

Volume

1

Database Performance Maximizer

**MaxGauge for
AWS Aurora
User's Guide
(version 1.0)**

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Part

1

Part 1 Introduction

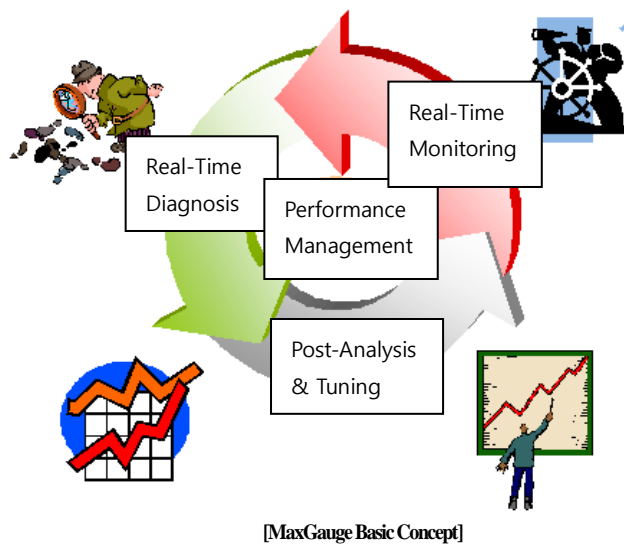
In Part 1, we will present a general product overview of MaxGauge for Aurora and discuss the main features and the process structures.

 1. Product Overview

 2. Main Features

1. Product Overview

MaxGauge is a performance management tool designed to support effective performance and fault management of each component of the computer system such as database, system, and applications. The system administrator who oversees the system operation must fulfill the following three tasks shown in the diagram below, which are essential to performance management, and each task must be carried out based on an organically connected relationship.



MaxGauge supports the system administrators or the database and application administrators whose job is to execute performance and fault management, to be effective in real-time monitoring, diagnosis, and analysis. And through real-time monitoring feature, it allows the administrators to easily and quickly identify the specific database or server in which the fault or the performance degradation occurred, among many servers and databases. In the event of an error or performance degradation, it easily identifies exactly in which part by what factors the problem occurred through a diagnostic process, ensuring a real-time resolution as much as possible, and it further investigates the root cause of the error or performance degradation through a post-analysis so that appropriate troubleshooting actions may be taken.

Main Features

Let us explain the features provided for the performance management of Aurora / MySQL / Maria databases by using MaxGauge. The features can be largely divided into three sections -- real-time monitoring, diagnosis, and post-analysis. We will briefly explain the features provided in each section.

MaxGauge provides features which allows you to browse the current performance status of the Aurora (MySQL / Maria for AWS) database, monitor if any indicator has exceeded the predefined threshold values, and track down the root cause of problems in the event of performance issues. These features allow the DBAs or performance administrators to recognize potential performance issues and make corrections to prevent problems before they occur. The details of the problem activities which occur during a database operation are logged by date and time and used as a useful resource for identifying the root cause of the problem.

MaxGauge for Aurora provides monitoring not only for Aurora on AWS, but also for MySQL and Maria DB installed on AWS EC2 and RDS. In this manual, we will refer to Aurora only.

Note) Some images contained in the manual will contain contents relating to MaxGauge for MySQL version for reference only.

Integrated Monitoring Feature

By monitoring multiple Aurora databases on a single screen, you can easily identify and solve the Aurora performance issues scattered across the system. You can also do comparisons of a single stat across many databases.

Session Monitoring Feature

By monitoring current wait and SQL information of a specific session organically on a single screen, you can identify the session's current performance status in real-time.

REPLICATION Environment Monitoring Feature

You can monitor replication delays and replication failed of a database configured with replication in real-time

Session Search Feature

You can search for several sessions connected to a single database by applying certain conditions and simultaneously monitor session aggregates which meet the conditions. You can view the ID, Thread ID, User Name, Host Name, and the currently executing SQL Text of a specific session.

LOCK Trace Feature

This feature traces the wait relationships of locks generated from Aurora database in real-time. You can analyze the session holding the lock and the wait sessions organically in a tree format, and monitor deadlocks in real-time.

SYSTEM Stat Monitoring Feature

Provides CPU Utilization, Freeable Memory, Freeable Memory, Free Storage Space, and other information through AWS Cloudwatch or CloudWatchLog API, which allows the user to effectively monitor greater number of performance stats.

Active Thread Logging Feature

According to the logging cycle defined by the user, it provides a log of all active threads executed within a cycle period, including the current SQL Text being executed.

Lock Logging Feature

According to the logging cycle defined by the user, it provides log data of all lock holder and lock waiter sessions generated within a cycle period in a tree format as a resource for analysis.

Parameter Logging Feature

Parameter log is taken once a day and provided for user.

Error Log Logging Feature

Saves the SQL error details generated in Aurora by using AWS CloudWatch API.

Slow Query Monitoring Feature

You can trace the slow queries being generated in real time and analyze the execution plan (EXPLAIN).

Dead Lock Logging Feature

Saves InnoDB's deadlock information.

InnoDB Status Logging Feature

Saves InnoDB's status information.

Database Size Info Logging Feature

Saves the data size of database per table unit.

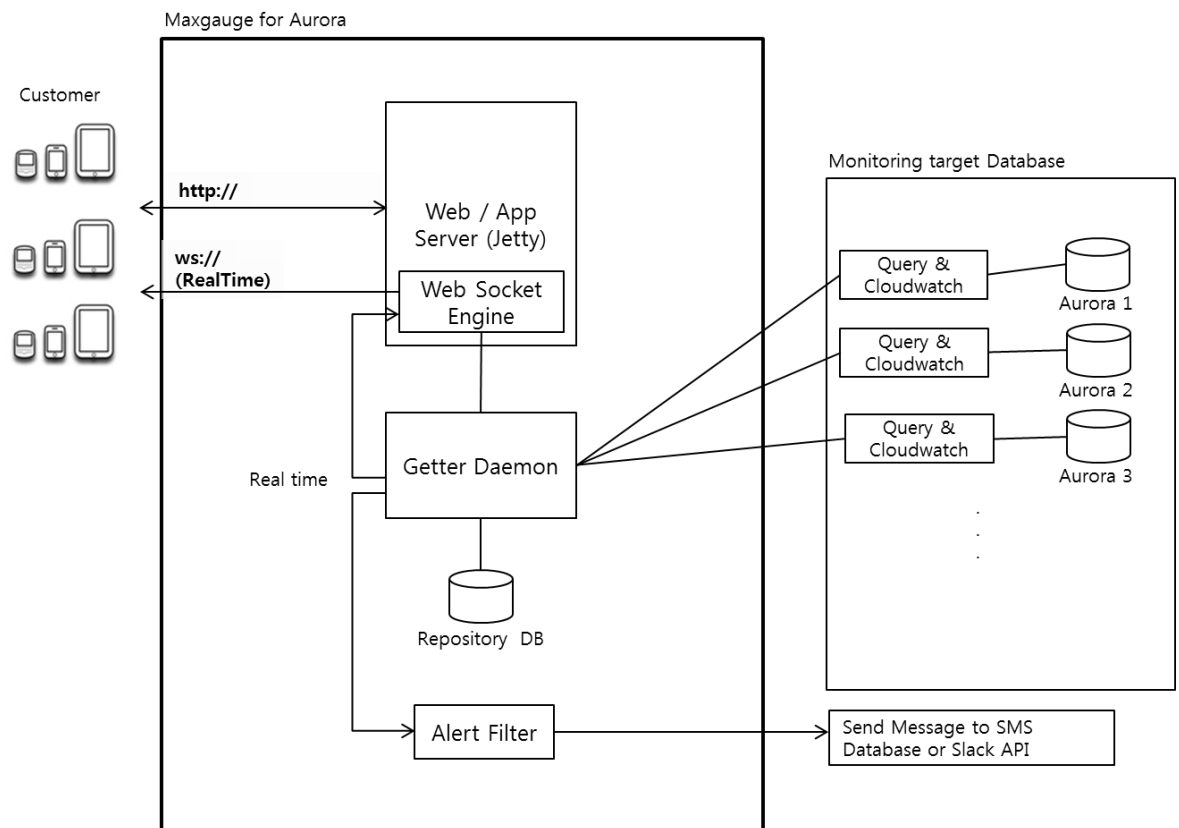
Threshold Value Alarm Feature

Besides the collected performance stats, it also provides the monitoring server's Disk Free Size and the replication info alarm.

2. Install & Configuration

2-1. MaxGauge Install

To install Maxgauge For Aurora, configuration of DB Server / Monitoring PC / Logging PC and installation preparation are needed in order to activate each daemon / client module.



2-1-1. Installation Preparation

To install and execute MaxGauge for Aurora, a Linux based PC is required. For optimal use of MaxGauge for Aurora, the following specifications are recommended.

- Assuming 10 servers for Aurora's operation monitoring target
 - Operation System : Linux Type
 - CPU : Dual core or higher

- Memory : 4GByte or more
- Disk : 1GByte or more

The above hard disk capacity is the size required for product installation, and additional minimum of 300 MB hard disk per day is needed to record logs. (10GByte / Month)

Prior to installation, preparation of monitoring target database's user and network environment is required.

- There are two ways to collect O/S resource (CPU, Memory) and process information from the Aurora server:
 - Approaching CloudWatch API by using the Accesskey / Secretkey
 - Approaching by IAM Role method
- Execute Aurora's monitoring of SQL Error Log / Slow Query Log. They can be used once appropriate settings are made on MaxGauge administrator page.
- WAS (Web Server) will use 1 TCP/IP port. By default, it will use 8070, however, if the corresponding port is being used by another service, then you need to secure an open port for use.

2-1-2. Logging Server (Repository) Installation

Aurora Repository DB is needed for logging. The MySQL Community Version needs to be pre-installed on the logging equipment, and for performance history details, it uses the INNODB Engine and hence, space and location information for the corresponding database needs to be set in advance.

For DB accounts, the root user is used in general, and when you need to manage accounts, reference the table below to create a user with such privileges.

Privileges
CREATE DATABASES/TABLES/INDEXES
DELETE TABLES
DROP DATABASES/TABLES
INDEX TABLES
INSERT TABLES
PROCESS
SELECT TABLES
SHOW DATABASES

2-1-3. Monitoring PC - Client Program Installation

Unzip install.maxgauge4mysql_LINUX.tar.gz file in the desired directory.

```
SHELL > tar -xvf install.maxgauge4mysql_20150116_LINUX.tar.gz
```

```
total 216860
drwxr-xr-x 10 root root      4096 Jan 22 18:26 ./
drwxrwxr-x 18 qa  qa        4096 Jan 22 15:10 ../
drwxr-xr-x  6 root root      4096 Jan 16 17:27 app/
drwxr-xr-x  5 root root      4096 Jan 16 17:27 bin/
drwxr-xr-x  3 root root      4096 Jan 16 17:27 biz/
drwxr-xr-x  8 root root      4096 Jan 16 17:27 conf/
-rw-r--r--  1 root root 222011355 Jan 16 17:45 install.maxgauge4mysql_20150116_LINUX.tar.gz
drwxr-xr-x  6 root root      4096 Jan 19 19:37 log/
drwxr-xr-x  4 root root      4096 Jan 15 12:50 svc/
drwxr-xr-x  2 root root      4096 Jan 22 15:10 tmp/
drwxrwxr-x  4 1000 1000      4096 Jan 21 08:54 x_convert/
-rw-r--r--  1 root root      10240 Jan 16 17:27 x_convert.tar
root@qa-OptiPlex-7010:/home/qa/MFM/150116# tar -xvf install.maxgauge4mysql_20150116_LINUX.tar.gz
```

2-2. Configuration

2-2-1. Environment Configuration File

The product's environment configuration files are as follows. In general, they operate well by running them in initial configuration, however, configuration adjustment may become necessary as the size increases.

```
SHELL > ls -l ./conf/properties/
-rw-r--r-- 1 root root 1226 Jan 19 19:44 daemon.properties
-rw-r--r-- 1 root root 1274 Jan 16 17:49 dbpool.properties
-rw-r--r-- 1 root root 709 Jan 16 17:27 system.properties
-rw-r--r-- 1 root root 70 Jan 16 17:27 version.properties
```

(For more detailed information about environment configuration, please reference [1-1. Gather Overview](#))

2-2-2. Repository Environment Configuration

Set configuration for Repository information and DB Connection environment.

Please contact us for configuration instructions as you will need to enter encrypted values.

```
SHELL > vi ./conf/properties/dbpool.properties
```

```

manager.logging=true^M
manager.pool_type=bonecp^M
^M
^M
#####^M
# EXEM MFS for web^M
#####^M
mydb.driver                = com.mysql.jdbc.Driver^M
mydb.url                   = jdbc:mysql://192.168.123.132:3306/exem0116^M
mydb.user                  = ^M
mydb.password              = ^M
mydb.connectTimeout       = 3^M
mydb.readTimeout          = 30^M
mydb.loginTimeout         = 1^M
mydb.testQuery             = SELECT 1^M
mydb.minConnectionsPerPartition = 3^M
mydb.maxConnectionsPerPartition = 30^M
mydb.partitionCount       = 1^M
^M
^M
#####^M
# Dynamic / Instance^M
#####^M
# Do not create 'dynamic.instance.driver'^M
dynamic.instance.connectTimeout = 3^M
dynamic.instance.readTimeout   = 30^M
dynamic.instance.loginTimeout  = 1^M
dynamic.instance.testQuery     = SELECT 1^M
dynamic.instance.minConnectionsPerPartition = 3^M
dynamic.instance.maxConnectionsPerPartition = 30^M
dynamic.instance.partitionCount = 1^M
~

```

2-3. MaxGauge Start and End

MaxGauge For Aurora is mainly divided into WAS section which sends the data to Client (Google Chrome) and Daemon section which collects the performance data.

2-3-2. How to Start MaxGauge Real-time Client

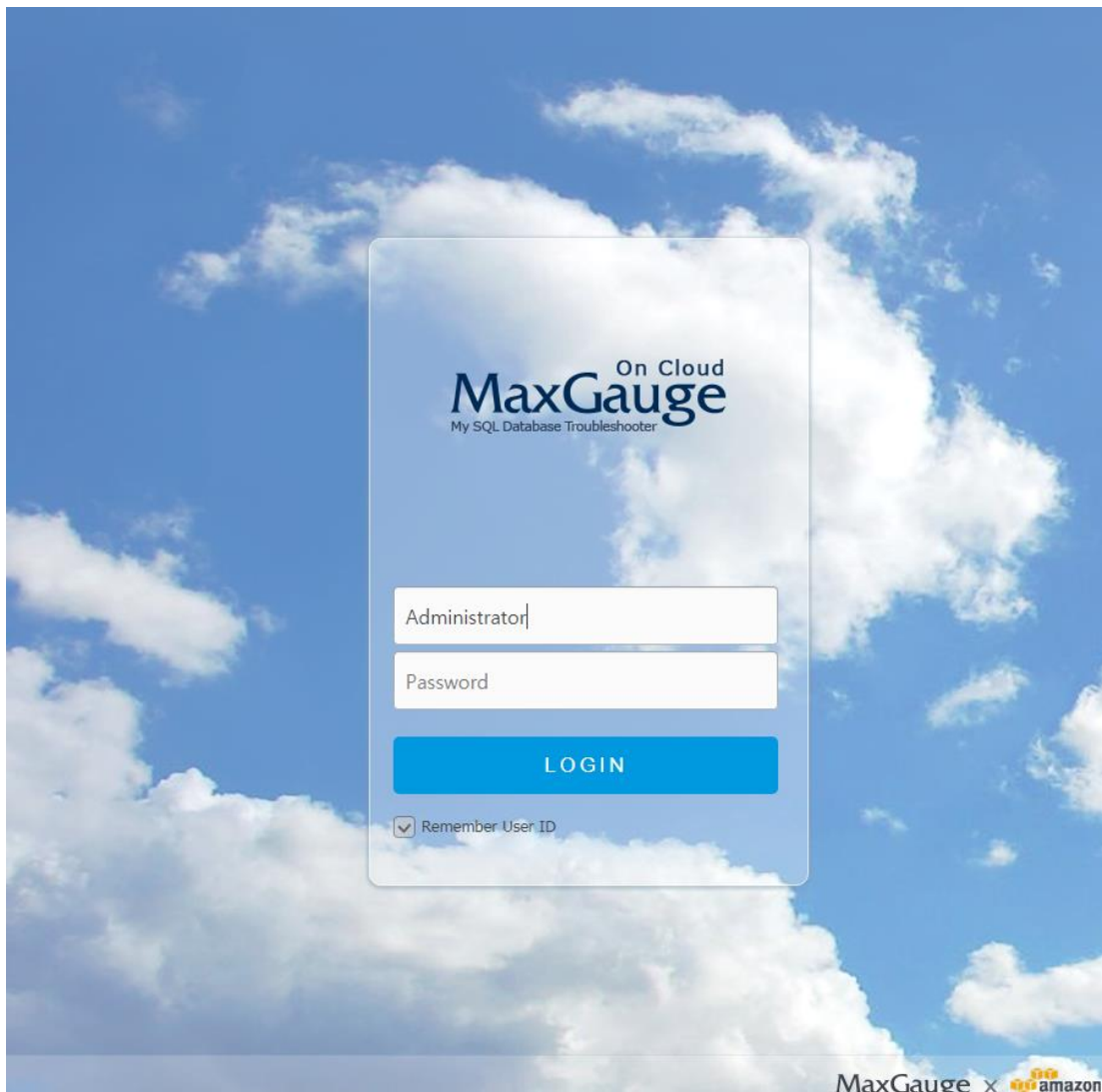
```
SHELL > ./bin/all.start.sh
```

2-3-3. How to End MaxGauge Real-time Client

```
SHELL> ./bin/allstop.sh
```

2-3-4. Log In

Open Chrome browser and enter the IP address in which the MaxGauge for Aurora has been installed. (ex: " 127.0.0.1:8070 ")



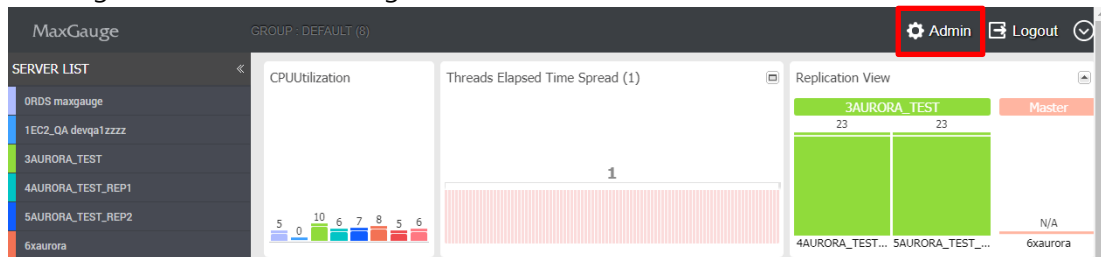
(Default Account : Administrator / Password : 1)

2-3-5. Monitoring Server Registration (Admin > Server(s) > Server)

The 'Server' is a feature for managing several databases' connection information. MaxGauge can manage multiple databases. However, if you wish to focus on 1 or 2 specific target databases, you can selectively connect to the desired 1 or 2 databases. Such tasks can be done in the 'Server'.


