

ORACLE

Managing and Monitoring MySQL: What's New?

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Product Management - MySQL Observability



Agenda

- Introduction
- Overview of monitoring in MySQL HeatWave service in OCI (MHS)
- New capabilities for Observability and Management of MySQL systems
- Demo
- Q&A

The background features abstract illustrations of hands and patterns. In the top left, a hand is shown with a blue patterned sleeve and a brown textured shape. In the bottom right, there are more hands and patterns in shades of brown, orange, and blue. The central text is white and stands out against the dark blue background.

Introduction

Oracle Cloud Observability and Management Platform

ORACLE
Cloud Infrastructure

 Microsoft
Azure




On-Premises



Observability and Management Advanced Services



Application Performance Monitoring



Stack Monitoring



Logging Analytics



Database and OS Management



Capacity Planning SQL Insights

Observability and Management Data Sources



Metrics



Logs



Events



Traces



SQL



Dashboard

Infrastructure Services



Compute



Storage



Network



Security





OCI services for a comprehensive database management solution

Public cloud, hybrid cloud, and multicloud

Database Management

Unified console for on-premises and cloud databases with lifecycle database management capabilities for monitoring, performance management, tuning, and administration

Stack Monitoring

Stack Monitoring provides discovery and monitoring of databases, hosts and other application tech stack components, enabling correlation of status and performance across the stack

Ops Insights

Predict and plan for future demand, eliminate systemic issues using advanced analytics on curated telemetry and long-term data

Logging Analytics

Proactive, repeatable, and automated problem detection and monitoring in a business context. Simplified IT Ops and DevOps using interactive ML/AI-driven advanced analytics

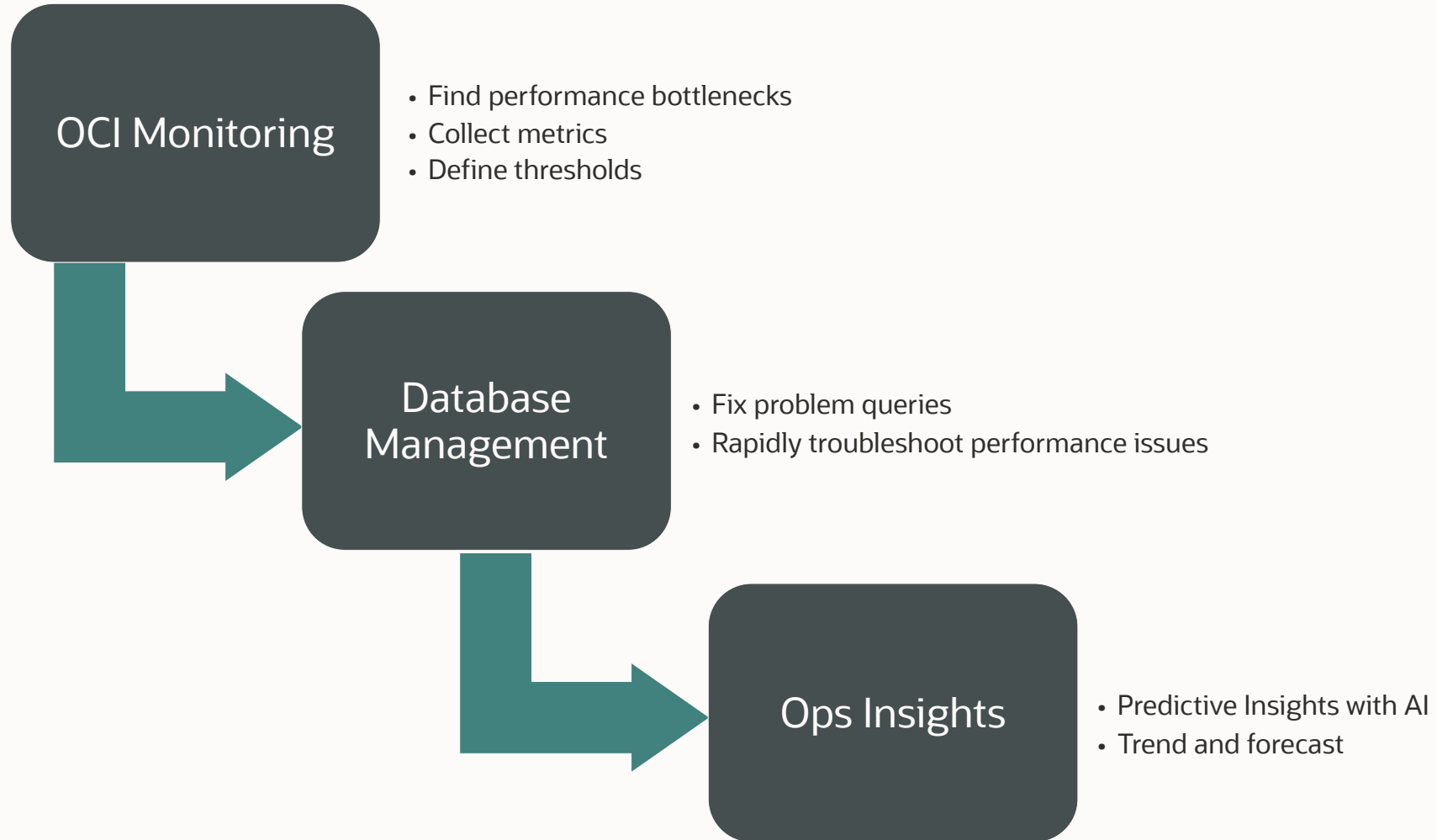


The background features a dark blue gradient with abstract, stylized elements. In the top left, there is a hand-like shape in light yellow and blue with a grid pattern. In the bottom right, there are more abstract shapes in orange, yellow, and blue, some with concentric line patterns. The main title is centered in white text.

