

What's New in MySQL and MongoDB Ecosystem

Year 2017

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In This Presentation

Few Words about Percona

Few Words about Percona University Program

Most Interesting Developments in MySQL and MongoDB ecosystems

Thank you our Speakers!

Pavel Genov, Pepper Media



Ben Kochie, Gitlab



Thank you

The Place Berlin



Berlin Valley

**BERLIN
VALLEY**

Few Words about Percona

Percona's Purpose

To Champion Unbiased Open
Source Database Solutions

We Do

Support, Managed Services for MySQL and MongoDB

Also Consulting and Training

Helping companies to migrate to Open Source Database

Develop Open Source Software

Solutions to maximize your success

Broad Software Ecosystem Support

MySQL

Percona Server

MariaDB

Percona XtraDB Cluster

Galera Cluster for MySQL

MariaDB Galera Cluster

MongoDB

Percona Server for
MongoDB

Amazon RDS for
MySQL/MariaDB/Aurora

Google CloudSQL

100% Free and Open Source Software

Percona Server
for MySQL

Percona Server
for MongoDB

Percona XtraDB
Cluster

Percona
Xtrabackup

Percona Toolkit

Percona
Monitoring and
Management

Percona University

Educational Technical Presentations

Multiple Locations in the World

Partnering with Local Companies

Affordable to Attend (Free)

Percona University – What to Expect

Several presentations on different topics

Feel free to only attend those you're interested in

Keep it Interactive! Ask Questions

Breaks

Prize Give away in the end

Whats new in MySQL and MongoDB

Top Highlights

Innovations worth Noticing

MySQL 5.7

MySQL 8

MariaDB 10.1

Amazon Aurora

Percona XtraDB
Cluster 5.7

Percona
Monitoring and
Management

MyRocks

ProxySQL

Orchestrator

Gh-ost

MongoDB 3.4

Percona Server
for MongoDB
3.4

MySQL 5.7 – Current GA

MySQL 5.7 - Security

“Secure by Default”

Password validation (no weak passwords by default)

Automatic SSL certificate creation

Simple SSL setup

“root” user created with password by default

MySQL 5.7 Encryption

Can encrypt InnoDB tables on disk

Only data is encrypted at this point

InnoDB log files, binary log files are not encrypted

MySQL 8 does InnoDB log file encryption

MySQL 5.7 - NoSQL

Native JSON data type

Can index fields in JSON documents

CRUD access through Protocol X

MySQL 5.7 - Replication

Parallel Replication

Multi-Source Replication

Can enable GTID online

MySQL Group Replication

MySQL Innodb Cluster

MySQL 5.7 – Performance Schema

Automatic configuration for Performance Schema

Reduced overhead (especially memory overhead)

