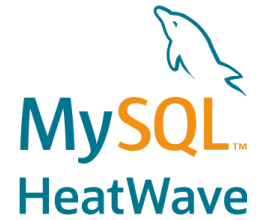# ORACLE

MySQL HeatWave

One MySQL cloud database service for transactions, real-time analytics, and machine learning—without ETL

#1 Open Source Database in Oracle Cloud, AWS, and Azure

Looking to simplify your database infrastructure while getting real-time analytics and lowering costs?

MySQL HeatWave is the only cloud database service that combines transactions, real-time analytics across data warehouses and data lakes, and machine learning into one MySQL Database—without the complexity, latency, risks, and cost of ETL duplication.

The simplicity of transaction, real-time analytics, and machine learning in one cloud database service

Eliminate the cost and complexity of separate analytics database, lakehouse, ML, and ETL services. Query data in MySQL, in object storage, or across both. Avoid the latency and security risks of data movement between data stores.

Unmatched performance and price performance

MySQL HeatWave is 4X faster than Amazon Redshift with 10X better price-performance, 4X faster than Snowflake with 15X better price-performance, and 1,400X faster than Amazon Aurora with 2,200X better price-performance.

Ready for the distributed cloud

Deploy MySQL HeatWave on OCI, AWS, Azure, or in your data center.

ORACLE CLOUD Infrastructure aws

Open Source in the Enterprise

The 2022 survey published in The State of Enterprise Open Source report[1] found that among developers and businesses:

- 95% considered enterprise open source important

- 89% believe enterprise open source is as or more secure than proprietary software

- 76% use enterprise open source to more easily adopt a hybrid cloud infrastructure

Through 2025, more than 70% of enterprises will increase their IT spending on open source software, compared with their current IT spending, according to Gartner's 2021 "Hype Cycle for Open-Source Software."

Open source technologies are often adopted to get applications into production faster. Projects are frequently unfunded or need instant IT approval. Projects start small and solve an immediate need, but over time many evolve into business-critical applications. Success with the initial use of MySQL generally translates into additional MySQL projects.

As organizations consolidate and standardize on a select few IT technologies, MySQL becomes a strategic part of their technology infrastructure.

[1] Red Hat, February 2022: The State of Enterprise Open Source

The #1 Choice for Developers

Which databases have you used in the last 12 months? (JetBrains; SQL is primary)[2]

Database	Percentage
MySQL	64%
PostgreSQL	48%
Redis	36%
MS SQL Server	32%
SQLite	30%
MongoDB	28%
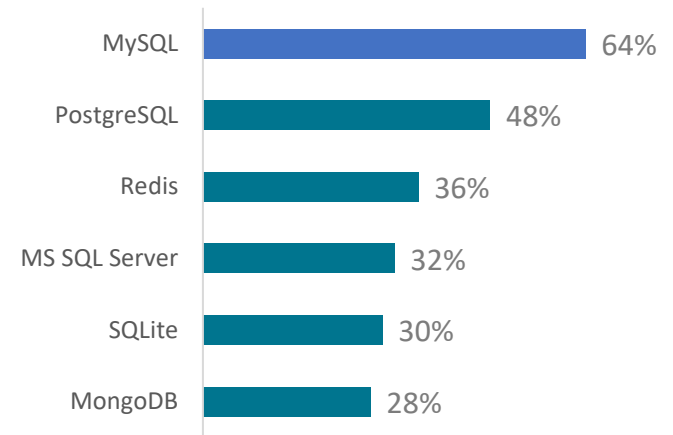
JetBrains ranks MySQL as the most popular database among developers. Its leadership position translates into an entire ecosystem of tools and applications that support MySQL, as well as a very large number of developers and DBAs with extensive MySQL experience and skills.

[2] JetBrains, The State of Developer Ecosystem 2022

Innovative Enterprises Across Many Industries Run MySQL

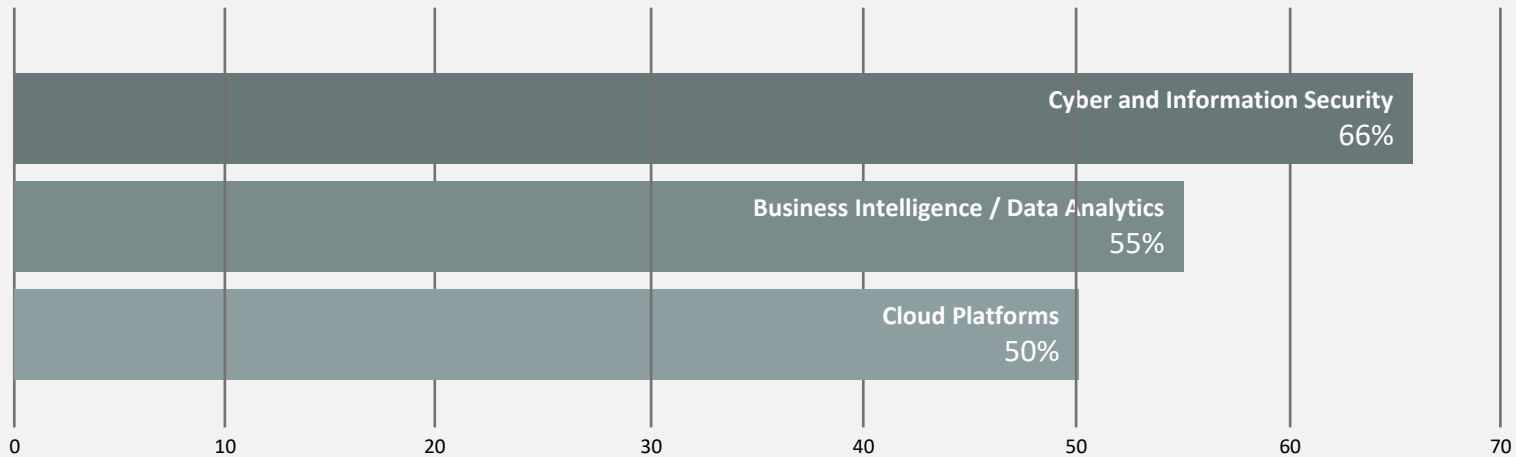| Social	eCommerce	Tech	Finance	Manufacturing
facebook	Booking.com	APPDYNAMICS part of Cisco	Bank of America	TESLA
X	NETFLIX	GitHub	J.P.Morgan	Volkswagen
LinkedIn	UBER	HubSpot	citi	TOYOTA
WeChat	airbnb	zendesk	Fidelity INVESTMENTS	CAT
Pinterest	淘宝网 Taobao.com	intuit mint	VISA	
	阿里巴巴 Alibaba.com	New Relic	CA	

CIOs' Top Areas of Increased Investment

Cyber and Information Security
66%

Business Intelligence / Data Analytics
55%

Cloud Platforms
50%

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 |

1. Cyber and Information Security   66%

2. Business Intelligence / Data Analytics   55%

3. Cloud Platforms   50%

Data: Your Most Valuable Asset

In today's digital world, data is arguably your organization's most valuable asset.