New Capabilities for MySQL Database Management

New Capabilities for MySQL Database Management

100% developed, managed, and supported by Oracle



Database Management services for MySQL

Categories	Capabilities
Database Management	<p>General Availability: October. 2023 for MDS</p> <p>Fleet and single DB dashboard</p> <ul style="list-style-type: none">• Collects ~40 key metrics with monitoring UI showing 7 days of historical data for correlation• Utilizes OCI Monitoring service data store & OCI Alarm capability• Performance Hub: Database performance diagnostics and troubleshooting• Basic configuration information<ul style="list-style-type: none">• Configuration parameters organized by categories & searchable with links to MySQL config template for modification
Operations Insights	<p>General Availability: July 2024 for MDS</p> <ul style="list-style-type: none">• Capacity Planning and Forecasting• SQL Explorer plus Warehouse

Note: Support for On-premises deployment would be GA in July 2024



MySQL Enterprise Monitor

MySQL Enterprise Monitor (MEM) End of Life (EOL) Announcement (Doc ID 3008050.1)

APPLIES TO:

MySQL Enterprise Monitor - Version 1.0 to 8.0 [Release 1.0 to 8.0]
Information in this document applies to any platform.

DETAILS

MySQL Enterprise Monitor (MEM) will be end of life and deprecated with obsolescence as of January 1, 2025.

After this date, MySQL Enterprise Monitor will no longer receive security updates, non-security updates, bug fixes, or online technical content updates. It will transition to the Sustaining Support model.

ACTIONS

What to expect when MySQL Enterprise Monitor reaches the end of life (EOL):

- MySQL will cease all bug-fix activities for the product.
- MySQL will cease all security fix activities for the product.
- MySQL will cease all new feature work for the product.

Sustaining Support does not include:

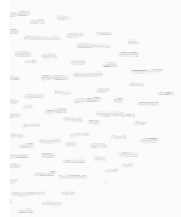
- New program updates, fixes, security alerts, and critical patch updates
- New tax, legal, or regulatory updates
- New upgrade scripts
- Certification with new third party products/versions
- 24 hour commitment and response guidelines for Severity 1 service requests as defined in "Section 9 - Severity Definitions" in the document titled "Oracle Software Technical Support Policies"
- Previously released fixes or updates that Oracle has withdrawn from publication. Older or existing published software bundles will remain available as archived content.

For the set of Oracle Technical Support Policies, visit: <https://www.oracle.com/support/policies.html>

For an explanation of the different support models (like Sustaining Support), visit: <https://www.oracle.com/support/lifetime-support/>

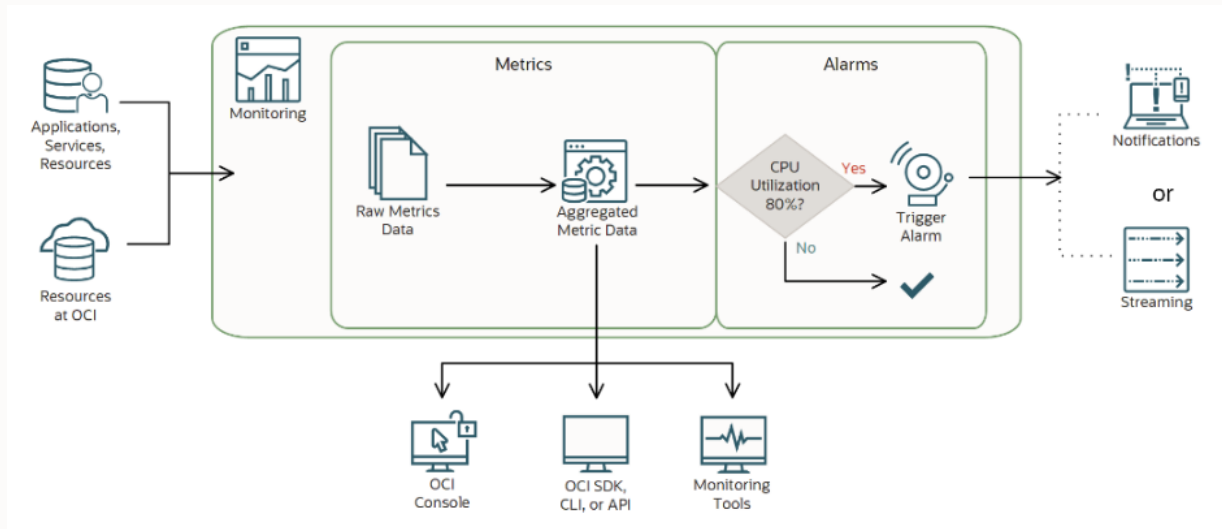
For customers that are currently using earlier versions of MySQL Enterprise Monitor, your options include:

- Use Enterprise Manager for MySQL. This is a free product for customers with a valid Oracle Support Contract.
For more info, visit: <https://blogs.oracle.com/observability/post/comprehensive-monitoring-and-compliance-management-for-mysql-databases-using-enterprise-manager>
- Use the database monitoring capabilities of the OCI Database Management service. For MySQL on-premises customers, this is a paid feature that will be released soon.
For more info, visit: <https://blogs.oracle.com/mysql/post/database-management-for-mysql-heatmap>



Monitoring MySQL databases in OCI

OCI monitoring service



OCI Console supports native monitoring and management of MySQL DB System in OCI

Metrics

- MySQL metrics to diagnose and troubleshoot problems
- Create alarms on key metrics based on thresholds

Events and Notification

- OCI Events can be used get informed about state change of MySQL resources.
 - Example: create/terminate, backup operations etc.
- Monitoring, events and notification service can also be integrated with third party services like Pager duty and Slack for operations management



Oracle Cloud Infrastructure Database Management Service

On-demand subscription based cloud service

Leading database performance diagnostics

- Combines back-end instrumentation and tools with visualization-driven interfaces
- Single pane of glass management view for databases deployed anywhere

Cloud native

- Fully managed by Oracle
- True cloud elasticity, low operations cost

Key use cases

- Monitor fleet of databases
- Real-time performance diagnostics
- Monitor databases deployed on multicloud or on-premises

The screenshot displays the Oracle Cloud Infrastructure Database Management Service interface for the eStore Compartment. The main heading is "Overview for eStore Compartment" with a sub-heading "Database Fleet Performance Diagnostics and Management". A dark blue banner contains the title and a brief description: "A single interface to monitor and manage Oracle and MySQL Databases. Database Management service provides comprehensive database performance diagnostics and management capabilities to:" followed by two bullet points: "• Monitor, analyze, and diagnose database performance" and "• Perform management tasks across a fleet or group of databases". Below this are links for "Pricing | Documentation" and "Documentation".

