

# MySQL Test Framework for Troubleshooting

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PERCONA

# What my Family Thinks I Do

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# What my Boss Thinks I Do

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# What I Really Do

```
sveta@Thinkie: ~/Lessons/Udemy/Docker: ssh sveta@Thinkie:~/mysql_packages/Percona: ssh sveta@Thinkie:~/build/ps-5.5/mysql-test 115x20
sveta@Thinkie:~/build/ps-5.5/mysql-test 115x20
worker[] Port and socket path for server(s):
worker[] mysql:1 13011 /home/sveta/build/ps-5.5/mysql-test/var/tmp/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/build/ps-5.5/mysql-test 115x20
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 1
Server version: 5.5.57-38.9-debug-log Source distribution

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
sveta@Thinkie:~/build/ps-5.6/mysql-test 115x22
Started [mysqld.1 - pid: 31196, wpidid: 31196]
worker[] Using config for test innodb.innodb
worker[] Port and socket path for server(s):
worker[] mysql:1 13021 /home/sveta/build/ps-5.6/mysql-test/var/tmp/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/build/ps-5.6/mysql-test 115x22
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 1
Server version: 5.6.37-82.2-debug-log Source distribution

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
sveta@Thinkie:~/build/ps-5.7/mysql-test 115x22
worker[]
worker[] Started [mysqld.1 - pid: 1105, wpidid: 1105]
worker[] Using config for test innodb.innodb
worker[] Port and socket path for server(s):
worker[] mysql:1 13030 /home/sveta/build/ps-5.7/mysql-test/var/tmp/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/build/ps-5.7/mysql-test 115x22
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.7.20-debug-log Source distribution

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
sveta@Thinkie:~/mysql_packages/Percona-Server-5.5.49-rel37.9-Linux.x86_64-ssl100/mysql-test 115x19
sveta@Thinkie:~/mysql_packages/Percona-Server-5.5.49-rel37.9-Linux.x86_64-ssl100/mysql-test 115x19
worker[] mysql:1 13001 /tmp/foobarak/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/mysql_packages/Percona-Server-5.5.49-rel37.9-Linux.x86_64-ssl100/mysql-test 115x19
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 1
Server version: 5.5.49-37.9-log Percona Server (GPL), Release 37.9, Revision efa0073

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
sveta@Thinkie:~/build/ps-5.7/mysql-test 115x22
sveta@Thinkie:~/build/ps-5.7/mysql-test 115x22
worker[] Started [mysqld.1 - pid: 3514, wpidid: 3514]
worker[] Using config for test innodb.innodb
worker[] Port and socket path for server(s):
worker[] mysql:1 13041 /home/sveta/build/ps-5.7/mysql-test/var/tmp/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/build/ps-5.7/mysql-test 115x22
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.7.20-19-debug-log Source distribution

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
sveta@Thinkie:~/mysql_packages/mariadb-10.2.5-Linux.x86_64/mysql-test 115x22
TEST
RESULT TIME (ms) or COMMENT
-----
worker[] Using MTR_BUILD_THREAD 305, with reserved ports 16100..16119
worker[]
worker[] Started [mysqld.1 - pid: 3738, wpidid: 3738]
worker[] Using config for test innodb.innodb
worker[] Port and socket path for server(s):
worker[] mysql:1 16100 /home/sveta/mysql_packages/mariadb-10.2.5-Linux.x86_64/mysql-test/var/tmp/mysql:1.sock
worker[] Waiting for server(s) to exit...

sveta@Thinkie:~/mysql_packages/mariadb-10.2.5-Linux.x86_64/mysql-test 115x22
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 8
Server version: 10.2.5-MariaDB-Log MariaDB Server

Copyright (c) 2008, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> [Innodb]> select * from t1 force index(email) where fl='testcancel@foobar.com' and (f21=20 and f21=30 and f2=10000)
order by f2 desc limit 1;
+-----+
f21=20 and
```



# I Investigate

---

- Why customer's SQL works wrongly

# I Investigate

---

- Why customer's SQL works wrongly
- Is this true with all versions?

# I Investigate

---

- Why customer's SQL works wrongly
- Is this true with all versions?
- With all branches?

# I Often Need to Test

---

- Customer's server version

# I Often Need to Test

---

- Customer's server version
- Same major branch, but latest version

# I Often Need to Test

---

- Customer's server version
- Same major branch, but latest version
- Latest version

# I Often Need to Test

---

- Customer's server version
- Same major branch, but latest version
- Latest version
- Upstream

# I Often Need to Test

---

- Customer's server version
- Same major branch, but latest version
- Latest version
- Upstream
- Other forks (e.g. MariaDB)

# I Often Need to Test

---

- Customer's server version
- Same major branch, but latest version
- Latest version
- Upstream
- Other forks (e.g. MariaDB)
- Same scenario

# Test Manually?

---

Not an Option!

# Solutions

---

- MySQL Sandbox
  - Complicated installations with single command
  - Scripts to start/stop/restart mysqld
  - Does NOT enter code for you!