Data is about your customers, employees, and partners. Data is about your IP, mergers and acquisitions, strategy, as well as sales figures.

The data might be generated by your organization, or it might have been entrusted to you, such as PII (Personally Identifiable Information), PCI (Payment Card), or PHI (Personal Health Information) data.

Your data presents great value for thieves, state-sponsored criminals, and malicious insiders who will do anything to obtain it.

Recent Data Breach Statistics

$4.35 million

was the average cost of a data breach

$164

was the average per record cost of a data breach

277 days

was average time to identify and contain a data breach

83% of organizations

have had more than one data breach

60% of organizations'

breaches led to increases in prices passed on to customers

45% of breaches

were cloud-based

Source: 2022 Cost of a Data Breach Report (IBM)

Security and Compliance

Always Up to Date with the Latest Security Fixes. Get the latest MySQL security updates from the MySQL Engineering Team to limit your exposure to security vulnerabilities.

Advanced Security Features to Help Meet Regulatory Requirements. Access built-in MySQL security features to help you protect data and comply with governments' data privacy laws and regulatory requirements for GDPR, HIPAA, etc.

A Fully Managed Service

MySQL HeatWave is a fully managed service. It enables you to:

- Instantly provision and connect to production-ready, pre-configured MySQL HeatWave instances.

- Automate database management tasks such as configuration, security patching, backup, and monitoring.

- Accelerate MySQL performance by orders of magnitude for analytics and mixed workloads with the HeatWave in-memory query accelerator.

- Query data in the object store.

- Deliver high availability with automatic failover.

- Build, train, deploy, and explain machine learning models with in-database ML.

- Save significant time and effort for developers, DBAs, and DevOps teams with machine learning-powered automation.

- Monitor the health of your resources, optimize the performance of your applications, and respond to anomalies in real time.
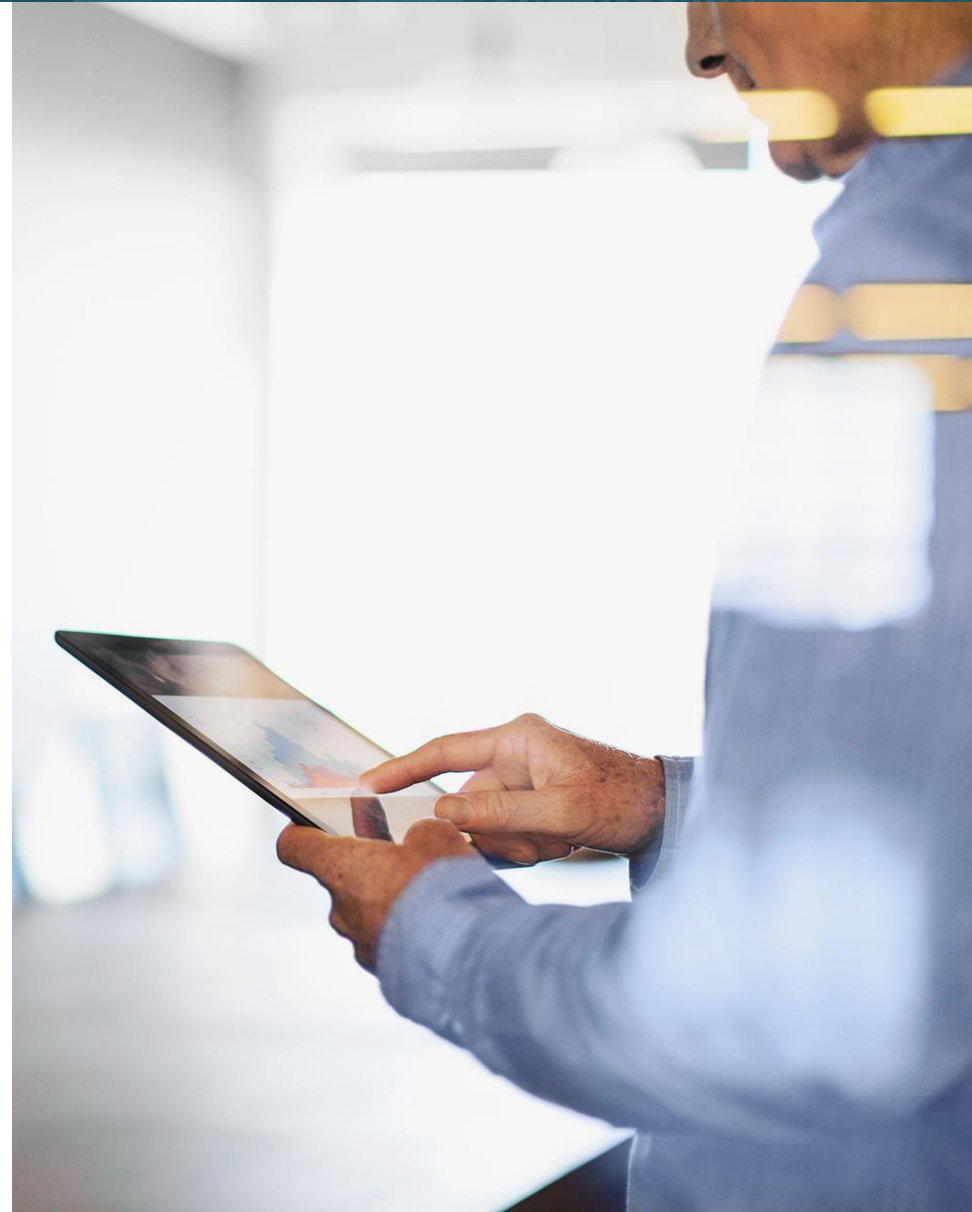
100% Developed, Managed, and Supported by Oracle

