

ORACLE®

# OpenWorld 2017

## Oracle Enterprise Manager for MySQL

Adventures with MySQL Monitoring

Kathy Forte  
Oracle MySQL Solutions Architect  
October 2, 2017



October 1-5, 2017  
SAN FRANCISCO, CA

# Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

# Oracle Enterprise Manager : **Agenda**

- 1 ➤ **Introductions**
- 2 ➤ **When to Use Enterprise Manager**
- 3 ➤ **Architecture**
- 4 ➤ **How To's**
- 5 ➤ **Live Demo**
- 6 ➤ **Future of Monitoring**
- 7 ➤ **Q & A**



**Kathy Forte**

MySQL Solutions Engineer, Oracle

# Oracle Enterprise Manager For MySQL

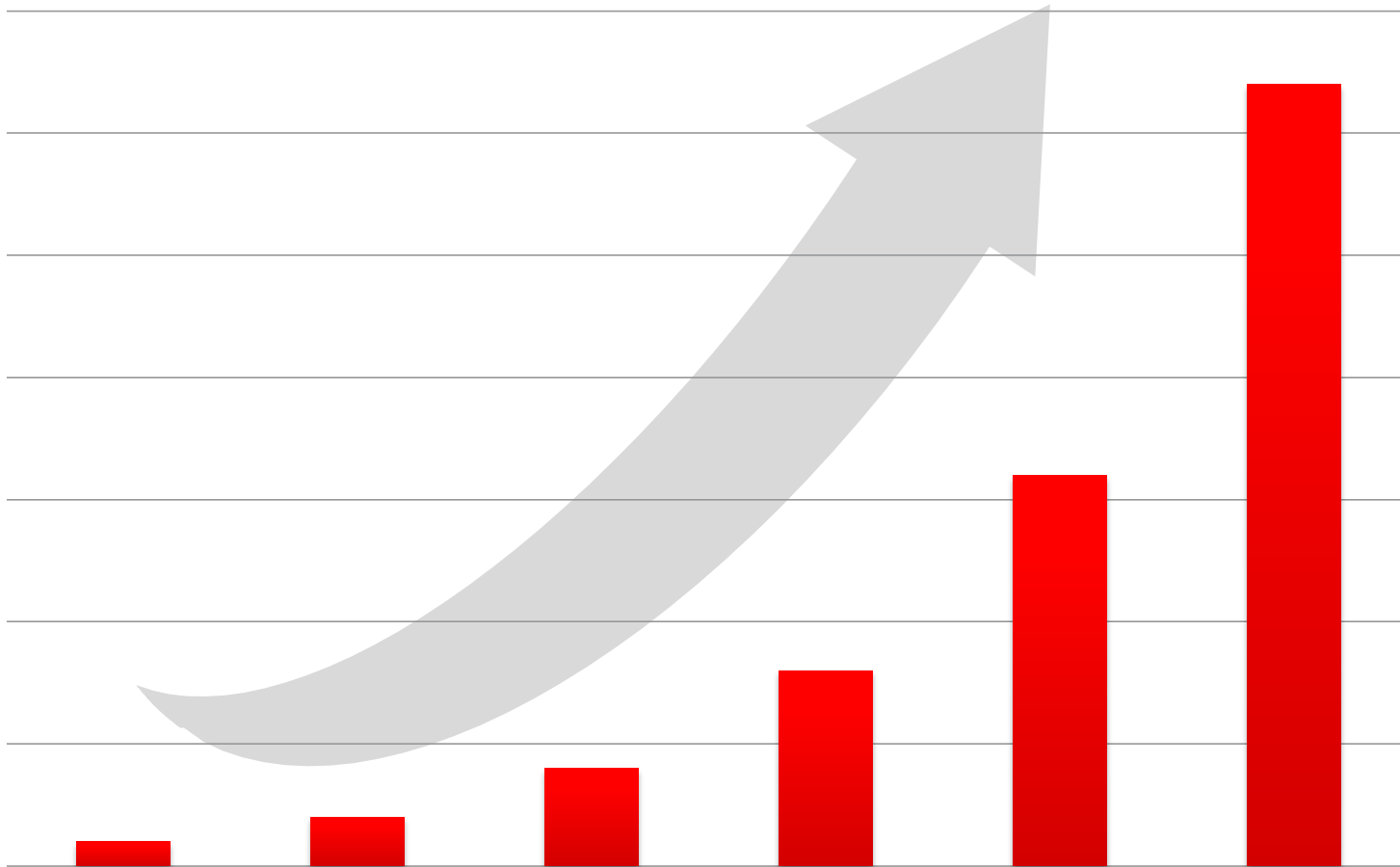
- Who are you?
- Where do you work?
- How do you monitor today?



# Oracle Enterprise Manager: **Agenda**

- 1 ➤ Introductions
- 2 ➤ **When to Use Enterprise Manager**
- 3 ➤ Architecture
- 4 ➤ How To's
- 5 ➤ Live Demo
- 6 ➤ Future of Monitoring
- 7 ➤ Q & A

# Database Application Growth



## Situation

- 2.1 Billion Internet Users
- 40% Data Growth/Year
- \$1 Trillion eCommerce
- 600 New Videos/Minute
- 58 Million Tweets/Day

## Monitoring Requirements



# The Operator's Responsibility



<http://9xmedia.com/new/products/xtops.php>

# The DBA's Responsibilities



# Oracle Enterprise Manager For MySQL

## Single Dashboard to manage Oracle stack for Web & Cloud

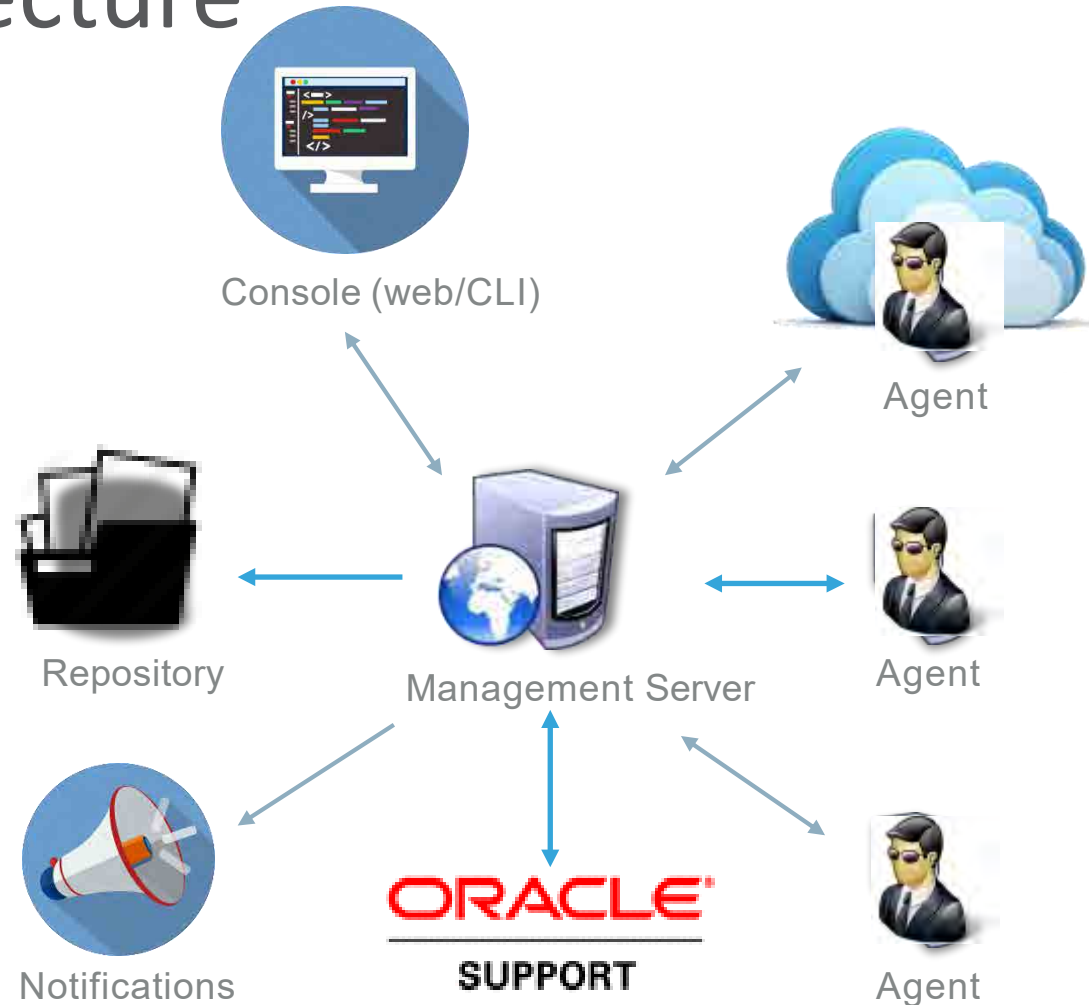
- An estimated 70% of Oracle customers also use MySQL
  - For Web, custom, departmental and embedded applications
  - #1 Requested integration



# Oracle Enterprise Manager: **Agenda**

- 1 ➤ Introductions
- 2 ➤ When to Use Enterprise Manager
- 3 ➤ **Architecture**
- 4 ➤ How To's
- 5 ➤ Live Demo
- 6 ➤ Future of Monitoring
- 7 ➤ Q & A

# Oracle Enterprise Manager Architecture



- Agents: Collect monitoring and configuration data from the targets
- Management Server (OMS): Receives and processes data from agents,
- Repository (OMR): Persistent store for data collected from the managed targets

# Enterprise Manager Architecture

- Console: web browser - primary interface for interactive management of objects/targets (database, application, middleware, cloud)
- CLI: Oracle Enterprise Manager's Command Line Interface



# Enterprise Manager Architecture

- All target specific management encapsulated in target plug-ins (MySQL Plug-In)
- Plug-ins provide additional vertical EM functionality (Cloud Application Plug-in)
- Supports 3rd party plugins

# Oracle Enterprise Manager : One Tool to Manage Them All!

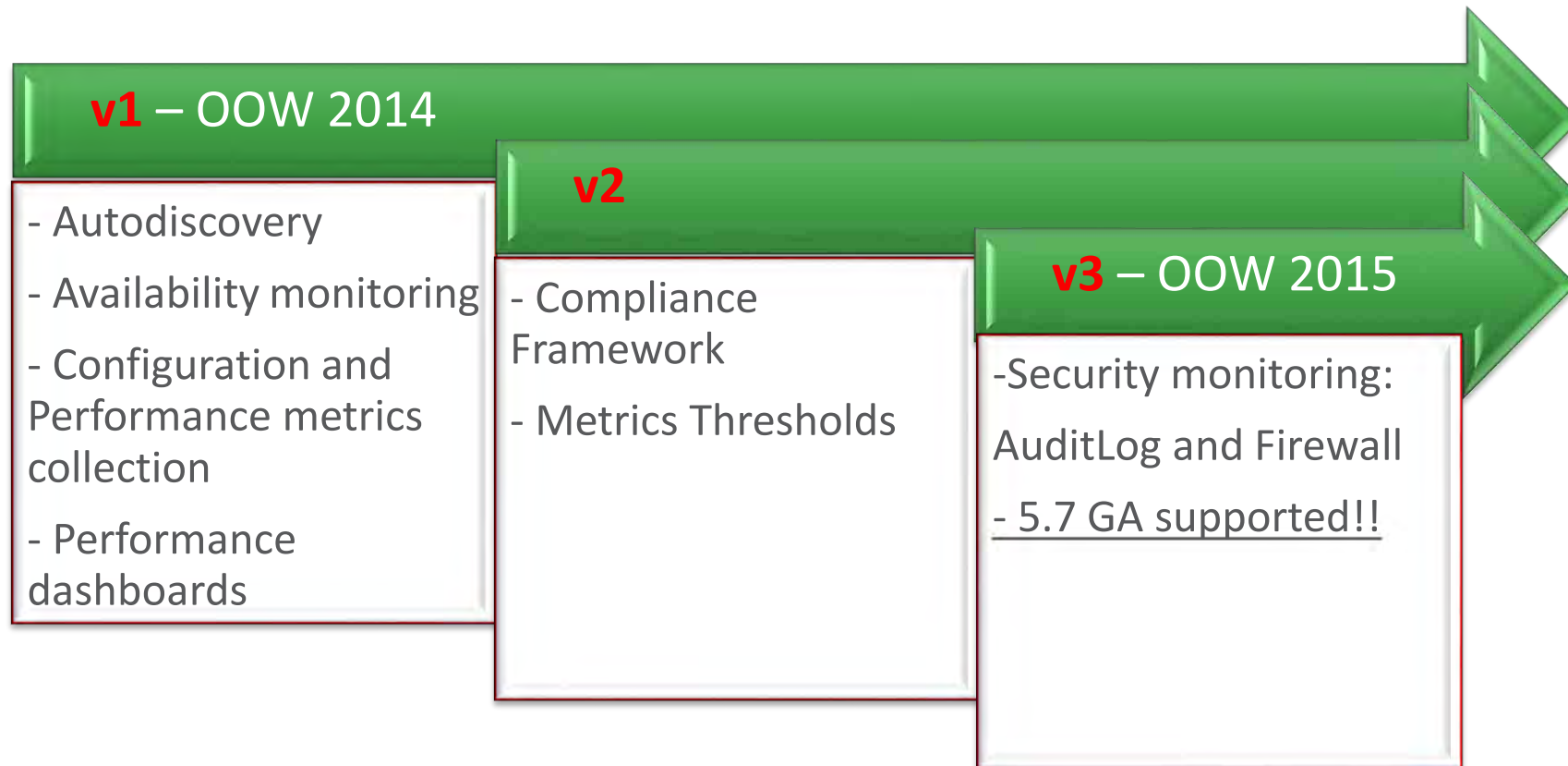
- Manage hardware
  - Servers
  - Network switches/hubs
  - Storage appliances
- Manage Virtualization
  - Oracle VM
  - VMware vSphere
- Manage Cloud
  - Oracle Cloud
  - OpenStack
  - AWS
- Manage databases
  - Oracle Database
    - Including full DBaaS functionality
  - SQL Server Plugin
  - DB2 Plugin
  - Sybase Plugin
  - Postgres Plugin
  - Times Ten Plugin
  - ***MySQL Plugin!***
- Manage applications
  - Apache [Tomcat], IIS
  - Weblogic, Websphere
  - Oracle Directory Server, Windows Active Directory
  - JVM, Microsoft .NET
  - Siebel, Peoplesoft
  - Oracle Fusion
- Manage BI tools
- Manage networks
  - F5, Dell Force10, ...



