Monitoring Maria Database Server

eG Innovations Product Documentation

eG
Total Performance Visibility

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Chapter 1: Introduction

MariaDB - one of the popular database servers is developed as open source software and as a relational database it provides an SQL interface for accessing data. For storage and retrieval of persistent data in an IT infrastructure, application components rely on database servers. A database server is responsible for reliably managing a large amount of data in a multi-user environment so that many users can concurrently access the same data. At the same time, a database server must also prevent unauthorized access and provide efficient solutions for failure recovery.

For ensuring high availability, performance, and security, a database server includes a wealth of data storage, caching, and retrieval functions. To ensure peak performance, a database server needs to be continuously monitored and tuned. Sometimes, there may be a sudden change in workload to the database, resulting in an increase in the number of simultaneously processed transactions. This scenario could result in a performance bottleneck at the database server. Continuous monitoring and optimization of the database server is essential for ensuring that the database server operates at its peak.

The eG Enterprise suite is programmed with a variety of tests that are designed to monitor the critical parameters of the Maria Database servers. This document describes how the eG Enterprise suite monitors the Maria Database servers.

Chapter 2: How to Monitor Maria Database Server Using eG Enterprise?

eG Enterprise can monitor Maria databse server in an agent-based or an agentless manner. In case of the agentless approach, the remote agent used to monitor the Maria database server should be deployed on a remote Windows host in the environment. The broad steps for monitoring the database server are as follows:

- Set the pre-requisites to configure the Maria database server to work with eG agent. See Section **2.1**.

- Manage the target Maria database server using eG Enterprise. To know how to do it, refer to Section **2.2**.

- Configuring the tests pertaining to the Maria database server. To know how to do it, refer to Section **2.3**.

2.1 Pre-requisites for Monitoring the Maria Database Server

The eG agent is capable of monitoring the Maria Database server in both *agent-based* and *agentless* manner. For the eG agent to collect the required metrics, ensure that the following pre-requisites are fulfilled:

1. The eG agent should be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges. For a detailed procedure, refer to Section **2.1.3** of this document.

2. Enabling the *performance_schema* database.

   Note:

   Performance overheads are generally noticed when the *performance_schema* database is enabled. The performance overhead varies according to the transaction load and the size of the hardware installed in the target environment, version of the target Maria Database server installed etc. If you choose not to enable the *performance_schema* database, then, the following test will not report metrics:

   - Maria Connection Errors

   - Maria Files

   - Maria Locks

- Maria Execution Statistics

- Maria Event Stages

- Maria Event Statements

- Maria Thread Statistics and

- Maria Wait Events

3. Enabling the tables like *setup_instruments* and *setup_consumers* available in the Performance schema database.

2.1.1 Enabling the Performance Schema Database

To execute certain tests of the target Maria Database server, it is necessary that the *performance_ schema* database on the Maria Database server is enabled. To enable the performance_schema database, do the following in the *my.cnf*/my.ini configuration files:

- If the Maria Database Server is installed on Linux/Unix platforms, open the *$MYSQL_ HOME/my.cnf* file. If the Maria Database Server is installed on Windows Platform, open the *<MariaDB_INSTALL_DIR>\data\my.ini* file.
  Note:

  There may be multiple *my.ini* files and *my.cnf* files in different directories of the target Maria Database server. To monitor the target Maria Database Server, it is necessary to enable the performance_ schema database by editing the files available in the above- mentioned direcctories only.

- Edit the *[mysqld]* section and include 'performance_schema' as shown in Figure 2.1.
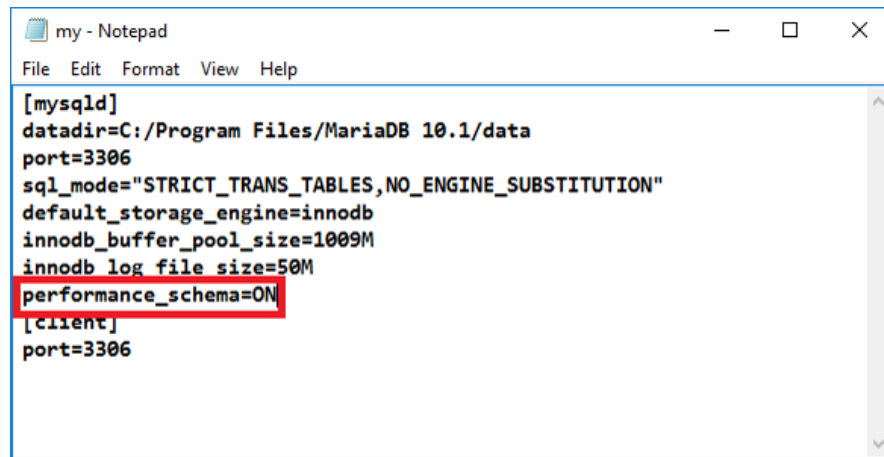
Figure 2.1: Enabling the performance_schema database

- Finally, save the file and restart the *MYSQL SERVICE* from the target Maria Database server.

2.1.2 Enabling the tables in the Performance Schema database

Some tests like **Maria Event Stages** test will execute and report metrics to the eG agent only when the *setup_instruments* and *setup_consumers* tables are enabled. To enable these tables, execute the following commands in the performance schema database:

```
--UPDATE setup_instruments SET ENABLED = 'YES', TIMED = 'YES';
```

```
--UPDATE setup_consumers SET ENABLED = 'YES' WHERE NAME LIKE '%stages%';
```

2.1.3 Configuring the eG Agent with Access Privileges

For the eG agent to collect the required metrics from the target Maria Database server, the eG agent should be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the target Maria Database server.

If such a user does not pre-exist, then, in the *user* table of the *mysql* database of the target Maria Database server, you need to manually create a user account with the aforesaid privileges.

To achieve this, follow the procedure discussed below:

1. To create a new user account, you must connect to the Maria Database server as the **mysql root user**. For that, first login to the Maria database host, and at the command prompt, issue the following command:

    mysql -u root

If you have assigned a password to the root account, you will also need to provide a -password or -p option, as shown below:

mysql -u root -p egurkha

2. After successfully logging into the Maria Database server, issue the following statement to access the *mysql* database, which holds the *user* table:

use mysql

3. Then, at the MySQL prompt, issue the following command to create a user:

CREATE USER '<username>'@'<IP_address_of_eG_agent>' IDENTIFIED BY '<password>';

*GRANT PROCESS,SELECT ON *.* TO '<username>'@'<IP_address_of_eG_agent>';*

GRANT SELECT ON performance_ schema. TO '<username>'@'<IP_ address_ of_ eG_ agent>';*
For instance, to ensure that user *john* (with password *john*) is able to connect to the Maria Database server (being monitored) from the eG agent host, *192.168.8.91*, the following command is to be issued:

CREATE USER 'john'@'192.168.8.91' IDENTIFIED BY 'john';

*GRANT PROCESS,SELECT ON *.* TO 'john'@'192.168.8.91';*

GRANT SELECT ON performance_schema. TO 'john'@'192.168.8.91';*
Note:

a. The *CREATE* and *GRANT* commands are case-sensitive; therefore, take care while specifying the user name, password, and privileges.

b. Only the IP address of the eG agent's host can be provided as part of the *CREATE* command's syntax; the host name of the eG agent cannot be provided instead.