MySQL HeatWave: fully managed database service

	Automation	MySQL HeatWave
Database	High Availability	✅
	Read Replicas	✅
	Backup	✅
	Query Acceleration	✅
	MySQL Autopilot	✅
	HeatWave AutoML	✅
	HeatWave Lakehouse	✅
	Security Patch & Upgrade	✅
	Provision & Configure	✅
OS	OS Security Patch & Upgrade	✅
	OS Installation	✅
Server	Hardware Purchase & Maintenance	✅
Storage	Storage Purchase & Maintenance	✅
Data Center	Rack & Space	✅
	Power, HVAC, Networking	✅

Native High Availability
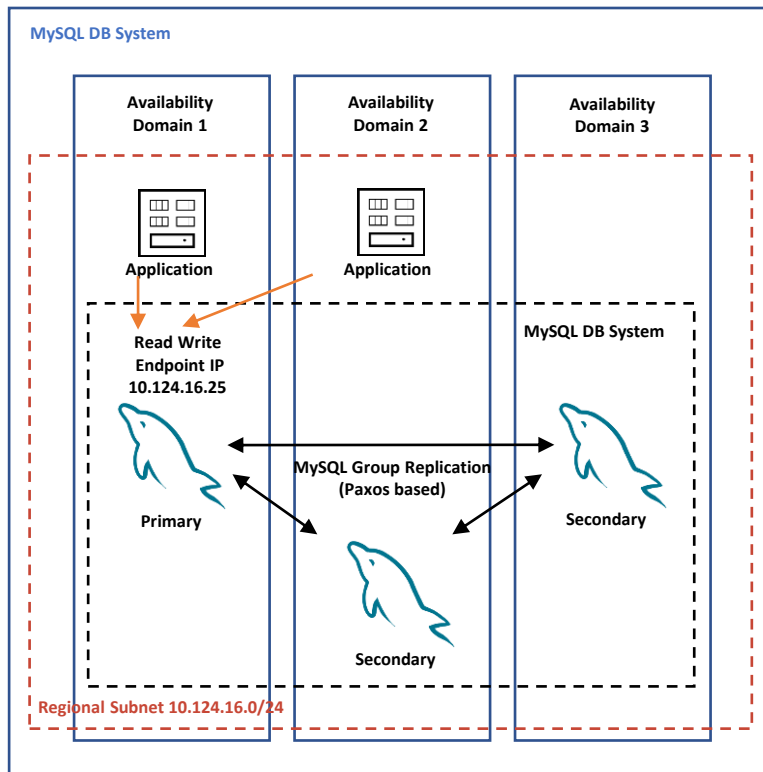
MySQL HeatWave uses native MySQL Group Replication for High Availability

Increased uptime

To achieve high availability, the database system must be resilient to many types of failures such as server, network, power, or entire data center. Companies can protect their data and ensure business continuity using native MySQL HA technologies with automatic failover. For ultimate high availability, MySQL HeatWave optimizes the placement of database instances in different Availability and Fault Domains.

Zero data loss

Built on native MySQL Group Replication, MySQL HeatWave includes 3 MySQL instances provisioned and spread across different physical locations. One instance is the "primary" instance, accepting the database traffic, while the "secondary" instances stand ready to take over the database traffic in case of failure, without any data loss.

66

When Oracle delivered its superfast version of MySQL, called MySQL HeatWave, we decided not to just deliver it inside the Oracle Cloud but also make it available to AWS users on AWS, and to also make it available to Azure users. Taking a service and making it available on multiple clouds."
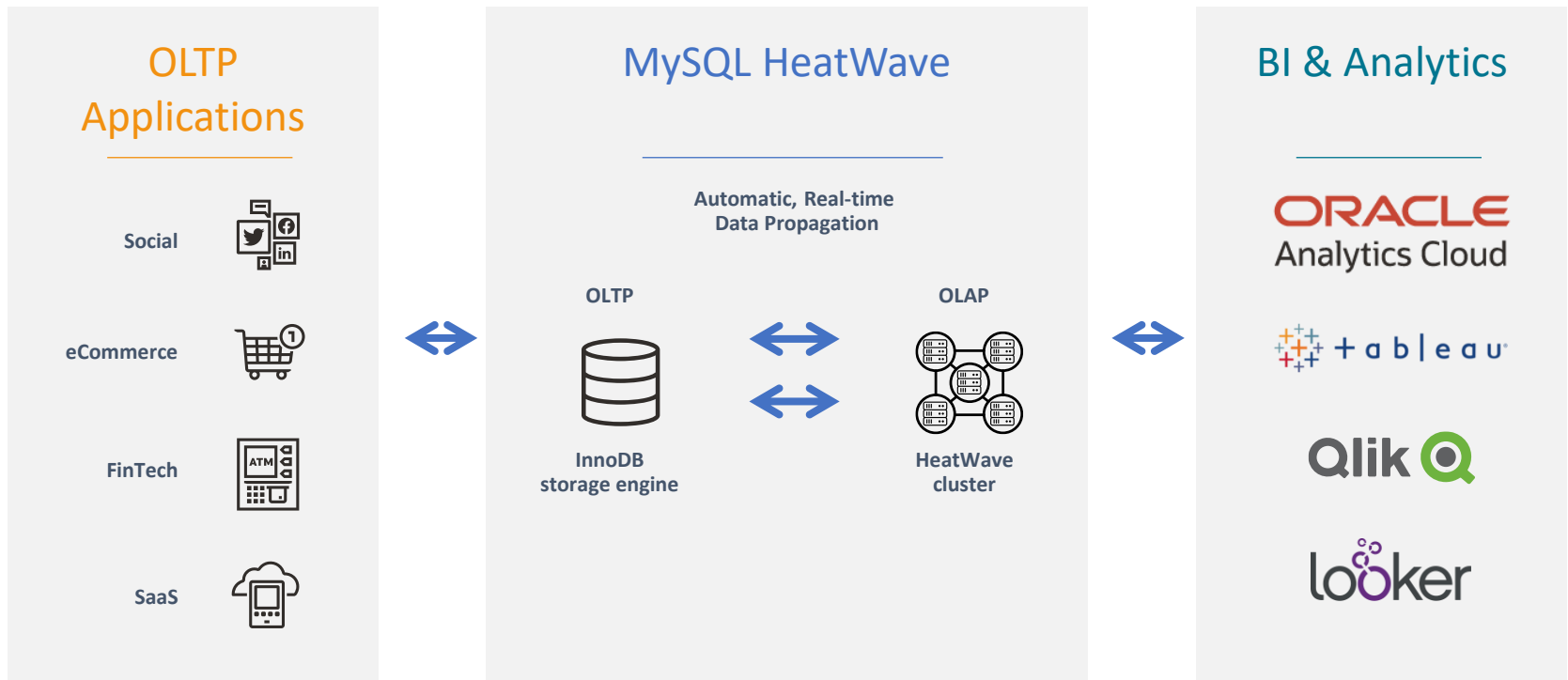
Larry Ellison

