Practical MySQL Performance Optimization

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In This Presentation We'll

Look at how to approach Performance Optimization

Discuss Practical Performance Optimization Tips

Look at the Tools which can help us

First Things First

MySQL Performance does not Matter!

What DOES Matter?

Application Performance!

Even More so

Application Performance Always Matters!

Take Away

Performance Problems might not be MySQL

Performance Solutions might not be with MySQL

Many “Tools”

Use the best Tool for the job

- MongoDB
- Cassandra
- Hadoop
- Spark
- Elastic
- Redis

Say Performance

Think about
Response Time

Related Issues

Stability

Scalability

Efficiency

Scalability?

Scalability with:

- Load
- Data Size
- Infrastructure

Performance “Sandbags”

- Security
- Manageability
- Compatibility
- Compliance
- Ease of use by Developers

“Good Enough”

You can always improve your system. Know when to stop.

What MySQL Does

Processes Queries

- Selects
- Inserts
- Deletes
- Updates

What to focus on?

Performance Optimization focused

- Making queries run faster
- Using less resources
- Scaling better

Transaction Optimization

Specific Application Transaction

- Find out which queries it runs
- Optimize them

General Optimization

Look at what queries Server Runs

- Prioritize them
- Optimize them

Queries

Are those the right queries ?

- Get rid of them?
- Can we change them to be doing less work?

Things to Consider

Do not look at the average case only	• But avoid focusing only on outliers
Look at trends over time	• Consider daily, weekly, monthly cycles
Think about future performance	• Data size change? Cardinality?

Query Tips

- Do less queries – latency and overhead
- Read less data; Modify less data
- Less data processing on the fly
- How much data is traversed vs sent
- How much data is sent vs used by app

Schema

Look at Schema and Queries together

- Minor Schema changes
- Data Architecture

Schema Tips

Learn Indexing	• http://bit.ly/1rAtamE
Design Schema for data access	• Starting with Text book schema is OK ending is likely not
Technics	• Partitioning & Sharding • Normalization and Denormalization • Covering Indexes

The Following Also Matter

- Infrastructure
- Operating System and Configuration
- MySQL Version
- MySQL Configuration

Optimization Process

Low Hanging Fruit	Medium Level	Hard Changes
• MySQL Configuration • OS Settings • Indexes • Caching	• Infrastructure • OS • MySQL Version	• Major schema changes • Application architecture change

Infrastructure

Scaling Up or Out

- One MySQL Node
- Many MySQL Nodes

Type

- Public Cloud
- Private Cloud
- Bare Metal

Hardware

- CPU
- Memory
- Disk
- Network

CPU

- Intel owns the market
- 2 sockets commonly used
- Faster cores or more cores
- Turboboost