On the right side of the banner, a "GET STARTED" section lists "Enable Database Management for:" with three sub-points: "• Oracle Databases", "• Cloud Databases", and "• Autonomous Databases", followed by "• MySQL Databases".

The interface includes a left-hand navigation menu with sections: "Database Management" (containing Overview, Fleet Summary, Oracle, MySQL, Exadata Infrastructure, Database Groups, and Administration), "Related Features" (Operations Insights, Capacity Planning, Oracle SQL Warehouse), and "Scope" (Compartment dropdown set to eStore, with a sub-item "eStore (root)/eStore").

The main content area features several summary cards:

- Oracle Databases:** Total 2 DB, Enabled 1 DB, Disabled 1 DB.
- MySQL Databases:** Total 6 DB, Enabled 4 DB, Disabled 2 DB.
- Related Services:** Use [Operations Insights](#) for database capacity planning and forecasting.
- Fleet Summary:** Monitor the availability, performance, and resource summary of your fleet of [Oracle Databases](#) and [MySQL Databases](#).
- Database Groups:** Create a [group](#) of your mission-critical Oracle Databases to monitor and perform management operations on all the databases in the group.
- Administration:** Enable Database Management to monitor your [Oracle Databases](#) and [MySQL Databases](#).



Fleet monitoring and management

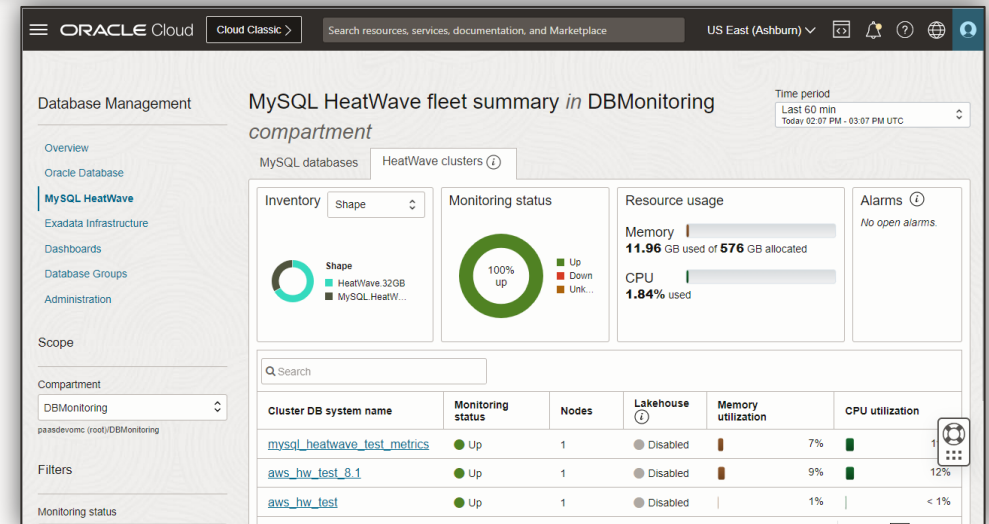
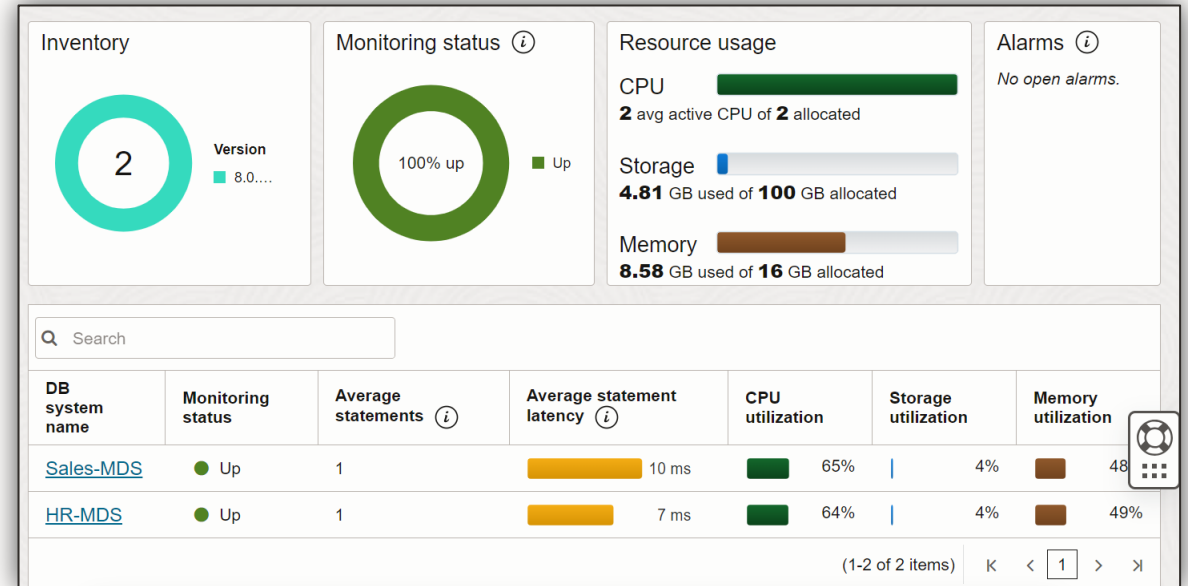
Unified fleet view of databases across Oracle Cloud and on-premises

- On the Fleet Summary page, you can monitor multiple Databases
 - MySQL, Autonomous, On-premises

