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***LAMP : THE PROMINENT OPEN SOURCE WEB PLATFORM FOR QUERY
EXECUTION AND RESOURCE OPTIMIZATION***

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INTRODUCTION TO MAJOR WEB DEVELOPMENT PLATFORMS

The concurrent online business transactions by millions of users have increased the scope of research on dynamic and database driven web applications. Many organizations are working in this area to explore new platforms as well as scripting languages to get the results with minimum query execution and response time. Different technologies are used for developing dynamic web applications including PHP, MySQL, Apache, ASP, ASP.NET, SQL Server, PostgreSQL, Python and many more. These technologies are implemented on MS Windows, Linux, Sun Solaris and other operating systems. Most of the organizations use LAMP (Linux, Apache, MySQL, PHP) or WAMP (Windows, Apache, MySQL, PHP) Stacks to develop low cost and high performance web applications using PHP and MySQL as efficient web programming tools. This paper highlights the excellent performance of LAMP Platform



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over WAMP Platform. In this paper, I have taken results of query execution of both platforms and found that LAMP is giving results in lesser time span than WAMP.

A dynamic web application has four major components: Operating System, Web Server (HTTP Server), Back-End Database and Server Side Scripting Language. A number of prominent combinations are available to develop the dynamic web applications including LAMP (Linux Apache, MySQL, PHP), WAMP (Windows, Apache, MySQL, PHP), WISA (Windows, IIS, SQL Server, ASP.NET), MAMP (Mac, Apache, MySQL, PHP), SAMP (Solaris, Apache, MySQL, PHP) and this list is also increasing day by day.

The operating system is known as the platform on which all other programs and tools executes. Generally Windows is considered as friendly and easier to use operating system. Still there are many problems with Windows including security vulnerability and administrative tasks to handle different operations. In case of small web applications, Windows is adopted and all web pages are hosted on this operating system. Web server or HTTP Server is an important program which takes request for pages from HTTP Client (Web Browser), interprets the request, and returns the results. Apache Web Server is an open-source program which is available on both the Linux and Windows platforms. Apache Web Server is considered more secure than IIS (Internet Information Services) Server.

Database is used to store information to be retrieved, stored, and manipulated by the server side scripting language. MySQL is an open source and free database



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management system that supports most of the standard SQL (Structured Query Language) syntax and runs on all operating systems. Microsoft SQL Server or MSSQL or just SQL Server is a licensed product which is considered an enterprise-level database.

SYSTEM REQUIREMENTS IN PROMINENT WEB DEVELOPMENT PLATFORMS

As far as system requirements are concerned, each web development framework needs its own library to run its source code. In case of ASP.NET, there is requirement of .NET Framework on the server and Visual Studio is required to develop the web applications.

Same is the case of Coldfusion, whereby specific system requirements must be fulfilled before working on actual project. Coldfusion is required to be installed on the systems with particular system requirements.

When we discuss about LAMP Stack, there is no need of such library. LAMP can be installed and used easily without any special requirements. Moreover, PHP files can be created and edited using any suitable source code editor or simply Notepad.

LAMP STACK GETTING FAME IN INDUSTRIES

LAMP, MAMP, SAMP, WAMP and WISA are excellent platforms for developing



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dynamic and business web applications. LAMP is free, open-source, and community-supported while WAMP is expensive and corporate suite. Generally LAMP is recommended for most dynamic web applications because of its cost, customization, simplicity in web integration, and Apache's security features. Any web platform which is Linux based or simply open source is considered as better option than other web stacks.

With the popularity of Linux Operating System, a new generation of secured web applications has emerged. Now LAMP suite is considered as more efficient and secured for hosting any high traffic website.

Cost is not only the factor in choosing the LAMP technology, but many enterprises are being attracted to the infrastructure required for both development and deployment. Moreover, there are many reasons for choosing LAMP for organization as summarized below.

- Flexibility
- Customization
- Ease of Development
- Ease of Deployment
- Security
- Community and Support
- Each of the components in the LAMP stack is an example of Free or Open Source Software (FOSS).



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INSTALLATION AND CONFIGURATION OF LAMP STACK

INSTALLING LAMP ON FEDORA

Apache

1. Apache is the web server to handle the requests of client. In Fedora installation, depending on the choices made during the installation process, we may or may not have Apache already installed. Just use the following command to check:

```
# rpm -q httpd
```

2. If it tells a version number, then it's already installed and we can progress to the next step. Otherwise, we have to install it:

```
# yum install httpd
```

3. After installation, the service needs to be configured to start automatically.

```
# /sbin/chkconfig httpd on
```

4. To start the server process:

```
# /sbin/service httpd start
```



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MySQL

1. The database component of the LAMP stack is MySQL. The following command will install the database and the server process.

```
# yum install mysql mysql-server
```

2. The server process must likewise be running and accessible.

```
# /sbin/chkconfig mysqld on
```

```
# echo '-A RH-Firewall-1-INPUT -m state --state NEW -m tcp -p tcp --dport 3306 -j ACCEPT' >> /etc/sysconfig/iptables
```

```
# /sbin/service iptables restart
```

```
# /sbin/service mysqld start
```

