Performance Schema

Slides
http://bit.ly/mysql_ps

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What is performance schema?

Performance Schema

Introduced in MySQL 5.5

Performance Schema

Introduced in MySQL 5.5

System database

Performance Schema

Introduced in MySQL 5.5

System database

PERFORMANCE SCHEMA storage engine

```
mysql> SHOW ENGINES\G
*************************** 8. row ***************************
      Engine: InnoDB
     Support: DEFAULT
     Comment: Supports transactions, row-
  level locking, and foreign keys
Transactions: YES
          XA: YES
  Savepoints: YES
*************************** 9. row ***************************
      Engine: PERFORMANCE_SCHEMA
     Support: YES
     Comment: Performance Schema
Transactions: NO
          XA: NO
  Savepoints: NO
9 rows in set (0.00 sec)
```

Performance Schema

Over 50 tables in MySQL 5.6

Performance Schema

Over 50 tables in MySQL 5.6

Not like INFORMATION_SCHEMA

- All lowercase performance_schema

Where to Begin?

setup_instruments

Where to Begin?

setup_instruments

- name

Where to Begin?

setup_instruments

- name
- enabled

Where to Begin?

setup_instruments

- name
- enabled
- timed

Where to Begin?

setup_instruments

- name
- enabled
- timed

SHOW CREATE TABLE

performance_schema.setup_instruments\G

Monitor Name

Heirarchical

Monitor Name

Heirarchical

Looks like a path to a file

Monitor Name

Heirarchical

Looks like a path to a file

e.g.

wait/io/file

Monitor Name

Heirarchical

Looks like a path to a file

e.g.

wait/io/file

statement/sql

Monitor Name

In MySQL 5.6.9-rc

543 total

Monitor Name

In MySQL 5.6.9-rc

543 total

45 wait/io/file monitors

Monitor Name

In MySQL 5.6.9-rc

543 total

45 wait/io/file monitors

147 wait/sync/mutex monitors

Monitor Name

In MySQL 5.6.9-rc

543 total

45 wait/io/file monitors

147 wait/sync/mutex monitors

167 statement/ monitors

Wait Monitor Examples

wait/io/file/sql/binlog

Wait Monitor Examples

wait/io/file/sql/binlog

wait/io/file/innodb/innodb_data_file

Wait Monitor Examples

wait/io/file/sql/binlog

wait/io/file/innodb/innodb_data_file

wait/synch/mutex/sql/PAGE::lock

Wait Monitor Examples

wait/io/file/sql/binlog

wait/io/file/innodb/innodb_data_file

wait/synch/mutex/sql/PAGE::lock

wait/synch/mutex/innodb/buf_pool_mutex

Other Monitor Examples

statement/sql/select

Other Monitor Examples

statement/sql/select

statement/sql/delete

Other Monitor Examples

statement/sql/select

statement/sql/delete

statement/sql/show_privileges

Other Monitor Examples

statement/sql/select

statement/sql/delete

statement/sql/show_privileges

statement/sql/load

Other Monitor Examples

statement/sql/select

statement/sql/delete

statement/sql/show_privileges

statement/sql/load

statement/com/Query

Other Monitor Examples

statement/sql/select

statement/sql/delete

statement/sql/show_privileges

statement/sql/load

statement/com/Query

stage/sql/Copying to tmp table

Other Monitor Examples

statement/sql/select

statement/sql/delete

statement/sql/show_privileges

statement/sql/load

statement/com/Query

stage/sql/Copying to tmp table

stage/sql/Sorting result

Seeing What is Enabled

```
mysql> select name from
  performance_schema.setup_instruments
  where enabled='YES';
```

Seeing What is Enabled

```
mysql> select name from
  PERFORMANCE_SCHEMA.SETUP_INSTRUMENTS
  where enabled='YES';
+-----------------------------------+
| name                              |
+-----------------------------------+
| wait/io/file/sql/map              |
| wait/io/file/sql/binlog           |
```

Seeing What is Enabled

```
mysql> select name from
  PERFORMANCE_SCHEMA.SETUP_INSTRUMENTS
  where enabled='YES';
+-------------------------------------+
| name                                |
+-------------------------------------+
| wait/io/file/sql/map                |
| wait/io/file/sql/binlog             |
| wait/io/file/sql/binlog_index       |
| wait/io/file/sql/relaylog           |
…
215 rows in set (0.00 sec)
```