Native OCI metrics for DevOps event alarms and monitoring

Drill down from the Fleet Summary page to a specific MySQL database of interest

Visualization-driven load and performance analysis



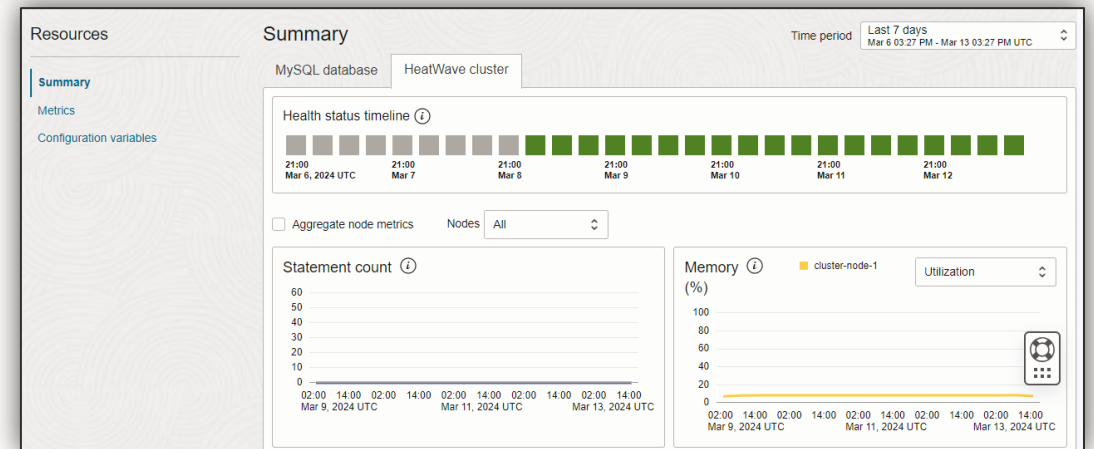
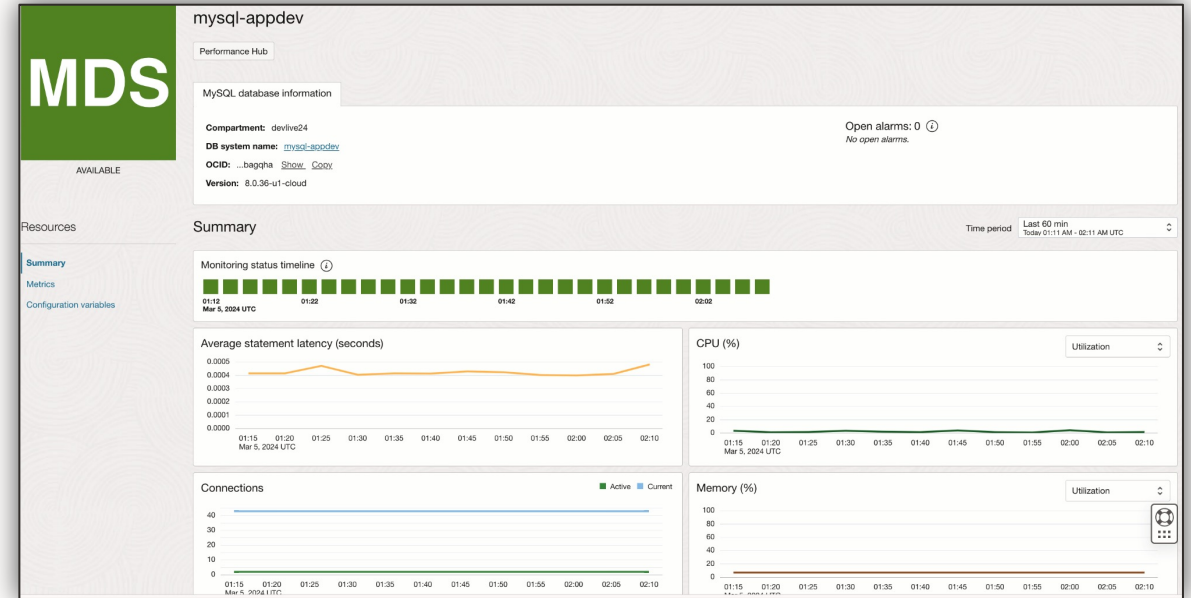
Performance summary

Drill down from the Fleet Summary page to a specific MySQL database of interest to monitor:

- Average statement latency
- CPU utilization
- Disk IOPS
- Memory
- Network throughput

Metrics page for detailed charts of all the available metrics for better co-relation

Configuration variables used by the running instances, view them by various filters, etc.



