

AN EMPIRICAL COMPARISON OF HTML, PHP, COLDFUSION, PERL,  
ASP.NET, JAVASCRIPT, VBSCRIPT, PYTHON AND JSP

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*Abstract*

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*With the advent of the World Wide Web, several Web development languages have emerged and selecting a suitable one is never an easy task. Over the years, several attempts have been made to evaluate Web development tools vis-à-vis software measurement. This paper presents a new experimental evaluation of nine web development languages. A shopping cart application was implemented in each of the Web development languages and the following factors were used in our evaluation: Platform, Performance, Functionality, Ease of use, Reliability, Program length, Portability, Database supports, Speed of execution, Maintainability, Object oriented programming, and Development cost.*

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**Keywords:** Web Development languages, World Wide Web, Information Technology (IT) and Web browser

**1. Introduction:**

The World Wide Web (WWW) has rapidly become the standard for displaying information on the Internet. Over the last ten years, the nature of the Internet and the World Wide Web has changed drastically from what they were then. Exciting new developments occur almost daily, as the pace of innovation is unprecedented by any other technology [1]. This tremendous advancement is mainly due to improvements in the design of Web sites with the aid of sophisticated Web development technologies and languages. The advent of these languages have changed the content of the Internet from its usual Web pages full of only static text and very few images to web sites that not only animate text and images but offer a wide range of services including database and multimedia features. Terms like portals, e- (commerce, payment, education, banking, learning etc) have become everyday terms due to the improvement in Web development technologies and their familiarity with the general public. Several methods and experiments have been carried out to determine the suitability and effectiveness of Web development tools which have led to the emergence of three evaluation methods namely: Empirical, Vendor and Usability. The metrics for comparing Web development tools coding and design representations in the work on assessing an aspect of a visual Programming Language (writing matrix multiplication problems) is reported in [2] while [3] examined the relative merits of two input devices for editing graphic diagrams. By far, the most extensive and ambitious research conducted using empirical comparison was done by [4]. Though the work was done by making use of a phone code program written in each of the seven programming Language or Web technologies, the author concluded that the work was not conclusive enough in terms of serving as a comparison guide. The growth of the Web is phenomenal, but the number of Web users is now measured in the tens of millions while the number of Web sites is now measured in the millions. Regardless of the actual numbers, it is clear that Corporate Companies, Academic Institutions, Government have spent a lot of time, attention, and money on the Web, Research Organisations etc wanting to get involved in Cyberspace. Very few of them have much of a feel for their payback on this investment. Much of that has been due to the incredible hype and fast growth surrounding this technology, combined with the low cost of experimentation with the latest and emerging sophisticated Web development tools or technologies available in the software market that suit their need.

**Background**

A programming language is simply referred to as a system of communication with its own set of conventions and special words used to interact with the computer system. A programming language enables a programmer to dictate what, how and when a computer system will perform a task. In this modern age of information technology (IT), where the computer and the internet has now become a key player in every area of our lives, the need for a comparative study on the different languages used to interact with the computer and internet has become necessary. According to [5], Web development tools are failing to address users' needs despite the promises made by vendors. However, the market has no clear leader, and there are inadequate products for medium or large-scale development projects. The main deficiencies in web development tools are that they cannot support teams of developers working together. In this fast evolving area, according to [6] in his works, he analysed a range of tools for building integrated Web applications. Developers are continuously in search of tools or technologies available in the software market that suit their need, as thousands of Web development tools or technologies exist. Web development technologies are

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equally subject to the Laws of Evolution (survival of the fittest) and there are some criteria used in measuring their acceptability and usability. To measure the usability of Web development tools or technologies which are particularly useful for the development of dynamic Web pages and animated movies, [7] introduced the popular Cognitive Dimensions framework which is a broad-brush evaluation technique for interactive devices and for non-interactive notations. It sets out a small vocabulary of terms designed to capture the cognitively-relevant aspects of structure, and shows how they can be traded off against each other. The development and application of various metrics for comparing visual and textual representations is reported in [8]. Some common web development tools are as follows:

1. **HTML:** Hyper Text Markup Language (HTML) which was founded in 1980 by Tim Berners-lee, is the predominant markup language for web pages. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists etc as well as for links, quotes, and other items. It allows images and objects to be embedded and can be used to create interactive forms. It is written in the form of HTML elements consisting of "tags" surrounded by angle brackets within the web page content [9]
2. **PHP:** Hypertext Preprocessor (PHP), was conceived in 1994 by Rasmus Lerdorf. He wrote it as a way to track visitors to his online CV. The first version was released in early 1995; Rasmus had found that by making the project open-source, people would fix his bugs. The first version was very straightforward and had a simple parser which recognized a few special macros and provided some of the utilities which were in common usage on web-pages back then. In 1995 it was renamed PHP/FI version 2. The "FI" in this version stood for the Form Interpreter which he added to PHP to cope with the growing needs of web-pages and mSQL (Microsoft SQL) support was also added at this time. PHP/FI underwent massive growth, and other people started to contribute code to it regularly. In 1997, Zeev Suraski and Andi Gutmans rewrote the main parser, and PHP shifted from being Rasmus' own to a more group orientated project. This formed the basis for PHP3, now named PHP: Hypertext Preprocessor with version such as PHP4 and PHP5 engine. The latest version comes with most of those features which were not in the earlier versions of PHP. It is easier to integrate into existing HTML pages, faster and more efficient for complex programming tasks and trying out new ideas. PHP is generally referred to as more stable and less resource intensive as well.[10,11]
3. **COLDFUSION:** ColdFusion (CF) is an application server and software language used for Internet application development such as for dynamically-generated web sites. In this regard, ColdFusion is a similar product to Microsoft Active Server Pages, Java Server Pages or PHP. ColdFusion was the first amongst these technologies to provide the developer the capability of creating dynamic websites that were attached to a backend database i.e. Cold Fusion has better database abstraction. The primary distinguishing feature of ColdFusion is its associated scripting language, ColdFusion Markup Language (CFML), which compares to Active Server Pages, JSP, or PHP resembles HTML in syntax. "ColdFusion" is often used synonymously with "CFML", but there are additional CFML application servers besides ColdFusion, as ColdFusion supports programming languages other than CFML, such as server-side Actionscript and embedded scripts that can be written in a JavaScript-like language known as CFScript. ColdFusion was originally developed by brothers JJ and Jeremy Allaire in July 1995. In 2001 Allaire was acquired by Macromedia, which in turn was acquired by Adobe Systems in 2005. ColdFusion is most often used for data-driven web sites or intranets, but can also be used to generate remote services such as SOAP web services or Flash remoting. It is especially well-suited as the server-side technology to the client-side Flex. ColdFusion can also handle asynchronous events such as SMS and instant messaging via its gateway interface; it also has a good error handling capability, date parsing features and more. Cold Fusion is available on Win32, Solaris, Linux and HP/UX operating systems respectively. Published by Allaire in 2004, ColdFusion 4.0 is an enterprise level Web application development suite. This means it can be used not just to develop simple Web pages but also to develop databases, and more dynamic Web sites. The product is now in its fourth version and has been a consistent market leader. ColdFusion uses its own anatomized scripting tags, which when embedded in a Web page are read by the Web server. The Web server then produces dynamic output for the end user. All ColdFusion scripting is browser independent, making its content available to a wide audience. Only in the exception that CFML is combined with DHTML will a high end browser be needed. Instructions are passed to ColdFusion using templates. A template looks like any HTML file, and the only difference being the CFML tags [12]
4. **PERL:** The first version was introduced in the year 1987 by Larry Wall. The author's purpose for the creation was as a result of the disappointing result of languages such as sed, C, awk and the Bourne Shell offered him. He looked for a language that will combine all of their best features, while having a few disadvantages of its own. Since then, Perl has seen several versions of each additional function. Perl version 5, which was released in 1994, was a complete rewrite of the Perl interpreter, and introduced such things as hard references, modules, objects and lexical scoping. Several minor versions of Perl appeared since then, and the most up-to-date stable version (as of October 2005) is 5.8.x. Perl became especially popular as a language for writing server-side scripts for web-servers. But that's not the only use of perl, as it is commonly used for system administration tasks, managing database data, as well as writing GUI applications. One problem with the pearl language is its flexibility / complexity that makes it easier to write code that another author / coder has a hard time reading [13,14]
5. **ASP.NET:** The Active Server Page (ASP.NET) was co-developed by Mark Anders, a manager on the IIS (Internet