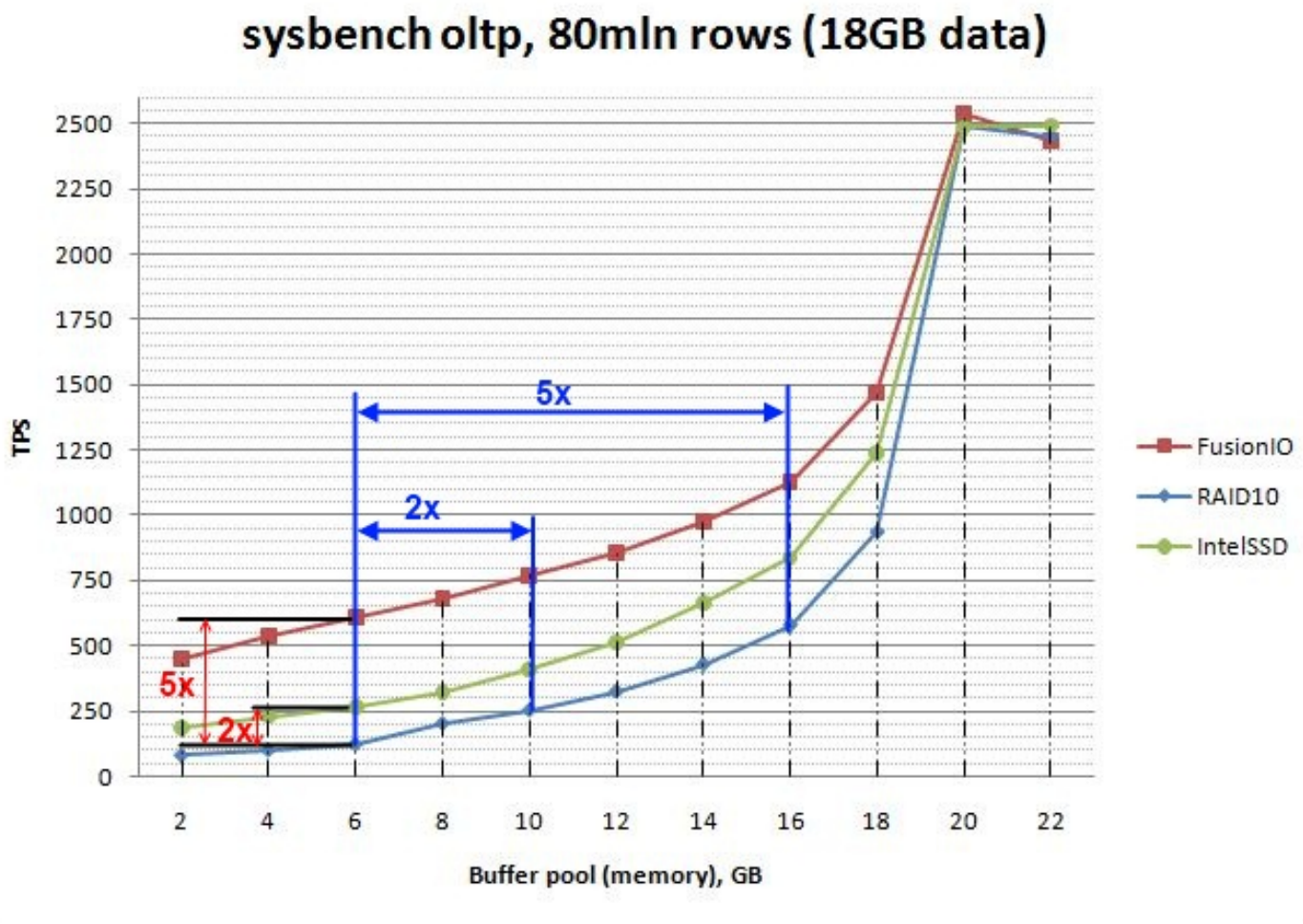
Memory

Main purpose – Cache

Think Database size vs Memory

Look together with Storage Optimization

Invest in Memory or Storage



Storage

Types

- Directly Attached
- SAN
- NAS
- Virtualized
- Cloud

Flash

- PCI-E
- SATA “Disks”
- TLC, MLC, eMLC, SLC

RAID

- Hardware
- Software
- Filesystem

Network

Latency	Throughput	Availability
• Distance • Number of “Hops”	• 1Gb is a must, trunking recommended • 10Gb increasingly affordable	• Bonding • Multipath

OS Choices

- Linux
- Server grade
- Recent
- Supporting MySQL well

OS Tuning

Defaults are good for common workloads

Filesystem: EXT4 or XFS

More Detail
http://bit.ly/MySQLonLinux

MySQL Version

New versions typically improve performance

MySQL 5.7 – Current GA

Scalability, Improved Optimizer, etc.

Expect some regressions

Try Percona Server 5.7

MySQL Configuration

Do not run with defaults

Do not ever obsess with tuning

More Details: http://bit.ly/1vth5Cu

MySQL Tuning in 1 slide

- max_connections
- log_bin
- table_open_cache_size
- table_definitions_cache_size
- open_files_limit
- innodb_buffer_pool_size
- innodb_log_file_size
- Innodb_flush_log_at_trx_commit
- Innodb_flush_method=O_DIRECT

Tools and The Process

Process

Developers Part

- Do not bring bad queries and schema in production

Operations Process

- Catch bad queries
- Validate changes in hardware, configuration, versions

Queries will be impacted

- Hardware Changes
- Configuration
- MySQL Version Changes
- Impact of Data Growth
- Changes to the Query Mix
- Optimizer Plan Changes

Tools

- PT-Query-Digest from Percona Toolkit
- MySQL Enterprise Monitor
- MonYog
- VividCortex
- PMM (Percona Monitoring and Management)

More on PMM

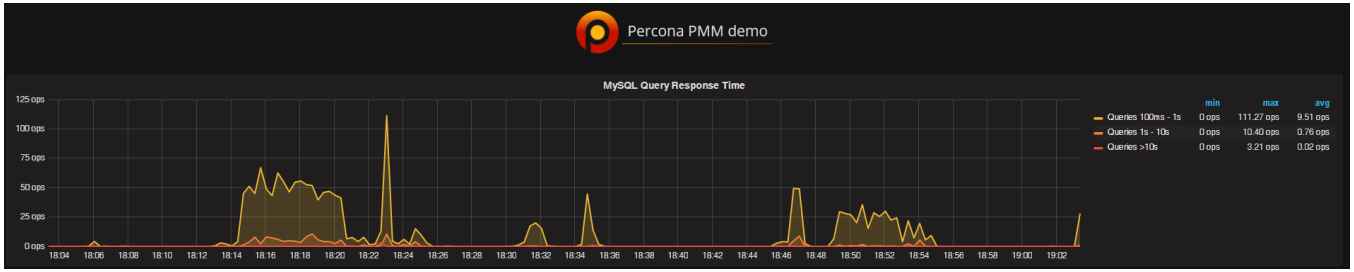
Percona's Open Source solution for MySQL and MongoDB Monitoring

Currently In Beta

Planning to add Management in the Future

Check it out yourself at http://pmmdemo.percona.com

Quick PMM Demo



To Sum it Up

- It is Application Performance what Matters!
- Use Right Tools for Right Job
- See what Queries MySQL is Running
- Reduce Number of Queries
- Reduce Data They Return
- See how they can do less work
- Do that work more efficiently

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