

Foglight® 6.0

# Getting Started with MySQL for Performance Investigation



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# Getting started with MySQL Performance Investigator

Based on Quest Software's leading application performance management solution; Foglight for MySQL provides combines world-class monitoring and alerting with operational best-practices designed to ensure the performance and availability of your MySQL databases. Utilizing standard API's, the cartridge provides integration to MariaDB and MySQL Versions 5.0 and above. The robust nature of the Agent ensures its ability to collect granular performance data and display that information through intuitive, easy-to-use dashboards. Based on vast experience building and deploying monitoring solutions, Foglight for MySQL ensures the performance and availability of this critical component. The solution leverages best practices for collecting, storing and representing data as well as detecting environmental abnormalities.

MySQL Performance Investigator (PI) allows you to rapidly identify bottlenecks, anomalies, and application trends by focusing on top resource consumers and providing multi-dimensional SQL domain drilldowns. MySQL PI allows you to:

- Monitor real-time MySQL Database performance at a glance
- Gather and diagnose historical views
- Identify and anticipate performance issues

**i** | **NOTE:** MySQL Performance Investigator requires a license. If you are using a trial version and would like to request pricing, contact <https://www.quest.com/register/107452/>.

**i** | **NOTE:** MySQL PI requires a repository database that is installed automatically on the Agent Manager.

## About this document

This document is intended as a summary of the requirements and procedures needed for implementing Performance Investigation with MySQL. For more detailed information, please refer to the *Foglight for MySQL Cartridge Guide*.

## Pre-installation Requirements and Configurations

Before installing the Foglight for MySQL cartridge, review the sections below to ensure that all requirements are met.

- [Foglight for MySQL Requirements](#)
- [Requirements for MySQL PI](#)
- [MySQL Server Pre-Configuration](#)
- [Configuring MySQL for Performance Investigation](#)

# Foglight for MySQL Requirements

Foglight for MySQL is compatible with MySQL 5.5+ and equivalent versions for drop-in replacements like MariaDB and managed database services like AWS Aurora/RDS and Microsoft Azure. However, older versions of the server may not provide some monitoring data that Foglight for MySQL presents for later versions. Most notably, statement digest data is not present earlier than 5.6.5.

The agent may be run on a FglAM that is either local or remote to the MySQL server. More information on configuring the MySQL server for monitoring can be found in the MySQL Server Pre-Configuration section of this document.

## Requirements for MySQL PI

In order for PI to collect data, the MySQL **Performance Schema** must be enabled with the required instrumentation. Refer to [Performance Schema Startup Configuration](#) in the MySQL documentation for more information.

**i** | **NOTE:** MySQL Performance Schema is enabled by default since MySQL 5.6.6

MySQL PI Data is collected based on MySQL **consumers** and **instruments**. Refer to [Configuring MySQL for Performance Investigation](#) for more information.

## MySQL Server Pre-Configuration

In order to allow full monitoring of the MySQL Server, the agent will require a user with sufficient privilege to execute system queries. Additional steps may also be required to enable a SSL connection or monitoring the slow query log if desired. These are covered in the following sections:

- [MySQL Agent User Permissions](#)
- [Configuring MySQL for Performance Investigation](#)
- [Configuring other server variables](#)

## MySQL Agent User Permissions

The Foglight MySQL agent requires certain minimum privileges for the MySQL Database User to be able to monitor a MySQL database.

Create a MySQL Database User by logging into the MySQL server and granting the privileges identified below.

User privileges required for the MySQL agent on the host machine:

- SELECT
- REPLICATION CLIENT (if monitoring replication)
- PROCESS
- SUPER (for MySQL versions below 5.1.24)

If Administration is enabled, the Admin user provided in the agent properties will be required to have privileges necessary to run operations or request explain plans for the functions that you want to have available.

