Analytical and Comparison Study of Main Web Programming Languages – ASP and PHP

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Abstract **— Web applications are growing and websites numbers are increasing, as well. At the same time the requirements on quality and performance are also increasing on the web application development. Every day new programming tools are appearing in the market. All of these issues are affecting the software development including web and mobile applications. This paper tries to provide helpful information for the web developers by means of making analytical comparison between two of the most important web programming languages – PHP and ASP as dynamic server-side scripting languages.**

Keywords **– ASP; PHP; Programming languages; Web Application.**

1. Introduction

Discussing web applications development, one should bear in mind that it does not mean talking about static web site such as personal homepage. The real web application is a dynamic and interactive application. The general structure of web application is shown in Figure 1. In this case HTML is not enough to develop a web site, ASP (C#), PHP, Java,Paython,..,and Database systems such MySQL will be used to produce a fully dynamic interactive web sites.

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This research focuses on PHP and ASP as the main popular languages used for web development.

There are many official and non-official comparisons studies about web programming languages in general, especially between PHP & ASP.net, but most of these comparisons may be rather outdated or limited regarding the characteristics of these languages. This research provides a practical comparison of PHP and ASP.net based on the last modern versions of the mentioned languages.

PHP is counted as popular, and general- purpose scripting web development programming language; PHP stands for Hypertext Preprocessor. It is a server-side scripting language, and it was created in 1994 by RasmusLerdorf and the last stable version is PHP 7.2.10 [1]. PHP is especially well-suited for creating dynamic web pages with connectivity to various database systems (MySQL is the most widely used because PHP provides native support for it and the database is free and an open-source project). PHP runs on different platforms, it is compatible with all servers used today. PHP is easy to learn and runs efficiently on the server side [6].

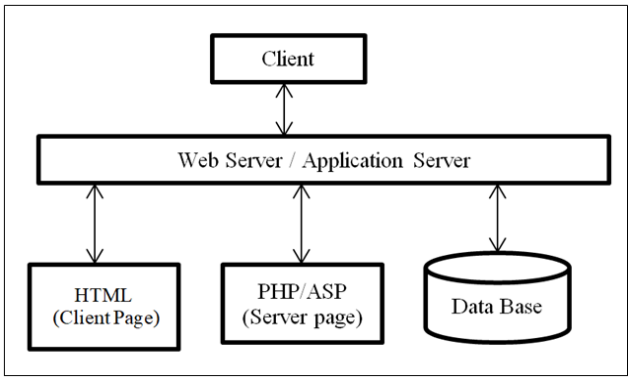

Figure 1. Web Application : General Structure

ASP.NET (Active Server Page) is an open source web framework for developing web applications, apps, and services using (.NET) framework, this framework runs on Microsoft Windows, creates websites based onHypertext Markup Language HTML5, Cascade Style Sheets CSS, and JavaScript that are very simple to use by users.

The first version of .NET Framework was released in 2002 [2], (first beta version was released in 2000 [15]). C# and VB.Net are used as behind code in ASP web development approach.

In this work all comparison between ASP and PHP will depends on using C# programming language. As a result of many studies [7],[8], Figure2 (A and B) shows information about number of websites used in the internet, and how this number is growing from 1995 to 2018.

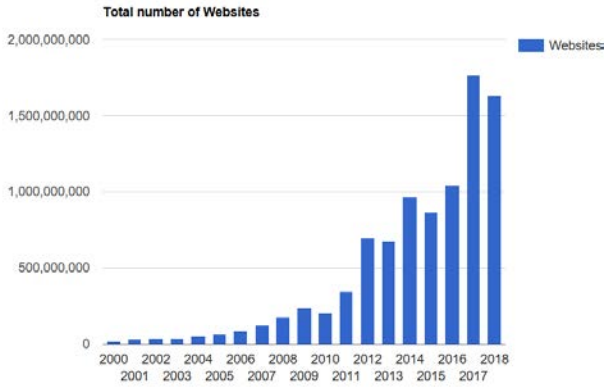

Figure 2. A: Number of web sites [7].