4. To ensure that the external agent is able to execute the **Maria SQL Network** test, make sure that you create a user with the same credentials (i.e., name and password) and privileges as above and map that user to the IP address of the external agent. For instance, in the example above, to enable the external agent at IP address *192.168.8.92* to run the **Maria SQL Network** test, your command should be:

CREATE USER 'john'@'192.168.8.91' IDENTIFIED BY 'john';

*GRANT PROCESS,SELECT ON *.* TO 'john'@'192.168.8.92';*

GRANT SELECT ON performance_schema.* TO 'john'@'192.168.8.92';

5. Once the above-mentioned commands execute successfully, the user table will be updated with two records for the user account that was newly created - one mapped to the internal/remote agent's IP address and another mapped to the external agent's IP address.

Then, proceed to configure the tests. While doing so, remember to configure the **USER** name and **PASSWORD** parameters with the name and password (respectively) that corresponds to the eG agent's IP address in the *user* table.

2.2 Managing the Maria Database Server

The Maria Database server cannot be automatically discovered by eG Enterprise. This implies that you will have to manually add the server into the eG Enterprise system to manage it. Follow the steps below to achieve the same:

1. Follow the Components -> Add/Modify menu sequence in the **Infrastructure** tile of the **Admin** menu.

2. Next, select *Maria Database* from the **Component type** drop-down and then click the **Add New Component** button.

3. When Figure 2.2 appears, provide the **Host IP/Name** of the *Maria Database* server that you want to manage.

Figure 2.2: Managing a Maria Database server in an agent-based manner

4. Then, provide a **Nick name** for the server.

5. The **Port number** will be set as 3306 by default. If the Maria Database server is listening on a different port in your environment, then override this default setting.

6. In case you are monitoring a Maria Database server in an agent-based manner, just pick an external agent from the **External agents** list box and click the **Add** button to add the component for monitoring.

7. On the other hand, if you are monitoring a Maria Database server in an agentless manner, then do the following:

   - Select the **Agentless** check box.

   - Pick the **OS** on which the Maria Database server is running.

   - Set the **Mode** to **Other**.

- Select the **Remote agent** that will be monitoring the Maria Database server. **Note that the Remote agent you choose should run on a Windows host.**

- Choose an external agent for the server by picking an option from the **External agents** list box.

- Finally, click the **Add** button to add the Maria Database server for monitoring.

Figure 2.3: Managing a Maria Database server in an agentless manner

8. Finally, click the **Signout** button at the right, top corner of the eG admin interface to sign out.

2.3 Configuring Tests

When you try to sign out of the eG admin interface, a **LIST OF UNCONFIGURED TESTS** page will appear, revealing the list of tests mapped to the Maria Database server that require manual configuration:

List of unconfigured tests for 'Maria Database'		
Performance		**maridata:3306**
Maria Activity	Maria Cache	Maria Connection Errors
Maria Connections	Maria Database Size	Maria Event Stages
Maria Event Statements	Maria Execution Statistics	Maria Files
Maria Lock Waits	Maria Locks	Maria Long Running Queries
Maria Queries	Maria Queue Cache	Maria SQL Network
Maria Thread Statistics	Maria Transactions	Maria Uptime
Maria User Processes	Maria Wait Events	Processes
Windows Services		

Figure 2.4: The list of unconfigured tests requiring manual configuration

Figure 2.4 indicates the list of unconfigured tests that need to be configured manually. For instance, click on the **Maria Activity** test.Figure 2.5 then appears listing the parameters to be configured.

Maria Activity parameters to be configured for maridata:3306 (Maria Database)	
TEST PERIOD	5 mins
HOST	192.168.10.1
PORT	3306
* DATABASE	master
* USER	sam
* PASSWORD	•••••
* CONFIRM PASSWORD	•••••

Update

Figure 2.5: Configuring the Maria Activity test

To know how to configure the parameters, refer to Section **3.4.1**. Now, After configuring this test, try to signout of the eG administrative interface, this time you will be prompted to configure the **Processes** test and the **Windows Services** test. These tests have been elaborately discussed in the *Monitoring Unix and Windows Servers* document.

After configuring the **Processes** and **Windows Services** tests, sign out of the eG administrative interface. Then, login to the eG monitoring console to view the state of and metrics reported by the specialized monitoring model that eG Enterprise offers for the Maria Databse server.

Chapter 3: Monitoring the Maria Database server

eG Enterprise provides an exclusive Maria Database server monitoring model that runs quick health checks on the Maria Database server at configured intervals, and proactively alerts administrators to potential bottlenecks to the performance of the server.
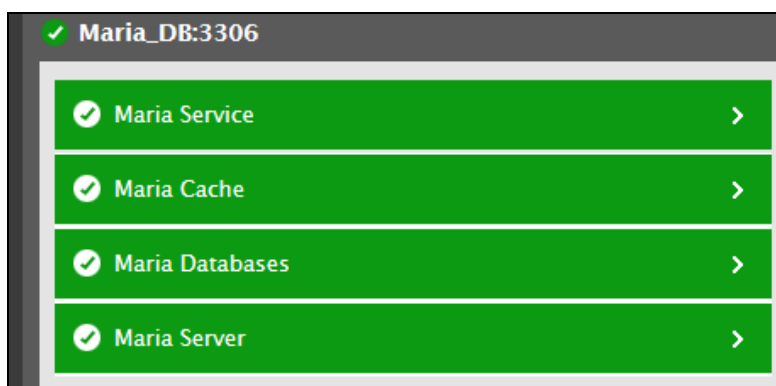
Figure 3.1: The layer model of the Maria Database server

Using the model depicted by Figure 3.1, administrators can determine the following:

- Is the database server available? If so, how quickly does it respond to user requests?

- Is the server overloaded?

- Are clients able to connect to the server, or are there too many connection failures?

- Are connections been closed properly? Are there an unusual number of open connections to the server?

- Is the query cache been utilized optimally?

- Has adequate memory been allotted to the cache?

- Is the key buffer cache utilized well?

- Is query execution efficient, or do queries need to be optimized for better performance?

- Are rollbacks kept at a minimum?

- Should the sort_buffer be increased?

- How is the overall locking activity on the server? Are too many requests waiting to acquire locks?

The forthcoming sections will deal with each layer mentioned in the layer model elaborately.

