



# MySQL 5.6 and Percona Server 5.6

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January 9, 2014

# About Percona

- Everything MySQL and MySQL Variants
- Started in 2006
- Vendor Neutral
- Distributed Company
  - More than 20 different countries, 10 different states
- “Headquarters” in Durham, NC
- Always looking for smart people

# Percona and MySQL Ecosystem

- MySQL Performance Blog
  - <http://www.mysqlperformanceblog.com>
- Spreading MySQL World
  - Conferences, Users Groups, Training
- Open Source Software
  - Percona Server
  - Percona Toolkit
  - Percona XtraDB Cluster
  - Percona Toolkit

# Open for Business

- Helping businesses (big and small) to reach full potential with MySQL
  - Consulting
  - Support
  - RemoteDBA
  - Training

# About Presentation

- Brief Overview
- Birds eye view of features in 5.6 and Percona Server 5.6
- Documentation + Production use
  - MySQL 5.6 is not very broadly used yet (around 8%)
- Focus on Why and When the feature is important for you

# MySQL 5.6

- Looks to be great release!
- Have been GA since 5<sup>th</sup> of February 2013
- A bit over 2 years since MySQL 5.5 GA
  - Work on some 5.6 features started 4+ years ago
- A lot of focus on conventional MySQL usage

# When to Upgrade to MySQL 5.6

- What specific benefits are you looking from upgrade ?
- Use it for any new development
- Reasonably safe to upgrade
  - Especially if not relaying on bleeding edge features

# Percona and MySQL 5.6

- Percona is ready to help you to be successful with MySQL 5.6
- MySQL 5.6 is fully supported by our Support, Consulting, RemoteDBA teams
- Percona Software support for 5.6 is current or on a way
- Learn more
  - <http://bit.ly/W5w5FC>
  - <http://bit.ly/W7zA0H>



# Percona Server 5.6

- Percona Server 5.6 Available as GA
  - Since October 2013
- Includes All MySQL 5.6 features plus Percona Improvements



PERCONA  
SERVER

# Percona Server 5.6 Value

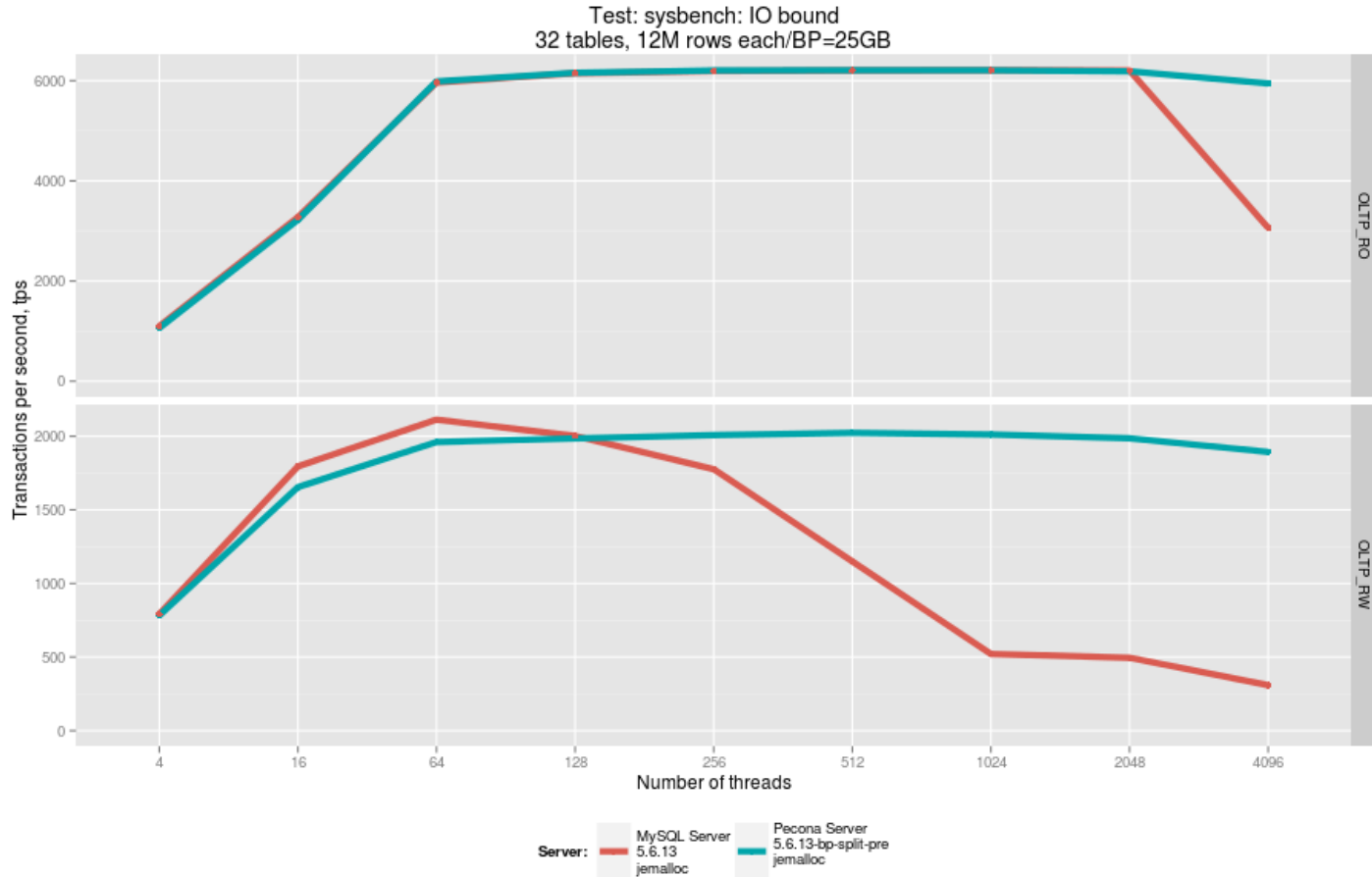
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- Performance and Scalability
- Operational Features
- Transparency
- Access to features which are close source in MySQL

