What's new in MySQL 5.5 and 5.6 replication

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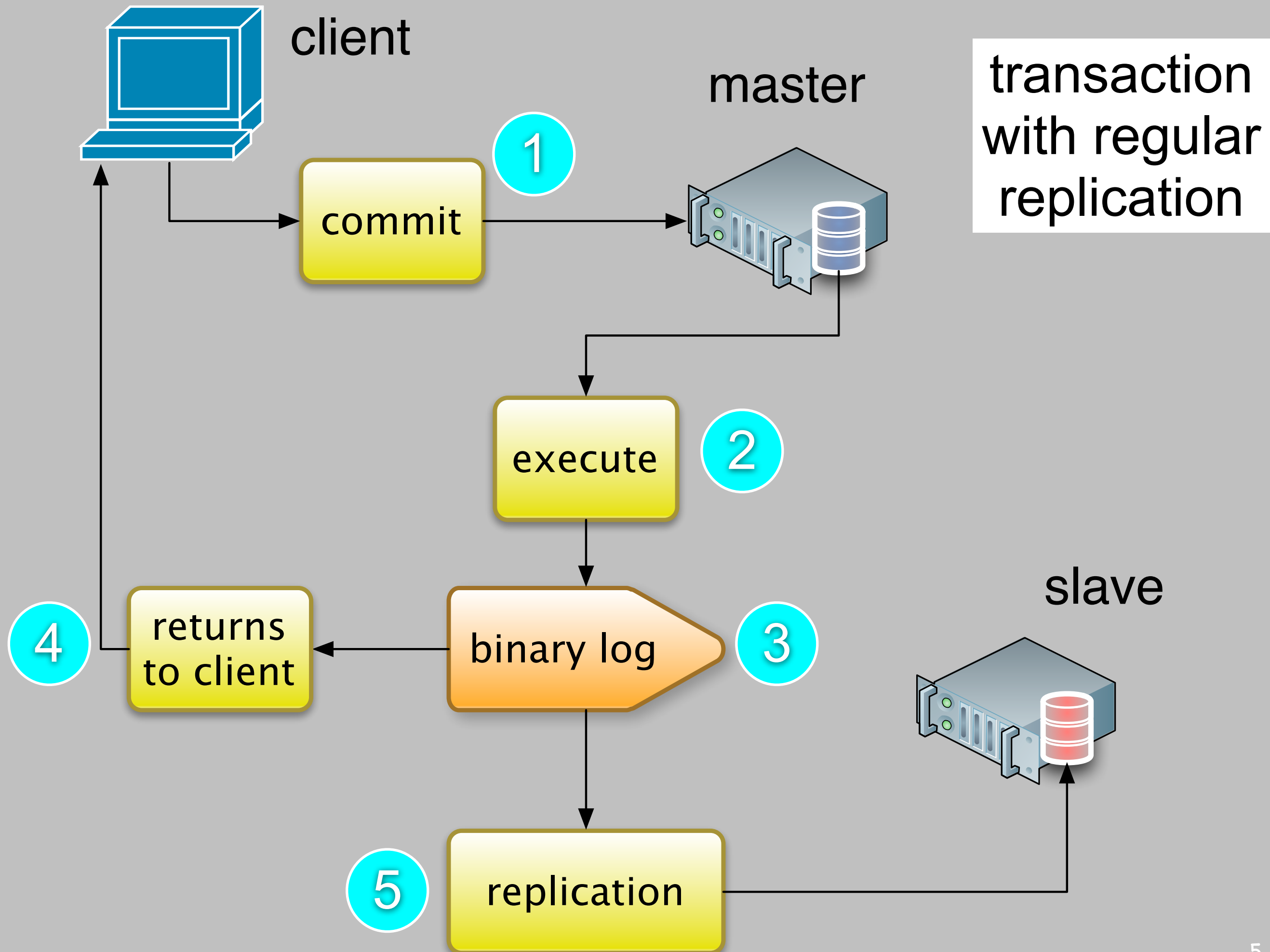Continuent, Inc