Memory Usage Instrumentation

Instrumentation of Storage Procedures

Instrumentation of Transactions

Sys_schema included for simple Performance Schema access

MySQL 5.7 - Performance

Further improved Multi-core scalability

Optimizations for Innodb Temporary Tables

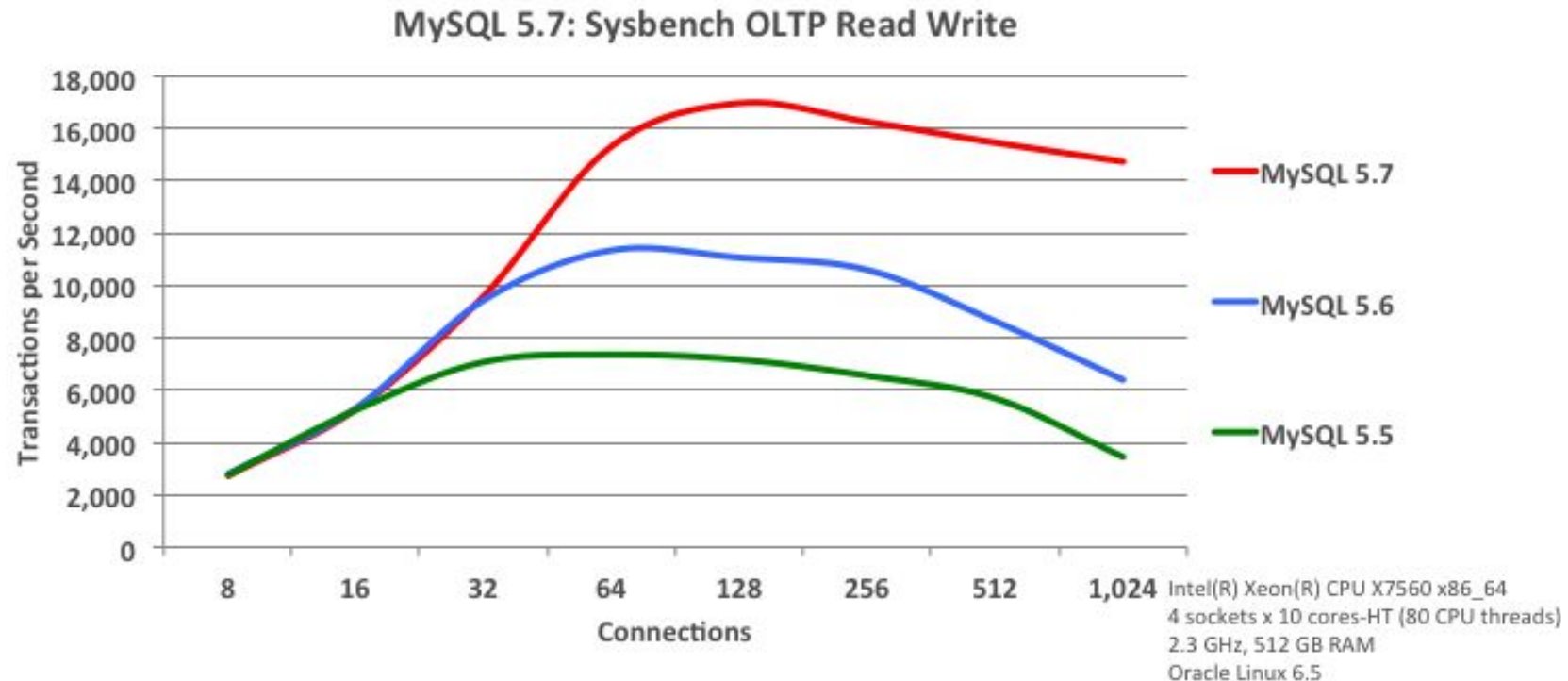
New Compression for Innodb Tables

Optimizer Improvements

MySQL 5.7 Benchmarking: Sysbench OLTP Read Write

1.5x Faster than MySQL 5.6
2.5x Faster than MySQL 5.5

17,000 TPS



Complete list of MySQL 5.7 Improvements

<http://www.thecompletelistoffeatures.com/>

MySQL 8 – Currently in Development

MySQL 8

What was
previously referred
as MySQL 5.8

Native Data
Dictionary (no
more .frm files)

Roles

Further
Performance
Schema
Improvements

Common Table
Expressions (CTE)
and Windowing
Functions

Replication
Performance
Improvements

Invisible Indexes

More to come

MariaDB 10.1 - Current GA

About MariaDB

“fork” by MySQL Founder Michael Widenious,

Replaced MySQL in many Linux Distributions

Has number of interesting features MySQL does not

More and More Becomes separate Database

Not every MySQL feature ported to MariaDB

Differences in Replication, Optimizer, JSON, Protocol X, GIS, Encryption

New in MariaDB 10.1

Optimistic Parallel Replication

Online Innodb Defragmentation (originally from Facebook)

Encryption (originally from Google) with encryption of log files and temporary files

Galera Replication is now included in MariaDB

Roles

Amazon Aurora

Amazon Aurora

The fastest Growing Database Technology at AWS

High End of Amazon RDS MySQL

Integration with Amazon Cloud Storage for Improved Performance and Replication

Automatic Replication and Cluster Recovery

Improved Query Cache

Not always faster than MySQL on EC2

Percona Server



Percona Server 5.7

Full compatibility with MySQL Community Edition

Many equivalents to MySQL Enterprise features

Improved Innodb Performance on heavy load

New design of DoubleWrite Buffer for better IO performance

Column Compression (with custom dictionary support)

Improved TokuDB Storage Engine

Percona XtraDB Cluster 5.7



Percona XtraDB Cluster 5.7

HA Solution based on Percona Server 5.7 and Galera Library

High Availability for MySQL without pains of Async replication

Automated Node Provisioning and Self Healing

Works great in the Cloud and with Containers

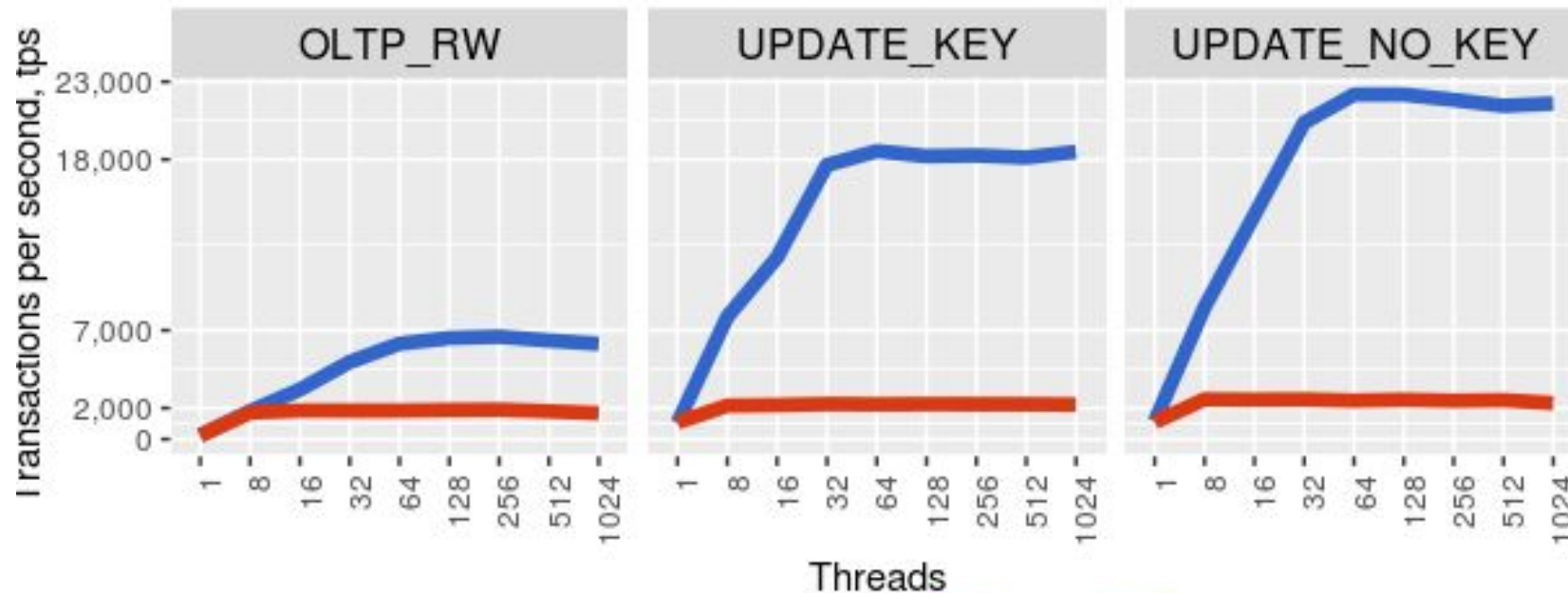
Integration with ProxySQL for traffic management

