities? (y or n)
MariaDB [TP5_BDA]> insert into transaction (idTransaction,valTransaction) values (1,1);
Query OK, 1 row affected (0,009 sec)

MariaDB [TP5_BDA]> select * from transaction;
+-----+-----+-----+
| idTransaction | valTransaction | new attribute |
+-----+-----+-----+
| VUPA         | 455           | NULL          |
| 1            | 1             | NULL          |
+-----+-----+-----+
2 rows in set (0,000 sec)

MariaDB [TP5_BDA]> insert into transaction (idTransaction,valTransaction) values (2,2);
Query OK, 1 row affected (0,001 sec)

MariaDB [TP5_BDA]> select * from transaction;
+-----+-----+-----+
| idTransaction | valTransaction | new attribute |
+-----+-----+-----+
| VUPA         | 455           | NULL          |
| 1            | 1             | NULL          |
| 2            | 2             | NULL          |
+-----+-----+-----+
3 rows in set (0,001 sec)
```

Figure 1: Insertion

```

MariaDB [TP5_BDA]> update transaction set valTransaction = 10 where idTransaction = "2";
Query OK, 1 row affected (0,009 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [TP5_BDA]> select * from transaction;
+-----+-----+-----+
| idTransaction | valTransaction | new_attribute |
+-----+-----+-----+
| VUPA         | 455           | NULL          |
| 1             | 1             | NULL          |
| 2             | 10            | NULL          |
+-----+-----+-----+
3 rows in set (0,000 sec)

MariaDB [TP5_BDA]> delete from transaction
-> where idTransaction = "1";
Query OK, 1 row affected (0,000 sec)

MariaDB [TP5_BDA]> select * from transaction;
+-----+-----+-----+
| idTransaction | valTransaction | new_attribute |
+-----+-----+-----+
| VUPA         | 455           | NULL          |
| 2             | 10            | NULL          |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> rollback;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> select * from transaction;
+-----+-----+-----+
| idTransaction | valTransaction | new_attribute |
+-----+-----+-----+
| VUPA         | 455           | NULL          |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> 

```

Figure 2: Modification, Suppression puis Rollback

Conformément, à ce qui est prévu, en faisant un rollback on perd tous les changements.

Q3) Session S2(id = 33)

```

MariaDB [TP5_BDA]> select * from transaction
-> ;
Empty set (0,000 sec)

MariaDB [TP5_BDA]> set autocommit = 0; insert into transaction values ('1', 456); insert into transaction values ('2', 747); quit; insert into transaction values ('3', 74);
Query OK, 0 rows affected (0,001 sec)

Query OK, 1 row affected (0,001 sec)

Query OK, 1 row affected (0,001 sec)

Bye

```

Session S1(id = 32)

```

MariaDB [TP5_BDA]> select * from transaction;
Empty set (0,000 sec)

MariaDB [TP5_BDA]> 

```

On constate que l'arrêt inopiné de la session S2 a fait perdre tous les changements, d'où le fait que la table soit vide.

Remarque : À l'origine le BDD est vide. La ligne ("VUPA", 445) fut rajouté à une question ultérieure.

Q4)

```
MariaDB [TP5_BDA]> insert INTO
INT          INT2          INT4          INTEGER          INTERSECTS          INTO
INT1         INT3         INT8         INTERIORRINGN  INTERVAL
MariaDB [TP5_BDA]> insert into transaction values ('1', 456); insert into transaction values ('2', 747); insert into transaction values ("VUPA" , 455);
Query OK, 1 row affected (0,001 sec)

Query OK, 1 row affected (0,000 sec)

ERROR 1146 (42S02): Table 'TP5_BDA.transaction' doesn't exist
MariaDB [TP5_BDA]> insert into transaction values ("VUPA" , 455);
Query OK, 1 row affected (0,001 sec)

MariaDB [TP5_BDA]> select * from transaction
-> ;
+-----+-----+
| idTransaction | valTransaction |
+-----+-----+
| 1             | 456            |
| 2             | 747            |
| VUPA          | 455            |
+-----+-----+
3 rows in set (0,001 sec)

MariaDB [TP5_BDA]> ^DBye
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC:~$ mariadb -u ing-mustang -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 60
Server version: 10.6.18-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

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 TP5_BDA;
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 [TP5_BDA]> select * from transaction;
Empty set (0,000 sec)

MariaDB [TP5_BDA]> █
```

Vu que rien n'est commit, les changements sont perdus.

Q5) Session S2 (id = 60)

```
ing-mustang@ingmustang-HP-ProBook-440-14-inch-G9-Notebook-PC:~$ mariadb -u ing-mustang -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 60
Server version: 10.6.18-MariaDB-0ubuntu0.22.04.1 Ubuntu 22.04

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 TP5_BDA;
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 [TP5_BDA]> select * from transaction;
Empty set (0,000 sec)