AGENDA

- 5.5

  - semi-synchronous replication

- 5.6

  - delayed replication

  - server UUID

  - crash-safe slave

  - multi-thread slave
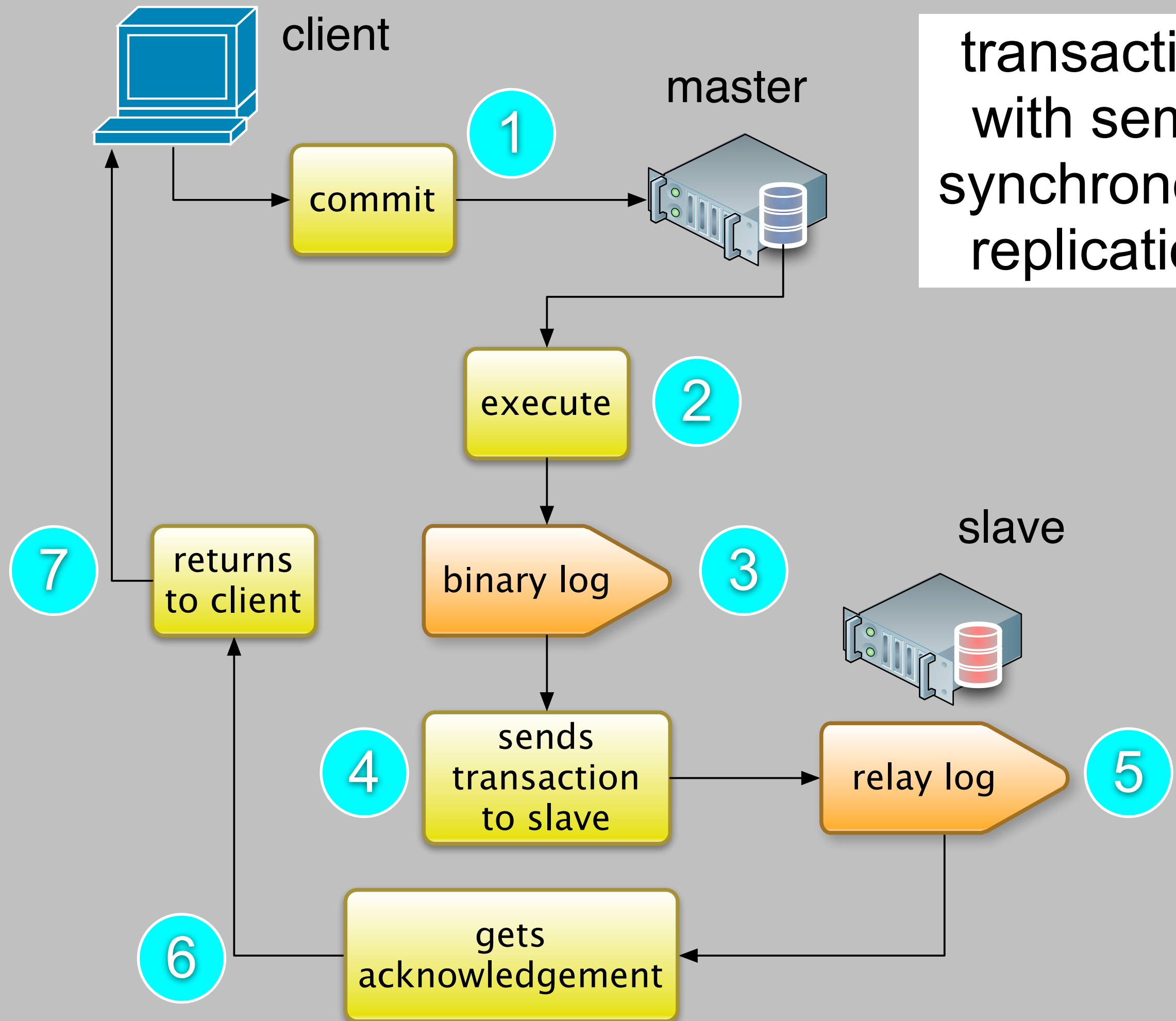
  - Global transaction identifiers

2

semi-synch replication

semi-synchronous replication

- Available in 5.5 and higher

- Makes sure that at least one slave has copied the data.

