How **AI** Can Help Developers Avoid **MySQL** Performance Pitfalls

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PERCONA UNIVERSITY

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Who am I?

- Founder of **Releem**
- Been using **MySQL** since **2008**
  - Developer
  - Support engineer
  - Reliability engineer
  - DBA
- **10**+ years in **MySQL** Consulting

Agenda

- How to improve the performance of real applications?
- Why **MySQL** Configuration Tuning is important?
- How to tune **MySQL Configuration**
- How **AI** can help
- AI-Powered tools

How to Improve Application **Performance**

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How To improve Application Performance

- Servers resources (CPU, Memory, Storage)
- Tune software configurations (Linux, Nginx, Php….)
- Tune DBMS (**MySQL**, **PostgreSQL**) configuration
- Optimize DB scheme, change indexes
- Optimize application (Code, Queries, Architecture….)

A comprehensive tuning approach yields the **best results**.

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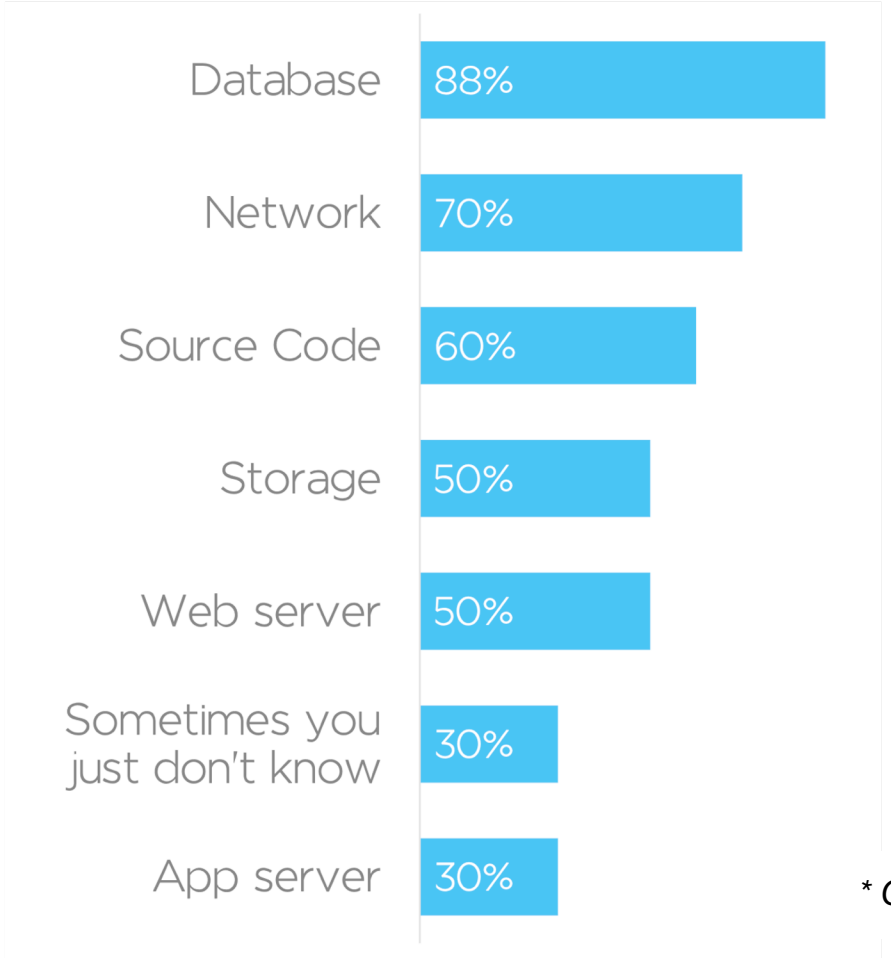
Top Reasons for Application Performance Issues



** Gleanster APM Survey*

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How does **MySQL** Tuning impact Application Performance?