Administrator Menu Location

After login, reference below and go to the administrator screen.



Connection Information Registration







To register connection information, click the 'ADD' button on the 'SERVER' screen.

- (1) Click  on the Server window.
- (2) Enter the connection information.

Server ID	Server Alias	Type	IP Address	Port	DB Login	DB Password	SQL Test Length	Instance Name	Gather No	Region	SSH Code	Service Type	Use ?
1	new	MYSQL	127.0.0.1	3306	root	*****	FULL LENGTH	test	0	ap-north-east-2		RDS	Y
2	emana	MSSQL	emana-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	emana	18	ap-north-east-2		RDS	Y
3	xyyqj	MYSQL	xyyqj-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	xyyqj	17	ap-north-east-2		RDS	Y
4	6xaurora	AURORA	test-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	test	16	ap-north-east-2		RDS	Y
5	5AURORA_TEST_REP1	AURORA	test1-rep1-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	test1rep1	2	ap-north-east-2		RDS	Y
6	4AURORA_TEST_REP1	AURORA	test1-rep1-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	test1rep1	2	ap-north-east-2		RDS	Y
7	3AURORA_TEST	AURORA	aurorabest1-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	root	*****	FULL LENGTH	aurorabest1	2	ap-north-east-2		RDS	Y
8	EC2_QA	MYSQL	13.124.83.188	3306	root	*****	FULL LENGTH	+064f0d94632f476	11	ap-north-east-2	22	EC2	Y
9	RDS_QA	MSSQL	emana-cy2mg2za3m-ap-north-east-2.rds.amazonaws.com	3306	emmanot	*****	FULL LENGTH	emana	0	ap-north-east-2		RDS	Y

Item	Item	Description
Connection	Server ID	Target Server name
	Server Alias	Target Server alias
	Type	Select Aurora / Maria / MySQL
	IP Address	Server IP address domain in which Aurora will be operated.
	Port	Port to be used by Aurora
	DB Login ID	Database username to connect to Aurora
	DB Password	Database user password to connect to Aurora
Server Information	SQL Text Length	Set the length for SQL Text to be saved; default value: Save All
	Instance Name	Actual instance name on AWS server platform
	Description	Memo input window
	Use ?	Select whether to use the log collection and real-time or not.
	Gather No	For big volume logging, numbering of the processes to be separated. Default value '0'.
	Region	AWS Target server's region
	SSH Code	SSH connection information code set on the "Slow Query log" menu for slow query collection.
	Service Type	RDS / EC2 type code

(3) Review the items entered, and click the Save button to save the information.

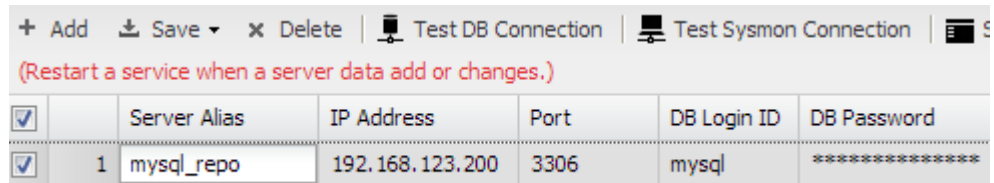
 Add
  Save
  Delete
  Test Connection
  Schema Info
  Clear Filters

(Restart a service when a server data add or changes.)

Edit Connection Information

To edit connection information, click on the desired target server on the 'Server' screen.

- (1) Once you have selected the target server, make desired changes to the connection information.




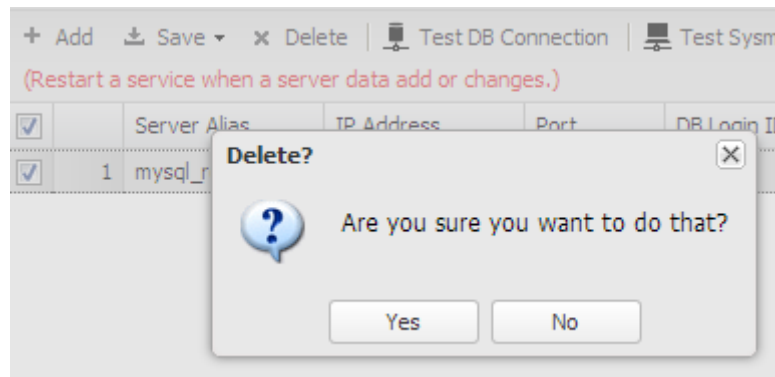
<input checked="" type="checkbox"/>	Server Alias	IP Address	Port	DB Login ID	DB Password
<input checked="" type="checkbox"/>	1 mysql_repo	192.168.123.200	3306	mysql	*****

- (2) When complete, click the Save button.

Delete Connection Information

To delete the connection information, click the 'Delete' button on the 'Server' screen.

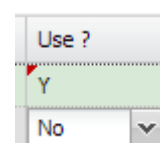
- (1) Select the desired connection information and click the  button on the Instance Manager screen.



- (2) Click 'Yes' to confirm.

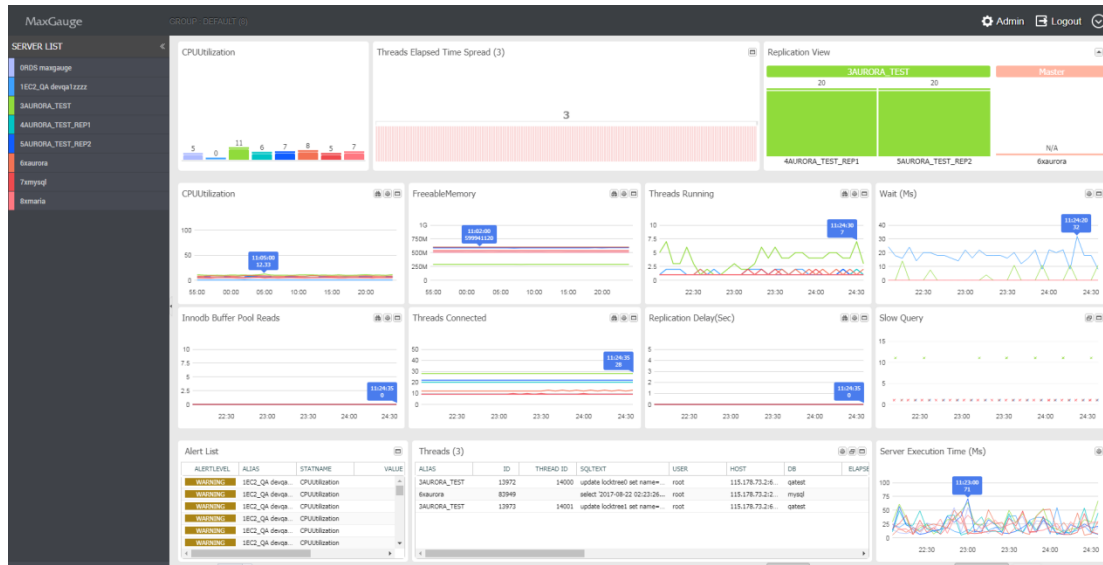
2-3-5. Start Log Collection and Monitoring

For log collection and monitoring, only Y will be active from the options



On Maxgauge for Aurora screen, go to Process > All STOP, and click START to apply the changes and the new server information will be reflected and you can verify the data collected from real-time and performance analyzer.

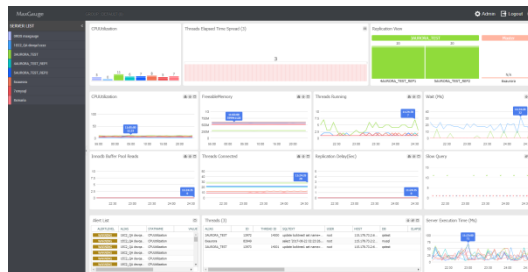
```
SHELL> ./bin/all.start.sh
```



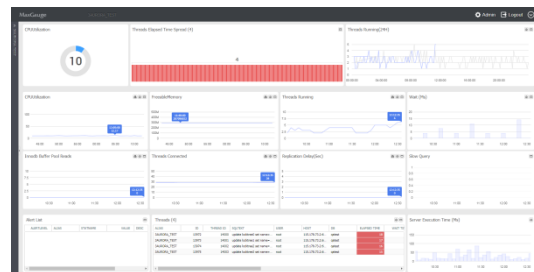
(Integrated Real-time)

2-4. Types of Real-time Displays

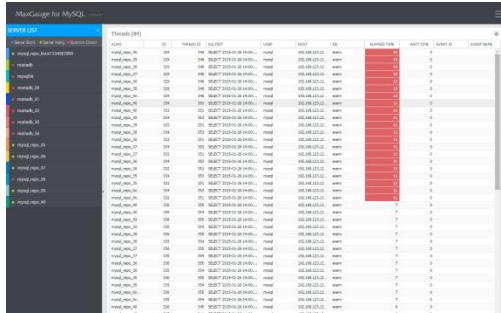
MaxGauge For Aurora is divided into 4 types of displays: Integrated Real-time, Single Real-time, Threads, and Slow Query View.



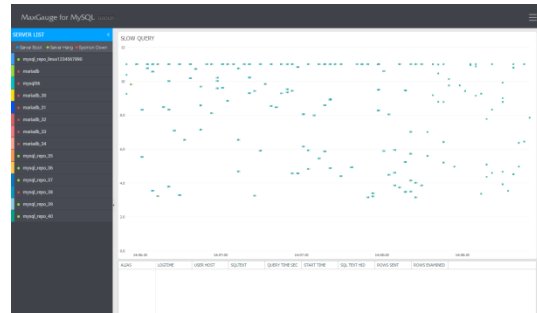
(Integrated Real-time)



(Single Real-time)



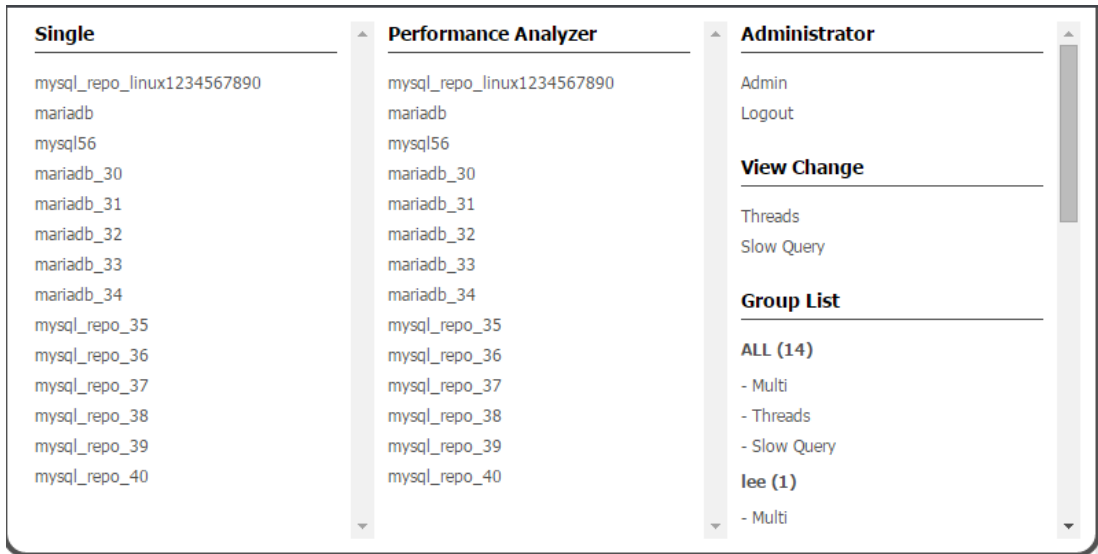
(Threads)



(Slow Query)

2-4-1. Product's View Shift

Use the configuration at the top of the product to shift around the products.



(Shift Menu)

Single

Shifts to the selected instance's Single View.

Performance Analyzer

You can easily shift to the Performance Analyzer, which is a tool for Maxgauge for mysql's

post-analysis.

View Change

Changes the current group's view. Shifts to either Threads or Slow Query View.

Group List

Shifts among the registered groups.

Admin

Moves to the Admin page where you can manage users and monitoring servers.

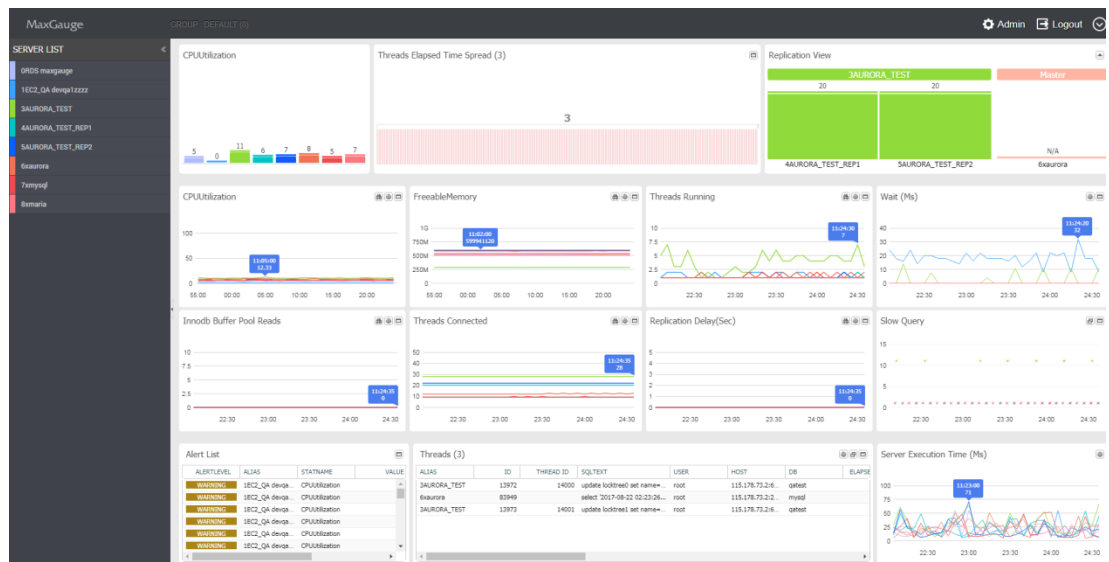
Log Out

Ends the session you were logged on and shifts to the login page.

3. MaxGauge Main Features

3-1. MaxGauge Main Screen Configuration (Multi Real-time View)

The MaxGauge main screen simultaneously monitors the performance issues of multiple Aurora databases from the system's overall perspective on a single screen, ensuring Aurora database's quick and effective real-time performance management.

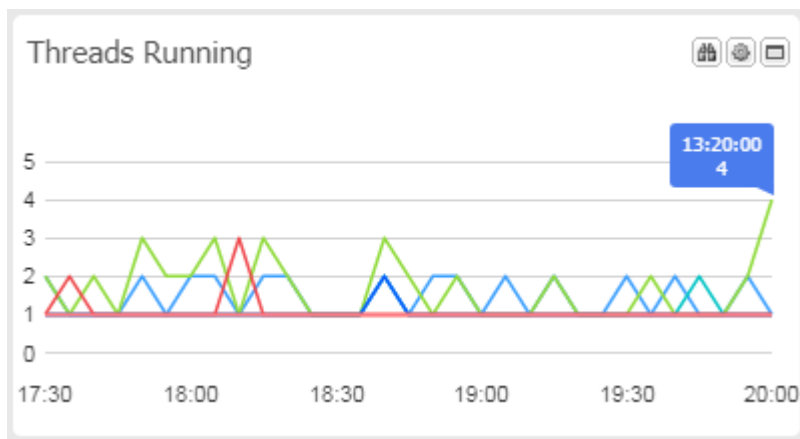





MaxGauge For Aurora's DBMS performance information collects data using the query method, and you can start monitoring immediately after installation without any database downtime. And through integrated monitoring of multiple databases on a single screen, in the event of performance degradation and errors in the database, you can quickly and effectively track down the session and the SQL identified as the root cause of the problem.

