MariaDB®

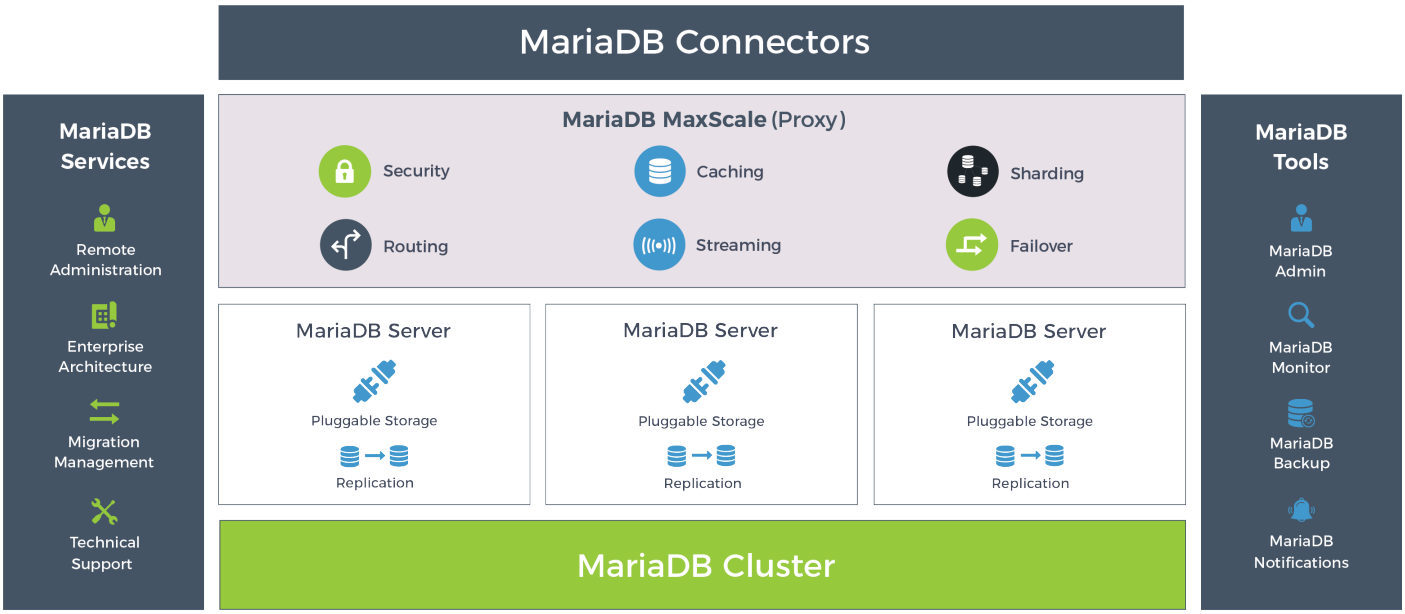
Enterprise Open Source Databases

WHITE PAPER

MariaDB vs. Oracle MySQL vs. EnterpriseDB

MariaDB TX – Born of the community. Raised in the enterprise.

MariaDB TX, with a history of proven enterprise reliability and community-led innovation, is a complete database solution for any and every enterprise. MariaDB TX, when deployed, is comprised of MariaDB connectors (e.g., JDBC/ODBC), MariaDB MaxScale (a database proxy and firewall), MariaDB Server, MariaDB Cluster (multi-master replication), MariaDB tools and access to MariaDB services – and is available via an enterprise open source subscription.



Enterprise reliability

High availability

Ensure uptime for mission-critical applications with built-in replication and automatic failover.

Disaster recovery

Recover from unexpected failure with backup and restore or binary log based rollback.

Security

Secure access to data with authentication, query filtering, data masking and encryption.

Scalability

Scale reads and writes with replication, clustering and sharding.

Performance

Meet user expectations with multi-core processors and a multi-threaded architecture.

Community innovation

Open development

Participate in a 100% open and transparent development process – tests and all.

Extensible architecture

Extend everything from storage to routing to implement features as needed.

Community contribution

Benefit from an active community with contributions from industry leaders.

Streaming integration

Stream database changes as Avro or JSON objects to external systems, including Kafka.

Flexible data model

Support applications with semi-structured data by using JSON and/or dynamic columns.

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Introduction

The role of open source software in modern infrastructure is expanding – the operating system, the middleware, and now, the database. In fact, many organizations are implementing open source mandates and/or strategic initiatives to evaluate open source software and limit the use of proprietary software. It reduces costs, supports the shift from capital expenses to operating expenses and enables enterprises to benefit from community collaboration and innovation.

The leading enterprise open source databases are MariaDB TX, (Oracle) MySQL Enterprise and EnterpriseDB Postgres Platform. However, when it comes to standardizing on an enterprise open source database, it is important to understand the differences both between the vendors and between the databases. The vendors have different business models while the databases have different architectures and features.

