## RESEARCH PAPER

**Research Paper On PHP:A Preferred Web Technology**

In this paper we talk about PHP or Hypertext pre-processor which is undoubtedly one of the most trusted and effective web development framework for building dynamic web page designs, website development and generating web applications. We also discuss about the technologies that are used at the client side and server side of PHP. PHP implementation, functionality and shortcomings are also included in their respective manner.

**1.INTRODUCTION**

In today’s modern Web World where web technologiesare used for Digital advertising, E-Commerce,Publishing,Backend services, Messaging,etc.,various languages like ASP, PHP and JavaScript are being used.The number of new websites being developed is increasing day by day.Now developers have moved from static to dynamic websites and it can be easily developed using Hypertext pre-processor (PHP).To implement this, PHP code is embedded into the html source file with PHP tags and is interpreted by the webserver. PHP is considered as one of the most preferred webprogramming languages. Its users recognize many reasons for its widespread deployment, major are strong database connectivity, powerful extension, rich object-orientation and ease to use. It also enables new and existing programmers to enhance their skills and knowledge set.

**2.1Client-Side technologies-Prerequisite for PHP**

## In order to startwith PHP, we should have basic understanding of following languages so that we can deploy them toutilize inthe PHP efficiency.

* + 1. **HTML**

Hyper Text Markup Language (HTML) was designed to structure information for presentation on webpages. These pages have certain advantages for examplethey take less time to download, compatible with all thebrowsers, search engine friendlyand possesses maximum forward compatibility.

**2.1.2 Cascading Style Sheets**

CSS designs how **HTML elements would be displayed asoutput.** It also allows the separationof presentation from the structure and its content. CSS ensures that web pages are presented ina way that is accessible and user friendly to all visitors over a wide range of media. Designersalso useCSS to make webpages appear more impressive.

* + 1. **JavaScript**

JavaScript is a light weight interpreted programming language. It was mainly designed to add dynamic and interactive elements to webpages. This language is easy to implement asit is integrated with HTML. Tag for Javascriptis: -

<script type=”text/javascript”>

* + 1. **AJAX**

AJAX stands for Asynchronous Javascript and XML. It is a new technique for creating better, faster and more interactive web applications with the help of XML, HTML, CSS, and Javascript.

AJAX uses XHTML for content, CSS for presentation, along with Document Object Model and Javascript for dynamic content display.

AJAX helps in asynchronous updating of web pages by exchanging data with a web server in the background. This implies that it is possible to update various parts of a web page, without reloading the whole page.

**2.2 Server-Side technologies working hand in hand with PHP**

**2.2.1 XML**

Extensible Mark-upLanguage (XML) is a software and hardware independent language used for describing and transmitting information. It is readable by both human and machine. It is one of the most common tool for all data set manipulation and data transmission.XML tags are user defined and case sensitive. XML documents are designed, transformed and formatted with the help of Extensible Stylesheet Language (XSL) documents. XSL is a language for expressing stylesheets and its working is similar to CSS.

**2.2.2 MySQL**

MySQL isconsidered as one of the world’s most popular opensource Relational Database Management System basedon popular Structured Query Language (SQL). With its features such as performance, reliability, ease-of-use,it hasbecome a most preferred database choice for web-based applications used by leading web applications like Facebook, Twitter, YouTube,etc.

**2.2.3 Major Servers used:**

**2.2.3.1Apache HTTP Server**

Apache is an open-source webserver application that helps to deliver web content to be accessed through the internet. Apache played a key role in initial growth of the world wide web. It has an ability to host one or more HTTP-based websites. This software is written in C language and is used mostly in Unix-like systems.

**2.2.3.2IIS**

Internet Information Services (IIS) is an extensible web server developed byMicrosoft designed for Windows operating system. It provides Graphical User Interface for handling websites and it’s users. This server can run any application and can process any kind of scripts contained in the given page and then send the processed data to the browser.

**2.3Major Browsers used for PHP**

Browsers areinterpreters of the web. They process request for information andafterreceiving information, it’s displayed on theweb page in auser-friendlyformat. Major browsers are as follows:

* [Google Chrome](https://www.google.com/chrome/) - Currently, the most popular browser developed by Google Inc.
* [Safari](https://www.apple.com/safari/) - Web browser developed by Apple Inc.
* [Firefox](https://www.mozilla.org/en-US/firefox/new/) - Open-sourceweb browserdeveloped by the Mozilla.
* [Internet Explorer](http://windows.microsoft.com/en-us/internet-explorer/download-ie) –Developed by Microsoft’s browser.