Global performance_schema

```
mysql> SHOW GLOBAL VARIABLES LIKE
  'performance_schema';
```

Global performance_schema

```
mysql> SHOW GLOBAL VARIABLES LIKE
  'performance_schema';
+--------------------+-------+
| Variable_name      | Value |
+--------------------+-------+
| performance_schema | ON    |
+--------------------+-------+
1 row in set (0.01 sec)
```

performance_schema

Static variable

performance_schema

Static variable

ON by default in MySQL 5.6

performance_schema

Static variable

ON by default in MySQL 5.6

- Many performance improvements

performance_schema

Static variable

ON by default in MySQL 5.6

- Many performance improvements

OFF by default in MySQL 5.5

performance_schema

Static variable

ON by default in MySQL 5.6

- Many performance improvements

OFF by default in MySQL 5.5

- Requires restart to turn on

Important setup_ tables

setup_instruments table

- what instruments are monitored

Important setup_ tables

setup_instruments table

- what instruments are monitored

setup_consumers table

Important setup_ tables

setup_instruments table

- what instruments are monitored

setup_consumers table

- what information is stored about instruments

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setup_consumers table

- what information is stored about instruments

setup_timers table

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- what instruments are monitored

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- what information is stored about instruments

setup_timers table

- information about how events are timed

Important setup_ tables

setup_instruments table

- what instruments are monitored

setup_consumers table

- **what information is stored about instruments**

setup_timers table

- information about how events are timed

```
mysql> SELECT * FROM setup_consumers;
+--------------------------------+---------+
| NAME                           | ENABLED |
+--------------------------------+---------+
|                                |         |
|                                |         |
|                                |         |
| events_statements_current      | YES     |
| events_statements_history      | NO      |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
+--------------------------------+---------+
12 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM setup_consumers;
+--------------------------------+---------+
| NAME                           | ENABLED |
+--------------------------------+---------+
| events_stages_current          | NO      |
| events_stages_history          | NO      |
| events_stages_history_long     | NO      |
| events_statements_current      | YES     |
| events_statements_history      | NO      |
| events_statements_history_long | NO      |
| events_waits_current           | NO      |
| events_waits_history           | NO      |
| events_waits_history_long      | NO      |
| global_instrumentation         | YES     |
| thread_instrumentation         | YES     |
| statements_digest              | YES     |
+--------------------------------+---------+
12 rows in set (0.00 sec)
```

Important setup_ tables

setup_instruments table

- what instruments are monitored

setup_consumers table

- what information is stored about instruments

setup_timers table

- **information about how events are timed**

setup_timers

```
mysql> SELECT * FROM setup_timers;
+-------------+-------------+
| NAME        | TIMER_NAME  |
+-------------+-------------+
| idle        | MICROSECOND |
| wait        | CYCLE       |
| stage       | NANOSECOND  |
| statement   | NANOSECOND  |
+-------------+-------------+
4 rows in set (0.00 sec)
```

performance_timers

```
mysql> SELECT * FROM performance_timers\G
*************************** 1. row ***************************
```

performance_timers

```
mysql> SELECT * FROM performance_timers\G
*************************** 1. row ***************************
       TIMER_NAME: CYCLE
  TIMER_FREQUENCY: 2492472636
TIMER_RESOLUTION: 1
   TIMER_OVERHEAD: 18
```

