If you can't clearly read this text, move closer. You'll thank me later.

Find Query Problems Proactively With Query Reviews

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Pythian

love your data

About Pythian

- Recognized Leader:
  - Global industry-leader in database infrastructure services for Oracle, Oracle Applications, MySQL and SQL Server
  - 150 current multinational companies such as Forbes.com, Fox Sports and Western Union to help manage their complex IT deployments
- Expertise:
  - One of the world's largest concentrations of dedicated, full-time DBA expertise.
- Global Reach & Scalability:
  - 24/7/365 global remote support for DBA and consulting, systems administration, special projects or emergency response

Query Review

- What is it?
  - Systematic review of all queries
- Why do it?
  - Find queries before they become a problem
  - Often a sample query is non-trivial to find

Query Review

- Who should do it?
  - Optimization knowledge
- When and where should it be done?
  - dev → test,load test,staging → production

Main tool

- mk-query-digest
  - “query fingerprint”
- Can be used on:
  - Slow query logs
  - Binary logs
  - General query logs

More mk-query-digest sources

- Direct database querying
  - Uses SHOW FULL PROCESSLIST
- pglog (Postgres)
- Parsing tcpdump for traffic:
  - MySQL
  - memcached
  - HTTP

Getting mk-query-digest

- wget maatkit.org/get/mk-query-digest
  - Easiest
  - Not always up-to-date!
- http://code.google.com/p/maatkit/
  - More work
  - You get all the maatkit tools, not just one
  - Most up to date

Last week, wget got rev 6067, download is 6070!

What is reported on

- Default setup uses --limit 95%:20
  - To see all queries, --limit 100%
- No --filter by default
- --filter
  - Any attribute at http://code.google.com/p/maatkit/wiki/EventAttributes
  - User, host, database, process id, lock_time, Memc_miss, Rows_sent, Rows_examined, Rows_affected, Rows_read, Query_time, insert_id

Other filters

- If using Percona's patches, you can filter on queries that cause:
  - Filesorts, disk filesorts
  - Temp tables, Temp disk tables
  - Full table scan, full join
  - Query cache hit
  - and more...

Output

- Overall summary
- Detailed report of matching queries
- Query Analysis Summary

- Commands run for examples:

```
perl mk-query-digest --limit 100% \
--review h=127.0.0.1,P=3307,D=maatkit,t=query_review,u=user,p=pass \
--create-review-table --type genlog genlog127.sql > genlogoutput.txt

perl mk-query-digest --limit 100% \
--review h=127.0.0.1,P=3307,D=maatkit,t=query_review,u=user,p=pass \
--type binlog binlog325.sql > binlogoutput.txt
```

Overall summary (genlog)

```
# 229.7s user time, 860ms system time, 94.79M rss, 145.48M vsz
# Overall: 906.22k total, 720 unique, 143.84 QPS, 0x concurrency_________
#                   total     min     max     avg     95%  stddev median
# Exec time             0       0       0       0       0       0      0
# Time range        2010-03-12 10:45:01 to 2010-03-12 12:30:01
# bytes           242.78M       5  69.06k  280.91  563.87  819.66 112.70
```

Overall summary (binlog)

```
# 390.2s user time, 1.8s system time, 62.70M rss, 113.45M vsz
# Overall: 1.07M total, 252 unique, 245.71 QPS, 5.69Gx concurrency_______
#                    total min       max       avg    95% stddev median
# Exec time  2478625699859 8s   0 4294967295s 23168970s 992ms 302909074s 0
# Time range        2010-04-10 07:14:17 to 2010-04-10 08:26:51
# @@session             86      0       1    0.50    0.99    0.50    0.99
# @@session            585      1       4    3.42    3.89    0.68    3.89
# @@session          3.44k      8      33   20.57   31.70   12.00   31.70
# @@session          1.34k      8       8       8       8       0       8
# @@session              1      1       1       1       1       0       1
# @@session        837.08k 837.08k 837.08k 837.08k 837.08k       0837.08k
# @@session             85      0       1    0.50    0.99    0.50       0
# bytes            415.05M      5   1.02M  349.05  563.87   1.34k 537.02
# error cod              0      0       0       0       0       0       0
```

