



Guide to MySQL Database Service in Oracle Cloud



100% Built, Managed and Supported by the MySQL Team

June, 2020
Copyright © 2020, Oracle and/or its affiliates

PURPOSE STATEMENT

This document provides an overview of the MySQL Database Service. It is intended solely to help you assess the business benefits of MySQL Database Service and to plan your I.T. projects.

DISCLAIMER

This document in any form, software or printed matter, contains proprietary information that is the exclusive property of Oracle. Your access to and use of this confidential material is subject to the terms and conditions of your Oracle software license and service agreement, which has been executed and with which you agree to comply. This document and information contained herein may not be disclosed, copied, reproduced or distributed to anyone outside Oracle without prior written consent of Oracle. This document is not part of your license agreement nor can it be incorporated into any contractual agreement with Oracle or its subsidiaries or affiliates.

This document is for informational purposes only and is intended solely to assist you in planning for the implementation and upgrade of the product features described. 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 in this document remains at the sole discretion of Oracle.

Due to the nature of the product architecture, it may not be possible to safely include all features described in this document without risking significant destabilization of the code.

TABLE OF CONTENTS

Executive Summary	3
MySQL: The World's Most Popular Open Source Database	3
DB-Engines: 2020 Database Ranking	3
Open Source in the Enterprise	4
The Most Innovative Companies Rely on MySQL	5
Growth of Cloud Database Market	6
MySQL Database Service In Oracle Cloud	7
Improve Organizational Agility	7
Cloud Empowers Developers through Automation	7
Security and Regulatory Compliance	8
Cost Advantages of the Cloud: CapEx vs. OpEx	9
Competitive Advantage of the MySQL Database Service	9
MySQL Database Service Use Cases	10
Getting Started with MySQL Database Service	10
Conclusion	13
Additional Resources	13

EXECUTIVE SUMMARY

MySQL has become the world's most popular open source database because of its reliability, high-performance, and ease of use. It powers the world's most trafficked web sites including Facebook, Twitter, YouTube and Booking.com. MySQL combines the benefits of a widely adopted open source database solution with a strong ecosystem, millions of users and the backing of Oracle.

Open source software is the driving force behind much of the innovation we are seeing today. The fastest growing companies in the world are using MySQL to deliver modern applications that are disrupting entire industries including ecommerce, advertising, retail, media and entertainment, travel and many more. Large enterprises are following the lead of these innovators in using MySQL to build modern, agile organizations.

It is no surprise that cloud computing infrastructure and services, are largely built on open source software. Cloud computing services enable the next step to innovate faster and increase business agility. The cloud DBMS market is currently \$10B/year and is the largest contributing factor to the overall DBMS market growth.

The MySQL Database Service in Oracle Cloud Infrastructure (OCI) is the only MySQL database service built on MySQL Enterprise Edition and 100% built, managed and supported by the MySQL team.






- **CIOs can improve business agility** and respond to changing market conditions
- **DevOps and DBAs can improve productivity** by automating manual database tasks
- **Developers can get applications to market faster** using the most modern tools

In this guide we will explore the dominance of MySQL, the state of the open source and cloud computing market, and look at how the MySQL Database Service can improve the operational efficiency of your organization.

MYSQL: THE WORLD'S MOST POPULAR OPEN SOURCE DATABASE

MySQL is the world's most popular database with millions of downloads every year. DB-Engines ranks MySQL as the most popular open source database¹. In addition, MySQL is the database management system that gained more popularity in the DB-Engines Ranking within the last year than any of the other 350 monitored database systems. MySQL was named DBMS of the Year 2019².

DB-ENGINES: 2020 DATABASE RANKING

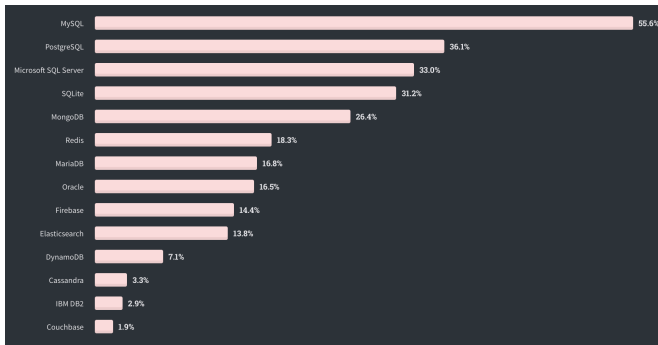
Rank			DBMS	Database Model	Jun 2020
Jun 2020	May 2020	Jun 2019			
1.	1.	1.	Oracle +	Relational, Multi-model 	1343.59
2.	2.	2.	MySQL +	Relational, Multi-model 	1277.89
3.	3.	3.	Microsoft SQL Server +	Relational, Multi-model 	1067.31
4.	4.	4.	PostgreSQL +	Relational, Multi-model 	522.99
5.	5.	5.	MongoDB +	Document, Multi-model 	437.08



