OKC MySQL Users Group

OKC MySQL

- Discuss topics about MySQL and related open source RDBMS
- Discuss complementary topics (big data, NoSQL, etc)
- Help to grow the local ecosystem through meetups and events

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MySQL – Query Optimization

“I mean, the query gives me the right answer, so why does it matter? My job is done!”
- Way too many developers :)

What is it?

- Human “questions” can generally be written in multiple forms in actual SQL
    - *Many* will even give the correct answer ;)
- Most queries will start out being poorly written and/or executed
- ORMs are notorious for writing “bad” queries
- Ways to optimize
    - Rewrite the query
    - Add indexes to the target tables

Optimization Basics

- Examine as few rows as possible to get result set
- Read rows in sorted order
- Avoid creating temporary tables

- How do we do that?

INDEXING!

Indexing – High Level

- An index in a database is the same in theory as the index in a book
- Which is faster?
  - Read every page and keep track of pages with X
  - Go to index, find X, jump to those pages
- Indexing works in the same way – shortcuts to data

As we've seen, you can do a whole 2 hour talk just on indexing – so that is outside the scope here...

Indexing – Basic Concepts

- Columns you want to index
  - Those in where clause
  - Those being sorted/grouped
  - Those being joined
- You can create composite (multi-column) indexes
- MySQL uses composite indexes from Left → Right
- Indexes **DO** require space, so don't over index
- Composite indexes are often **BETTER** than several single indexes

How do I find queries?

- Periodic review of production queries
- Review of all queries in pre-prod prior to release
- Developer review of queries while developing (this makes the above easier)
- And the number one way people find bad queries...
    - An outage in production!

Great, but how do I find them?

- Slow query log
  - For historical review
- SHOW FULL PROCESSLIST
  - To find slow queries running now
  - (i.e. site is down and db is crawling)
- Please don't use the general log
  - Less info than slow log, much less useful

The Slow Log

- This is the best tool for finding slow queries
- long_query_time defines threshold for queries to be reported
  - Note – this can be set to 0 to capture **all** queries
- Wealth of information
  - Rows examined vs rows returned
  - Execution time
  - Execution metadata (filesort, etc)
  - Percona Server offers additional metrics
- Numerous tools to parse the log
  - pt-query-digest is most used

I found one! Now what?!

```
SELECT * FROM foo WHERE user_id = 1 ORDER
BY date_created DESC
```

- Query takes forever to run
- Seems super easy since it should only return one row!
- First things first – can somebody tell me in English what that query is doing?

First Step...

- Run EXPLAIN

```
mysql> EXPLAIN SELECT * FROM foo WHERE user_id = 1 ORDER BY date_created
DESC\G
*************************** 1. row ***************************
           id: 1
  select_type: SIMPLE
        table: foo
         type: ALL
possible_keys: NULL
          key: NULL
      key_len: NULL
          ref: NULL
         rows: 24
        Extra: Using where; Using filesort
1 row in set (0.00 sec)
```

Second Step...

- Check the table structure (primarily indexes)

```
mysql> SHOW CREATE TABLE foo\G
*************************** 1. row ***************************
       Table: foo
Create Table: CREATE TABLE `foo` (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `user_id` int(11) DEFAULT NULL,
  `data` varchar(255) DEFAULT NULL,
  `date_created` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP ON UPDATE
CURRENT_TIMESTAMP,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=29 DEFAULT CHARSET=latin1
1 row in set (0.00 sec)
```

Next...

- Determine what index is best (won't always be perfect)
- Alter the table (you do have a test environment, right??)
- Re-run the query with explain
- Call it a day!

Participation time!!

To the VM we go!