3.1 The Maria Server Layer

The tests associated with this layer indicate the level of activity on the Maria Database server by monitoring the threads, queries, internal files, wait events, event stages, SQL statements executed on it.
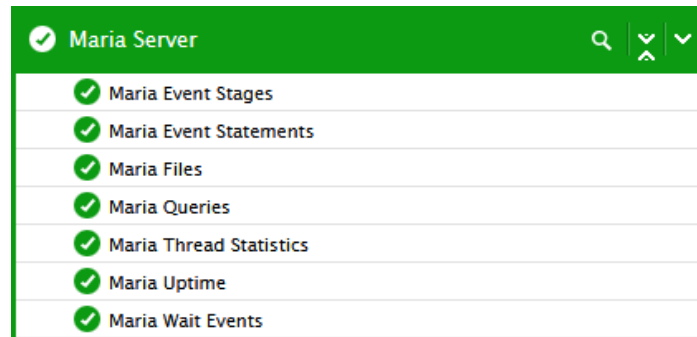
Figure 3.2: The tests associated with the Maria Server layer

3.1.1 Maria Event Stages Test

Events are named database objects containing SQL statements that are to be executed at a later stage, either once off, or at regular intervals. Events are only executed if the event scheduler is running.

Administrators need to continuously track the status of events that are scheduled, so that they can always tell which events are running as per schedule and which scheduled events are still waiting. The **Maria Event Stages** test helps in this regard. This test monitors pre-configured tasks at periodic intervals and reports the count of tasks in various stages of progress. To determine which tasks are in what state currently, use the detailed diagnosis of the test.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.

Parameter	Description
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option.
	The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
	• The eG manager license should allow the detailed diagnosis capability
	• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total events	Indicates the total number of events executed in the database server.	Number	
Running events	Indicates the number of events that were running during the last measurement period.	Number	The detailed diagnosis of this measure lists the thread ID, the event ID, the name of the event, the time stamp at which the event was started, the time stamp at which the event was ended and the name of the source.
Completed events	Indicates the number of events that were completed during the last measurement period.	Number	

Measurement	Description	Measurement Unit	Interpretation
Nested events	Indicates the number of events that were waiting for the same resource used by another event.	Number	The detailed diagnosis of this measure lists the thread ID, the event ID, the name of the event, the time stamp at which the event was started, the time stamp at which the event was ended and the name of the source.
Waited events	Indicates the number of events that were in wait state during the last measurement period.	Number	The detailed diagnosis of this measure lists the thread ID, the event ID, the name of the event, the time stamp at which the event was started, the time stamp at which the event was ended and the name of the source.
Waited events percentage	Indicates the percentage of events that were in wait state.	Percentage	A value close to 100 indicates that the events executing on the database are in wait state. This may be due to a performance bottleneck or connection errors.

3.1.2 Maria Event Statements Test

The Performance Schema is a feature for monitoring the database server performance and it is implemented as a storage engine on the Maria Database server. The storage engine contains a database called performance_schema, which in turn consists of a number of tables that can be queried with regular SQL statements, returning specific performance information. Whenever there is a dip in the performance of the Maria Database server, it is necessary for the administrators to check the performance schema tables for any discrepancies. Administrators can use the **Maria Event Statements** test to perform such a check on the performance schema tables.

This test monitors the performance schema tables of the target Maria Database server and reports the number of digest statements executing on the database server. This test also throws light on the SQL statements that are running on the performance schema tables, the statements waiting for locks and the rows affected and examined. Using this test, administrators can also figure out the FLUSH commands executed on the tables as well as the temporary tables.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
DD Frequency	Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against DD Frequency.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Digest statements	Indicates the number of digest statements	Number	The Performance Schema digest is a hashed, normalized form of a

Measurement	Description	Measurement Unit	Interpretation
	executing on the database server.		statement with the specific data values removed. It allows statistics to be gathered for similar kinds of statements.
Statements waiting for lock	Indicates the number of statements that were waiting for a lock on the database server.	Number	The detailed diagnosis of this measure lists the Thread ID, Event ID, name of the event, the start time, end time, the duration of the event, the lock time of the event and the SQL statement that created the event.
Rows affected	Indicates the number of rows that were affected by the statements on the database server.	Number	
Rows sent	Indicates the number of rows sent by the statements on the database server.	Number	
Rows examined	Indicates the number of rows that were read during the statement execution.	Number	
Statement errors	Indicates the rate at which FLUSH commands were executed.	Number	
Statements running	Indicates the number of statements running on the database server.	Number	The detailed diagnosis of this measure lists the Thread ID, Event ID, name of the event, the start time, end time, the duration of the event, the lock time of the event and the SQL statement that created the event.
Statements waited	Indicates the number of statements that were waiting on the database server for execution.	Number	
Statement warnings	Indicates the number of statements that were	Number	

Measurement	Description	Measurement Unit	Interpretation
	executed with a warning on the database server.		
Temporary disk tables	Indicates the number of implicit temporary tables that were created on the disk, while executing statements during the last measurement period.	Number	If the value of this measure is high, consider increasing the 'tmp_table_ size' configuration setting for the server.
Temporary tables	Indicates the number of implicit temporary tables that were created in the memory created while executing statements during the last measurement period.	Number	

3.1.3 Maria Files Test

This test monitors the internal files created on the target database server and reports the number of internal files created on the database and the maximum number of files that can be created on the server. Using this test, administrators can also determine the percentage of files created on the database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the Maria Database server being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server

Parameter	Description
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Files opened	Indicates the total number of internal files that are currently created on the database server.	Number	If the value of this measure is close to the *Maximum File Limit* measure, then, administrators should try increasing the *Maximum File Limit* measure.
Maximum file limit	Indicates the maximum number of file instances that can be created on the database server by default.	Number	
File usage	Indicates the percentage of files that are currently created on the database server.	Percentage	A value close to 100 indicates that the maximum limit for creating the files on the database server has been reached. To reduce this value, it is necessary to increase the *Maximum File Limit* measure of the database server.

3.1.4 Maria Queries Test

This test reports the performance statistics pertaining to the queries executed on the Maria Database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Query rate	Indicates the rate at which queries are sent to the server.	Queries/Sec	This is an indicator of server workload.
Slow queries	Indicates the number of queries that have taken more than the 'long_query_time' for execution, during the last measurement period.	Number	This value should ideally be 0. If it remains consistently high, the administrator should look to identify and optimize the slow queries.
Index first entry read count	Indicates the number of times the first entry was read from an index during the last measurement period.	Number	If the value of this measure is high, it suggests that the server is doing a lot of full index scans.
Row read requests based on a key	Indicates the number of requests that were received in the last measurement period, to read a row based on a key.	Number	If the value of this measure is high, it indicates that your queries and tables are properly indexed.
Next row read	Indicates the number of	Number	This will be incremented if you are

Measurement	Description	Measurement Unit	Interpretation
requests based on key order	requests received in the last measurement period, to read the next row in the key order.		querying an index column with a range constraint. This will also be incremented if you are doing an index scan.
Previous row read requests based on key order	Indicates the number of requests received in the last measurement period, to read the previous row in the key order.	Number	This is mainly used to optimize ORDER BY... DESC.
Row read requests based on a fixed position	Indicates the number of requests received in the last measurement period, to read a row based on a fixed position.	Number	This will be high if you are executing a lot of queries that require sorting of the result. If the value of this measure is high, then you probably have a lot of queries that require Maria database server to scan whole tables or you have joins that do not use keys properly.
Next row read requests in the datafile	Indicates the number of requests received in the last measurement period, to read the next row in the datafile.	Number	This will be high if you are performing a lot of table scans. Generally, this suggests that your tables are not properly indexed or that your queries are not written to use the indexes properly.