This white paper compares MariaDB, Oracle and EnterpriseDB and their databases: MariaDB TX, MySQL Enterprise Edition and EnterpriseDB Postgres Platform. It begins with a comparison of business models and licensing strategies and then focuses on the following database features:

- Disaster recovery
- High availability
- Security
- Firewall
- Performance and scalability
- Development

The comparisons are based on MariaDB 10.3, PostgreSQL 9.6 and MySQL 5.7. However, where appropriate, features in alpha, beta and release candidate releases have been noted.

Vendor Comparison

MySQL and EnterpriseDB follow an open core business model. MySQL Enterprise Edition extends MySQL with proprietary features (e.g., MySQL Enterprise Audit). EnterpriseDB Postgres Platform extends PostgreSQL with proprietary features (e.g., hash partitioning). However, MariaDB TX does not extend MariaDB Server with proprietary features.

MariaDB, MySQL and EnterpriseDB solutions include both open source and proprietary tools. However, for proprietary tools, MariaDB uses a Business Source License (BSL) that converts to an open source license. For example, MariaDB MaxScale 2.1 will automatically convert from BSL to GPL on July 1, 2019.

In addition, whereas MySQL development is closed, MariaDB development is open and transparent, ensuring the community and customers have access to everything from test cases and security bugs to source code and roadmaps.

	EnterpriseDB	MySQL	MariaDB
Database: core	Similar to BSD/MIT	GPL	GPL
Database: enterprise features	Proprietary	Proprietary	GPL
Database: enterprise tools	Proprietary	Proprietary	BSL

Product Comparison

Disaster Recovery

The most basic disaster recovery plans include online failover and/or offline recovery. MariaDB, MySQL and EnterpriseDB support online failover with hot standbys (using replication), and offline recovery with backup and restore tools. In addition, MariaDB TX supports online recovery with point-in-time rollback.

	EnterpriseDB	MySQL	MariaDB
Replication	Yes	Yes	Yes
Backup and restore	Yes	Yes	Yes
Point-in-time rollback	X	X	Yes

High Availability

The two most common approaches to high availability are master/slave replication with automatic failover and multi-master clustering. In addition, transparent routing is required to avoid application changes, and thus downtime, when the topology changes.

MariaDB, MySQL and EnterpriseDB support asynchronous master/slave replication with automatic failover. MariaDB and MySQL support synchronous multi-master clustering as well – MariaDB via Galera Cluster and MySQL via Group Replication. However, EnterpriseDB is limited to asynchronous, bi-directional replication via EnterpriseDB Replication Server.

MariaDB uses an advanced database proxy with automatic topology detection and intelligent routing. MySQL uses a basic router (e.g., no connection pooling), and EnterpriseDB relies on virtual IP addresses.

	EnterpriseDB	MySQL	MariaDB
Master/Slave replication	Yes	Yes	Yes
Automatic failover	Yes	Yes	Yes
Multi-master clustering	X	Yes	Yes
Transparent routing	Yes	Yes	Yes

Security

The security requirements for databases have increased. While end-to-end encryption, authentication/authorization and auditing has long been considered the bare minimum, it is no longer enough. The frequency of high-profile data breaches and the introduction of new regulations (e.g., General Data Protection Regulation) has made data masking and database firewalls critical features.

MariaDB and MySQL provide comprehensive sets of security features. However, MySQL and EnterpriseDB do not support data masking. Further, EnterpriseDB does not support encrypted data (i.e., transparent data encryption).

	EnterpriseDB	MySQL	MariaDB
Encryption: data	X	Yes	Yes
Encryption: connections	Yes	Yes	Yes
Encryption: external key management	X	X	Yes
Auditing: format – CSV	Yes	X	Yes
Auditing: format – XML	Yes	Yes	X
Auditing: output – file	Yes	Yes	Yes
Auditing: output – syslog	X	X	Yes
Authentication: PAM	Yes	Yes	Yes
Authentication: LDAP	Yes	Yes	Yes (via PAM)
Authentication: Kerberos/NTLM	Yes	Yes	Yes
Authentication: user/group mapping	Yes	Yes	Yes
Authorization: privileges	Yes	Yes	Yes
Authorization: roles	Yes	8.0	Yes
Authorization: resource limits	X	Yes	Yes
Password strength check	Yes	Yes	Yes
Data masking	X	X	Yes
Firewall	Yes	Yes	Yes

Firewall

A database firewall is necessary to prevent unauthorized and/or unintended access to data, whether it is from internal bad actors or external attacks. MariaDB includes the most advanced database firewall on the market. While MySQL and EnterpriseDB are limited to whitelisting specific queries (MySQL) or queries on specific tables (EnterpriseDB), MariaDB enables administrators to whitelist or blacklist queries based on syntax.