1.1. Objectives

The aim of this work is to provide analytical review and practical recommendation of using web programming language in order to produce a high quality product. To achieve this goal, the research will consider the following issues:

- It analyzes main concepts of two of the most common widely used web development languages ASP, and PHP.
- It gives some guidance, especially for new web developers, for selecting web tools suitable for their experience.
- It provides comparison knowledge between ASP and PHP, since such researches do not very exist in our references.

1.2. Significance of the Research

This paper is very important because many web developers are having difficulties in choosing the suitable approach for developing their websites and web applications (Figure.1) Furthermore, there is lacking enough knowledge respecting the potential capabilities for PHP and ASP.net. In this research we focus on the displaying and comparison of properties and capabilities of both PHP, and ASP.net languages in order to provide web developers a good chance for success in developing web applications and enhance its performance.

2. Methodology

The research methodology that is used in this study regards the accumulative experience of web developers and their opinions about PHP, ASP. The other method is depending on information published in different references (including books and web sites) that comprises web programming, and comparing between PHP and ASP using two web applications with the same requirements.

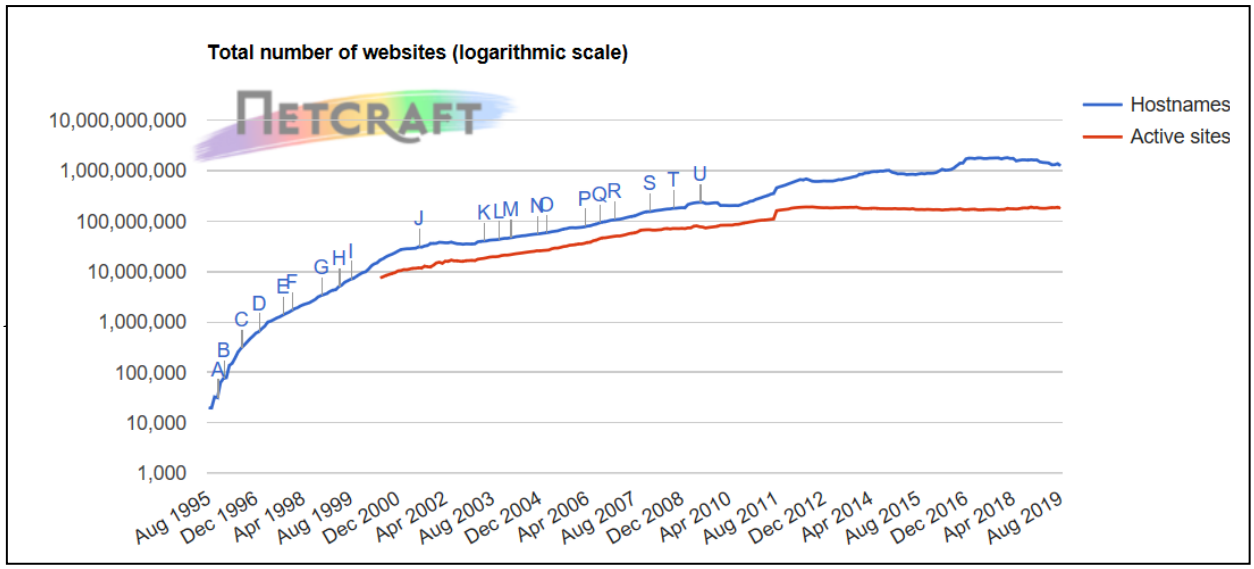

Figure 2. B: Number of web sites [8].

3. Result Analysis and Comparison

The results of comparison between PHP and ASP.net will be included in this section. They will reflect the impact of each language on some of software quality factors and other comparison criterion.

3.1. Readability, Understandability and Maintainability

Regarding these factors (as quality factors), there are no big differences between PHP and ASP.net, because these factors primarily depend on Programmer experiences when using quality standards and guidelines, but in general we can say that:

- PHP source codes are easier than ASP codes.
- Using behind C# or VB.net code in ASP projects gives high value for readability, understandability, and maintainability factors by comparing with PHP code written in HTML pages. This issue gives a good chance for testers to deal with ASP better than PHP.

3.2. Cost

Generally, the cost of developing any software depends on the cost of developers (programmers), and cost of the tools used to develop, for example when producing a web software application some software tools will have to be used. The following table (1) displays the relationship between costs and software tools used in PHP, and ASP.net

Notes: IIS7 provides a single Web server platform for developing, deploying, hosting and managing the most popular languages used on the Web, from ASP.NET to PHP [5].