6. Information Server) team, and Scott Guthrie, who had joined Microsoft in 1997 after graduating from Duke University. The initial design was developed over the course of two months by Anders and Guthrie, and Guthrie coded the initial prototypes during the Christmas holidays in 1997. ASP.NET is a web application framework developed and marketed by Microsoft to allow programmers to build dynamic web sites, web applications and web services. It was first released in January 2002 with version 1.0 of the .NET Framework, and is the successor to Microsoft's Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language such as VB.NET, C#, VC++.NET, etc. ASP.NET pages, known officially as "web forms", are the main building block for application development. Web forms are contained in files with an ".aspx" extension; in programming jargon, these files typically contain static (X)HTML markup, as well as markup defining server-side Web Controls and User Controls where the developers place all the required static and dynamic content for the web page. Additionally, dynamic code which runs on the server can be embedded within webpages within a block `<% -- dynamic code -- %>` which is similar to other web development technologies such as PHP, JSP, etc. The biggest drawback of ASP is that it's a proprietary system that is natively used only on Microsoft Internet Information Server (IIS). This limits its availability to Win32 based servers [1,14]
7. **JavaScript:** JavaScript is an object-oriented scripting language used to enable programmatically access to objects within both the client application and other applications. It is primarily used in the form of client-side JavaScript, implemented as an integrated component of the web browser, allowing the development of enhanced user interfaces and dynamic websites. JavaScript is a dialect of the ECMAScript standard and is characterized as a dynamic, weakly typed, prototype-based language with first-class functions. JavaScript was influenced by many languages and was designed to look like Java, but to be easier for non-programmers to work with. JavaScript was originally developed by Brendan Eich of Netscape under the name *Mocha*, which was later renamed to *LiveScript*, and finally to JavaScript. The change of name from LiveScript to JavaScript roughly coincided with Netscape adding support for Java technology in its Netscape Navigator web browser. JavaScript was first introduced and deployed in the Netscape browser version 2.0B3 in December 1995. The naming has caused confusion, giving the impression that the language is a spin-off of Java, and it has been characterized by many as a marketing ploy by Netscape to give JavaScript the cachet of what was then the hot new web-programming language. JavaScript, despite the name, is essentially unrelated to the Java programming language even though the two do have superficial similarities. Both languages use syntaxes influenced by that of C syntax, and JavaScript copies many Java names and naming conventions. The language's name is the result of a co-marketing deal between Netscape and Sun, in exchange for Netscape bundling Sun's Java runtime with their then-dominant browser. The key design principles within JavaScript are inherited from the Self and Scheme programming languages [14,18]
8. **VBScript:** Visual Basic Scripting (VBScript) is an Active Scripting language, developed by Microsoft, which uses the Component Object Model to access elements of the environment within which it is running (e.g. FileSystemObject or FSO used to create, read, update and delete files). The language's syntax reflects its origins as a limited variation of Microsoft's Visual Basic programming language. VBScript has been installed by default in every desktop release of Microsoft Windows since Windows 98; as part of Windows Server since Windows NT 4.0 Option Pack; and optionally with Windows CE (depending on the device it is installed on). VBScript script must be executed within a host environment, of which there are several provided with Microsoft Windows, including: Windows Script Host (WSH), Internet Explorer (IE), Internet Information Services (IIS). Additionally, The VBScript hosting environment is embeddable in other programs, through technologies such as the Microsoft Script control. VBScript began as part of the Microsoft Windows Script Technologies, which were launched in 1996, initially targeted at web developers. During a period of just over two years, the VBScript and JScript languages advanced from version 1.0 to 2.0, and over that time it gained support from Windows system administrators seeking an automation tool more powerful than the batch language first developed in the late 1970s. In version 5.0, the functionality of VBScript was increased with new features such as: regular expressions; classes; the *With* statement; the *Eval*, *Execute*, and *ExecuteGlobal* functions to evaluate and execute script commands built during the execution of another script; a function-pointer system via *GetRef*, and Distributed COM (DCOM) support. In version 5.5, *SubMatches* were added to the *regular expression* class in VBScript, to finally allow VBScript script authors to capture the text within the expression's groups. That capability before was only possible through JScript. With the advent of the .NET framework, the scripting team took the decision to implement future support for VBScript within ASP.NET for web development, and therefore no new versions of the VBScript engine would be developed and it moved over to being supported by Microsoft's *Sustaining Engineering Team*, who are responsible for bug fixes and security enhancements. For Windows system administrators, Microsoft suggests that they migrate to Windows PowerShell. However the scripting engine will continue to be shipped with future releases of Microsoft Windows and IIS [15]
9. **PYTHON:** Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. The programming language was conceived in the late 1980s by Guido Van Rossum at CWI in the Netherlands as a successor to the ABC programming language (itself inspired by the SETL) . Ever since, various versions of the language has emerged with new features ported with the various versions of the language. Python is a multi-paradigm