3.1.5 Maria Thread Statistics Test

This test tracks the Maria Database server threads and reports various performance statistics pertaining to them.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total threads	Indicates the total number of threads that are currently running on the database server.	Number	
Background threads	Indicates the number of background threads i.e., internal server threads that are currently executing on the database server.	Number	
Foreground threads	Indicates the number of foreground threads i.e., user connection threads that are currently executing on the database server.	Number	
Killing threads	Indicates the number of threads that kill other threads executing on the database server.	Number	
Error threads	Indicates the number of threads that are error prone	Number	

Measurement	Description	Measurement Unit	Interpretation
	on the database server.		
Delayed insert threads	Indicates the number of threads that inserts the results of the *INSERT DELAYED* statements.	Number	
Retrieve longdata thread	Indicates the number of threads that retrieve long data while executing prepared statements on the database server.	Number	
Maximum duration thread	Indicates the maximum time taken for a thread to execute on the database server.	Seconds	

3.1.6 Maria Uptime Test

In most production environments, it is essential to monitor the uptime of critical database instances in the infrastructure. By tracking the uptime of each of the database instances, administrators can determine what percentage of time a database instance has been up. Comparing this value with service level targets, administrators can determine the most trouble- prone areas of the infrastructure.

In some environments, administrators may schedule periodic reboots of their database instance. By knowing that a specific database instance has been up for an unusually long time, an administrator may come to know that the scheduled reboot task is not working on a database instance.

This **Maria Uptime** test monitors the uptime of the target Maria database instance.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for every Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
ReportManagerTime	By default, this flag is set to **Yes**, indicating that, by default, the detailed diagnosis of this test, if enabled, will report the shutdown and reboot times of the device in the manager's time zone. If this flag is set to **No**, then the shutdown and reboot times are shown in the time zone of the system where the agent is running(i.e., the system being managed for agent-based monitoring, and the system on which the remote agent is running - for agentless monitoring).
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Has server restarted?	Indicates whether the database instance has		If the value of this measure is *Yes*, it

Measurement	Description	Measurement Unit	Interpretation
	been rebooted during the last measurement period or not.		means that the database instance was rebooted during the last measurement period. By checking the time periods when this metric changes from *No* to *Yes*, an administrator can determine the times when this database instance was rebooted. The Detailed Diagnosis of this measure, if enabled, lists the *TIME, SHUTDOWN DATE, RESTART DATE, SHUTDOWN DURATION, and IS MAINTENANCE.*
Uptime since last measure	Indicates the time period that the database instance has been up since the last time this test ran.	Secs	If the database instance has not been rebooted during the last measurement period and the agent has been running continuously, this value will be equal to the measurement period. If the database instance was rebooted during the last measurement period, this value will be less than the measurement period of the test. For example, if the measurement period is 300 secs, and if the database instance was rebooted 120 secs back, this metric will report a value of 120 seconds. The accuracy of this metric is dependent on the measurement period – the smaller the measurement period, greater the accuracy.
Uptime	Indicates the total time that the database instance has been up since its last reboot.	Minutes	This measure displays the number of years, months, days, hours, minutes and seconds since the last reboot. Administrators may wish to be alerted if the database instance has been running without a reboot for a very long period. Setting a threshold for this metric allows administrators to determine such conditions.

3.1.7 Maria Wait Events Test

In SQL Server, wait types represent the discrete steps in query processing, where a query waits for resources as the instance completes the request. By analyzing wait types and their wait times, administrators can receive quick and objective evidence of performance bottlenecks and their probable causes. The **Maria Wait Events** test enables this analysis. For every type of wait that is currently experienced by the server, this test reports the number, nature, and duration of waits, thereby leading you to the specific wait types that may have contributed to a general slowdown/deterioration in server performance.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the target Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Idle Time	Specify the time duration (in seconds) above which the processes that are waiting in the database will be regarded as idle.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available

Parameter	Description
	only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total wait events	Indicates the total number of wait events that are currently occurring on the database server.	Number	
Read wait events	Indicates the events that are currently waiting for read operations on the database server.	Number	The detailed diagnosis of this measure reveals the Thread ID, Event ID, name of the event, the start time, end time, the duration of the event and the operations performed on the source.
Read wait event rate	Indicates the rate at which wait events occurred for reading operations on the database server during the last measurement period.	Events/sec	
Maximum duration for read waits	Indicates the maximum time taken by a wait event for a read operation.	Seconds	A low value is desired for this measure.
Write wait events	Indicates the number of events that are currently waiting for write operations to be performed on the database server.	Number	
Write wait events rate	Indicates the rate at which wait events occurred for performing write operations on the database server during the last	Events/sec	

Measurement	Description	Measurement Unit	Interpretation
	measurement period.		
Maximum duration for write waits	Indicates the maximum time taken by a wait event to perform write operation on the database server.	Seconds	A low value is desired for this measure.
Lock wait events	Indicates the number of events that are currently waiting for a lock operation on the database server.	Number	
Lock wait events rate	Indicates the rate at which wait events were created to perform lock operations on the database server during the last measurement period.	Events/sec	
Maximum duration for lock waits	Indicates the maximum duration taken by a wait event to perform lock operation on the database server.	Seconds	A low value is desired for this measure.

3.2 The Maria Databases Layer

The tests associated with this layer helps administrators figure out if any database is running out of space and if so, what type of file is the reason for space drain?
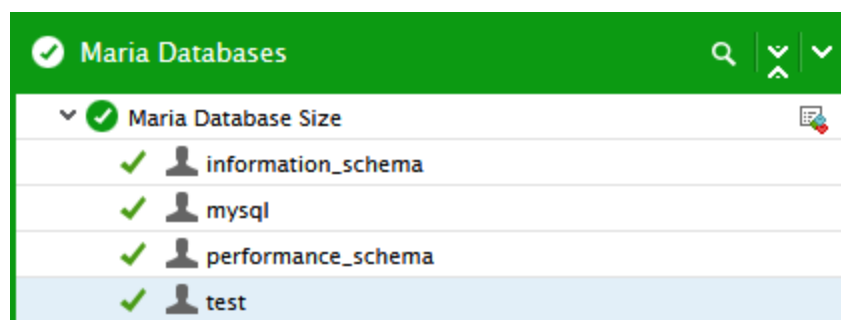

Figure 3.3: The tests associated with the Maria Databases layer

3.2.1 Maria Database Size Test

Storage space contentions on a database can result in the loss of critical data. To avoid this, administrators should keep a close watch on the space usage/growth rate of each database, proactively detect a space crunch, and promptly resolve it. This is where the **Maria Database Size** test helps. This test auto-discovers all the databases on the Maria Database server and monitors the size of each database. Alerts are promptly sent out if any database is running out of space. In the event of a space crunch in a database, you can also use this test to figure out what is causing the space drain - documents? or index files?