This is a clear indicator of MySQL's ubiquity and the market's confidence in using MySQL for business-critical applications. With so many active installations, organizations can rest assured of finding developers and DBAs with MySQL experience and skills. Plus, there is an entire ecosystem of tools and applications that support MySQL.

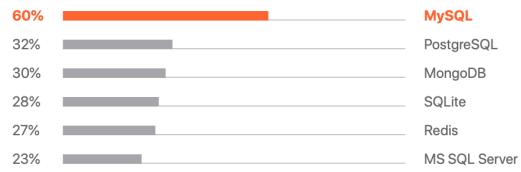
Stack Overflow: Developer Survey 2020

Databases



JetBrains: The State of Developer Ecosystem 2019

Which databases have you used in the last 12 months?



OPEN SOURCE IN THE ENTERPRISE

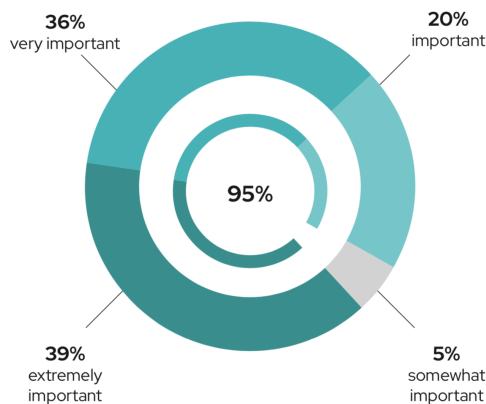
In 2020, 950 IT leaders were surveyed to determine how they think about open source software. The results were published in The State of Enterprise Open Source Report⁵. The survey found that:

- **95%** of respondents agree that enterprise open source is important.
- **86%** of respondents associate open source with being used by the most innovative companies.
- **77%** of respondents plan to increase their usage of open source.

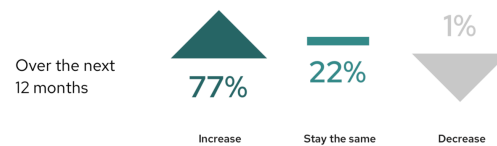
Open source technologies are often adopted out of a need to get applications into production faster. These projects are frequently un-funded and can't wait for IT approval. They start small and solve an immediate need, but over time many evolve into a business-critical applications.

As is often the case with MySQL, customers are successful deploying their first project using open source software and then use it for additional projects. As organization consolidate and standardize on a select few IT supported technologies, MySQL becomes a a strategic part of their technology infrastructure.

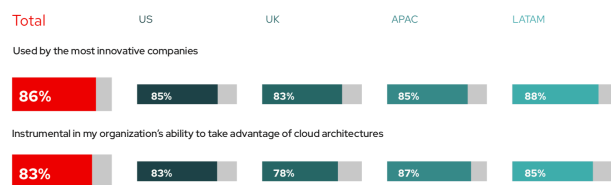
Importance of enterprise open source



Expected future change in use of enterprise open source



Attributes associated with enterprise open source









One of the main drivers of the adoption of open source software is the Total Cost of Ownership savings that companies realize. For example, MySQL enables organizations to reduce their database TCO by over 90% compared to Microsoft SQL Server. Other reasons cited for using enterprise open source include higher quality software, better security, access to the latest innovations and designed to work in the cloud. As a result, it is not surprising to see that the adoption of Enterprise Open Source is expected to rise from 36% to 44% over the next two years.

According to the Gartner State of the Open-Source DBMS Market Research Report⁴, by 2022, more than 70% of new in-house applications will be developed on an Open Source Database Management System (OSDBMS). 89% of organizations reported using open source DBMS.






THE MOST INNOVATIVE COMPANIES RELY ON MYSQL

MySQL became the database platform of choice for web developers. It is being used by world's most innovative companies including Twitter, Facebook, Netflix and Uber. Many of these companies did not exist 20 years ago. Today they are disrupting multiple industries and are operating at a scale that is hard to imagine. These are nimble organizations where developers have the power and resources to evolve products and services quickly and shape the user experience in new ways. These disruptors are using MySQL to innovate faster.