Improved Ease of Use, Security and Performance

PXC 5.7 Performance Improvements

<http://bit.ly/2qGCr0T> and <http://bit.ly/2pzvAIW>

Sysbench: dataset 100tables/4M rows(100GB)
innodb_buffer_pool=150GB,innodb_doublewrite=1,
innodb_flush_log_at_trx_commit=1,sync_binlog=1
Box: 28 Cores+HT



Percona XtraDB Cluster: ■ 5.7.16 ■ 5.7.17

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MyRocks

MyRocks

MySQL Storage engine based on MyRocks

Used by Facebook for better efficiency and performance

Uses LSM trees as underlying data structure

Write Optimized Engine

Experimental integration available with Percona Server and MariaDB

RocksDB Efficiency

Mark Callaghan: <http://bit.ly/2epDJqD>

Small server: Linkbench, IO-bound

MyRocks: best throughput & QoS, most efficient
MongoRocks: better than WiredTiger

	TPS	lostat r/t	lostat wKB/t	CPU usecs/t	Size (GB)	p99 update
MongoRocks+zlib	1087	1.07	4.42	24656	23	2
WiredTiger+zlib	429	1.24	17.98	153763	33	22
MyRocks+zlib	2246	0.67	1.27	12688	18	1
InnoDB	1860	0.82	10.62	7991	63	14
InnoDB+zlib	1855	0.67	8.60	10431	40	8

Percona Monitoring and Management



Percona Monitoring and Management

100% Free and Open Source

Comprehensive Database focused Monitoring

Supports MySQL and MongoDB (and variants)

Easy to Install and Use

Version 1.x focuses on Trending and Query Analyses

Management Features to come

Why did we created PMM

No good database focused monitoring solution

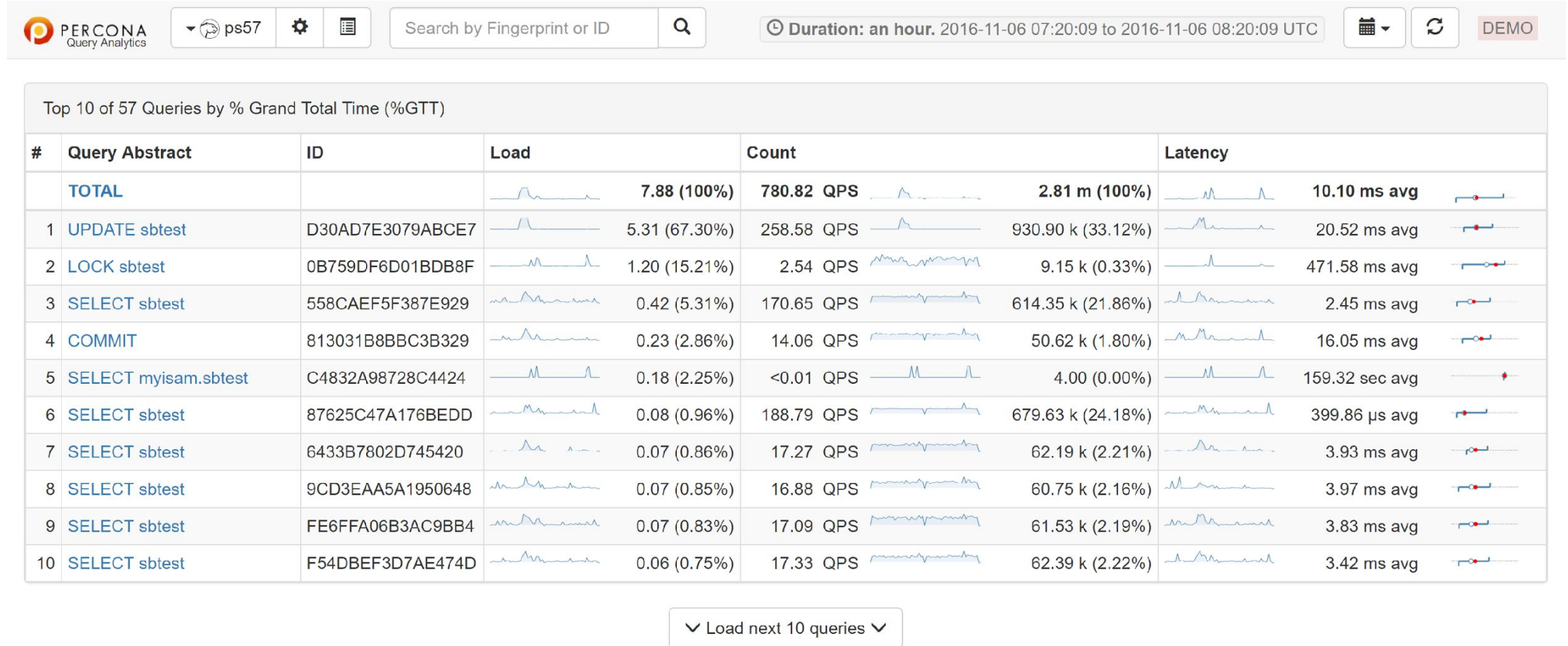
Existing solutions Proprietary or Cloud Only

Do it yourself is possible but hard

Want everyone to be able to run monitoring in every environment

To fix problems before they appear

What Queries are causing the load ?

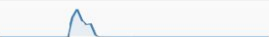


Why are they causing this load ?