Query analysis part 1 (genlog)

```
# Query 9: 1.69 QPS, 0x concurrency, ID 0x188B27831A9DE05B at byte
268215186

# This item is included in the report because it matches --limit.

#              pct   total     min     max     avg     95%  stddev  median

# Count          1   10647

# Exec time      0       0       0       0       0       0       0       0

# Databases                1 proddb

# Time range 2010-03-12 10:45:02 to 2010-03-12 12:30:01

# bytes          0 613.45k      59      59      59      59       0      59
```

Query analysis part 1 (binlog)

```
# Query 5: 3.90 QPS, 297.34Mx concurrency, ID 0x188B27831A9DE05B at byte
596881917

# This item is included in the report because it matches --limit.

#              pct   total     min     max     avg     95%  stddev median

# Count          1      16829

# Exec time    5 1284195222560s 0 4294967295s 76308469s 992ms 546294873s 0

# Databases                1 proddb

# Time range 2010-04-10 07:14:52 to 2010-04-10 08:26:51

# bytes          0 969.38k      58      59   58.98   56.92        0   56.92

# error cod      0       0       0       0       0       0       0       0
```

Query analysis part 2 (genlog)

```
# Query_time distribution
#   1us
#  10us
# 100us
#   1ms
#  10ms
# 100ms
#    1s
#  10s+
# Review information
#    first_seen: 2010-03-12 10:45:02
#     last_seen: 2010-03-12 12:30:01
#   reviewed_by:
#   reviewed_on:
#      comments:
```

Query analysis part 2 (binlog)

```
# Query_time distribution
#   1us
#  10us
# 100us
#   1ms
#  10ms
# 100ms
#    1s  ################################################################
#  10s+  ################
# Review information
#    first_seen: 2010-03-12 10:45:02
#     last_seen: 2010-04-10 08:26:51
#   reviewed_by:
#   reviewed_on:
#      comments:
```

Query analysis part 3 (genlog)

```
# Tables
#    SHOW TABLE STATUS FROM `proddb` LIKE 'colors'\G
#    SHOW CREATE TABLE `proddb`.`colors`\G
update colors set publishable_flag = true where id = 267354\G
# Converted for EXPLAIN
# EXPLAIN
select  publishable_flag = true from colors where  id = 267354\G
```

Query analysis part 3 (binlog)

```
# Tables

#    SHOW TABLE STATUS FROM `proddb` LIKE 'colors'\G

#    SHOW CREATE TABLE `proddb`.`colors`\G

update colors set publishable_flag = true where id = 284297\G

# Converted for EXPLAIN

# EXPLAIN

select  publishable_flag = true from shopping_events where  id =
284297\G
```

Query analysis part 1 (binlog)

```
# Query 5: 3.90 QPS, 297.34Mx concurrency, ID 0x188B27831A9DE05B at byte
596881917

# This item is included in the report because it matches --limit.

#              pct   total     min     max     avg     95%  stddev median

# Count          1      16829

# Exec time    5 1284195222560s 0 4294967295s 76308469s 992ms 546294873s 0

# Databases                1 proddb

# Time range 2010-04-10 07:14:52 to 2010-04-10 08:26:51

# bytes          0 969.38k      58      59   58.98   56.92        0   56.92

# error cod      0       0       0       0       0       0       0       0
```

```
update colors set publishable_flag = true where id = 284297\G
```

Query Analysis Summary

```
# Profile

# Rank Query ID           Response time              Calls  R/Call
Item

# ==== ================== ========================== ====== ==============

#    1 0x85FFF5AA78E5FF6A 985694996247 1.0000 39.8% 177057   55671054.8720
                                                                BEGIN

#    2 0x8F345B7550CA9147 466433474976 3.0000 18.8% 686030    6799024.4592
                                                  INSERT user_events_live

#    3 0xCACEE7C0CF15B39B 261993005782 1.0000 10.6%  63756   41093074.5000
                                                              UPDATE skus

#    4 0x308A3C4E761F5834 137868450337 5.0000  5.6%  17845   77258868.2194
                                                   UPDATE shopping_events

#    5 0x188B27831A9DE05B 128419522256 0.0000  5.2%  16829   76308468.8668
                                                        UPDATE colors

#    6 0xD8F78067CE3F07AB 127990025536 0.0000  5.2%  18180   70401554.2002
                                                              UPDATE offers

#    7 0x3C70600B502E3A08 121547574585 5.0000  4.9%  16829   72225072.5447
                                                           UPDATE products
```

