



Analytical Evaluation of Web Development Framework Using Open Source and License-Based Software

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ABSTRACT: Websites are distributed system which follows the client-server architecture Model. The quality criteria of the web-based project depend on how many HTTP requests of users will be handled by it. Various Frameworks are available for developing the web-based project. Some frameworks like Hypertext Pre-Processor (PHP) and JAVA Server Page (JSP) are open source and available freely. Frameworks like ASP.NET is license based. The developer has to buy the license for Microsoft Windows Operating System. This research paper is focused on the comparison between PHP, JSP, and ASP.NET Web Development Framework and also concludes whether Framework plays an important role the in reliable development of Web Based Projects or not.

Keywords: Framework, Open -Source Software, License-Based Software, PHP, JSP, ASP.NET

INTRODUCTION

Web -Based Projects are client-server architecture based distributed Systems that require a connection of more than one computer through a network. In the network, one computer is a Server and all other computers are clients. The server computer fulfills the request of client computers through HTTP Protocols (Nourie, 2006).

Web development is required in two types of programming languages. Some languages like HTML, DHTML, Java Script, VB Script, and Ajax are client-side scripting languages. Some languages like JSP, ASP, and PHP are server-side scripting languages. Server-Side scripting languages are responsible for carrying users' HTTP requests and showing responses. (RAJENDRAN, et al., 2010)

Some Server- side scripting languages like JSP and PHP are open-source software and some server-side scripting like ASP are closed-source software. Open-source software is available for free. Closed-source software is licensed-based software. For using Closed-source software we have to pay the cost. (Botwe & Davis, 2015)

The quality criteria of the website depending on the number of HTTP requests of users will be processed by the website. In this paper, we focus on the selection of the best Web Development Framework. The comparison is between three Web Development Framework: PHP, JSP, and ASP. This research will also help the developer in the selection of the best Framework for web development

II. LITERATURE SURVEY

(**RAJENDRAN, et al., 2010**) have analyzed the content & structure of web programming language with parameters like the ease of programming, built-in functionality, etc, and also tried to suggest suitable programming languages for web development. But researchers have concluded that every programming language has its own advantage & disadvantage. The selection of programming language depends on the compatibility of the Programmer.

(**Mishra, 2014**) has presented a comparison of ASP.NET & PHP technology development. The comparison is based on web user state and persistence, make-up reusability, Input validation, proactive behavior, Database Interaction, and security issue. The author has concluded that Both technologies are similar in programming paradigm. But have some certain architectural differences.

(**Sharma, 2015**) has described the technologies of PHP and how it is related to ASP.NET. The author has concluded that ASP.NET is easy to create, debug & deploy but has many drawbacks like cost and editor dependent. So, it is used in developing small-scale projects. But PHP is editor independent and promoted by the PHP community. So, it is used in developing the large project.

(**Patel & Pancholi, 2018**) have analyzed the MVC Model of ASP.NET and PHP on the basis of parameters like Page Load Time(ms), Time to first-byte transfer(ms), Time to last byte

transfer(ms), Request transfer speed(kbps), and Response transfer speed (Mbps). The author has concluded that ASP.NET Framework is better than the PHP Framework.

(Haris & Hasim, 2019) has studied 23 features of different frameworks such as ORM, Code Generator, Template Engine, and CRUD Generator and concluded that the selection of a PHP Framework depends on the web application requirement. The selection of one project is not suitable for another project.

(R.Pavithra & Kumar, 2019) has summarized the benefits of adopting PHP and MySQL in web development. The outcome of this paper is increasing the use of all Frameworks of PHP will be beneficial for Web development.

(Odeh, 2019) has studied the various features of PHP & ASP like Cost, Performance, deploying and editing tools, etc., and tried to suggest which technologies are better for web development. But he concluded that there are no fixed criteria to select ASP & PHP for Web development.

(Ranjan, et al., 2012) have performed the analysis with execution time parameter on four benchmarks: factorial of 100, determining whether a random word having 1 million characters is palindrome or not, sorting a list of 1 million random integers using merge sort, Dijkstra's algorithm on a graph with 1000 nodes and 5000 edges. All benchmarks are written in built-in functions and self-written code. and concluded that no language is best in all conditions.