UPDATE sbtest

D30AD7E3079ABCE7

Selected query class: 930.90 k Queries (258.58 QPS, 67.30%, 5.31 Load) | Total: 2.81 m Queries (780.82 QPS, 100.00%, 7.88 Load)

Metrics	Rate/Sec	Sum	Per Query Stats
Query Count	259.12 (per sec) 	932.85 k 32.40% of total	
Query Time	5.31 load (67.16%) 	19101.45 sec 67.16% of total	5.25 ms avg 
Lock Time	1.38 (avg load) 	4965.60 sec 51.50% of total 15.13% of query time	793.79 µs avg 
Innodb Row Lock Wait	<0.01 (avg load) 	28.14 sec 42.03% of total 1.44% of query time	75.79 µs avg 
Innodb IO Read Wait	<0.01 (avg load) 	35.85 sec 2.47% of total 10.93% of query time	573.60 µs avg 
Innodb Read Ops	2.48 (per sec) 	8.91 k 1.86% of total	0.00 avg 
Innodb Read Bytes	39.61 KB (per sec) 	139.25 MB 1.86% of total 16.00 KB avg io size	3.50 KB avg 
Innodb Distinct Pages	-	-	6.03 avg 
Bytes Sent	13.18 KB (per sec) 	46.35 MB 1.72% of total	52.00 Bytes avg 
Rows Examined	258.17 (per sec) 	929.43 k 0.64% of total 0.00 per row sent	0.88 avg 

How to fix them

EXPLAIN											
Database: innodb				EXPLAIN							
Id	SelectType	Table	Partitions	CreateTable	Type	PossibleKeys	Key	KeyLen	Ref	Rows	Extra
1	SIMPLE	sbtest1			const	PRIMARY	PRIMARY	4	const	1	

CREATE

STATUS

```
CREATE TABLE `sbtest1` (  
  `id` int(10) unsigned NOT NULL AUTO_INCREMENT,  
  `k` int(10) unsigned NOT NULL DEFAULT '0',  
  `c` char(120) NOT NULL DEFAULT '',  
  `pad` char(60) NOT NULL DEFAULT '',  
  PRIMARY KEY (`id`),  
  KEY `k_1` (`k`)  
) ENGINE=MyISAM AUTO_INCREMENT=100000001 DEFAULT CHARSET=latin1 |
```

CREATE

STATUS

Name	Value
Name	sbtest1
Engine	MyISAM
Version	10
RowFormat	Fixed
Rows	100.00 m
AvgRowLength	189.00 Bytes
DataLength	17.60 GB
MaxDataLength	756.00 GB
IndexLength	1.70 GB