The query_review table

- Remember, we did the command:

```
perl mk-query-digest --limit 100% \
--review h=127.0.0.1,P=3307,D=maatkit,t=query_review,u=user,p=pass \
--create-review-table --type binlog binlog325.sql > binlogoutput.txt
```

- What does the query review table look like?

```
mysql> select * from query_review where checksum=0x188B27831A9DE05B\G
*************************** 1. row ***************************
   checksum: 17685507227138048 91
fingerprint: update colors set publishable_flag = true where id = ?
     sample: update colors set publishable_flag = true where id =
100563
 first_seen: 2010-03-12 10:45:02
  last_seen: 2010-04-10 08:26:51
reviewed_by: NULL
reviewed_on: NULL
   comments: NULL
1 row in set (0.00 sec)
```

How do we review a query?

- EXPLAIN, SHOW CREATE TABLE, etc.
- Now what?

```
mysql> update query_review set reviewed_by='Sheeri',
reviewed_on=now(), comments='This query is OK, it uses the primary key
to search on.' where checksum=17685507227138048 91;
Query OK, 1 row affected (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

- One query down.....

```
mysql> select count(*) from query_review where reviewed_on is null;
+----------+
| count(*) |
+----------+
|      769 |
+----------+
1 row in set (0.00 sec)
```

- 769 to go!

Systematic approach

- You can look at a few queries per day

- Reviewed queries do not appear in subsequent reports of mk-query-digest
  - If you have something in reviewed_by
  - Unless you specify --report-all

Query review

- --no-report to just parse a log to the database:

```
perl mk-query-digest --limit 100% --no-report -review \
h=127.0.0.1,P=3307,D=maatkit,t=query_review,u=user,p=pass \
--type binlog mybinlog.txt
```

- Can save counts, etc to an historical table

```
perl mk-query-digest --limit 100% --no-report -review \
h=127.0.0.1,P=3307,D=maatkit,t=query_review,u=user,p=pass \
--create-review-history-table -review-history \
h=127.0.0.1,P=3307,D=maatkit,t=qr_history,u=user,p=pass \
--type genlog mygenlog.txt
```

Query review history

```
mysql> select * from qr_history where checksum=0x188B27831A9DE05B\G

*************************** 1. row ***************************
            checksum: 17685507227138048 91
              sample: update colors set publishable_flag = true where id
= 284297
              ts_min: 2010-04-10 07:14:52
              ts_max: 2010-04-10 08:26:51
              ts_cnt: 16829
      Query_time_sum: 1.2842e+12
      Query_time_min: 0
      Query_time_max: 4.29497e+09
   Query_time_pct_95: 0.992137
   Query_time_stddev: 5.46295e+08
   Query_time_median: 0
       Lock_time_sum: NULL
       Lock_time_min: NULL
       Lock_time_max: NULL
    Lock_time_pct_95: NULL
    Lock_time_stddev: NULL
    Lock_time_median: NULL
                                          Rows_sent_sum: NULL
                                          Rows_sent_min: NULL
                                          Rows_sent_max: NULL
                                       Rows_sent_pct_95: NULL
                                       Rows_sent_stddev: NULL
                                       Rows_sent_median: NULL
                                     Rows_examined_sum: NULL
                                     Rows_examined_min: NULL
                                     Rows_examined_max: NULL
                                  Rows_examined_pct_95: NULL
                                  Rows_examined_stddev: NULL
                                  Rows_examined_median: NULL
```

Query review history

```
mysql> select * from qr_history where checksum=0x188B27831A9DE05B\G

*************************** 1. row ***************************
            checksum: 17685507227138048 91
              sample: update colors set publishable_flag = true where id
= 284297
              ts_min: 2010-04-10 07:14:52
              ts_max: 2010-04-10 08:26:51
              ts_cnt: 16829
     Query_time_sum: 1.2842e+12
     Query_time_min: 0
     Query_time_max: 4.29497e+09
   Query_time_pct_95: 0.992137
   Query_time_stddev: 5.46295e+08
   Query_time_median: 0
```