(Trent, et al., 2008) have performed load tests by using SPECweb2005 benchmarks on the three web applications: quick sort, levenshetein, and Fibonacci which are implemented using both server-side scripting languages JSP and PHP with web servers Apache and Lighttpd. The performance parameters like Run time, throughput, and CPU usage were used in the analysis. And concluded that web systems can attain similar outcomes using either PHP or JSP.

(Botwe & Davis, 2015) have compared the performance of web development technology on response time of processing HTTP request through Network and concluded that JSP has good performance over Cake PHP in processing the HTTP request of User.

III. PROBLEM STATEMENT

Comparison of JSP, PHP, and ASP on the basis of the load time, connect time and latency of HTTP-Requests handled per unit time and suggest which server-side scripting language is suitable for handling the HTTP requests web-based Projects.

IV. AIM AND OBJECTIVE

The following are the specific objectives that have been set to achieve the above aim.

1. To compare between Open Source IDE like PHP, JSP, and Licensee-based IDE like ASP on the basis of Load Test.
2. To explore the merits and demerits of Opensource IDE and licensee-based IDE.

V. Comparing PHP, JSP, and ASP on Basis of Features & Programming Structure

A. Hypertext Preprocessor (PHP)

PHP Stand Form is Hypertext Preprocessor, an open-source scripting language developed by Rasmus Lerdroof and used for developing webpages and websites. The recent versions of this PHP language, such as PHP 7 and PHP 8, are object-oriented and are used to develop a secure framework that is dynamic and reusable (Anon., 2023).

PHP supports the following features.

- It is an open-source programming language.
- It has an extensive library of programming.
- It is adaptable to multiple platforms.
- it has wide community support also.
- Maintenance of PHP projects is an easy task.

B. JAVA SERVER PAGE (JSP)

JSP is the server-side scripting language and all the processing is done at the server site, not the client site. JSP is a technology of Java. So, it is platform and server independent. It gives an ideal platform for creating web applications easily and quickly (Sharma, 2008)

JSP supports the following features

- JSP is platform and server independent.
- JSP uses pure Java and takes full advantage of object-oriented.
- JSP uses a combination of tags and scripting to create dynamic web pages.
- JSP Pages are reusable components like enterprise Java Beans.
- Maintenance of JSP projects is an easy task.

C. Active Server Page (ASP)

ASP is the same as JSP. ASP is developed by Microsoft. ASP is server-side scripting. ASP is a server-side scripting language that enables you to make dynamic and interactive web pages that are not affected by the browser type the website visitor uses. (Sharma, 2008)

ASP supports the following features

- ASP pages are platform independent but ASP supports Microsoft IIS Server
- ASP Pages are reusable components like COM/DCOM.
- ASP does not support customizable tags.
- ASP is a Product of Microsoft.
- ASP Supports VB Scripts and JScript.

Parameters	PHP	JSP	ASP
Licensing Cost	Free	Free	Free with Window OS license
Platform	multiple	multiple	Window OS only
External Hosting	Widely available with Zero Cost	Not So available although Free	Widely available but not free
Security	Very Good	Good	Good
Scalability	Scales very Well	Scales well when configured properly	Can be difficult to scale
Configuration	Very Flexible	Moderate flexible	Not Flexible
Framework	Many available	Standard available	Standard available

TABLE 1. Comparison between PHP, JSP, and ASP (Ranjan, et al., 2012)

PHP	JSP	ASP
<pre><html><body> <?php echo "Hello World!"; ?></body> </html></pre>	<pre><html><body> <%= "Hello World!" %> </body> </html></pre>	<pre><html><body> <% Response. Write("Hello World!"); %></body> </html></pre>

TABLE 2. Programming Structure of PHP, JSP, and ASP (Ranjan, et al., 2012)

VI. RESULT & DISCUSSION

We can say PHP is the most suitable server-side scripting language on the basis of its Characteristics and programming structures. All the above research papers compared this language to features or programs with no database. ASP is a licensed-based integrated development environment. But our research study is based on an Open source-integrated development environment. For finding a conclusion, the same web application was developed in both IDE JSP & PHP and executed on the same configuration computer. Before launching the website on the online server, it is necessary to load test it on the local server. So, we have performed load testing through Apache JMeter on the web application and compared performance on parameters like Load Time, connect Time, and Latency. An Online Zoo ticket booking system project has been developed in both PHP and JSP web scripting languages. The description of Web applications is described in Table 3.