Application	Response Time (Latency)	CPU Utilization	Queries per Seconds
WordPress WooCommerce	-63%	-37%	+106%
Drupal Commerce Kickstart	-97%	-73%	+268%
Aimeos Laravel	-42%	-86%	+291%

Tuned MariaDB configuration compared to default MariaDB configuration

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Benefits of **MySQL** Performance Tuning

- Enhanced Database Efficiency
- Improved Query Response Times
- Reduced Resource Usage
- Enhanced User Experience
- Reduced costs on servers

How to Tune **MySQL**

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How to Tune MySQL – **Analyze Monitoring Data**

- **Resource Utilization**
  CPU, Memory, Disk I/O…
- **MySQL metrics**
  InnoDB Cache Hit Rate, Table Cache Hit Rate, Thread Cache Hit Rate…

Tools:
Zabbix, Prometheus, Percona Monitoring and Management, Nagios

How to Tune MySQL – **Configure MySQL Variables**

- **MySQL variables**
  innodb_buffer_pool_size
  innodb_log_file_size
  innodb_flush_log_at_trx_commit
  innodb_flush_method

  And more that 100 other variables…

  Resources:
  MySQL Documentation, Blogs, Best practices

Challenges of Manual Tuning

- **Time-Consuming** to Learn
- **Needs Experimentation** to Get Experience
- **Requires Installation** of Complicated Monitoring Solutions

Emergence *of*
Performance Tuning Tools

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Emergence of Performance Tuning Tools — **Rule-based**

- **Analyze MySQL and server metrics**
- **Give recommendations**
- **Scripts:** MySQLTuner, Percona Toolkit, tuner-primer.sh

Rule-based scripts benefits

- simple installation
- automate calculations
- suggest improvements

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Rule-based scripts limitations

- Required significant manual intervention
- Static analysis
- Doesn’t automate changes to configuration
- Can’t analyze the workload
- Can’t tune cloud managed databases

Emergence *of*
AI-Powered
Performance Tuning Tools

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Emergence of **AI-Powered** Performance Tuning Tools

- **Agent**
  - metrics collection
  - applying configurations
- **Dashboard**
  - graphs
  - settings