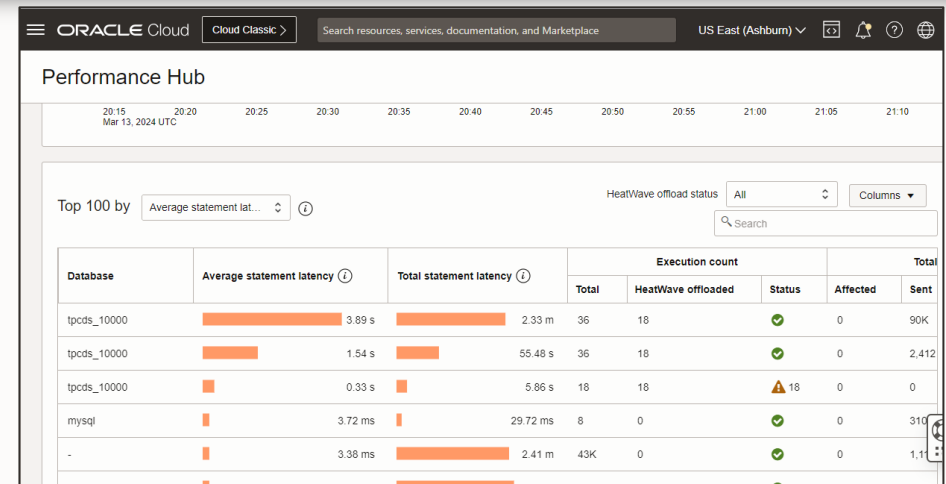
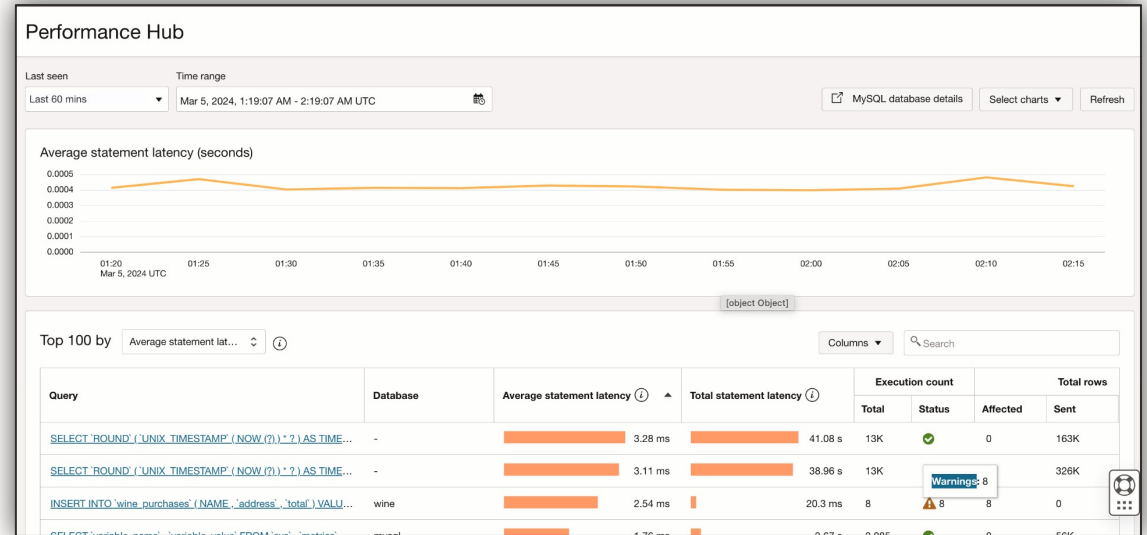
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Performance Hub for SQL performance management

Performance Hub: Find and Fix Problem Queries

Monitor and troubleshoot query performance

- Quickly identify expensive queries that impact the performance of their applications
- Visualize query activity to gain further insight into performance beyond query statistics
- Filter for specific query problems like full table scans and bad indexes using advanced global search options
- Filter for queries offloaded to HeatWave Cluster
- Fix the root causes of poor performance directly in the SQL code



Performance Hub: Find and Fix Problem Queries

Real-time aggregation of query content and performance statistics without relying on MySQL logs or SHOW PROCESS LIST

- Aggregated and searchable roll-ups of all queries
- Canonical form of all queries
- Total number of query executions
- Total execution time of queries
- Total data size of queries
- Date and time when a query was "first seen"

Top 100 by No index used Columns Search

Query	Database	Average statement latency	Total statement latency	Total
SELECT 'employees'.first_name, 'employees'.last_name,...	employees	12.24 s	1.36 h	399
SELECT @@version_comment LIMIT ?	-	116.36 µs	46.43 ms	399
SELECT SCHEMA(.)	-	51.02 µs	20.36 ms	399

Total	Execution count		Status	Total rows			Last seen	First seen	Temporary tables
	No index used	Affected		Sent	Examined				
399	0	0	✓	399	399	Sep 8, 2023, 4:38:08 PM UTC	Aug 28, 2023, 10:53:01 AM ...	0	
399	0	0	✓	399	399	Sep 8, 2023, 4:38:08 PM UTC	Aug 28, 2023, 10:53:01 AM ...	0	
399	399	0	✓	44M	3.326M	Sep 8, 2023, 4:38:17 PM UTC	Aug 28, 2023, 10:53:13 AM ...	399	



Performance Hub: Find and Fix Problem Queries

Analyzes data from Performance Schema to provide data about how statements generate their result sets drill down to specifics like:

- Table Lock time
- How many rows were examined versus returned
- How many temporary tables were created, and whether any were created on disk
- Whether range scans were done, and in what form they were done
- Whether sorting happened, how many rows were sorted, and what form the sort took

The screenshot displays the Performance Hub interface. On the left, a table lists top queries sorted by average statement latency. The selected query is an UPDATE statement. The right pane shows the SQL details for this query, including the normalized SQL, execution time statistics, row counts, and execution metrics.

Performance Hub

Top 100 by: Average statement lat... (i)

Query	Data
SELECT ROUND(UNIX_TIMESTAMP(NOW(7)) * ?) AS TIME...	-
SELECT ROUND(UNIX_TIMESTAMP(NOW(7)) * ?) AS TIME...	-
INSERT INTO `wine_purchases` (`NAME`, `address`, `total`) VALU...	wine
SELECT `variable_name`, `variable_value` FROM `sys`.`metrics`...	mysc
SHOW VARIABLES LIKE ?	-
SHOW GLOBAL VARIABLES WHERE `Variable name` IN (...)	-
SELECT SCHEMA_NAME, `digest`, `digest_text`, `count_star`, ...	mysc
SHOW GLOBAL STATUS LIKE ?	-
UPDATE `A1P_USERS` `U` SET `USR_CHECKOUT_COUNT` = `U`...	wine
SELECT UNIX_TIMESTAMP(NOW()) - CAST(`variable_valu...	-

SQL details

Statement digest: ...de1370e3414b98926304 [Show](#) [Copy](#) Database: wine First seen: Mar 4, 2024, 6:54:07 PM UTC
Last seen: Mar 5, 2024, 2:10:59 AM UTC

Normalized SQL:

```
UPDATE `A1P_USERS` `U` SET `USR_CHECKOUT_COUNT` = `USR_CHECKOUT_COUNT` + ? WHERE `USR_USERID` = ?
```