ID	URL	Implementation Tools
PHP Application	http://localhost/wolf safari	<ul style="list-style-type: none"> • Dreamweaver8.0 as a program Editor • PHP as Server-side Scripting language • MySQL as a Database Server • XAMAP as a web server
JSP Application	http://localhost/vatsya	<ul style="list-style-type: none"> • Netbeans8.2 as a program Editor • JSP as Server-side Scripting language • MySQL as a Database Server • Apache Glassfish as a web server

Table 3: Description of Web Application

A. Comparison of Application on the Basis of Load Time: -

The first comparison is based on Load Time. Load time is the time from just before sending the request to just after receiving the last part of the response (Holdeew, 2017). The Average Load Time of each web Project through POST and GET are presented in Table 4. These data have also been presented in the form of column charts which are shown in Figure 1.

Server-Side Scripting language	Average Load Time(millisecond)	
	POST	GET
PHP Application	195	166
JSP Application	240	275

Table4: Load Time(milliseconds) of Application

Load Time application should be less for better performance of the application. It shows that web page will be loaded fast on web browser.

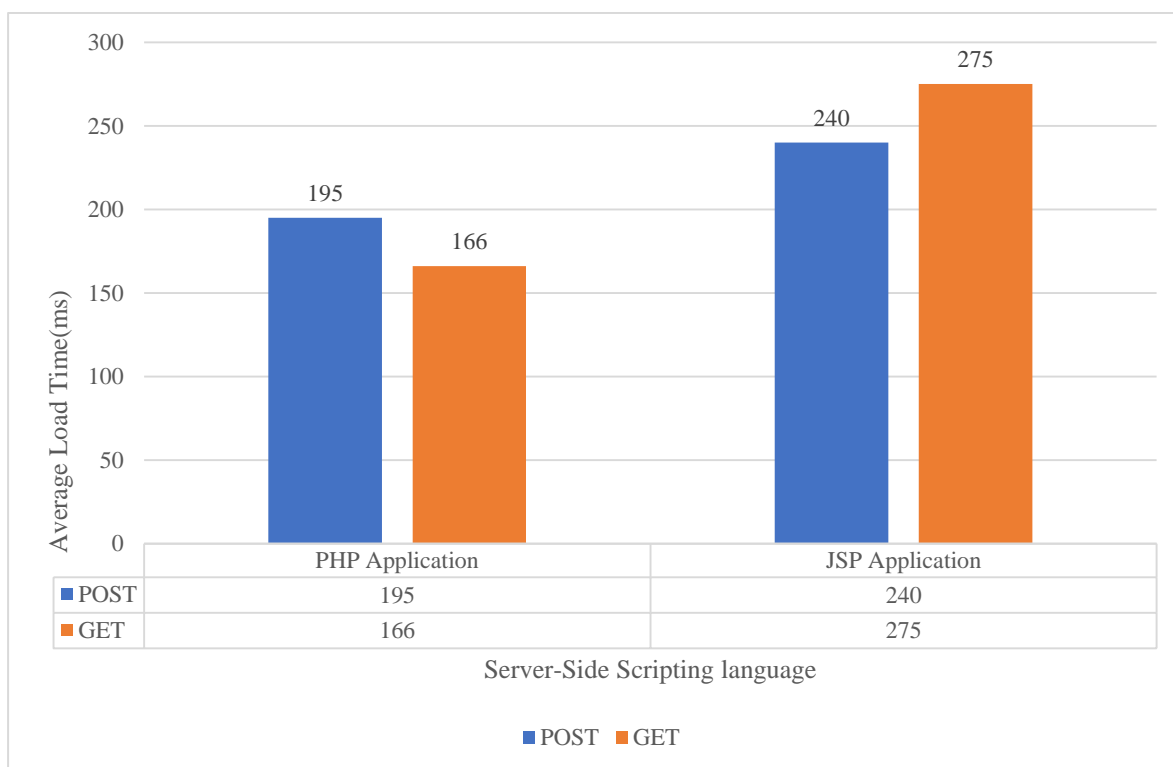


Figure 1: Average Load Time of Web Application

According to figure 1, PHP has less Load time in both POST and GET Method. So, PHP Pages are loaded fast as compared to JSP Pages.