	EnterpriseDB	MySQL	MariaDB
Whitelist	Yes	Yes	Yes
Blacklist	X	X	Yes
Rules: simple	Yes	Yes	Yes
Rules: custom	X	X	Yes
Rules: compound	X	X	Yes
Rules: ordered	X	X	Yes
Queries: specific	X	Yes	Yes
Queries: with TABLE	Yes	X	Yes
Queries: with COLUMN	X	X	Yes
Queries: with FUNCTION	X	X	Yes
Queries: with a wildcard (*)	X	X	Yes
Queries: without WHERE	Yes	X	Yes
Queries: with unbounded WHERE	Yes	X	X
Queries: match regular expression	X	X	Yes
Queries: frequency	X	X	Yes
Queries: type	X	X	Yes
Queries: DDL	Yes	X	Yes
Users/roles: any	X	X	Yes
Users/roles: specific	Yes	Yes	Yes

Performance and Scalability

In the digital era, defined by web, mobile and Internet of Things (IoT) applications, performance and scalability is necessary to engage thousands, if not millions, of customers while meeting rising user experience expectations.

MySQL and MariaDB implement a multi-threaded architecture to scale performance with the number of cores/processors. EnterpriseDB is limited by a process-based architecture. However, it can use multiple processes to parallelize parts of queries: sequential scans, hash joins/nested loops and aggregation.

In addition, MariaDB uses compression to reduce IO. MariaDB includes a storage engine with distributed partitions to scale reads, writes and storage, but it will not be supported until the next release.

	EnterpriseDB	MySQL	MariaDB
Multi-threaded architecture	X	Yes	Yes
Partitions: local	Yes	Yes	Yes
Partitions: local subpartitions	Yes	Yes	Yes
Partitions: distributed	X	X	10.3
Compression: table data	X	Yes	Yes
Compression: column data	TOAST	X	10.3
Compression: log (e.g., WAL, Binlog)	Yes	X	Yes

Development

A database not only has to meet operational requirements (e.g., availability and security), it has to meet the requirements of developers, both new (e.g., JSON) and existing (e.g., stored procedures). It has to support faster development of web, mobile and IoT applications and services while at the same time supporting the maintenance of existing enterprise applications.

EnterpriseDB and MariaDB include broad support for modern application development, everything from dynamic columns for more flexible schemas to window functions for faster and simpler analytical queries. However, MySQL has a number of limitations when it comes to data types and functions, SQL, stored procedures and schema definitions.

Data types and functions

	EnterpriseDB	MySQL	MariaDB
JSON	Yes	Yes	Yes
Geospatial	Yes	Yes	Yes
Dynamic columns	Yes	X	Yes
Virtual columns	X	Yes	Yes
Array columns	Yes	X	X

SQL

	EnterpriseDB	MySQL	MariaDB
Common table expressions	Yes	8.0	Yes
Window functions	Yes	X	Yes
INTERSECT/EXCEPT	Yes	X	10.3

Stored procedures

	EnterpriseDB	MySQL	MariaDB
Anonymous blocks	Yes	X	Yes
Associative arrays	Yes	X	10.3
Cursors with arguments	Yes	X	Yes
Savepoints	Yes	Yes	Yes
User defined functions	Yes	Yes	Yes
User defined types	Yes	X	10.3

Schema

	EnterpriseDB	MySQL	MariaDB
Default value expressions	Yes	X	Yes
Check constraints	Yes	X	Yes
Multiple triggers per type and event	Yes	Yes	Yes

Oracle Compatibility

With enterprise open source databases having matured, organizations are in the process of migrating off of Oracle Database. Oracle Database compatibility not only simplifies the process, it reduces migration costs and time.

EnterpriseDB supports PL/SQL and Oracle sequences. MariaDB will support PL/SQL and Oracle sequences in the next release. In addition, EnterpriseDB and MariaDB support EXECUTE IMMEDIATE statements. MySQL has no plans for Oracle compatibility. MySQL is an Oracle product, and Oracle Database is Oracle's flagship product.

	EnterpriseDB	MySQL	MariaDB
PL/SQL	Yes	X	10.3
SEQUENCE	Yes	X	10.3
EXECUTE IMMEDIATE	Yes	X	Yes

Conclusion

MariaDB TX, (Oracle) MySQL Enterprise Edition and EnterpriseDB Postgres Platform are the leading enterprise open source databases. However, these databases have different architectures and unique features, and their vendors have various business models.

Oracle and EnterpriseDB include proprietary features in their databases, MariaDB does not. In addition, MariaDB development is open and transparent, leading to collaboration with innovators like Alibaba, Facebook, Google and Tencent. While all three vendors develop proprietary tools, MariaDB uses a Business Source License, ensuring they become open source.

MariaDB TX, (Oracle) MySQL Enterprise Edition and EnterpriseDB Postgres Platform have competitive disaster recovery and high availability features. However, MariaDB TX has the most comprehensive set of security features, and the most advanced firewall.

MariaDB TX and EnterpriseDB Postgres Platform have a comprehensive set of development features, more than (Oracle) MySQL Enterprise Edition. EnterpriseDB Postgres Platform has Oracle compatibility. MariaDB TX will introduce Oracle compatibility with MariaDB Server 10.3.

When it comes to standardizing on an enterprise open source database, MariaDB is the clear winner – born in the community, raised in the enterprise. It provides the best of both worlds.

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