Performance study of various connectivity of PHP and MySQL database

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Abstract: PHP and MySQL are best open source software to develop a website. The paper deals with research on investigating the performance of various connectivity options of the PHP and MySQL database. There are many aspects to compare, but in this paper, we analyze the execution speed of mysql, mysqli, and PDO database connectivity. Apache JMeter is a standard testing tool that is used to measure performance.

Index Terms - PHP, MySQL, PDO, Apache JMeter.

I. INTRODUCTION

A static website design using HTML, CSS, JavaScript, JQuery etc. A server-side scripting language and database are used to design and develop a dynamic website. PHP is the most popular server-side, HTML-embedded scripting language [8]. It is available for most operating systems and web servers, and can access most common databases, including MySQL. PHP may be run as a separate program or compiled as a module for use with a web server [7].

MySQL is a popular open source RDBMS software. It was designed and optimized for websites. MySQL became the platform of choice for web developers, and the default database for web-based applications [1]. Since then, the performance & scalability, reliability, and ease of use of the world’s most popular open source database, characteristics that made MySQL the first choice for web applications. PHP, MySQL, and Apache web server improve operational efficiency and reduce IT infrastructure costs for developing a website.

II. PHP / MySQL DATABASE CONNECTIVITY

PHP offers mysql, mysqli, and PDO extensions APIs to connect to MySQL. PHP 5 users can choose between the deprecated mysql extension, mysqli, or PDO_MySQL. PHP 7 removes the mysql extension, leaving only the latter two options [7].

1. PHP MySQL Extension

This is the original extension designed to allow you to develop PHP applications that interact with a MySQL database. The mysql extension provides a procedural interface and is intended for use only with MySQL versions older than 4.1.3 [8]. This extension can be used with versions of MySQL 4.1.3 or newer, but not all of the latest MySQL server features will be available.

2. PHP MySQLi Extension

mysqli is a new variant of mysql, providing both procedural and object-oriented support. It introduced prepared statements, transactions, and multiple statements execution. The mysqli extension is included with PHP versions 5 and later [7, 8].

3. PDO:

The PHP Data Objects (PDO) database abstraction layer may use one of several database-specific drivers. One of the drivers it has available is the PDO MYSQL driver, which allows it to interface with the MySQL server. In theory, if you are using the PDO API, you could switch the database server you used, from say Firebird to MySQL, and only need to make minor changes to your PHP code. While PDO has its advantages, such as a clean, simple, portable API, its main disadvantage is that it doesn't allow you to use all of the advanced features that are available in the latest versions of MySQL server.

All these three connectivity feature comparison is given table 1.
Table 1: Feature Comparison

<table>
<thead>
<tr>
<th></th>
<th>mysql</th>
<th>mysqli</th>
<th>PDO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduced Version</td>
<td>PHP 2.0</td>
<td>PHP 5.0</td>
<td>PHP 5.1</td>
</tr>
<tr>
<td>Procedural Interface</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Object Oriented Interface</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Prepared Statement</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Store Procedure</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Supports nonblocking, asynchronous queries with mysqli</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Lifecycle</td>
<td>Deprecated in 5.6.25 Removed from 7.x</td>
<td>Active</td>
<td>Active</td>
</tr>
</tbody>
</table>

III. MATERIALS AND METHODS

The Apache JMeter application is open source software, a 100% pure Java application designed to load test functional behavior and measure performance [6]. JMeter testing tool is used to generate different user load and http requests. All http requests are generated from the same machine. The experiment is carried out in JMeter GUI mode. JMeter test plan parameter setting is as under:

- No. of Threads(User): 5
- Ramp up Period (in seconds): 1
- Execution Time: 60 seconds.

The machine hardware and software configuration is as under:

- Desktop Processor: Intel® Core™ i5-2320 CPU @ 3.00GHz
- RAM: 2 GB / 4GB
- Operating System: Window 7 Home Basic (32 bits)
- Apache JMeter: Version 2.9 r1437961
- PHP: Version 5.5.27
- MySQL Database: Version 5.6.25
- Apache Web Server: Version 2.4.12 (Win32)

The experiment will generate throughput for the all three database connectivity with 2GB RAM and 4GB RAM other configuration are same. Throughput is calculated as requests/unit of time. The formula is: Throughput = (number of requests) / (total time). The Throughput is the most important parameter. It represents the ability of the server to handle heavy load. The higher throughput is the better performance of the database connectivity.

IV. RESULTS AND DISCUSSION

MySQL, MySQLi and PDO database connectivity performance measure for the display record and insert record operation of database. The experiment result data shown in Table 2 and result graph of display record and insert record are shown in Figure 1 and Figure 2 respectively.

Table 2: Throughput of Display and Insert Record Operation

<table>
<thead>
<tr>
<th>Connection Type</th>
<th>Display Record Operation</th>
<th>Insert Record Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2GB RAM</td>
<td>4GB RAM</td>
</tr>
<tr>
<td>MySQL</td>
<td>171.2</td>
<td>435.9</td>
</tr>
<tr>
<td>MySQLi</td>
<td>180.1</td>
<td>460.7</td>
</tr>
<tr>
<td>PDO</td>
<td>175.7</td>
<td>448.3</td>
</tr>
</tbody>
</table>
The experiment results indicate the MySQLi connectivity method performance is better than MySQL connectivity but the minor performance variation in PDO and MySQLi. Furthermore, record display operation program RAM utilization is more than record insert operation therefore result data of 2GB and 4GB has more difference in display record and less difference in insert record.

V. CONCLUSION

MySQL is a most popular open source relational database management system. There are three api “MySQL, MySQLi and PDO” to connect the MySQL with PHP serverside scripting. MySQL api extension is removed from the PHP 7.x version and it doesn’t support the Object Oriented features and not support the Prepare statement. MySQL api performance is low compare to the MySQLi and PDO. MySQLi and PDO api support the object oriented features, security and other features. MySQLi and PDO performance has not a much more difference and both are the active in latest PHP version.

REFERENCES


