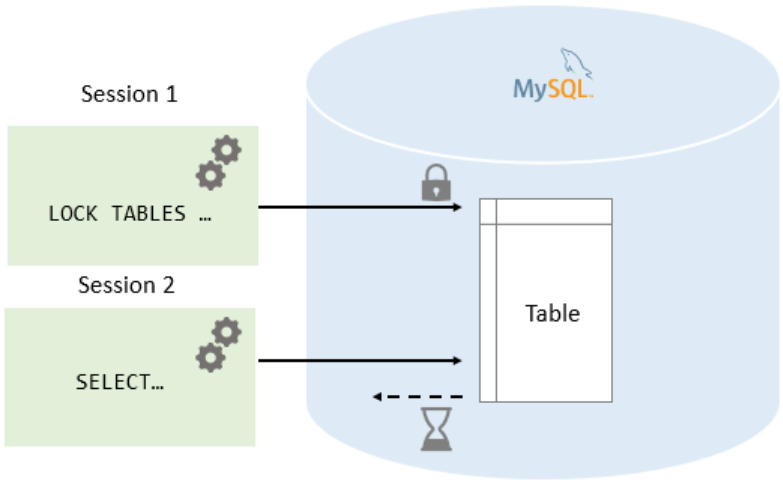
MySQL Table Locking

Summary: in this tutorial, you will learn how to use MySQL locking for cooperating table accesses between sessions.

A lock is a flag associated with a table. MySQL allows a client session to explicitly acquire a table lock for preventing other sessions from accessing the same table during a specific period.

A client session can acquire or release table locks only for itself. And a client session cannot acquire or release table locks for other client sessions.



Before we move on, let's create a table named `messages` for practicing with the table locking statements.

```
CREATE TABLE messages (
    id INT NOT NULL AUTO_INCREMENT,
    message VARCHAR(100) NOT NULL,
    PRIMARY KEY (id)
);
```

MySQL `LOCK TABLES` statement

```
LOCK TABLES table_name [READ | WRITE]
```

In this syntax, you specify the name of the table that you want to lock after the `LOCK TABLES` keywords. In addition, you specify the type of lock, either `READ` or `WRITE`.

MySQL allows you to lock multiple tables by specifying a list of comma-separated names of tables with lock types that you want to lock after the `LOCK TABLES` keywords:

```
LOCK TABLES table_name1 [READ | WRITE],
            table_name2 [READ | WRITE],
             ... ;
```

MySQL `UNLOCK TABLES` statement

To release a lock for a table, you use the following statement:

```
UNLOCK TABLES;
```

`READ` Locks

A `READ` lock has the following features:

> A `READ` lock for a table can be acquired by multiple sessions at the same time. In addition, other sessions can read data from the table without acquiring the lock.
>
> The session that holds the `READ` lock can only read data from the table, but cannot write. And other sessions cannot write data to the table until the `READ` lock is released. The write operations from another session will be put into the waiting states until the `READ` lock is released.
>
> If the session is terminated, either normally or abnormally, MySQL will release all the locks implicitly. This feature is also relevant for the `WRITE` lock.

Let's take a look at how the `READ` lock works in the following scenario.

In the first session, first, connect to the database and use the `CONNECTION_ID()` function to get the current connection id as follows:

```
SELECT CONNECTION_ID();
```

CONNECTION_ID()
9

Then, insert a new row into the `messages` table.

```
INSERT INTO messages(message)
VALUES('Hello');
```

Next, query the data the `messages` table.

```
SELECT * FROM messages;
```

After that, acquire a lock using the `LOCK TABLE` statement.

```
LOCK TABLE messages READ;
```

Finally, try to insert a new row into the `messages` table:

```
INSERT INTO messages(message)
VALUES('Hi');
```

MySQL issued the following error:

```
Error Code: 1099. Table 'messages' was locked with a READ lock and can't be update
```

So once the `READ` lock is acquired, you cannot write data to the table within the same session.