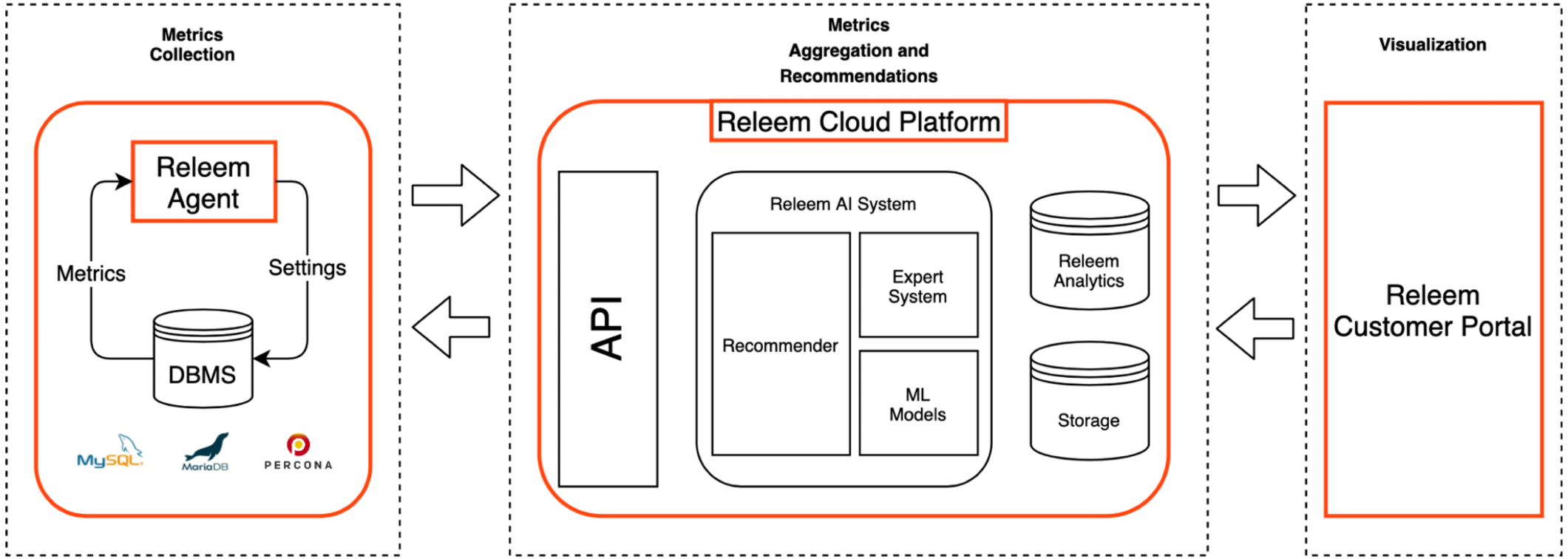
Tools:
OtterTune, dbtune.ai, Releem

- **AI-Powered platform**
  - metrics storage
  - metrics analyze
  - recommended configurations

AI-Powered Performance Tuning Tools — How it works?

- The Goal of optimization (Latency, Throughput, Resource usage)
- Reinforcement learning algorithms
- Workload Mapping

AI-Powered Performance Tuning Tools — How it works?



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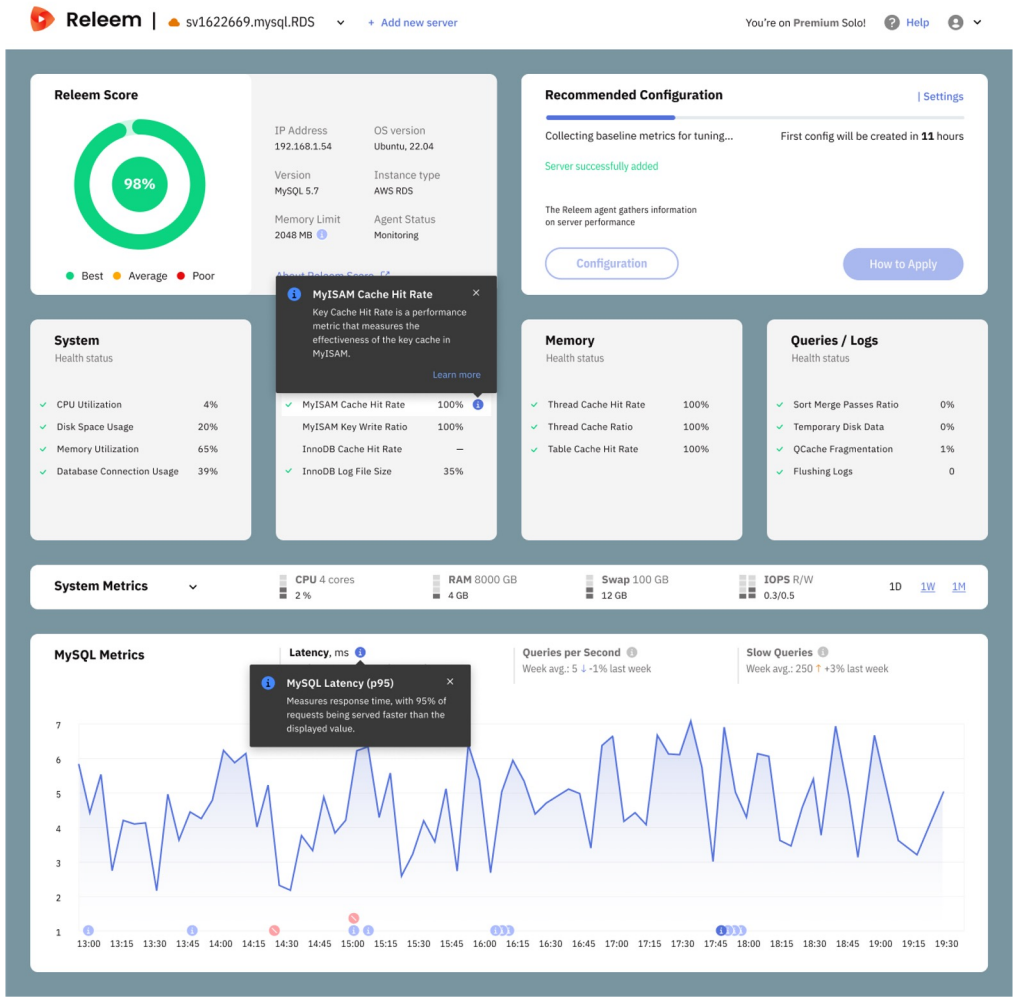
AI-Powered Performance Tuning Tools — Dashboard