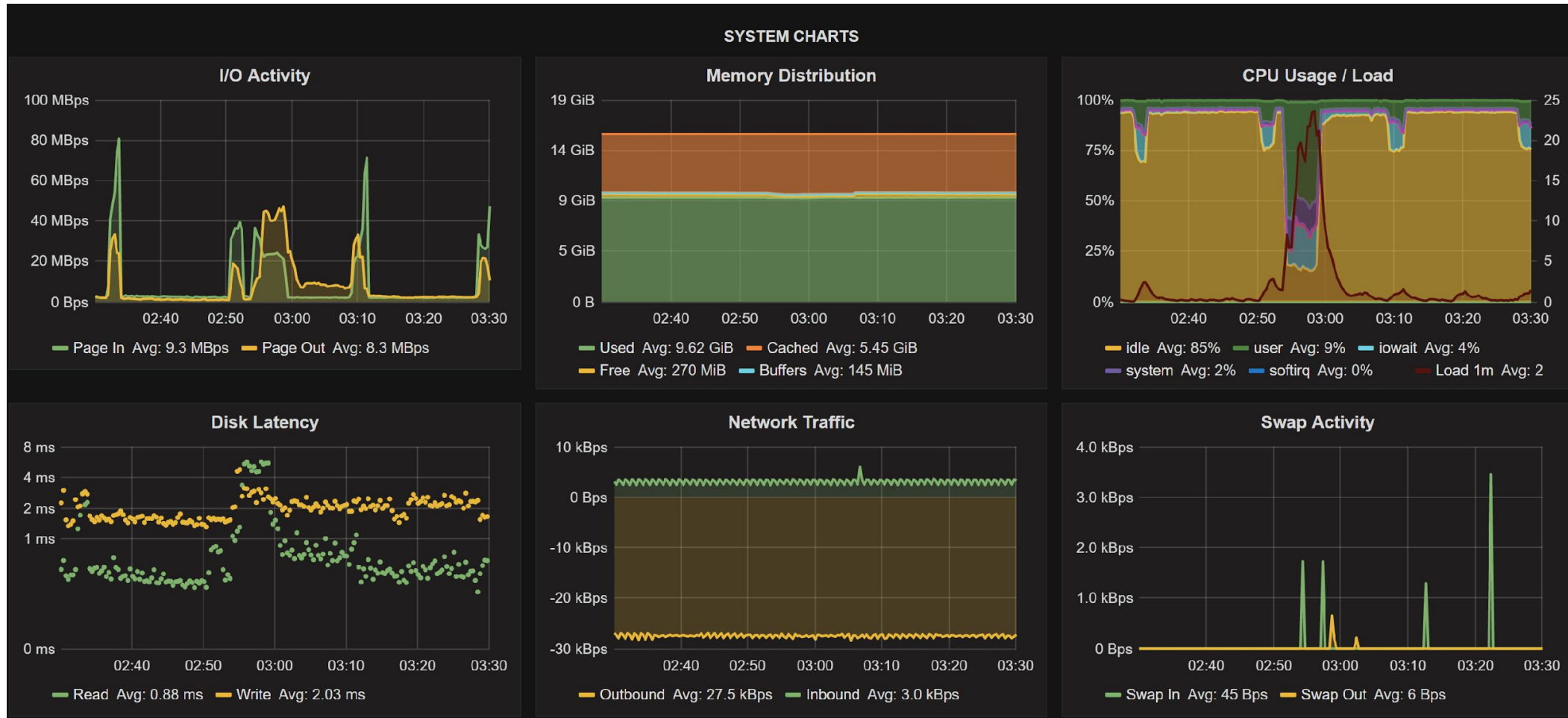
System Information

MySQL Summary

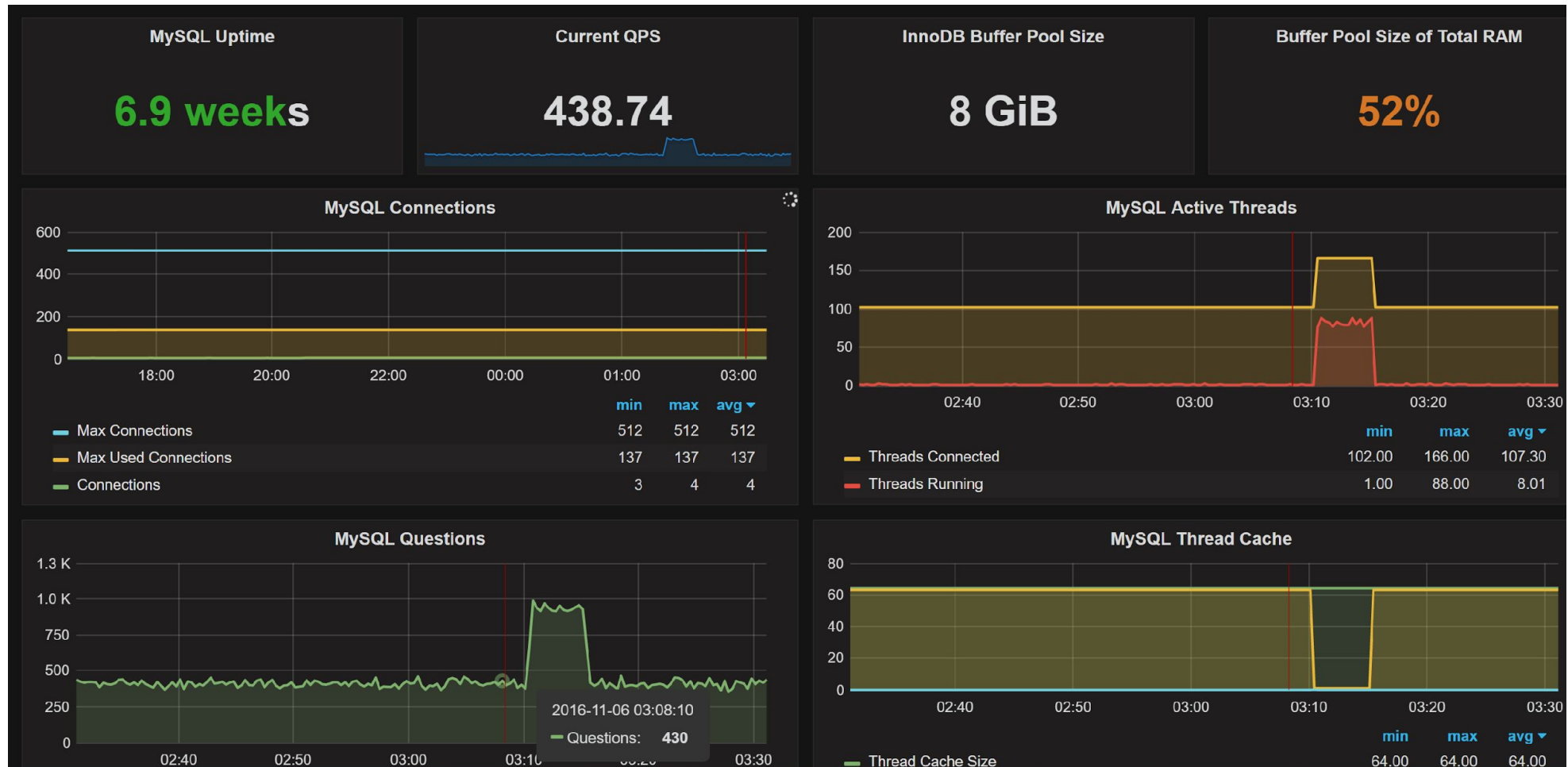
```
# Percona Toolkit MySQL Summary Report #####
      System time | 2016-11-06 08:27:41 UTC (local TZ: CET +0100)
# Instances #####
Port  Data Directory      Nice OOM Socket
=====
      0      0

# MySQL Executable #####
      Path to executable | /usr/sbin/mysqld
      Has symbols | No
# Report On Port 3306 #####
      User | root@localhost
      Time | 2016-11-06 09:27:41 (CEST)
      Hostname | ps57
      Version | 5.7.14-8-log Percona Server (GPL), Release 8, Revision 1f84ccd
      Built On | Linux x86_64
      Started | 2016-10-06 16:33 (up 30+16:54:37)
      Databases | 8
      Datadir | /var/lib/mysql/
      Processes | 250 connected, 2 running
      Replication | Is not a slave, has 1 slaves connected
      Pidfile | /var/run/mysqld/mysqld.pid (exists)
```