If monitoring a replication slave server with the agent, that database user must have:

- SELECT
- REPLICATION CLIENT

**i** | **NOTE:** Refer to the *Foglight for MySQL Cartridge Guide* for detailed examples.

## Configuring MySQL for Performance Investigation

In order for PI to collect data, the MySQL **Performance Schema** must be enabled with the required instrumentation.

For MySQL PI to function properly, there are configurations required on monitored MySQL instances.

The configuration changes can be done two ways:

- changing the MySQL options file (known as *my.cnf* or *my.ini*) to add or change prerequisite parameters. This change will be permanent.
- via a SQL command. Changes will reside in memory and persist until a restart of the MySQL service.

### ***To make a permanent change using the config file***

The lines below should be copied and added directly to your MySQL config file. This name and location of this file depends on the operating system used:

- Linux – find the *my.cnf* file in ***/etc/my.cnf***, ***/usr/my.cnf*** or the **default installation directory**.
- Windows – find the *my.ini* or *my.cnf* file, usually in the Windows directory or the MySQL installation directory.

```
#Make sure the following Performance schema consumers are set
performance-schema-consumer-events-waits-current=ON
performance-schema-consumer-events-waits-history=ON
performance-schema-consumer-statements-digest=ON
performance-schema-consumer-thread-instrumentation=ON
performance-schema-consumer-events-statements-current=ON
performance-schema-consumer-events-statements-history=ON
performance-schema-consumer-statements-digest=ON
performance-schema-consumer-events-statements-history-long=ON

#Make sure the following Performance schema instruments are on
performance_schema = ON
performance_schema_instrument = 'statement/%=on'
performance_schema_instrument = 'wait/%=on'

#Make sure the following server variables are configured more than a default (w
high is too low)

#To gather more digests (Nomalized)
```

```

performance_schema_digests_size=10000
performance_schema_events_waits_history_size = 100
performance_schema_events_waits_history_long_size=10000
performance_schema_events_statements_history_size = 1000
performance_schema_events_statements_history_long_size=20000

#To see larger digest text (Normalized)
max_digest_length=1024
performance_schema_max_digest_length=1024

#To see larger SQL text
performance_schema_max_sql_text_length=1024

```

***[Optional] To change the configuration using SQL commands***

Copy the script below and execute it on the MySQL instance. Changes made will persist until the MySQL service is restarted.

```

--Parameter: performance_schema=ON
UPDATE performance_schema.setup_instruments
SET enabled = 'YES'
WHERE name = 'performance_schema';

--Parameter: performance_schema_instrument = 'wait/%=on'
UPDATE performance_schema.setup_instruments
SET enabled = 'YES'
WHERE name LIKE ( 'wait%' );

--Parameter: performance_schema_digests_size=10000
SET LOCAL performance_schema_digests_size=10000;

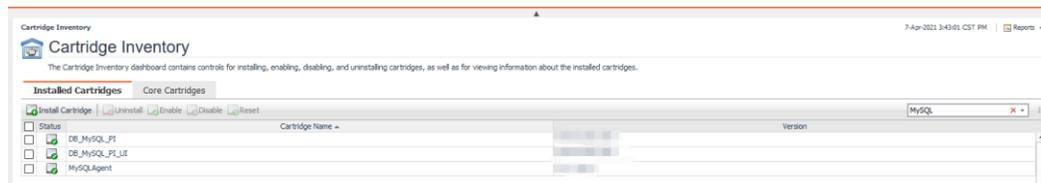
```

## Installing Foglight for MySQL

The use of Performance Investigation for MySQL requires the installation of the Foglight for MySQL cartridge and the MySQL PI cartridge.