MariaDB [TP5_BDA]> insert into transaction values ("VUPA" , 455);
Query OK, 1 row affected (0,011 sec)

MariaDB [TP5_BDA]> ALTER TABLE TRANSACTION ADD new_attribute CHAR(30)
-> ;
ERROR 1146 (42S02): Table 'TP5_BDA.TRANSACTION' doesn't exist
MariaDB [TP5_BDA]> ALTER TABLE transaction ADD new_attribute CHAR(30)
-> ;
Query OK, 0 rows affected (0,027 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [TP5_BDA]> select * from transaction
-> ;
+-----+-----+-----+
| idTransaction | valTransaction | new_attribute |
+-----+-----+-----+
| VUPA          | 455           | NULL         |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> ROLLBACK;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> select * from transaction
-> ;
+-----+-----+-----+
| idTransaction | valTransaction | new_attribute |
+-----+-----+-----+
| VUPA          | 455           | NULL         |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> █
```

Les changements sont commits. C'est aussi le cas dans la session 1.

Bilan : Tous les opérations qui sont liés à la structure de la table sont directement commit (Même si on à préciser autocommit). Ce qui n'est pas le cas quand on ajoute/modif/suppr des valeurs de la table

Q6)

- Session : Temps dans laquelle on accède à la BDD, on peut le voir via le numéro de session
- Transaction : Ensemble d'opération (Requêtes SQL) qui sont comprises avant un commit ou une interruption de session
- Pour valider une transaction, il faut explicitement l'enregistrer via **COMMIT**

Exercice n° 2 Transactions concurrentes

On va insérer les deux tables **Client** et **Vol**

```
MariaDB [TP5_BDA]> CREATE TABLE vol (
  ->   idVol VARCHAR(44),
  ->   capaciteVol INT(10),
  ->   nbPlacesReserveesVol INT(10)
  -> );
Query OK, 0 rows affected (0,046 sec)

MariaDB [TP5_BDA]> CREATE client ( idClient VARCHAR(44), prenomClient VARCHAR(11), nbPlacesReservees INT(10));
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near 'client ( idClient VARCHAR(44), prenomClient VARCHAR(11), nbPlacesReservees IN..' at line 1
MariaDB [TP5_BDA]> CREATE TABLE client ( idClient VARCHAR(44), prenomClient VARCHAR(11), nbPlacesReservees INT(10));
Query OK, 0 rows affected (0,027 sec)

MariaDB [TP5_BDA]> SET TRANSACTION ISOLATION LEVEL READ COMMITTED;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> █
```

On insère un vol dans T1 (id = 33)

Dans MariaDB. Le niveau d'isolation par défaut est **REPEATABLE READ**. On peut visualiser le niveau d'isolation avec : **SELECT @@tx_isolation;**

De même, on peut visualiser le statut de l'autocommit via : **SELECT @@autocommit;**

Dans le cadre de ce TP, on doit commit de manière manuel (autocommit = 0) et le niveau d'isolation doit être **READ COMMITTED**. Si l'on désactive l'autocommit, on doit manuellement démarrer la transaction via **START TRANSACTION**

On va deux client dans **T1 (id = 33)**, on a :

```
MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                  |
| 1        | John         | 0                  |
+-----+-----+-----+
2 rows in set (0,000 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)
```

Dans **T2 (id = 34)**, on a :

```
MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
Empty set (0,001 sec)
```

La notion d'isolation est bien respecté. T2 ne voit pas les changement de T1.

En effectuant un **ROLLBACK** dans T1. La base revient bien à son état initial. T2 n'a pas été modifié.

```
MariaDB [TP5_BDA]> ROLLBACK;
Query OK, 0 rows affected (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
Empty set (0,001 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)
```

Figure 3: État T1 après Rollback

```
MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
Empty set (0,001 sec)
```

Figure 4: État T2 après rollback de T1

En reproduisant les même étapes et en commitant, on voit les données sont définitivement intégré dans la base de donnée pour **T1 et T2**.

```
MariaDB [TP5_BDA]> START TRANSACTION;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> INSERT INTO client VALUE (0,"Samir",1);
Query OK, 1 row affected (0,001 sec)

MariaDB [TP5_BDA]> INSERT INTO client VALUE (1,"John",10);
Query OK, 1 row affected (0,000 sec)

MariaDB [TP5_BDA]> COMMIT;
Query OK, 0 rows affected (0,011 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 1                  |
| 1        | John         | 10                 |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> □
```

Figure 5: État de T1 après COMMIT

```
MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 100                   |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 1                  |
| 1        | John         | 10                 |
+-----+-----+-----+
2 rows in set (0,000 sec)
```

Figure 6: État de T2 après COMMIT de T1

Isolation incomplète = incohérence possible

On reinitialise certaines valeur de nos tables pour avoir un nombres de places reserves à 0.

On va effectuer les series d'actions pour mettre en lumière un cas de mise à jour perdue.

E1 : Selection de vol et client pour T1