performance_timers

```
mysql> SELECT * FROM performance_timers\G
*************************** 1. row ***************************
       TIMER_NAME: CYCLE
 TIMER_FREQUENCY: 2492472636
TIMER_RESOLUTION: 1
  TIMER_OVERHEAD: 18
*************************** 2. row ***************************
       TIMER_NAME: NANOSECOND
 TIMER_FREQUENCY: 1000000000
TIMER_RESOLUTION: 1
  TIMER_OVERHEAD: 59
…
5 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM setup_consumers;
+--------------------------------+---------+
| NAME                           | ENABLED |
+--------------------------------+---------+
|                                |         |
|                                |         |
|                                |         |
| events_statements_current      | YES     |
| events_statements_history      | NO      |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
+--------------------------------+---------+
12 rows in set (0.00 sec)
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row **********************
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                THREAD_ID: 260436
                 EVENT_ID: 10
             END_EVENT_ID: 10
               EVENT_NAME: statement/sql/select
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ******************** 1. row ********************
                THREAD_ID: 260436
                 EVENT_ID: 10
             END_EVENT_ID: 10
               EVENT_NAME: statement/sql/select
                   SOURCE: mysqld.cc:923
              TIMER_START: 232362318970123000
                TIMER_END: 232362348008490000
               TIMER_WAIT: 29038367000
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                  THREAD_ID: 260436
                   EVENT_ID: 10
               END_EVENT_ID: 10
                 EVENT_NAME: statement/sql/select
                     SOURCE: mysqld.cc:923
                TIMER_START: 23236231897012300
                  TIMER_END: 23236234800849000
                 TIMER_WAIT: 29038367000
```

TIMER_WAIT = TIMER_END – TIMER_START

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                  THREAD_ID: 260436
                   EVENT_ID: 10
               END_EVENT_ID: 10
                 EVENT_NAME: statement/sql/select
                     SOURCE: mysqld.cc:923
                TIMER_START: 23236231897012300
                  TIMER_END: 23236234800849000
                 TIMER_WAIT: 29038367000

TIMER_WAIT = TIMER_END – TIMER_START

0.2903 seconds
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                  THREAD_ID: 260436
                   EVENT_ID: 10
               END_EVENT_ID: 10
                 EVENT_NAME: statement/sql/select
                     SOURCE: mysqld.cc:923
                TIMER_START: 23236231897012300
                  TIMER_END: 23236234800849000
                 TIMER_WAIT: 29038367000
                  LOCK_TIME: 235000000
                   SQL_TEXT: SELECT content
      FROM runs_logs
      WHERE buildbot_id = '25840763' AND type =
  'raw'
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
   ********************* 1. row *********************
                  DIGEST:
22515fa2d311917737990f527f387ed3
             DIGEST_TEXT: SELECT `content` FROM
`runs_logs` WHERE `buildbot_id` = ? AND TYPE =
?
        CURRENT_SCHEMA: tbpl_dev_allizom_org
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
   ********************* 1. row *********************
                  DIGEST:
22515fa2d311917737990f527f387ed3
             DIGEST_TEXT: SELECT `content` FROM
`runs_logs` WHERE `buildbot_id` = ? AND TYPE =
?
          CURRENT_SCHEMA: tbpl_dev_allizom_org
             OBJECT_TYPE: NULL
           OBJECT_SCHEMA: NULL
             OBJECT_NAME: NULL
 OBJECT_INSTANCE_BEGIN: NULL
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
   ********************* 1. row *********************
                  DIGEST:
22515fa2d311917737990f527f387ed3
             DIGEST_TEXT: SELECT `content` FROM
`runs_logs` WHERE `buildbot_id` = ? AND TYPE =
?
           CURRENT_SCHEMA: tbpl_dev_allizom_org
              OBJECT_TYPE: NULL
            OBJECT_SCHEMA: NULL
              OBJECT_NAME: NULL
     OBJECT_INSTANCE_BEGIN: NULL
              MYSQL_ERRNO: 0
        RETURNED_SQLSTATE: NULL
             MESSAGE_TEXT: NULL
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
   ********************* 1. row *********************
                  DIGEST:
22515fa2d311917737990f527f387ed3
             DIGEST_TEXT: SELECT `content` FROM
`runs_logs` WHERE `buildbot_id` = ? AND TYPE =
?
           CURRENT_SCHEMA: tbpl_dev_allizom_org
              OBJECT_TYPE: NULL
            OBJECT_SCHEMA: NULL
              OBJECT_NAME: NULL
     OBJECT_INSTANCE_BEGIN: NULL
              MYSQL_ERRNO: 0
        RETURNED_SQLSTATE: NULL
             MESSAGE_TEXT: NULL
                   ERRORS: 0
                 WARNINGS: 0
            ROWS_AFFECTED: 0
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                ROWS_SENT: 0
            ROWS_EXAMINED: 0
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ******************** 1. row ********************
                ROWS_SENT: 0
            ROWS_EXAMINED: 0
CREATED_TMP_DISK_TABLES: 0
      CREATED_TMP_TABLES: 0
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ******************** 1. row ********************
                ROWS_SENT: 0
            ROWS_EXAMINED: 0
CREATED_TMP_DISK_TABLES: 0
      CREATED_TMP_TABLES: 0
        SELECT_FULL_JOIN: 0
 SELECT_FULL_RANGE_JOIN: 0
           SELECT_RANGE: 0
     SELECT_RANGE_CHECK: 0
              SELECT_SCAN: 1
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                ROWS_SENT: 0
            ROWS_EXAMINED: 0
CREATED_TMP_DISK_TABLES: 0
      CREATED_TMP_TABLES: 0
        SELECT_FULL_JOIN: 0
 SELECT_FULL_RANGE_JOIN: 0
           SELECT_RANGE: 0
     SELECT_RANGE_CHECK: 0
              SELECT_SCAN: 1
       SORT_MERGE_PASSES: 0
              SORT_RANGE: 0
               SORT_ROWS: 0
               SORT_SCAN: 0
```