Below is a table which highlights some the MySQL users and the scale at which they are operating.

Company	Description
	Facebook is one of the Top 10 most trafficked web sites in the world. They have 2.5 billion monthly active users. 55 million status updates and 350 million photos are uploaded every day.
	Booking.com is one of the Top 100 most trafficked web sites in the world. They have 28 million reported accommodation listings and more than 1.5 million room nights are reserved daily on their platform.
	Netflix is one of the Top 20 most trafficked web sites in the world. They have over 167 million subscribers. 165 million hours of Netflix are watched everyday across the globe.
	Twitter is one of the most widely used social media platforms in the world with over 330 million monthly active users. There are 500 million tweets sent each day or 6,000 tweets every second.
	Airbnb has about 150 million users with more than 5 million listings worldwide, covering 65,000 cities
	There are over 75 million active Uber riders across the world and Uber fulfills 40 million rides per month.

SaaS is one of the main categories of the cloud computing market. The SaaS market was valued at about \$134.44 billion in 2018 and is expected to grow to \$220.21 billion at a CAGR of 13.1% through 2022⁵. Some of the most innovative, fastest growing ISVs are delivering their applications in a SaaS model and are choosing MySQL for its ease of use, reliability, performance and scalability. Users benefit from faster time to realize value, low up-front costs, better security and more flexibility. Below is a table which highlights some the leading SaaS companies using MySQL:

Company	Description
	Zendesk is a leading SaaS provider of CRM applications with close to \$1B in annual revenue.
	Hubspot is a leading SaaS provider of marketing and sales applications with close to \$1B in annual revenue.
	Github is a leading SaaS provider of software development version control with 40 million users and 100 million repositories.
	Square is a leading provider of payment and point-of-sale solutions with over \$4B in annual revenue.
	Mint is a leading SaaS provider of personal finance applications with over 20 million users.

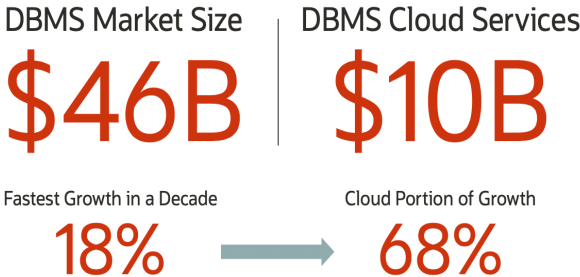
With each new release, MySQL performance and scalability continues to improve, enabling companies to keep pace with the growth in users and data. Plus, new features such as the MySQL Document Store, MySQL Shell and X Dev API, MySQL InnoDB Cluster are helping our customers meet the evolving data management requirements and improve developer productivity.

GROWTH OF CLOUD DATABASE MARKET

The move to the cloud is the single most significant technology shift organizations will face over the next decade. Even though this shift has been going on for some time, what we see now is only the beginning. Gartner projects the Cloud Services Industry to grow exponentially through 2022. More than \$1.3 trillion in IT spending will be directly or indirectly affected by the shift to cloud by 2022. In fact, the market size and growth of the cloud services industry is nearly 3x the growth of overall IT services.

If we look at the DBMS market, similar growth rates and shifts in spending are also taking place. Gartner published a research report titled, The Future of the DBMS Market Is Cloud⁶. In the report they shared the following information:

- The overall DBMS Market grew to \$46B in 2018 at 18% from 2017-2018, the fastest growth in a decade.
- \$10B of the DBMS market is from DBMS Cloud Services, which accounted for 68% of that growth.



The evidence is clear, all organizations, big and small, will be using the cloud in increasing amounts.

MYSQL DATABASE SERVICE IN ORACLE CLOUD

There are many reasons to move to the cloud – the cloud helps organizations improve agility, reduce costs, improve developer and DBA productivity, become more secure and many others. Let's take a look at how the MySQL Database Service can help you realize some of these benefits.

Improve Organizational Agility

Organizational agility is the single biggest benefit of moving to the cloud. The ability to adapt quickly to fast changing market conditions and competitive actions, could be the determining factor in the success or failure of your business.

In the traditional on-premises model, business units often have to wait months before they can get started on new projects because their IT department doesn't have the resources to dedicate to new initiatives. Business units find themselves having to go through the lengthy process of budget approval, hardware and software procurement and IT staff resource allocation before getting started on a new project.