# MySQL Integration

- Integrated as an Oracle provided plugin
  - Went GA at Oracle Open World 2014
  - Requires OEM 12c Release 4 or later
  - Available from within OEM itself using the Self Update tool
  - Listed within the Extensibility Exchange
    - <https://apex.oracle.com/pls/apex/f?p=53891:1>
  - Available as a standalone download (.opar file)
    - Via MyOracle Support and eDelivery
- Supports MySQL 5.5 and later
- Included with select commercial editions (Enterprise and CGE)

# History



# Oracle Enterprise Manager : **Agenda**

- 1 ➤ Introductions
- 2 ➤ When to Use Enterprise Manager
- 3 ➤ Architecture
- 4 ➤ **How To's**
- 5 ➤ Live Demo
- 6 ➤ Future of Monitoring
- 7 ➤ Q & A

# Reporting – How To See What Is Going On? The Operator



<http://9xmedia.com/new/products/xtops.php>

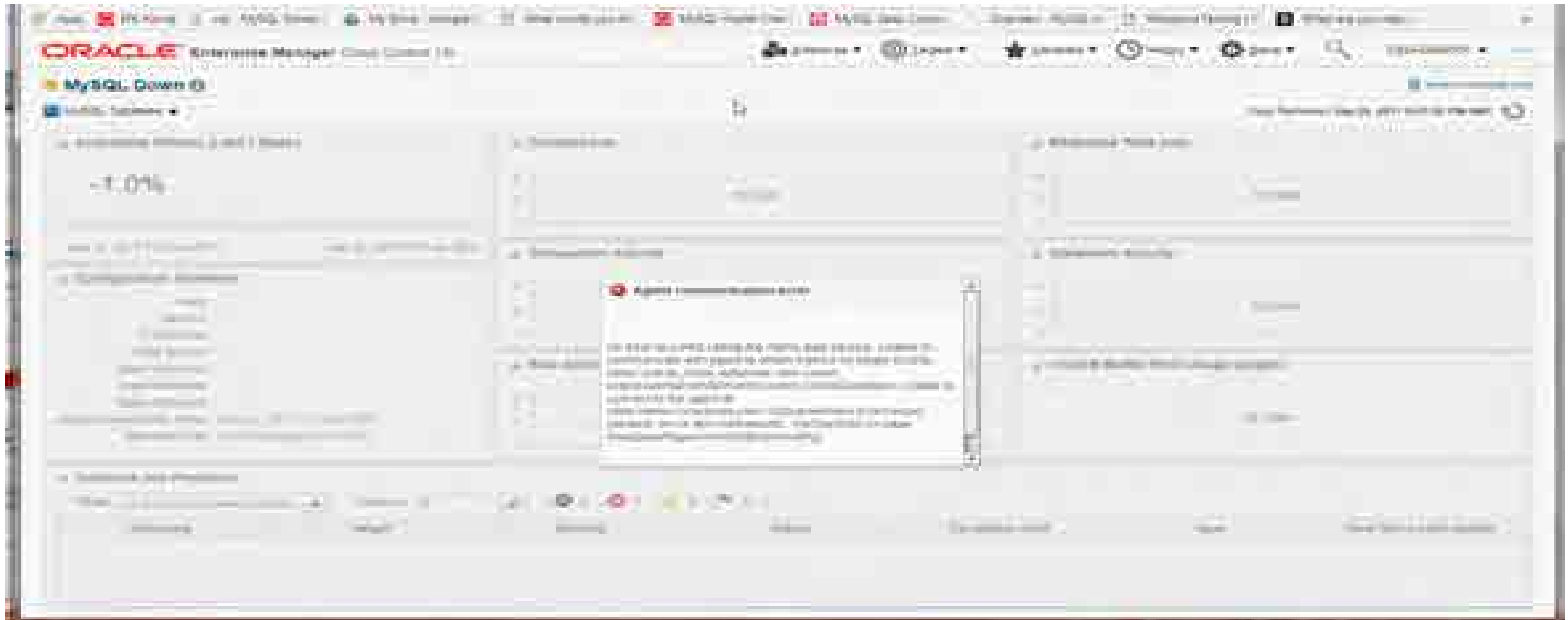
# What Systems Are Down?

The screenshot displays the Oracle Enterprise Manager (EM) console interface. At the top, the navigation bar includes the Oracle logo and the text "Enterprise Manager". A red box highlights the "Alerts" icon in the navigation bar. The main content area is divided into several sections:

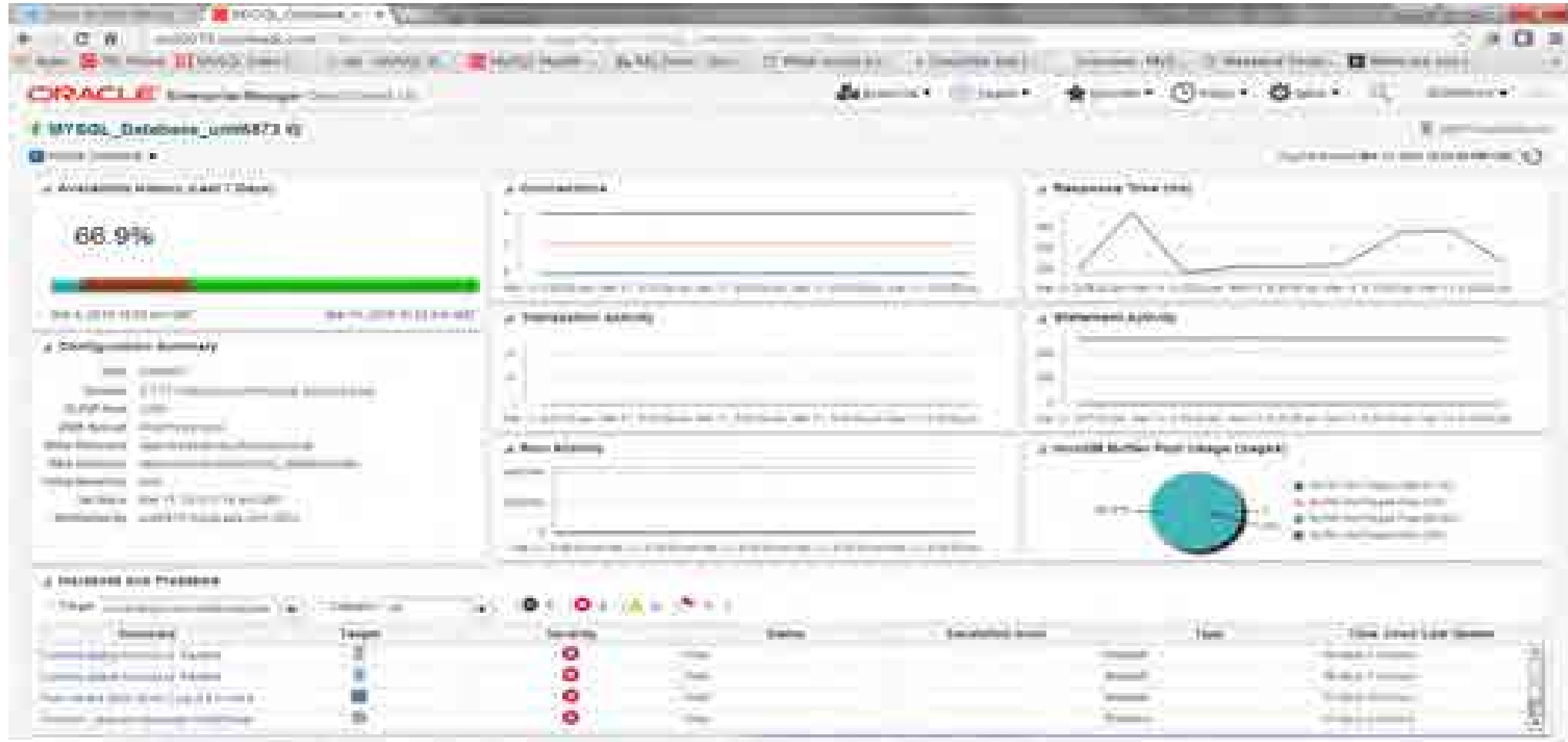
- Overview:** Shows a pie chart for "System Status" with a total of 1188 systems. The legend includes: Up (2188), Down (1000), Unknown (270), and Total (1188).
- Alerts:** Displays a list of alerts with columns for "Alert Name", "Severity", and "Message".
- System Status:** Shows a list of systems with columns for "System Name", "Status", and "Last Update".
- Performance:** Shows a list of performance metrics with columns for "Metric Name", "Value", and "Unit".