3-1-1. When You Want to Change Monitoring Stats

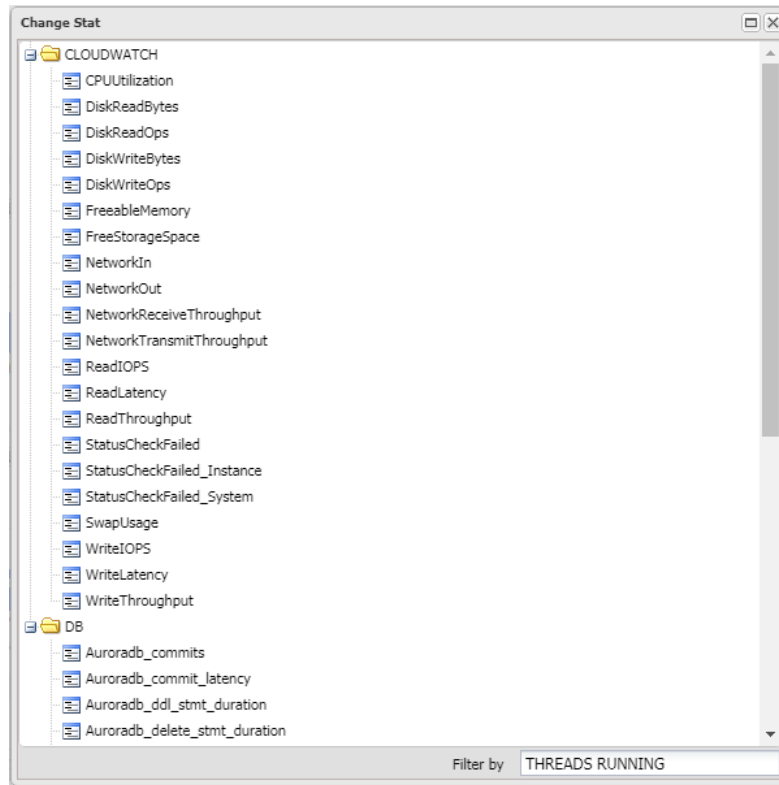
1. The monitoring stats displayed on MaxGauge's Multi Monitor area may be changed according to user's preference.
2. Aurora's stats and OS stats have been separated for user's convenience, and you can change to any stats of your interest. To change to a new stat, click on the desired stat name.

(1)



-  View the 24Hour trends of the select date.
-  Change the viewing chart format.
-  View a close-up in a pop-up.

- (2) Outputs a list of stat items for selection. Click on the desired stat. MaxGauge for Aurora will transmit only the pre-selected performance stats to Real-Time View. If change is not needed, go to Admin > Stat > Stat Info and select 'Yes' for Use option and apply. The corresponding stats will appear on the Real-Time View.



3-1-2. When You Want to View the Threads

3. You will find a list of current active threads at the bottom of the screen in the Threads area.

(1)

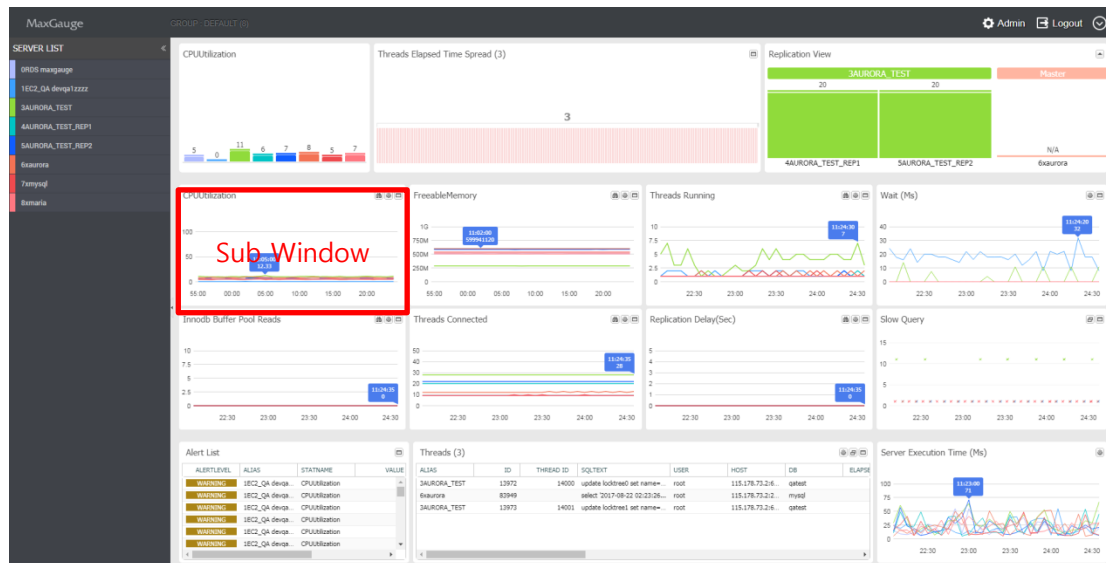
Threads (12)

ALIAS	ID	THREAD ID	SQLTEXT	USER	HOST	DB	ELAPSED TIME	WAIT
mysql_repo_lin...	542	561	SELECT '2015-01-26 16:53:...	mysql	192.168.123.12...	exem	10	
mysql_repo_lin...	544	563	SELECT '2015-01-26 16:53:...	mysql	192.168.123.12...	exem	8	
mysql_repo_lin...	537	556	SELECT '2015-01-26 16:53:...	mysql	192.168.123.12...	exem	8	
mysql_repo_lin...	535	554	SELECT '2015-01-26 16:53:...	mysql	192.168.123.12...	exem	8	
mysql_repo_lin...	539	558	SELECT '2015-01-26 16:53:...	mysql	192.168.123.12...	exem	6	

3-1-3. Multi Monitor Area

The 'Multi Monitor Area' on MaxGauge's main screen is composed of 10 sub-windows, and the user can choose and switch various information provided by MaxGauge such as Aurora's

performance stat, CPU stat, and the ratio stat of the corresponding database, on each sub-window.



3-1-4. Monitoring Target Main Performance Stats

- CPU Utilization
- Freeable Memory
- Threads running
- Innodb buffer pool reads
- Threads connected
- Replication Delay (sec)
- Slow Query

The Multi Monitor area plays a very important role in terms of providing database system's performance information. Once initial MaxGauge installation is complete, 6 performance stats will be displayed in the Multi Monitor area. The graph and the values displayed on the screen are defined as follows: 1) For performance stats recording cumulative values, the average value per second of the difference value of the current time point (t) and the previous time point (t-1) divided by the elapsed time (sec). 2) For performance stats recording current values, it displays the current values.

3-1-5. Alert Area

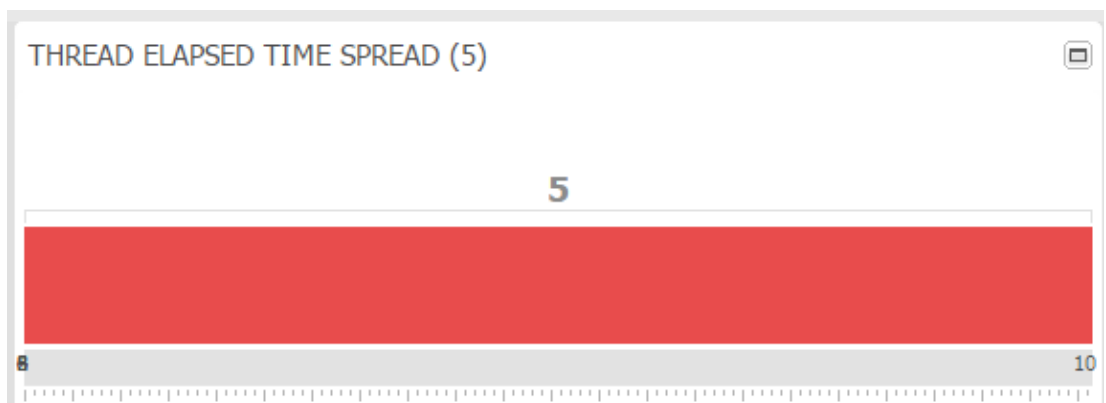
The Alert area displays the number of alarms generated by the instances currently being monitored.

When you click on an instance displaying the number of alarms, it will shift to the single real-time view for a detailed review.

ALERTLEVEL	ALIAS	STATNAME	VALUE	DESC
CRITICAL	225	CPU	52.00	
WARNING	225	active memory(...	67.80	
CRITICAL	225	Bytes_sent	3758.60	
WARNING	132	active memory(...	45.36	
CRITICAL	132	Bytes_sent	9157.80	

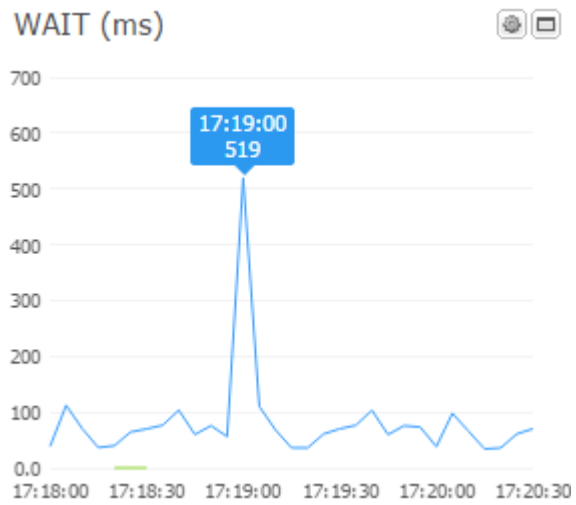
3-1-6. Thread Elapsed Time Spread Area

Displays the number of active threads by each elapsed time segment.



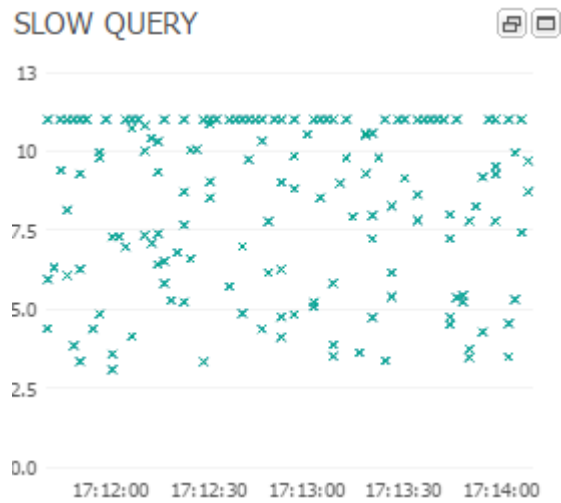
3-1-7. WAIT (ms) Area

Displays the WAIT information.



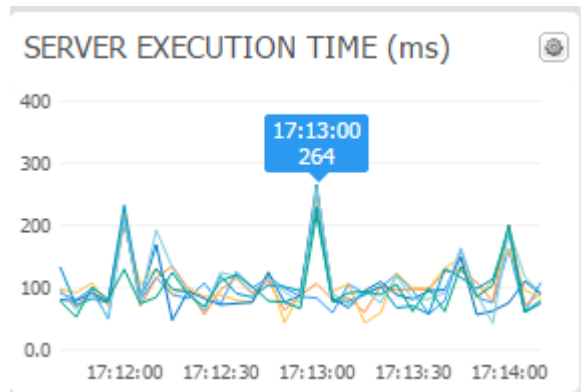
3-1-8. Slow Query XView Area

Displays the XView based on slow queries' end elapsed time.

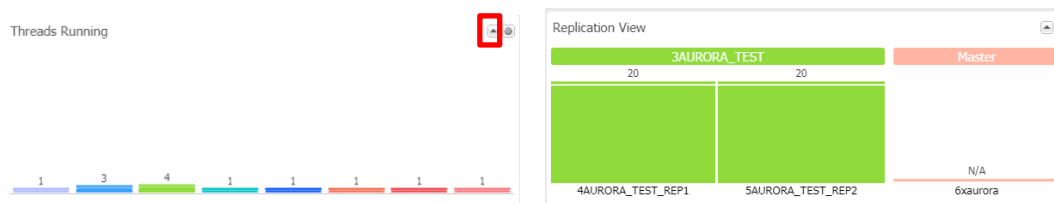


3-1-9. SERVER EXECUTION TIME (ms) Area

The Server Execution Time displays the time elapsed for collecting from the monitoring target servers in ms unit.



3-1-20. Threads Running & Replication view



When you click on the arrow on the top right corner of the Realtime Multi view, the graph will switch from Threads Running screen to Replication view screen.

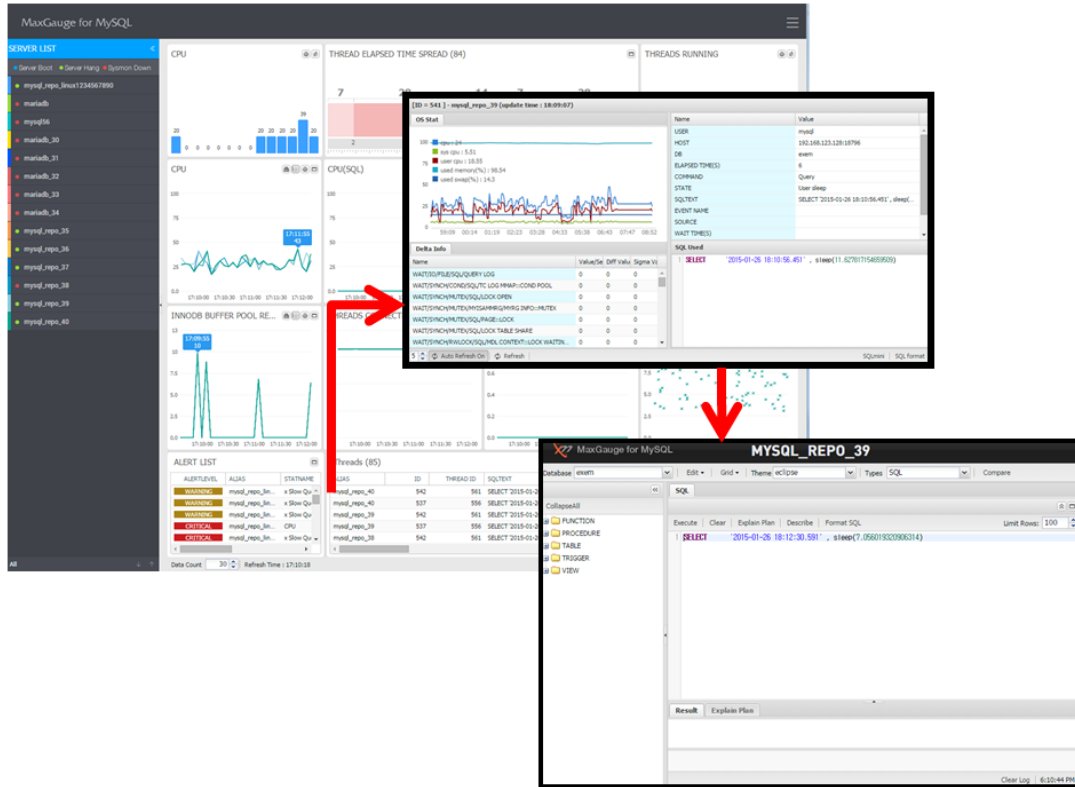
The Threads Running screen displays the number of currently active threads by each AWS target server in a bar graph. The Replication view screen displays the master / slave status of AWS target server, indicating replica_lag_in_milliseconds value at the top of the graph.

3-2. Top-down Method of Session Tracking

3-2-1. Top Session Tracking

The image below illustrates the top-down approach method of tracking process via Session > SQL > Explain Plan as implemented in MaxGauge. One of MaxGauge's greatest advantages is that you can track down and explain the root cause of the problem by quickly collecting all

relevant performance stats through top-down approach method which can track down the root cause of the problem via 'Threads Detail', 'SQL Level', and 'Execution Plan Level' from the main screen.