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for each database on the server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Database size	Indicates the total size of this database.	MB	
Data size	Indicates the total size of all the documents and	MB	The value of this measure will decrease when you delete

Measurement	Description	Measurement Unit	Interpretation
	padding stored in the database.		documents, but will not decrease when documents shrink because the space used by the original document has already been allocated (to that particular document) and cannot be used by other documents. Alternatively if a user updates a document with more data, the value of this measure will remain the same as long as the new document fits within its originally padded pre-allocated space.
Index size	Indicates the total size of all indexes created on this database.	MB	If the value of this measure is equal to the *Database size* measure, then it indicates that the indices are consuming the entire space in the database. Comparing the value of this measure with that of the *Data size* measure helps administrators to figure out whether documents are consuming the maximum space in the database or the indices are consuming the maximum amount of database space.
Growth rate	Indicates the rate at which the size of this database is growing.	MB/Sec	The value of this measure is calculated using the following formula: (Data size + Index size) of the current measurement period (-) (Data size + Index size) of the previous measurement period A consistent increase in the value of this measure is a cause for concern, as it indicates a steady growth in database size.

3.3 The Maria Cache Layer

The tests associated with this layer monitor the locking activity, health of the query cache and the buffer cache on the Maria Database server.
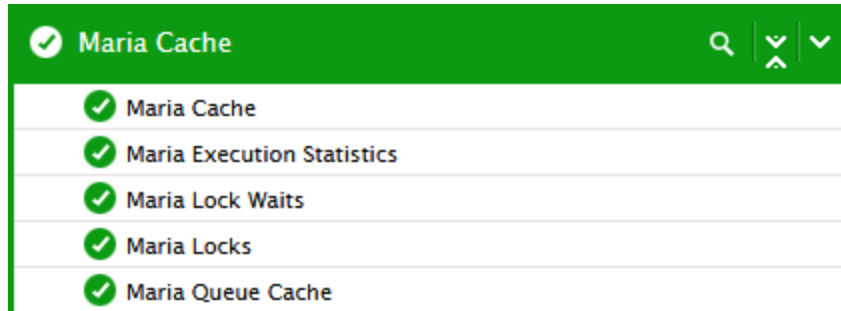
Figure 3.4: The tests associated with the Maria Cache layer

3.3.1 Maria Cache Test

This test monitors the key buffer cache in the Maria Database server and reports the number of physical reads of a key block, the number of read requests received by the cache and the number of key blocks that have been modified but not flushed to the cache. Using this test, administrators can figure out data mismatch between the cache and the disk and rectify the same before end users start complaining about outdated data from the disk.

Target of the test : A Maria Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every Maria Database server monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know

Parameter	Description
	how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Key read requests	Indicates the number of physical reads of a key block from the disk instead of the cache during the last measurement period.	Number	A high value for this measure indicates that the *key_buffer_size* variable is probably too small to cache the data.
Key reads	Indicates the number of reads requests received by the cache during the last measurement period.	Number	The higher the count, the better the performance of the server, as it does not need to read the requested key data from disk.
Not flushed key blocks	Indicates the number of key blocks that have been modified in the cache but have not been flushed to the disk during the last measurement period.	Number	A high value for this measure indicates a mismatch of data between the cache and the disk. If the value of this measure increases in a steep manner, then, there may be a mismatch in the data received by the users since the disk may not be updated as son as the data in the cache is modified.

3.3.2 Maria Execution Statistics Test

The test reports the sort and join operations performed on the target database server. Using this test, administrators can figure out how many table scans were performed with index and how many table scans were performed without index. Administrators can also figure out the rate at which sorting was performed by scanning the table using full table scan method.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Sorts performed by range	Indicates the number of sorts performed on the statements that shared a similar range.	Number	
Range sort rate	Indicates the rate at which ranges were sorted.	Sorts/sec	
Sorts by full table scan	Indicates the number of sorts performed using a full	Number	Full table scans may sometimes cause a huge amount of unnecessary

Measurement	Description	Measurement Unit	Interpretation
	table scan.		I/O, placing a processing burden on the entire database. Therefore, a low value is desired for this measure.
Full table scan rate	Indicates the rate at which sorting was performed by scanning the table using full table scan method.	Sorts/sec	
Sorts by merge passes	Indicates the number of merge passes that were performed using the sort algorithm.	Number	
Merge passes sort rate	Indicates the rate at which the sort algorithm performed merge passes.	Sorts/sec	If this value is large you should consider increasing the sort_buffer.
Joins not using index	Indicates the number of joins that do not use an index.	Number	
Joins performed by full table scan	Indicates the number of joins that were performed by full table scan.	Number	
Range check joins without keys	Indicates the number of joins that were performed in a range without using the keys after each row.	Number	
Table scan with index	Indicates the number of table scans that were performed with index.	Number	The detailed diagnosis of this measure lists the Thread ID, Event ID, name of the event, the start time, end time and the duration of the event.
Table scan without index	Indicates the number of table scans that were performed without index.	Number	A low value is desired for this measure.
Statements executed using good index	Indicates the number of statements that were executed using good indexing techniques.	Number	

Measurement	Description	Measurement Unit	Interpretation
Statements executed using bad index	Indicates the number of statements that were executed without proper indexing techniques.	Number	The detailed diagnosis of this measure reveals the Thread ID, Event ID, name of the event, the start time, end time and the duration of the event.

3.3.3 Maria Locks Test

This test monitors the locking activity of various transactions supported by a Maria Database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Maximum read and write locks	Indicates the maximum number of read and write locks that can be held on the server.	Number	

Measurement	Description	Measurement Unit	Interpretation
Total locks count	Indicates the total number of locks that are currently held on the server.	Number	A high value of this measure may indicate a contention for locks in the system, delayed execution of requests etc.
Read locks count	Indicates the number of locks that were held to read data from the database server.	Number	
Write locks Count	Indicates the number of locks that were held to write data to the database server.	Number	
Current read and write locks	Indicates the percentage of locks that were currently held to read from and write to the database server.	Percentage	A value close to 100% indicates that the maximum number of read and write locks that can be held on the server is reached. Try increasing the Maximum read and write locks measure to reduce the value of this measure.

3.3.4 Maria Lock Waits Test

MariaDB enables client sessions to acquire table locks explicitly for the purpose of cooperating with other sessions for access to tables, or to prevent other sessions from modifying tables during periods when a session requires exclusive access to them. A session can acquire or release locks only for itself. One session cannot acquire locks for another session or release locks held by another session.

Locks may be used to emulate transactions or to get more speed when updating tables.