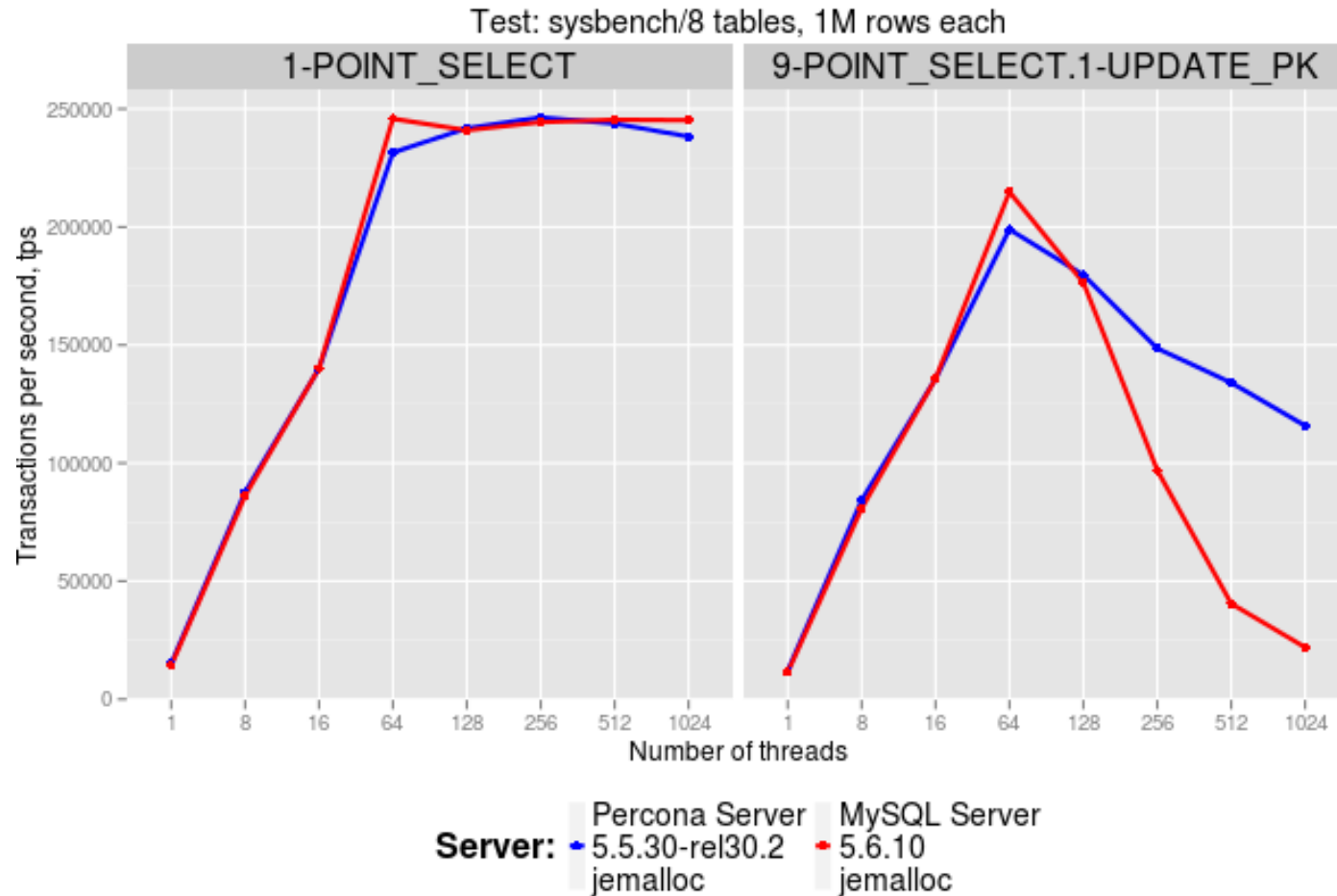
# PS 5.6 Performance

- MySQL 5.6 focuses a lot of Performance issues
  - Many Previous Percona Server ideas have been implemented in MySQL
- Our Development team found more great opportunities for optimizations
  - Performance, Stable Performance
  - Mutexes; Flushing Code; Balancing

# Scalability with Many Threads



# Many Concurrent Transactions



# Better Backup

- Features to support better backup with Percona Xtrabackup
  - Page Change Tracking
    - Supporting real incremental backup
  - Log Archiving
    - Recover from full backup using innodb transactional logs

# Make it Open

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- Thread Pool for handling very large number of connections
  - “MySQL Enterprise Scalability”
- PAM Plugin
  - “MySQL Enterprise Security”

# Percona XtraDB Cluster 5.6

- PXC 5.6 is Release Candidate now
- Great potential of joining MySQL 5.6 replication improvements
  - With Galera Replication technology



PERCONA  
XTRADB CLUSTER



# Feature Categories

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- Scalability
- Optimizer and Execution
- Replication
- Transparency
- Database Operations
- New Functionality
- Security