```
SELECT * FROM events_statements_current
LIMIT 1\G
    ********************* 1. row *********************
                ROWS_SENT: 0
            ROWS_EXAMINED: 0
CREATED_TMP_DISK_TABLES: 0
      CREATED_TMP_TABLES: 0
        SELECT_FULL_JOIN: 0
 SELECT_FULL_RANGE_JOIN: 0
           SELECT_RANGE: 0
      SELECT_RANGE_CHECK: 0
             SELECT_SCAN: 1
       SORT_MERGE_PASSES: 0
              SORT_RANGE: 0
               SORT_ROWS: 0
               SORT_SCAN: 0
           NO_INDEX_USED: 1
      NO_GOOD_INDEX_USED: 0
        NESTING_EVENT_ID: NULL
      NESTING_EVENT_TYPE: NULL
```

```
mysql>  select * from events_statements_history
  limit 1\G
Empty set (0.00 sec)
```

```
mysql> SELECT * FROM setup_consumers;
+--------------------------------+---------+
| NAME                           | ENABLED |
+--------------------------------+---------+
|                                |         |
|                                |         |
|                                |         |
| events_statements_current      | YES     |
| events_statements_history      | NO      |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
+--------------------------------+---------+
12 rows in set (0.00 sec)
```

“Interesting” Queries

```
SELECT event_name,sql_text FROM
  events_statements_current
```

“Interesting” Queries

```
SELECT event_name,sql_text FROM
  events_statements_current
      WHERE lock_time>0
```

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE lock_time>0

WHERE rows_examined>rows_sent

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE lock_time>0

WHERE rows_examined>rows_sent

WHERE no_index_used!=0

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE lock_time>0

WHERE rows_examined>rows_sent

WHERE no_index_used!=0

WHERE created_tmp_tables>0

“Interesting” Queries

```
SELECT event_name,sql_text FROM
  events_statements_current
        WHERE lock_time>0
        WHERE rows_examined>rows_sent
        WHERE no_index_used!=0
        WHERE created_tmp_tables>0
        WHERE created_tmp_disk_tables>0
```

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

- WHERE lock_time>0
- WHERE rows_examined>rows_sent
- WHERE no_index_used!=0
- WHERE created_tmp_tables>0
- WHERE created_tmp_disk_tables>0

– Joins, sorts, scans....

“Interesting” Queries

```
SELECT event_name,sql_text FROM
  events_statements_current
      WHERE timer_end – timer_start>1000
```

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE timer_end – timer_start>1000

- Timing is in picoseconds

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE timer_end – timer_start>1000

- Timing is in picoseconds
- One trillionth of a second

“Interesting” Queries

SELECT event_name,sql_text FROM events_statements_current

WHERE timer_end – timer_start>1000

- Timing is in picoseconds
- One trillionth of a second
- No matter what setup_timers is