(Thread -> Session Detail -> Sql Mini)

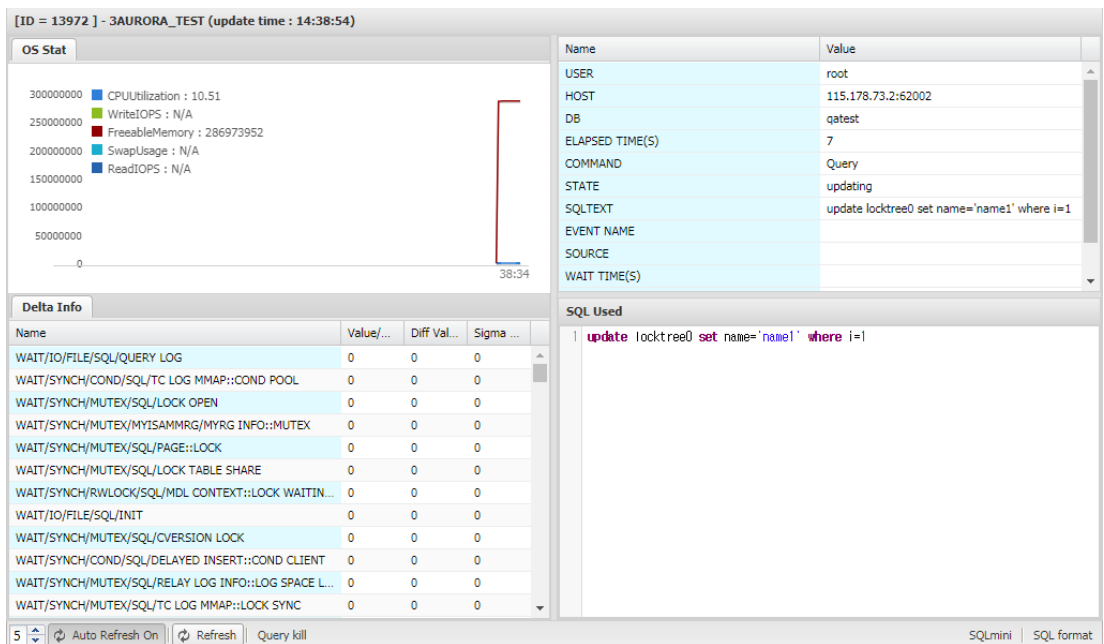
3-3. Thread Detail

3-3-1. Thread Detail Overview

The Thread Detail can provide detailed information about a particular thread in the database system and has the following features.

- Wait stat's content and activity level from the login time onto the select thread through the current time.
- Wait stat's content and activities between the current time and the previous time point.
- Thread default information and the SQL text currently executing.
- Query Kill feature

The following is the Thread Detail initial screen.



3-3-2. Thread Detail Area Explanation

Thread Control Area



You can manually Refresh or Query Kill a thread which is running.

Detail Info Area

Displays the wait information of the corresponding session that has waited until now in cumulative value (Sigma) and Value/sec value.

Delta Info			
Name	Value/Sec(s)	Diff Value(s)	Sigma Value(s)
wait/io/file/innodb/innodb_data_file	3.03	3.03	3
wait/synch/mutex/innodb/buf_pool_...	0.01	0.01	0
wait/synch/mutex/innodb/rw_system...	0	0	0
wait/synch/mutex/innodb/log_flush...	0	0	0
wait/synch/mutex/innodb/btr_search...	0	0	0
wait/synch/mutex/sql/PAGE:lock	0	0	0
wait/synch/mutex/sql/TC_LOG_MMA...	0	0	0
wait/synch/mutex/sql/TC_LOG_MMA...	0	0	0
wait/synch/mutex/sql/TC_LOG_MMA...	0	0	0
wait/synch/mutex/sql/MYSQL_BIN_L...	0	0	0
wait/synch/mutex/sql/MYSQL_RELAY...	0	0	0
wait/synch/mutex/sql/Delayed_insert...	0	0	0
wait/synch/mutex/sql/hash_flo:lock	0	0	0
wait/synch/mutex/sql/LOCK_active_mi	0	0	0
wait/synch/mutex/sql/LOCK_connect...	0	0	0
wait/synch/mutex/sql/LOCK_crypt	0	0	0
wait/synch/mutex/sql/LOCK_delayed...	0	0	0
wait/synch/mutex/sql/LOCK_delayed...	0	0	0
wait/synch/mutex/sql/LOCK_delayed...	0	0	0
wait/synch/mutex/sql/LOCK_error_log	0	0	0
wait/synch/mutex/sql/LOCK_gd	0	0	0
wait/synch/mutex/sql/LOCK_global_s...	0	0	0
wait/synch/mutex/sql/LOCK_manager	0	0	0
wait/synch/mutex/sql/LOCK_prepare...	0	0	0
wait/synch/mutex/sql/LOCK_rpl_status	0	0	0
wait/synch/mutex/sql/LOCK_server...	0	0	0
wait/synch/mutex/sql/LOCK_status	0	0	0

Item	Description
Name	MySQL wait stat name
Value/Sec(s)	The average value per second of the value generated between the two time points
Diff Value(s)	The difference value between the two time points
Sigma Value(s)	Cumulative value until the present

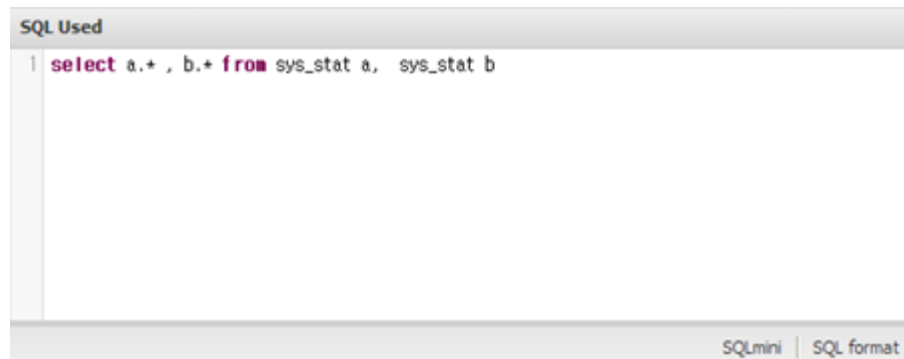
Session Basic Information and Current Wait Area

Displays information such as the user name, host name, DB name, elapsed time and current wait information.

Name	Value
USER	mysql
HOST	192.168.123.75:51275
DB	exem
ELAPSED TIME(S)	51
COMMAND	Sleep
STATE	
SQL-TEXT	
EVENT NAME	
SOURCE	
WAIT TIME(S)	
SPINS	
OBJECT NAME	

SQL Used Area

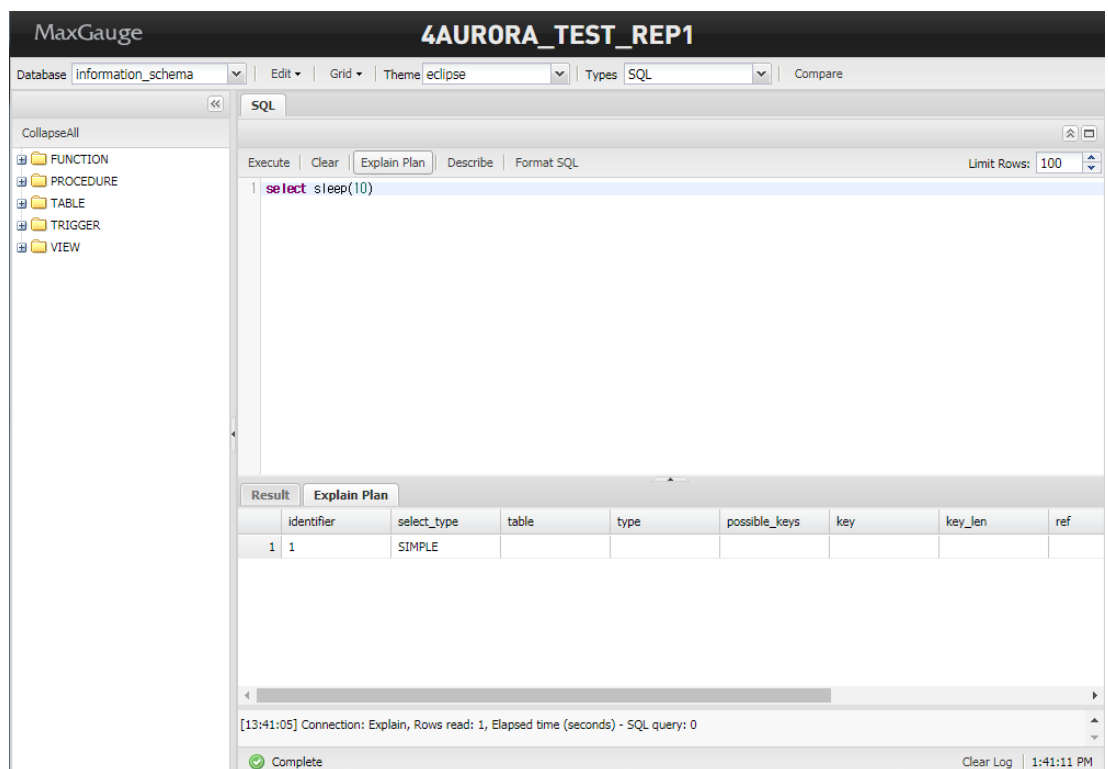
The SQL text currently being executed is displayed.



```
SQL Used
| select a.+ , b.+ from sys_stat a, sys_stat b
```

SQLmini | SQL format

To see the execution plan for the SQL text, click the SQLmini button located on the bottom right corner. It will take you to SQLmini product. Now click the Explain Plan button to see the execution plan.



MaxGauge 4AURORA_TEST_REP1

Database: information_schema | Edit | Grid | Theme: eclipse | Types: SQL | Compare

SQL

Execute | Clear | Explain Plan | Describe | Format SQL | Limit Rows: 100

```
| select sleep(10)
```

Result | Explain Plan

	identifier	select_type	table	type	possible_keys	key	key_len	ref
1	1	SIMPLE						

[13:41:05] Connection: Explain, Rows read: 1, Elapsed time (seconds) - SQL query: 0

Complete | Clear Log | 1:41:11 PM

If it is difficult to read due to extensive length of the SQL text, then you can use the SQL formatting feature. Click on the Format SQL button located right below the window.

3-3-3. Thread Detail Run Method

You can run a Thread Detail using the following methods.

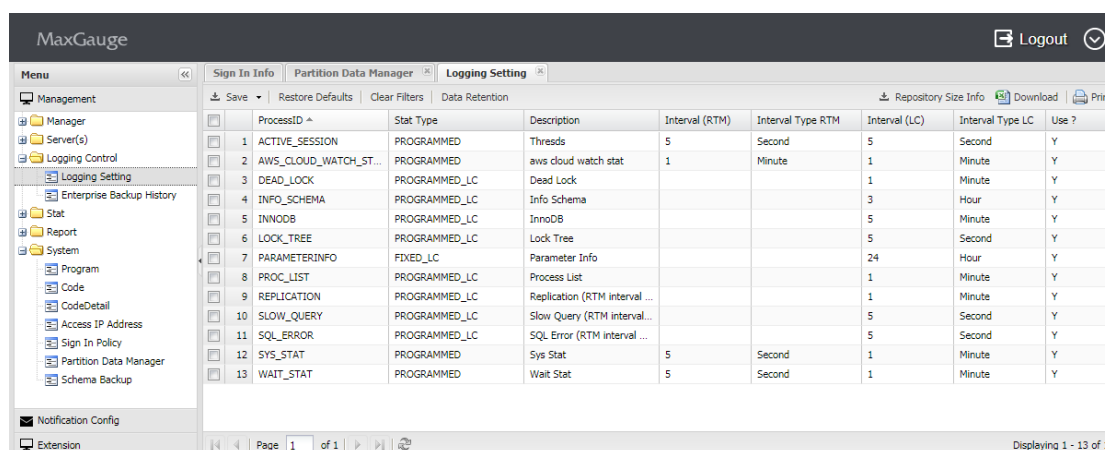
- Go to MaxGauge's main screen's Thread tab and double-click on the session.
- Go to MaxGauge's Thread Manager screen and double-click on the session.
- Go to MaxGauge's Lock Tree screen and double-click on the thread.

3-4. Refresh Feature

For most of the window monitoring performance information, including MaxGauge's main screen, once the initial installation is complete, the auto refresh time is set for every 5 seconds by default and the user can adjust the time interval as needed. The auto refresh time should be a minimum 5 seconds to take effect and in most cases, less than 5 seconds is not necessary. You can increase the auto refresh time interval for databases with low activity level.

Auto Refresh

- (1) Admin > Logging Control > Logging Manager.



The screenshot shows the MaxGauge interface with the 'Logging Setting' tab selected. The table below represents the data shown in the interface.

ProcessID	Stat Type	Description	Interval (RTM)	Interval Type RTM	Interval (LC)	Interval Type LC	Use ?
1	ACTIVE_SESSION	Threads	5	Second	5	Second	Y
2	AWS_CLOUD_WATCH_ST...	aws cloud watch stat	1	Minute	1	Minute	Y
3	DEAD_LOCK	Dead Lock			1	Minute	Y
4	INFO_SCHEMA	Info Schema			3	Hour	Y
5	INNODB	InnoDB			5	Minute	Y
6	LOCK_TREE	Lock Tree			5	Second	Y
7	PARAMETERINFO	Parameter Info			24	Hour	Y
8	PROC_LIST	Process List			1	Minute	Y
9	REPLICATION	Replication (RTM interval ...			1	Minute	Y
10	SLOW_QUERY	Slow Query (RTM interval...			5	Second	Y
11	SQL_ERROR	SQL Error (RTM interval ...			5	Second	Y
12	SYS_STAT	Sys Stat	5	Second	1	Minute	Y
13	WAIT_STAT	Wait Stat	5	Second	1	Minute	Y

(Full View Snapshot)

ProcessID ^	Stat Type	Description	Interval (RTM)	Interval Type RTM	Interval (LC)	Interval Type LC	Use ?	
1	ACTIVE_SESSION	PROGRAMMED	Thresds	5	Second	5	Second	Y
2	AWS_CLOUD_WATCH_ST...	PROGRAMMED	aws cloud watch stat	1	Minute	1	Minute	Y
3	DEAD_LOCK	PROGRAMMED_LC	Dead Lock			1	Minute	Y
4	INFO_SCHEMA	PROGRAMMED_LC	Info Schema			3	Hour	Y
5	INNODB	PROGRAMMED_LC	InnoDB			5	Minute	Y
6	LOCK_TREE	PROGRAMMED_LC	Lock Tree			5	Second	Y
7	PARAMETERINFO	FIXED_LC	Parameter Info			24	Hour	Y
8	PROC_LIST	PROGRAMMED_LC	Process List			1	Minute	Y
9	REPLICATION	PROGRAMMED_LC	Replication (RTM interval ...			1	Minute	Y
10	SLOW_QUERY	PROGRAMMED_LC	Slow Query (RTM interval...			5	Second	Y
11	SQL_ERROR	PROGRAMMED_LC	SQL Error (RTM interval ...			5	Second	Y
12	SYS_STAT	PROGRAMMED	Sys Stat	5	Second	1	Minute	Y
13	WAIT_STAT	PROGRAMMED	Wait Stat	5	Second	1	Minute	Y

(Settings)

You can adjust the real-time and logging collection cycle settings. Once you have made the changes, you must restart (all.stop.sh -> all.start.sh) the product.

4. Main Features

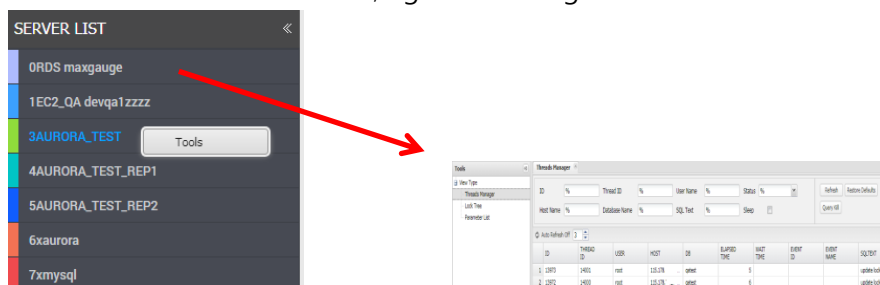
4-1. Threads Monitor

The Threads Manager is intended for the purpose of monitoring the sessions that are connected to the database and being executed, and it also helps users to find specific sessions by applying search conditions.

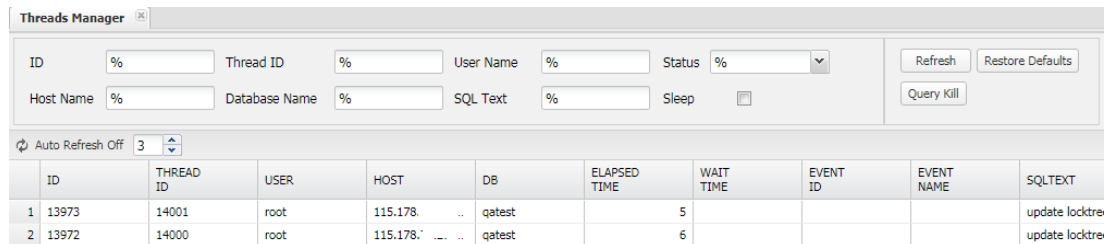
4-1-1. Threads Manager Run Method

Go to Tool menu of the server you want to monitor.

- (1) From the Server List on the left, right-click and go to Tool -> Threads Manager.



- (2) When the corresponding database' Threads Manager window opens, it will show the information of all sessions currently connected to the database.



4-1-2. Thread Search

The user can search for specific threads from the entire list by entering certain values in the conditions input box located at the bottom of the Threads Manager.