Sometimes, in an attempt to release locks for compatible requests, Maria Database server may end up increasing the lock wait times for certain incompatible requests. Some other times, certain long-running operations can cause the length of the queue to increase along with the waiting time for locks. Long lock wait times can adversely impact application performance. This is why, administrators will have to keep an eye on the locking activity on a Maria Database server, determine whether/not requests are waiting too long for locks. This will enable administrators to quickly diagnose why the requests are taking too long to acquire a lock and resolve the bottleneck. The **Maria Lock Waits** test helps administrators achieve this.

This test reports the rate at which locks of that type were acquired, the percentage of requests that were waiting for locks and the number of times a table lock could not be acquired by the requests. With this information, administrators can easily figure out if the lock wait time is prolonged and troubleshoot the long wait times.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the target Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Lock waits	Indicates the percentage of requests that were waiting to acquire a lock.	Percentage	A consistent increase in the value for this measure could indicate that locks are not being released in a timely manner. A high value of this measure may be attributed to the following reasons: ○ inadequate number of locks available in the database, ○ unusually high locking behavior of

Measurement	Description	Measurement Unit	Interpretation
			applications accessing the database, ○ improper database application design, etc.
Table Locks Waited	Indicates the number of times a table lock could not be acquired by the requests and had to wait for a lock during the last measurement period.	Number	A high value for this measure may indicate one of the following: ○ Too many transactions happening ○ Locked resources not being released properly ○ Locks are being held by long-running operations A high value for this measure may cause performance issues to the database server. To reduce the value of this measure, you may try optimizing the queries or split the tables of the database server or use replication process on the database server.

3.3.5 Maria Queue Cache Test

This test monitors the health of the query cache in the Maria Database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.

Parameter	Description
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Queries registered	Indicates the number of queries that are registered with the cache.	Number	
Queries added	Indicates the number of queries added to the cache during the last measurement period.	Number	
Cache hits	Indicates the number of times the cache was accessed during the last measurement period.	Number	
Queries deleted	Indicates the number of queries that were deleted from the cache during the last measurement period.	Number	A high value could indicate low memory allocation for the query cache. Since reading from the cache is less expensive than reading directly from the database, a higher memory allocation to the cache is advisable.
Non cached queries	Indicates the number of queries that were not cached (not cacheable due to their QUERY_CACHE_TYPE) during the last measurement period.	Number	

Measurement	Description	Measurement Unit	Interpretation
Free memory	Indicates the amount of free memory in the query cache.	MB	A low value of this measure could cause subsequent queries to be rejected by the cache, owing to low memory availability. It would be good practice to tune the cache memory to handle more load.
Free blocks	Indicates the number of free memory blocks in the query cache currently.	Number	
Total blocks	Indicates the total number of blocks in the query cache currently.	Number	
Total queries	This is the sum of cache inserts, cache hits, and non-cached queries during the last measurement period.	Number	

3.4 The Maria Service Layer

The tests associated with this layer monitor the sorting activity and transactions executing on the Maria Database server. By executing the tests associated with this layer, administrators can monitor the errors encountered in the database connections and the long running queries executing on the database server.
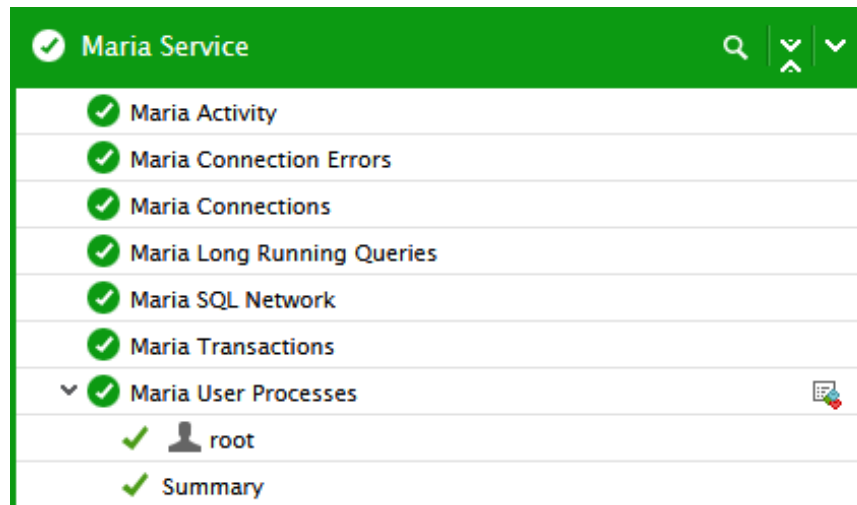
Figure 3.5: The tests associated with the Maria Service layer

3.4.1 Maria Activity Test

This test tracks the writes, inserts, deletes, and flushes happening on a Maria Database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Delayed writes	Indicates the rate at which rows are written with *INSERT DELAYED*.	Writes/Sec	
Delayed errors	Indicates the rate at which errors occurred in the rows written with *INSERT DELAYED*.	Errors/Sec	Ideally, the value of this measure should be zero.
Updates	Indicates the rate at which requests to update a row in a table were received.	Updates/Sec	
Inserts	Indicates the rate at which requests to insert a row in a table were received.	Inserts/Sec	
Deletions	Indicates the rate at which requests to delete a row in a table were received.	Deletions/Sec	
Flushes	Indicates the rate at which FLUSH commands were executed.	Flushes/Sec	

3.4.2 Maria Connections Test

Monitoring client connections to a Maria Database server typically provide insights into the workload of the server and whether/not the server is sized well-enough to handle the load. This is exactly the type of visibility the **Maria Connections** test provides. This test tracks client connections to the target server and reports their usage. With the help of the metrics reported by this test, administrators can assess the load on the server and can determine whether/not the server has

sufficient free connections to handle subsequent connection requests. Based on these insights, administrators can plan the future connection capacity of the server.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the Maria Database server being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Active connections	Indicates the count of incoming connections that were opened by the clients to the server.	Number	This is a good measure of the current load on the server. A persistent high value or a bottleneck in the server is an indication for the administrator to check if the connections are not closed properly.
Connections aborted	Indicates the number of connections that were aborted due to the client terminating the connection instead of closing the	Number	

Measurement	Description	Measurement Unit	Interpretation
	connection during the last measurement period.		
Connections create rate	Indicates the rate at which connections were created to connect to the server from the clients during the last measurement period.	Connections/sec	
Connections failed	Indicates the number of connection that failed on the server during the last measurement period.	Number	A high value of this measure may be an indication of either a configuration problem with the server/clients or some malicious attack on the server.
Maximum connections	Indicates the maximum number of connections that were simultaneously in use on the server during the last measurement period.	Number	

3.4.3 Maria Connection Errors Test

Sometimes, errors may be detected when connections to the Maria Database server are established. These errors when left unnoticed may causes severe performance bottleneck on the database server. For an improved and enhanced performance of the database server, it is necessary for the administrators to capture errors on the database server and rectify them as soon as they are detected. The **Maria Connection Errors** helps administrators in this regard!