- Increases reliability

client

master

transaction with regular replication

1

commit

2

execute

slave

4

returns to client

3

binary log

5

replication

5

transaction with semi-synchronous replication

client

master

slave

1 commit

2 execute

3 binary log

4 sends transaction to slave

5 relay log

6 gets acknowledgement

7 returns to client

6

semi-synchronous replication in practice

- installation:
    - it's a plugin.
    - Actually, two plugins

semi-synch replication install

```
# in the master
plugin-load=rpl_semi_sync_master=semisync_master.so
rpl_semi_sync_master_enabled=1


# in each slave
plugin-load=rpl_semi_sync_slave=semisync_slave.so
rpl_semi_sync_slave_enabled=1


# restar all servers
```

semi-synch replication check

```
# in the master
show variables like 'rpl_semi%';

+-------------------------------------+-------+
| Variable_name                       | Value |
+-------------------------------------+-------+
| rpl_semi_sync_master_enabled        | ON    |
| rpl_semi_sync_master_timeout        | 10000 |
| rpl_semi_sync_master_trace_level    | 32    |
| rpl_semi_sync_master_wait_no_slave  | ON    |
+-------------------------------------+-------+
```

semi-synch replication check

```
show status like "rpl_semi_%tx";

+------------------------------------+-------+
| variable_name                      | value |
+------------------------------------+-------+
| RPL_SEMI_SYNC_MASTER_NO_TX   | 0        |
| RPL_SEMI_SYNC_MASTER_YES_TX  | 0        |
+------------------------------------+-------+
```

semi-synch replication test

```
master> create table t1 ( i int);
Query OK, 0 rows affected (0.01 sec)


master> show status like "rpl_semi_%tx";
+----------------------------+-------+
| Variable_name              | Value |
+----------------------------+-------+
| Rpl_semi_sync_master_no_tx  | 0     |
| Rpl_semi_sync_master_yes_tx | 1     |
+----------------------------+-------+
```

disabling semi-synch

```
# for each slave

set global rpl_semi_sync_slave_enabled=0;
stop slave io_thread;
start slave io_thread;
```

disabled semi-synch replication test

```
master> insert into t1 values (1);
Query OK, 1 row affected (10.00 sec)


master> show status like "rpl_semi_%tx";
+-----------------------------+-------+
| Variable_name               | Value |
+-----------------------------+-------+
| Rpl_semi_sync_master_no_tx  | 1     |
| Rpl_semi_sync_master_yes_tx | 1     |
+-----------------------------+-------+
2 rows in set (0.00 sec)
```

disabled semi-synch replication test

```
master> insert into t1 values (2);
Query OK, 1 row affected (0.01 sec)


master> show status like "rpl_semi_%tx";
+-----------------------------+-------+
| Variable_name               | Value |
+-----------------------------+-------+
| Rpl_semi_sync_master_no_tx  | 2     |
| Rpl_semi_sync_master_yes_tx | 1     |
+-----------------------------+-------+
2 rows in set (0.00 sec)
```

re-enabling semi-synch

```
# in one slave

set global rpl_semi_sync_slave_enabled=1;
stop slave io_thread;
start slave io_thread;
```

reenabled semi-synch replication test
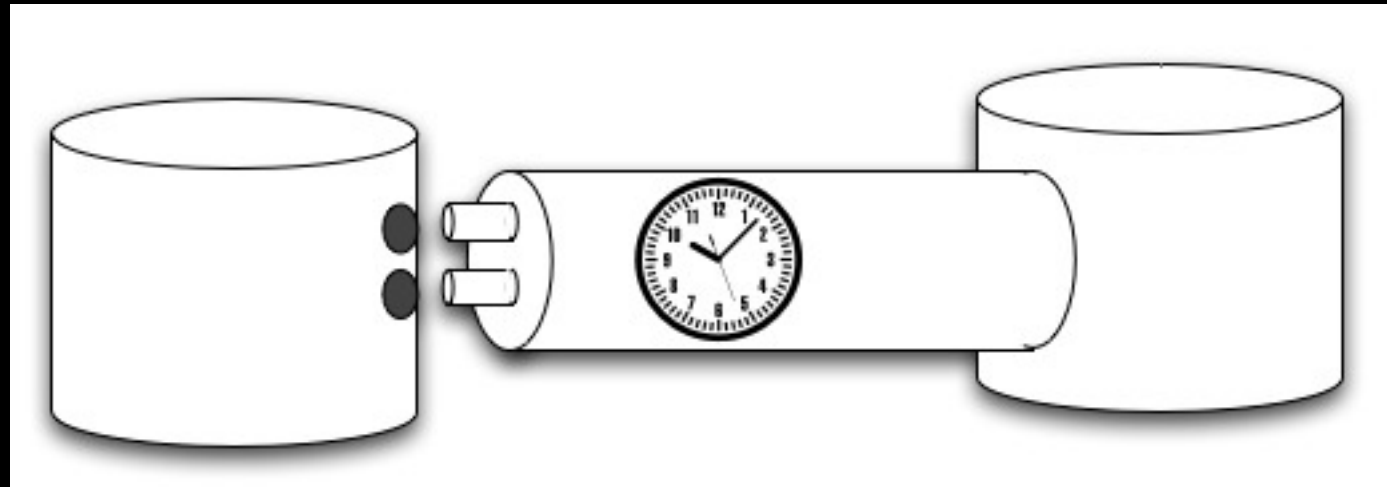
```
master> insert into t1 values (3);
Query OK, 1 row affected (0.01 sec)


master> show status like "rpl_semi_%tx";
+-----------------------------+-------+
| Variable_name               | Value |
+-----------------------------+-------+
| Rpl_semi_sync_master_no_tx  | 2     |
| Rpl_semi_sync_master_yes_tx | 2     |
+-----------------------------+-------+
2 rows in set (0.00 sec)
```