**2.4 Frameworks used for PHP**

Frameworks helps in assisting the work of programming languages.Frameworks process all the difficult and repetitive tasks tomake aweb application.Few examples of framework are as follows: -

[**Bootstrap**](http://getbootstrap.com/) - It is a user interface (UI) framework for developingresponsive websites with HTML/CSS/JavaScript.

[**Laravel**](http://laravel.com/)- It is used to develop web applications such as interaction with the databaseor for e-commerce websites. Taylor Otwell developed this and is also maintaining it. Laravel basically knows commonly used tasks that any web application usually does such as email, routing, sessions, database interaction, etc. making it easier to interact and building functions.

**Dreamweaver**- It helps in combining a visual design surface known as Live View and a code editor with features such as code collapsing,code completion and also highlights the content with errors.It enables theprogrammer todesign complex websites using HTML, JavaScript and server-side programming languages.

**3.IMPLEMENTING WEB APPLICATION**

We havedevelopeda web application based onPHP and onthebasis of the features, application and maintenance of this web application, we have identifiedvarious advantagesand shortcomings of PHP. We have also tried to find solutions for the same.

# 3.1 PHP Development: A Preferred Web Technology

**3.1.1 EASY USABILITY**

 Besides beingeasy to learn and use, PHP is considered as a stable platform for developing impressive websites.

**PHP can be used in three primary ways:**

* **Server-side scripting**:

Server-side scripting is related to the web pages and refers to the PHP code that is executed on web server before data is passed to the browser.

When PHP code is written on serverside, the user side remains uninterrupted.

The result isprocessed HTML document and then displayed on thebrowser accordingly.

* **Command-line scripting**:

PHP is used in majority with web server but besides that we canalso use command line interface to run variousscripts. We can make a PHP script to run it without any server or browser. For thiswe require a PHP parser to use it in this way. This kind of usage is ideal for scripts regularly executed using cron(onLinux)or Task Scheduler (on Windows). These scripts can also be used for simple text processing tasks.For example, they can be used for developing system administration taskssuch as backup.

* **Client-side GUI applications**:

In order to create desktop applications inPHP with Graphical User Interface we require some advance PHP features in our client-side applications like PHP-GTK to write such program. With the help of PHP-GTK extension, various command-line PHP programs can be full-featured GUI applications and is a popular open source which implements the GIMP toolkitabbreviated as GTK+. PHP-GTK is a cross-platform like PHP, so that the same code can run on Unix and Windows.

**3.1.2 HIGH FUNCTIONALITY**

* PHP SESSIONSis a special array used to store information across the page requested by a user during its visiton website or web application. We used Sessions in our loginform to store the username and used it in functions of other pages. In ASP we have to pass username and password using hidden input type but with PHP we started the sessions, stored the same there and then used them on further web pages using session\_start() function.Session variables are set with the PHP global variable: $\_SESSION.
* PHP has a garbage collector and has a complex memory manager. The amount of memory being used by the script canbe increased ordecreased duringthe execution of the script. To get the current memory usage we can use the memory\_get\_usage() function and to get the highest amount of memory used at any point, we can use  [memory\_get\_peak\_usage()](http://us2.php.net/manual/en/function.memory-get-peak-usage.php) function.
* A PHP array or other complex data structure cannot be stored or usedon outside running PHP scripts. To enable this we use two popular method variables:-

[**Serialize()**](http://php.net/manual/en/function.serialize.php): Serializingis encoding any type of variable into a string or bunch of text that can be saved to a file or database and read later using unserialize().

**Unserialize()**:It makes the single serialized datastring into a PHP value again.

* PHP consist of some predefined error reporting constants that generate warning on encountering error notice. Forexample, when E\_STRICT is enabled, a warning for the programelement that programmers are discouraged to use is enabled.
* No compilation is required in PHP. When the users are compiling their programs, they just take the source code andprocess the files in a special format which is in an optimized manner. Since PHP is a language which is optimized in nature it is very fast and doesn’t need to be compiled.
* PHP has become the main provider of solutions even in the areas of Content Management Systems (CMS) and small to medium shop systems.

Some well-known solutions are mentioned below:

**CMS**: WordPress, Drupal, TYPO3.

**Online shopping Systems**: Magento, WooCommerce, Shopware.In these areas ASPNET is usually not used.

* COOKIES are text files stored in the client’s computer and can beused for tracking purposes.“Remember Me” and “Keep Me Login” are few examples of working with cookies. They are saved on local machines and need to be manually destroyed.