ORACLE CLOUD
Infrastructure

aws

Single MySQL Database for OLTP and OLAP

Customers can run both OLTP and OLAP workloads in MySQL without the need to move data out of MySQL databases (no ETL) and without requiring any proprietary syntax or changes to their applications.
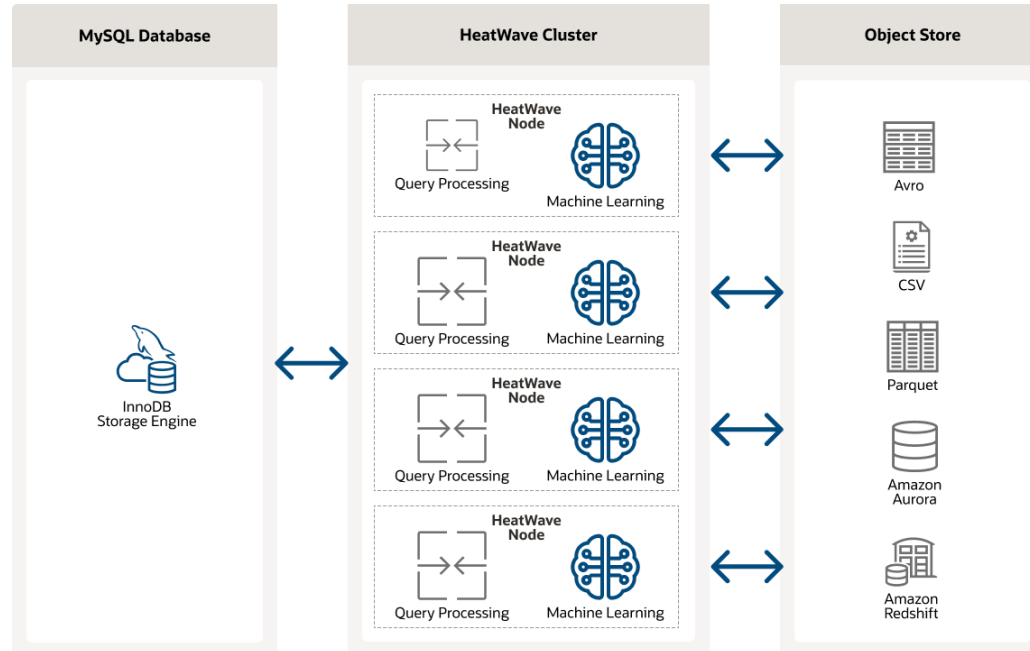
OLTP Applications

Social

eCommerce

FinTech

SaaS

MySQL HeatWave

Automatic, Real-time Data Propagation

OLTP

OLAP

InnoDB storage engine

HeatWave cluster

BI & Analytics

ORACLE Analytics Cloud

+ableau

Qlik Q

looker

MySQL HeatWave Lakehouse: Fast Analytics on All Data

MySQL HeatWave Lakehouse enables customers to query half a petabyte of data in the object store—in a variety of file formats, such as CSV, Parquet, Avro, and export files from other databases.

- Query data in MySQL, in the object store, or across both—using standard SQL syntax

- Up to 500 TB of data; the HeatWave cluster scales to 512 nodes – an industry first

- Querying data in the object store is as fast as querying the database

- Scale out data processing in the object store, data is not copied to the MySQL Database: for both MySQL and non-MySQL workloads

MySQL Autopilot: Machine Learning-Powered Automation

Advisor

System setup
- Auto provisioning
- Auto shape prediction
- Auto schema inference
- Adaptive data sampling

Data load
- Auto parallel loading
- Auto data placement
- Auto encoding
- Auto unload
- Auto compression
- Adaptive data flow

MySQL Autopilot
Data-driven
Query-driven
ML automation

Failure handling
- Auto error recovery

Query execution
- Auto scheduling
- Auto change propagation
- Auto query time estimation
- Auto query plan improvement
- Adaptive query execution
- Auto thread pooling

Automated

MySQL Autopilot provides workload-aware, machine learning-powered automation of various aspects of the application lifecycle, including provisioning, data loading, query execution, and failure handling. It also provides capabilities designed for OLTP workloads, which further improve MySQL HeatWave price performance compared to Amazon RDS and Aurora.

MySQL HeatWave AutoML: Native, In-Database Machine Learning

HeatWave AutoML delivers native, in-database machine learning, enabling developers and data analysts to build, train, and deploy machine learning models within MySQL HeatWave. HeatWave AutoML delivers predictions with an explanation of the results, helping organizations with regulatory compliance, fairness, repeatability, causality, and trust.

- Accelerate ML initiatives, increase security, and reduce costs.

- Build machine learning models using familiar SQL commands or a visual interface (no coding).

- Apply ML training, inference, and explanation to data stored inside MySQL HeatWave and in object storage.

- Leverage integration with popular notebooks such as Jupyter and Apache Zeppelin.
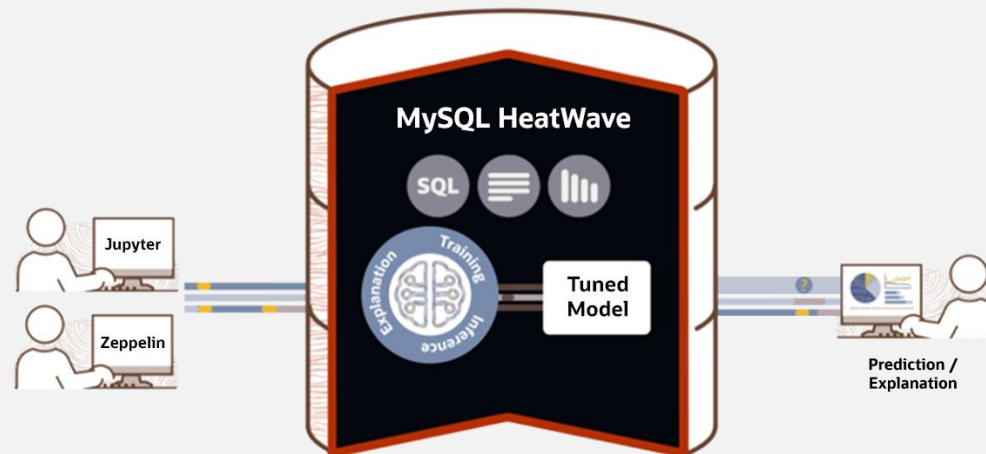
HeatWave AutoML automates the machine learning lifecycle.