10. programming language. This means that, rather than forcing programmers to adopt a particular style of programming, it permits several programming style: object oriented and structured programming are fully supported. The python language has a very good memory management capability [16]
11. **JSP:** Java Server Pages (JSP) is a Java technology designed by Sun Microsystems that allows software developers to create dynamically-generated web sites, with HTML, XML, or other document types, in response to a Web client request. The technology allows Java code and certain pre-defined actions to be embedded into static content. The JSP syntax adds additional XML-like tags, called JSP actions, to be used to invoke built-in functionality. Additionally, the technology allows for the creation of JSP tag libraries that act as extensions to the standard HTML or XML tags. Tag libraries provide a platform independent way of extending the capabilities of a Web server. The JSP engine/compiler (An engine that compiles codes written in the java server pages) is built around the Servlet Engine i.e. JSP is servlet made easy as most of the complicated task in servlet were made easy. JSPs are compiled into Java Servlets by a JSP compiler. Which may generate a servlet in Java code that is then compiled by the Java compiler, or it may generate byte code for the servlet directly. JSPs can also be interpreted on-the-fly, reducing the time taken to reload changes. Even though JSP is platform, web browser independent, it requires the coder/programmer to be familiar to the java language very well or the object oriented programming technique [14,17,18]

### **MATERIALS AND METHODS**

Very often technology based decisions are made by technical personnel who base their decision on personal use, attendance at vendor sponsored workshops, reading about it in trade publications or having used other products from the same vendor. In this work, the empirical approach involves the experimental observation of the subject matter, observation of the behavioural patterns and recording of practical finding by a group of professional users whom were used to evaluate the Web development tools under consideration. Below are twelve (12) criteria that was used for the evaluation.

- **PROGRAM LENGTH**

Program length is the same as the number of lines of codes present in the program which contains anything that contributes to the semantics of the program in each of the program files e.g., a statement, a declaration or at least a delimiter such as a closing brace or tags.

*Length:* manually counting the number of executable lines of codes for the implementation.

