Pune Institute of Computer Technology

Sub: Database Management System Lab

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What is MySQL?

MySQL is a relational database management system based on SQL – Structured Query Language. The application is used for a wide range of purposes, including data warehousing, ecommerce, and logging applications. The most common use for MySQL however, is for the purpose of a web database.

MySQL is currently the most popular database management system software used for managing the relational database. It is open-source database software, which is supported by Oracle Company. It is fast, scalable, and easy to use database management system in comparison with Microsoft SQL Server and Oracle Database. It is commonly used in conjunction with PHP scripts for creating powerful and dynamic server-side or web-based enterprise applications.

It is developed, marketed, and supported by **MySQL AB, a Swedish company**, and written in C programming language and C++ programming language. Many small and big companies use MySQL. MySQL supports many Operating Systems like Windows, Linux, MacOS, etc. with C, C++, and Java languages.

Features of MySQL:

MySQL is a Relational Database Management System (RDBMS) software that provides many things, which are as follows:

- It allows us to implement database operations on tables, rows, columns, and indexes.
- It defines the database relationship in the form of tables (collection of rows and columns), also known as relations.
- It provides the Referential Integrity between rows or columns of various tables.
- It allows us to updates the table indexes automatically.
- It uses many SQL queries and combines useful information from multiple tables for the end-users.

Comparison of MySQL with different databases :

MySQL server is much faster than mSQL (and most other SQL implementations) on the following:

- Complex SELECT operations.

- Retrieving large results (MySQL server has a better, faster, and safer protocol).
- Tables with variable-length strings because MySQL server has more efficient handling and can have indexes on VARCHAR columns.
- Handling tables with many columns.
- Handling tables with large record lengths.
- SELECT with many expressions.
- SELECT on large tables.
- Handling many connections at the same time. MySQL server is fully multi-threaded. Each connection has its own thread, which means that no thread has to wait for another (unless a thread is modifying a table another thread wants to access). In mSQL, once one connection is established, all others must wait until the first has finished, regardless of whether the connection is running a query that is short or long. When the first connection terminates, the next can be served, while all the others wait again, etc.
- Joins. mSQL can become pathologically slow if you change the order of tables in a SELECT. In the benchmark suite, a time more than 15,000 times slower than MySQL server was seen. This is due to mSQL's lack of a join optimiser to order tables in the optimal order. However, if you put the tables in exactly the right order in mSQL2 and the WHERE is simple and uses index columns, the join will be relatively fast!
- ORDER BY and GROUP BY.
- DISTINCT.
- Using TEXT or BLOB columns.

Pros of MySQL:

1. Data Security:

MySQL is globally renowned for being the most secure and reliable database management system used in popular web applications like WordPress, Drupal, Joomla, Facebook and Twitter. The data security and support for transactional processing that accompany the recent version of MySQL, can greatly benefit any business especially if it is an eCommerce business that involves frequent money transfers.

2. On-Demand Scalability

MySQL offers unmatched scalability to facilitate the management of deeply embedded apps using a smaller footprint even in massive warehouses that stack terabytes of data. On-demand flexibility is the star feature of MySQL. This open source solution allows complete customization to eCommerce businesses with unique database server requirements.

3. High Performance

MySQL features a distinct storage-engine framework that facilitates system administrators to configure the MySQL database server for a flawless performance. Whether it is an eCommerce website that receives a million queries every single day or a high-speed transactional processing

system, MySQL is designed to meet even the most demanding applications while ensuring optimum speed, full-text indexes and unique memory caches for enhanced performance.

4. Free installation.

The community edition of MySQL is free to download. With a basic set of tools for individual use, MySQL community edition is a good option to begin with. Of course, there are other, prepaid options for Enterprise or Cluster purposes with richer functionality. Nevertheless, if your company is too small to pay for one of them, the free-to-download model is the most suitable for a fresh start.