# Scalability

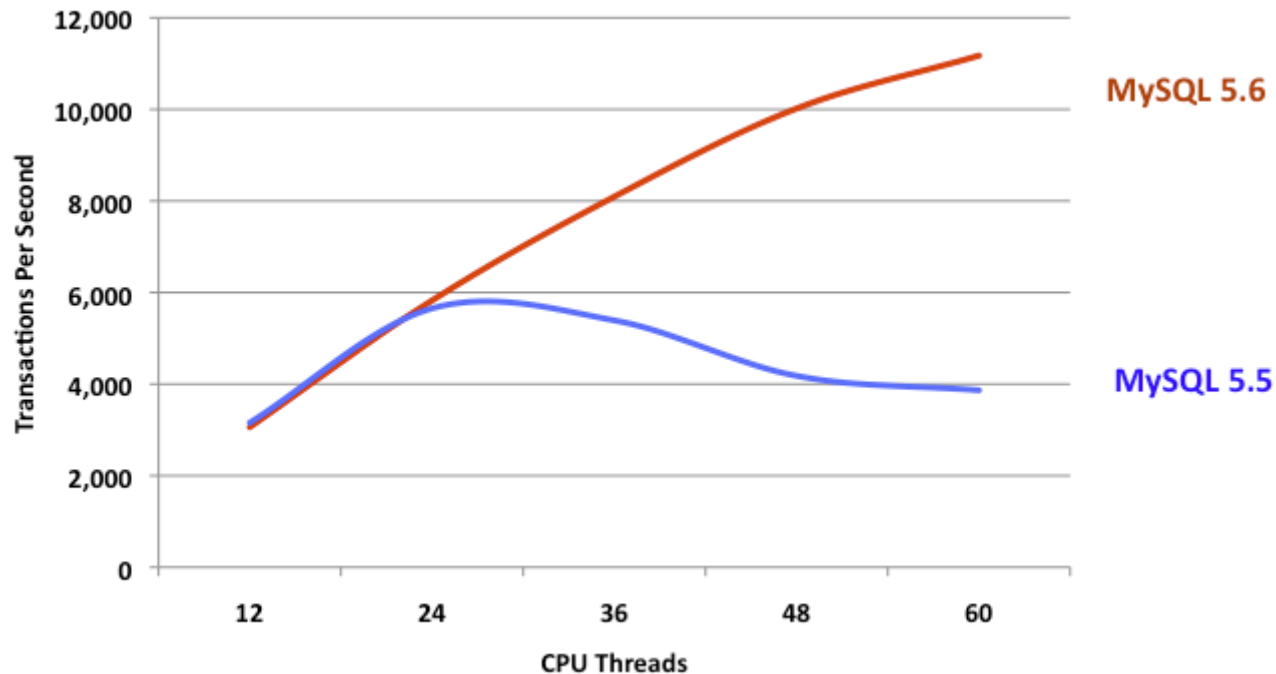
- Innodb Storage engine in Focus
- Scalable Read Only Transactions
- Non Recursive Deadlock Detection
- Improved Innodb Thread Concurrency
- Multiple Background Purge Threads
- Improved Purge Lag Control
- Improved Adaptive Flushing
- Support for Large (over 4GB) redo logs

# Scalability

- Split of “Kernel Mutex”
- Data Dictionary Cache
- Page Cleaner / Separate Flush Thread
- Group Commit for Binary Log
- Reduced Innodb Memory Fragmentation
- Reduced Locking for Partitioned Tables
- Reduced Contention for **LOCK\_open**
- Multiple **table\_open\_cache** instances