Get the highest level of MySQL expertise.

MySQL Support together with Oracle Premier Support and the industry's most experienced MySQL Engineers provide a unified support solution for both cloud infrastructure and MySQL. It includes:

- 24/7 production support in 29 languages

- Unlimited support incidents

- Knowledge base and maintenance releases

- Bug fixes, patches, and updates

- MySQL consultative support

No other cloud vendor can deliver such comprehensive support for the MySQL database.

Sam.ai helps clients make decisions at the speed of thought

SAM

> 66
>
> With the performance of Oracle MySQL HeatWave Database Service on OCI, Sam.ai can analyze data and answer questions that it couldn't on AWS. It has given us an unmatched competitive advantage at a predictable cost, especially for our SAM HQ product for enterprise clients."

Raz Choudhury

Founder and CEO
Sam.ai

66

With MySQL HeatWave we improved database performance by 10X and significantly dropped our costs after migrating from Amazon Aurora. We also did not have to modify our application for a great experience."

Kanami Suzuki

Developer
FANCOMI

FANCOM:

"
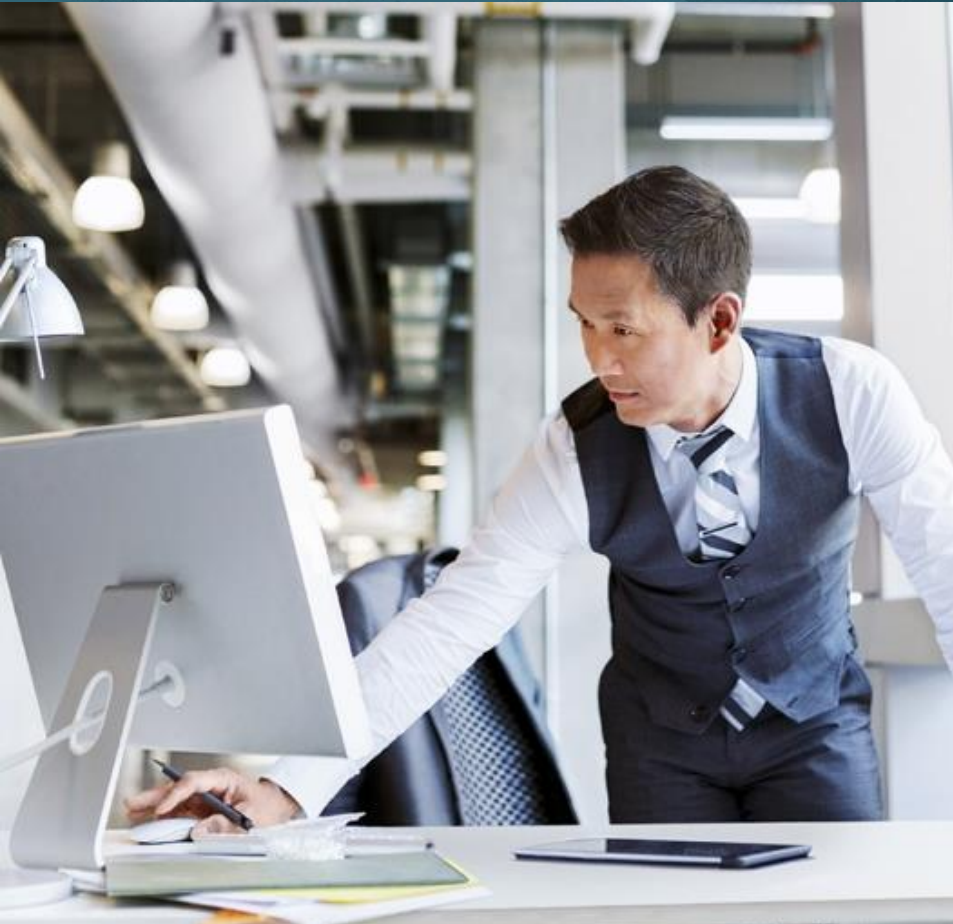
MySQL HeatWave provides us with a very efficient and fast way to explore and use data. We can now run more than one million customer dashboard queries in a few seconds. Plus, by moving from AWS Redshift to Oracle MySQL HeatWave, we have reduced our total cost of ownership by at least 30%."

WAVENET
潮 網 科 技

Hung Chih Chieh

Chief Technology Officer
Wavenet Technology

Fintech startup deployed MySQL HeatWave on OCI to deliver real-time trading to retail investors

> **"** Our business model is contingent on getting very fast query times from the database to reduce our latency between the exchange and the subscriber. We chose MySQL HeatWave on OCI. Compared to Amazon RDS and Redshift, it has pretty much everything. It's faster, it's cheaper, and it's more reliable."

Grant Peace

Business Founder
Exchange Speed Pty Ltd

> **"** Without a doubt, Oracle has helped us sell our loan default solutions to credit institutions throughout Colombia and beyond thanks to the automated machine learning engine within MySQL HeatWave, and to the high availability and scalability of Oracle Cloud Infrastructure."

Yelitza Romero

CEO
Aicoll

Teyuto boosts customer experiences with recommendation engines built on MySQL HeatWave

> 66
> For me, HeatWave is the future because of its machine learning integrated within MySQL with immense power. It's astounding and the speed is remarkable. MySQL HeatWave AutoML has it all."

Marcello Violini

CEO & Founder
Teyuto S.r.l.

teyuto

"

MySQL HeatWave on AWS simplifies our data platform with a consolidated database for both transaction processing and analytics. We have seen 60 to 90X faster complex queries compared to AWS RDS and Aurora that generates real-time analytics we need for targeted, multichannel campaigns. We now have greater scalability to onboard more data and new clients of any size without increasing IT administration."

Thomas Henz

Chief Executive Officer
Johnny Bytes

> **❝** MySQL HeatWave on AWS has 50X faster complex queries compared to AWS RDS. That not only provides us with real-time insights to accelerate application development, but also helps us improve patients' lives."

Kyle Yang

Assistant Manager
Bionime

Centroid Systems expands with 15x query performance gains

> " We found MySQL HeatWave on AWS improved query performance by 15X with no changes to our application compared to using MariaDB on AWS RDS. With MariaDB for analytics along with Tableau for visualization, we had been experiencing multiple outages because of the volume of data and patches impacting the SQL query performance. The performance gains from MySQL HeatWave gave our business confidence to expand and bring more offerings to the market."