Let's check the `READ` lock from a different session.

First, connect to the database and check the connection id:

```
SELECT CONNECTION_ID();
```

connection_id()
11

Next, query data from the `messages` table:

```
SELECT * FROM messages;
```

id	message
1	Hello

Then, insert a new row into the `messages` table:

```
INSERT INTO messages(message)
VALUES('Bye');
```

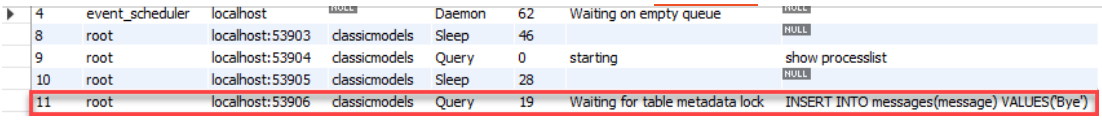
Here is the output:

#	Time	Action	Message
1	18:00:53	INSERT INTO messages(message) VALUES('Bye')	Running...

The insert operation from the second session is in the waiting state because a `READ` lock is already acquired on the `messages` table by the first session and it has not released yet.

From the first session, use the `SHOW PROCESSLIST` statement to show detailed information:

```
```



4	event_scheduler	localhost	NULL	Daemon	62	Waiting on empty queue	NULL
8	root	localhost:53903	classicmodels	Sleep	46		NULL
9	root	localhost:53904	classicmodels	Query	0	starting	show processlist
10	root	localhost:53905	classicmodels	Sleep	28		NULL
11	root	localhost:53906	classicmodels	Query	19	Waiting for table metadata lock	INSERT INTO messages(message) VALUES('Bye')

After that, go back to the first session and release the lock by using the `UNLOCK TABLES` statement. After you release the `READ` lock from the first session, the `INSERT` operation in the second session executed.

Finally, check it the data of the `messages` table to see if the `INSERT` operation from the second session really executed.

```
1 SELECT * FROM messages;
```

id	message
1	Hello
2	Bye

Write Locks

A `WRITE` lock has the following features:

> The only session that holds the lock of a table can read and write data from the table.
>
> Other sessions cannot read data from and write data to the table until the `WRITE` lock is released.

Let's go into detail to see how the `WRITE` lock works.

First, acquire a `WRITE` lock from the first session.

```
1 LOCK TABLE messages WRITE;
```

Then, insert a new row into the `messages` table.

```
1 INSERT INTO messages(message)
2 VALUES('Good Moring');
```

It worked.

Next, query data from the `messages` table.

```
1 SELECT * FROM messages;
```

id	message
1	Hello
2	Bye
3	Good Moring

It also works.

```
INSERT INTO messages(message)
VALUES('Bye Bye');

SELECT * FROM messages;
```

MySQL puts these operations into a waiting state. You can check it using the `SHOW PROCESSLIST` statement.

```
SHOW PROCESSLIST;
```

Id	User	Host	db	Command	Time	State	Info
4	event_scheduler	localhost	NULL	Daemon	495	Waiting on empty queue	NULL
8	root	localhost:53903	classicmodels	Sleep	27		NULL
9	root	localhost:53904	classicmodels	Query	0	starting	show processlist
10	root	localhost:53905	classicmodels	Sleep	461		NULL
12	root	localhost:54000	classicmodels	Query	10	Waiting for table metadata lock	INSERT INTO messages(message...

Finally, release the lock from the first session.

```
UNLOCK TABLES;
```

You will see all pending operations from the second session executed and the following picture illustrates the result:

id	message
1	Hello
2	Bye
3	Good Moring
4	Good Night

Read vs. Write locks

> Read locks are “shared” locks which prevent a write lock is being acquired but not other read locks.
>
> Write locks are “exclusive ” locks that prevent any other lock of any kind.

In this tutorial, you have learned how to lock and unlock tables for cooperating with the table accesses between sessions.

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