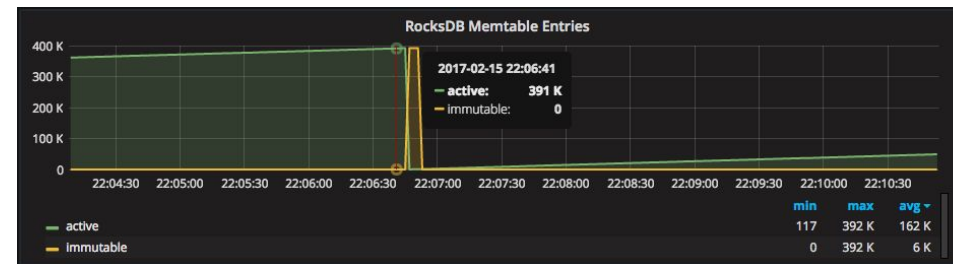
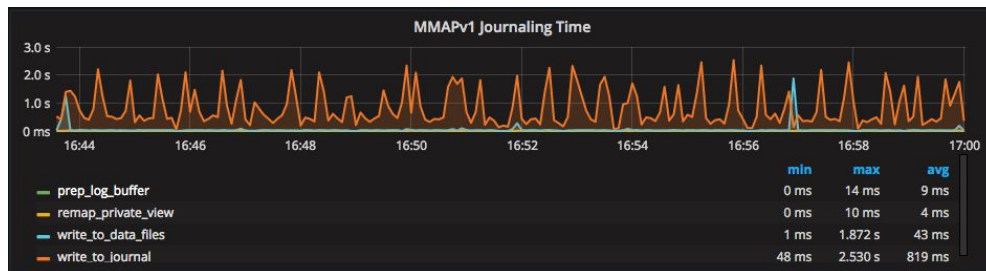
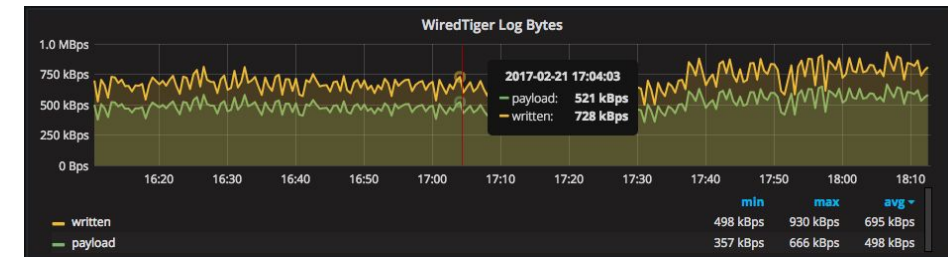
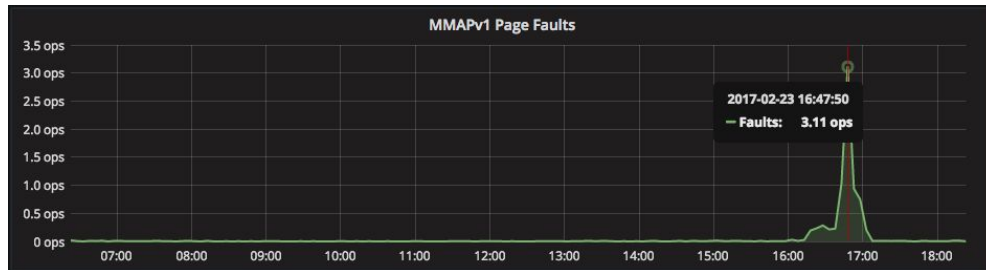
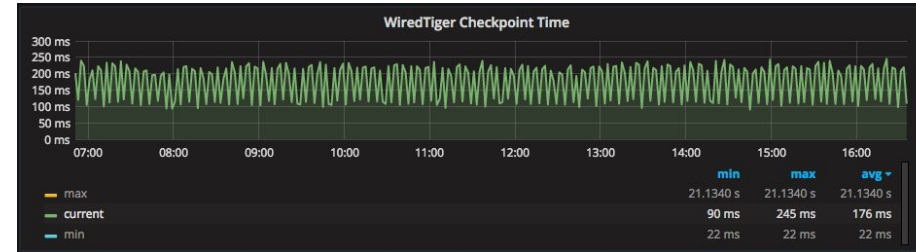
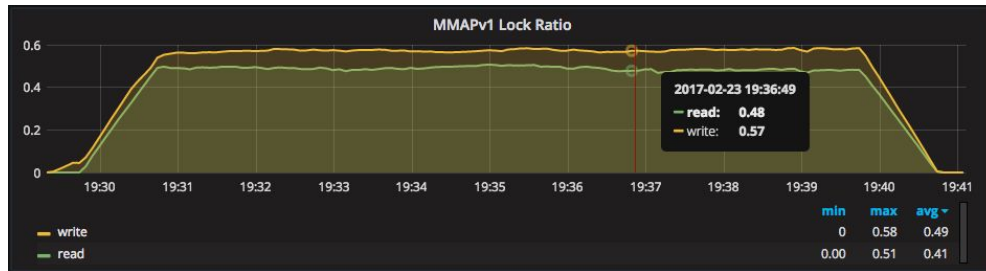
What happens on OS and Hardware Level



As well as Database Level



In-Depth MongoDB Dashboards



Best to check out Demo

<http://pmmdemo.percona.com>

ProxySQL



ProxySQL

Traffic Management Solution for MySQL (MySQL Proxy)