Cost of PHP is less free than ASP; it does not need additional licensing. It needs to Apache server, MySql, and PHP (all of them are also free). But ASP needs licensing Microsoft's server, which cost can be more than 1000$[12],[13].

3.3. Performance

Measuring performance is very complicated process. All of the following information is depending on the published comparisons studies.

- ASP supports parallel programming (it has threads), PHP supports threads, but relying on the engine in order to determine when a thread should join. It may cause undesirable behavior; the programmer should be explicit at whenever time [1].
- Irrespectively of used database engine, PHP products have better performance than ASP. It is more suitable for running "lightly" applications on servers. Lacking of GUI (or simple GUI) gives PHP more advantages in performance [14].
- Performance in which analyzing and comparing two identical applications (developed using PHP, and ASP) according to different criteria published in 2014 [13], the researchers found that PHP works better than ASP, for the reason that in performance test the response time was lower for PHP. In addition, PHP performed better than ASP in stress, and endurance test [13].

3.4. Deploying and Editing Tools

To solve the same problem ASP.net needs more Line of Source Code (LOC) comparing to PHP, more time and effort regarding the development process. PHP is producing a web software application some software tools will have to be used. The following table (1) displays the relationship between costs and software tools used in PHP, and ASP.net interpreting the source code at the server, which is why there is no need for additional steps toward seeing the modification effects on the page. ASP.net compiles the source code after each change. This issue means more time consuming. As a conclusion, ASP.net applications take more effort, time to complete developing process, and they are more complex [13].

PHP codes can be edited using any text editor such as: Notepad++, VI, or VIM…, so its editor is independent ASP.net uses Microsoft Visual Studio editing tools.

Table 1. Cost relating PHP, and ASP

No	Components	PHP		ASP.net	
		Software Tools	Cost	Software Tools	Cost
1	Platform	Independent: Linux, Unix, OS, Windows	Mostly Free	Windows	Not free
2	Server	Apache	Free	IIS	Not free
3	Data Base	MySql (example)	Free	MySql (example) MS-SQL	Free Not free

3.5. Platform, Data Base, Web Server, and Core Language:

- Linux, Unix, and Windows platforms can be used to run PHP web applications using apache server. ASP can be run on Windows platforms only using IIS servers [3].
- ASP is built on COM based architecture, which is an overhead for the server whereas PHP code runs in its own memory space [3].
- PHP includes many of builtin features like File Transfer Protocol (FTP), and encryption mechanisms, but such types of builtin features are not found in ASP.
- PHP as a programming langauesis derived from C++ language, the used syntax in this language (PHP) is very similar to syntaxes used in C/C++.
- The syntax for ASP is based on the Visual Basic's and C#'s syntax [3].
- PHP and ASP can connected to differenttypes of databasesystems.
- Database: MySql is a built-in supported by PHP; the function open and close are not required for opening and closing connections to MySQL servers [13].

3.6. General Structure of a Web Page

Generally, The PHP web page consists of one file represented in a script combined of HTML tags and PHP segments, which are embedded in the HTML document by enclosing it between the <?php and ?> tags, as shown in Figure3. On the other hand, ASP.net web page can be done by one file using the same way as PHP (embedding ASP.net code <% %> in HTML script), or using two separate files, as shown in Figure4, and Figure5, one for design using HTML tags, ASP instructions and tools, and the other (behind code) to write source code using programming languages such C# or VB.Net to implement the required functions for web page [4].

```
<!DOCTYPE html>
<html>
<body>

<?php
echo "<h2>PHP is Fun!</h2>";
echo "Hello world!<br>";
echo "I'm about to learn PHP!<br>";
echo "This ", "string ", "was ", "made ", "with multiple parameters.";
?>

</body>
</html>
```

Figure 3. PHP sample

```
<!DOCTYPE html>
<body>
    <form id="form1" runat="server">
        <div>
            <h2>
                <% Response.Write("ASP is Fun"); %>
            </h2>
            <%
                Response.Write("Hello world!<br>");
                Response.Write("I'm about to learn ASP!<br>");
                Response.Write("This string was made with multiple parameters.");
                %>
        </div>
    </form>
</body>
</html>
```

