



# MariaDB

## MariaDB vs MySQL

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### **Contents**

<b>Introduction</b>	<b>2</b>
<b>Similarities Between MariaDB and MySQL</b>	<b>2</b>
<b>Differences Between MariaDB and MySQL</b>	<b>3</b>
<b>Conclusion</b>	<b>5</b>
<b>Notes</b>	<b>6</b>

## Introduction

The purpose of this document is to compare MariaDB and MySQL<sup>®</sup>, noting their similarities and their differences. Before doing so it will be helpful — to those who may not be familiar with one or the other — to describe each one in general terms.

Both are what is known as a Relational Database Management System, or RDBMS.<sup>1</sup> The most well known RDBMS is probably Oracle Corporation's Oracle Database.

## What is MySQL?

MySQL grew out of a need in the early 1990s for a fast, flexible database for use in web-based applications. No suitable existing databases were found, so Michael “Monty” Widenius developed one. He called it “MySQL” after his daughter, My, and SQL, which stands for *Structured Query Language*. SQL is a programming language used to interact with MySQL and many other databases.

When people think of an easy-to-use, reliable, open-source database, the first one they often think of is MySQL. This popular database has been around for many years, is stable and reliable, and is used by a many companies, both large and small, in a wide range of industries.

MySQL was developed for many years by the company MySQL Ab. The company was acquired in 2008 by Sun Microsystems. Sun was, in turn, acquired by Oracle Corporation in 2009.

MySQL is released under two main “editions”. There is an open source, *community* edition, which uses the GPL license, version 2.<sup>2</sup> And there is a closed source, *enterprise* edition.

## What is MariaDB

MariaDB is an enhanced, drop-in, binary compatible replacement for MySQL created by several of the former core developers of MySQL including Monty, who left soon after the Sun acquisition because he was dissatisfied with the quality of MySQL releases after the merger and the slow rate of improvement.

## Similarities Between MariaDB and MySQL

The similarities between MariaDB and MySQL go very deep. MariaDB is based on the open-source MySQL code. It is a branch, or fork, of the source code. What this means is that the developers have taken the freely available MySQL code and then added to it. As changes are made to MySQL the MariaDB developers review and incorporate those same changes into MariaDB.

When installing MariaDB, users will likely notice that while the downloaded package names are different, the names of the installed files and binaries are the same and they are installed in the same locations as with MySQL.

When using MariaDB, users may notice that the SQL language and commands are the same between MySQL and MariaDB. The configuration files are also the same, with a very few new, easy to learn, MariaDB-specific parts.

Going deeper, things like the ports and sockets, the client APIs and protocols MariaDB uses are all the same as MySQL. All MySQL connectors, those bits of code which allow languages like Java, C, PHP, .Net, Perl, Python, and Ruby to talk directly to a MySQL database, all work unchanged with MariaDB. All client programs that can talk to MySQL databases can also talk to MariaDB databases without any changes.

Even the “on disk” format of the databases is the same. MySQL can open a database created with MariaDB just like MariaDB can open one created with MySQL.

All told, an experienced MySQL user or database administrator (DBA) will be up and running instantly with MariaDB on day one, and they will be able to learn and start taking advantage of the differences with a minimal amount of learning. Someone new to databases, or just to MySQL and MariaDB, will have no trouble utilizing the many MySQL — and growing number of MariaDB — training and learning resources available both online and off to get up and running with MariaDB.

## Differences Between MariaDB and MySQL

If there are so many similarities, why does MariaDB exist at all? What does MariaDB provide that MySQL does not?

MariaDB has new features, performance improvements, better testing, and bug fixes which are not found in MySQL. Some of these were developed “in house” by the core MariaDB developers, and others come from outside individual contributors and companies such as Facebook, Twitter, Google, and others.

Describing all of the new features in MariaDB in detail is beyond the scope of this document. Here are a few chosen differences which we feel are especially significant.

### Ease of Use in MariaDB

MariaDB has looked for, and found, several ways of making the lives of MariaDB users and developers better. Here are a few of the many improvements the developers have made which make MariaDB easier to use than MySQL.

One way they have done this by providing INDEX and TABLE statistics through a feature called, somewhat unimaginatively, User Statistics.<sup>3</sup> This feature adds several new information schema tables and several new FLUSH and SHOW commands. These tables and commands can be used to understand the server activity better and to identify the sources of your database’s load.

Another improvement makes a big difference for long running ALTER TABLE and LOAD DATA INFILE commands. Instead of these commands being opaque, and not letting you know how much progress they have made, MariaDB provides a mechanism where clients can receive progress messages from the server. After all, the last thing you want to do is cancel a long-running ALTER TABLE command when it is 99% complete.<sup>4</sup>

With today's high-performance database servers, having the highest precision of the `TIME`, `DATETIME`, and `TIMESTAMP` datatypes, and their associated temporal functions, be a single second was limiting. So another MariaDB improvement is the addition of microsecond support.<sup>5</sup>

The developers have also introduced some NoSQL-style features to MariaDB. `HandlerSocket`<sup>6</sup> is one. It provides developers with fast, direct access to InnoDB tables by skipping the SQL layer. Another is `Dynamic Columns`<sup>7</sup>, which provides users with the ability to have a different set of "virtual" columns for each row in a table.