# How Do You Find Which Instance has Status of Down or Unknown?



# What Is Going On With Your MySQL Instance?



# What Is The Load On Your MySQL Instance?

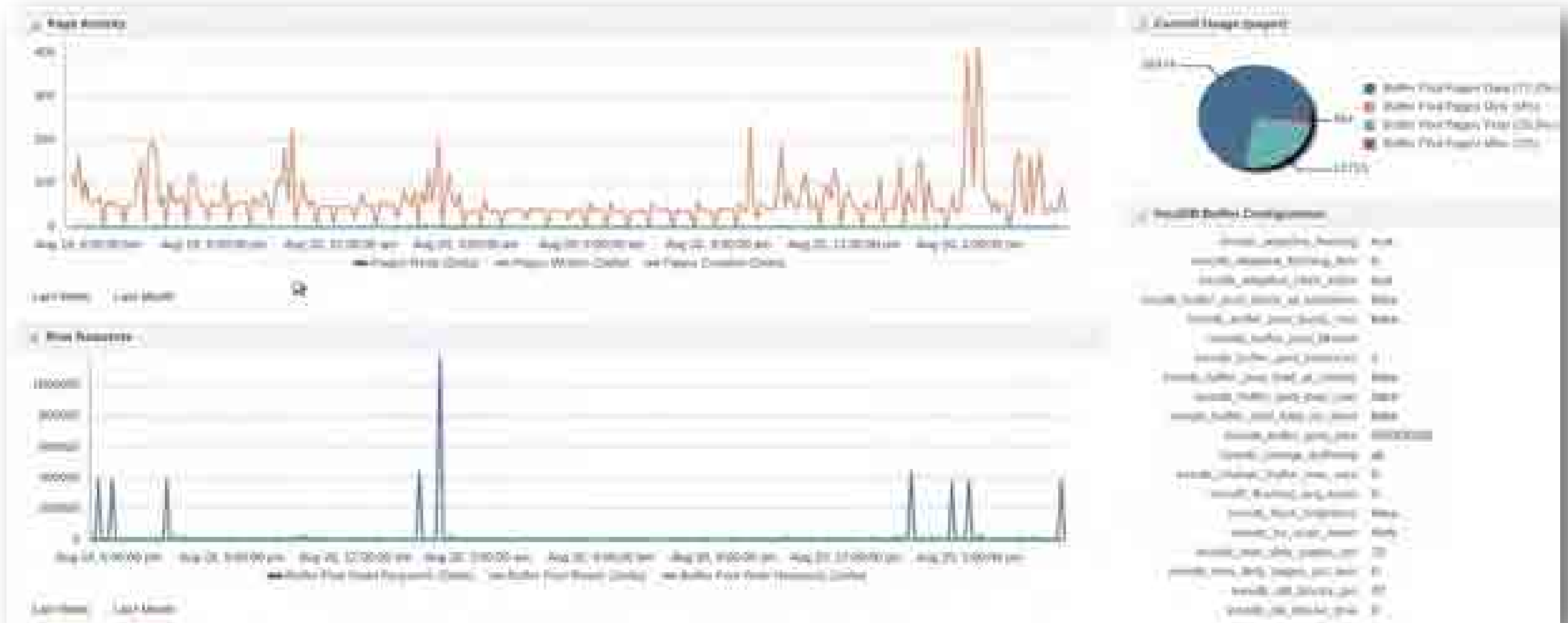




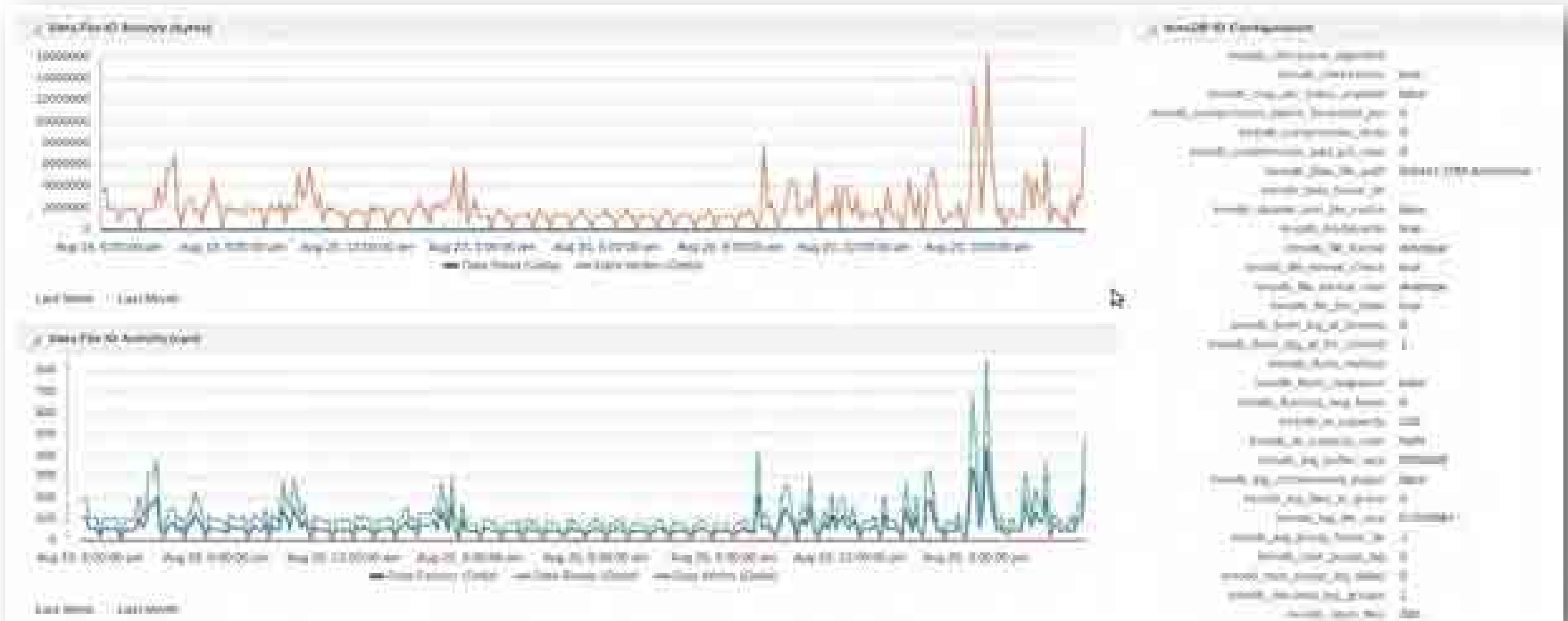
# What Kind Of SQL Statements Are Running On Your MySQL Instance?



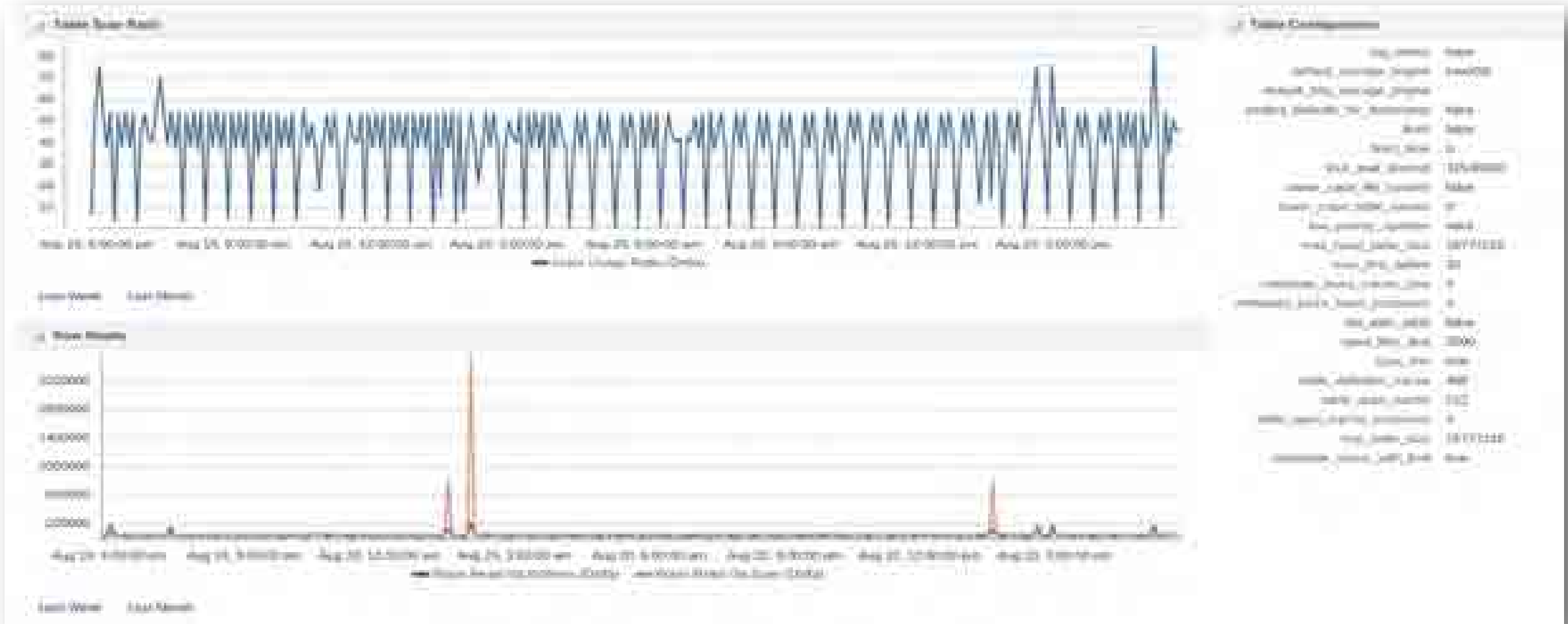
# Are You Hitting Data In Cache? Innodb Buffer Pool



# Am You Going To Disk Too Often? File I/O



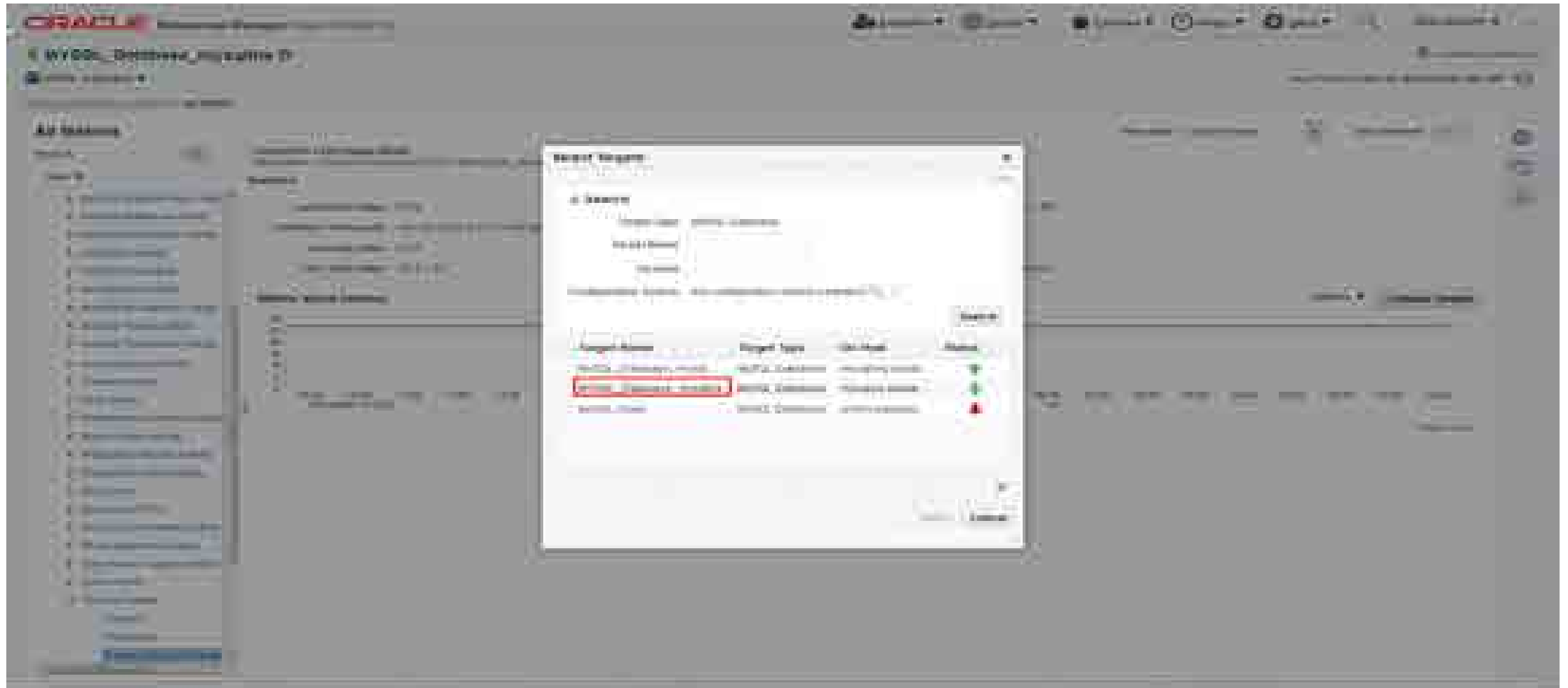
# Am You Using Indexes Or Doing Table Scans? Table/Rows