Ajay Arora

Chief Technology Officer
Centroid Systems

MySQL HeatWave vs. Amazon Aurora

4TB TPC-H

Query Performance
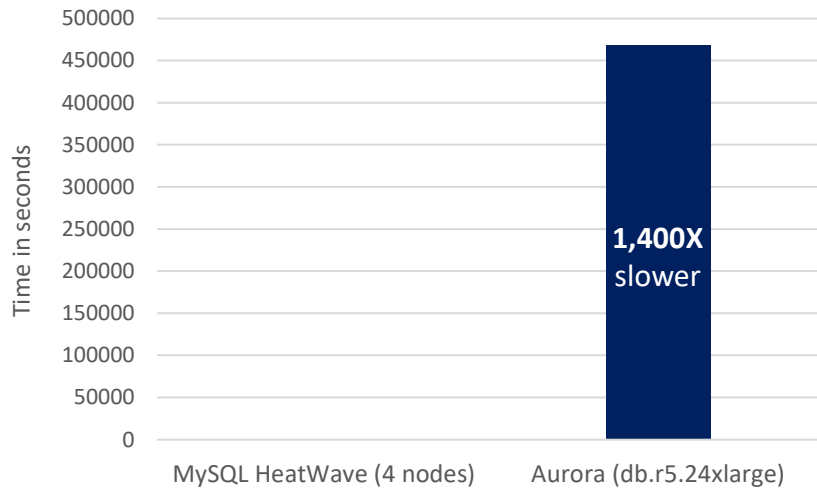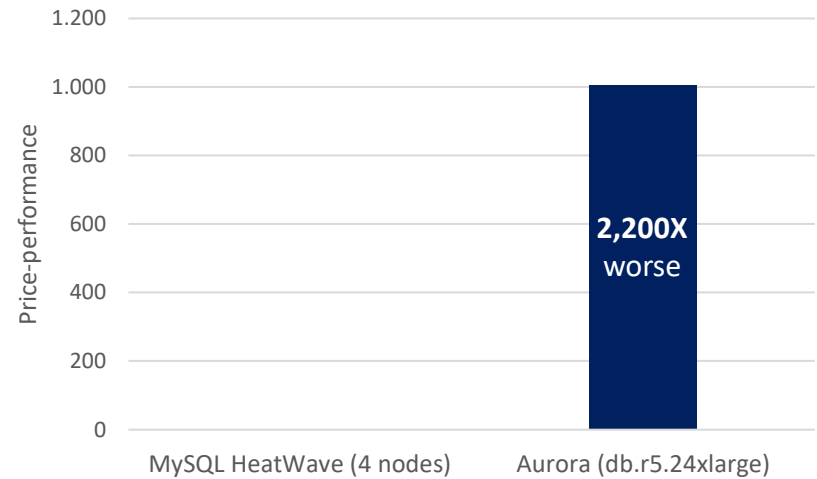
Query Price/Performance

MySQL HeatWave vs. Amazon Redshift

10TB TPC-H

Query Performance

Query Price/Performance

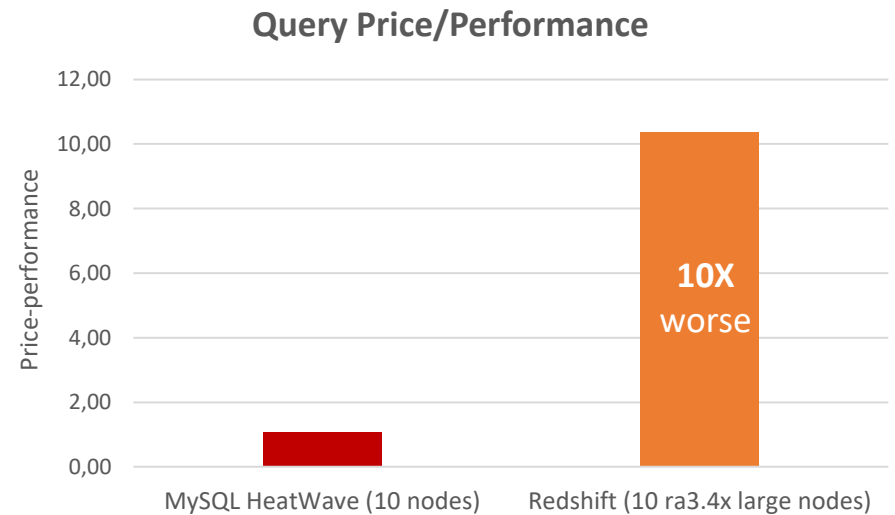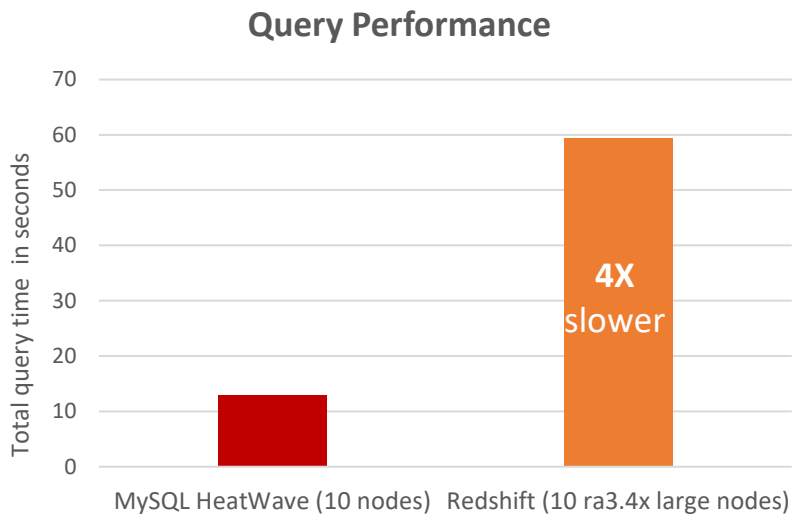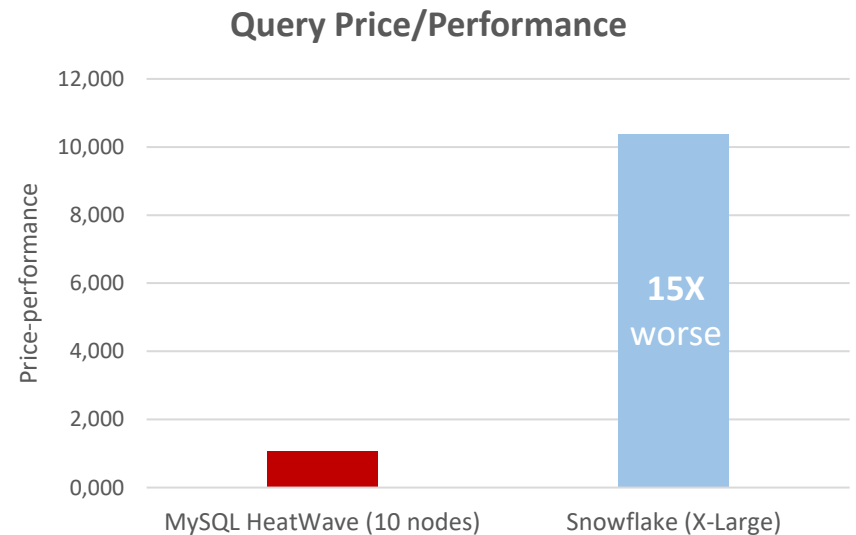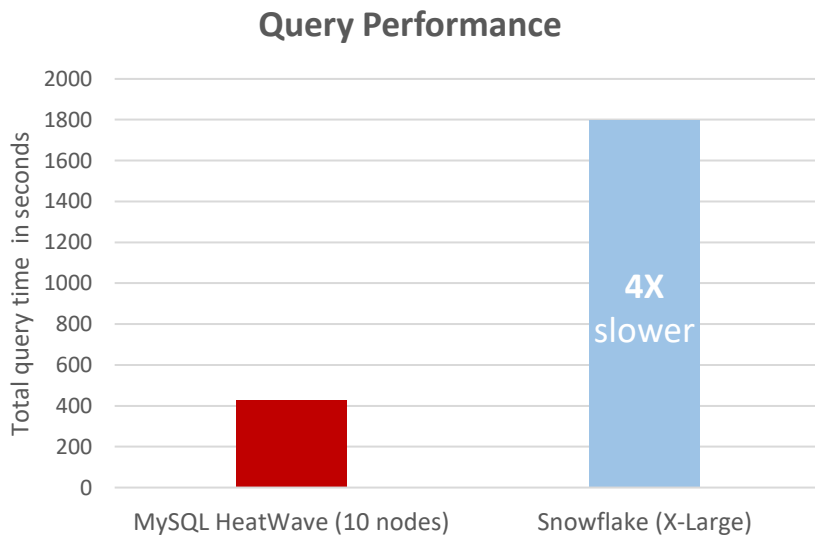https://www.oracle.com/mysql/heatwave/performance-benchmarks/
Benchmark queries are derived from the TPC-H benchmark, but results are not comparable to published TPC-H benchmark results since they do not comply with the TPC-H specification.