SYNTAX: Setcookie(name,value,expire,path,domain,secure,httponly);

* PHP possesses various other abilities such as outputting images, PDF files and even Flash movies (in SWF format using libswf and Ming) generated on the fly. We can also easily output any text, such as XHTML or any other XML file. PHP has a power of auto generating these files and save them in a file system instead of printing them out, leadsto the formation of a server-side cache for the dynamic content.
* PHP has a function namedcheckdnsrr() which will fetch the email address and then checkit whether it resolves as an IP address or not. It is generally helpful when this function returns falsevalue as you can passan error information tothe user that the domain probably doesn't exist thus it savesour time to write codes for validation.
* In order to represent the graphical data usually in the field of e-commerce, PHP can be incredibly useful since it helps in creating up to fourteen different types of charts including pie charts, bar graphs, dot/scatter etc. using image\_graph.

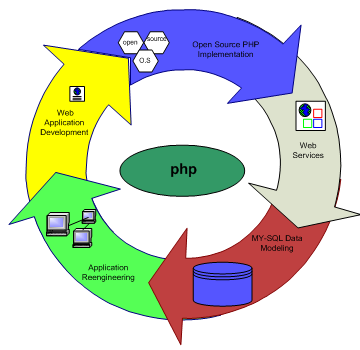
**3.1.3 COST AND SPEED**

PHP is an [open source](http://www.hiddenbrains.com/opensource.html) web technology, which is free and readily available without payment or any restrictive license. Speed of the websites implemented through this technology depends upon database server, web browser, and theway client accessthese websites.

**3.1.4 DATABASE INTERACTIVITY AND PLATFORM INDEPENDENT**

PHP haverich Application Programming Interface (API’s) for handlingdatabase connections. Therefore, these frameworks are designed to work hand in hand with a wide variety of relational as well as No Sql database including MS SQL Server and MySQL. Examples of other databases that are compatible are Oracle, Sybase, Generic ODBC and IBM DB2. However, MySQL hasbeen preferred the most among PHP developers.PHP is platform independent and can run on any platform-Linux, UNIX, Windows.





**Fig 1**:AREAS OF PHP (Source:<http://www.comentum.com>)

**3.1.5 PREFERRENCE OF PHP OVER ASP**

Earlier we used to work on ASP which stands for Active Server Pages. Itwas Microsoft’s first server-side script engine fordeveloping dynamic, interactive web pages. During the phase of development of web applications through ASP we faced some issues and after rigorous research it was found that PHP was able to resolve these issues easily. Some of which are explained below:

* ASP is compatible only with IIS installed on a Windows platform server that restricts its usage with other existing advanced servers whereas PHP programs can run on variousplatforms like Linux, UNIX, Windows and Solaris.
* ASP’s syntax is based on the syntax of visual Basic which is an object-basedlanguage and thus it lacks features like polymorphism and inheritance whereas PHP is based on C++ language and the syntax used in PHP is quite similar to C/C++. It is also an object-oriented language.
* ASP mainly uses MS-SQL for its functioning whereas PHP can connect to various

databases like MySQL, Oracleetc.

* While working we also found that PHP codes are easier to implement and are also less time consuming as compared to ASP.
* ASP is built on component object model (COM) based architecture, it is a binary-interface for software components which is an overhead for the server whereas PHP code runs on its own memory space.
* In ASP when we used a function to show image(say to display signature of an employee) on a click of a button, it worked well on Internet Explorer but was inefficienton chrome whereas usingPHP for the same we didn’t detect any kind of inefficiency.
  1. **SHORTCOMINGS OF PHP AND ITS SOLUTIONS**

Apart from its various empowering features, PHP also has some issues which can be resolved through following given solutions: -

* + 1. **SECURITY ISSUES**

PHPbeingan open source programming language, provides access of the source code to all itsusers i.e. its design is publicly accessible which is quite helpful on one side butcan also leads to several issues on another side. Because, if there are any bugs in the source code, it can be utilized by the people to identify the weaknessesin it.

While working on projects, we get to know aboutvarious **‘**Security Vulnerabilities’ in PHP and some of them arementioned below:

* + - 1. **SQL INJECTION**-

It is one of the most common web hacking techniques that includes the placement of malicious code like SQL statements through input of the web page that might destroy the database.

**PROBLEM**-If we enter any SQL statement in the form of value in the URL or web form such as “truncate table statement” so it might delete content of the entire table in database and isquite destructive.