# Solutions

---

- MySQL Sandbox
- Docker
  - Runs everything you wish with single command
  - Not much version variations pre-installed
  - You need to write Dockerfile if you want
    - Custom setup
    - Custom options
    - Run SQL inside Docker
  - **Does NOT check results!**

# Solutions

---

- MySQL Sandbox
- Docker
- MySQL Test Framework

# SQL you are Used to

---

```
$cat mtr_test_1.test
```

```
#!/usr/bin/perl
use strict;
use warnings;
use DBI;
use DBD::mysql;

my $dsn = "mysql://root:root@localhost:3306/test";
my $dbh = DBI->connect($dsn, "root", "root");

my $table = "t";

CREATE TABLE $table (
  id int(11) NOT NULL,
  f varchar(100) DEFAULT NULL,
  PRIMARY KEY (id)
) ENGINE=InnoDB;

insert into $table values(12345, 'value1'), (54321, 'value2');
select * from $table;
show create table $table;

drop table if exists $table;
```

# Custom Options

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/mtr_test_2-master.opt  
--transaction-isolation=read-committed
```

# Concurrent Execution

---

```
--source include/have_innodb.inc
```

```
CREATE TABLE 't' ('id' int(11) NOT NULL, 'f' varchar(100) DEFAULT NULL,  
PRIMARY KEY ('id')) ENGINE=InnoDB;  
insert into t values(12345, 'value1'), (54321, 'value2');
```

```
begin;  
select * from t;
```

```
--connect(addconroot,localhost,root,,)  
--connection addconroot
```

```
begin;  
update t set f='foo' where id=12345;  
commit;
```

```
--connection default  
select * from t;
```

```
11 drop table if exists t;
```



# Error Handling

---

```
--source include/have_innodb.inc
CREATE TABLE 't' ('id' int(11) NOT NULL, 'f' varchar(100) DEFAULT NULL,
PRIMARY KEY ('id')) ENGINE=InnoDB;
insert into t values(12345, 'value1'), (54321, 'value2');
begin;
select * from t where id=12345 lock in share mode;
--connect(addconroot,localhost,root,,)
--connection addconroot

set innodb_lock_wait_timeout=3;
begin;
--error 1205
update t set f='value3' where id=12345;
rollback;

--connection default
rollback;
drop table if exists t;
```



# Result Processing

---

```
...
--connect(addconroot,localhost,root,,)
--connection addconroot
begin;
select * from t where id=54321 for update;

--connection default
--send update t set f='value3' where id=54321

--connection addconroot
update t set f='value3' where id=12345;

--connection default
--error 1213
--reap
...
```

# External Commands

---

```
...  
--exec $MYSQL_DUMP test > $MYSQL_TEST_DIR/var/tmp/mtr_amer_5.sql  
--exec ls $MYSQL_TEST_DIR/var/tmp/
```

```
drop table t;  
show tables;
```

```
--exec $MYSQL test < $MYSQL_TEST_DIR/var/tmp/mtr_amer_5.sql  
show tables;  
select * from t;  
...
```

# Flow Control

---

```
--source include/have_innodb.inc
```

```
CREATE TABLE 't' ('id' int(11) NOT NULL, 'f' varchar(100) DEFAULT NULL,  
PRIMARY KEY ('id')) ENGINE=InnoDB;
```

```
--disable_query_log
```

```
--let $c=1
```

```
while ($c<100)
```

```
{
```

```
--eval insert into t values($c, md5($c))
```

```
--inc $c
```

```
}
```

```
--enable_query_log
```

# Replication from the Box

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_7.test
```

```
--source include/master-slave.inc
```

```
--source include/have_innodb.inc
```

```
# We are on master
```

```
CREATE TABLE 't' ('id' int(11) NOT NULL, 'f' varchar(100) DEFAULT NULL,  
PRIMARY KEY ('id')) ENGINE=InnoDB;
```

```
insert into t values(12345, 'value1'), (54321, 'value2');
```

```
select * from t;
```

```
show create table t;
```

```
--connection slave
```

```
--vertical_results
```

```
show slave status;
```

```
--connection master
```

```
--horizontal_results
```

```
update t set f='foo';
```



# Replication from the Box

---

```
#We are on master
--sync_slave_with_master
#We are on slave
select * from t;

--connection master
drop table if exists t;

--sync_slave_with_master
stop slave;
```

# Replication Options

---

- On master

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_7-master.opt  
--gtid_mode=ON --log-slave-updates --enforce-gtid-consistency --binlog-format=row
```

# Replication Options

---

- On master

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_7-master.opt  
--gtid_mode=ON --log-slave-updates --enforce-gtid-consistency --binlog-format=row
```

- On slave

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_7-slave.opt  
--gtid_mode=ON --log-slave-updates --enforce-gtid-consistency --binlog-format=row
```

# Any Complicated Setup

---

```
--let $rpl_topology= 1->2,2->3,3->1  
--source include/rpl_init.inc
```

# Any Complicated Setup

---