Execution time

Total: 2.94 ms
Average: 367.77 µs
Maximum: 587.4 µs
Minimum: 272.72 µs
Total lock time: 19 µs
Quantile 95%: 602.56 µs
Quantile 99%: 602.56 µs
Quantile 99.9%: 602.56 µs

Rows

Total affected: 0
Total sent: 0
Total examined: 0

Executions

Total: 8
No index used: 0
No good index used: 0
Errors: 8
Warnings: 0

Temporary tables

Tables: 0
Disk tables: 0

Selects

Full join: 0
Full range join: 0

Sorts

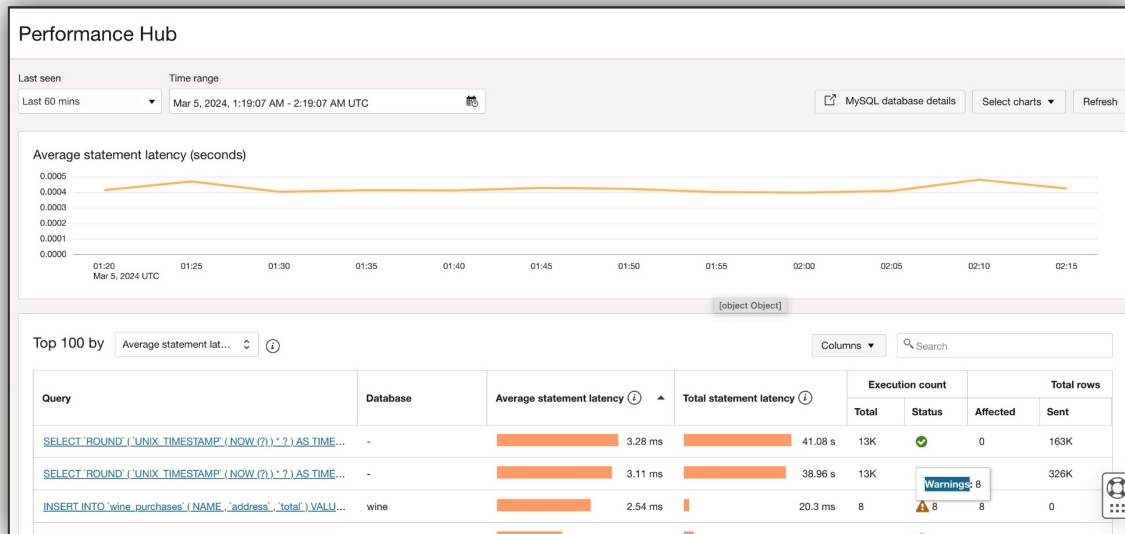
Merge passes: 0
Range: 0



Performance Hub: Find and Fix Problem Queries

Problem scenarios:

- Queries with high execution times
- Queries a high number of rows



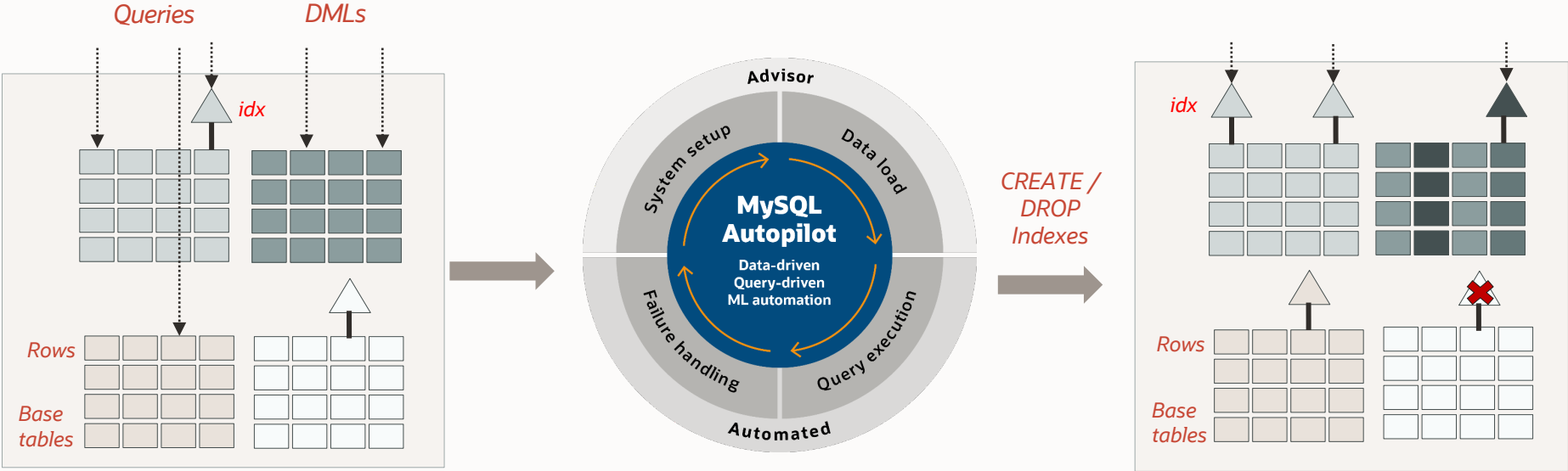
Solution approach using Performance Hub

- Identify queries with high execution times and small result sets
- Check if these queries are querying a large number of rows
- Determine if non-indexed columns are being used in the query
- Optimize the query by simplifying it or using indexed columns
- Monitor the performance of the query after optimization to ensure that the execution time has improved.