**Example**: http://localhost:80/showdata.php?id=6;TRUNCATE student

**SOLUTION**-After rigorous study we overcame this problem by using PDO (PHP data objects) prepared statements.

**Example:**

$pdo = get\_connection();

$query = 'SELECT \* FROM student WHERE id =: idVal’;

$stud = $pdo->prepare ($query);

$stud->bindParam('idVal', $id);

$stud->execute();

$stud->fetch();

In this example, firstly we call a function for making connection then change a query function to “prepare” and put a: dial where the id value should go. The prepare () functiondoes *not* actually execute a query, it just returns a PDOStatementobject.Then wecall bindParam for substituting each placeholder with the real value followed by execute () to actually make the sql injection freequery .Finally, to get the required data from the query, we finish up callingeitherfetch () or fetch All ().

## 3.2.1.2.XSS (Cross Site Scripting)-It is regarded as the injection/placement of any client-side code in the web form or through hyperlinks.The code injected can be any malicious client-side code, such as JavaScript, VBScript, HTML, CSS and others.Bug bountycompany HackerOne in 2017 reported that XSS is still a major threat vector.

**PROBLEM**-Consider the following code snippet,

<form action="post.php" method="post">

<input type="text" name="comment" value="">

<input type="submit" name="submit" value="Submit">

<form action="open.php" method="post">

<input type="text" name="comment" value="">

<input type="submit" name="submit" value="Submit">

</form>

Here, we have a simple form in which there is a text box for data input and a submit button. Once the form is submitted, it will submit the data to open.php. Let, open.phpoutput the data like so:

<?php

echo $\_POST["comment"];

Now if, user write some javascript code in place of providing some textinput(say he writes “<script>alert("hacked");</script>”),so he could easily submit the following which will generates a popup in the browser with the message “hacked”.

In a similar manner user can write other JavaScript code to steal a user’s cookie and extract sensitive information from it making it unsecure.

**SOLUTION**- the golden rule of preventing XSS is- “never trust the data which is coming from the user or from any other third-party sources.”

So, we prevent this with the help of following:

**1. Data validation**:It is the process of ensuring that our application is running with correct form of data.

**2.Data sanitization:**It focuses on manipulating the data to make sure it is safe by removing any unwanted bits from the data and normalizing it to the correct form.

**Example:** sanitization and validation of a phone number.

<?php

$phone = preg\_replace('/[^d]/', "", $phone);

$length = strlen($phone);

if ($length == 8 || $length == 10 || $length == 11) {

echo $phone . " is valid format.";

?>

**Output escaping**: Escaping theunwanted content such as spaces, special characters etc. given by the user in the form of inputat the time of displaying the same data in the browser in order to protect the integrity of the outputted data.

**Example**: Escaping output sent to the browser.

<?phpecho "You searched for: “. htmlspecialchars($\_GET["query"]);

?>

Here,htmlspecialchars() function converts some predefined characters (&,”,’,<,>) to HTML entities.

## .

## 3.2.1.4 Session Hijacking/

## Cookie Hijacking:

## It is defined as the exploitation of a valid computer session to gain unauthorized access of informationor services in a computer system.

## PROBLEM: Private information such as username or password if stored in sessions (temporary storage) can be stolen via XSS attack.

## SOLUTION: Use session\_regenerate\_id () function to change the session ID and notify the client. If still it is not cured in php.ini file there is a setting that prevent JavaScript from being given access to the session id (session.cookie.httponly). Finally, we preventit by using a function session\_set\_cookie\_parms().

## 3.2.2 If there is a need to perform function asynchronously (without the need to reload the page), then PHP will not work.

## PROBLEM: While working on a project we need to display some of the selected information by the user on the same page which is not possible through PHP without submitting.

**SOLUTION**: We use AJAX (**A**synchronous [**J**avaScript](https://www.thoughtco.com/what-is-javascript-2037921) **A**nd **X**ML), so that the browser doesn't need to reload the entire page when only a small bit of data on the page has changed. AJAX passes only the updated information to and from the server.

**4. CONCLUSION**

## From our experience with the PHP we conclude that PHP being an open source technology not only contributes to the cost-effectiveness of a project, it is in fact a much simpler language compared to any other web technologies like ASP.Net. From our analysis on the technologies, PHP proves to be efficient and flexibleweb technology for online Database Management System (DBMS) – making it easily available for developers to edit, add and delete information from webpage or web app online. When considering the User Complaint web application in future perspective, more functionality and new features can be added. The present structure of the database can be increased with more requirements. Even though PHP is considered to be the oldest scripting language it lacks in advancement of tools and controls and also faces some vulnerabilities which can be cured by considering preventive measures. Day by day there are new updates and new versions are introduced in PHP i.e. the platform which is more compatible, reliable and which helps in reducing the security issuesis henceforth considered for developing a successful web application.

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