5. Simple syntax and mild complexity:

MySQL's structure and style are very plain. Developers even consider MySQL a database with a human-like language. MySQL is often used in tandem with the PHP programming language. Because they share a gentle learning curve, it's much easier to form a team to manage your database. Also, MySQL is easy to use. For instance, most of the tasks can be executed right in the command line, reducing development steps.

6. Cloud compatibility:

Business-oriented by nature and originally developed for the web, MySQL is supported by the most popular cloud providers. It's available on such leading platforms as Amazon, Microsoft, and others. This makes MySQL even more attractive and gives businesses room for growth.

CONS OF MySQL:

1.Scalability challenges. MySQL was not built with scalability in mind, which is inherent in its code. In theory, you can scale MySQL, but it will need more engineering effort as compared to any of the NoSQL databases. So, if you expect one day your database will increase substantially, keep this limitation in mind or choose another DBMS option.

2.Partial open-source support. Although MySQL has the open-source part, it's mostly under Oracle's license. This limits the MySQL community in terms of improving the DBMS. Why do you care? Because when you have completely open-source support, you expect many problem-specific implementations and community assistance. This is not the case when the software belongs to corporate owners and you'll have to pay for support.

3.Limited compliance with SQL standards. Structured Query Language has specific standards. MySQL doesn't completely follow them, i.e. MySQL provides no support for some standard SQL features. On the other hand, MySQL has some extensions and distinct features that don't match the Structured Query Language standards. It's not a big deal for small web applications. The issues may appear when you have to shift to other databases, which is likely to happen when your business starts growing.

Characteristics of MySQL in detail:

Easy to use

MySQL is easy to use. We have to get only the basic knowledge of SQL. We can build and interact with MySQL by using only a few simple SQL statements.

It is secure

MySQL consists of a solid data security layer that protects sensitive data from intruders. Also, passwords are encrypted in MySQL.

Client/ Server Architecture

MySQL follows the working of a client/server architecture. There is a database server (MySQL) and arbitrarily many clients (application programs), which communicate with the server; that is, they can query data, save changes, etc.

Free to download

MySQL is free to use so that we can download it from MySQL official website without any cost.

It is scalable

MySQL supports multi-threading that makes it easily scalable. It can handle almost any amount of data, up to as much as 50 million rows or more. The default file size limit is about 4 GB. However, we can increase this number to a theoretical limit of 8 TB of data.

Speed

MySQL is considered one of the very fast database languages, backed by a large number of the benchmark test.

High Flexibility

MySQL supports a large number of embedded applications, which makes MySQL very flexible.

Compatible on many operating systems

MySQL is compatible to run on many operating systems, like Novell NetWare, Windows* Linux*, many varieties of UNIX* (such as Sun* Solaris*, AIX, and DEC* UNIX), OS/2, FreeBSD*, and others. MySQL also provides a facility that the clients can run on the same computer as the server or on another computer (communication via a local network or the Internet).

Allows roll-back

MySQL allows transactions to be rolled back, commit, and crash recovery.

Memory efficiency

Its efficiency is high because it has a very low memory leakage problem.

High Performance

MySQL is faster, more reliable, and cheaper because of its unique storage engine architecture. It provides very high-performance results in comparison to other databases without losing an essential functionality of the software. It has fast loading utilities because of the different cache memory.

High Productivity

MySQL uses Triggers, Stored procedures, and views that allow the developer to give higher productivity.

Platform Independent

It can download, install, and execute on most of the available operating systems.

Partitioning

This feature improves the performance and provides fast management of the large database.

GUI Support

MySQL provides a unified visual database graphical user interface tool named "MySQL Workbench" to work with database architects, developers, and Database Administrators. MySQL Workbench provides SQL development, data modeling, data migration, and comprehensive administration tools for server configuration, user administration, backup, and many more. MySQL has a fully GUI supports from MySQL Server version 5.6 and higher.

Dual Password Support

MySQL version 8.0 provides support for dual passwords: one is the current password, and another is a secondary password, which allows us to transition to the new password.

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