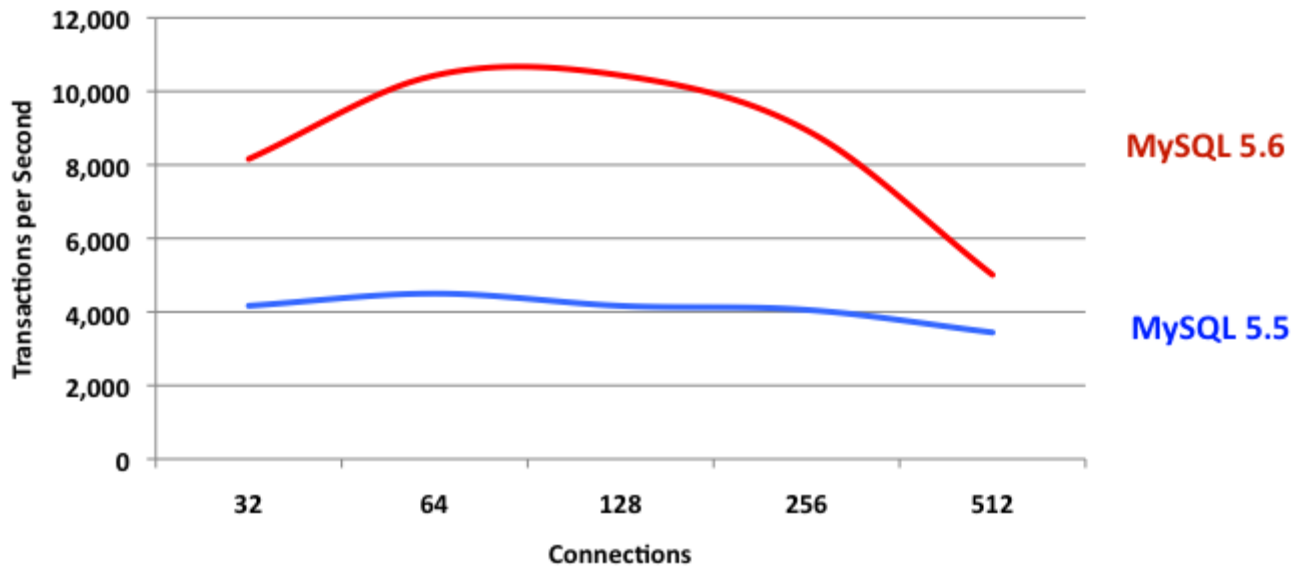
# MySQL 5.6 performance

- Multiple CPU cores at focus
  - Results from Oracle



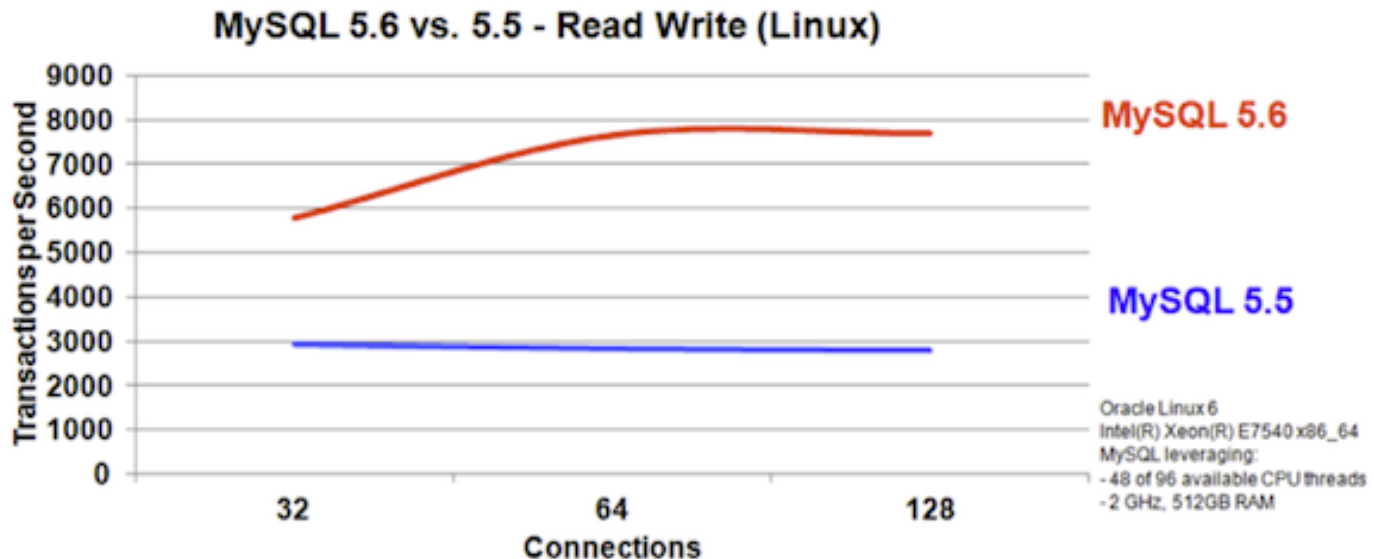
# MySQL 5.6 Performance

- Number of connections at Focus
  - Results from Oracle



# Binary log Group Commit

- Gains with sync\_binlog=1
  - Results by Oracle



# Optimizer and Execution

- Index Condition Pushdown (ICP)
- Batched Key Access Joins (BKA)
- Multi Range Read (MRR)
- Faster **ORDER BY nidxcollimit N**
- Persistent Statistics for Innodb
- Improvements to Innodb Compression