B. Comparison of Application on the Basis of Connect Time: -

The second comparison is based on Connect Time. JMeter measures the time it took to establish the connection, including SSL handshake is called connect time (foundation, n.d.). The Average Connect Time of each web Project through POST and GET is presented in Table 5. These data have also been presented in the form of column charts which are shown in Figure 2.

Server-Side Scripting language	Average Connect Time(millisecond)	
	POST	GET
PHP Application	38	50
JSP Application	35	66

Table5: Connect Time(millisecond) of Application

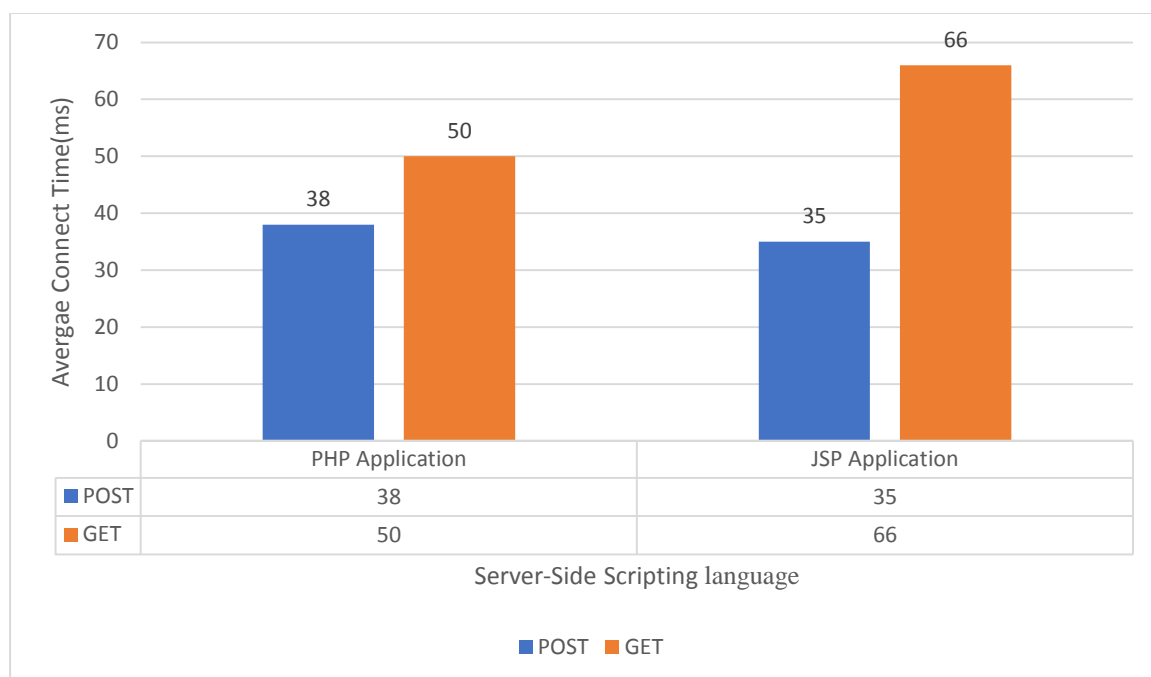


Figure 2: Average Connect Time of Web Application

Connect time shows that the web pages will be connected to Server. If it is less than it shows that web page will sending User HTTP request in less time. According to figure 2, PHP pages have less time to connect with server as compared JSP through GET Method. JSP Pages have less time to connect with the server than PHP, but it is a little bit less.

C. Comparison of Application on the Basis of Latency: -

The third comparison is based on Latency. JMeter measures the latency from just before sending the request to just after receiving the first response. Thus, the time includes all the processing needed to assemble the request and the first part of the response, which generally will be longer than one byte (foundation, n.d.). The Average Latency of each web Project through POST and GET are presented in Table 6. These data have also been presented in the form of column charts which are shown in Figure 3.

Server-Side Scripting language	Average Connect Time(millisecond)	
	POST	GET
PHP Application	147	166
JSP Application	234	273

Table 6: latency(millisecond) of Application

Load Time application should be less for better performance of the application. It shows that web page will be Started responding fast.