MySQL HeatWave vs. Snowflake

10TB TPC-H

https://www.oracle.com/mysql/heatwave/performance-benchmarks/
Benchmark queries are derived from the TPC-H benchmark, but results are not comparable to published TPC-H benchmark results since they do not comply with the TPC-H specification.

MySQL HeatWave Lakehouse Performance Comparison
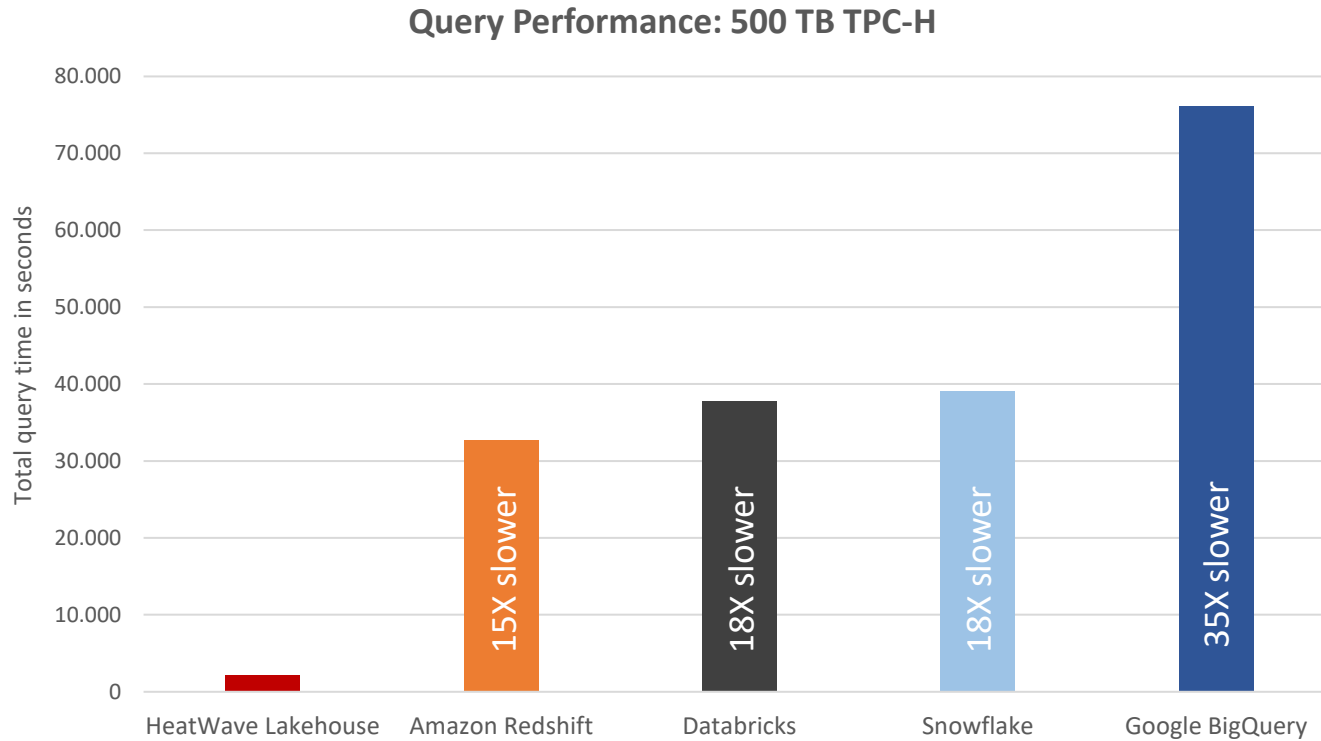

Query Performance: 500 TB TPC-H

Total query time in seconds

- HeatWave Lakehouse
- Amazon Redshift — 15X slower
- Databricks — 18X slower
- Snowflake — 18X slower
- Google BigQuery — 35X slower

