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 user
WHERE username = "admin1"
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 user  WHERE username = "admin1" ORDER BY
date_created DESC\G
*************************** 1. row ***************************
           id: 1
  select_type: SIMPLE
        table: user
         type: ALL
possible_keys: NULL
          key: NULL
      key_len: NULL
          ref: NULL
         rows: 4179574
        Extra: Using where; Using filesort
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 user
WHERE username = "admin1";
ORDER BY date_created DESC
```

Second Step...

- Check the table structure (primarily indexes)

```
mysql> SHOW CREATE TABLE user\G
*************************** 1. row ***************************
       Table: user
Create Table: CREATE TABLE `user` (
  `user_id` int(10) unsigned NOT NULL AUTO_INCREMENT,
  `username` varchar(45) NOT NULL,
  `password` varchar(45) NOT NULL,
  `email` varchar(125) NOT NULL,
  `date_created` timestamp NULL DEFAULT CURRENT_TIMESTAMP,
  `last_update` timestamp NULL DEFAULT NULL,
  PRIMARY KEY (`user_id`)
) ENGINE=InnoDB AUTO_INCREMENT=4587468 DEFAULT CHARSET=latin1
1 row in set (0.00 sec)
```

*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

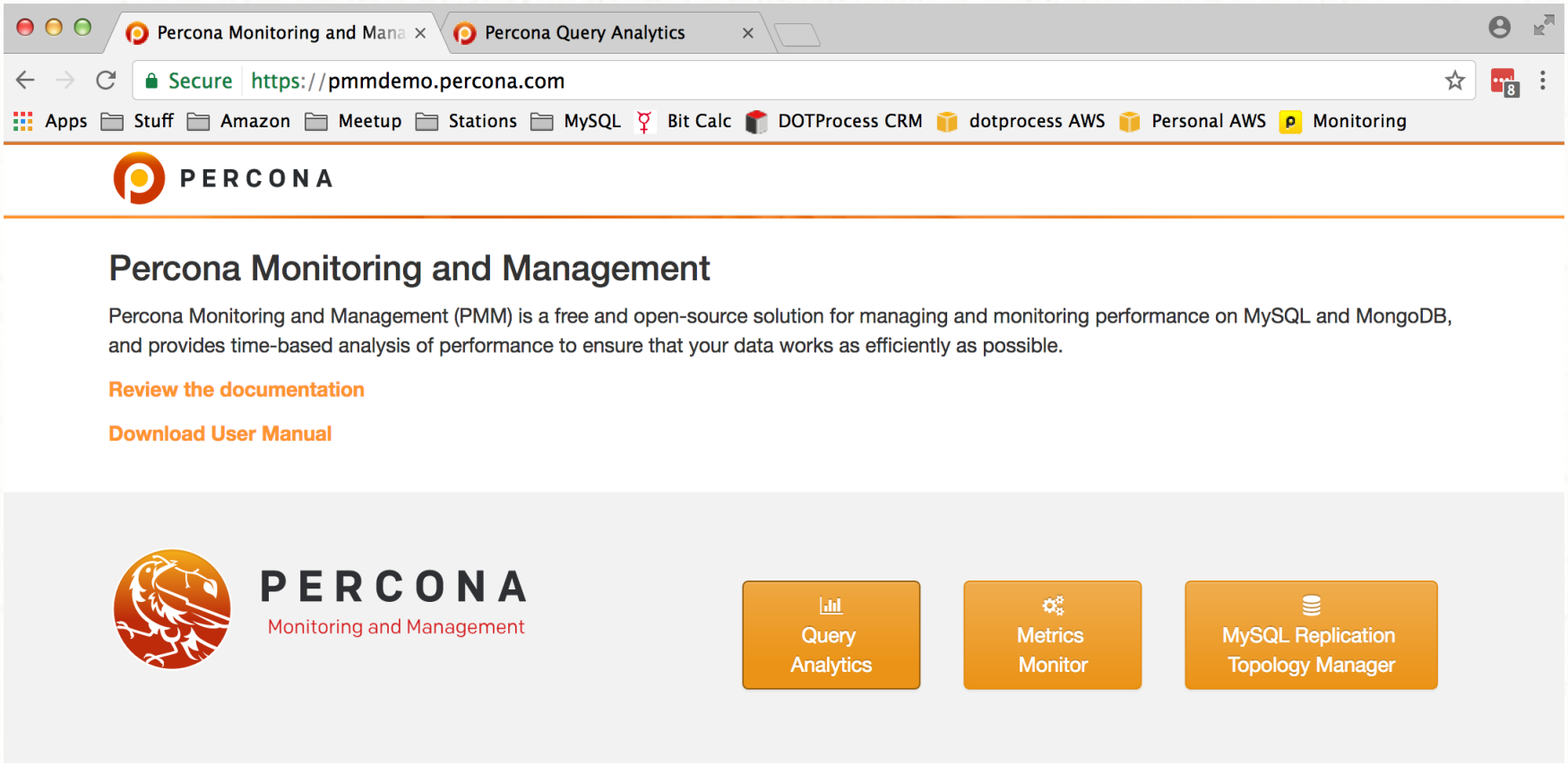
*** Please note, no animals were harmed during the making of this slide deck!**

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...

PMM!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Questions?

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

Thanks for coming!

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