```
--let $rpl_topology= 1->2,2->3,3->1
--source include/rpl_init.inc

# On server 1
--let $rpl_connection_name= server_1
--source include/rpl_connection.inc
create table t1(id int) engine=innodb;
insert into t1 values(1);
```

# Any Complicated Setup

---

```
--let $rpl_topology= 1->2,2->3,3->1
--source include/rpl_init.inc

# On server 1
--let $rpl_connection_name= server_1
--source include/rpl_connection.inc
create table t1(id int) engine=innodb;
insert into t1 values(1);

# On server 2
--let $rpl_connection_name= server_2
--source include/rpl_connection.inc
create table t2(id int) engine=innodb;
insert into t2 values(2);

# On server 3
--let $rpl_connection_name= server_3
--source include/rpl_connection.inc
create table t3(id int) engine=innodb;
insert into t3 values(3);
```

# Complicated Replication Options

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_9.cnf  
!include ../../rpl/my.cnf
```

# Complicated Replication Options

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_9.cnf
!include ../../rpl/my.cnf

[mysqld.1]
log-slave-updates
gtid_mode=ON
enforce-gtid-consistency
```

# Complicated Replication Options

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ cat suite/mtr_test/t/rpl_mtr_test_9.cnf
!include ../../rpl/my.cnf

[mysqld.1]
log-slave-updates
gtid_mode=ON
enforce-gtid-consistency

[mysqld.2]
master-info-repository=TABLE
relay-log-info-repository=TABLE
log-slave-updates
gtid_mode=ON
enforce-gtid-consistency

[mysqld.3]
# Third server options
[ENV]
SERVER_MYPORT_3=          @mysqld.3.port
SERVER_MYSOCK_3=         @mysqld.3.socket
```



# Run by Single Command

---

```
sveta@delly:~/build/ps-5.7/mysql-test$ ./mtr --suite=your_suite your_test
```

```
Logging: ./mtr
```

```
MySQL Version 5.7.19
```

```
...
```

```
=====
```

TEST	RESULT	TIME (ms) or COMMENT
------	--------	----------------------

```
-----
```

```
worker[1] Using MTR_BUILD_THREAD 300, with reserved ports 13000..13009
```

```
create table t1(f1 int);
```

```
insert into t1 values(1);
```

```
select * from t1;
```

```
f1
```

```
1
```

```
drop table t1;
```

```
your_suite.your_test
```

```
[ pass ] 45802
```

```
-----
```

```
The servers were restarted 0 times
```

```
Spent 45.802 of 61 seconds executing testcases
```



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# Run by Single Command

---

- Record result:

```
sveta@delly:~/build/ps-5.7/mysql-test$ ./mtr --record --suite=your_suite your_test
```

```
Logging: ./mtr
```

```
MySQL Version 5.7.19
```

```
Checking supported features...
```

```
...
```

```
=====
```

TEST	RESULT	TIME (ms) or COMMENT
------	--------	----------------------

```
-----
```

```
worker[1] Using MTR_BUILD_THREAD 300, with reserved ports 13000..13009  
your_suite.your_test [ pass ] 45802
```

```
-----
```

```
The servers were restarted 0 times
```

```
Spent 45.802 of 61 seconds executing testcases
```

```
Completed: All 1 tests were successful.
```



# On Any Number of Servers

---

- mysql-scripts

# On Any Number of Servers

---

- `mysql-scripts`
- Run tests: `do_test.sh`

# On Any Number of Servers

---

- `mysql-scripts`
- Run tests: `do_test.sh`
  - With single version

```
$ cp suite/mtr_test/t/mtr_test_1.test ~/src/tests/t
$ do_test.sh -b ps-5.7
Logging: ./mysql-test-run.pl --record --force mtr_test_1
MySQL Version 5.7.19
...
```

# On Any Number of Servers

---

- `mysql-scripts`
- Run tests: `do_test.sh`
  - With multiple versions

```
$ do_test.sh -b ps-5.7 -b ps-5.6 -b ps-5.5
Logging: ./mysql-test-run.pl --record --force mtr_test_1
MySQL Version 5.7.19
Checking supported features...
...
```

# On Any Number of Servers

---

- `mysql-scripts`
- Run tests: `do_test.sh`
- Archive: `ar_test.sh`

# On Any Number of Servers

---

- `mysql-scripts`
- Run tests: `do_test.sh`
- Archive: `ar_test.sh`
- Copy to remote box: `scp_test.sh`

# MySQL Test Framework

---

- SQL Syntax
- Custom commands
- Any complicated setups
- Runs everything automatically
- Checks results

# Thank you!

---

[dev.mysql.com/doc/dev/mysql-server/latest/PAGE\\_MYSQL\\_TEST\\_RUN.html](https://dev.mysql.com/doc/dev/mysql-server/latest/PAGE_MYSQL_TEST_RUN.html)

<https://github.com/svetasmirnova/mysql-scripts>

[https://github.com/svetasmirnova/mtr\\_test](https://github.com/svetasmirnova/mtr_test)

<http://www.slideshare.net/SvetaSmirnova>

<https://twitter.com/svetsmirnova>



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