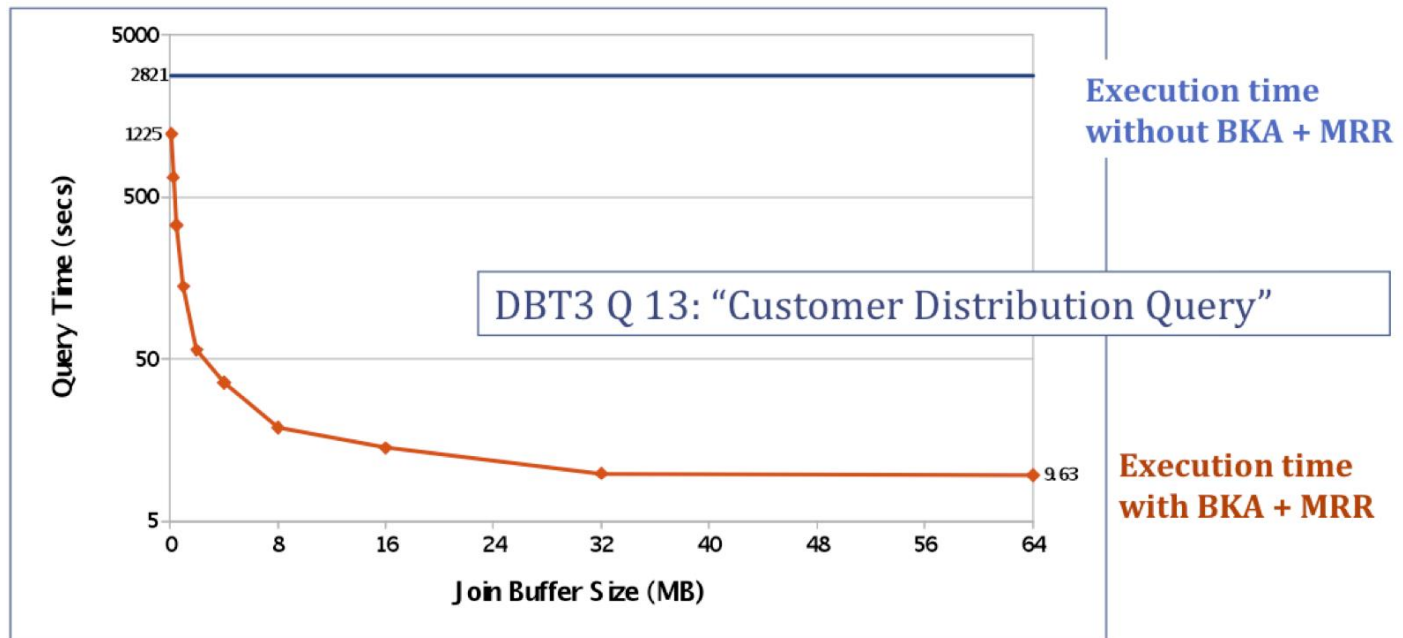
# Optimizer and Execution

- Fast Page Checksums (CRC32)
- 4K and 8K Page sizes for Innodb
- Subquery Optimizations
- More efficient Optimizer
  - Especially handling many tables in JOIN