```
mysql> SELECT * FROM setup_consumers;
+--------------------------------+---------+
| NAME                           | ENABLED |
+--------------------------------+---------+
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
|                                |         |
| statements_digest              | YES     |
+--------------------------------+---------+
12 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
            SCHEMA_NAME: tbpl_dev_allizom_org
                 DIGEST:
 22515fa2d311917737990f527f387ed3
            DIGEST_TEXT: SELECT `content`
 FROM `runs_logs` WHERE `buildbot_id` = ?
 AND TYPE = ?
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
            SCHEMA_NAME: tbpl_dev_allizom_org
                 DIGEST:
 22515fa2d311917737990f527f387ed3
            DIGEST_TEXT: SELECT `content`
 FROM `runs_logs` WHERE `buildbot_id` = ?
 AND TYPE = ?
             COUNT_STAR: 9236
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
            SCHEMA_NAME: tbpl_dev_allizom_org
                 DIGEST:
 22515fa2d311917737990f527f387ed3
            DIGEST_TEXT: SELECT `content`
 FROM `runs_logs` WHERE `buildbot_id` = ?
 AND TYPE = ?
              COUNT_STAR: 9236
          SUM_TIMER_WAIT: 85708388944000
          MIN_TIMER_WAIT: 100534000
          AVG_TIMER_WAIT: 9279816000
          MAX_TIMER_WAIT: 44538747900O
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
                SUM_LOCK_TIME: 606242000000
                   SUM_ERRORS: 0
                 SUM_WARNINGS: 0
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
                SUM_LOCK_TIME: 606242000000
                   SUM_ERRORS: 0
                 SUM_WARNINGS: 0
            SUM_ROWS_AFFECTED: 0
                SUM_ROWS_SENT: 9238
            SUM_ROWS_EXAMINED: 9238
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
                  SUM_LOCK_TIME: 60624200000
                     SUM_ERRORS: 0
                   SUM_WARNINGS: 0
              SUM_ROWS_AFFECTED: 0
                  SUM_ROWS_SENT: 9238
              SUM_ROWS_EXAMINED: 9238
SUM_CREATED_TMP_DISK_TABLES: 0
      SUM_CREATED_TMP_TABLES: 0
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************
                  SUM_LOCK_TIME: 60624200000
                     SUM_ERRORS: 0
                   SUM_WARNINGS: 0
              SUM_ROWS_AFFECTED: 0
                  SUM_ROWS_SENT: 9238
              SUM_ROWS_EXAMINED: 9238
SUM_CREATED_TMP_DISK_TABLES: 0
      SUM_CREATED_TMP_TABLES: 0
        SUM_SELECT_FULL_JOIN: 0
 SUM_SELECT_FULL_RANGE_JOIN: 0
            SUM_SELECT_RANGE: 0
      SUM_SELECT_RANGE_CHECK: 0
               SUM_SELECT_SCAN: 0
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************

 SUM_SORT_MERGE_PASSES: 0
         SUM_SORT_RANGE: 0
          SUM_SORT_ROWS: 0
          SUM_SORT_SCAN: 0
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************

 SUM_SORT_MERGE_PASSES: 0
         SUM_SORT_RANGE: 0
          SUM_SORT_ROWS: 0
          SUM_SORT_SCAN: 0
      SUM_NO_INDEX_USED: 0
SUM_NO_GOOD_INDEX_USED: 0
```

```
mysql> SELECT * FROM
  events_statements_summary_by_digest
 LIMIT 1\G
*************************** 1. row ***************************

 SUM_SORT_MERGE_PASSES: 0
         SUM_SORT_RANGE: 0
          SUM_SORT_ROWS: 0
          SUM_SORT_SCAN: 0
      SUM_NO_INDEX_USED: 0
SUM_NO_GOOD_INDEX_USED: 0
             FIRST_SEEN: 2013-07-26 08:05:24
              LAST_SEEN: 2013-07-29 00:50:28
1 row in set (0.14 sec)
```

events_statements_summary_by_digest

`events_statements_summary_by_digest`

Powerful

`events_statements_summary_by_digest`

Powerful

Similar to pt-query-digest

`events_statements_summary_by_digest`

Powerful

Similar to pt-query-digest

Only in MySQL 5.6

Changing the Monitoring

Dynamic

Changing the Monitoring

Dynamic

Benchmark before and after

Changing the Monitoring

Dynamic

Benchmark before and after

“path” format makes this easy

Changing the Monitoring

Turn off CSV table monitoring of timing:

Changing the Monitoring

Turn off CSV table monitoring of timing:

```
UPDATE setup_instruments SET timed = 'NO'
  WHERE name like '%csv%';
```

Changing the Monitoring

Turn off CSV table monitoring of timing:

```
UPDATE setup_instruments SET timed = 'NO'
  WHERE name like '%csv%';
```

Completely eliminate all CSV instruments:

Changing the Monitoring

Turn off CSV table monitoring of timing:

```
UPDATE setup_instruments SET timed = 'NO'
  WHERE name like '%csv%';
```

Completely eliminate all CSV instruments:

```
UPDATE setup_instruments SET enabled = 'NO'
  WHERE name LIKE '%csv%';
```

Changing the Monitoring

Turn off CSV table monitoring of timing:

```
UPDATE setup_instruments SET timed = 'NO'
  WHERE name like '%csv%';
```

Completely eliminate all CSV instruments:

```
UPDATE setup_instruments SET enabled = 'NO'
  WHERE name LIKE '%csv%';
```

Disable all instruments:

Changing the Monitoring

Turn off CSV table monitoring of timing:

```
UPDATE setup_instruments SET timed = 'NO'
  WHERE name like '%csv%';
```

Completely eliminate all CSV instruments:

```
UPDATE setup_instruments SET enabled = 'NO'
  WHERE name LIKE '%csv%';
```

Disable all instruments:

```
UPDATE setup_instruments SET enabled = 'NO';
```

Changing the Monitoring

Enable only I/O monitoring:

Changing the Monitoring

Enable only I/O monitoring:

```
UPDATE setup_instruments SET enabled = 'YES'
  WHERE name LIKE '%/io%';
```

Changing the Monitoring

Enable only I/O monitoring:

```
UPDATE setup_instruments SET enabled = 'YES'
  WHERE name LIKE '%/io%';
```

More complicated example from the MySQL Manual:

Changing the Monitoring

Enable only I/O monitoring:

```
UPDATE setup_instruments SET enabled = 'YES'
  WHERE name LIKE '%/io%';
```

More complicated example from the MySQL Manual:

```
UPDATE setup_instruments SET ENABLED =
  IF(NAME LIKE 'wait/io/file/%','NO','YES');
```

Changing the Monitoring

Enable only I/O monitoring:

```
UPDATE setup_instruments SET enabled = 'YES'
  WHERE name LIKE '%/io%';
```

More complicated example from the MySQL Manual:

```
UPDATE setup_instruments SET ENABLED =
  IF(NAME LIKE 'wait/io/file/%','NO','YES');
```

Disable history tables:

Changing the Monitoring

Enable only I/O monitoring:

```
UPDATE setup_instruments SET enabled = 'YES'
  WHERE name LIKE '%/io%';
```

More complicated example from the MySQL Manual:

```
UPDATE setup_instruments SET ENABLED =
  IF(NAME LIKE 'wait/io/file/%','NO','YES');
```

Disable history tables:

```
UPDATE setup_consumers SET enabled = 'NO'
  WHERE name LIKE '%history%';
```

Tables with Information

events_statements_summary_by_digest

events_statements_current

events_waits_summary_global_by_event_name

Most Frequent Waits

events_waits_summary_global_by_event_name

Top 5 most frequent wait events:

Most Frequent Waits

events_waits_summary_global_by_event_name

Top 5 most frequent wait events:

```
SELECT * FROM

  events_waits_summary_global_by_event_name
```

Most Frequent Waits

events_waits_summary_global_by_event_name

Top 5 most frequent wait events:

```
SELECT * FROM
  events_waits_summary_global_by_event_name
WHERE count_star > 0 ORDER BY count_star
  DESC limit 5\G
```

Longest Waits

events_waits_summary_global_by_event_name

Find events that have been waiting the most:

Longest Waits

events_waits_summary_global_by_event_name

Find events that have been waiting the most:

```
SELECT * FROM

  events_waits_summary_global_by_event_name
```

Longest Waits

events_waits_summary_global_by_event_name

Find events that have been waiting the most:

```
SELECT * FROM
  events_waits_summary_global_by_event_name
  ORDER BY sum_timer_wait DESC limit 5\G
```

Most Frequent **File** Wait Event

Most Frequent **File** Wait Event

```
mysql> SELECT event_name FROM
  file_summary_by_event_name
```

Most Frequent File Wait Event

```
mysql> SELECT event_name FROM
  file_summary_by_event_name ORDER BY
  count_read DESC LIMIT 1;
```

Most Frequent File Wait Event

```
mysql> SELECT event_name FROM
  file_summary_by_event_name ORDER BY
  count_read DESC LIMIT 1;
+----------------------------------+
| event_name                       |
+----------------------------------+
|wait/io/file/innodb/innodb_data_file|
+----------------------------------+
```

wait/io/file/innodb/innodb_data_file

wait/io/file/innodb/innodb_data_file

Query the file_summary_by_instance table to see all the files affected by that event:

wait/io/file/innodb/innodb_data_file

Query the file_summary_by_instance table to see all the files affected by that event:

```
mysql> SELECT file_name FROM
  file_summary_by_instance
```

wait/io/file/innodb/innodb_data_file

Query the file_summary_by_instance table to see all the files affected by that event:

```
mysql> SELECT file_name FROM
  file_summary_by_instance WHERE event_name =
  'wait/io/file/innodb/innodb_data_file';
```

wait/io/file/innodb/innodb_data_file

Query the file_summary_by_instance table to see all the files affected by that event:

```
mysql> SELECT file_name FROM
  file_summary_by_instance WHERE event_name =
  'wait/io/file/innodb/innodb_data_file';
+-------------------------------------+
| file_name                           |
+-------------------------------------+
| /var/lib/mysql/my_fks/mytable_inno.ibd   |
|/var/lib/mysql/my_fks/etl_download_control.
  ibd                                |
| /var/lib/mysql/ibdata1              |
+-------------------------------------+
```

Files with the most writes:

Files with the most writes:

```
mysql> SELECT * FROM
  file_summary_by_event_name
```

Files with the most writes:

```
mysql> SELECT * FROM
  file_summary_by_event_name
ORDER BY COUNT_WRITE DESC limit 2\G
```

Files with the most writes:

```
mysql> SELECT * FROM
  file_summary_by_event_name
ORDER BY COUNT_WRITE DESC limit 2\G
*************************** 1. row ***************************
           EVENT_NAME: wait/io/file/innodb/innodb_log_file
           COUNT_READ: 6
          COUNT_WRITE: 15497630
SUM_NUMBER_OF_BYTES_READ: 69632
SUM_NUMBER_OF_BYTES_WRITE: 56373471232
```

Files with the most writes:

```
mysql> SELECT * FROM
  file_summary_by_event_name
ORDER BY COUNT_WRITE DESC limit 2\G
*************************** 1. row ***************************
           EVENT_NAME: wait/io/file/innodb/innodb_log_file
           COUNT_READ: 6
          COUNT_WRITE: 15497630
SUM_NUMBER_OF_BYTES_READ: 69632
SUM_NUMBER_OF_BYTES_WRITE: 56373471232
*************************** 2. row ***************************
           EVENT_NAME: wait/io/file/aria/MAI
           COUNT_READ: 1233229
          COUNT_WRITE: 15366900
SUM_NUMBER_OF_BYTES_READ: 491022284
SUM_NUMBER_OF_BYTES_WRITE: 577624076
2 rows in set (0.00 sec)
```

Files with the most reads:

Files with the most reads:

```
mysql> SELECT * FROM file_summary_by_event_name
ORDER BY COUNT_READ DESC limit 2\G
```

Files with the most reads:

```
mysql> SELECT * FROM file_summary_by_event_name
ORDER BY COUNT_READ DESC limit 2\G
*************************** 1. row ***************************
           EVENT_NAME: wait/io/file/myisam/dfile
           COUNT_READ: 1809256185
          COUNT_WRITE: 2965886
SUM_NUMBER_OF_BYTES_READ: 2527870679350
SUM_NUMBER_OF_BYTES_WRITE: 3547570604
```

Files with the most reads:

```
mysql> SELECT * FROM file_summary_by_event_name
ORDER BY COUNT_READ DESC limit 2\G
*************************** 1. row ***************************
           EVENT_NAME: wait/io/file/myisam/dfile
           COUNT_READ: 1809256185
          COUNT_WRITE: 2965886
SUM_NUMBER_OF_BYTES_READ: 2527870679350
SUM_NUMBER_OF_BYTES_WRITE: 3547570604
*************************** 2. row ***************************
           EVENT_NAME: wait/io/file/aria/MAD
           COUNT_READ: 150850634
          COUNT_WRITE: 14512
SUM_NUMBER_OF_BYTES_READ: 1198672551
SUM_NUMBER_OF_BYTES_WRITE: 800649588
2 rows in set (0.00 sec)
```

Mutex Locks

Mutex Locks

Query what threads have an open mutex lock:

Mutex Locks

Query what threads have an open mutex lock:

```
SELECT * FROM mutex_instances
WHERE locked_by_thread_id IS NOT NULL\G
```

Read/Write Locks

Find out which threads are write locked:

Read/Write Locks

Find out which threads are write locked:

```
SELECT * FROM rwlock_instances
```

Read/Write Locks

Find out which threads are write locked:

```
SELECT * FROM rwlock_instances
WHERE write_locked_by_thread_id
IS NOT NULL;
```

Read/Write Locks

Find out which threads are write locked:

```
SELECT * FROM rwlock_instances
WHERE write_locked_by_thread_id
IS NOT NULL;
```

Find out top 5 read locked threads:

Read/Write Locks

Find out which threads are write locked:

```
SELECT * FROM rwlock_instances
WHERE write_locked_by_thread_id
IS NOT NULL;
```

Find out top 5 read locked threads:

```
SELECT * FROM rwlock_instances
ORDER BY read_locked_by_count DESC
LIMIT 5\G
```

Confusing?

PERFORMANCE_SCHEMA in 5.6.9 has 52 tables

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Mark Leith's ps_helper

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Views/procedures for 5.5 and 5.6

ps_helper

5.5 views

ps_helper

5.5 views

latest_file_io

ps_helper

5.5 views

- latest_file_io
- top_io_by_file

ps_helper

5.5 views

- latest_file_io
- top_io_by_file
- top_io_by_thread

ps_helper

5.5 views

- latest_file_io
- top_io_by_file
- top_io_by_thread
- top_global_consumers_by_avg_latency

ps_helper

5.5 views

- latest_file_io
- top_io_by_file
- top_io_by_thread
- top_global_consumers_by_avg_latency
- top_global_consumers_by_total_latency

ps_helper

5.5 views

- latest_file_io
- top_io_by_file
- top_io_by_thread
- top_global_consumers_by_avg_latency
- top_global_consumers_by_total_latency
- top_global_io_consumers_by_latency

ps_helper

5.5 views

- latest_file_io
- top_io_by_file
- top_io_by_thread
- top_global_consumers_by_avg_latency
- top_global_consumers_by_total_latency
- top_global_io_consumers_by_latency
- top_global_io_consumers_by_bytes_usage

ps_helper

5.6 views

ps_helper

5.6 views

- statement_analysis

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans
- statements_with_errors_or_warnings

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans
- statements_with_errors_or_warnings
- schema_table_statistics

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans
- statements_with_errors_or_warnings
- schema_table_statistics
- schema_index_statistics

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans
- statements_with_errors_or_warnings
- schema_table_statistics
- schema_index_statistics
- schema_unused_indexes

ps_helper

5.6 views

- statement_analysis
- statements_with_runtimes_in_95th_percentile
- statements_with_temp_tables
- statements_with_sorting
- statements_with_full_table_scans
- statements_with_errors_or_warnings
- schema_table_statistics
- schema_index_statistics
- schema_unused_indexes
- schema_tables_with_full_table_scans

Resources

OurSQL Podcast episodes 139, 140, 141

- http://bit.ly/oursql139
- http://bit.ly/oursql140
- http://bit.ly/oursql141

Slides:

- http://bit.ly/mysql_ps