

MONITOR MYSQL MANAGED CLOUD DATABASES WITH EASE

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OVERVIEW

Once upon a time, organizations hosted their database servers on-premises. Later, they moved to data centers, and now the same servers are often found in the major cloud platforms.

Most of the new deployment and development of database-oriented applications are on the cloud. AWS, MS Azure, and GCP are prevalent hosting applications and databases. While the fundamental principles of monitoring remain the same when deployment is in the cloud or on-premises, some areas need more attention on the cloud-based MySQL.

In this whitepaper, we will discuss the major areas to focus on when one has to monitor the performance of MySQL on the cloud. We will focus on monitoring critical metrics along with the automatic alerting mechanism. After reading this whitepaper, DBAs and businesses will better understand how to drive efficiency in their investments.



MYSQL MONITORING IN CLOUD ENVIRONMENT

It is often straightforward to manage only one database on one platform. However, the natural world always has different challenges. In industry, applications use multiple technology stacks, and one can find various platforms involved in hosting applications and databases.

Traditionally DBAs ran MySQL databases on-premises and managed everything on their own. However, this solution had many challenges, automatically resolved in the managed cloud database. Instead of running MySQL on-premises, one can purchase managed cloud services from providers.

Cloud service providers manage infrastructure, underlying servers, and everything required to run MySQL. They offer APIs as well as various utility which helps users to run multiple MySQL-related operations.

Amazon Web Services's RDS, Google Cloud Platform's Cloud SQL, Oracle, Heroku, and Azure Database offer managed MySQL cloud services. The most significant advantage of managed cloud hosting with a reputed host is high scalability and performance. Every host has a different tier of offerings and can easily opt for necessary hardware configuration and software selections.

When it comes to the cloud, there are three types of primary deployments.

- Managed Cloud Databases
- Cloud Virtual Machines
- Hybrid Cloud Environment

Each deployment has its advantages and challenges. However, a few challenges are prevalent among all kinds of deployments. Today we will discuss three essential aspects of cloud deployment, associated difficulties, and solutions.

- Scalability
- Performance
- Cost

MONITORING SCALABILITY

When servers are scaled up, they perform better, but the subscription charges also go up. Often people go on a managed cloud thinking its services will be cost-effective as they do not have to manage infrastructure, but it is not always true. There have been scenarios where organizations have realized that their server cost has gone higher after they moved to managed cloud services.

One has to stay extra vigilant when using cloud services as the workload changes on your server; it has to be finely tuned in terms of the available resources. If the server is underpowered, it will perform poorly; if it is overpowered, it will waste resources. Monitoring is highly essential when it comes to cloud services.

Some of the cloud providers have dynamic scaling features. At the same time, this feature looks very helpful until a human makes an error in deployed application code. An infinite loop can consume all the available resources on the server. If the server is configured for dynamic scaling, it may get more and more resources, eventually leading to very high subscription costs.

Every cloud provider provides metrics and a dashboard to manage and maintain the servers. When using managed cloud databases, users may get trapped with the providers if database applications start depending on cloud host-provided utilities.

It is always a good idea to have external software to monitor the system's scalability, which affects the performance and cost of the service.

MONITORING PERFORMANCE

The performance of any system is dependent on many different aspects. The three significant contributors to better application performance are hardware, workload, and optimal server configuration.

One of the challenges of the on-premises server is that it was impossible to upgrade the server's hardware on the fly. On the cloud, it is easy to scale up and down as required by the application for MySQL. Many organizations often consider upgrading the hardware when encountering MySQL performance problems. While adding more hardware may look more accessible, sometimes it may not solve the performance problem. Adding more hardware means increasing the cost regularly on the cloud-based setup.

While adding hardware and getting better performance on Virtual Machine hosted servers may be easy, it may not be straightforward on managed instances. However, if you are on the managed services model, there may be restrictions related to a configuration that you can change or not change. There are few global configurations; when changed, they impact the entire server, and many cloud providers restrict access to such configurations.

Performance Schema

The Performance Schema contains information about recent statement events and aggregates that information in summary tables. It is essential to have access to the performance schema for any modern MySQL installation. However, while many leading cloud providers give access to the performance schema, some do not provide access for security reasons.