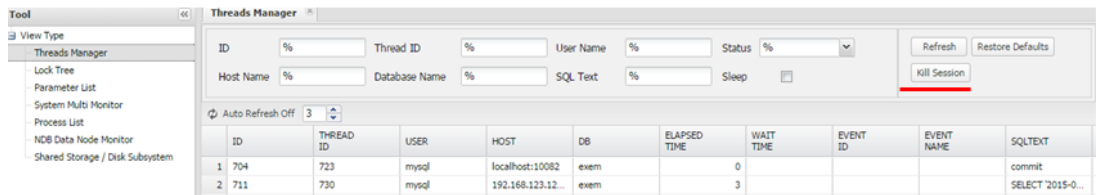
The following explains the criteria for search conditions.

Item	Description
ID	Search by ID.
Thread ID	Search by Thread ID.
User Name	Search by User Name
Host Name	Search by Host Name.
DB Name	Search by Database Name.
SQL Text	Search by SQL Text.
Elapsed Time	Search by Elapsed Time (Sec).
Sleep	Displays threads that are in sleep mode.

4-1-3. Kill in Threads Manager Results Window

The sessions displayed in the Threads Manager Results window may be selected by using your mouse or direction arrow keys and the session is highlighted when selected.

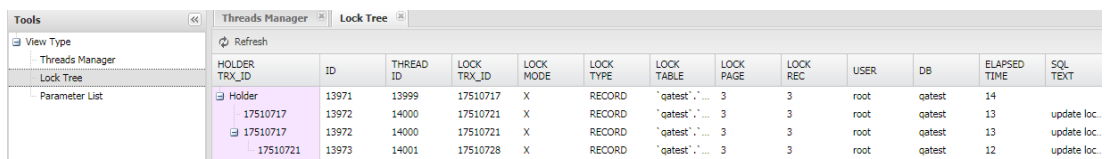
When a session is selected and highlighted, the Kill function can be executed and therefore, it must be handled with caution.



4-2. Tracking Lock Sessions (Lock Tree)

The Lock Tree screen displays information of sessions waiting on the lock and the session which generated the lock among all sessions currently connected to the database system.

- 1) Tools > Select Lock Tree
- 2) Lock tree screen of the corresponding database



The lock tree screen displays the relationship between the selected database' lock holder and the requests in a layer structure, and so you can quickly distinguish the lock relationships among the sessions.

4-3. Parameter List

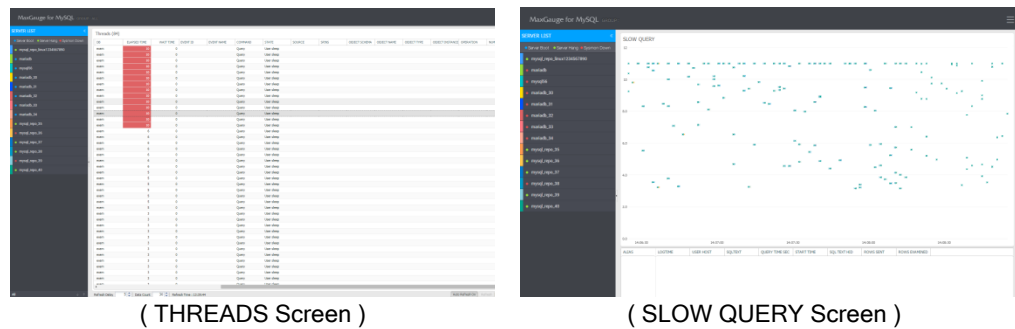
You can check the parameter values of the current database.

- 1) Tools > Select Parameter List
- 2) Parameter List screen of the corresponding database

NAME	VALUE
aurora_lab_mode	OFF
aurora_load_from_s3_role	
aurora_max_alter_table_log_entries	1000
aurora_max_connections_limit	16000
aurora_select_into_s3_role	
aurora_server_id	auroratest1
aurora_version	1.13
auto_increment_increment	1
auto_increment_offset	1
autocommit	ON
automatic_sp_privileges	ON
aws_default_lambda_role	
aws_default_s3_role	
awsauthenticationplugin_max_backoff_delay	2000
awsauthenticationplugin_max_retry_count	3
awsauthenticationplugin_retry_delay	250
back_log	59
basedir	/rdsdbsbin/oscar/
big_tables	OFF
bind_address	*
binlog_cache_size	32768
binlog_checksum	CRC32
binlog_direct_non_transactional_updates	OFF
binlog_format	MIXED


5. Selective Intensive Monitoring Screen (Threads and Slow Query)

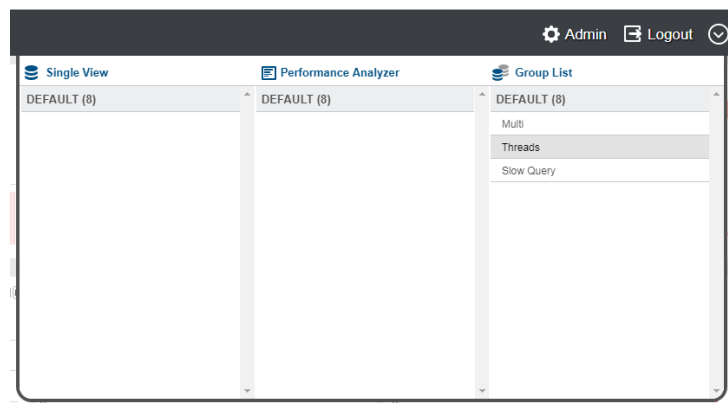
During real-time monitoring, you may sometimes have to intensively monitor threads or slow query.



5-1. Threads

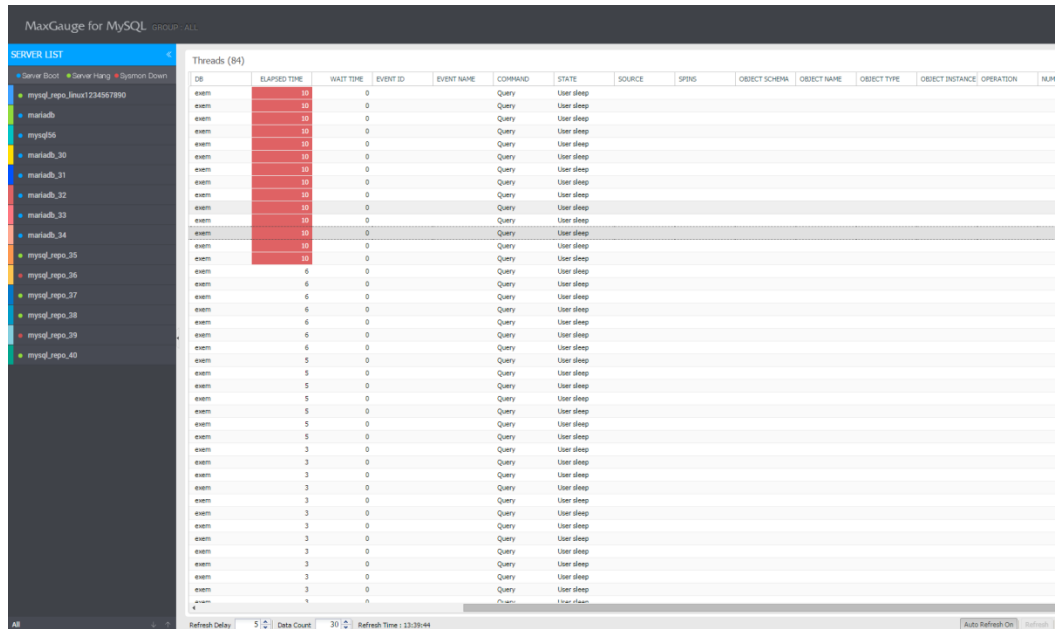
5-1-1 Run Threads

- 1) Click the  icon on the top right corner of the multi monitoring screen.
- 2) Click Group List -> Desired Group -> Threads.



5-1-2 Threads Screen

The server list of the corresponding group will be on the left and the threads within the group will be shown on the right.



(THREAD Screen)



5-1-3 Highlighting Based on ELAPSED TIME Criteria

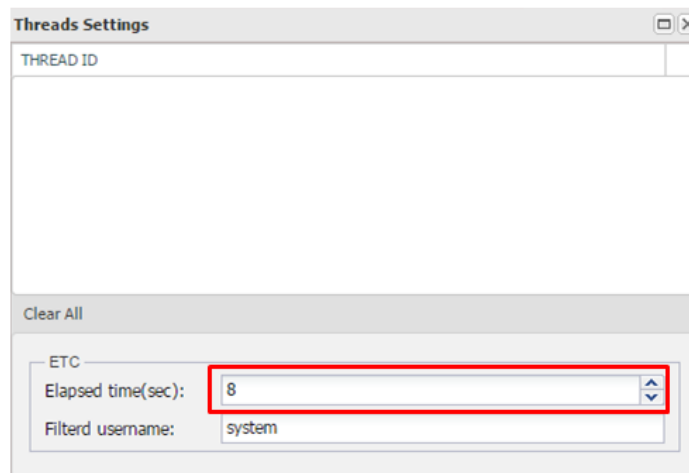
Elapsed Time >= Highlights the threads based on elapsed time criteria.

Threads (109)



ALIAS	ID	THREAD ID	SQLTEXT	USER	HOST	DB	ELAPSED TIME
mysql_repo_40	716	734	SELECT '2015-01-29 14:02:...	mysql	192.168.123.12...	exem	13
mysql_repo_39	716	734	SELECT '2015-01-29 14:02:...	mysql	192.168.123.12...	exem	13
mysql_repo_38	716	734	SELECT '2015-01-29 14:02:...	mysql	192.168.123.12...	exem	13

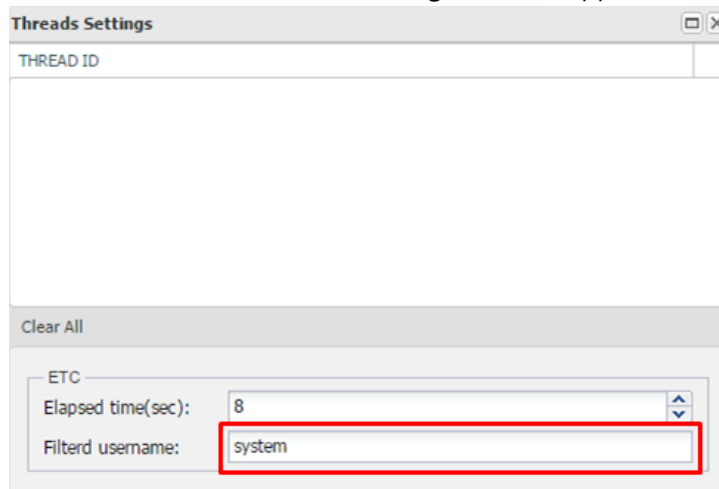
5-1-4 ELAPSED TIME Highlight Settings

- 1) Click the  icon.
- 2) Enter values in the elapsed time(sec) input box.
- 3) Click the  button and the changes will be applied.

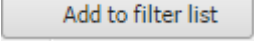




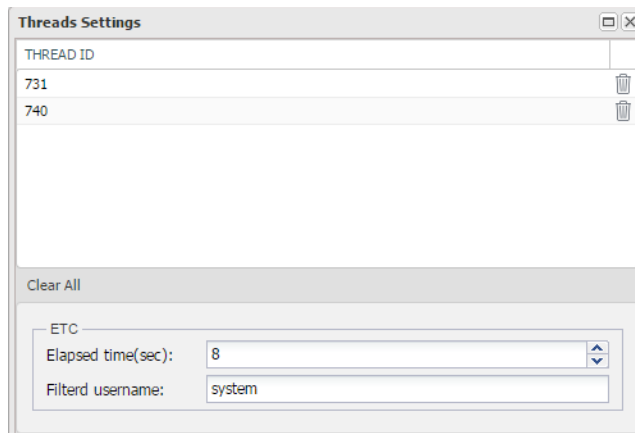
5-1-3 Filtering Select Users from THREAD List

- 1) Click the  button.
- 2) Enter values in the Filter username input box.
- 3) Click the  button and the changes will be applied.



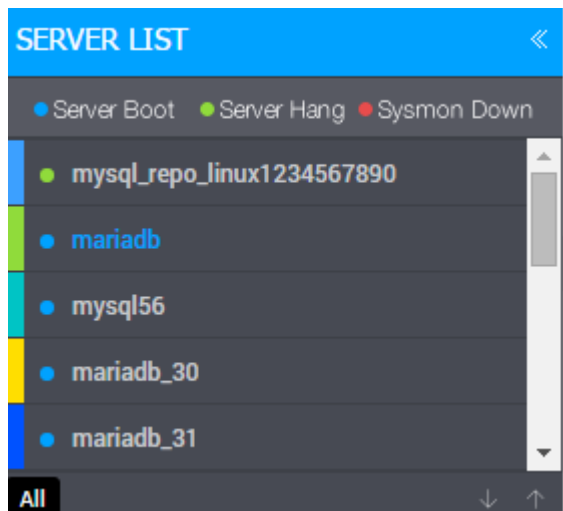
5-1-3 Filtering Select Thread ID from THREAD List

On the Thread List, mouse right-click and select , and it will immediately show the filtered results. To cancel the filter, click the  button and then click the  button of the corresponding thread ID.



5-1-4 Single Server View


Click on the server you want to see from the Server List on the left. To undo, click on **All** button to clear the selections.

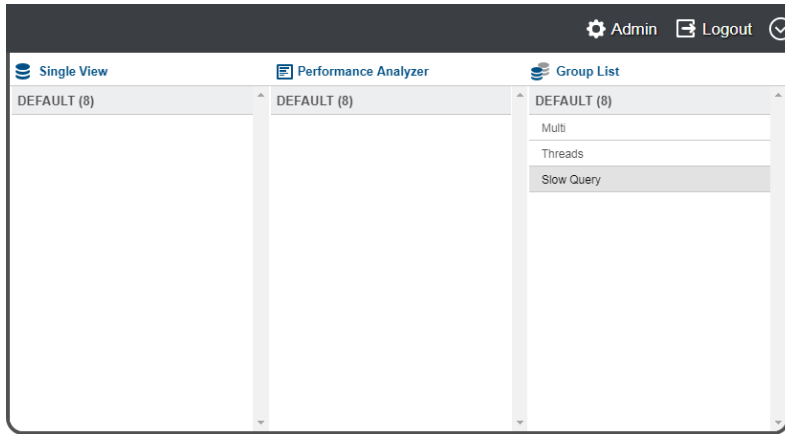


5-2. Slow Query

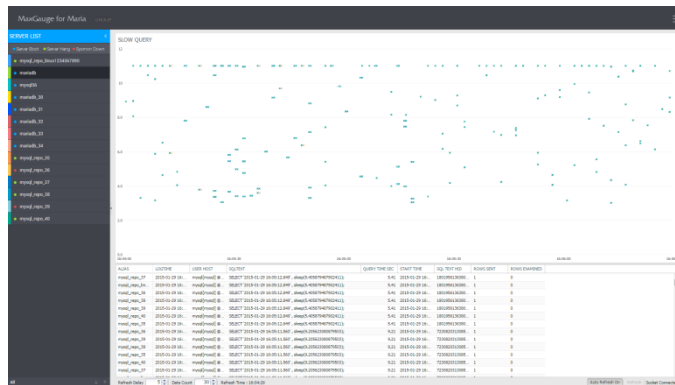
Displays the slow queries currently being collected.

5-2-1 Run Slow Query

- 3) Click on  icon located on the top right corner of the multi monitoring screen.
- 4) Click the Group List -> Desired Group -> Slow Query.

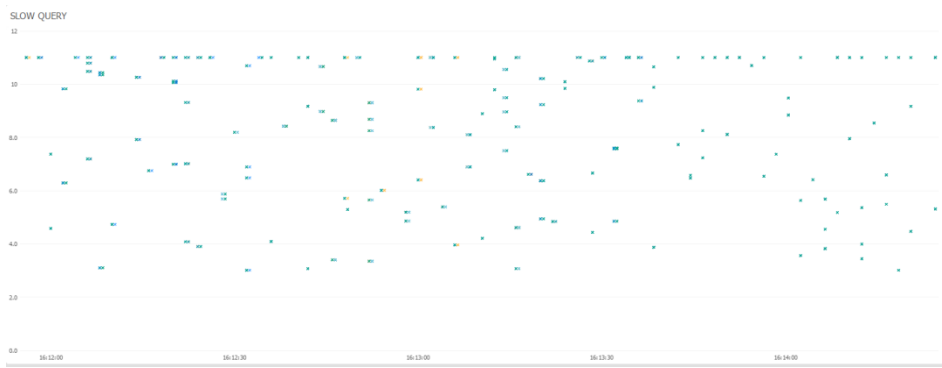


5-2-2 Slow Query Screen

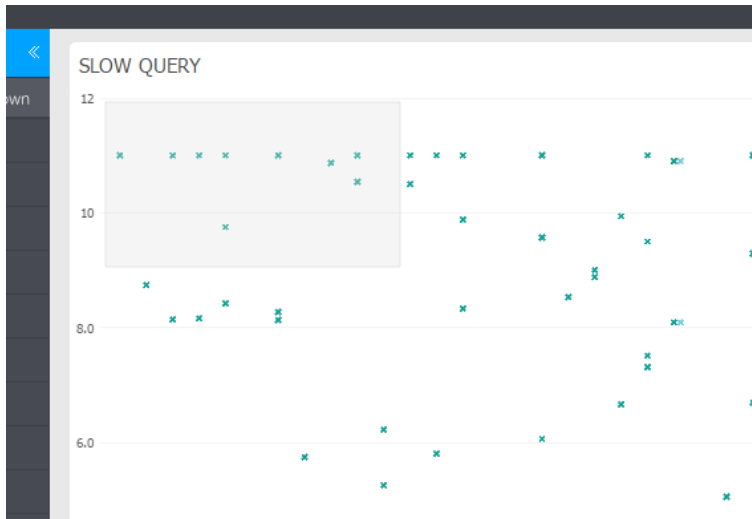


5-2-3 Browsing the X-VIEW Area

The Y axis is the execution time (Query Time) and the X axis is the time at which it was saved to the Repository (TIME).