MySQL Autopilot indexing (Coming soon)

Recommends secondary indexes for OLTP workloads



Autopilot Indexing (Coming soon)

ML automation with MySQL HeatWave

Features

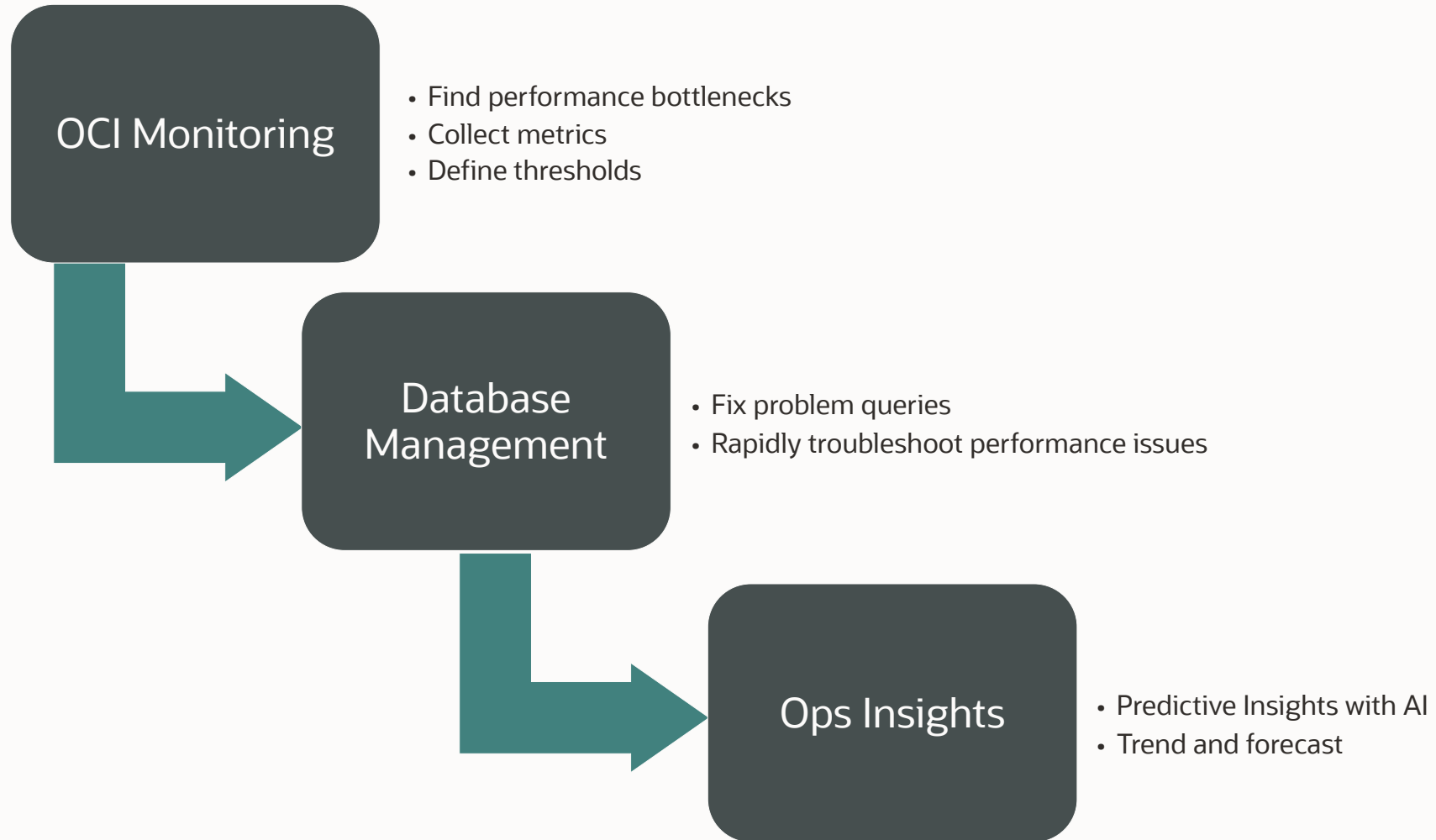
- ML-based feature designed to help optimize database systems for better cost and performance
- Considers both query and DML performance
- Recommends CREATE and DROP of indexes
- Generates DDLs for index creation/drop
- Provides performance prediction
- Provides storage prediction
- Continuous learning and adapting

Benefits

- DBAs no longer need to manually identify the secondary indexes for the database workload.
- Considers both the query performance and the cost of maintaining the indexes
- Predicts expected improvement without creating the indexes
- Provides explanation for the recommendations
- Oriented by performance objectives: throughput, latency, storage

New Capabilities for MySQL Database Management

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Predictive Insights

Predict demand from changing workloads

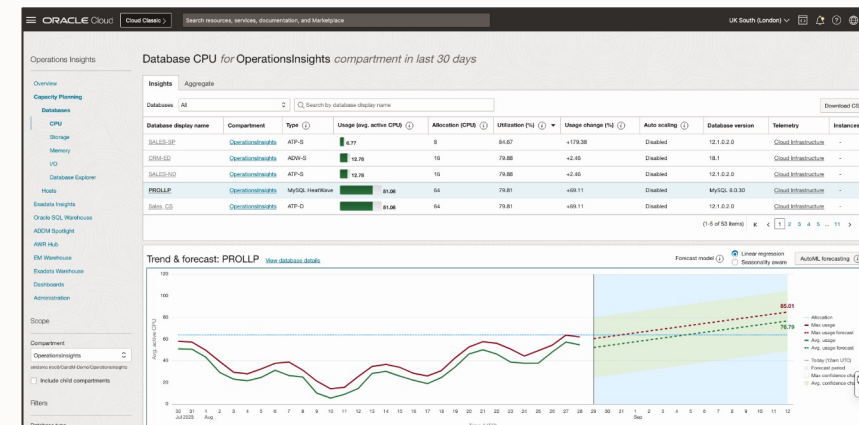
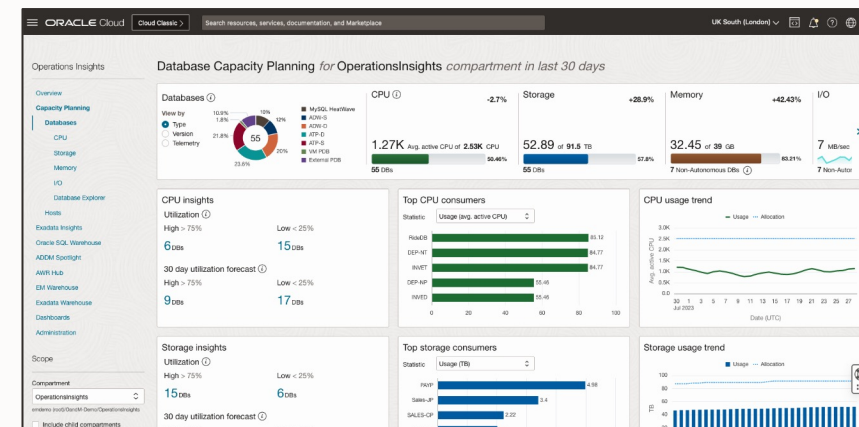
Forecast demand for changing workloads