- **PROGRAM RELIABILITY**

It is concerned with how well programs behave. Web development tool reliability entails that the tool must consider unforeseen errors like syntax errors and other forms of language violations and responds appropriately by informing the user(s) of any violation instead of terminating executions inadvertently.

*Reliability:* measured by Web page output presentation in response of the Web browser / Web server.

- **DEVELOPMENT COST**

The cost of developing a program in the target Web development tool is determined by the total man hours used in bringing out the final version of a Web application program, the cost in terms of the systems resources used and procurement of software and any other device or resource.

*Development cost:* would involve a collection of all expenses incurred in getting each of the selected Web tools, the machine time utilized in terms of coding, compiling / interpreting and running programs in each Web tools.

- **EASE OF USE**

Is the ease which the language is used in developing an application and the availability of structures that reduce programming complexity. For instance, some Web development tools with support for GUI are more users friendly and aid usability than Web tools without those features.

*Ease of use:* would be determined by taking note of how easier it is to write or design programs using any of the selected Web tools.

- **SPEED OF EXECUTION**

The time it takes to compile and execute. The amount of time is measured by use of a stopwatch or by building in some program segment (s) to keep track of the execution and compilation time.

*Speed of execution:* this is obtained by a program module that records start and stop time of execution.

- **PLATFORM**

This described the ability of software to run on a variety of different operating systems or the same operating systems. Different operating systems provide different platform challenges for web development tools. Issues with respect to 32 bit and 64 bit operating system are prominent.

*Platform:* the ability of the program to run on the same or different operating systems and hardware.

- **FUNCTIONALITY**

This described the ability of software to function properly or meet users' needs in order to achieve their desired goals.

*Functionality:* entails that the Web tools respond to users' need in order to achieve their desire goals without any delay in delivery the Web content.

- **PERFORMANCE**

This described how will the Web development technologies can be used to achieve quickly and efficient delivery of applications.

**Performance:** can be determined by considering how quickly and efficiently the selected tools are used to implement a Web site.

- **MAINTAINABILITY**

This described how easy the Web development tools could adapt to changes when the need arises.

**Maintainability:** can be determining by considering how debugging is carried out when there is an error in the program and modifying tosuit required upgrade.

- **OBJECT ORIENTED PROGRAMMING DESIGN FACILITIES**

This described the ability for the Web development tools to support OOP, which enhances reuse of object and quicker way to develop application.

**Object-oriented programming facilities:** determined by considering the various Web tools if they have the ability to used objects for programming reusability.

- **DATABASE SUPPORTS**

This described how the Web development technologies support a wide variety of back-end databases for effective records keeping.

**Database supports:** tests compatibility by linking the Web tools to a variety of database programs.

- **PORTABILITY**

A term applied to software that is not dependent on the properties of a particular machine, and can therefore be used on any machine. Such software is also described as portable.

**Portability:** can be determined by implementing these tools on various computer machines in order to know whether it is machine dependent or independent

**1. RESULTS AND DISCUSSION**

**Empirical Evaluation of Web development tools**

The identified twelve (12) criteria used to evaluate the algorithm of each tool to ascertain their worthiness based on application developed with them. A simple shopping cart algorithm was used to program, and implemented with the case tools and the results obtained alongside the apparent conclusions are given as follows: see appendix for the algorithm.

- ✚ **PROGRAM LENGTH**

The number of lines of code for each algorithm implemented for Web development tool is as shown in table 1

**Table 1: Average Program Length of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Observable number of line of codes	10	8	8	8	8	10	10	10	5

An examination of the data in Table 1 shows an increase in the source codes, by computing the program length which is given as:

$$\text{Program Length} = \sum_{i=1}^n E_i$$

Where:

$E_i$  = executable lines of codes

n = the total lines of codes

- ✚ **PROGRAM RELIABILITY**

Reliability of programs written in any programming languages/Web development technologies is never easy to determine as there are different parameters used by different software practitioners. In our own case, we considered the ease with which each of the Web development tools implemented their source code, their response when no input was fed in and the response of the interpreter to syntax errors. HTML and PHP were very reliable while the others were reliable. As shown in table 2

**Table 2: Reliability of the selected Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Execution and interpreter behaviour	Interprets well, error messages display and performs poorly when empty data are encountered	Interprets well, but slowly; terminates execution when empty data are encountered error messages not display	Interprets and execute well, error messages not display	Interprets well and error messages display	Interprets well and error messages display	Interprets well and error messages display	Interprets well and error messages display	Interprets well and error messages display	Interprets well and error messages display
Reliability rating	Very reliable	Very reliable	Reliable	Reliable	Reliable	Reliable	Reliable	Reliable	Reliable

**DEVELOPMENT COSTS**

The combined cost of acquiring an interpreter, setting it up, and that of the systems resources taken up by the Web page design in the target Web development technologies are summarized in Table 3.

**Table 3: Development Costs of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Average cost of interpreter (\$)	Free	Free	80	300	400	350	180	160	Free
Average set up costs (\$)	Free	Free	2.40	4.50	6.80	3.20	2.70	2.64	5.40
Systems Requirements	1,064,356	1,024,543	1,004,564	1,324,097	1,423,206	1,300,340	1,320,543	1,375,300	1,400,200
Costs of writing Programs/computer time	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

**EASE OF USE**

In rating the easy to use of the Web development technology with a scale of 1 to 2 (where 1 denotes Easy to Learn and 2 Denote Difficult to Learn). Table 4 shows that HTML, PHP, CF, PERL, and JSP are the easy to learn, while ASP, JS, VBS and PYTON are difficult to learn.

**Table 4: Ease of Use of the selected Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Easy to use (When scaled)	1	1	1	1	2	2	2	2	1

**SPEED OF EXECUTION**

The speed of execution (measured in seconds) by taking the system start time and subtracting it from the system stop time for each of the simple Web page created the results are shown in table 5

**Table 5: Average Speed of Execution of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Interpreting/speed of execution (in seconds)	0.56	0.60	0.60	0.60	0.60	0.58	0.58	0.58	0.60

**PLATFORM**

Testing each tool on two major operating systems; Windows Operating System 98 and Windows XP Operating system determined the platform supports by the Web development tools examined. From our observation, it was apparent to us, to use an objective scale for the tools which was used to identify the platform they support: 1 for dependent; 2 for independent. Table 6 shows that all the programming languages are independent.

**Table 6: Platform Support of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Platform (When scaled)	2	2	2	2	2	2	2	2	2

**FUNCTIONALITY**

Functionality of the Web development tools can measure by the way the tools meets users need based on the fact that they can easily be used to designed sophisticated Web page or Web application. The functionality was objectively rated as 1 for excellent, 2 for very good, 3 for good, and 4 for poor as shown in table 7.

**Table 7: Functionality of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Functionality (When scaled)	1	2	2	2	2	2	2	2	2

**MAINTAINABILITY**

Maintainability had to be measured by use of established methods for determining the effect of modifying or debugging of errors from the coded Web development tools. It was observed that HTML, PHP, CF, and PERL were very easy to maintain while ASP, JS, VBS, PYTON, and JSP were easy to maintain. From the general point of view, we can conclude that the maintainability of Web tools is okay. Rating the maintainability of the Web development tools with an objective scale of 1 to 4 (where 1 stands for very easy, 2 for very difficult, 3 for easy, 4 difficult) as shown in table 8.

**Table 8: Maintainability of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Maintainability (When scaled)	1	1	1	1	3	3	3	3	3

**OBJECT ORIENTED PROGRAMMING FACILITIES**

This can be determined by the usage of its features in the various Web development technologies. From our observation, we can rate the various tools into the classes they belong. That is, 1 for Excellent, 2 for Very Good, 3 for Good, and 4 for Poor as shown in table 9.