You can use mouse drag and drop to search a specific time segment, and the results will be output at the bottom.



(Query Times greater than 10 seconds will be shown as 10 seconds for display purpose.)

ALIAS	LOGTIME	USER HOST	SQLTEXT	QUERY TIME SEC	START TIME	SQL TEXT HID	ROWS SENT	ROWS EXAMINED
mysql_repo_37	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_36	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_39	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_lin...	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_38	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_35	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_40	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	11.76	2015-01-29 16:...	1832199493982...	1	0
mysql_repo_38	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	15.73	2015-01-29 16:...	1431085900900...	1	0
mysql_repo_40	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	15.73	2015-01-29 16:...	1431085900900...	1	0
mysql_repo_lin...	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	15.73	2015-01-29 16:...	1431085900900...	1	0
mysql_repo_37	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	15.73	2015-01-29 16:...	1431085900900...	1	0
mysql_repo_36	2015-01-29 16:...	mysql[mysql] @...	SELECT '2015-0...	15.73	2015-01-29 16:...	1431085900900...	1	0

(Results Window)

5-2-4 Viewing Slow Query's Execution Plan (EXPLAIN)

When you double-click on the retrieved results, you can see the execution plan (Explain) in real-time.

identifier	select_type	table	type	possible_keys	key	key_len	ref	rows	filtered	extra
1	SIMPLE									No tables used

6. Management Features

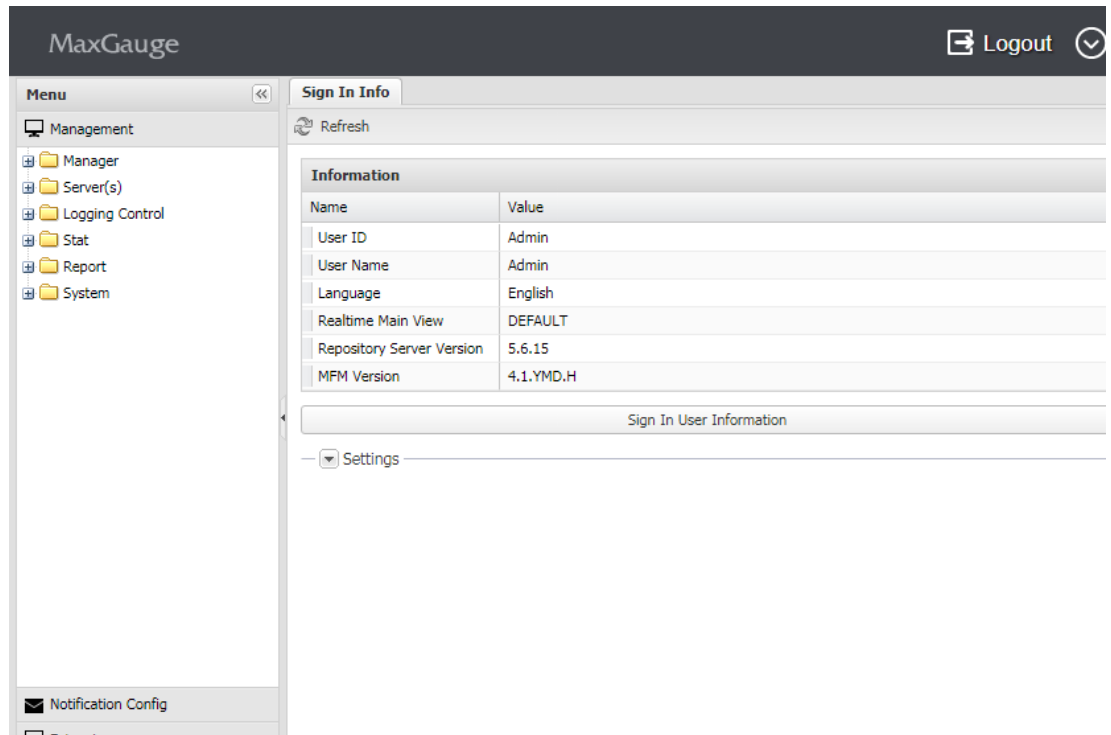
You can manage specific settings for the Maxgauge product. After making changes to settings, some features require you to restart the Gather for the changes to be applied.

6-1. Admin Access

- 1) Click on Admin.



6-2. Admin Screen



(Screen Configuration)

6-3. Administrator Menu

Category	Menu	Description
Manager (Manage Users)	User	Register, edit, or delete users who will be using the Maxguage Client.
	User View Settings (User Window)	Register, edit, or delete multiple screens (service group) for which monitoring permission will be given according to each user.
	Program Permissions (Privileges for Program Access)	Register, edit, or delete privileges for manager menu access by each user.

	Control Permissions (Privileges by Each User)	Register, edit, or delete privileges such as the use of alarm settings, kill session, and SQLmini by each user.
Server(s) (Manage Servers)	Server	Register, edit, or delete monitoring target servers. After making changes, restarting Gather is required.
	View Setting (Window Settings)	Register, edit or delete windows (service group).
	Slow Query log (via SFTP)	Manage SSH access information for slow query collection.
Logging Control (Manage logging)	Logging Settings	Set monitoring refresh cycle and logging collection cycle.
Event (Manage Events)	Event Settings	Register, edit, or delete alarms for each server.
	Event History	You can check the alarms generated from all servers and the error & OS log by date.
Stat (Manage Stats)	Stat Settings (Stat Info)	Set which stats to be displayed in the real-time chart by selecting Yes or No.
	User Equation Stat Settings (User Defined Stats)	This function can produce separate stats using operators on the stats collected from MaxGauge. ex) $\text{Connection_Ratio} = \text{CurrentConnection} / \text{maxConnection} * 100$
Report	Statistics	Outputs a report.
System	Program	This is an internal menu for running MaxGauge and making direct changes is not required.
	Code	This is an internal menu for running MaxGauge and making direct changes is not required.
	Code Details	This is an internal menu for running MaxGauge and making direct changes is not required.
	Access IP Address	Enter IP for access permission by each user.

	Sign In Policy (Login Policy)	Determine the product login policy. You can set the policy for IP check, account, and password.
	Partition Data Manager	Can manage the partition information created while logging data in Maxgauge.
	Schema Backup	Provides a feature for backing up or recovering settings information for replacing MaxGauge's repository to a different server or configuring a similar environment.
Event	Alert History	You can check the history of alarms generated upon exceeding the threshold values set by the user while collecting performance information.
	Alert Settings	You can register alarms by setting threshold values for each performance stat.
	Event Filter	For repetitive and continuous alarms generating frequently, control by adjusting frequency or time.
Notification Settings	Notification Package Settings	Register, edit, or delete stats to be allowed for notification by group.
	Target Setting (Notification Recipient Settings)	Register, edit, or delete notification recipients by group.
	Method Settings (Notification Rules)	Set notification rules.
	Message Format (Notification Text Settings)	Set text format.
Notification Report	Sent History	Browse sent history.




Part**2**

Part 2 Performance Log Analysis

In Part 2, we will discuss about MaxGauge Logging Controller which has the logging feature for post-analysis, various analysis on log, and Performance Analyzer which executes reporting.

 Gather (Logging Controller)

 Performance Analyzer

1. Gather (MaxGauge Logging Controller)

1-1. Gather Overview

The limitation of real-time performance management is in that the problem diagnosis and resolution must be done in real-time. However, a DBA cannot be available 24 hours around the clock in front of a computer to maintain the role of real-time monitoring and diagnosis. And in the event performance issues arise, trying to resolve the issues by rebooting the database, cancelling sessions by force, or program automatic shutdown will only destroy the fundamental source of data through which the root cause of problem can be identified, making it impossible to further investigate the problem through a post-analysis.

In general, it is very difficult to replay a situation which occurred during a database operation. Therefore, it is often impossible to replay situations such as database system failures or significant batch job delays for a post-analysis to identify the root cause of the problem.

MaxGauge logs various performance information collected from Aurora in a safe repository to support the function of post-analysis of performance issues, which compensates for the time limitation of real-time monitoring through log analysis.

Especially, it replays the past execution situations as if in real-time, and by rewinding back to a specific timepoint in the past, the analyzing function of the sessions and SQL executed at the corresponding time can be a helpful resource in identifying the root cause of the problem and finding its solutions. MaxGauge also provides a trend analysis feature which utilizes data accumulated over many days.

MaxGauge uses queries to collect and store Aurora's performance, sessions, and lock information. The DBA can use the logging controller program to set the logging cycle and select logging data, and the performance analyzer to do analysis.

You can check performance degradation and database failures generated in the system through post analysis. Because it is possible to check performance stat trends with data from a specific time period by using the performance analyzer, you can accurately and conveniently pinpoint the exact time at which the overload occurred, and by browsing to that specific time, you can identify the sessions and SQL that were executed at the time.

1-2. Environment Settings

MaxGauge provides a repository in which the performance information is stored.

1-2-1. Repository Settings

The repository settings is used when you are trying to save the performance information.

The settings file is located in conf/properties.

(1) dbpool.properties

Set up DB access information for Gather.

SETTINGS KEY	DEFAULT VALUE	DESCRIPTION
manager.logging	true	Logging or No Logging

manager.pool_type	bonecp	DB Pool Type
mydb.driver	com.mysql.jdbc.Driver	Connect Driver
mydb.url	jdbc:mysql://<HOSTNAME>:<PORT>/<DB_NAME>	Location of Repository to be accessed
mydb.user		REPOSITORY user
mydb.password		REPOSITORY password
mydb.connectTimeout	3	Connection delay wait time
mydb.loginTimeout	10	Login process wait time
mydb.minConnections	3	DB Pooling minimum (min)
mydb.maxConnections	30	DB Pooling maximum (max)

(2) system.properties

Set to which port the web client should connect and other related settings.

SETTINGS KEY	DEFAULT VALUE	DESCRIPTION
socket.ip	localhost	Do Not Change
socket.port	8070	Port to which the WEB CLIENT should connect.
socket.context	/ws	Fixed value for internal operations.
websocket.compress	false	Web socket data compression settings
websocket.write_timeout	10000	Web socket write timeout
websocket.idle_timeout	300000	Web socket idle delay timeout
websocket.max_message_size	524288	Maximum size per transmission through web socket

websocket.compress	false	Whether to compress or not compress the websocket data
websocket.sqltext.len	30	Set the length of SQL text which will be displayed in the THREAD LIST.

(3) daemon.properties

This is Gather settings. In general, you do not need to make any changes.

(4) version.properties

This contains the product version information. You can also check the version information in the Admin's information area.

1-2-1. Gather Start and End

Once settings are complete, execute Gather with all.start.sh.

```
SHELL > ./bin/all.start.sh
```

To end Gather, use ALL.STOP.sh.

```
SHELL > ./bin/all.stop.sh
```

1-4. Dashboard Support Feature

You can link with data in MaxGauge for Aurora and other Exem products on Exem Dashboard.

There are no separate environment settings in this product, but since a linking job on Exem Dashboard is necessary, you can set up by seeking technical support.



2. MaxGauge Performance Analyzer

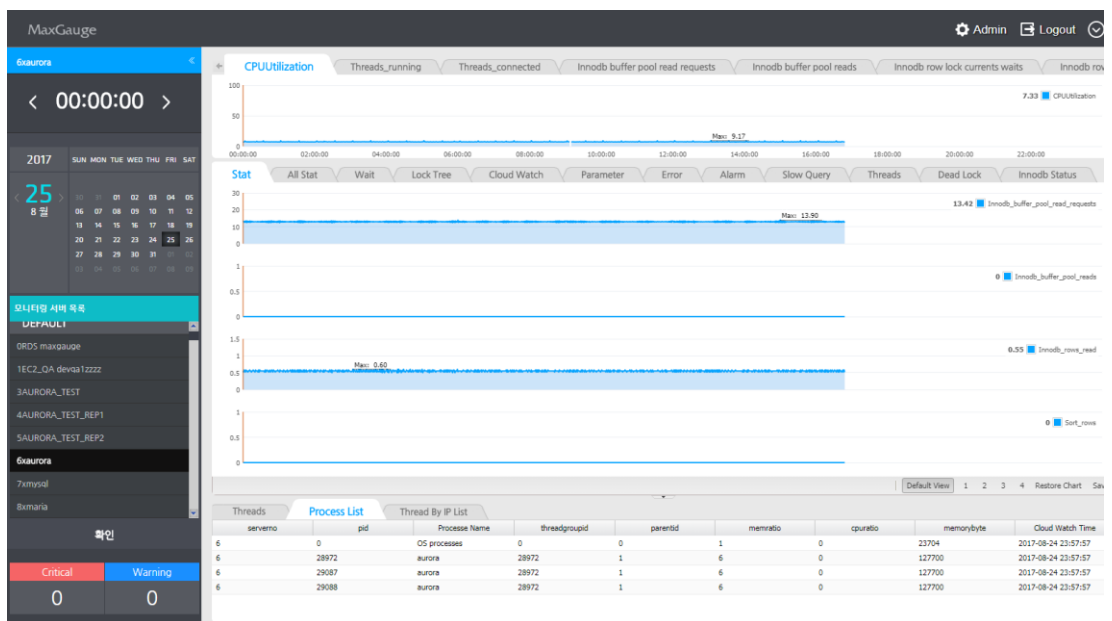
2-1. Performance Analyzer Overview

Performance Analyzer executes the role of analyzing Aurora database by replaying the exact same information as the real-time such as the performance stats, Active Sessions, SQL Text, CPU indicator, and Top Processes which have been stored in the repository through gather.

Performance Analyzer is generally used in the following situations.

- To analyze performance system-wide issues
- To analyze Peak Times of specific dates, problem sessions, and to trace SQLs.
- To analyze system resource usage type and trends analysis

2-1-1. Performance Analyzer Initial Screen

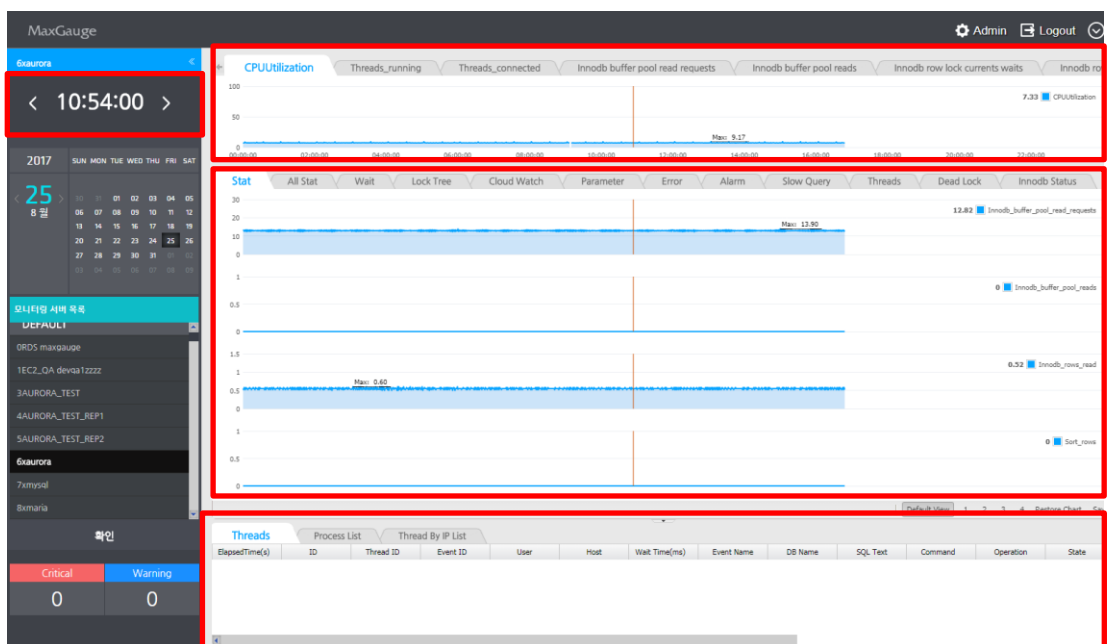


2-1-2. Log Selection

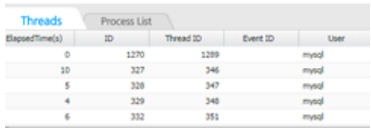
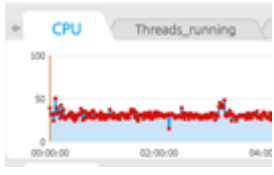
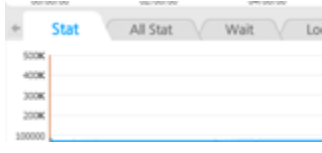
Currently, Aurora / Maria / MySQL Repository are used as the logging type supporting MaxGauge for Aurora. The corresponding log uses innodb engine and partitions to create a database.