The MySQL Database Service in Oracle Cloud Infrastructure enables you to:

- **Improve business agility** to quickly take advantage of new business opportunities or changing priorities.
- **Deploy applications in hours or days**, not months by immediately obtaining database instances and compute capacity from Oracle Cloud.
- **Adapt quickly** to changing market conditions and respond to competitors' actions
- **Eliminate the** lengthy process of budgeting, purchasing, configuring and maintaining your own computing and database infrastructure.
- **Reduce the risk of a projects getting delayed or never started** because of IT resource bottlenecks.

Cloud Empowers Developers through Automation

Databases hold data that is highly critical to any organization. In an on premises environment, deploying a database is a multi-step process that requires the provisioning of compute, storage and networking components, configuring them properly and making sure the database is secure and meets regulatory requirements. The IT department then prioritizes the request, allocates the resources, configures and manages the database. This process is time consuming, error prone and requires specialized skills.

According to Forrester, 75% of businesses have a digital strategy, but only 16% claim to have the skills to deliver it⁷. This lack of technical skills comes at a time when IT complexity is increasing. To solve this IT skills gap problem, organizations are turning to fully managed services like the MySQL Database Service.

The MySQL Database Service is a fully managed service that eliminates a lot of the manual tasks that are associated with managing your own infrastructure as seen below.

On-Premises vs MySQL Database Service

- Automated
- Manual



		MySQL On Premise	MySQL Database Service
Database	Scaling	●	●
	Backup	●	●
	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	●	●

MySQL Database Service is a fully managed service that automates many of the manual tasks. It enables you to:

- **Instantly provision MySQL instances** and connect to a production ready, pre-configured MySQL database.
- **Automate database specific** tasks such as configuration, security patching, backup and monitoring.
- **Choose from multiple compute shapes** depending on your application and capacity requirements.
- **Provision fast, reliable and secure cloud storage** for all enterprise workloads from high performance local SSD to extremely durable and cost-effective archive.
- **Enable fast, predictable networking with end to end network security** including a Virtual Cloud Network (VCN).
- **Monitor the health of your resources**, optimize the performance of your applications, and respond to anomalies in real time.
- **Access to dozens of additional Oracle Cloud Services** enabling organizations to embrace the shift to the cloud.
- **Free up developer, DBA and DevOps time** to focus on value added tasks that are core to your business.

Security and Regulatory Compliance

Massive data breaches continue to make news headlines. Every year there are thousands of data breaches and hundreds of millions of records stolen. According to the Ponemon Institute, a breach of 1 million records yields an average total cost of \$40 million, while a breach of 50 million records yields an average total cost of \$350 million. As you might expect, Security was the top investment priority for CIOs in 2019 and continues to be one of the top Investment priorities for CIOs in 2020.

Government and industry regulatory compliance is another top priority for CIOs. Over 100 countries have now adopted data protection laws. GDPR is one of the most wide-ranging data protection regulatory schemes and includes data privacy rights, data security standards, data breach notification requirements and fines for failing to comply.

A company running its own on-premises servers, carries the entire burden of security and regulatory compliance. For example, they are responsible for setting appropriate user access policies, installing firewalls, ensuring security patches are installed promptly, backups are scheduled and encryption is enabled. If not managed properly, on premises servers can leave an organization vulnerable to security threats and out of compliance. One way to mitigate this risk, is to leverage cloud providers who have dedicated resources focused on data protection and regulator compliance.

Oracle Cloud: MySQL Enterprise Edition

Oracle Cloud is the only public cloud to offer MySQL Enterprise Edition as a database service. MySQL Enterprise Edition provides advanced security including:

- **Audit** enables you to quickly and seamlessly add policy-based auditing compliance to new and existing applications. You can dynamically enable user level activity logging, implement activity-based policies, manage audit log files and integrate MySQL auditing with Oracle and third-party solutions.

- **Authentication** provides ready to use external authentication modules to easily integrate MySQL with existing security infrastructures including PAM and Windows Active Directory. MySQL users can be authenticated using Pluggable Authentication Modules ("PAM") or native Windows OS services.
- **Masking and De-identification** provides an easy to use, built-in database solution to help organizations protect sensitive data from unauthorized uses by hiding and replacing real values with substitutes.
- **Transparent Data Encryption (TDE)** enables data-at-rest encryption by encrypting the physical files of the database. Data is encrypted automatically, in real time, prior to writing to storage and decrypted when read from storage.
- **Encryption** provides encryption, key generation, digital signatures and other cryptographic features to help organizations protect confidential data and comply with regulatory requirements.
- **Firewall** guards against cyber security threats by providing real-time protection against database specific attacks, such as an SQL Injection.