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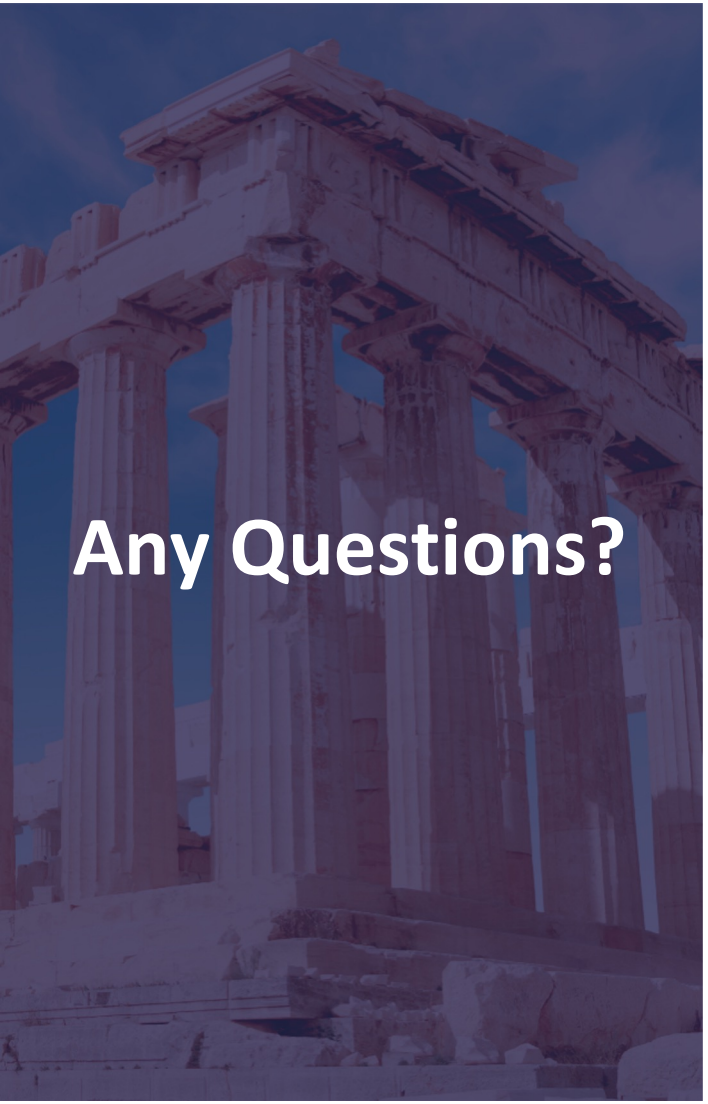
AI-Powered tools limitations

- Interpretability
- Applying recommendation on production environments
- Compatibility

AI-Powered tools benefits

- Tuning of hundreds variables
- Improved accuracy
- Dynamic analysis
- Automate configuration changes
- Can tune cloud managed databases



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welcome to join, we'll be in touch.

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