2-2. Performance Analyzer Screen Overview

Performance Analyzer displays daily execution details of Aurora database. All performance stats are displayed in a 24 hour trends graph, and you can easily identify the Peak Time and navigate to the time you want to analyze with a single mouse click. Aurora performance stats, threads, SQL Text and O/S process information are organically integrated which allows you to accurately analyze the Peak Times and the times at which errors occurred.




Item Image	Item	Description
	Time currently being searched.	Provides the current time and allows you to shift to different time points.

 <table border="1"> <thead> <tr> <th>ElapsedTime(s)</th> <th>ID</th> <th>Thread ID</th> <th>Event ID</th> <th>User</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1270</td> <td>1289</td> <td></td> <td>mysql</td> </tr> <tr> <td>10</td> <td>327</td> <td>346</td> <td></td> <td>mysql</td> </tr> <tr> <td>5</td> <td>328</td> <td>347</td> <td></td> <td>mysql</td> </tr> <tr> <td>4</td> <td>329</td> <td>348</td> <td></td> <td>mysql</td> </tr> <tr> <td>6</td> <td>332</td> <td>351</td> <td></td> <td>mysql</td> </tr> </tbody> </table>	ElapsedTime(s)	ID	Thread ID	Event ID	User	0	1270	1289		mysql	10	327	346		mysql	5	328	347		mysql	4	329	348		mysql	6	332	351		mysql	<p>Thread information</p>	<p>You can view the active sessions and O/S processes of the selected time point.</p>
ElapsedTime(s)	ID	Thread ID	Event ID	User																												
0	1270	1289		mysql																												
10	327	346		mysql																												
5	328	347		mysql																												
4	329	348		mysql																												
6	332	351		mysql																												
	<p>Main Stats Area</p>	<p>Displays the main performance stats graph. The user can change the stats for the Detailed Stats area's graph, however, the user cannot change the stats for the main stats area's graph.</p>																														
	<p>Detailed Stats Area</p>	<p>The detailed information window will have several tabs for each item such as performance stat, wait stat and others. For the description of each item, reference the corresponding section below.</p>																														

2-2-1. Thread and Process List Window

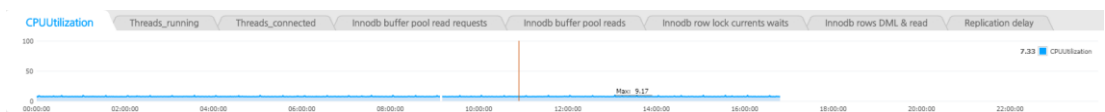
By looking at the trends of performance stats displayed on the screen, you can know the type of resource usage during the collection period and the peak time of database system usage. From sessions and processes windows, you can sort the values by clicking on the column header of each stat, which allows you to easily identify which sessions have used up the most resource. In general, excessive usage of resource calls for special attention and you can check the SQL text's execution plan of such sessions to take appropriate actions to resolve the problem.



ElapsedTime(s)	ID	Thread ID	Event ID	User	Host	Wait Time(ms)	Event Name	DB Name	SQL Text	Command	Operation	State	Source
0	1270	1289		mysql	%42172	0	event	event	INSERT INTO p...	Query	update		
10	327	346		mysql	192.168.123.12	0	event	event	SELECT 2015-0...	Query	User sleep		
5	328	347		mysql	192.168.123.12	0	event	event	SELECT 2015-0...	Query	User sleep		
4	329	348		mysql	192.168.123.12	0	event	event	SELECT 2015-0...	Query	User sleep		
6	332	351		mysql	192.168.123.12	0	event	event	SELECT 2015-0...	Query	User sleep		

2-2-2. Main Stats Area

Main Stats area displays the O/S CPU, threads and other important performance stats provided by Aurora.



Item	Description
CPU Utilization	OS CPU Usage (%)
Threads Running	Active Sessions
Threads Connected	Total sessions
InnoDB buffer pool read requests	Number of blocks read in Buffer Pool (memory I/O)
InnoDB buffer pool reads	Number of blocks read from Disk (Disk I/O)
InnoDB row lock currents waits	Number of sessions waiting on lock
InnoDB rows DML & Read	InnoDB rows deleted: Number of records deleted InnoDB rows updated: Number of records updated InnoDB rows inserted: Number of records entered InnoDB rows read: Number of records read
Replication delay	Master – Slave sync delay in replication environment (Unit: sec)

2-3. Detailed Stats Area

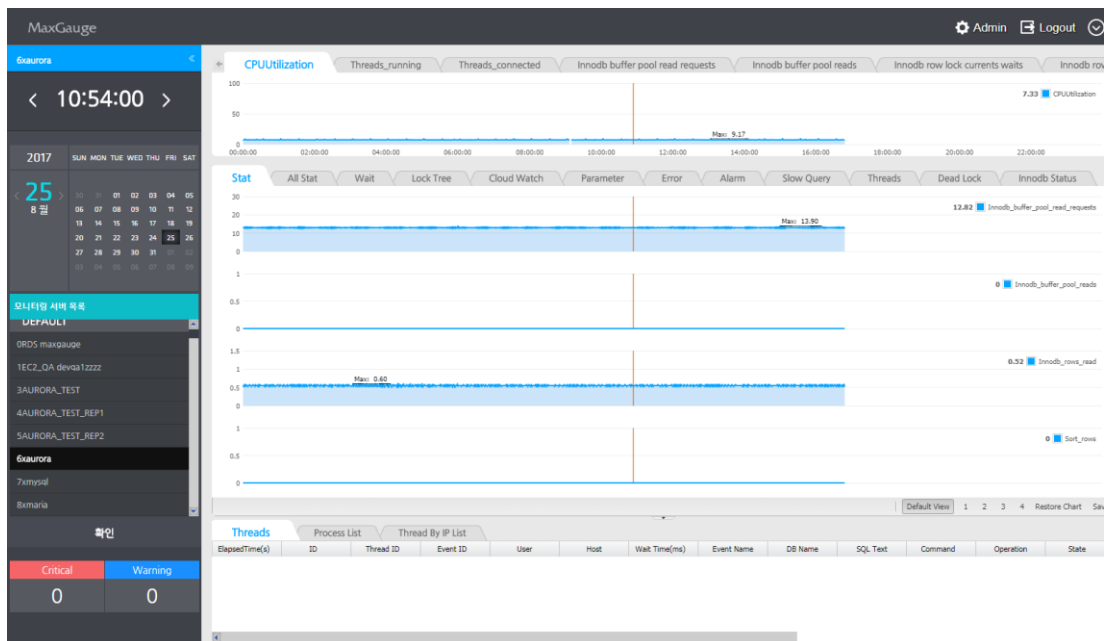
The detailed stats area consists of 9 tabs and each tab provides the following content.

Item	Description
Stat	Provides MySQL performance stat trends and active sessions list.
All Stat	Provides current value of all performance stats in MySQL and the active sessions list.
Wait	Provides current value of all wait stats in MySQL and the active sessions list.
Lock Tree	Provides lock generation details of corresponding time point in a tree structure.
Cloud Watch	Cloud Watch stat
Parameter	Provides parameter information
Error Log	Provides MySQL error log information
Slow Query	Provides slow query information

Threads	Search feature for threads
Alarm	Provides a feature for checking the details of alarms generated based on preset threshold values.
Deadlock	Provides a feature for checking the details of deadlocks generated.
Innodb Status	Provides a feature for checking the Innodb Status.

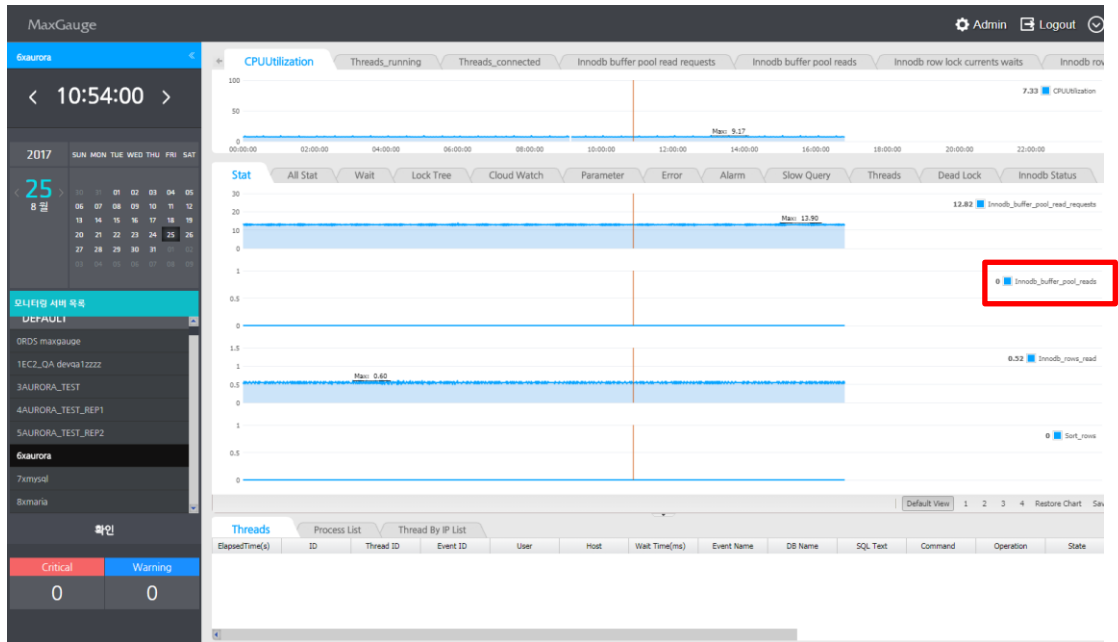
2-3-1. Stat

The Stat screen displays the trends graph by using the difference values (per second) of performance stats generated in between the time segments and the threads list. On the Stats screen, you can easily recognize when the peak times are for the Aurora database, and navigate to the corresponding time by double-clicking the specific time on the graph. You can also easily identify the sessions which caused the peak times through the resource usage information shown in the active sessions list.

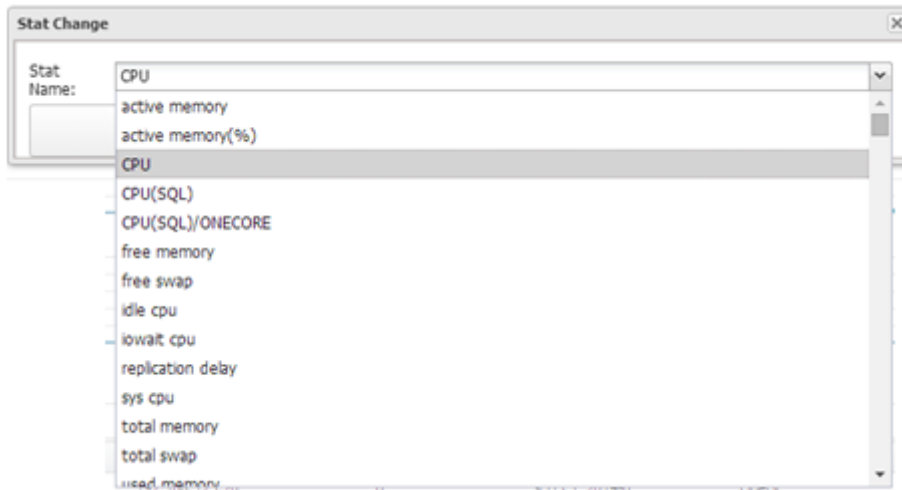


The 4 stats displayed on the screen can be changed to different indicators by the user. To change the stats, click on the performance stat name located on the right side of the screen.

- (1) Click on the stat name



(2) Enter or select the desired stat and click 'OK' button.



When you click on the blue square on the left of the performance stat name, it provides all values logged at each specific time.

LogTime	Sigma	Diff(s)	Value/Sec
2014-08-18 00:00:00	5,522...	640.00	10.67
2014-08-18 00:01:00	5,522...	43.00	0.72
2014-08-18 00:02:00	5,522...	7.00	0.12
2014-08-18 00:03:00	5,522...	263.00	4.38
2014-08-18 00:04:00	5,522...	13.00	0.22
2014-08-18 00:05:00	5,522...	1.00	0.02
2014-08-18 00:06:00	5,522...	5.00	0.08
2014-08-18 00:07:00	5,522...	0.00	0.00
2014-08-18 00:08:00	5,522...	0.00	0.00
2014-08-18 00:09:00	5,522...	0.00	0.00
2014-08-18 00:10:00	5,522...	0.00	0.00
2014-08-18 00:11:00	5,522...	1.00	0.02
2014-08-18 00:12:00	5,522...	0.00	0.00
2014-08-18 00:13:00	5,522...	0.00	0.00
2014-08-18 00:14:00	5,522...	0.00	0.00
2014-08-18 00:15:00	5,522...	0.00	0.00
2014-08-18 00:16:00	5,522...	0.00	0.00
2014-08-18 00:17:00	5,522...	1.00	0.02
2014-08-18 00:18:00	5,522...	0.00	0.00
2014-08-18 00:19:00	5,522...	0.00	0.00
2014-08-18 00:20:00	5,522...	0.00	0.00
2014-08-18 00:21:00	5,522...	0.00	0.00
2014-08-18 00:22:00	5,522...	0.00	0.00
2014-08-18 00:23:00	5,522...	0.00	0.00
2014-08-18 00:24:00	5,522...	0.00	0.00
2014-08-18 00:25:00	5,522...	0.00	0.00
2014-08-18 00:26:00	5,522...	0.00	0.00
2014-08-18 00:27:00	5,522...	2.00	0.03
2014-08-18 00:28:00	5,522...	0.00	0.00
2014-08-18 00:29:00	5,522...	0.00	0.00
2014-08-18 00:30:00	5,522...	0.00	0.00

2-3-2. All Stat

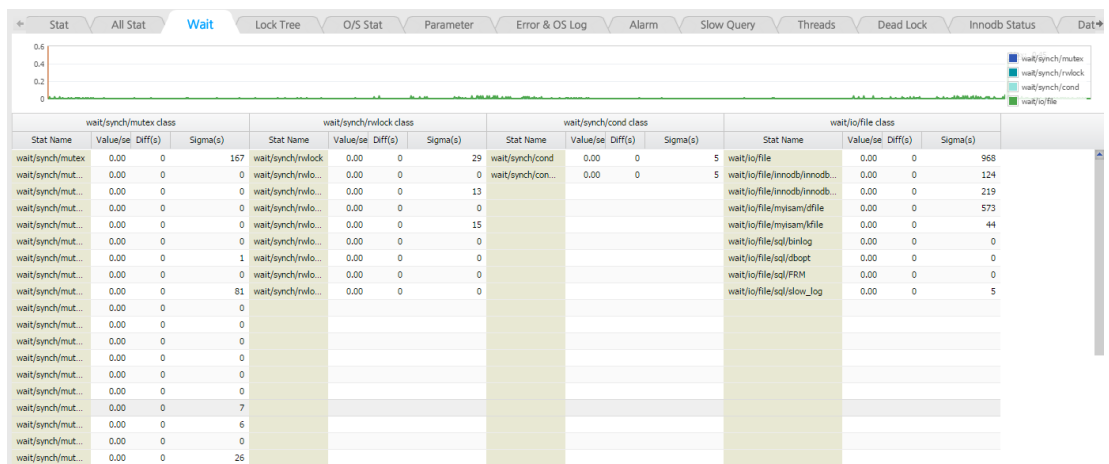
Provides all performance stats provided by Aurora.