100% Free and Open Source

Multiplexing

Query Routing

Sharding and Read Write Splitting

Query Caching

Integrates with Percona XtraDB Cluster and MySQL Group Replication

<http://www.proxysql.com/>

Orchestrator



orchestrator

<> with ♥ by **GitHub**

Orchestrator

Visualize MySQL Replication

Replication Monitoring

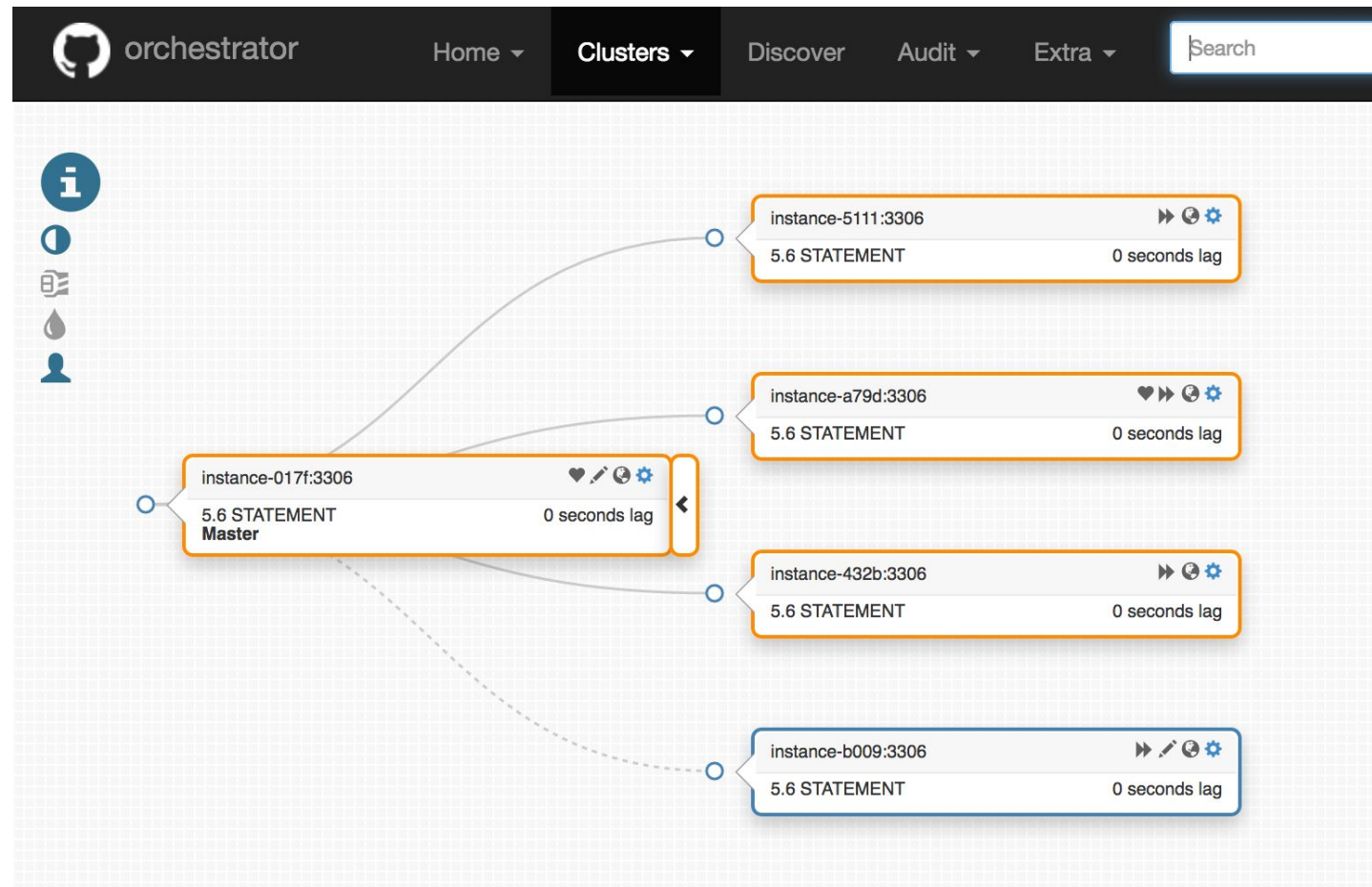
Failover

Change to Replication Topology

Now Maintained by GitHub

<https://github.com/github/orchestrator>

Orchestrator Screenshot



Gh-ost

GitHub's Online Schema Migrations for MySQL

Pt-online-schema-change on steroids

Does not use Triggers (less overhead and limitations)

Requires ROW binary log enabled

Tracks table changes through Binary Log

<https://github.com/github/gh-ost>

MongoDB 3.4

MongoDB 3.4 – New version most popular NoSQL Database

Collation support for more than 100 languages and locales

Decimal128

\$graphLookup operator for Graph Processing

Faceted navigation

Zones for Geographically Distributed Clusters

Faster initial sync and better shard balancing

Views

Percona Server for MongoDB 3.4



PERCONA
Server for MongoDB

Percona Server for MongoDB 3.4

100% Compatible with MongoDB 3.4 Community Edition

Open Source with Alternatives to many MongoDB Enterprise Features

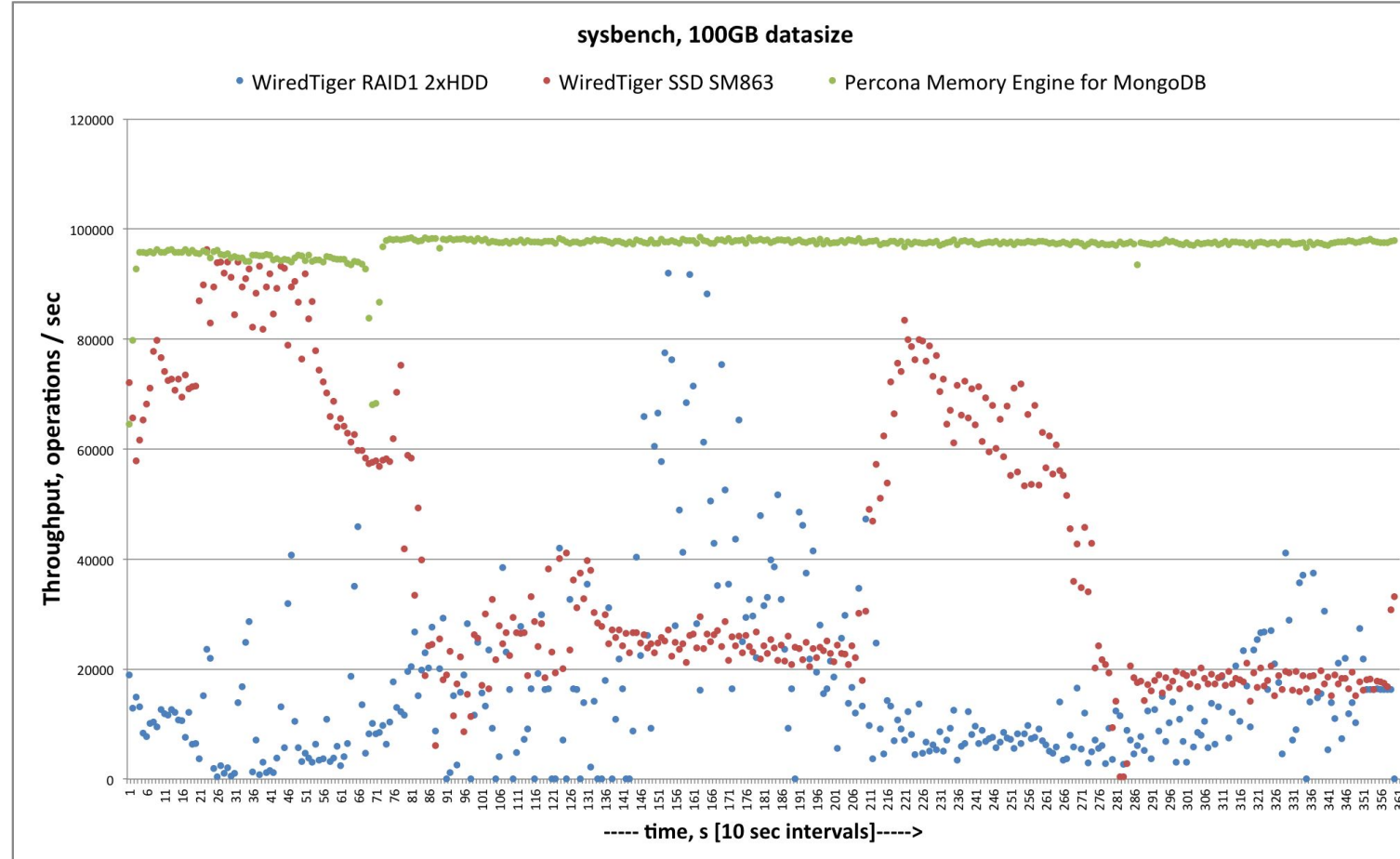
MongoRocks (RocksDB) and Percona Memory Engine