3. To check whether everything is working okay so far, run this command to print out some information and check its status:

```
# mysqladmin version status
```

PHP (or Perl or Python)

1. To install PHP along with the needed stuff to glue it together with the web server and the mysql database.

```
# yum install php php-mysql
```



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2. We have to restart the web server to make sure it loads the PHP module.

```
# /sbin/service httpd restart
```

3. To run Python, run the following. (Python is already installed on all Fedora Core installations, so it's not needed to install that as well.)

```
# yum install mod_python MySQL-python
```

4. For Perl, the following will get you started:

```
# yum install perl mod_perl perl-DBD-mysql
```

INSTALLING LAMP ON UBUNTU

Install Apache

To start off we will install Apache.

1. Open the Terminal (Applications > Accessories > Terminal).
2. Copy/Paste the following line of code into Terminal and then press enter:

```
$ sudo apt-get install apache2
```

3. The Terminal will then ask for password, type it and then press enter.



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To make sure everything installed correctly we will now test Apache to ensure it is working properly.

1. Open any web browser and then enter the following into the web address:

<http://localhost/>

There should be a message "It works!" , congrats to you!

Install PHP

In this part we will install PHP 5.

Step 1. Again open the Terminal (Applications > Accessories > Terminal).

Step 2. Copy/Paste the following line into Terminal and press enter:

```
$ sudo apt-get install php5 libapache2-mod-php5
```

Step 3. Now, we have to restart Apache Web Server. Type the following code in Terminal to do this:

```
$ sudo /etc/init.d/apache2 restart
```

To check whether everything is find let's give it a quick test run.



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Step 1. In the terminal copy/paste the following line:

```
sudo gedit /var/www/testphp.php
```

This will open up a file called phptest.php.

Step 2. Copy/Paste this line into the phptest file:

```
<?php phpinfo(); ?>
```

Step 3. Save and close the file.

Step 4. Now open you're web browser and type the following into the web address:

```
http://localhost/testphp.php
```

Install MySQL

Step 1. Open the Terminal and then copy/paste this line:

```
$ sudo apt-get install mysql-server
```

Step 2 (optional). To enable other computers work on our network and to view the server, we must first edit the "Bind Address". Begin by opening up Terminal to edit the my.cnf file.

```
$ gksudo gedit /etc/mysql/my.cnf
```



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Change the line

```
bind-address = 127.0.0.1
```

And change the 127.0.0.1 to your IP address.

Step 3. Start by typing the following into Terminal:

```
$ mysql -u root
```

Use the following code -

```
mysql> SET PASSWORD FOR 'root'@'localhost' = PASSWORD('yourpassword');
```

Step 4. Now, we will install a program called phpMyAdmin, an easy tool to edit your databases. Copy/paste the following line into Terminal:

```
$ sudo apt-get install libapache2-mod-auth-mysql php5-mysql phpmyadmin
```

After installation, our next task is to get PHP to work with MySQL. Now, we have to open a file entitled php.ini.

To open it type the following:

```
$ gksudo gedit /etc/php5/apache2/php.ini
```

Uncomment the following line by taking out the semicolon (;).

Change this line:

```
;extension=mysql.so
```



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To look like this:

```
extension=mysql.so
```

Restart Apache and it is done

```
$ sudo /etc/init.d/apache2 restart
```

EXPERIMENTAL ANALYSIS OF QUERY EXECUTION IN LAMP AND WAMP

I have developed a Server Side Program in PHP and XML is used to store database records. The PHP Script was executed on both platforms LAMP (Ubuntu Desktop Edition Linux, Apache Web Server, MySQL, PHP) and WAMP (WAMP Server 2.0h) to check the performance in terms of response time and query execution time.

On execution of the script on both platforms, I found that LAMP is giving results in less time as compared to WAMP suite. Table-1 shows the query execution results on both platforms.

XML Database Structure

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<employees>
  <emp>
    <ID>1</ID>
```



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```
<NAME>Bob Dylan</NAME>
<SALARY>9000</SALARY>
<DEPARTMENT>Research</DEPARTMENT>
</emp>
<emp>
  <ID>2</ID>
  <NAME>Bonnie Tyler</NAME>
  <SALARY>10000</SALARY>
  <DEPARTMENT>Testing</DEPARTMENT>
</emp>
<emp>
  <ID>3</ID>
  <NAME>Dr. Smith</NAME>
  <SALARY>19000</SALARY>
  <DEPARTMENT>Testing</DEPARTMENT>
</emp>
<emp>
  <ID>4</ID>
  <NAME>Gary Moore</NAME>
  <SALARY>23000</SALARY>
  <DEPARTMENT>Development</DEPARTMENT>
</emp>
<emp>
  <ID>5</ID>
```