Stat	All Stat	Wait	Lock Tree	Cloud Watch	Parameter	Error	Alarm	Slow Query	Threads	Dead Lock	InnoDB Status	
Stat Name	Value/Sec	Diff(s)	sigma	watch log time	Value/Sec	Diff(s)	sigma	watch log time	Value/Sec	Diff(s)	sigma	watch log time
ssl_accepts	0.0	0.0	0		0.0	0.0	0		InnoDB_buffer_pool_wait_free	0.0	0.0	0
Com_ghor_create_func	0.0	0.0	0		0.0	0.0	0		Max Elapsed Time	0.0	0.0	0
Com_set_option	0.0	0.0	14		0.0	0.0	0		Performance_schema_thread_classes_lost	0.0	0.0	0
Com_start_all_slaves	0.0	0.0	0		0.0	0.0	0		Performance_schema_table_handles_lost	0.0	0.0	0
Performance_schema_thread_classes_lost	0.0	0.0	0		0.0	0.0	0		Com_uninstall_plugin	0.0	0.0	0
NetworkReceiveThroughput	2038.6	2038.6	2,038.63	2017-08-24 23:57:00	0.0	0.0	0		InnoDB_data_reads	0.0	0.0	397
InnoDB_x_lock_spin_rounds	0.0	0.0	30		0.0	0.0	0		InnoDB_buffer_pool_read_ahead	0.0	0.0	0
InnoDB_data_reads	0.0	0.0	397		0.0	0.0	0		ssl_accepts	0.0	0.0	0
InnoDB_system_rows_read	0.1	7.0	217.093		0.0	0.0	0		Com_ghor_create_func	0.0	0.0	0
InnoDB_buf_flushes	0.0	0.0	0		0.0	0.0	0		NetworkReceiveThroughput	2038.6	2038.6	2,038.63
InnoDB_log_write_requests	0.0	0.0	6,537		0.0	0.0	0		Com_xa_start	0.0	0.0	0
Qcache_not_cached	0.0	0.0	0		0.0	0.0	0		Key_blocks_used	0.0	0.0	14
Key_blocks_used	0.0	0.0	14		0.0	0.0	0		InnoDB_log_write_requests	0.0	0.0	6,537
InnoDB_buffer_pool_read_ahead	0.0	0.0	0		0.0	0.0	0					
InnoDB_system_rows_updated	0.0	1.0	6,671		0.0	0.0	0					
Com_xa_start	0.0	0.0	0		0.0	0.0	0					
Performance_schema_table_handles_lost	0.0	0.0	0		0.0	0.0	0					
Select_range	0.0	0.0	0		0.0	0.0	0					
Slow_launch_threads	0.0	0.0	0		0.0	0.0	0					
Select_range_check	0.0	0.0	0		0.0	0.0	0					
Com_alter_tablespace	0.0	0.0	0		0.0	0.0	0					
Max Elapsed Time	0.0	0.0	0		0.0	0.0	0					

Performance Stat Area	
Stat Name	Performance stat name
Value/sec(s)	Difference value of previous time and current time per second.
Diff(s)	The difference value of previous time and the current time.
Sigma	Cumulative Value
Watch log time	CloudWatch's time during performance stat collection

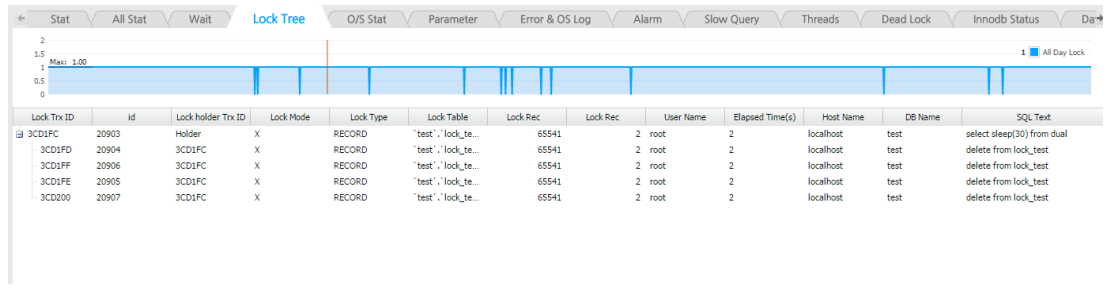
2-3-3. Wait

Provides all wait information provided by Aurora.



2-3-4. Lock Tree

The Lock Tree screen displays the relationship between the Lock Holder sessions and the Waiter sessions of the lock time point in a tree format, and provides mode, SQL text, and wait time information. This screen is configured in the same way as the Real-Time Lock Tree screen.



2-3-5. CloudWatch

Displays the stats provided by AWS CloudWatch. In case the target monitoring servers on AWS are RDS and EC2, some of AWS CloudWatch stats will be different for each kind, and MaxGauge displays the stats of RDS and EC2 provided by API separately.



AWS Link Stats

No	StatName	Type	Remarks
1	DiskWriteOps	CloudWatch	
2	NetworkTransmitThroughput	CloudWatch	
3	DiskReadOps	CloudWatch	
4	CPUCreditUsage	CloudWatch	
5	WriteThroughput	CloudWatch	
6	DiskReadBytes	CloudWatch	
7	CPUCreditBalance	CloudWatch	
8	CPUUtilization	CloudWatch	
9	StatusCheckFailed_Instance	CloudWatch	
10	FreeStorageSpace	CloudWatch	
11	DiskWriteBytes	CloudWatch	
12	NetworkReceiveThroughput	CloudWatch	
13	NetworkOut	CloudWatch	
14	WriteLatency	CloudWatch	
15	NetworkIn	CloudWatch	
16	StatusCheckFailed_System	CloudWatch	
17	WriteIOPS	CloudWatch	
18	ReadIOPS	CloudWatch	
19	ReadLatency	CloudWatch	
20	ReadThroughput	CloudWatch	
21	FreeableMemory	CloudWatch	
22	StatusCheckFailed	CloudWatch	
23	SwapUsage	CloudWatch	
24	load avg 1min	CloudWatchLog	RDS
25	load avg 15min	CloudWatchLog	RDS
26	load avg 5min	CloudWatchLog	RDS
27	SlowQuery	Amazon RDS	RDS
		SSH / SFTP	EC2
28	SQL Error	Amazon RDS	RDS
		SSH / SFTP	EC2
29	ProcessList	CloudWatchLog	RDS

2-3-6. Parameter

Provides parameter information. Parameter information is logged once a day.

Stat	All Stat	Wait	Lock Tree	O/S Stat	Parameter	Error & OS Log	Alarm	Slow Query	Threads	Dead Lock	InnoDB Status
Variable name					Value						
autocommit				ON							
automatic_sp_privileges				ON							
auto_increment_increment				1							
auto_increment_offset				1							
back_log				50							
basedir				/usr/local/mysql							
big_tables				OFF							
binlog_cache_size				32768							
binlog_direct_non_transactional_updates				OFF							
binlog_format				STATEMENT							
binlog_stmt_cache_size				32768							
bulk_insert_buffer_size				8388608							
character_set_dir				/usr/local/mysql/share/charsets/							
character_set_client				utf8							
character_set_connection				utf8							
character_set_database				utf8							
character_set_filesystem				binary							
character_set_results											
character_set_server				utf8							
character_set_system				utf8							
collation_connection				utf8_general_ci							
collation_database				utf8_general_ci							
collation_server				utf8_general_ci							
completion_type				NO_CHAIN							
concurrent_insert				AUTO							

2-3-7. Error Log

Provides Aurora’s error log information. This information can be filtered by error type.

Stat	All Stat	Wait	Lock Tree	Cloud Watch	Parameter	Error	Alarm	Slow Query	Threads	Dead Lock	InnoDB Status
Type	All	09:00	Recovery - Row	Recovery - Server	Clear Filter	Value	Log Time	Recovery Time	Reason	Writer	
1	NO Che...	Error	WARNING	RDS_QA	170825 0:57:44 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:59					
2	NO Che...	Error	WARNING	RDS_QA	170825 0:57:45 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:59					
3	NO Che...	Error	WARNING	RDS_QA	170825 0:57:46 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:59					
4	NO Che...	Error	WARNING	RDS_QA	170825 0:57:46 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:59					
5	NO Che...	Error	WARNING	RDS_QA	170825 0:57:40 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:54					
6	NO Che...	Error	WARNING	RDS_QA	170825 0:57:40 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:54					
7	NO Che...	Error	WARNING	RDS_QA	170825 0:57:43 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:54					
8	NO Che...	Error	WARNING	RDS_QA	170825 0:57:41 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:54					
9	NO Che...	Error	WARNING	RDS_QA	170825 0:57:44 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:54					
10	NO Che...	Error	WARNING	RDS_QA	170825 0:57:44 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:54					
11	NO Che...	Error	WARNING	RDS_QA	170825 0:57:35 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:49					
12	NO Che...	Error	WARNING	RDS_QA	170825 0:57:36 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:49					
13	NO Che...	Error	WARNING	RDS_QA	170825 0:57:38 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:49					
14	NO Che...	Error	WARNING	RDS_QA	170825 0:57:38 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:49					
15	NO Che...	Error	WARNING	RDS_QA	170825 0:57:39 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:49					
16	NO Che...	Error	WARNING	RDS_QA	170825 0:57:39 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:49					
17	NO Che...	Error	WARNING	RDS_QA	170825 0:57:39 (Warning) Access denied for user 'root'@'182.18.21.57' (using password: YES)	2017-08-25 09:58:49					
18	NO Che...	Error	WARNING	RDS_QA	170825 0:57:39 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:49					
19	NO Che...	Error	WARNING	RDS_QA	170825 0:57:30 (Warning) IP address 182.18.21.57 could not be resolved: Temporary failure in name resolution	2017-08-25 09:58:44					

2-3-8. Alarm

According to thresholds set up in Admin’s Alarm Setup, when alarms are generated, the stat’s alarm details of the corresponding time will be logged. You can check the alarm time and specific details through the Performance Analyzer.

- (1) When you find red (or yellow) points on the graph, it means that alerts have been generated for the corresponding time according to threshold values set

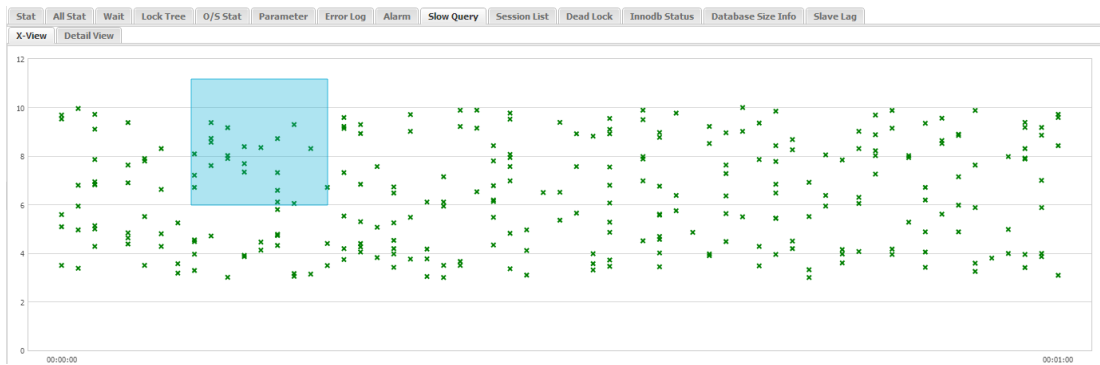


(2) Click on the corresponding time and go to Alarm Tab and you will find the details of alarms generated as shown below.

CheckID	Level	ServerID	Event Name	Event Value	Description	Log Time	Recovery Time	Reason	Writer
1	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:59:00		
2	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:58:00		
3	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:57:00		
4	NO Che	WARNING	ECL_QA	CPUUtilization	0.17		2017-08-25 13:56:00		
5	NO Che	WARNING	ECL_QA	CPUUtilization	0.08		2017-08-25 13:55:00		
6	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:54:00		
7	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:53:00		
8	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:52:00		
9	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:51:00		
10	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:50:00		
11	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:49:00		
12	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:48:00		
13	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:47:00		
14	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:46:00		
15	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:45:00		
16	NO Che	WARNING	ECL_QA	CPUUtilization	0.08		2017-08-25 13:44:00		
17	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:43:00		
18	NO Che	WARNING	ECL_QA	CPUUtilization	0.12		2017-08-25 13:42:00		
19	NO Che	WARNING	ECL_QA	CPUUtilization	0.13		2017-08-25 13:41:00		

2-3-9. Slow Query

Provides the Slow Query information. Displays 1-minute data of the slow queries in the searched time period with an X symbol. You can select a specific segment by dragging your mouse and navigate to the Detail View and use Plan and Thread Tracking feature.



(X-View : Slowquery 1 Minute Data)

LogTime	Start Time	User Host	Query Time	Lock Time	Rows Sent	Rows Examined	Server ID	SQL Text
2014-08-18 00:00:14.0	2014-08-18 00:00:07.0	mysql[mysql] @ [192.168.123.200]	00:00:05	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.085', sleep(5.246234176270949);
2014-08-18 00:00:16.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:06	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.701', sleep(6.715490132262842);
2014-08-18 00:00:16.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.899', sleep(7.223290440561625);
2014-08-18 00:00:18.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.767', sleep(8.085649309466733);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.487', sleep(7.607283436476675);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.453', sleep(8.581919007467953);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.334', sleep(8.74474825536015);
2014-08-18 00:00:20.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:09	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.833', sleep(9.378171645592708);
2014-08-18 00:00:20.0	2014-08-18 00:00:10.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:10.684', sleep(7.90185204716796);

Detail View

Plan Refresh | Format SQL

```

1 SELECT
2 '2014-08-18 00:00:09.487'
3 , sleep(7.607283436476675);
        
```

identifier	select_type	table	type	possible_keys	key	key_len	ref	rows	filtered
1	SIMPLE								

(DOUBLE-CLICK AND SEE REAL-TIME PLAN VIEW)

Start Time: 00:00:07 To: 00:00:16 Server ID: Query Time: 5 ~ (between) 12 Rows Examined: >=

User Host: % SQL Text: % OK

LogTime	Start Time	User Host	Query Time	Lock Time	Rows Sent	Rows Examined	Server ID	SQL Text
2014-08-18 00:00:14.0	2014-08-18 00:00:07.0	mysql[mysql] @ [192.168.123.200]	00:00:05	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.085', sleep(5.246234176270949);
2014-08-18 00:00:16.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:06	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.701', sleep(6.715490132262842);
2014-08-18 00:00:16.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:08.899', sleep(7.223290440561625);
2014-08-18 00:00:18.0	2014-08-18 00:00:08.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.767', sleep(8.085649309466733);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.487', sleep(7.607283436476675);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.453', sleep(8.581919007467953);
2014-08-18 00:00:18.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:08	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.334', sleep(8.74474825536015);
2014-08-18 00:00:20.0	2014-08-18 00:00:09.0	mysql[mysql] @ [192.168.123.200]	00:00:09	00:00:00	1	0	0	SELECT '2014-08-18 00:00:09.833', sleep(9.378171645592708);
2014-08-18 00:00:20.0	2014-08-18 00:00:10.0	mysql[mysql] @ [192.168.123.200]	00:00:07	00:00:00	1	0	0	SELECT '2014-08-18 00:00:10.684', sleep(7.90185204716796);

Thread Tracking

ElapsedTime(s)	ID	Thread ID	Event ID	User	Host	WaitTime(ms)	Event Name	SQL Text	Conn
6	14580	0		mysql	192.168.123.200	0		SELECT '2014-0...	
1	14580	0		mysql	192.168.123.200	0		SELECT '2014-0...	

(THREAD TRACKING FEATURE ON MOUSE RIGHT-CLICK MENU)

2-3-10. Threads

This feature allows the user to enter specific time period and conditions to search the corresponding session information from the logged Thread List. If you check the Last Elapsed Time checkbox, you can search for the SQL's last query time executed by the same thread.

Threads Details Menu		
Search Option	TIME	Logged time search condition
	HOST NAME	Connection HOST search condition
	DB NAME	SCHEMA search condition
	USER NAME	DB USER search condition
	ID	ID search condition
	ELAPSED TIME(S)	QUERY TIME search condition
	SQL TEXT	SQL TEXT search condition
LAST ELAPSED TIME		For threads running for a long period, logs may be duplicated and in such a case, you can use this option to check the last elapsed time. Grouped by THREAD ID + ID + SQL TEXT

Stat											
All Stat											
Wait											
Lock Tree											
O/S Stat											
Parameter											
Error Log											
Alarm											
Slow Query											
Session List											
Dead Lock											
Innodb Status											
Database Size Info											
Slave Lag											
From	00:00:00	To	00:01:00	Host Name	%	DB Name	%	User Name	%	<input type="checkbox"/> Last Elapsed Time	
Elapsed Time(s)	>=	0	ID		SQL Text	%	<input type="button" value="OK"/>				
ElapsedTime(s)	ID	Thread ID	Event ID	User	Host	Wait Time(ms)	Event Name	SQL Text	Command	Operation	
7	14569	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		▲
5	14587	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
1	14588	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
5	14589	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
8	14583	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
3	14582	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
8	14585	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
7	14584	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
3	14581	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
6	14580	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
1	14590	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
3	14579	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		
1	14591	0		mysql	192.168.123.20...	0		SELECT '2014-0...	Query		▼

2-3-12. Deadlock

This feature provides details about the generated deadlocks. Logging occurs if any changes occur in unit of 1 minute.

The screenshot shows the 'Dead Lock' tab selected in the MaxGauge interface. The main display area contains a detailed log of a deadlock event. The log starts with 'LATEST DETECTED DEADLOCK' and provides the following information:

- Transaction 1:** ID 250146766, ACTIVE 0 sec inserting. It holds a lock on table 'even'.
- Transaction 2:** ID 250146765, ACTIVE 0 sec inserting. It is waiting for the lock held by Transaction 1.
- Lock Structure:** Details the lock structure for the table 'even', including the lock mode (S), the lock type (PRIMARY), and the partition information.
- Locks Held:** Lists the locks held by each transaction, including the lock mode (S), the lock type (PRIMARY), and the partition information.

2-3-13. Innodb Status

This feature allows you to check the Innodb Status information. The corresponding data is saved in unit of 5 minutes.

The screenshot shows the 'Innodb Status' tab selected in the MaxGauge interface. The main display area contains the 'INNODB MONITOR OUTPUT' log. The log provides the following information:

- Background Threads:** Lists the status of various threads, including 'srv_master_thread' and 'srv_slave_thread'.
- Semaphores:** Provides statistics for semaphore counts, including 'OS WAIT ARRAY INFO' and 'OS WAIT ARRAY INFO'.
- Lock Wait Times:** Provides statistics for lock wait times, including 'mutex spin waits' and 'mutex spin rounds'.
- Deadlock Information:** Shows the 'LATEST DETECTED DEADLOCK' log, which is identical to the one shown in the previous screenshot.



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