**Table 9: OOP Facilities of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
OOP (When scaled)	1	4	4	4	2	2	3	3	4

Determining the development costs for the various language implementations was a bit difficult and we had to arrive at a compromise to base the actual costs of the interpreters in US Dollars since that is the most recognized currency used in international and on-line business transactions. The costs of the interpreters were found to vary from one marketer to the other and after comparing prices for 8 (eight) different retailers, we took the average price which was in the range of prices offered and which included the prices for shipping. The set up costs indicated in the offer prices were used while for the cost of writing, coding and running each algorithm in the selected languages, a flat rate of \$1.50 per hour of computer time was assumed if one were to carry out the programming task in a commercial center. The assumed price is closest to the N250 charged per hour of computer time in business centers. An examination of table 9 shows that the development cost of the HTML program is the cheapest while the development costs of the Macromedia ColdFusion program is the most expensive.

**DATABASE SUPPORTS**

The database supports is determined by the linkage of the Web page to some of the various database software. From our observation, the following scale rating from 1 to 4 was used to determine the level of support to the database, that is, (1 for Excellent, 2 for Very Good, 3 for Good, and 4 for Poor)

**Table 10: Database supports of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Database supports (When scaled)	1	4	4	4	2	2	2	2	2

**PORTABILITY**

The portability of the Web development tools based on the simple Web page design with then was measured based on the execution of the program in different computer machines. From our observation, we can rate the portability into scale as (1 for Highly Portable, 2 for Portable, 3 for Fairly Portable and 4 for Not Portable) as shown in table 11.

**Table 11: Portability of the different Web development technologies**

Technology	HTML	PHP	CF	PERL	ASP	JS	VBS	PYTON	JSP
Portability (When scaled)	1	1	1	1	2	2	1	2	1

**4.0 CONCLUSION**

From our findings in this research, we conclude that the choice of users to a particular web tool is based on the task at hand which may be designing a simple webpage:- Use HTML, FrontPage editor or PHP; designing for efficient database support:- PHP, CF, ASP, JS, VBS, and PYTON; designing for Object oriented task:- Use PHP, Java Script; designing for Low cost:- PHP, HTML, ASP, VBS, JS; designing for small program length:- JSP since it requires less coding; designing for portability:- PHP, HTML, PYTON, and JS; designing for functionality:- PHP, JSP and XML and designing for Speed of Execution:- PHP. This shows that the use of reliable approaches or software development processes, copious analyst, good designers, and painstaking implementation techniques are a pre-requisite. Thus, very rich design and coded Web site for transactions in the Internet produces attractiveness, and user-friendly Web pages.

**5.0 APPENDIX**

A simple shopping cart algorithm that was implemented in the nine Web development languages which was used in the evaluation factors is as follows:

**ALGORITHM FOR A SIMPLE SHOPPING CART**

```

add_item
select item from shelf
    verify maximum limit
    if not maximum limit
        add_item to cart
        increment counter by number of items
    
```



```

obtain item_cost
    to add more item, loop add_item
    compute_cost
    otherwise do_not_add
remove_item
    select item from cart
    delete the item
    to remove more item, loop remove_item
    compute_cost
make_payment
    obtain the total cost
    verify payment method
    deduct item_cost from current_balance
    
```