# BKA+MRR May rock your world

- Reporting Query Benchmark
  - Results from Oracle

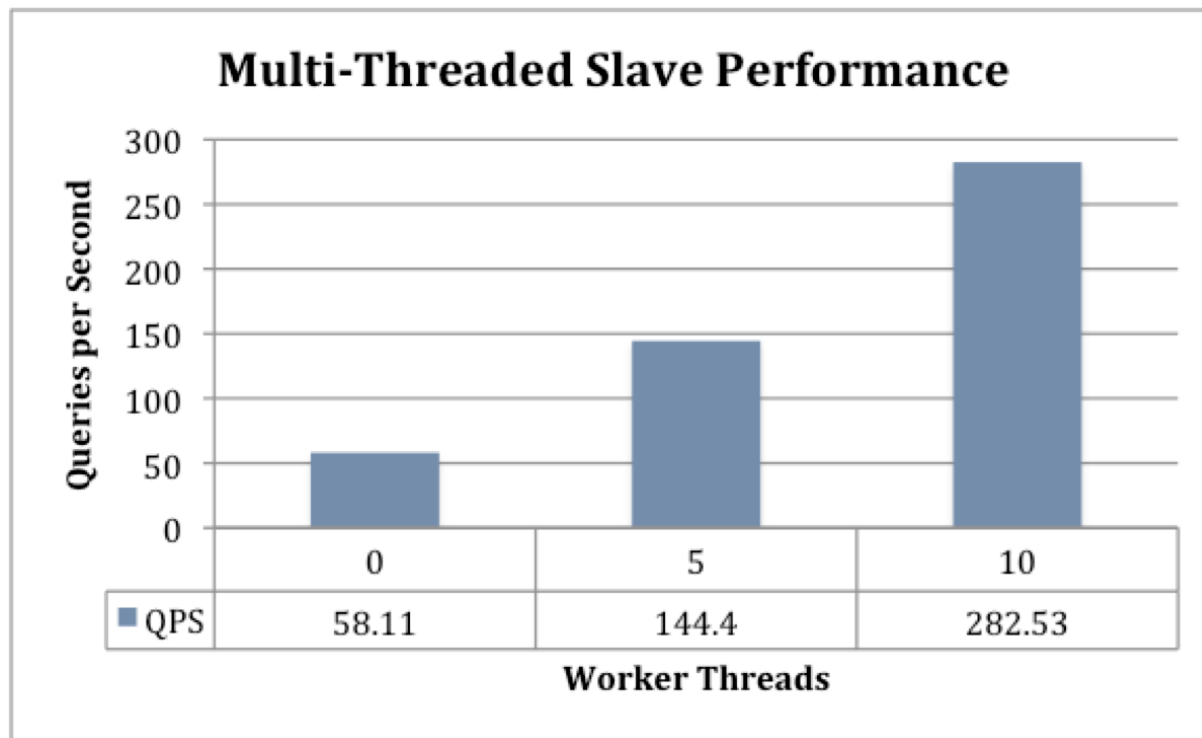


# Replication

- Optimized ROW Based Replication
- Multi-Threaded Slave
- Global Transactions Identifiers
- Crash Safe Slave and Binlog
- Replication Event Checksums
- Time Delayed Replication
- Server UUID
- Improved Logging for ROW based Repl.
- Replication Utilities for Failover and Adm.

# Multi Threaded Slave

- Peak gains with Multiple Schema
  - Results by Oracle



# Transparency

- Many new **INFORMATION\_SCHEMA** tables
  - **INNODB\_METRICS**
  - Table Meta Data Information Tables
  - Buffer Pool Contents Information Tables
- Improved EXPLAIN
  - Handling **INSERT/UPDATE/DELETE**
  - **JSON** output with additional information
- Optimizer Tracing
- Deadlock Logging
- **GET DIAGNOSTICS**

# Innodb Metrics Example

```
mysql [localhost] {msandbox} (information_schema) > select * from innodb_metrics where
status!="disabled" and count!=max_count limit 1 \G
***** 1. row *****
      NAME: buffer_pool_pages_free
      SUBSYSTEM: buffer
      COUNT: 2359
      MAX_COUNT: 7957
      MIN_COUNT: 2359
      AVG_COUNT: NULL
      COUNT_RESET: 2359
      MAX_COUNT_RESET: 7957
      MIN_COUNT_RESET: 2359
      AVG_COUNT_RESET: NULL
      TIME_ENABLED: 2013-03-06 09:43:43
      TIME_DISABLED: NULL
      TIME_ELAPSED: 471
      TIME_RESET: NULL
      STATUS: enabled
      TYPE: value
      COMMENT: Buffer pages currently free (innodb_buffer_pool_pages_free)
1 row in set (0.01 sec)
```

# JSON EXPLAIN Example

```
mysql [localhost] {msandbox} (sbtest) > explain format=json delete from sbtest where k>2 \G
***** 1. row *****
EXPLAIN: {
  "query_block": {
    "select_id": 1,
    "table": {
      "delete": true,
      "table_name": "sbtest",
      "access_type": "range",
      "possible_keys": [
        "PRIMARY",
        "k"
      ],
      "key": "k",
      "used_key_parts": [
        "k"
      ],
      "key_length": "4",
      "rows": 1,
      "filtered": 100,
      "attached_condition": "(`sbtest`.`sbtest`.`k` > 2)"
    }
  }
}
1 row in set (0.00 sec)
```

# Transparency

- Improved **PERFORMANCE\_SCHEMA**
  - Reduced Overhead
  - Simplified Configuration
  - Table Access Instrumentation
  - Statement Instrumentation
  - Stages Instrumentation
  - Aggregation by User, Host etc
  - Network IO Instrumentation
  - Host Cache contents
  - Improved File I/O Instrumentation