Oracle Cloud Infrastructure Gen 2 Security

In addition, MySQL Database Service is built on Oracle Cloud Infrastructure Gen 2. OCI Gen 2 is a second-generation infrastructure-as-a-service (IaaS) offering architected on security-first design principles, a significant improvement over first-generation public clouds. The Oracle Cloud Infrastructure architecture was designed for security of the platform through isolated network virtualization, highly secure firmware installation, a controlled physical network, and network segmentation.

Cost Advantages of the Cloud: CapEx vs. OpEx

Traditionally companies that use on-premises infrastructure require a huge CapEx investment to purchased space, equipment, software, and a workforce. This model gave them control over system configuration, software updates, security, performance optimization, but at what cost? Future requirements can be unpredictable making capacity planning difficult. Getting stuck with capacity you don't need is wasting money. Not enough capacity means you are limiting your company's ability to deliver new projects and respond to business opportunities.

MySQL Database Service is a fully managed service running on Oracle Gen 2 Cloud Infrastructure. It enables you to:

- **Switch from a CapEx to an OpEx expense model** as a more flexible approach to lower your business expenses.
- **Reinvest CapEx savings** back into your business to grow revenues and improve profits.
- **Eliminate the huge up-front costs** associated with buying, operating and maintaining your own on premises computing infrastructure.
- **Pay for what you use, when you use it** with a flexible, pay-as-you-go pricing model with no up-front commitments.
- **Reduce the unnecessary spend on excess capacity** required to handle peak demand. Realize savings in the cloud by running at near 100% utilization.
- **Free up your IT talent** from infrastructure maintenance and focus on delivering better products and services that are core to your business.

Competitive Advantage of the MySQL Database Service

100% Developed, Managed and Supported by the MySQL Team

The MySQL Database Service is the only MySQL public cloud database service 100% Developed, Managed and Supported by the MySQL Team. That means you get the most up to date version of MySQL with new features and security fixes faster, including a tight feedback loop to the MySQL Engineering Team. MySQL Support together with Oracle Premier Support provide a unified 24/7 support solution for both cloud infrastructure and MySQL. No other cloud vendor can deliver such comprehensive support for the MySQL database.

100% Compatible with On Premises MySQL

Moving to the cloud is one of the Top 5 strategic priorities for CIOs in 2020. MySQL Database Service is 100% compatible with On Premises MySQL, making it easier to migrate applications to the cloud without vendor lock in. Due to data location

requirements or governance concerns, some applications or data may need to stay on premises. MySQL provides organizations the flexibility of a hybrid deployment model.

Integrations with Oracle Technologies

Leverage your exiting Oracle investment and easily integrate the MySQL Database Service with other Oracle Cloud services including Oracle Cloud Infrastructure Identity and Access Management Service, Audit Service, Oracle Data Integrator, Oracle Container Engine for Kubernetes, Oracle Analytics Cloud and many more. All Oracle Cloud services can be monitored and managed using a using a single pane of glass.

MySQL Database Service Use Cases

Move Workloads to the Cloud

Move MySQL workloads to the cloud to free up resources and focus on your business while improving security. MySQL Database Service uses the same database as MySQL On-Premises. Additionally, it integrates with your existing Oracle technologies.

Develop New Cloud Native Applications

Improve business agility by developing modern, cloud-native MySQL-based applications. Developers can provision resources quickly and easily without the bottleneck of IT. DBAs and DevOps can focus on value added projects using a fully managed database service and automating time consuming tasks such as patching, upgrades, security fixes, etc.

Hybrid Cloud Deployment Flexibility

MySQL Database Service is 100% compatible with MySQL On-Premises, giving you complete deployment flexibility between on-premises, cloud or a hybrid model for your different workloads. Move your MySQL workloads seamlessly without lock-in.

