# Structured Comparison of SQLite and MySQL

Introduction to MySQL

MySQL is a lightweight relational database management system developed by the Swedish MySQL AB company and currently belongs to the Oracle company (Oracle doc, 2020). At present, MySQL is widely used in small and medium-sized websites on the Internet. Due to its small size, high speed, low total cost of ownership, open source, and free, the development of small and medium-sized websites generally chooses Linux + MySQL as the website database.

MySQL is a relational database management system (Oracle doc, 2020). The relational database stores data in different tables instead of putting all data in a large warehouse, which increases speed and flexibility.

Supported Data Types

MySQL supports a variety of types, which can be roughly divided into three categories: numeric, date/time, and string (character) types (Oracle doc, 2020).

MySQL supports all standard SQL numeric data types.

These types include strict numeric data types (INTEGER, SMALLINT, DECIMAL, and NUMERIC), and approximate numeric data types (FLOAT, REAL, and DOUBLE PRECISION).

The keyword INT is a synonym for INTEGER, and the keyword DEC is a synonym for DECIMAL.

The BIT data type saves bit field values and supports MyISAM, MEMORY, InnoDB and BDB tables.

As an extension of the SQL standard, MySQL also supports the integer types TINYINT, MEDIUMINT, and BIGINT.

MySQL features

MySQL is a widely used database with the following characteristics:

1. Written in C and C++, and tested with a variety of compilers to ensure the portability of the source code.

2. Support AIX, FreeBSD, HP-UX, Linux, Mac OS, Novell Netware, OpenBSD, OS/2 Wrap, Solaris, Windows and other operating systems.

3. APIs are provided for multiple programming languages. Programming languages ​​include C, C++, Python, Java, Perl, PHP, Eiffel, Ruby, Tcl, etc.

4. Support multi-threading, make full use of CPU resources.

5. Optimized SQL query algorithm, effectively improving query speed.

6. It can be used as a separate application in the client-server network environment, and can also be embedded into other software as a library to provide multi-language support. Common encodings such as GB 2312 and BIG5 in Chinese and Shift\_JIS in Japanese Etc. can be used as data table name and data column name.

7. Provide multiple database connection methods such as TCP/IP, ODBC and JDBC.

8. Provide management tools for managing, checking, and optimizing database operations.

9. Can handle large databases with tens of millions of records.

Context of MySQL

MySQL is designed for speed and reliability, but at the cost of fully following standard SQL. MySQL developers have been working hard to adhere to standard SQL more strictly, but it still lags behind other SQL implementations. It is true, but it comes with a variety of SQL modes and extensions that make it closer to compliance. Unlike applications that use SQLite, applications that use a MySQL database access it through a separate background resident process. Because the server process is located between the database and other applications, it can better control who has access to the database.

MySQL has inspired a large number of third-party applications, tools, and integrated libraries, which extend the functionality of MySQL and make it easier to use. Among these third-party tools, phpMyAdmin, DBeaver and HeidiSQL are widely used.

Advantages of MySQL

Compared with large databases such as Oracle, DB2, SQL Server, etc. MySQL has its own shortcomings, such as small scale and limited functions (the functions and efficiency of MySQL Cluster are relatively poor), but this does not reduce it in the slightest. Popularity. For general individual users and small and medium-sized enterprises, MySQL provides more than enough functions, and because MySQL is open source software, it can greatly reduce the total cost of ownership. At present, the popular website architecture method on the Internet is LAMP (Linux+Apache+MySQL+PHP), which uses Linux as the operating system, Apache as the Web server, MySQL as the database, and PHP as the server-side script interpreter.

Disadvantages of MySQL

Known limitations: Because MySQL is designed to speed and ease of use, rather than fully complying with the SQL standard, it has certain functional limitations. For example, lack of support for the FULL JOIN clause.

License and proprietary features: MySQL are a dual-licensed software, a free and open source community edition licensed under GPLv2, and several paid commercial editions released under a proprietary license. Therefore, some functions and plug-ins can only be used in the proprietary version.

The development speed has slowed down: Since the MySQL project was acquired by Sun Microsystems in 2008 and subsequently acquired by Oracle in 2009, users have been complaining that the development process of DBMS has slowed down significantly, because the community no longer has institutions to quickly respond to problems and implement them change.

When to Consider Using MySQL instead of SQLite

Distributed operation: MySQL's support for replication makes it an excellent choice for setting up distributed databases, such as primary-secondary or primary-primary architecture.

Websites and web applications: MySQL provides support for many websites and applications on the Internet. This is largely due to the ease of installing and setting up the MySQL database, as well as its overall speed and scalability in the long run.

Expected future growth: MySQL's support for replication helps promote horizontal expansion. In addition, upgrading to the commercial version of MySQL is a relatively simple process, such as a MySQL cluster that supports automatic sharding, which is another horizontal scaling process.

When to Consider Using SQLite instead of MySQL

According to the official SQLite documentation (SQLite doc, 2020):

SQLite is not directly comparable to client/server SQL database engines such as MySQL, Oracle, PostgreSQL, or SQL Server since SQLite is trying to solve a different problem. Client/server SQL database engines strive to implement a shared repository of enterprise data. They emphasize scalability, concurrency, centralization, and control. SQLite strives to provide local data storage for individual applications and devices. SQLite emphasizes economy, efficiency, reliability, independence, and simplicity. SQLite does not compete with client/server databases (SQLite doc, 2020).

I think SQLite should be able to perform outstandingly in small and medium-sized website application scenarios because (Hongyu, 2019):

1. Compared with MySQL, it is more completely free, and there are no restrictions on use.

2. Very compact, no configuration is required to support SQLite in PHP5 and above.

3. No need to purchase database service separately, no server process, zero configuration cost.

4. The entire database is stored in a single file, data import, export, backup and recovery are all copied files, and the maintenance difficulty is zero.

5. The reading speed is fast, and the speed is faster when the amount of data is not very large. More importantly, it saves a database remote connection without complicated authorization verification, and can be operated after opening it.

Summary

In general, MySQL and SQLite do not belong to the same category of database language design ideas. So, their application scenarios are not very the same. For most cases, it is necessary to specify the relevant database according to the needs of the user. But not blindly choose one database

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