***Follow the procedures below to install both cartridges.***

- 1 Open the Foglight Web Console.
- 2 From the navigation pane, select: **Administration**.
- 3 Click **Licenses** in the **Administer Server** section.
- 4 Install the appropriate license key to run the cartridge.
- 5 Return to the **Administration** dashboard.
- 6 Click **Cartridges** in the **Administer Server** section.
  - To install the Foglight for MySQL Cartridge:
    - a Load the *MySQLAgent-6\_x.car* file by clicking **Install Cartridge**. Leave **Enable on Install** selected when installing the cartridge.
    - b Once the installation is completed on the Foglight Management Server, the MySQL Agent Cartridge will appear in this list below as an installed cartridge.
  - To install the MySQL PI Cartridge:
    - a If you want to enable SQL Performance Investigator, ensure the **DB\_MySQL\_PI** cartridge is installed.
    - b Load the *DB\_MySQL\_PI-6\_x.car* file by clicking **Install Cartridge**. Leave the **Enable on Install** check box checked when installing the cartridge.
    - c Once the installation is completed on the Foglight Management Server, the **DB\_MySQL\_PI** and **DB\_MySQL\_PI\_UI** Cartridges will appear in this list below as installed cartridges.

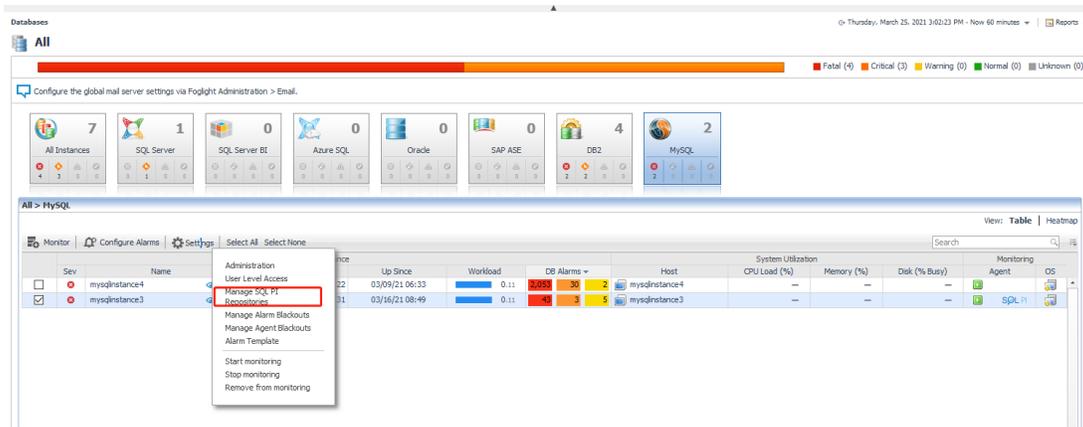


## Managing SQL PI Repositories

You can view SQL PI repositories and change SQL PI repository credentials in the Manage SQL PI Repositories dashboard.

### **To open the Manage SQL PI Repositories dashboard:**

- 1 In the navigation panel, under **Homes**, click **Databases**.
- 2 Click **Settings** and then click **Manage SQL PI Repositories**.