This test reports the number of hosts connected to the target database server, the various types of errors encountered by the database server. Using this test, administrators can also figure out the percentage of connection errors encountered by the database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Connected hosts	Indicates the number of hosts that are connected to the database server.	Number	
Connection errors	Indicates the number of times protocol handshake errors were encountered when hosts were being validated for a connection	Number	A high value may indicate network connectivity issues with the database server. The detailed diagnosis shows the IP, Host and first seen, last seen, error

Measurement	Description	Measurement Unit	Interpretation
	to the database server.		seen values for a host that faces connection problem with server
Maximum connection errors	Indicates the maximum number of times the connections from a host failed and beyond which the host is blocked from contacting the database server.	Number	
Percentage of connection errors	Indicates the percentage of connection errors that occurred on the database server.	Percentage	If this value is high or close to 100, then hosts may not be able to connect to the database server.
Host blocked connection errors	Indicates the number of connections that were blocked due to the connections exceeding the Maximum connection errors.	Number	
Transient errors	Indicates the number of transient erorrs that occurred during IP to host DNS lookups.	Number	
Permanent errors	Indicates the number of permanent errors that occurred during IP to host DNS lookups.	Number	
Host name format errors	Indicates the number of hostname format errors.	Number	
Reverse lookup DNS errors	Indicates the number of errors that occurred during DNS reverse lookups.	Number	
Host not privileged errors	Indicates the number of errors that were captured due to the users from the host are not permitted to	Number	

Measurement	Description	Measurement Unit	Interpretation
	login.		
Authentication errors	Indicates the number of errors that were captured due to authentication failures.	Number	Authentication failures generally occur when incorrect username or password is provided to connect to the database server. The detailed diagnosis of this measure lists the IP, Host and first seen, last seen, error seen values.
Authentication plug-in errors	Indicates the number of errors that were reported by an authentication plugin.	Number	
Handshake errors	Indicates the number of errors that were detected at the wire protocol level.	Number	
Proxy users errors	Indicates the errors that occurred when a proxy user of a user that does not exists tries logging in.	Number	
Max user authentication errors	Indicates the maximum number of times authentication errors were detected for a user after the quota of that user exceeded the tries.	Number	
Default database errors	Indicates the number of errors that occurred due to the user not having required permission to access the default database.	Number	
Local errors	Indicates the number of local server errors such as out-of-memory errors, unrelated to network, authentication, or authorization errors detected.	Number	

3.4.4 Maria Long Running Queries Test

This test tracks the currently executing queries on a Maria Database server and determines the number of queries that have been running for a long time. This test also tracks the maximum time taken to execute the queries. You can also use the detailed diagnosis of this test to drill down to the exact queries that have been running for an unreasonably long time, and thus isolate the resource-intensive queries to the database.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the target Maria Database being monitored

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Elapsed Time	In the Elapsed Time text box, specify the duration (in seconds) beyond which a query should have executed for it to be regarded as a long running query. The default value is 10.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option.

The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: |

Parameter	Description
	• The eG manager license should allow the detailed diagnosis capability
	• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Long running queries	Indicates the number of queries currently executing on the database server that have been running for more time than the configured Elapsed Time.	Number	The detailed diagnosis for this measure indicates the exact queries and which user is executing the queries. This information can be very useful in identifying queries that may be candidates for optimization.
Maximum duration	Indicates the maximum duration taken to execute the queries.	Seconds	

3.4.5 Maria SQL Network Test

This test monitors the availability and responsiveness of the Maria Database server by emulating a client connecting and executing queries on the Maria Database server.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database

Parameter	Description
	server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option.
	The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled:
	• The eG manager license should allow the detailed diagnosis capability
	• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Maria server Availability	Indicates whether the database instance is responding to requests.	Percent	The availability is 100% when the instance is responding to a request and 0% when it is not. Availability problems may be caused by a misconfiguration/malfunctioning of the database instance, or because the instance is using an invalid user account. Besides the above, this measure will report that the server is unavailable even if a connection to the database instance is unavailable, or if a query to the database fails. In this case, you can check the values of the *DB connection availability* and *Query processor availability* measures to know what is exactly causing the database instance to

Measurement	Description	Measurement Unit	Interpretation
			not respond to requests - is it owing to a connection unavailability? or is it due to a query failure?
Connection time	Indicates the time taken by the database connection.	Secs	A high value could indicate a connection bottleneck. Whenever the Total response time of the measure soars, you may want to check the value of this measure to determine whether a connection latency is causing the poor responsiveness of the server.
Database connection availability	Indicates whether the database connection is available or not.	Percent	If this measure reports the value 100 , it indicates that the database connection is available. The value 0 on the other hand indicates that the database connection is unavailable. A connection to the database may be unavailable if the database is down or if the database is listening on a port other than the one configured for it in the eG manager or owing to a poor network link. If the *Oracle server availability* measure reports the value 0, then, you can check the value of this measure to determine whether/not it is due to the unavailability of a connection to the server.
Statement availability	Indicates whether the database query is executed successfully or not.	Percent	If this measure reports the value 100, it indicates that the query executed successfully. The value 0 on the other hand indicates that the query failed. In the event that the *Maria server availability* measure reports the value 0, check the value of this measure to figure out whether the failed query is the reason why that measure reported a server unavailability.
Statement execution time	Indicates the time taken for query execution.	Secs	A high value could indicate that one/more queries to the database are taking too long to execute. Inefficient/badly

Measurement	Description	Measurement Unit	Interpretation
			designed queries to the database often take too long to execute. If the value of this measure is higher than that of the *Connection time* measure, you can be rest assured that long running queries are causing the respond slowly to requests.
No of records	Indicates the number of records fetched from the database.	Number	The value 0 indicates that no records are fetched from the database.
Response time	Indicates the time taken by the database to respond to a user query. This is the sum total of the connection time and query execution time.	Secs	A sudden increase in response time is indicative of a bottleneck at the database server. This could even be owing to a connection delay and/or long running queries to the database. Whenever the value of this measure is high, it would be good practice to compare the values of the Connection time and Query execution time measures to zero-in on the root-cause of the poor responsiveness of the server - is it because of connectivity issues? or is it because of inefficient queries?