Here is one example of how a performance schema can be helpful. One of the tables which can help us understand long-running queries is the event statement summary by digest table.

```
SELECT SCHEMA_NAME, DIGEST, DIGEST_TEXT, COUNT_STAR,  
SUM_TIMER_WAIT/1000000000000 SUM_TIMER_WAIT_SEC,  
AVG_TIMER_WAIT/1000000000000 AVG_TIMER_WAIT_SEC,  
SUM_LOCK_TIME/1000000000000 SUM_LOCK_TIME_SEC  
FIRST_SEEN, LAST_SEEN  
FROM events_statements_summary_by_digest;
```

The above script provides information about how long any statement was locked and how often it occurred. This query offers valuable insight into when the event occurred and its latest occurrence. Now, if this query is not allowed to run, the user may not have access to vital information about the application's behavior.

Slow Query Logs

Setting the `slow_query_log` parameter in MySQL configuration creates a log of files that exceed the defined threshold. The threshold is specified in seconds and is suggested with the `long_query_time` variable. Queries that take longer than the `long_query_time` run are identified and logged. MySQL configuration settings get changed by modifying the configuration file `my.cnf`. Finding performance troublemakers may be an issue if cloud providers do not provide modification access.

Global Status Variables

Any server should have enough resources so it can accommodate changing workloads. The server can easily manage the workload if the workload is smaller and steady. However, if the workload is large and heavily volatile, it can be a considerable challenge to allocate the right resource.

Here are a few examples:

```
SHOW GLOBAL STATUS LIKE 'Connections';
```

The above script will show all the current connections to the server.

```
SHOW GLOBAL STATUS LIKE 'Slow_Queries';
```

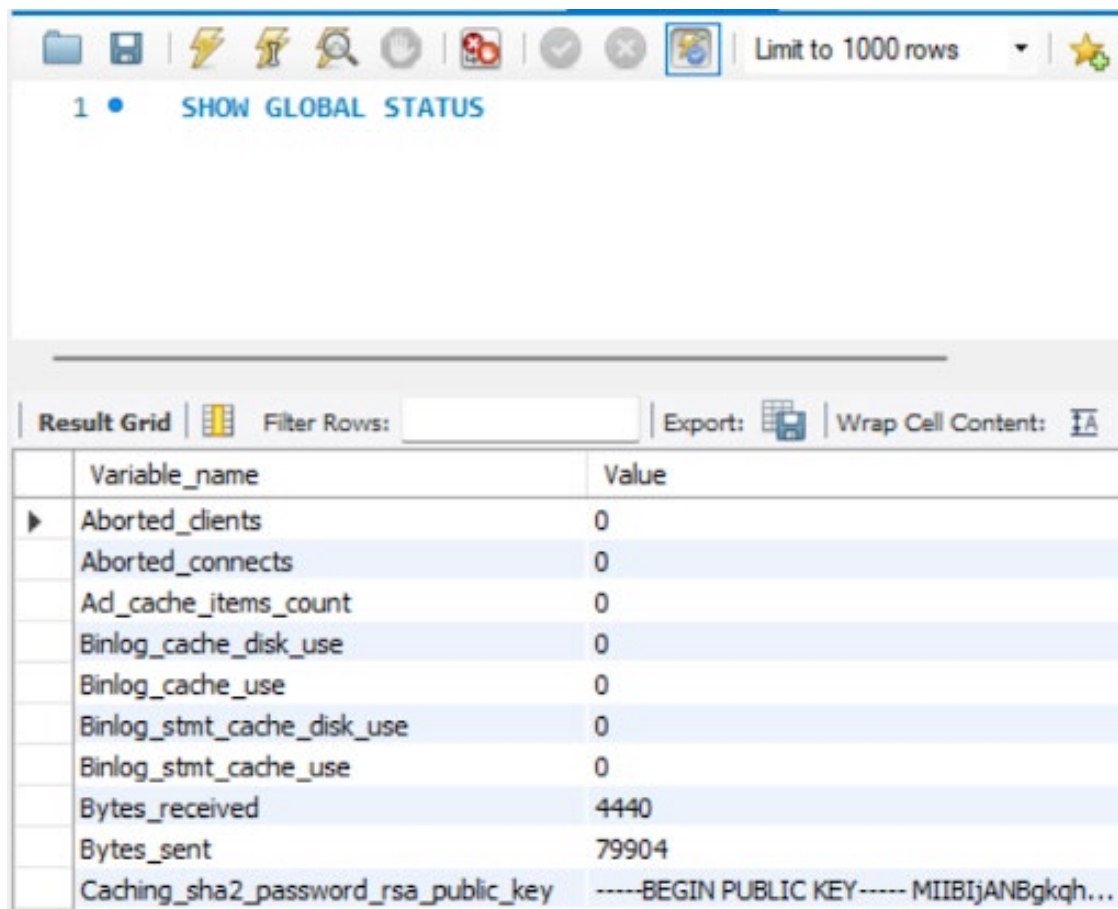
The above script will show your system's total number of slow queries.