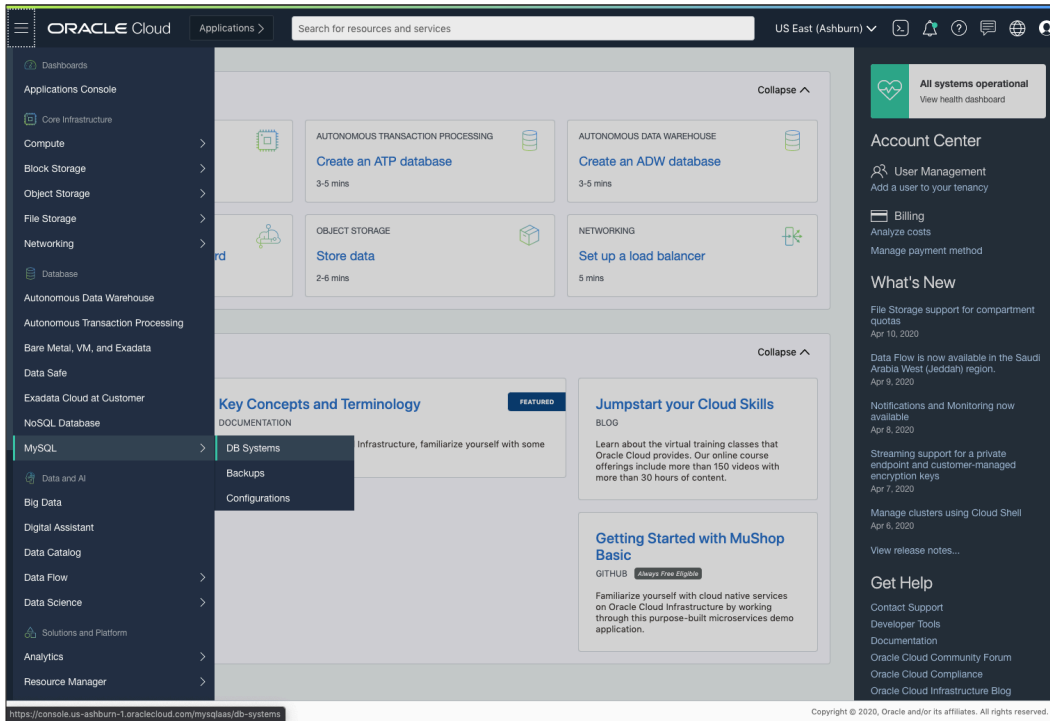
SaaS Applications

MySQL has long been an extremely popular embedded database for ISVs, and it powers numerous SaaS offerings today. As an ISV, you can scale your SaaS applications globally by leveraging Oracle Cloud Infrastructure and MySQL Database Service.

GETTING STARTED WITH MYSQL DATABASE SERVICE

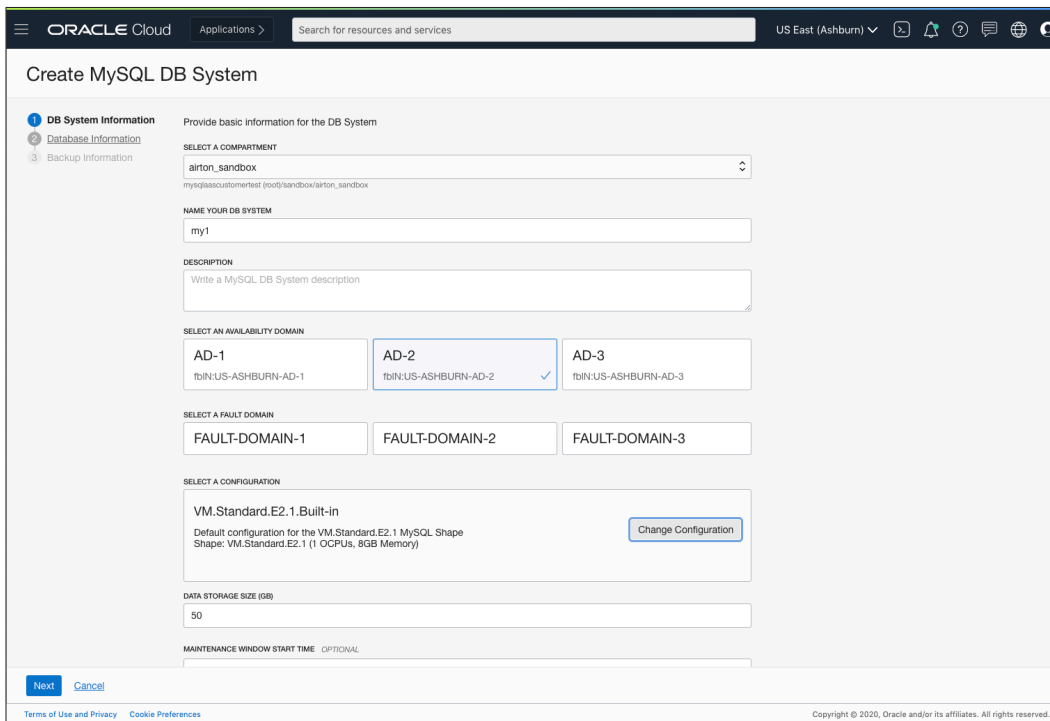
To get start with MySQL Database Service is easy. If you don't have an OCI account, you can sign up and get access to free offers at www.oracle.com/cloud/free.