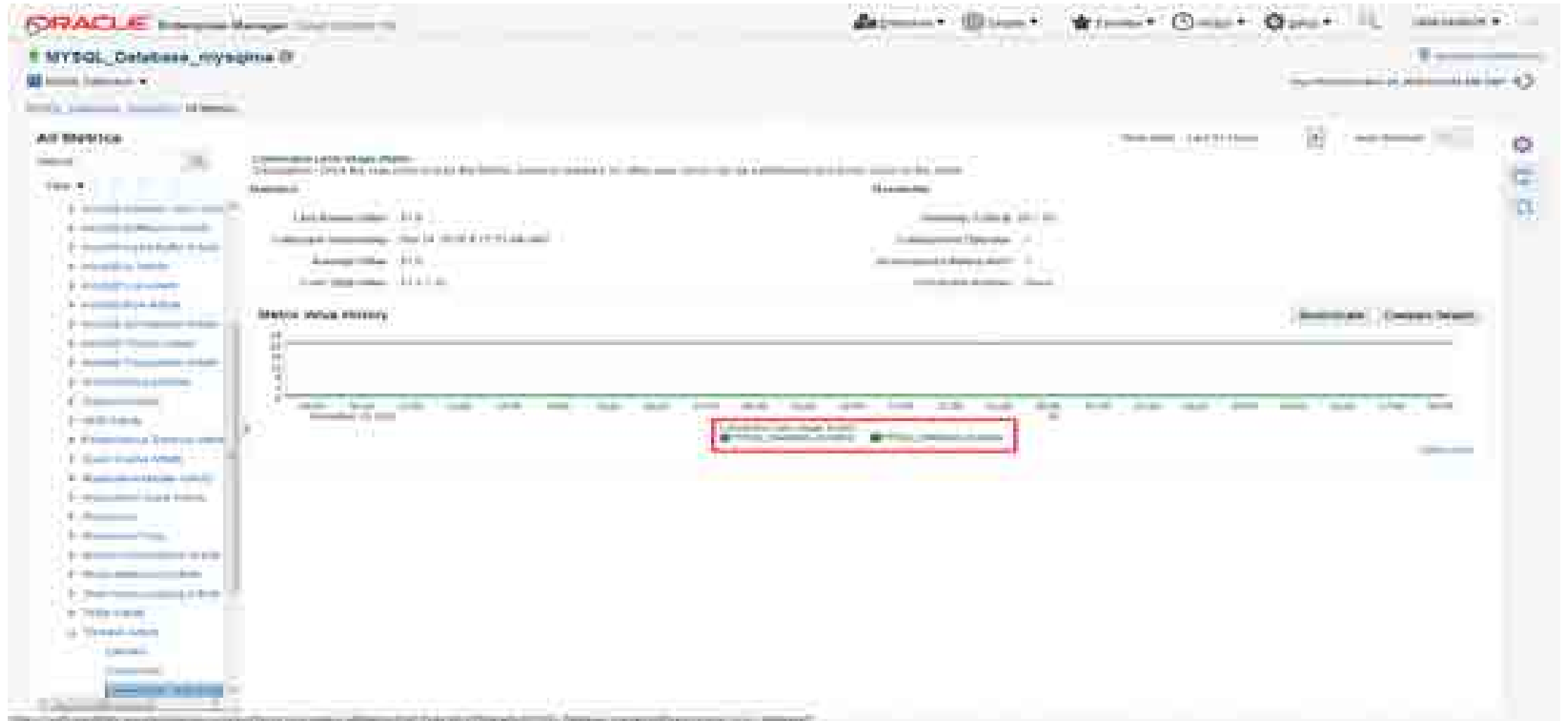
# Is Your Master In Sync With Your Slave?



# Is Your Master In Sync With Your Slave?



# Is Your Master In Sync With Your Slave?







# What Are Details Of Master Slave Setup?

The screenshot displays the Oracle Enterprise Manager interface for a MySQL database. The top navigation bar includes the Oracle logo and various utility icons. The breadcrumb trail shows the path: MySQL Database - mysolima. The left-hand navigation pane is titled 'All Metrics' and contains a tree view of metrics. The 'Replication View Activity' metric is highlighted with a red box. The main content area shows the 'Replication View Activity' page, which includes a table with the following columns: 'Metric', 'Thresholds', and 'Real Time Value'. The table contains several rows of data, including 'Log File Size', 'Log File Used', 'Log File Free', 'Log File Full', 'Log File Error', 'Log File Warning', 'Log File Critical', 'Log File Fatal', 'Log File Panic', 'Log File Unknown', 'Log File Other', 'Log File Total', 'Log File Used', 'Log File Free', 'Log File Full', 'Log File Error', 'Log File Warning', 'Log File Critical', 'Log File Fatal', 'Log File Panic', 'Log File Unknown', and 'Log File Other'. The 'Real Time Value' column shows the current values for each metric.

# What Kind Of Hardware Is Your MySQL Instance Running On?



# What Kind Of Hardware Is Your MySQL Instance Running On?

The screenshot displays the Oracle Enterprise Manager (OEM) console interface. At the top, the Oracle logo and 'Enterprise Manager' text are visible. A red box highlights the 'Home' link in the top navigation bar. Below the navigation bar, there are several summary cards: 'Overall Health', 'Open Connections', 'CPU Utilization' (0%), and 'Memory Utilization' (43%). The main content area is titled 'Summary' and features a cartoon penguin icon. To the right of the penguin, there is a 'Basic Statistics' section with a '0%' indicator. Below this, there are several charts and graphs, including 'CPU Utilization' and 'Memory Utilization', which show performance metrics over time. The interface is clean and professional, typical of Oracle's management tools.

# Are There Any Recommendations For MySQL Instances?

**ORACLE** Enterprise Manager Cloud Control V18.0.0

Compliance Results

Security Recommendations For Oracle Products

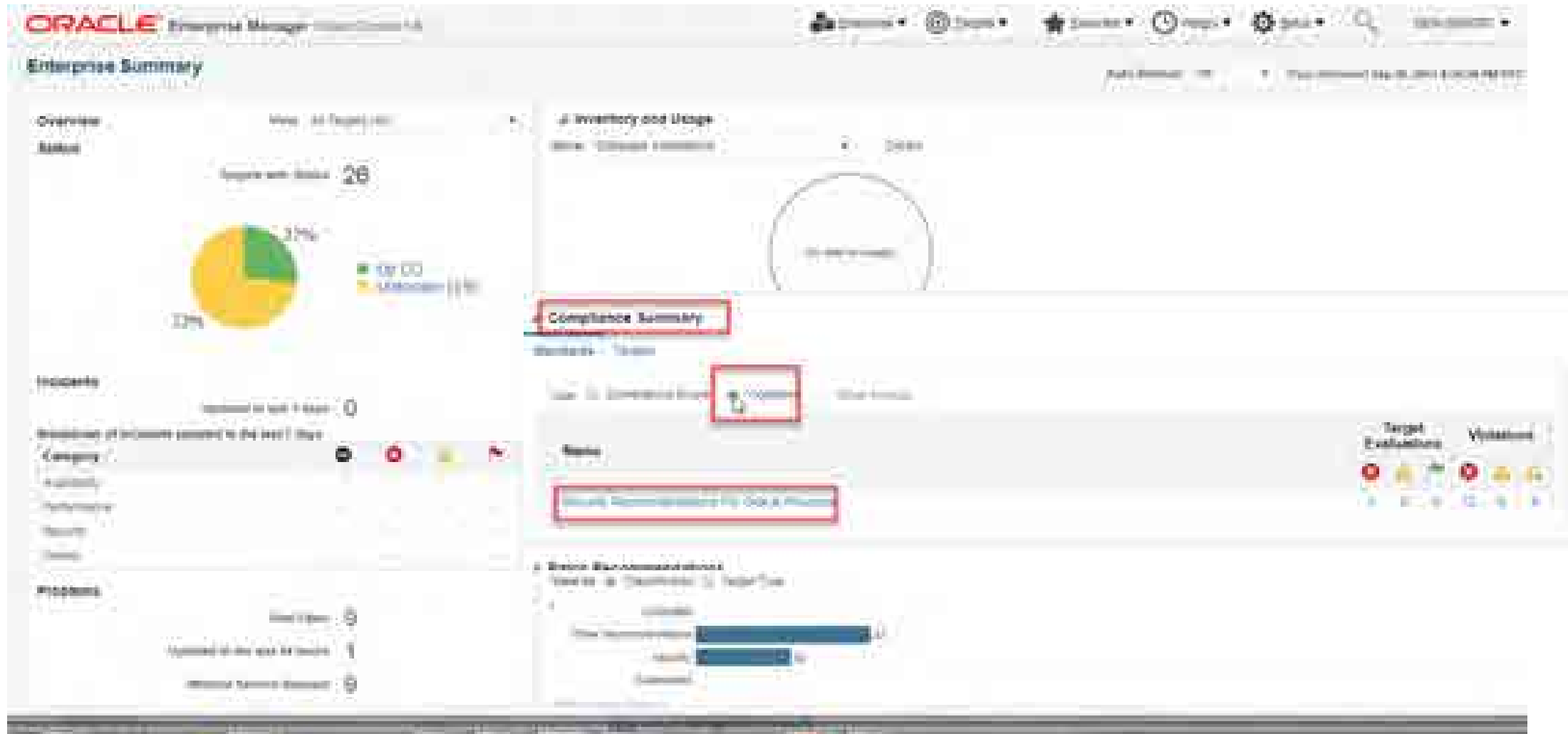
### Security Recommendations For Oracle Products (Compliance Standard)

Target Scorecard

Rule Evaluations

Target Name	Required Data Available	Violations	Score (N/A)	Last Evaluation Date
...	Yes	0	...	01-Mar-2017
...	Yes	1	...	01-Mar-2017
...	Yes	4	...	01-Mar-2017

# Are There Any Recommendations For MySQL Instances?



# Are There Any Recommendations For MySQL Instances?

The screenshot displays the Oracle Enterprise Manager Cloud Control interface, specifically the 'Security Recommendations For Oracle Products' page. The page title is 'Security Recommendations For Oracle Products (Compliance Standard)'. Below the title, there is a search bar and a table of recommendations. The table has columns for 'Name', 'Target Name', 'Applicable To', 'Severity', and 'Keywords'. One recommendation is highlighted with a red box, indicating a vulnerability on the target mysqlsa.oracleads.com:3378. Below the table, there are sections for 'Event Details' and 'Guided Resolution'.

Name	Target Name	Applicable To	Severity	Keywords
Security Recommendation	mysqlsa.oracleads.com:3378	MySQL	Critical	CVE-2015-5279
Security Recommendation	mysqlsa.oracleads.com	MySQL	Critical	CVE-2015-5279
Security Recommendation	mysqlsa.oracleads.com	MySQL	Critical	CVE-2015-5279
Security Recommendation	mysqlsa.oracleads.com	MySQL	Critical	CVE-2015-5279
Security Recommendation	mysqlsa.oracleads.com	MySQL	Critical	CVE-2015-5279
Security Recommendation	mysqlsa.oracleads.com	MySQL	Critical	CVE-2015-5279

**The target mysqlsa.oracleads.com:3378 in host mysqlsa.oracleads.com is vulnerable. The security patch 25162467 is applicable to it.**

**Event Details**  
Event Name: Security Recommendations For Oracle Products  
Risk Component: ORACLE  
Risk Category: Security  
Risk Status: Critical  
Risk Type: Security

**Guided Resolution**  
Recommendations: 100% are of the verified security policy type (assuming target is unred)  
Actions: 100% are of the type: Recommended at 100% critical  
If the event will be automatically closed after the underlying event is closed.

# Are There Any Recommendations For MySQL Instances?



The screenshot displays the Oracle Enterprise Manager interface for a MySQL database instance. The 'MySQL Query Log' configuration page is visible, showing various settings and a detailed description of the log's purpose. A red rectangular box highlights the following text:

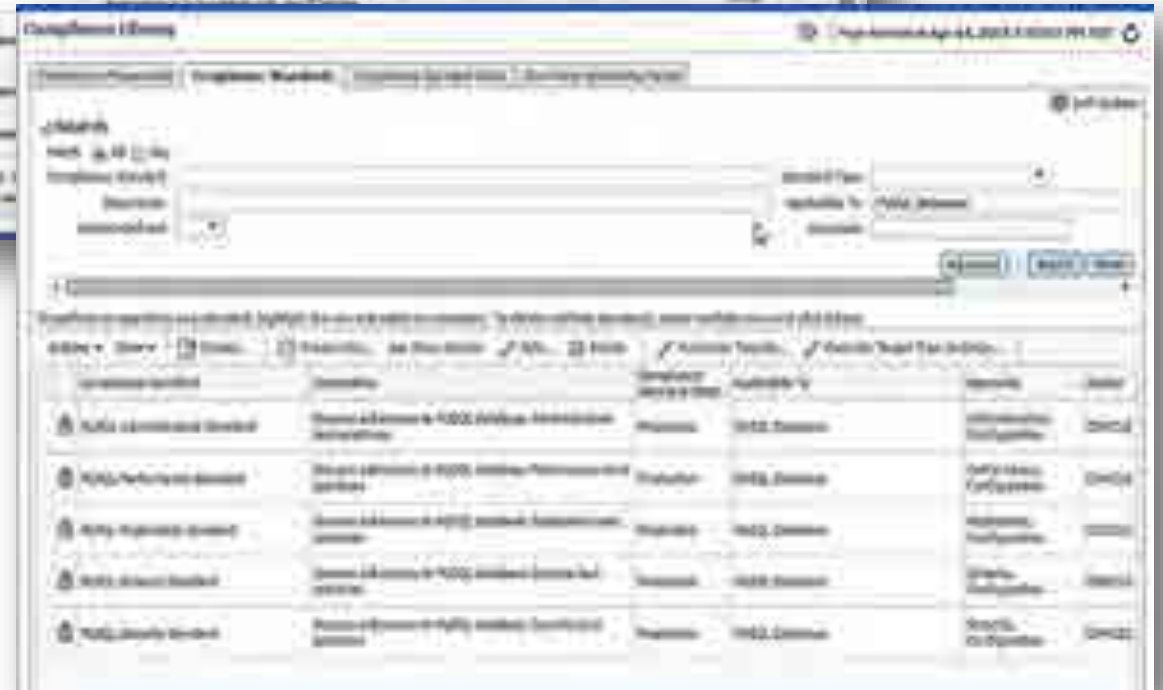
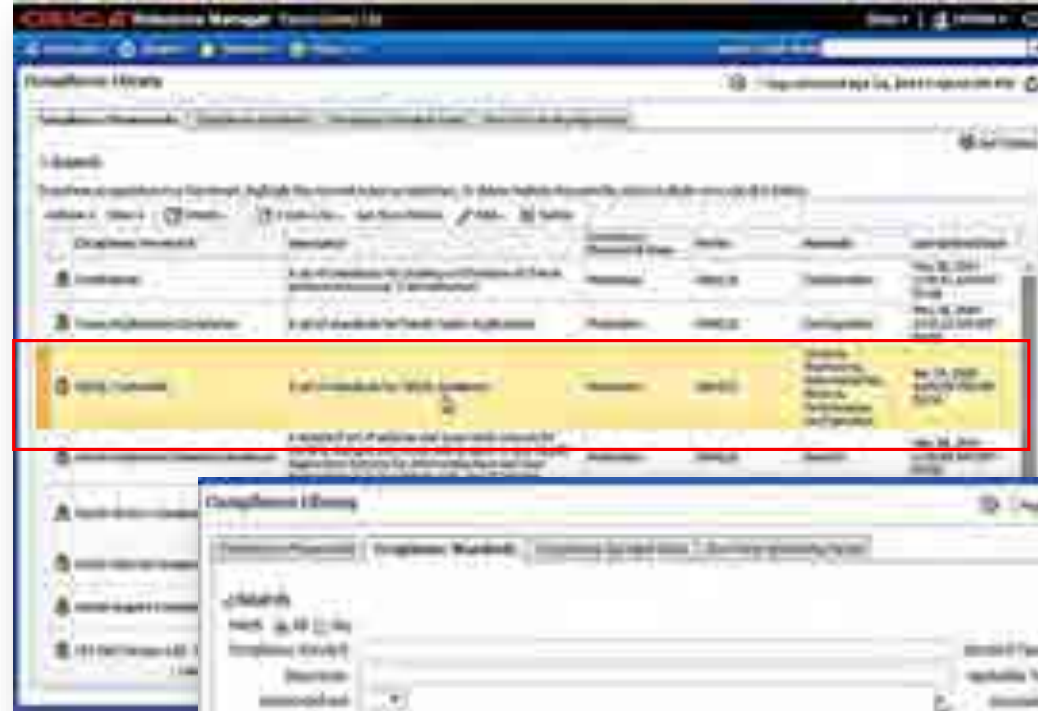
Turn on the Slow Query Log (if it is not already turned on) and monitor what goes into it. Statements that are logged here are candidates for... (truncate) but not for...

The interface includes a left-hand navigation pane with options like 'Home', 'Performance', and 'Alerts'. The main content area contains a 'Description' section with a detailed paragraph explaining the Slow Query Log's function, and a 'Basic Features' section with several checkboxes for configuration options.



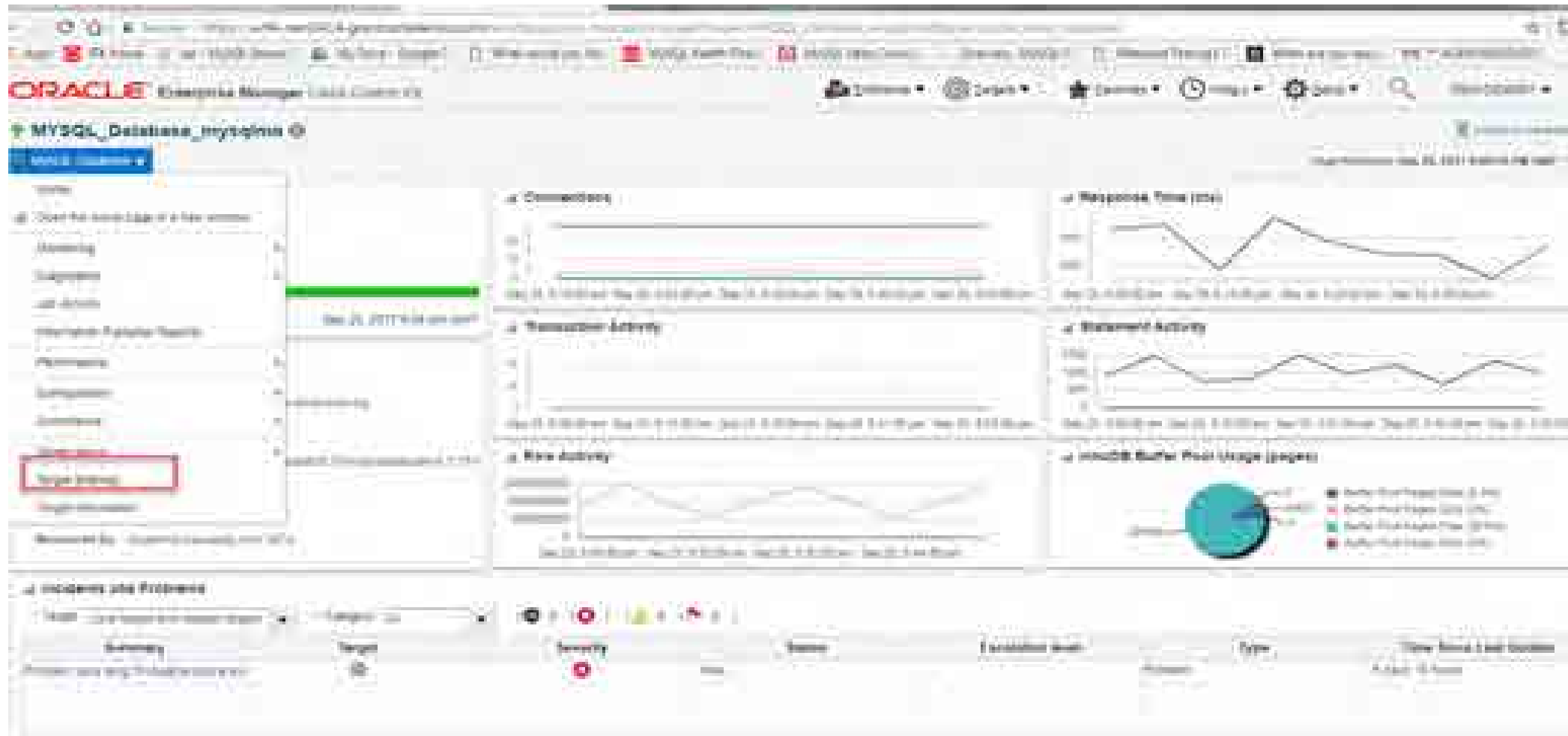
# Compliance Framework

- Set of product **best practices**
- **Suggested by our experts**
- Based on configuration metrics
- Composed of:
  - 5 Compliance Standards
    - ✓ Administration
    - ✓ Performance
    - ✓ Replication
    - ✓ Schema
    - ✓ Security
  - Around 29+ Compliance Rules





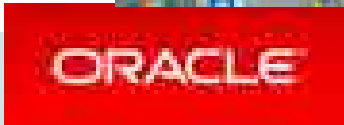
# What Metrics Are Set? Target Sitemap For MySQL



# What Thresholds Are Set? Target Sitemap For MySQL

The screenshot shows the Oracle Enterprise Manager interface for a MySQL database. A red box highlights the 'MySQL Database' section in the left-hand navigation pane. The main area displays a table of configuration parameters with columns for Name, Current Value, Target Value, Unit, and Status. The table lists various MySQL parameters such as innodb\_buffer\_pool\_size, innodb\_log\_file\_size, and innodb\_log\_buffer\_size.

Name	Current Value	Target Value	Unit	Status
innodb_buffer_pool_size	10485760	10485760	bytes	OK
innodb_log_file_size	10485760	10485760	bytes	OK
innodb_log_buffer_size	10485760	10485760	bytes	OK
innodb_data_file_path	ibdata1:10485760	ibdata1:10485760	bytes	OK
innodb_data_home_dir				OK
innodb_log_group_home_dir	./log	./log		OK
innodb_flush_log_at_timeout	1	1		OK
innodb_flush_log_at_trx_commit	1	1		OK
innodb_flush_sync	0	0		OK
innodb_force_recovery	0	0		OK
innodb_file_per_table	1	1		OK
innodb_file_format	Antelope	Antelope		OK
innodb_force_load_data	0	0		OK
innodb_force_write_compression	0	0		OK
innodb_io_capacity	1000	1000	bytes	OK
innodb_io_capacity_max	10000	10000	bytes	OK
innodb_lock_wait_timeout	50	50	seconds	OK
innodb_max_undo_log_size	10485760	10485760	bytes	OK
innodb_online_logback_lsn	0	0		OK
innodb_online_logsize	10485760	10485760	bytes	OK
innodb_print_diagnostics	0	0		OK
innodb_read_ahead_disabled	0	0		OK
innodb_read_ahead_enabled	1	1		OK
innodb_read_ahead_threads	1	1		OK
innodb_read_ahead_threads_max	1	1		OK
innodb_read_consistent_snapshot	0	0		OK
innodb_read_only	0	0		OK
innodb_read_only_mode	0	0		OK
innodb_read_timeout	30	30	seconds	OK
innodb_recover_after_crash	1	1		OK
innodb_recover_after_crash_report_data_loss	0	0		OK
innodb_recover_after_crash_report_data_loss_timeout	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_max	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_min	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_max	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_min	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_max	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_min	30	30	seconds	OK
innodb_recover_after_crash_report_data_loss_timeout_max	30	30	seconds	OK