You can run the following command if you want to see all the available options for the global status.

```
SHOW GLOBAL STATUS
```



When you run the above command, it will display something similar to the following image.



SHOW GLOBAL STATUS	
Variable_name	Value
Aborted_clients	0
Aborted_connects	0
Ad_cache_items_count	0
Binlog_cache_disk_use	0
Binlog_cache_use	0
Binlog_stmt_cache_disk_use	0
Binlog_stmt_cache_use	0
Bytes_received	4440
Bytes_sent	79904
Caching_sha2_password_rsa_public_key	-----BEGIN PUBLIC KEY----- MIIBIjANBgkqh...

You can easily query the global status on the Virtual Machine. However, some cloud providers on managed hosting do not allow the command as it shows the data related to every client on the same server.

We can't always depend on MySQL's capability or the cloud provider's offering to monitor our performance. We need a tool that is not restricted by anything and provides comprehensive details about our server's performance.

MONITORING COST

Cost is directly proportional to the resources made available to the server. If the server has more resources or better quality resources, it has an excellent chance to perform better and cost more. While cloud providers provide a dashboard of the cost that occurred and a potential forecast of the price, they never give insight into what can help save cost.

The cost of the server can be unpredictable if the workload varies and the server is configured for dynamic scaling. It is also tricky to right-size the server resources if the server load goes heavily during pick and off-pick times.

Monitoring the cost is never an easy task. The workaround is to monitor the server resources and workload and find the right balance between them. There is a need for a monitoring tool independent of the underlying host that gives distinct suggestions to improve the server's performance.

FINAL THOUGHTS - MONITORING SOLUTION

Monitoring and managing resources, cost, and performance is essential; they all depend on each other. After going through various real-world related scenarios, it is evident that the third-party monitoring tool is needed for MySQL, which supports cloud databases.

Monyog (aka SQL Diagnostic Manager for MySQL) is as versatile as it is powerful. With Monyog, you can use a single tool to monitor your MySQL performance across physical, virtual, and cloud environments. Monyog is compatible with the following:

- Managed cloud databases
 - Amazon RDS for MySQL/MariaDB and Amazon Aurora
 - Microsoft Azure Database for MySQL
 - Google Cloud SQL for MySQL
 - Oracle MySQL Cloud Service
- Cloud virtual machines
 - Amazon Elastic Compute Cloud (EC2)
 - Microsoft Azure Virtual Machines (VM)
- Hybrid cloud environments
 - MySQL on MariaDB on Galera
 - MySQL on cloud virtual machines
 - Cloud managed databases

Monyog provides everything you need to check how your databases perform. Begin your 14-day, functional trial today - no credit card required.

Monyog finds and fixes performance problems in physical, virtual, and cloud environments. Unlike its competition, it provides agentless monitoring with no additional load on servers, custom monitors, customizable dashboard and charts, and much more.

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ABOUT THE AUTHOR

Mehul Lal is a MySQL Expert and product evangelist for Monyog. He has been a part of the industry for more than 7 years and has helped several users with MySQL Server performance problems using Monyog.