New: Sensitive Data Masking

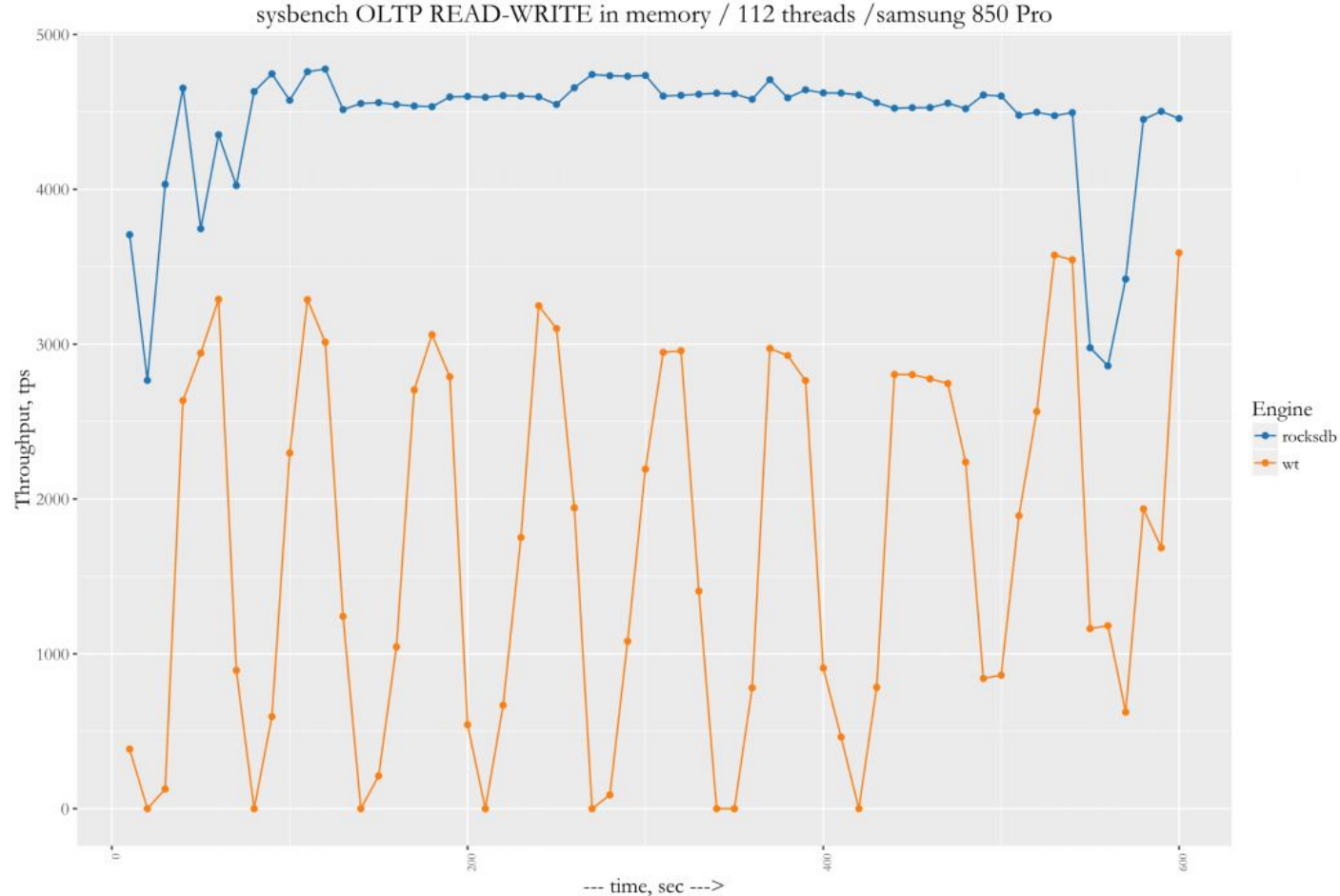
New: Query Sampling

New: Hot Backup for WiredTiger and MongoRocks

Percona Memory Engine for MongoDB Benchmarks



WiredTiger vs MongoRocks – write intensive



Before we take a Break...



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Refer a friend and get \$1000 if one is hired by Percona

... and eternal gratitude for helping to get the most amazing job

Save the Date!

Percona Live Europe Open Source Database Conference

- September 25-27, 2017
- Radisson Blu Royal Hotel
- Dublin, Ireland

Call for Proposals and Registration

- Opening Soon!



PERCONA
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DUBLIN



Database Performance Matters