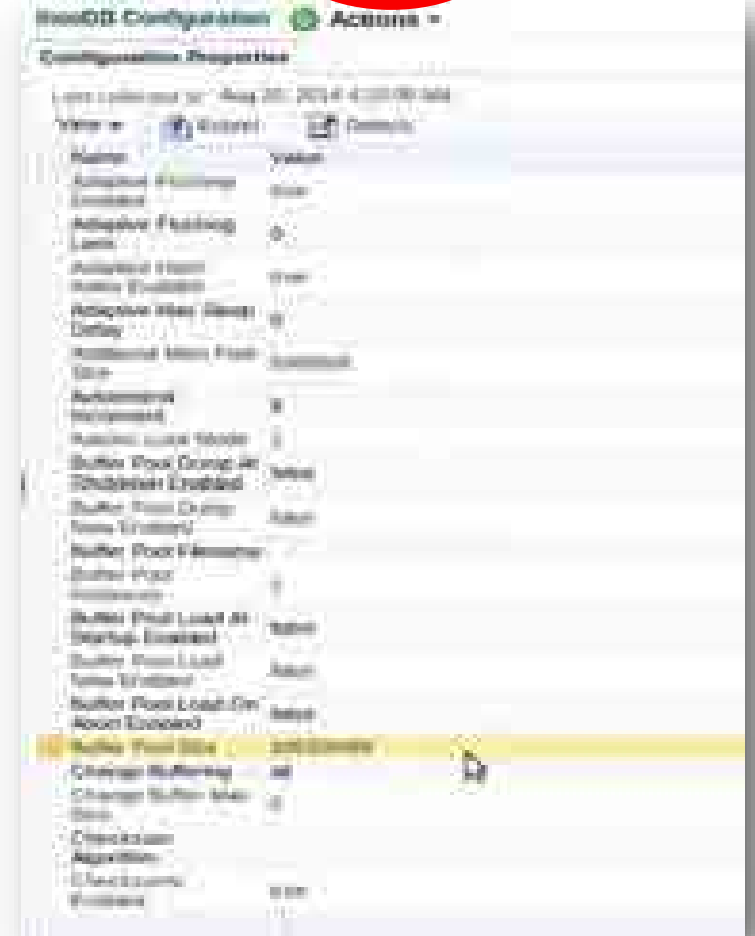
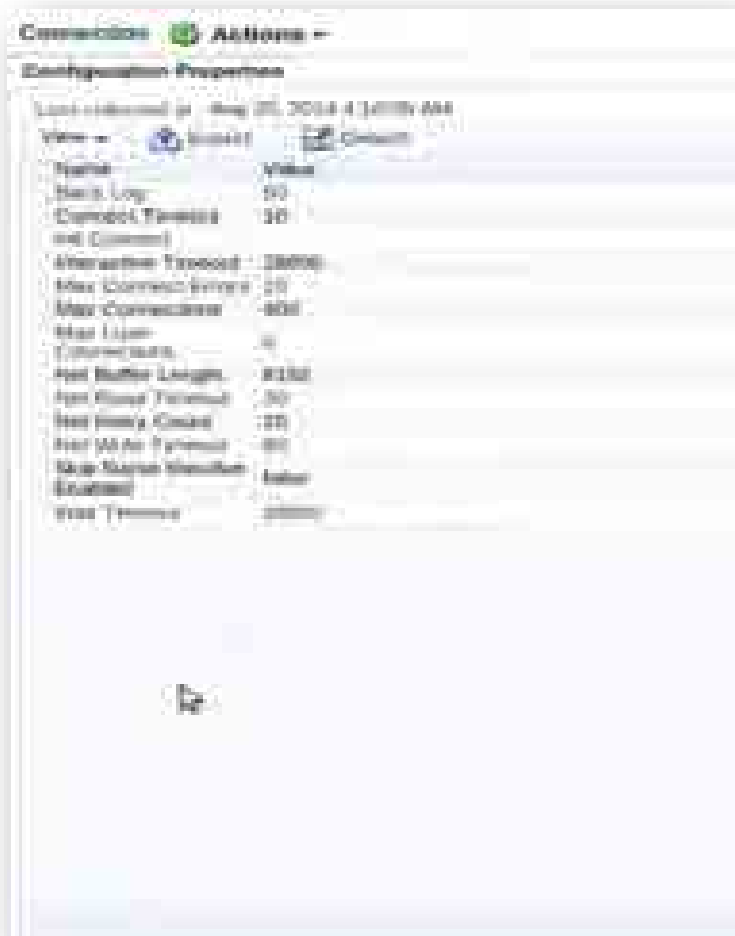
# How Do You Set Up Your Oracle Enterprise Manager?



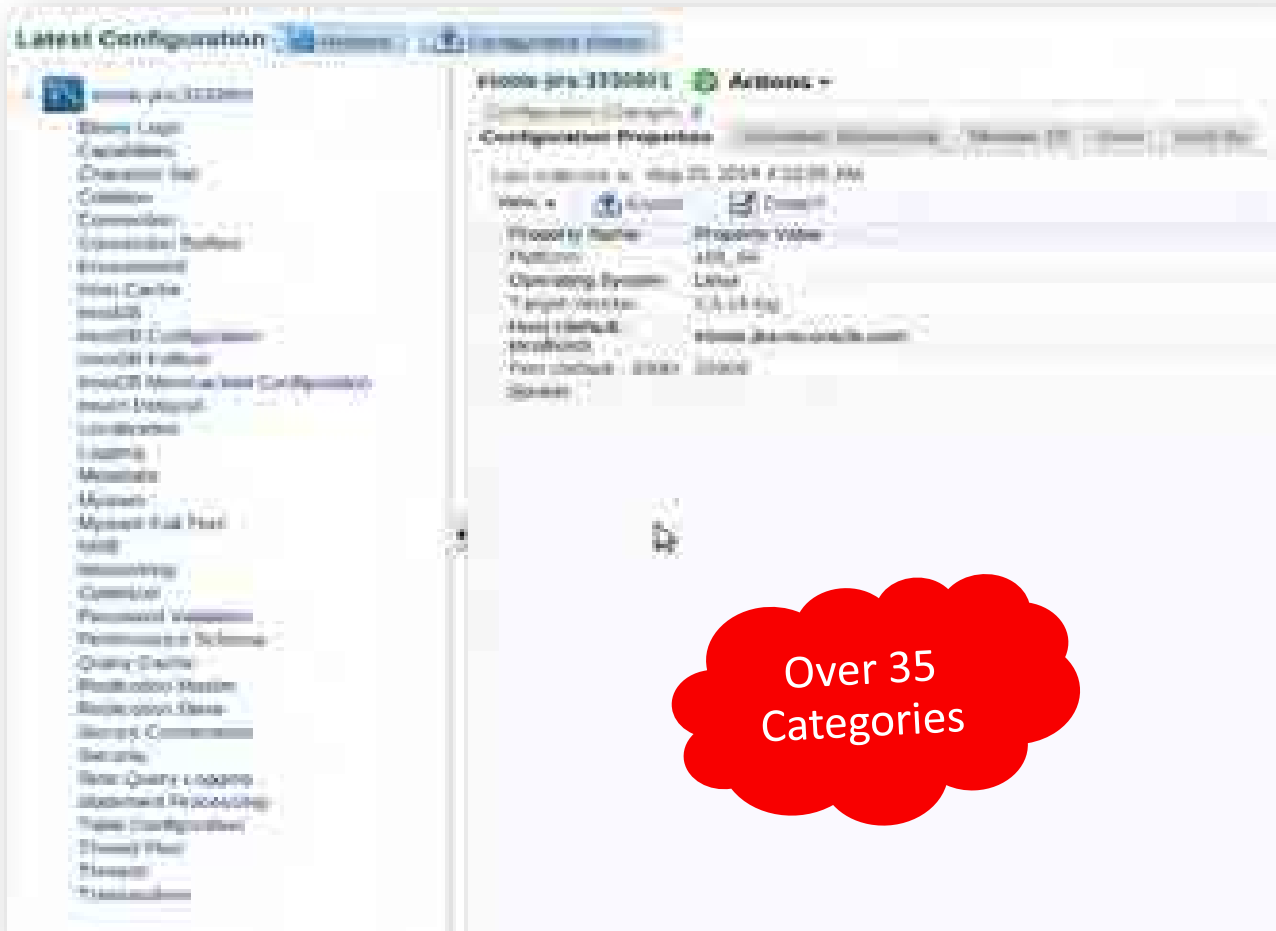
<http://9xmedia.com/new/products/xtops.php>

# What Are Configuration Metrics?

Track of more than 563 config metrics available



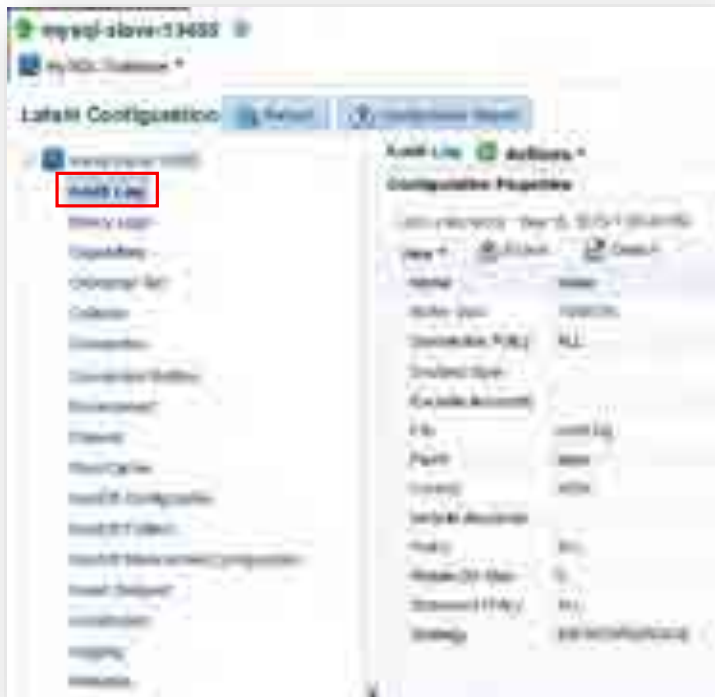
# More On Configuration Metrics



## Highlights:

- Those metrics that represent **configuration** and come from ie. “show global variables”
- Categorized variables
- Collected every 24 hrs by default
- History and Comparable with other servers

# What About Security Configuration Metrics? Firewall And Audit



....and 60+ more, scattered on other categories

# What Are Performance Metrics?

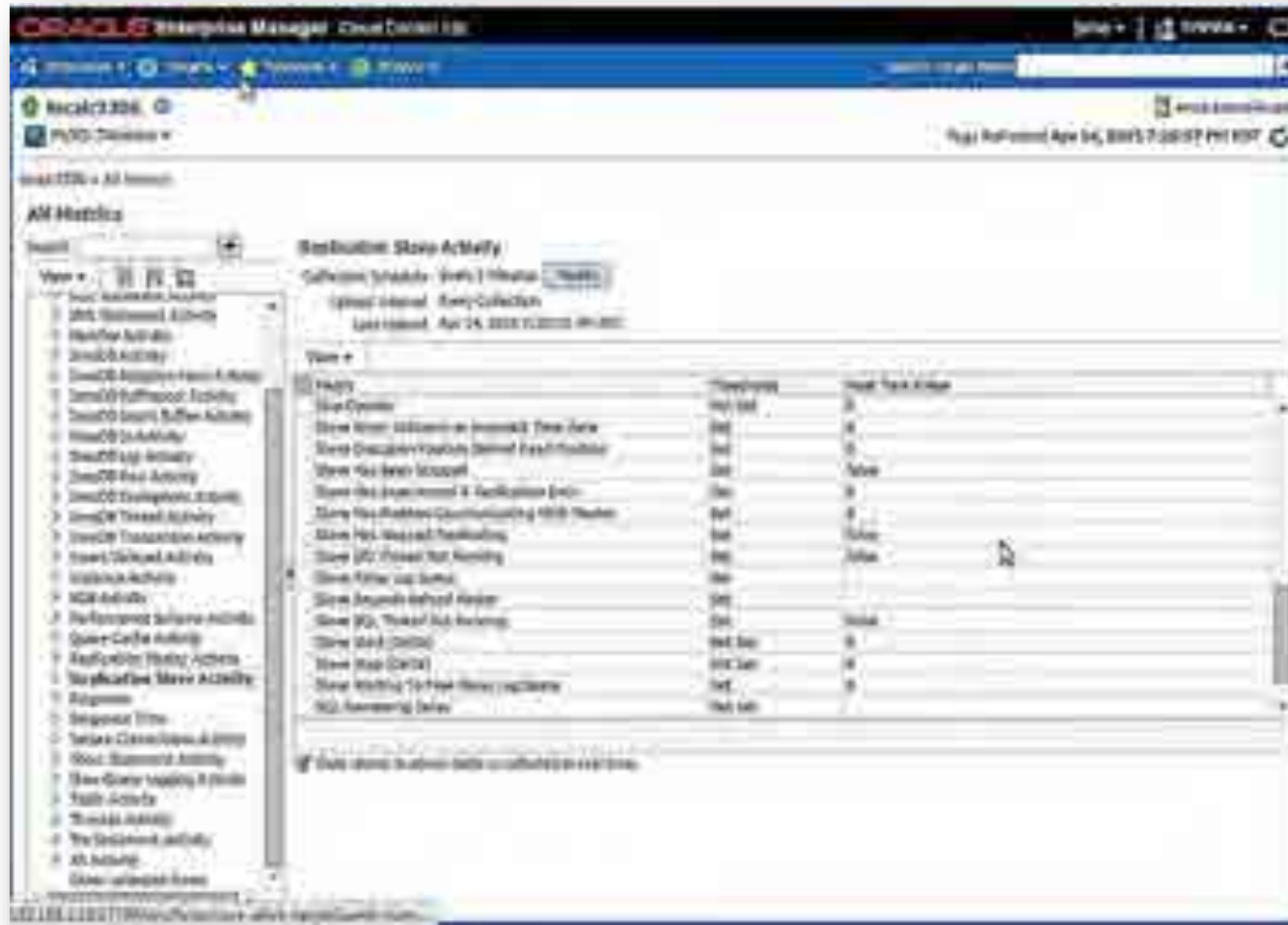
The screenshot displays the Oracle Enterprise Manager interface. On the left, a tree view under 'All Metrics' shows 'InnoDB Activity' selected and highlighted with a red box. The main panel shows the 'InnoDB Activity' configuration page, including collection intervals (Every 5 Minutes) and a table of metrics.