Although included as part of the **Oracle SQL Network** test, this measure maps to the **Oracle Service** layer. |

The detailed diagnosis of the *Total response time* measure, if enabled, reveals the top ten resource consuming queries to the database. Resource consumption is reported in terms of disk reads, buffer gets, number of loads, execution cycles, rows processed, etc. Using this information, you can identify the non-optimal queries that could impact the database performance adversely (see Figure 3.6).
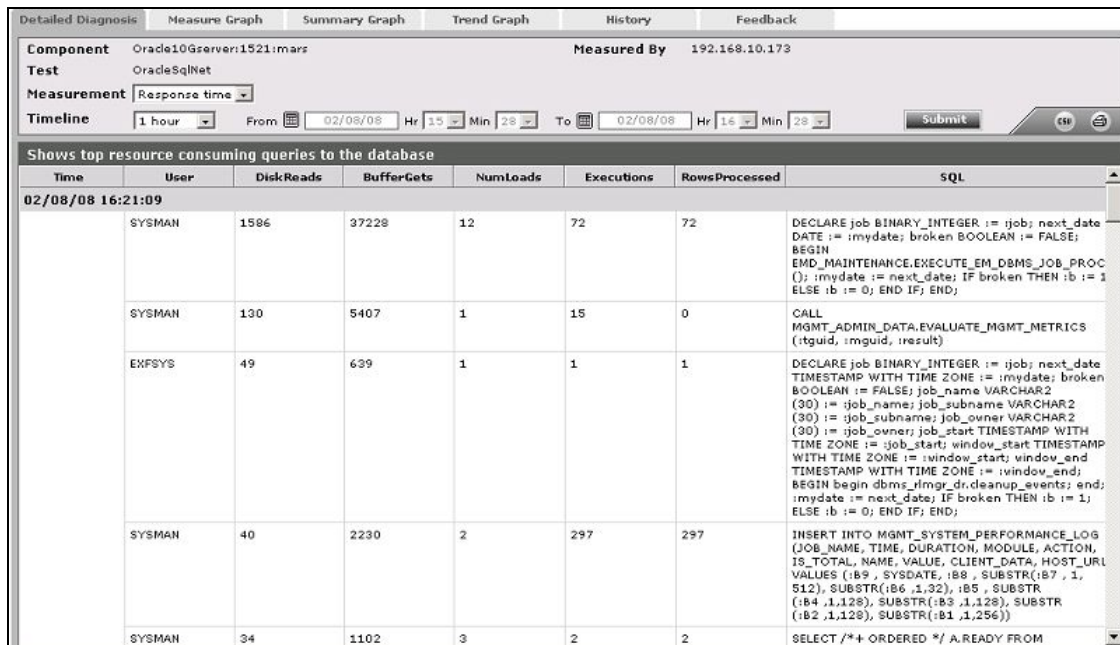
Figure 3.6: Detailed diagnosis of the Response time measure displaying the top 10 resource consuming queries

3.4.6 Maria Transactions Test

Rollbacks are costly operations on the database. This test monitors the percentage of rollbacks happening for user transactions with a database instance.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for the target Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening.
Database	Specify the name of the database that is to be monitored on the target Maria Database server.
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide

Parameter	Description
	PROCESS and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
User commits	Indicates the number of user commits that have happened during the last measurement period.	Number	
User rollbacks	Indicates the number of user rollbacks that have happened during the last measurement period.	Number	Ideally, there should be few user rollbacks happening. Typically, whenever a delete, insert or update operation is performed on the database, Undo tablespace is consumed, I/O overheads increase, and considerable server time is spent in performing that operation. When such operations are rolledback, these resources are wasted! To conserve resources, its best to keep rollbacks at a minimum.
Rollback percentage	Indicates the number of user rollbacks as a percentage of the total user transactions (user commits + user rollbacks) with the database	Percent	The closer the percentage of rollbacks is to zero, the lower the overhead on the database due to rollbacks. The acceptable value of rollbacks will vary from one instance to another and will have to be configured based on the patterns of requests being handled by the database instance.

3.4.7 Maria User Processes Test

This test reports the number and state of the processes of each user who is currently connected to the Maria Database server. Using the metrics reported by this test, administrators can promptly

isolate idle processes, which are a drain on a server's resources.

Target of the test : A Maria Database server

Agent deploying the test : An internal/remote agent

Outputs of the test : One set of results for each user currently connected to the Maria Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The IP address of the Maria Database server.
Port	The port on which the server is listening
Database	Specify the name of the database that is to be monitored on the target Maria Database server
User and Password	The eG agent has to be configured with the credentials of a user who has server-wide **PROCESS** and **SELECT** privileges on the monitored Maria Database server. To know how to create such a user, refer to Section **2.1.3** of this document.
Confirm Password	Confirm the password by retyping it here.
Idle Time	Specify the time duration (in seconds) above which the processes that are waiting in the database will be regarded as idle.
DDRowCount	Specify the number of long running queries for which details will be available in the detailed diagnosis page. By default, this parameter is set to 5. This indicates that even if the total number of long running queries is, say 10, the detailed diagnosis of this test will provide information pertaining to only 5 queries by default. For information related to more number of queries, you should increase the DDRowCount.
DD Frequency	Refers to the frequency with which detailed diagnosis measures are to be generated for this test. The default is *1:1*. This indicates that, by default, detailed measures will be generated every time this test runs, and also every time the test detects a problem. You can modify this frequency, if you so desire. Also, if you intend to disable the detailed diagnosis capability for this test, you can do so by specifying *none* against DD Frequency.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are

Parameter	Description
	detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total process	Indicates the total number of processes for this user.	Number	The detailed diagnosis of this measure if enabled, lists out all the processes for this user.
Active process	Indicates the number of processes of this user that are currently active.	Number	The detailed diagnosis of this measure indicates the exact active processes of this user and the time for which the processes are actually active.
Inactive process	Indicates the processes that were inactive for this user in this database.	Number	The detailed diagnosis of this measure if enabled, indicates the inactive processes of this user and the time for which the processes were inactive.
Idle process	Indicates the processes that were idle for this user in this database.	Number	The detailed diagnosis of this measure if enabled, indicates the idle processes of this user and the time for which the processes were idle.
Process usage	Indicates the percentage of processes used by this user with respect to the maximum number of allowed processes.	Percentage	A high value is a cause of concern as the users may experience slowdowns in the database server connection.
Maximum process	Indicates the maximum number of processes that were allowed to this user.	Number	If the value of this measure is close to the Total process measure, then the users may experience slowdowns to connect to the database server.

The detailed diagnosis of the *Active processes* measure, if enabled, will indicate the exact active processes of this user and the time for which the processes were actually active.

Figure 3.7: The detailed diagnosis of the Active processes measure

The detailed diagnosis of this measure if enabled, indicates the idle processes of this user and the time for which the processes were idle. Using this information, you can understand how each of the idle connections were made - i.e., using which program - and from where - i.e., from which host.

Figure 3.8: The detailed diagnosis of the Idle processes meaure

About eG Innovations

eG Innovations provides intelligent performance management solutions that automate and dramatically accelerate the discovery, diagnosis, and resolution of IT performance issues in on-premises, cloud and hybrid environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, from virtualization to cloud, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations is dedicated to helping businesses across the globe transform IT service delivery into a competitive advantage and a center for productivity, growth and profit. Many of the world's largest businesses use eG Enterprise to enhance IT service performance, increase operational efficiency, ensure IT effectiveness and deliver on the ROI promise of transformational IT investments across physical, virtual and cloud environments.

To learn more visit www.eginnovations.com.

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