# PERFORMANCE\_SCHEMA Example

```
mysql [localhost] {msandbox} (performance_schema) > select  
* from users;
```

USER	CURRENT_CONNECTIONS	TOTAL_CONNECTIONS
NULL	18	21
msandbox	1	2

```
2 rows in set (0.00 sec)
```



# .. Not replacement for User Statistics

```
mysql> select * from information_schema.user_statistics limit 1\G
***** 1. row *****
      USER: root
TOTAL_CONNECTIONS: 2
CONCURRENT_CONNECTIONS: 0
CONNECTED_TIME: 4
  BUSY_TIME: 0
   CPU_TIME: 0
  BYTES_RECEIVED: 67
   BYTES_SENT: 0
BINLOG_BYTES_WRITTEN: 0
   ROWS_FETCHED: 2
   ROWS_UPDATED: 0
TABLE_ROWS_READ: 0
  SELECT_COMMANDS: 2
  UPDATE_COMMANDS: 0
  OTHER_COMMANDS: 0
  COMMIT_TRANSACTIONS: 0
ROLLBACK_TRANSACTIONS: 0
  DENIED_CONNECTIONS: 0
  LOST_CONNECTIONS: 0
   ACCESS_DENIED: 0
   EMPTY_QUERIES: 0
TOTAL_SSL_CONNECTIONS: 0
1 row in set (0.00 sec)
```

# Operational Improvements

- Separate Tablespaces for UNDO Logs
- Fast Restart – Innodb BP preloading
- Online DDL
- Import/Export for Partitioned Tables
- Remote Binlog Backup
- Innodb Transportable Tablespaces
- New configuration variables defaults
- User defined **DATA DIRECTORY** for Innodb tables

# New Functionality for Developers

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- MemcachedD API for Innodb
- Explicit Partition Selection in Queries
- Full Text Search indexes for Innodb
- Microsecond TIME precision
- Precise spatial operations for GIS

# Security

- Passwords hashes in Query Logs
- SHA256 hashing w salt for Authentication
- Support obfuscated password storage for command line tools
- Policy Based password validation
- Plugin based Authentication support in Replication

# Where to Learn More ?

- MySQL 5.6 Manual is great
  - <http://dev.mysql.com/doc/refman/5.6/en/mysql-nutshell.html>
- Blogs
  - <http://blogs.innodb.com>
  - <http://www.planetmysql.org>
  - <http://www.mysqlperformanceblog.com>

# Local MySQL Meetup

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- MySQL Meetup at Durham, NC
  - Hosted by Percona
  - [http://www.meetup.com/triangle\\_mysql](http://www.meetup.com/triangle_mysql)
- Come to our first meeting next Monday!

# Introducing Percona Cloud Tools

#1 SELECT wp\_usermeta (34F2DCFBA107501A)

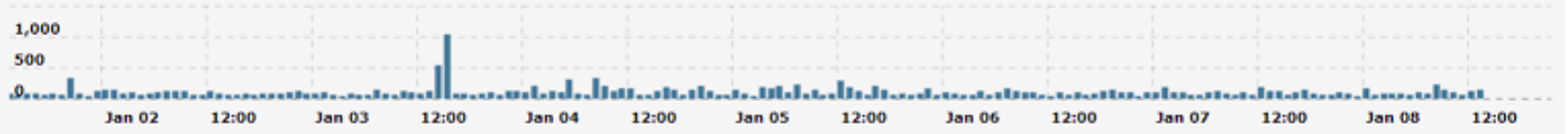
Metrics Example Tables

Metric	Percent	Total	Average	Minimum	Median	95%	Maximum	Stddev
Query count	30.45	69.15M	-	-	-	-	-	-
<b>- Query_time</b>	<b>16.34</b>	<b>Tot: 3h55m</b>	<b>Avg: 186.45µs</b>	<b>Min: 5.00µs</b>	<b>Med: 191.70µs</b>	<b>95%: 276.35µs</b>	<b>Max: 529.74ms</b>	<b>Std: 80.41µs</b>

Total (seconds)



Average QPS



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# **Thank You!**

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