MySQL HeatWave Lakehouse Performance Comparison
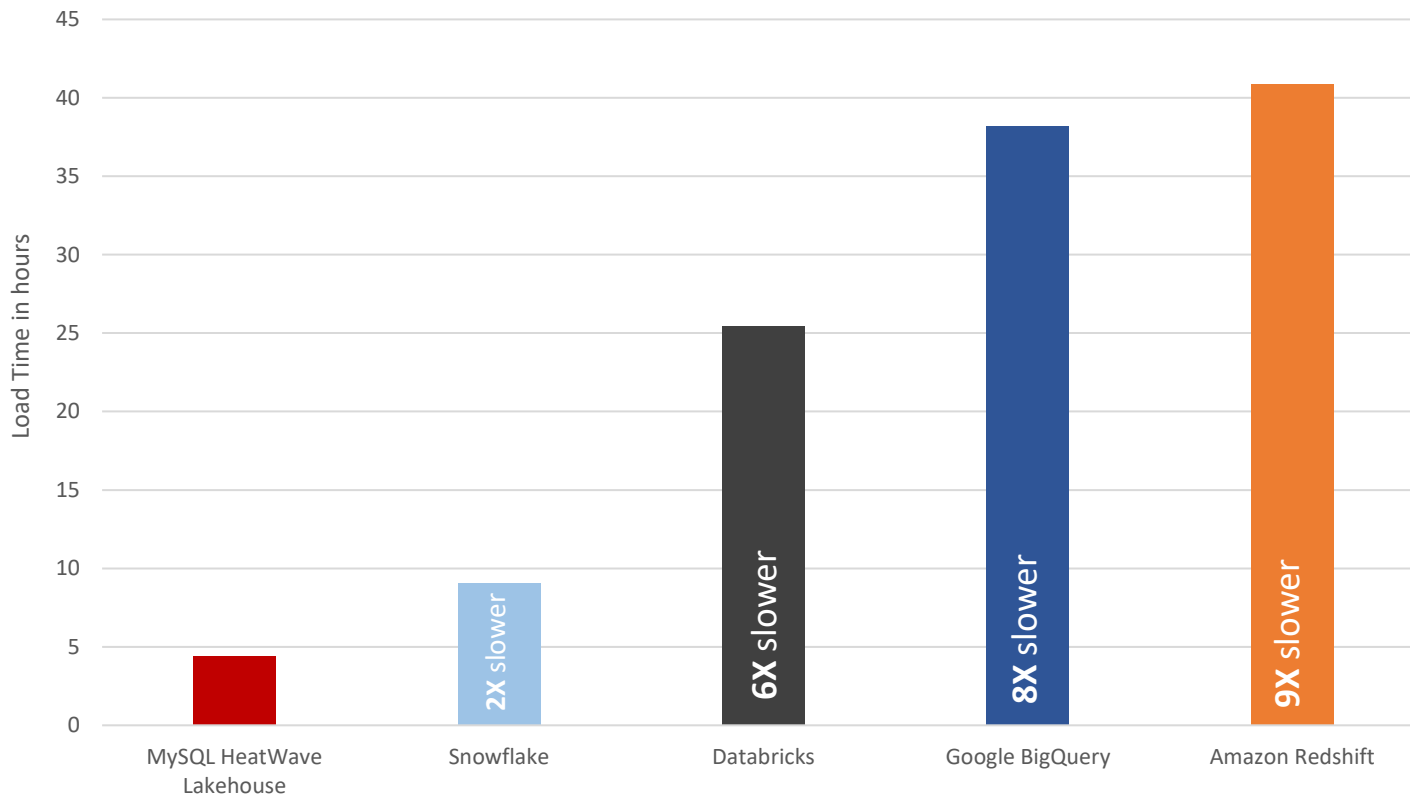
Load Performance: 500 TB TPC-H

Benchmark queries are derived from the TPC-H benchmark, but results are not comparable to published TPC-H benchmark results since they do not comply with the TPC-H specification.

Benefits Across the Organization

Developer

- Accelerate time to market with a single database for OLTP, real-time analytics across data warehouses and data lakes, and ML—avoiding the complexity of ETL duplication.

- Easily add ML capabilities to provide recommendations and enable smart apps.

- Develop in your favorite language (Java, PHP, Python, Ruby, NodeJS, etc.). Work with your open source apps of choice (WordPress, Drupal, Magento, Joomla, and more).

Data Analyst/Scientist

- Automate the machine learning lifecycle with HeatWave AutoML.

- Train models 25X faster than with Amazon Redshift ML.

- Use popular notebooks such as Jupyter and Apache Zeppelin or a built-in visual interface.

DBA

- Simplify your infrastructure with a single database for OLTP, real-time analytics across data warehouses and data lakes, and ML.

- Meet performance and uptime SLAs with higher performance than Amazon RDS, Aurora, Redshift, Snowflake and real-time elasticity with no downtime/read-only time.

- Save significant time with ML-powered automation (MySQL Autopilot).

VP of IT

- Lower costs with MySQL HeatWave—Price-performance is 10X better than Redshift, 15X better than Snowflake. Eliminate separate analytics databases, ML services, and ETL processes.

- Enable business teams to make better and faster decisions with real-time analytics across all data.

- Avoid the risks of data movement between data stores. Protect data and help ensure regulatory compliance with built-in advanced security features.

Industry Analysts about MySQL HeatWave

IDC

"May very well be the single greatest innovation in open source cloud databases in the past 20 years."

CLOUD WARS

"One MySQL HeatWave database is simpler than two from AWS plus all the associated ETL tools and data movers—that's a fact, not an opinion."

FUTURUM.

"MySQL HeatWave represents the fiscally responsible approach to cloud databases while AWS Redshift and Snowflake represent the fiscally reckless approach."

MOOR INSIGHTS & STRATEGY

"You can spend $80K on HeatWave and that would cost you $420K to run on Snowflake. It's a no brainer..."

ESG Enterprise Strategy Group

"With HeatWave ML, machine learning is democratized, it's fast, uses up-to-date data, and costs less than other cloud database services."

Conclusion

With MySQL HeatWave, you can drastically simplify your infrastructure and get real-time analytics across all your data—whether in MySQL or object storage—while improving data security and reducing costs.

You can democratize machine learning, making it easy for various departments to build, train, deploy, and explain machine learning models—without requiring expert data scientists.

You can choose where to deploy MySQL HeatWave-powered applications: on OCI, AWS, Azure, or in your data center.

LEARN MORE

TRY FREE

Connect with us

ORACLE CLOUD
Infrastructure

aws

MySQL
HeatWave