delayed replication

delayed replication in practice

```
STOP SLAVE;

change master to master_delay=60;

START SLAVE;


SHOW SLAVE STATUS\G

(...)

                    SQL_Delay: 60
         SQL_Remaining_Delay: NULL
```

delayed replication in practice

```
master >   use test;
master >   create table t2 (i int);



SHOW SLAVE STATUS\G
(...)
                    SQL_Delay: 60
          SQL_Remaining_Delay: 55


slave> SHOW TABLES FROM test;
+------------------+
| Tables_in_test   |
+------------------+
| t1               |
+------------------+
```

delayed replication in practice

```
# after 1 minute


SHOW SLAVE STATUS\G
(...)
                         SQL_Delay: 60
               SQL_Remaining_Delay: NULL


slave> SHOW TABLES FROM test;
+-----------------+
| Tables_in_test  |
+-----------------+
| t1              |
| t2              |
+-----------------+
```

Server UUID

testing some replication

```
make_replication_sandbox mysql-5.6.5-m8-
osx10.7-.tar.gz
....
....
replication directory installed in
$HOME/sandboxes/rsandbox_mysql-5_6_5
```

testing some replication

```
~/sandboxes/rsandbox_mysql-5_6_5/s1
show slave status\G
********* 1. row *****************************
       Slave_IO_State: Waiting for master to send event
          Master_Host: 127.0.0.1
          Master_User: rsandbox
          Master_Port: 12630
        Connect_Retry: 60
      Master_Log_File: mysql-bin.000001
  Read_Master_Log_Pos: 2524
       Relay_Log_File: mysql_sandbox12631-
relay-bin.000002
        Relay_Log_Pos: 2677
Relay_Master_Log_File: mysql-bin.000001
     Slave_IO_Running: Yes
    Slave_SQL_Running: Yes
```

testing some replication

```
~/sandboxes/rsandbox_mysql-5_6_5/s1
show slave status\G

....
Master_Server_Id: 1
Master_UUID: be3c022a-726f-11e1-a26a-a64f991393aa
Master_Info_File: /Users/gmax/sandboxes/
rsandbox_mysql-5_6_5/node1/data/master.info
SQL_Delay: 0
SQL_Remaining_Delay: NULL
Slave_SQL_Running_State: Slave has read all relay
log; waiting for the slave I/O thread to update it
```

crash safe slave

uncovering replication features

```
show variables like '%info%';
+-------------------------+-----------------+
| Variable_name           | Value           |
+-------------------------+-----------------+
| master_info_repository  | FILE            |
| relay_log_info_file     | relay-log.info  |
| relay_log_info_repository | FILE          |
| sync_master_info        | 0               |
| sync_relay_log_info     | 0               |
+-------------------------+-----------------+
show variables like '%worker%';
+-------------------------+------+
| Variable_name           | Value |
+-------------------------+------+
| slave_parallel_workers  | 0     |
+-------------------------+------+
```

uncovering replication features

```
STOP SLAVE;

set global master_info_repository='table';
Query OK, 0 rows affected (0.00 sec)

slave1 [localhost] {msandbox} ((none)) > set global
relay_log_info_repository='table';
Query OK, 0 rows affected (0.00 sec)

slave1 [localhost] {msandbox} ((none)) > set global
slave_parallel_workers=3;
Query OK, 0 rows affected (0.00 sec)
```

fixing replication tables

```
use mysql;

slave1 [localhost] {msandbox} (mysql) > alter table
slave_master_info engine=innodb;
Query OK, 1 row affected (0.01 sec)
Records: 1  Duplicates: 0  Warnings: 0


slave1 [localhost] {msandbox} (mysql) > alter table
slave_relay_log_info engine=innodb;
Query OK, 1 row affected (0.01 sec)
Records: 1  Duplicates: 0  Warnings: 0


slave1 [localhost] {msandbox} (mysql) > alter table
slave_worker_info engine=innodb;
Query OK, 0 rows affected (0.01 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

Look at the new features