Figure 4. ASP Sample as script

```
protected void Button1_Click(object sender, EventArgs e)
{
    Response.Write("<h2>ASP is Fun<br></h2>");
    Response.Write("Hello world!<br>");
    Response.Write("I'm about to learn ASP!<br>");
    Response.Write("This string was made with multiple parameters.");
}
```

Figure 5. ASP sample as behind code

3.7. General Syntactic Characteristics

PHP statements are considered as dynamic typing statements, and its variable does not need to be declared (just write and use without defining data type). It is not a declarative programming language. ASP.NET supported by C# (VB.NET) is considered to be a declarative language [6]. The following table provides some of the general syntactic characteristics for PHP and ASP.net [4].

Table 2: General Syntactic Characteristics

Syntactic Characteristics	PHP	ASP.net
Variable	Not type declared	Type declared
Primitive Data Type	Has four scalar data type (integer, double, string, and boolean)	Has long list of primitive data type
Compound types	Arraies and objects	Long list
Special types	Two: resource and NULL	
Operators	Usual collection (based on C programming language)	Usual collection (based on C#, and VB programming language)
Array	Combination of the arrays of typical language and associative array, or hashes, found in some other language such as Python.	Typical language arrays
Cookies	support	Support

3.8. Managed VS Unmanaged (Scripting) Languages

Managed Programming Languages (MPLs) have specific features such as: data and memory type safety, by which they are performing automatic memory management, and dynamic code transmission [9]; C# used in ASP.net is managed language. Scripting Languages (SLs) are interpreted within another language for example JavaScript; PHP codes can be included in HTML and then executed (interpreted) by the browser.

Table 3. Managed VS Unmanaged (Scripting) Languages

	Managed Programming Languages	**Unmanaged (Scripting) Languages**
Coding and Design	Full coding	Partially coding
GUI	Full designing	Partially, only supporting for GUI.
Complexity	Complex	Easy
Development time	Take long time	Take less time

3.9. Programming Languages Features

Depending on the very important comparison study, which comprises six programming languages [10], this section will cover the summary regarding the most important features of PHP and ASP(C#).

Another study presents comparison between ASP and PHP be developing two web applications with the same requirements, and same Graphical User Interface GUI [15].

It concludes that ASP has more advanteges than PHP, the source code in ASP is more flexible,for small scale web applications the average effort and time for developing using ASP is bigger by comparing to PHP. ASP needs more memory for long code path (PHP is more effiecient in this case), PHP can be supported by many open-source resources and developpers, ASP is supported by Microsoft Windows resourses and developpers only [15].

4. Conclusion

This research completely regards the effect of right choice within web programming languages (PHP or ASP), in order to develop our projects. As a conclusion of this study we can state the following: there is no explicit recommendation to use PHP or ASP to all types of applications, and many factors have to be considered before selecting ASP or PHP. For example ASP is more suitable for developers who are more familiar with Microsoft products. From other point of view, PHP is better for developers who are preferring work with script directly. PHP codes are considered to be unsafe languages, weak, and one of the dynimaclly typed languages. C# represents safer languages, respecting server-side web application development particularly, but both of them are suitable [6]. By comparing ASP and PHP technologies, ASP is more reliable and efficient than PHP; regarding to simplicity PHP is simple scripting language during development process [15]. Finally, developer can select the preferred one depending on their knowledge, application domain, used platform and other factors.

Table 4: Programming Languages Features

No	**Feature**	**PHP**	**ASP (C#)**
1	Programming paradigms	Functional , ,Object-oriented, Imperative, Reflective,,, and Procedural	Multi-paradigm: Generic, Structural, Imperative, Event driven, Reflective, Object-oriented, andConcurrent.
2	Boundary Check	At runtime level	Yes, it can be disabled
3	Static Type Checking	Not applicable	Applicable during code compilation.
4	Dynamic Type Checking	Yes	Yes
5	Exception Handling	Applicable using: -throw exceptions, and try/catch [11]	Applicable using: -try/ catch/finally statements.
6	Conditional compilation	Applicable	Applicable
7	Multiple Inheritance	N/A	N/A
8	Session Management	Using: $_SESSION	ASP.NET uses Session State

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