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```
<NAME>Eros Ramazzotti</NAME>
<SALARY>30000</SALARY>
<DEPARTMENT>Development</DEPARTMENT>
</emp>
<emp>
  <ID>6</ID>
  <NAME>Bee Gees</NAME>
  <SALARY>13000</SALARY>
  <DEPARTMENT>Research</DEPARTMENT>
</emp>
<emp>
  <ID>7</ID>
  <NAME>Dr.Hook</NAME>
  <SALARY>UK</SALARY>
  <DEPARTMENT>Testing</DEPARTMENT>
</emp>
<emp>
  <ID>8</ID>
  <NAME>Rod Stewart</NAME>
  <SALARY>12000</SALARY>
  <DEPARTMENT>Development</DEPARTMENT>
</emp>
<emp>
  <ID>9</ID>
```



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```
<NAME>Andrea Bocelli</NAME>  
<SALARY>17000</SALARY>  
<DEPARTMENT>Development</DEPARTMENT>  
</emp>  
<emp>  
<ID>10</ID>  
<NAME>Percy Sledge</NAME>  
<SALARY>80000</SALARY>  
<DEPARTMENT>Research</DEPARTMENT>  
</emp>  
</employees>
```

Output Format For Getting Query Execution Time

Select the Department: Testing

ID: 7

NAME: Dr.Hook

SALARY: UK

DEPARTMENT: Testing

Query took 0.0006 sec

Select the Department: Development

ID: 9

NAME: Andrea Bocelli



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SALARY: 17000

DEPARTMENT: Development

Query took 0.0008 sec

QUERY EXECUTION TIME (IN SECONDS)	
LAMP Platform	WAMP Platform
0.0006	0.0011
0.0011	0.0138
0.0007	0.0011
0.0004	0.0008
0.0007	0.0009
0.0004	0.0008
0.0007	0.0009

Table-1

Figure-2 depicts the query execution time in LAMP and WAMP platforms. It is clear from Figure-2 that LAMP is excellent in performance.



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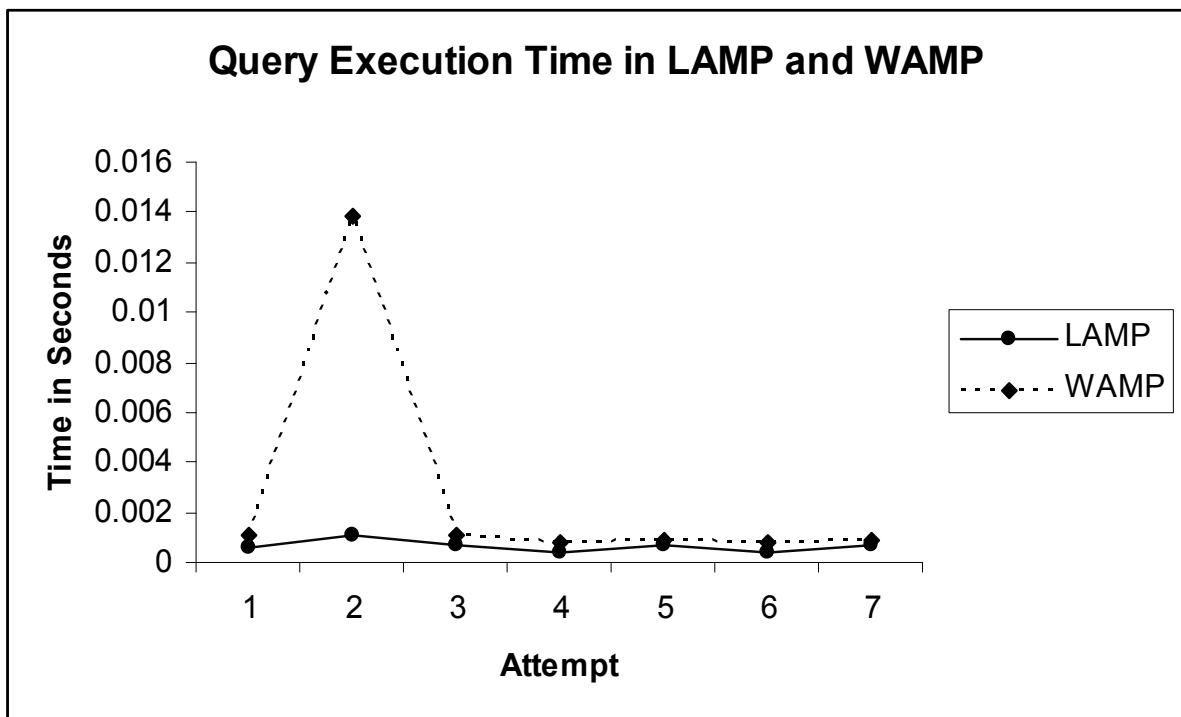


Figure-1

CONCLUSION

In this paper, the performance of two major web platforms has been evaluated. After running the script in both LAMP and WAMP stacks, I found that LAMP is better option for hosting dynamic websites than WAMP. Moreover, LAMP is more secured than WAMP because of in-built security mechanism in Linux Distribution. In my experiments, a significant performance is obtained using Linux (Ubuntu), Apache Web Server, MySQL and PHP.



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