Lastly, users who are coming to MariaDB or MySQL from other databases may have heard horror stories about the horrible status of subqueries. For all practical purposes, subqueries in MySQL are unusable. They were unusable in MariaDB until the developers decided to tackle this old problem and take care of it once and for all. The result is that in MariaDB, subqueries are actually usable and useful.<sup>8</sup>

Many other ease of use improvements are included in MariaDB which we don't have time to go into here.

## Performance in MariaDB

Several enhancements found in MariaDB are performance related. MySQL has great performance out of the box, but that does not mean it can't be improved. One of the major goals of the MariaDB developers is to continually improve the performance of MariaDB.

One area the developers have focused on is the optimizer. The optimizer is the engine that sits at the core of MySQL and MariaDB. Its job is to take the entered SQL commands and turn them into instructions for the database.<sup>9</sup> The improved optimizer in MariaDB performs significantly faster than MySQL on complex workloads.<sup>10</sup>

Replication is another area of focus and the MariaDB developers have introduced several enhancements in this area. One is "group commit for the binary log"<sup>11</sup>, which makes many setups which use replication and have many updates more than two times faster.

Another new feature in MariaDB is `Table Elimination`<sup>12</sup> This optimization is especially useful when using views to access highly normalized data. The basic idea is that sometimes it is possible to resolve a query without even accessing some of the tables that the query refers to. And since the query doesn't need to access as many tables, it completes faster.

Many other performance improvements are included in MariaDB which we don't have time to go into here.

## Better Testing in MariaDB

A key component to better code is better testing. To that end, the MariaDB developers have made great improvements to the testing infrastructure of MariaDB. These improvements include:

- ...more tests in the test suite. Dozens of new tests have been added to the

MariaDB test suite, both to test newly found bugs, and to provide greater coverage of the MariaDB code.

- ... fixes for test suite bugs. The MariaDB developers test the test suite, just like they test other parts of MariaDB
- ... testing builds with different configure options and on multiple operating system and processor combinations, to get better feature testing.
- ... the removal of invalid tests. For example: Don't test feature "X" if that feature is not in the build you are testing.
- ... and much more.

The cumulative effect of the expanded and enhanced MariaDB test infrastructure is that bugs are found earlier and fixed faster, and new features are thoroughly and extensively tested long before they are released.

### **Fewer Bugs & Warnings in MariaDB**

Speaking of bugs, software bugs are bad. Everyone knows this. Every effort is made to fix as many bugs as possible in every MariaDB release and to not introduce new ones. The enhanced MariaDB testing infrastructure helps with this, but even more important is the deep knowledge and experience of the MariaDB developers. There isn't a team of developers anywhere who know the MySQL code better than the developers working on MariaDB.

A related issue is compiler warnings. Some may not agree, but the MariaDB developers feel that these are almost as bad as bugs and they try to fix as many of them as possible.

The result of the above two priorities has been a great reduction in the overall number of bugs and compiler warnings in MariaDB.

### **Conclusion**

With MariaDB, you not only get everything good from MySQL, you also get extra features, performance improvements, better testing, and fewer bugs. For a growing number of individuals and companies the choice is clear: MariaDB is the future of MySQL.

## Notes

- <sup>1</sup>More about RDBMSs is available on Wikipedia: <http://en.wikipedia.org/wiki/RDBMS>
- <sup>2</sup>A copy of the GPLv2 license is available at: <http://kb.askmonty.org/en/mariadb-license>
- <sup>3</sup>*User Statistics* documentation: <http://kb.askmonty.org/en/user-statistics>
- <sup>4</sup>*Progress Reporting* documentation: <http://kb.askmonty.org/en/progress-reporting>
- <sup>5</sup>*Microsecond* documentation: <http://kb.askmonty.org/en/microseconds-in-mariadb>
- <sup>6</sup>*HandlerSocket* documentation: <http://kb.askmonty.org/en/handlersocket>
- <sup>7</sup>*Dynamic Columns* documentation: <http://kb.askmonty.org/en/dynamic-columns>
- <sup>8</sup>*Subquery* documentation: <http://kb.askmonty.org/en/subquery-optimizations>
- <sup>9</sup>A complete list of the optimizer enhancements and a comparison with MySQL is at <http://kb.askmonty.org/en/optimizer-feature-comparison-matrix>.
- <sup>10</sup>A benchmark comparing the performance of the MariaDB and MySQL optimizers is available at: <http://blog.mariadb.org/mariadb-5-3-optimizer-benchmark>.
- <sup>11</sup>*Group Commit* documentation: <http://kb.askmonty.org/en/group-commit-for-the-binary-log>
- <sup>12</sup>*Table Elimination* documentation: <http://kb.askmonty.org/en/table-elimination>