```
************* 2. row *************
checksum: 17685507227138048 91
sample: update colors set
publishable_flag = true where id =
279850
ts_min: 2010-03-24 10:45:01
ts_max: 2010-03-24 12:30:00
ts_cnt: 7109
Query_time_sum: 0
Query_time_min: 0
Query_time_max: 0
Query_time_pct_95: 0
Query_time_stddev: 0
Query_time_median: 0
```

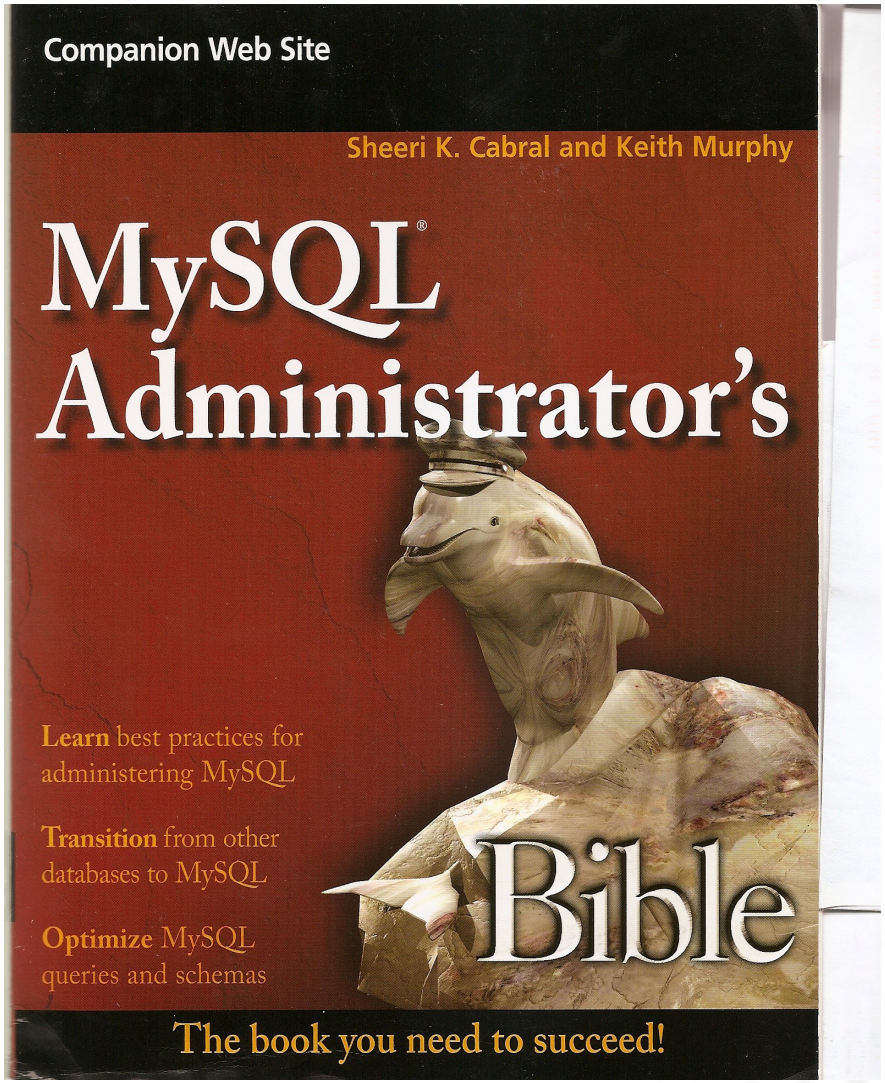
What I'd like to see

- Besides query reviews being common practice...
- More fields in the query_review table
  - what index(es) are used – fields, index type
  - Tables involved and their approx row count
  - Approx rows examined from EXPLAIN
- More fields in the query_review_history table
  - Source (genlog, binlog, etc)
  - When the review was done.

Start Today!

- Grab a log
- Find a test machine with a database
- Start EXPLAINing all your queries
- mk-query-digest has tons of other great features other than query reviews.....

Thank You.



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Thank You

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