Metric	Threshold	Real Time Value
Accesses (only I/O)	Not Set	0
Buffer Pool Bytes Used	Not Set	
Buffer Pool Bytes Total	Not Set	
Buffer Pool Dirty Bytes	Not Set	
Buffer Pool Free Bytes	Not Set	
Buffer Pool InnoDB Bytes	Not Set	
Buffer Pool InnoDB Free	Not Set	
Buffer Pool InnoDB Total	Not Set	10474
Buffer Pool Pages Clean	Not Set	0
Buffer Pool Pages Dirty	Not Set	0
Buffer Pool Pages Flushed (I/O)	Not Set	100
Buffer Pool Pages Free	Not Set	12710
Buffer Pool Pages Latched	Not Set	
Buffer Pool Pages Miss	Not Set	0
Buffer Pool Pages Read	Not Set	10211
Buffer Pool Pages Written (I/O)	Not Set	0

## Highlights:

- Those that represent **usage** and come from ie. “show status”
- Collected by default every 5 minutes
- Categorized variables
- Current and historical activity
- Counters and Deltas
- Settable thresholds

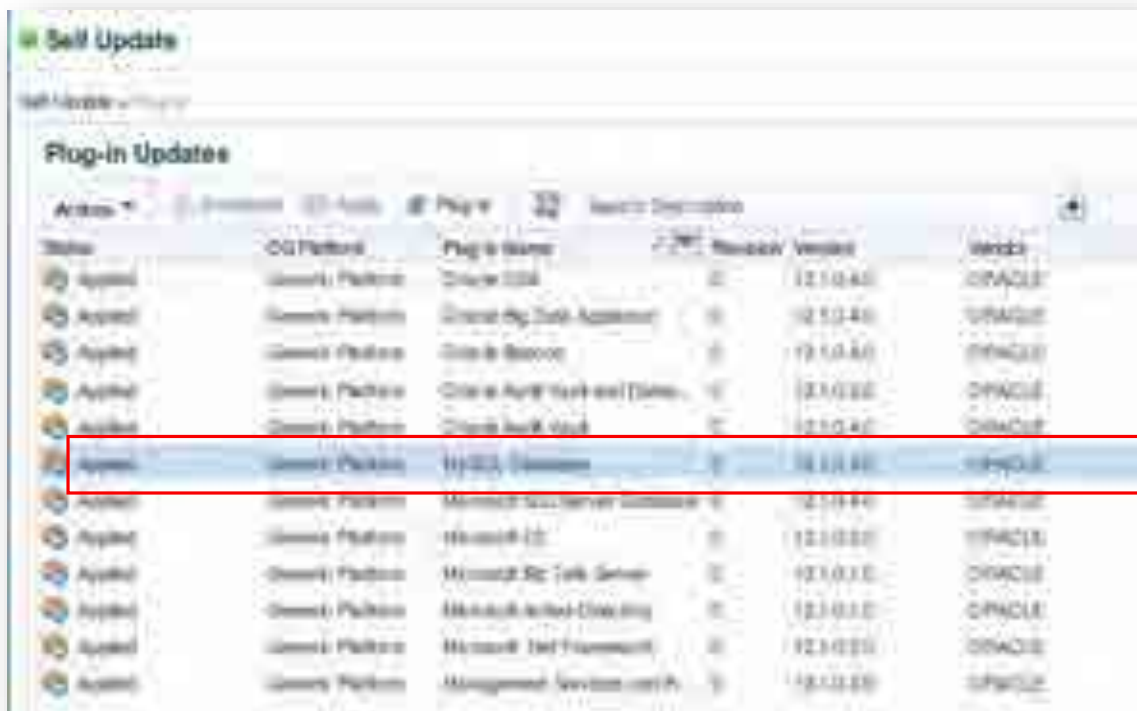
# What Are Performance Thresholds?



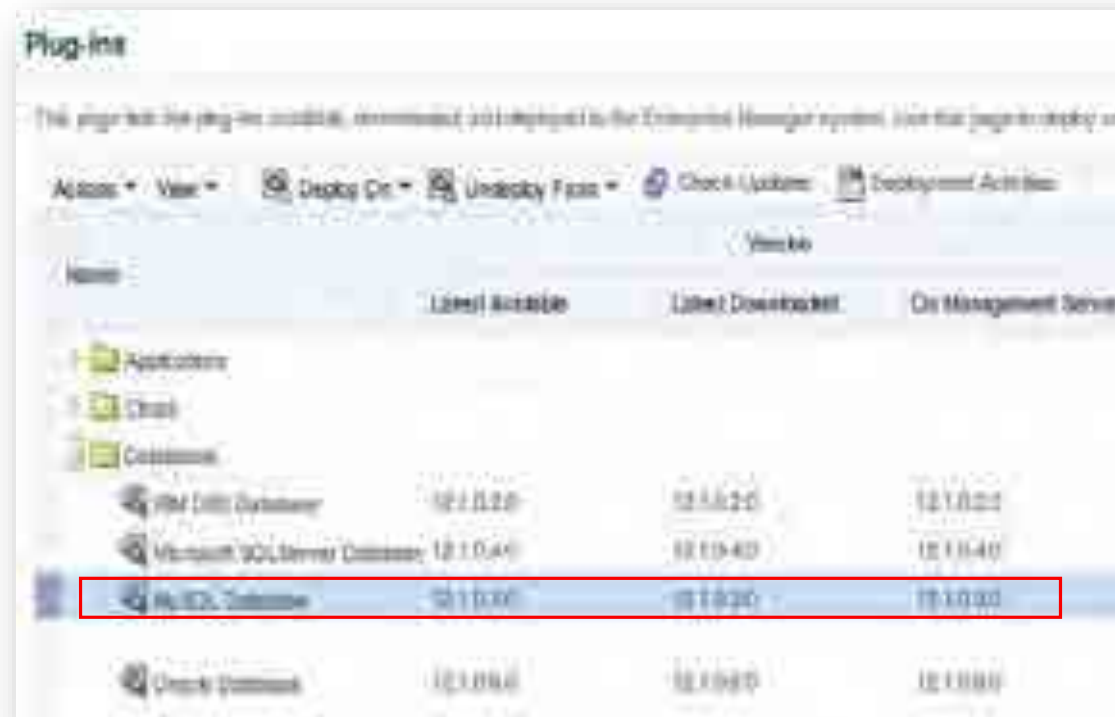
- 26+ metrics with thresholds
- **Expert advisors**
- Include the most important:
  - Availability
  - Replication
  - Key Performance Indicators
- Get alerts !!!



# How Do You Install Oracle Enterprise Manager? Two Ways

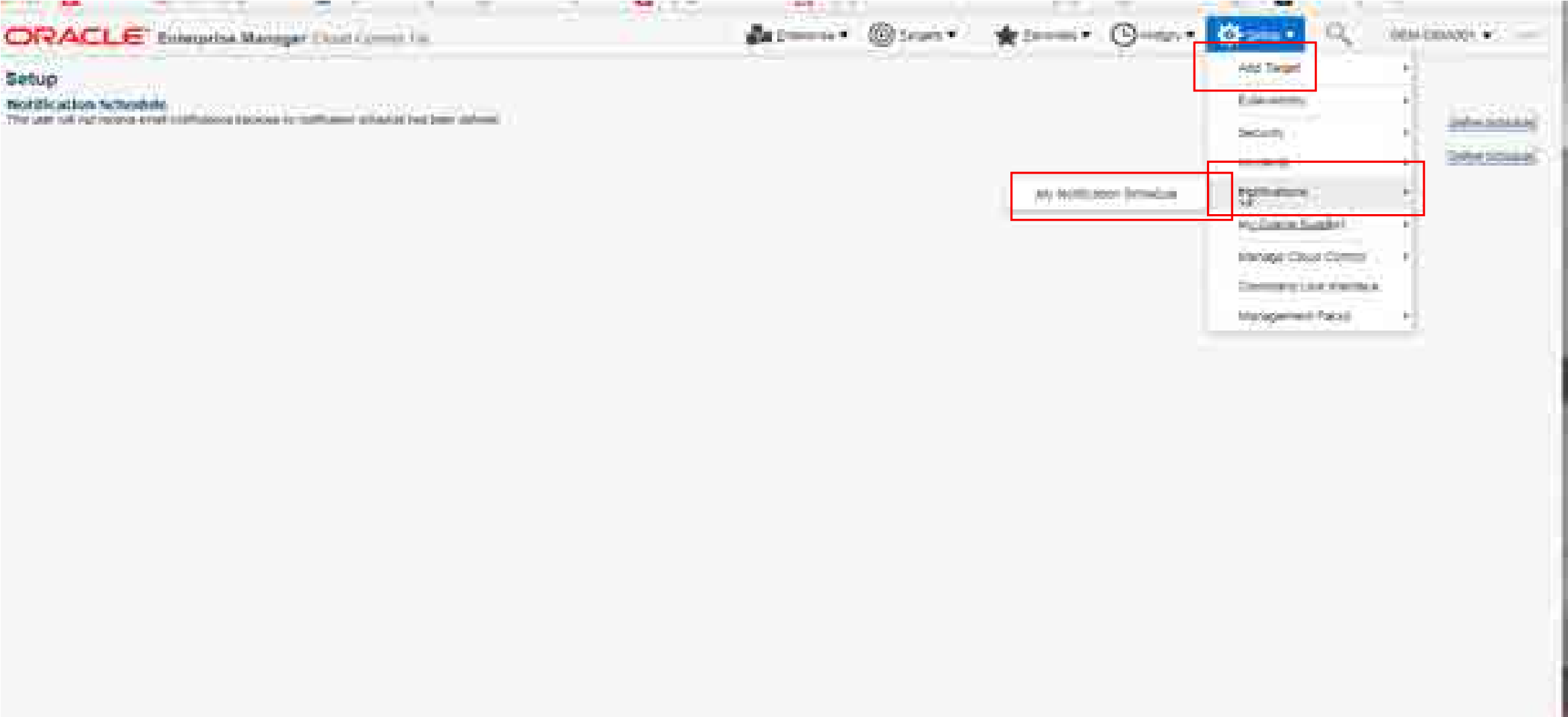


Self-Update



Plug-in Deployment

# How Do You Set Up Notifications?



# How Do You Setup Notifications?

The screenshot shows the Oracle Enterprise Manager Cloud Control interface. At the top, the Oracle logo and "Enterprise Manager Cloud Control 12c" are visible. The navigation bar includes links for Home, Alerts, Events, Jobs, and Settings. The main content area is titled "Setup" and features a yellow warning banner with a red error icon. The banner text reads: "No E-mail Addresses" and "User 'SYSMAN' does not have any e-mail addresses defined. The address should be added under e-mail addresses." Below the banner, there is a section for "Notification Schedules" with a sub-header "This user will not receive email notifications because no schedules are defined for this user." On the right side of the page, there are two buttons: "Add E-mail Address" (highlighted with a red box) and "Add Schedule".

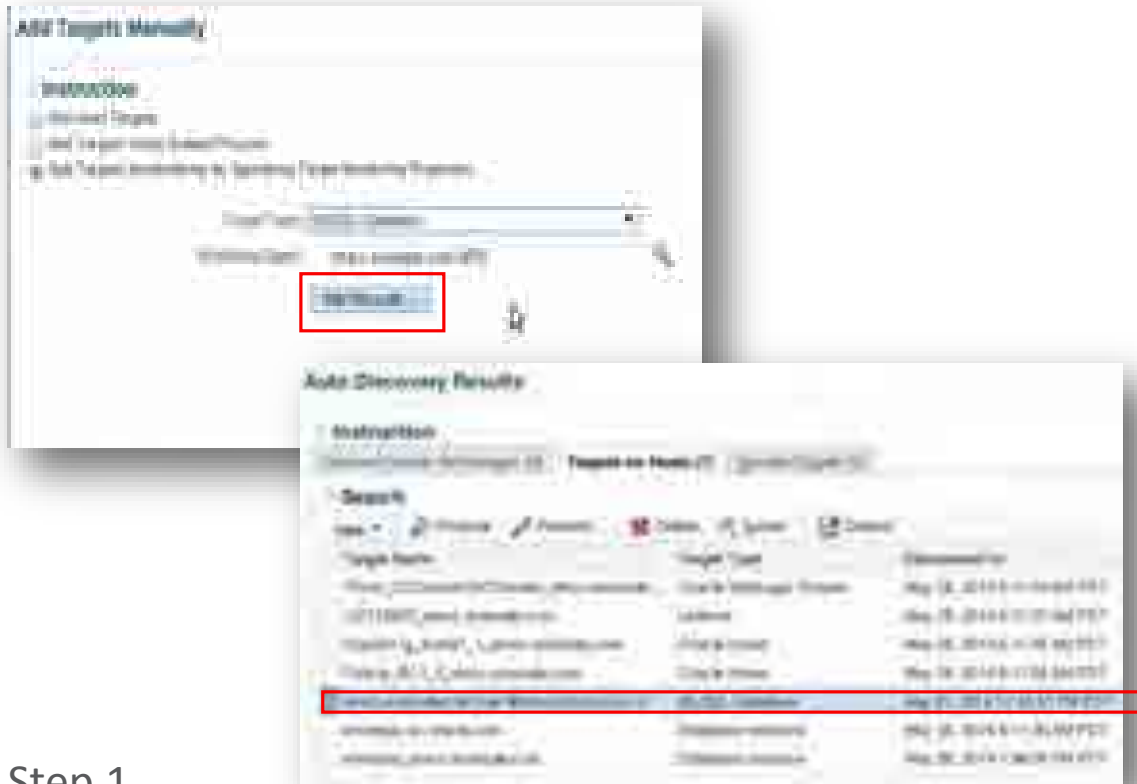
# How Do You Set Up Notifications?