## REFERENCES

- [1] Active Server Pages : "An Introduction to Web-based Application Development" available at <http://www.abiglime.com/webmaster/articles/asp/122297.htm>
- [2] Pandey, R.K. and Burnett, M.M. (1993) "Is it Easier to Write Matrix Manipulation Programs Visually or Textually? An Empirical Study", in IEEE Symposium on Visual Languages, Bergen, Norway, pp. 344-351. IEEE computer society press, California, U.S.A
- [3] Apte, A. and Kimura, T.D. (1993) "A Comparison Study of the Pen and Mause in Editing Graphic Diagram.," Proc. IEEE 1993 Workshop on VisualLanguages, Bergen, Norway
- [4] Prechelt, L., (2000), An Empirical Evaluation of C. C++, Java, Perl, Pytton, Rexx and Tel. Journal of visual languages and computing, IEEE computer society press, Calefonia, U.S.A. available online [page.mi.fu-berlin.de/prechelt/Biblio/jccpprt\\_computer2000.pdf](http://page.mi.fu-berlin.de/prechelt/Biblio/jccpprt_computer2000.pdf)
- [5] Janstal, K. (2000) "The Next Generation: ERP is Web Enabled for E-business" Pages: 185 ISBN:1-56607-075-9 Published byData Research DPU ab - Torsvikssvängen 34, SE-181 34 Lidingö, Sweden
- [6] Ward-Dutton N. (2002) Oracle makes its "enterprise 2.0" play. Available online [www.mwdadvisors.com/.../oracle-makes-its-enterprise-20-play.html](http://www.mwdadvisors.com/.../oracle-makes-its-enterprise-20-play.html)
- [7] Petre, M., Blackwell, A. F. and Green, T. R. G. (1996) Usability Analysis of Visual Programming Environments Cognitive Questions in Software Visualisation To appear in 'Software Visualization: Programming as a Multi-Media Experience', edited by Stasko J., Domingue, J., Price, B., and. Brown, M. MIT Press. Available online [http://scholar.google.com/scholar?start=10&hl=en&as\\_sdt=0,5&scioldt=0,5&cites=2870041312051621517](http://scholar.google.com/scholar?start=10&hl=en&as_sdt=0,5&scioldt=0,5&cites=2870041312051621517)
- [8] Nickerson (1994) "A SURVEY OF VISUAL PROGRAMMING" available online [nickerson.to/visprog/CH2/CH2.HTM](http://nickerson.to/visprog/CH2/CH2.HTM)
- [9] Berners-Lee T. (2001) "Design Issues" Available online [en.wikipedia.org/wiki/HTML](http://en.wikipedia.org/wiki/HTML)
- [10] Bakken S.S., (2000), "Introduction to PHP", available at <http://www.zend.com/zend/hop/tas,as.php>
- [11] Bakken S.S., (2000), "A Brief History of PHP", available at <http://www.php.net/manual/en/intro-history.php>
- [12] Gilson, S., (2002), "Developing ColdFusion MX Applications with CFML", available at <http://www.macromedia.com/php/cioldfiusion/documentation/fmx-dev-cf-apps.pdf>.
- [13] Rice's Theorem. *The Perl Review* 4 (3): 23–29. Summer 2008. and "Perl is Undecidable". *The Perl Review* 5 (0): 7–11. Fall 2008., which is available online at Kegler, Jeffrey. "Perl and Undecidability". <http://www.jeffreykegler.com/Home/perl-and-undecidability>
- [14] Jeske, D., (2005), "Clearsilve compared: VS PHP, ASP, JSP" available at <http://www.clearsilver.net>
- [15] Introduction to VBScript available at <http://www.Vbxml.com/xhtml/articles/xhtml-tables>
- [16] Getting started with Perl and CGI available at <http://www.perl.com/cgi>
- [17] Getting started with JavaScript available at <http://www.javaScript.com>
- [18] Krill, Paul (2008-06-23). "JavaScript creator ponders past, future". InfoWorld. [http://www.infoworld.com/article/08/06/23/eich-javascript-interview\\_1.html](http://www.infoworld.com/article/08/06/23/eich-javascript-interview_1.html). Retrieved 2009-05-19.
- [19] Deitel, H.M., Deitel, P.J., and Goldberg, A.B., (2004), "INTERNET & WORLD WIDE WEB How to program", 3<sup>rd</sup> Edition, Published by Pearson Education Ltd., Singapore.