- Max and average demand forecasts
- Machine learning seasonality models
- Automatic prediction of near-term issues

Quickly isolate the largest, most utilized, and fastest growing databases

Identify under-utilized and over-allocated footprint for right sizing

Insights and recommendations to right size your infrastructure and optimize resource utilization



Predictive Insights

Insights into SQL performance

Detect performance degradation in business-critical SQL

Correlate performance

Aggregate and compare across databases

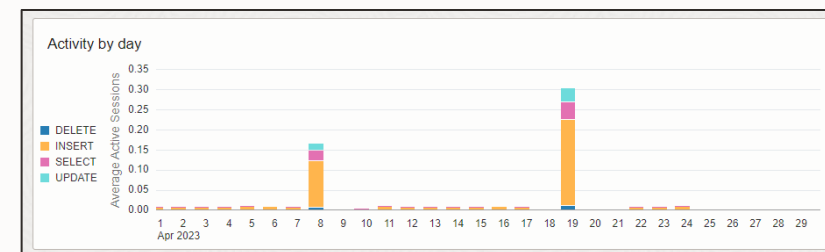
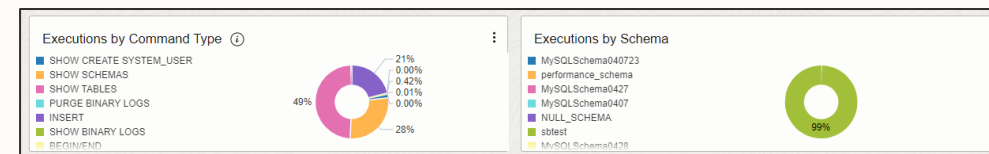
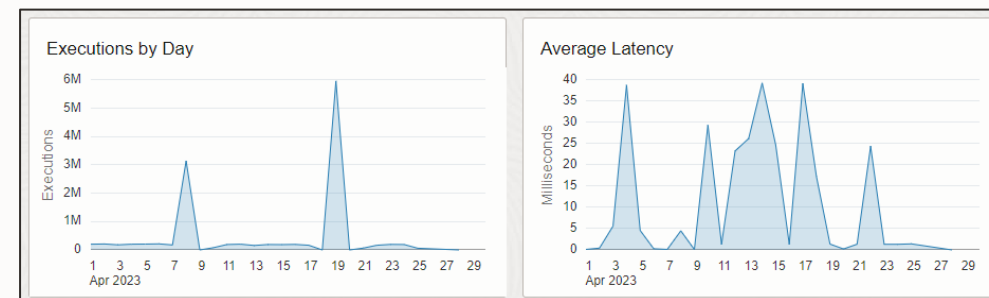
Identify application scalability and inefficiency issues

Trend and forecast metrics seasonality via custom analytics for solving specific issues

- Detects causes, measure effects, then correlates them
 - Causes: workload changes, configuration changes
 - Effects: regressed SQL, reach resource limits (CPU, I/O, memory)

Top Statements by Average Latency

SCHEMA_NAME	DIGEST	COMMAND_TYPE	LATENCY	AVG_LATENCY_SECS	CPU_TIME	DB_TIME	AVG_ROWS_EXAMINED	AVG_ROWS_AFFECTED	AVG_FULL_SCANS	AVG
performance_schema	582031a4179500f149f1100073fbb230e343060707e207cc15991d83451eb	SELECT	539.742	1.535	504.873	539.742	2.950.261	0	1	
performance_schema	29279e79f124ab86d7511b112128020a5acc10568f08b6b3cc700107c0f96011	SELECT	33.507	0.098	30.995	33.507	1.816.035	0	1	
stbest	05c4e8b0554e4e314ab628907b6874a9e40473204752a236378448a268	SELECT	81.23	0.044	6.318	81.23	400.991	0	0	
stbest	ab0a0018aa9d714946824a3055a15c58e448c96e64acc2a5418c3707e4	SELECT	61.718	0.041	6.440	61.718	400.95	0	0	



Maximizing reliability with **automated proactive monitoring**

MySQL HeatWave service finds the problems before you do

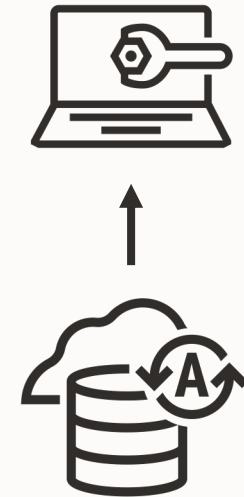
Oracle Cloud Operations uses continuous monitoring for each database:

8000+ metrics and 1500+ alarms

- Much broader than any on-premises customer
- Consolidated monitoring of entire stack: infrastructure, load balancer, connection manager, database

Automatic service requests are generated for each deviation

- Immediate investigation and resolution by cloud ops
- Root cause analysis for every issue
- Zero customer actions required



DEMO

Oracle Cloud Observability and Management Platform

ORACLE
Cloud Infrastructure

Microsoft
Azure

aws

On-Premises



Observability and Management Advanced Services



Application Performance Monitoring



Stack Monitoring



Logging Analytics



Database and OS Management



Capacity Planning SQL Insights

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