```
MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 0                     |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                  |
| 1        | John         | 0                  |
+-----+-----+-----+
2 rows in set (0,001 sec)
```

E2 : Selection de vol et client pour T2

```
MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 0                     |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                  |
| 1        | John         | 0                  |
+-----+-----+-----+
2 rows in set (0,001 sec)
```

E3 : Mise à jour de T1 sur les vol et clients puis validation

```
MariaDB [TP5_BDA]> UPDATE client SET nbPlacesReservees = 2 WHERE idClient = 0;
Query OK, 1 row affected (0,001 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [TP5_BDA]> UPDATE vol SET nbPlacesReserveesVol = 2 WHERE idVol = 0;
Query OK, 1 row affected (0,001 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [TP5_BDA]> COMMIT;
Query OK, 0 rows affected (0,010 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 2                  |
| 1        | John         | 0                  |
+-----+-----+-----+
2 rows in set (0,000 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 2                  |
| 1        | John         | 0                  |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150         | 2                     |
+-----+-----+-----+
1 row in set (0,001 sec)
```


E4 : Mise à jour de T2 sur les vol et clients puis validation

```
MariaDB [TP5_BDA]> UPDATE client SET nbPlacesReservees = 3 WHERE idClient = 1;
Query OK, 1 row affected (0,001 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [TP5_BDA]> UPDATE vol SET nbPlacesReserveesVol = 3 WHERE idVol = 0;
Query OK, 1 row affected (0,001 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 3                 |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> COMMIT;
Query OK, 0 rows affected (0,003 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 3                 |
+-----+-----+-----+
2 rows in set (0,000 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0      | 150         | 3                     |
+-----+-----+-----+
1 row in set (0,000 sec)

MariaDB [TP5_BDA]> █
```

La base de donnée se retrouve dans un état incohérent, car on a deux valeurs différentes pour les deux sessions (2 Pour T1 et 3 pour T2)

Isolation complète = blocage et rejet des transactions possibles

En mode sérialisation, on peut éviter qu'une transaction écrive sur une donnée déjà utilisée par une autre transaction. On évite les mises à jour perdues. Ce principe utilise un mécanisme de verrou.

1. T1 : Sélection de vol et client
2. T2 : Sélection de vol et client
3. T1 : Écriture de vol et client
4. T2 : Écriture de vol et client - - - > Lors de cette étape, la requête est mise en attente de la fin de la transaction de T1. Au bout d'un certain temps la requête est rejetée


```

2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> SET TRANSACTION ISOLATION LEVEL SERIALIZABLE;
ERROR 1568 (25001): Transaction characteristics can't be changed while a trans
MariaDB [TP5_BDA]> COMMIT;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> COMMIT;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> SET TRANSACTION ISOLATION LEVEL SERIALIZABLE;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 0                 |
+-----+-----+-----+
2 rows in set (0,000 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150        | 0                     |
+-----+-----+-----+
1 row in set (0,000 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150        | 0                     |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 0                 |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> UPDATE client SET nbPlacesReservees = 2 WHERE idClient = 0;
Query OK, 1 row affected (0,000 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [TP5_BDA]> UPDATE vol SET nbPlacesReserveesVol = 2 WHERE idVol = 0;
Query OK, 1 row affected (0,001 sec)
Rows matched: 1 Changed: 1 Warnings: 0

MariaDB [TP5_BDA]> 

```

```

MariaDB [TP5_BDA]> SET TRANSACTION ISOLATION LEVEL SERIALIZABLE;
Query OK, 0 rows affected (0,000 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 0                 |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150        | 0                     |
+-----+-----+-----+
1 row in set (0,000 sec)

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150        | 0                     |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 0                 |
| 1        | John         | 0                 |
+-----+-----+-----+
2 rows in set (0,001 sec)

MariaDB [TP5_BDA]> UPDATE client SET nbPlacesReservees = 3 WHERE idClient = 1;
ERROR 1205 (HY000): Lock wait timeout exceeded; try restarting transaction
MariaDB [TP5_BDA]> 

```

État final après COMMIT de T1 :

```

MariaDB [TP5_BDA]> select * from vol;
+-----+-----+-----+
| idVol | capaciteVol | nbPlacesReserveesVol |
+-----+-----+-----+
| 0     | 150        | 5                     |
+-----+-----+-----+
1 row in set (0,001 sec)

MariaDB [TP5_BDA]> select * from client;
+-----+-----+-----+
| idClient | prenomClient | nbPlacesReservees |
+-----+-----+-----+
| 0        | Samir        | 2                     |
| 1        | John         | 3                     |
+-----+-----+-----+
2 rows in set (0,001 sec)

```