```
show slave status\G
....
....
Master_UUID: be3c022a-726f-11e1-a26a-
a64f991393aa
Master_Info_File:
mysql.slave_master_info
```

Look at the new features

```
select * from mysql.slave_master_info\G
*************************** 1. row ******
                Master_id: 101
          Number_of_lines: 22
          Master_log_name: mysql-bin.000001
           Master_log_pos: 2524
                     Host: 127.0.0.1
                User_name: rsandbox
            User_password: rsandbox
                     Port: 12630
....

                Heartbeat: 1800
                     Bind:
        Ignored_server_ids: 0
        Uuid: be3c022a-726f-11e1-a26a-a64f991393aa
              Retry_count: 86400
```

Look at the new features

```
select * from mysql.slave_relay_log_info\G
*************************** 1. row ***************************
        Master_id: 101
  Number_of_lines: 6
   Relay_log_name: ./mysql_sandbox12631-relay-bin.
000002
    Relay_log_pos: 2677
  Master_log_name: mysql-bin.000001
   Master_log_pos: 2524
        Sql_delay: 0
Number_of_workers: 3
```

Look at the new features

```
select * from mysql.slave_worker_info\G
************** 3. row **********************
                  Master_id: 101
                  Worker_id: 2
            Relay_log_name: ./mysql_sandbox12631-relay-
bin.000003
             Relay_log_pos: 1394
           Master_log_name: mysql-bin.000001
            Master_log_pos: 3651
 Checkpoint_relay_log_name: ./mysql_sandbox12631-relay-
bin.000003
  Checkpoint_relay_log_pos: 1199
Checkpoint_master_log_name: mysql-bin.000001
 Checkpoint_master_log_pos: 3456
          Checkpoint_seqno: 0
     Checkpoint_group_size: 64
   Checkpoint_group_bitmap:
```

multi-threaded slave

facts about multiple threaded slave a.k.a. parallel replication

- Requires MySQL 5.6 in both master and slave

- Parallel replication with a 5.5 master will slow down replication

- Data gets parallelized by schema

enabling multi-threaded slave

```
set global slave_parallel_workers=10;

show variables like '%worker%';
+------------------------+-------+
| Variable_name          | Value |
+------------------------+-------+
| slave_parallel_workers | 10    |
+------------------------+-------+


stop slave; start slave;
```

global transaction identifier

global transaction identifier

- Requires MySQL 5.6 in both master and slave

- requires all servers in the cluster to run these options:

  - log-bin

  - log-slave-updates

  - gtid-mode=ON

  - disable-gtid-unsafe-statements

global transaction identifier issues

- Can't work with:

  - non-transactional updates.

  - temporary tables within transactions

  - CREATE TABLE ... SELECT

- disable-gtid-unsafe-statements will make the server fail on any of the above cases.

enabling global transaction identifiers

```
# change my.cnf in ALL nodes
# (master and slaves)

[mysqld]
log-bin
log-slave-updates
gtid-mode=ON
disable-gtid-unsafe-statements

# restart the servers
```

testing global transaction identifiers

```
create table t1 (i int not null primary key);
show binlog events\G
********* 3. row ***************************
   Log_name: mysql-bin.000002
        Pos: 147
 Event_type: Gtid
  Server_id: 1
End_log_pos: 191
       Info: SET
@@SESSION.GTID_NEXT='44556A96-8417-11E1-9589-2BD5ACDD51FD:1'
********* 4. row ***************************
   Log_name: mysql-bin.000002
        Pos: 191
 Event_type: Query
  Server_id: 1
End_log_pos: 305
       Info: use `test`; create table t1 (i int not null primary
key)
```

testing global transaction identifiers

```
SHOW SLAVE STATUS\G
(...)
    Retrieved_Gtid_Set: 44556A96-8417-11E1-9589-2BD5ACDD51FD:1-2
     Executed_Gtid_Set: 44556A96-8417-11E1-9589-2BD5ACDD51FD:1-2
```

DEMO

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44