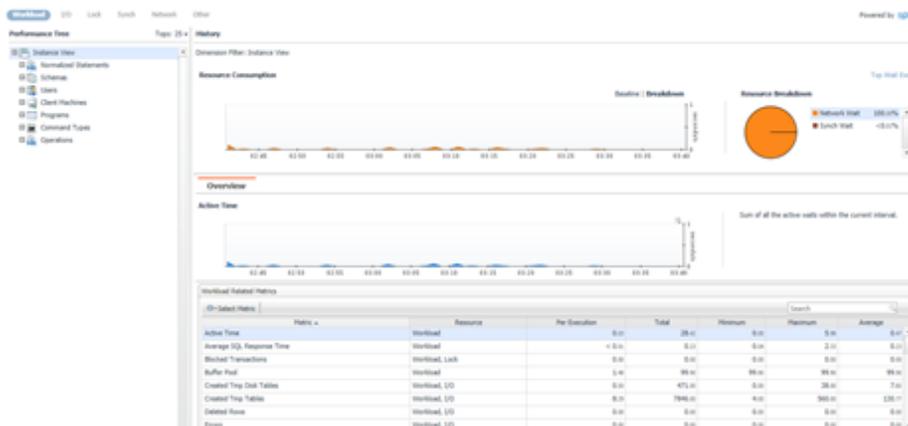


- 3 To change SQL PI Repository credentials:
  - a Select the radio button of a repository row in the **SQL PI Repositories** table.
  - b Click **Set Credentials**.
- 4 On the **Set SQL PI Repository Credentials** dialog make any required changes to **Authentication**, **Username**, and **Password** as necessary. Click **Set**.
- 5 The **Confirm Editing Credentials** dialog appears. Click **Yes**.
  - a If the given SQL PI repository user does not have sufficient privileges. The **Insufficient Privileges** dialog appears.
  - b Enter an admin user and password, and then click **Grant Privileges**.

## Using SQL Performance Investigator

**NOTE:** This dashboard will not be available if SQL Performance Investigator is not enabled.

The SQL PI view provides the ability to perform a more in-depth analysis and investigation of the database activity and resource consumption.



# Performance Tree

The performance tree provides iterative (up to three levels) access to any of the key dimensions associated with MySQL Database activity, based on the OLAP multidimensional model and a database view of the database activity. Domain nodes offer a hierarchical view of all types of MySQL Database activity characteristics.

Selecting a dimension from the tree determines what subset of activity is displayed. Iterative drill-down into domains of interest provides increasingly refined focus and diagnosis.

***For example, to begin the investigation by first identifying the most active User, follow the steps described below:***

- 1 Select the **Users** node to display the most active database users in the selected time range. That is the database users who consumed the highest amount of the selected resource.
- 2 Select the first user to focus the entire window on that user's activity.
- 3 Identify the most demanding SQL statement that this specific user has executed, by expanding the user node and then selecting the Normalized statement dimension node. This displays the most active Normalized statements executed by this user.
- 4 Select a specific Normalized statement to focus the entire window on the selected statement's activity.
- 5 Select Client Machines under the selected Normalized Statement, to view the computers on which the statement was run.

In a similar manner, such iterative drill-downs can be carried out into any MySQL Database dimension of interest, to gain a complete understanding of the causes of its behavior.

The default Azure SQL Database dimensions are as follows:

- **Normalized Statements** – The executed SQL queries.
- **Schemas** – The default database for the statement
- **Users**-- MySQL Database login names used for logging in to MySQL Database.
- **Client Machines** — The machines on which the client executable (connected to MySQL Database) is running.
- **Programs** — names of the programs that connected to MySQL Database and executed the SQL statements.
- **Command Types** — Executed SQL command type (for example, INSERT and SELECT).
- **Operations** – The type of operation performed, such as `lock`, `read`, or `write`.

## Viewing Historical Metrics

The History section view is divided into two sections that are correlated to each other:

- **Resource consumption charts** — This section displays data in five different charts:
  - **Workload chart** — Displays the database resource activity over the selected time frame by emphasizing the resources by colors.
    - **Baseline chart** — Displays the database workload compared to the baseline over time.
    - **Breakdown chart** — Activity of the database by second.

- **Resource Breakdown pie chart** — Displays the resource breakdown usage by % of the total database activity.
- **Top Wait Events pop up** — Displays details of the wait events that the database is waiting on during the selected time range.
- **Overview section-** Displays a graphical representation of the metrics highlighted in the Workload related Metrics table below.
  - **Workload Related Metrics** - A table that displays a variety of resource consumption metrics which can give an in-depth of the database activity, each resource holds its default metrics.

Selecting each dimension in the performance tree together with a specific resource effects the data displayed for each level.

- For example, by selecting the Lock resource the Database view dimension will present only locks related data, the Normalized Statements dimension will present only the statements that were experiencing locks and DB users the were experiencing locks and so on through all the dimensions and resources.

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