Let's work through the process and fix this:

```
SELECT * FROM foo
WHERE user_id = 1
ORDER BY date_created DESC
```

*More than one way to skin a cat**

- EXPLAIN – we've talked about this, but good first step
- Handler Operations
  - **`FLUSH STATUS`**
  - Run query
  - **`SHOW STATUS LIKE 'ha%'`**
  - Do this before/after any alters
- Query Profiling
  - **`SET profiling = “ON”`**
  - Run query
  - **`SHOW PROFILE FOR QUERY 1`**
  - Rinse/repeat

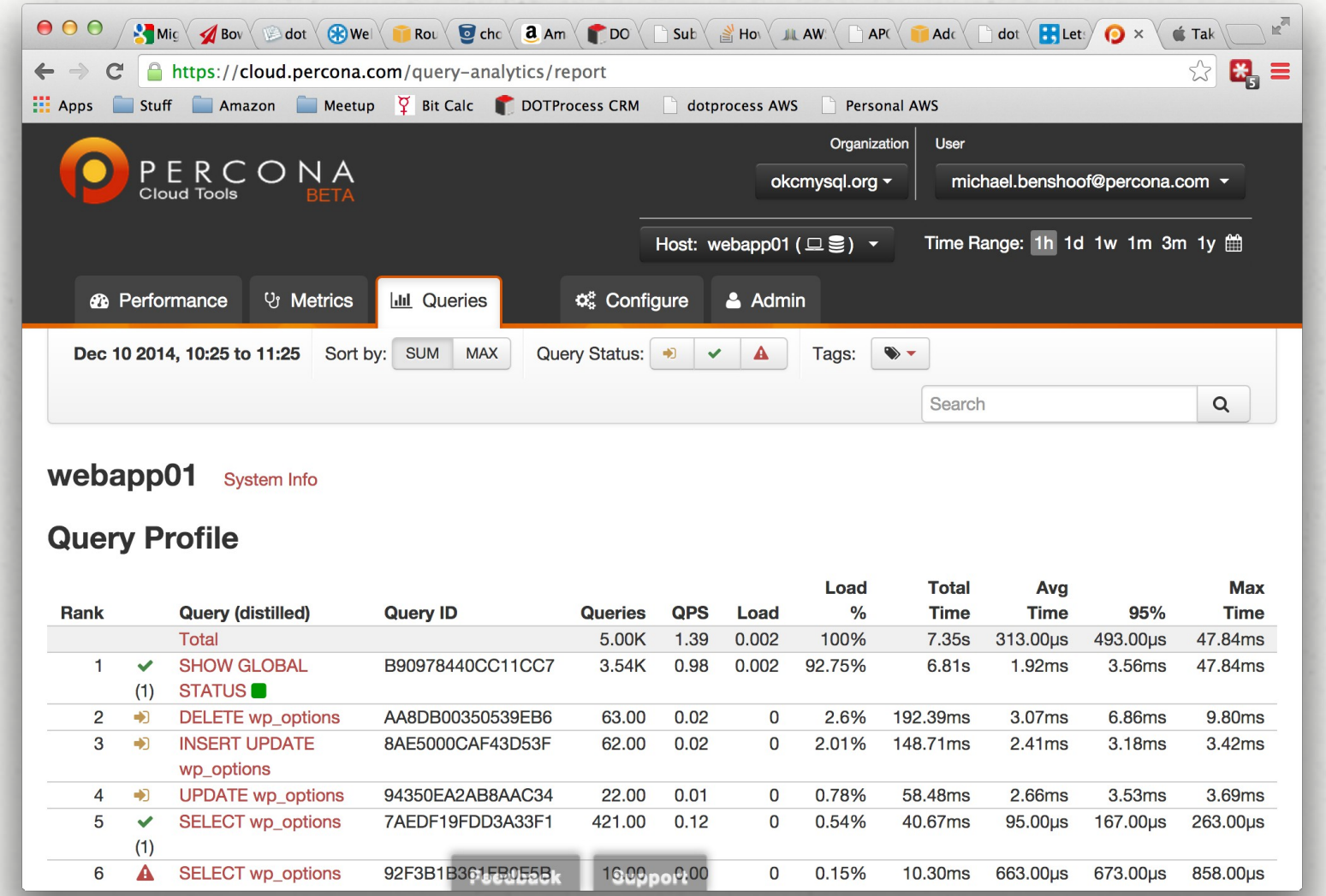
*** Please note, no animals were harmed during the making of this powerpoint!**

That is entirely too much work...

While finding problem queries can be tedious, there are tools to make it much easier

… and queue shameless pitch now...

Percona Cloud Tools!



Let's take it for a spin...

… assuming all of you promise not to hack okcmysql.org now that you can see some of my database structure!

Questions?

(I know you have them, that's why you came today...
so don't be shy)

Thanks for coming!

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