Access the MySQL Database Service from the Oracle Cloud Console



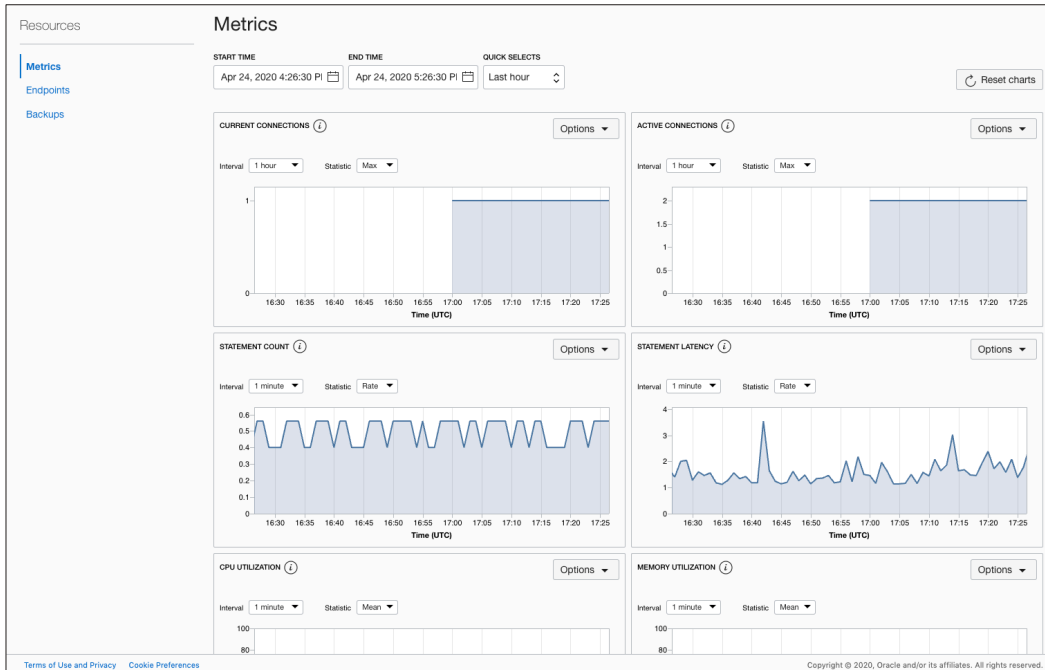
To create and manage MySQL databases using the Console, access the MySQL menu under Databases, then DB Systems. Alternatively, you can use the OCI Command Line Interface or the REST API. Only users granted with the necessary policies to manage the MySQL family can create and manage MySQL DB Systems.

Easily create pre-configured MySQL instances with just a few clicks



Following the step-by-step wizard, you select the desired MySQL Configuration, Virtual Cloud Network (VCN), and Subnet to place your MySQL endpoint. The Configuration can be selected between pre-defined and optimized or customized by the user and will set the MySQL Server options and the shape for the DB System (amount of CPU and RAM).

View database metrics in multiple dimensions



After you launch a MySQL DB System, the database is ready to use with the daily DBA tasks will be automated and ready to use with a few clicks. MySQL Database service is integrated with OCI Monitoring, can visualize in-depth graphs right in the Console, and set alarms based on the database metrics.

Schedule and configure backups

Automatic daily Backups are also configured while you launch your MySQL Databases, with no extra work. You can also create additional backups manually. Both Automatic or Manual Backups can be used to recover or clone DB Systems and can be configured with retention policies to optimize storage costs.