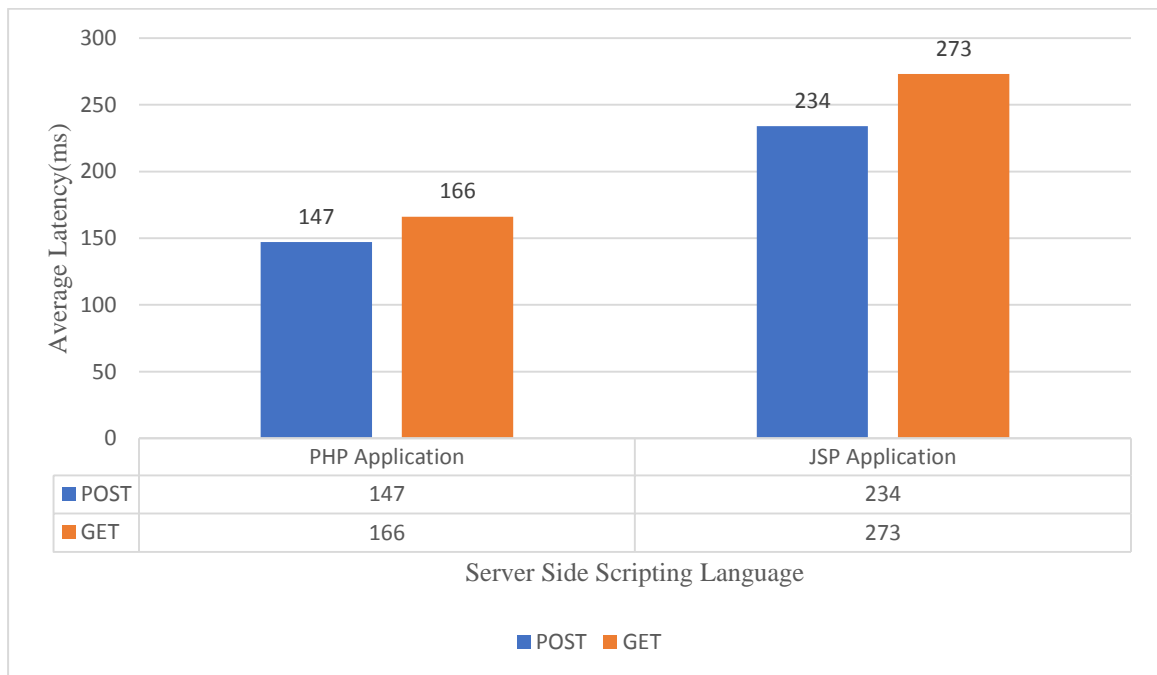


Figure 3: Latency of Web Application

According to figure 3, PHP pages have less latency as compared to JSP through GET and POST Method. PHP pages start fast response as compared to JSP Pages.

Comparing the above result, we find contradictory result of research article (David A. Botwe, 2015). In that article, the researcher has compared the performance of web development technology on response time of processing HTTP request through Network and concluded that JSP has good performance over Cake PHP and ASP.NET in processing the HTTP request of Users.

But in my research, We have performed load testing through Apache JMeter .PHP have less page load time on web browser and less time to connect with server Over JSP pages. PHP pages have less latency as compared to JSP Pages. So, PHP Pages start responding fast.

VII. CONCLUSION

JSP is open source server-side scripting language and compatible with many platforms but it has a complex programming structure. JSP Program contain java packages, predefined function and implicit object. Before executing the JSP pages, JSP engines convert these pages into servlet. So, JSP Pages takes more time to load on web browser, establishing the connection with server and latency. ASP is license

based but it also has complex programming structure of C#. it is compatible with Windows environment. PHP is open source server-side scripting language and compatible with many platforms. It programming structure is less complex as compared to JSP & ASP because PHP program structure is based on predefined command, variable and arrays. PHP does not contain complex predefined packages, methods and object. PHP pages are directly interpreted by browser. So, PHP Pages takes less time to load on web browser, establishing the connection with server and latency. In last we can say that PHP is better server- side scripting language than JSP & ASP on basis of load testing.

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