The screenshot shows the Oracle Enterprise Manager interface for configuring user notifications. The page title is "Enterprise Manager Password & Email". It features several sections:

- Password:** Includes fields for "Current Password" (masked with a black box), "New Password", and "Confirm New Password".
- Email Addresses:** This section is highlighted with a red box. It contains a "Select Email Address" dropdown menu, a "Email Time (Hours:Minutes)" field, and a "Save" button.
- Additional Information:** A section with a "Show/Hide" button and a "Save" button.

The Oracle logo and navigation icons are visible at the top of the page.

# How Do You Add MySQL Database Instances? Targets

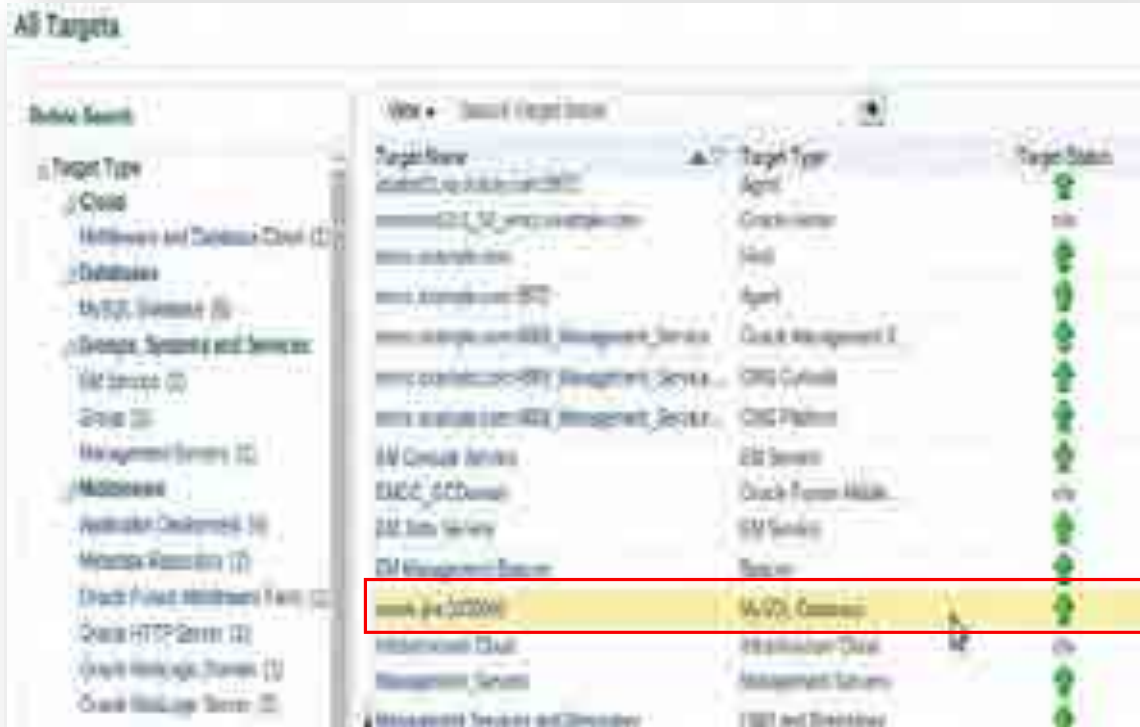


Step 1  
Manually or Autodiscovered

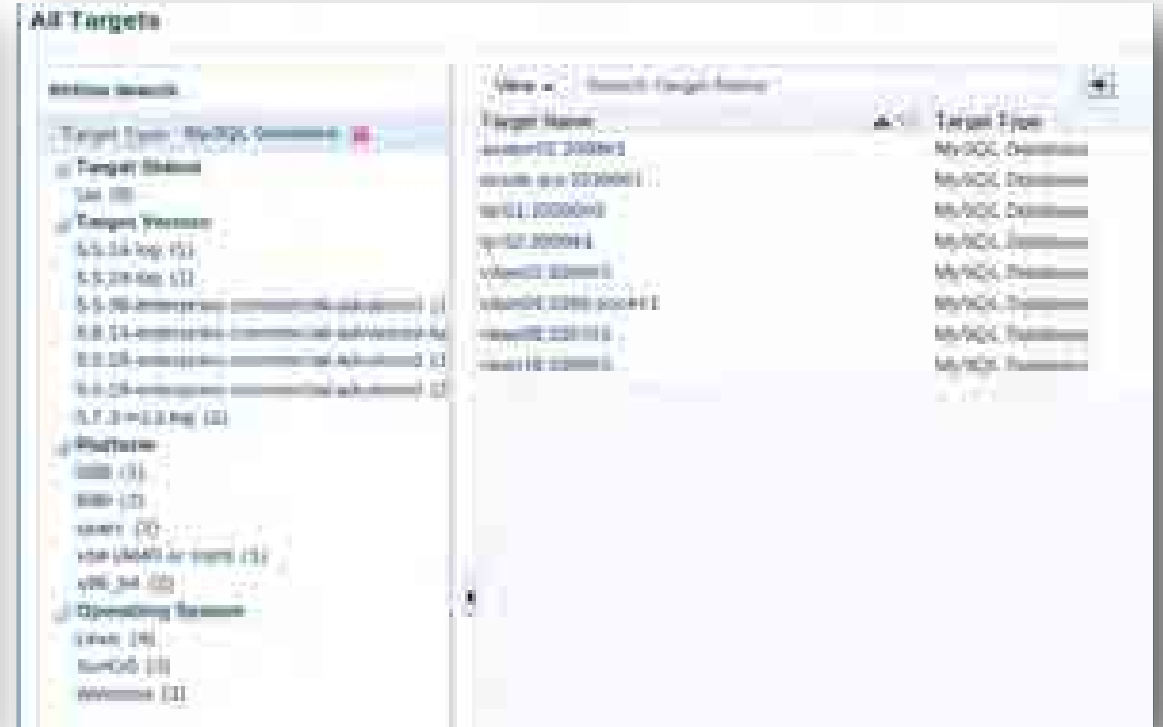


Step 2  
Fill out the form with instance parameters

# What Instances Do You Have Installed? Targets



All targets



Filtered targets

# When Should You Use Which Tool?



## ORACLE ENTERPRISE MANAGER for MySQL

- Provides a High Level Overview of MySQL within Your Enterprise
- Tool for the Operations Team



## MySQL Enterprise Monitor

- Allows You to Dive Deeper Into
  - Query Analyzer
  - Exhaustive Best Practice Advisors
- Tool for the MySQL DBA & Dev team(s)

# When Should You Use Which Tool?



## ORACLE ENTERPRISE MANAGER for MySQL

- Can Drill Down to Topology of Hardware
- A 'Map' to All Your Systems
- CLI Interface to Oracle Cloud Infrastructure



## Enterprise Monitor

- Can Look at Backups
- Can Drill Down to Topology of Replication



# Oracle Enterprise Manager : **Agenda**

- 1 ➤ Introductions
- 2 ➤ When to Use Enterprise Manager
- 3 ➤ Architecture
- 4 ➤ How To's
- 5 ➤ **Live Demo**
- 6 ➤ Future of Monitoring
- 7 ➤ Q & A

# Oracle Enterprise Manager : **Agenda**

- 1 ➤ Introductions
- 2 ➤ When to Use Enterprise Manager
- 3 ➤ Architecture
- 4 ➤ How To's
- 5 ➤ Live Demo
- 6 ➤ **Future of Monitoring**
- 7 ➤ Q & A

# This Is How We Used to Monitor - Get System Table Information And Put in Excel



<https://i.ytimg.com/vi/FVRJU--8YMY/maxresdefault.jpg>

# Now

No longer have to monitor in past tense

We have advice for you

We give you graphs



<http://www.tsi.com/Landing-Pages/HS-Silica.aspx>

# In The Near Future

Give me fix  
Patch for me  
Implement the  
change  
Give me the  
possible effects of  
the change



<https://kiply.com/blog/three-productivity-mistakes-you-can-fix-monitoring-time/>

# Your Monitor Talks to You, Alerts You - Alexa



[https://www.google.com/search?q=alerting+that+talks+to+you+alexa&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi0rla-9cjWAhXmhFQKHebYAT0Q\\_AUICigB&biw=1961&bih=841#imgsrc=C4A1RDLcCPoF4M](https://www.google.com/search?q=alerting+that+talks+to+you+alexa&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi0rla-9cjWAhXmhFQKHebYAT0Q_AUICigB&biw=1961&bih=841#imgsrc=C4A1RDLcCPoF4M)

# And Now ...

Where do you think monitoring is going?

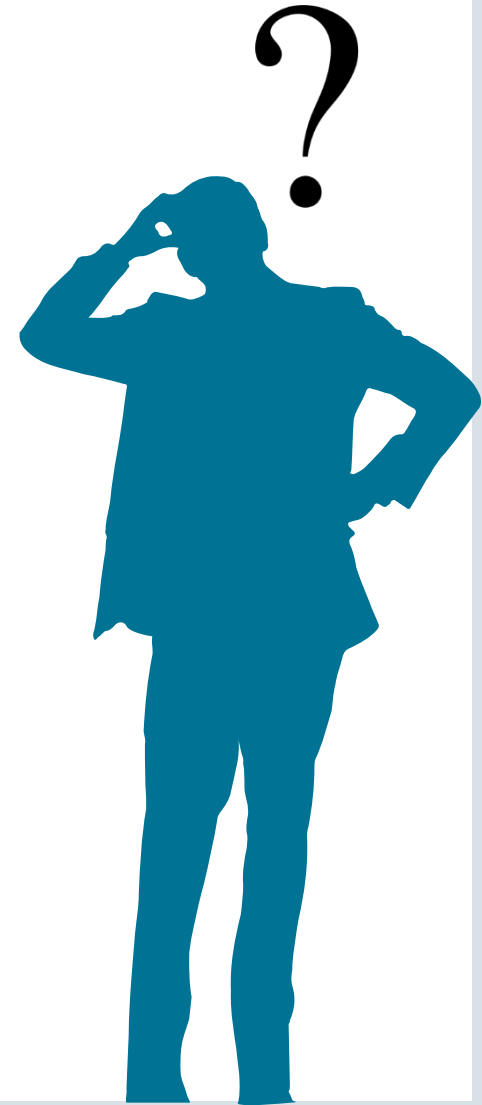
What would help you solve your business/operations issues in the Oracle Enterprise Manager – the MySQL plugin?

# Oracle Enterprise Manager : Agenda

- 1 ➤ Introductions
- 2 ➤ When to Use Enterprise Manager
- 3 ➤ Architecture
- 4 ➤ How To's
- 5 ➤ Live Demo
- 6 ➤ Future of Monitoring
- 7 ➤ Q & A



# Q & A



# Learn More

- Oracle Enterprise Manager for MySQL  
<http://www.mysql.com/products/enterprise/em.html>
- MySQL Enterprise Monitor  
<http://www.mysql.com/products/enterprise/monitor.html>
- Download  
<https://eDelivery.oracle.com>
- Kathy Forte  
kathy.forte@oracle.com

# Thank You!



[https://www.123rf.com/photo\\_22066345\\_young-female-construction-worker-with-an-electric-drill-and-plans-vector-illustration.html](https://www.123rf.com/photo_22066345_young-female-construction-worker-with-an-electric-drill-and-plans-vector-illustration.html)

ORACLE®