Practical MySQL Performance Optimization

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In This Presentation We’ll

1. Look at how to approach Performance Optimization
2. Discuss Practical Performance Optimization Tips
3. 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

• Selects
• Inserts
• Deletes
• Updates
What to focus on?

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

- 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

<table>
<thead>
<tr>
<th>Do not look at the average case only</th>
<th>But avoid focusing only on outliers</th>
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<tbody>
<tr>
<td>Look at trends over time</td>
<td>Consider daily, weekly, monthly cycles</td>
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<tr>
<td>Think about future performance</td>
<td>Data size change? Cardinality?</td>
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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

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
- MySQL Configuration
- OS Settings
- Indexes
- Caching

Medium Level
- Infrastructure
- OS
- MySQL Version

Hard Changes
- 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
- Distance
- Number of “Hops”

Throughput
- 1Gb is a must, trunking recommended
- 10Gb increasingly affordable

Availability
- Bonding
- Multipath
OS Choices

Linux
Server grade
Recent
Supporting MySQL well
Defaults are good for common workloads

Filesystem: EXT4 or XFS

More Detail
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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Thank You!

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