Set security rules

Security List for Private Subnet-al-sandbox-vcn

Instance traffic is controlled by firewall rules on each Instance in addition to this Security List

[Move Resource](#) [Add Tags](#) [Terminate](#)

Security List Information [Tags](#)

OCID: ...ygtksa [Show](#) [Copy](#) **Compartment:** airton_sandbox

Created: Fri, Apr 24, 2020, 15:08:11 UTC

Resources

- [Ingress Rules \(5\)](#)
- [Egress Rules \(1\)](#)

Ingress Rules

[Add Ingress Rules](#) [Edit](#) [Remove](#)

<input type="checkbox"/>	Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
<input type="checkbox"/>	No	10.0.0.0/16	TCP	All	22		TCP traffic for ports: 22	SSH Remote Login Protocol
<input type="checkbox"/>	No	0.0.0.0/0	ICMP			3, 4	ICMP traffic for: 3, 4	Destination Unreachable; Fragmentation Needed and Don't Fragment was Set
<input type="checkbox"/>	No	10.0.0.0/16	ICMP			3	ICMP traffic for: 3	Destination Unreachable
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	3306		TCP traffic for ports: 3306	
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	33060		TCP traffic for ports: 33060	

0 Selected Showing 5 items < Page 1 >

MySQL Database Service is natively integrated with OCI Virtual Cloud Networks, enabling expose the MySQL endpoints in Private Subnets without direct access from the public Internet. To enable access from your client hosts you will set the security rules to allow only from the trusted sources.

Connect with the standard MySQL protocols

From a Compute host in your Virtual Cloud Network, you can connect with MySQL using both classic protocol or the new X protocol. MySQL Database Service can be used for your traditional SQL workloads but also for new modern NoSQL applications that require a Document Store.

CONCLUSION

You already know that MySQL powers the leading eCommerce and SaaS companies. You also know that MySQL has a well-earned reputation for being easy to use, highly scalable, and cost-effective.

You've experienced the pain and cost of managing your database instances on your own infrastructure. Data security is very important to you, so you have decided to move your applications to a cloud model with a fully managed and secure service.

Next, you have to choose the right cloud platform for your business. Unlike proprietary forks of MySQL available in other cloud services, Oracle MySQL Database Service is the only cloud service that is 100% compatible with on-premises MySQL for a seamless transition to cloud, on-premises, and hybrid deployments.

It is the only cloud service 100% developed, managed, and supported by the MySQL Team. This ensures new features and security fixes at a faster pace with a unique tight feedback loop to the MySQL Engineering Team. You'll also receive the highest level of MySQL expertise with a unified 24/7 support solution for both cloud infrastructure and MySQL.

In addition, the Oracle Gen 2 Cloud infrastructure delivers a highly secure and integrated cloud environment.

The MySQL Database Service on Oracle Gen 2 Cloud will enable your business to easily deploy modern applications globally with a secure, managed, and supported cloud service from the MySQL Team.

Start Now!

ADDITIONAL RESOURCES

- Read more about the MySQL Database Service
<http://www.oracle.com/mysql>
- Read more about MySQL Enterprise Edition
<https://www.mysql.com/products/enterprise/>
- Read more about Oracle Gen 2 Cloud Infrastructure
<https://www.oracle.com/cloud/>

REFERENCES

¹ DB Engines Ranking. <https://db-engines.com/en/ranking>. April 2020.

² MySQL is the Database of the Year. https://db-engines.com/en/blog_post/83. January 2020.

³ State of Enterprise Open Source Report. <https://www.redhat.com/en/enterprise-open-source-report/2020>. February 2020

⁴ State of the Open-Source DBMS Market. <https://www.gartner.com/en/documents/3970418/state-of-the-open-source-dbms-market-2019>. October 2019

⁵ Software as a service (SaaS) Global Market Report 2020. <https://www.prnewswire.com/news-releases/global-software-as-a-service-saas-market-report-2020-market-was-valued-at-134-44-bn-in-2018-and-is-expected-to-grow-to-220-21-bn-at-a-cagr-of-13-1-through-2022--300970629.html>. December 2019.

⁶ The Future of Database Management Systems is Cloud. <https://blogs.gartner.com/adam-ronthal/2019/06/23/future-database-management-systems-cloud/>. June 2019.

⁷ 7 challenges facing CIOs and IT leaders in 2020. <https://www.mrc-productivity.com/blog/2019/11/7-challenges-facing-cios-and-it-leaders-in-2020/>. November 2019.

CONNECT WITH US

Call +1.800.ORACLE1 or visit oracle.com.

Outside North America, find your local office at oracle.com/contact.

 blogs.oracle.com/mysql

 facebook.com/mysql

 twitter.com/mysql

Copyright © 2020, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only, and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group. 0120

