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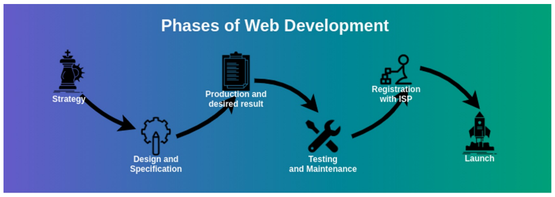
Phases of Web Development

- Difficulty Level : Medium
- Last Updated : 15 May, 2020
- Read
- Discuss

Web Development refers to a term that includes all the processes involved in developing a web project or website. It contains the various phases such as planning, designing, testing, and launching of the web project. The web development process requires a team of experts responsible for implementing the different tasks needed to create a website.



The various stages that are needed in order to develop a web project in web development are as following:

Strategy: The first step in the web development process for a developer is to make a strategy for developing a web page or web site. In the strategy phase, web developer has to done the following:

- Deciding goals and objectives
- Developing team
- Make the appropriate analysis associated with problem and review the analysis
- Formulate a list of tasks
- Proposal of project to web team for developing

Design and Specification: After the strategy-making, the next step in the web development process is to develop a planned work. Web developer has to determine the schedule and the specifications. The tasks in this phase are as follows.

- Developing approach
- Planning of contents needed for use
- Making of rough design for project
- Making of final design from rough design, if there are no considerable modification in rough design.
- Frame a prototype of project for developing
- Test the prototype

If prototype is accomplish, then go to next phase phase-3 otherwise repeat the phase 2 until prototype is accomplish.

Production of desired result: In this phase of the web development process, the actual functional site is built. After the proper testing of the prototype, the developer has to work on developing the actual live web project. The actual live web project is built according to the requirements of the client. Web developer has to consider all the situations from the design phase to create all the features in the web project. This phase involves both front end development and back end development of the website. Front end development comprises of the writing codes with the basic technologies like HTML, CSS, etc. according to the web standards. It generally starts by developing the home page first and then other pages. Back end development is also completed in this phase by installing and configuring the content management systems, databases, and frameworks. After completing all the steps that were finalized in the strategy and design phase by which the original website becomes functional, it is tested in the next phase.

Testing and Maintenance: Testing is an important phase in the web development process. Testing is performed by the developers and testers to ensure the client’s requirements after completion of the web project. In this phase, quality assurance and browser compatibility issues of the website are checked. Testers test all the developed features and assure the validity of the written code. Various types of testing such as integration testing, regression testing, functional testing, smoke testing, load testing, and performance testing are performed in this phase by both testing and development teams. Testing can be performed manually or automatically on the basis of the type of testing and web projects. If desired and satisfactory results are not found, the proper actions for removing the bugs are taken.

Registration with ISP: After completion of the Testing and Maintenance and removing all the bugs from the project, the next step or phase is to register the web project with the regional ISP to make the web project legal. The web project is delivered to the client after uploading the website to a server. File transfer protocol (FTP) is used to host the website to a hosting server. The client has to select and decide the ISP which provides domain name registration and web hosting services. After setup of these accounts and registering with the ISP so that the web project gets an accurate domain space at the ISP server.

Launch: This is the last phase of the web development process. Project is launched after getting registered with ISP. after launching, web project is publicly accessed by the users of the particular domain. The tasks performed in the launch phase are as follows.

- Migration of data
- Launching of server
- Merging of code
- Redirecting domain name

How does web browsers work?

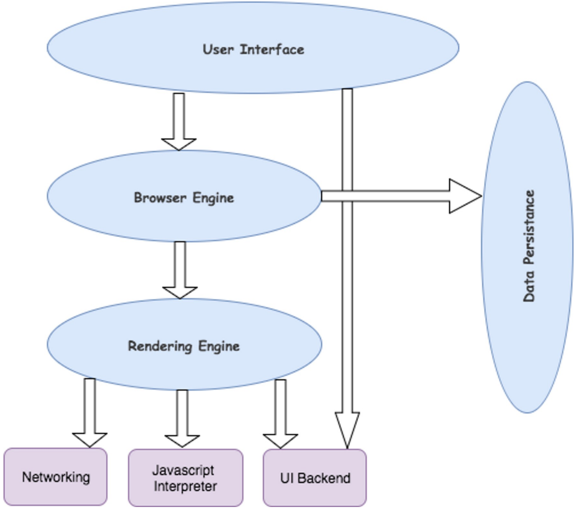
A browser is a software application used to locate, retrieve and display content on the World Wide Web, including Web pages, images, video and other files. As a client/server model, the browser is the client run on a computer that contacts the Web server and requests information. The Web server sends the information back to the Web browser which displays the results on the computer or other Internet-enabled device that supports a browser.

Today's browsers are fully-functional software suites that can interpret and display HTML Web pages, applications, JavaScript, AJAX and other content hosted on Web servers. Many browsers offer plug-ins which extend the capabilities of the software so it can display multimedia information (including sound and video), or the browser can be used to perform tasks such as videoconferencing, to design web pages or add anti-phishing filters and other security features to the browser.

A browser is a group of structured codes which together performs a series of tasks to display a web page on the screen. According to the tasks they perform, these codes are made as different components.

High-level architecture of browser

The below image shows the main components of a web browser:



Main components of the browser

1. **The User Interface**: The user interface is the space where User interacts with the browser. It includes the address bar, back and next buttons, home button, refresh and stop, bookmark option, etc. Every other part, except the window where requested web page is displayed, comes under it.
2. **The Browser Engine**: The browser engine works as a bridge between the User interface and the rendering engine. According to the inputs from various user interfaces, it queries and manipulates the rendering engine.
3. **The Rendering Engine**: The rendering engine, as the name suggests is responsible for rendering the requested web page on the browser screen. The rendering engine interprets the HTML, XML documents and images that are formatted using CSS and generates the layout that is displayed in the User Interface. However, using plugins or extensions, it can display other types data also. Different browsers user different rendering engines:
   * Internet Explorer: Trident
   * Firefox & other Mozilla browsers: Gecko
   * Chrome & Opera 15+: Blink
   * Chrome (iPhone) & Safari: Webkit
4. **Networking**: Component of the browser which retrieves the URLs using the common internet protocols of HTTP or FTP. The networking component handles all

aspects of Internet communication and security. The network component may implement a cache of retrieved documents in order to reduce network traffic.

5. **JavaScript Interpreter:** It is the component of the browser which interprets and executes the javascript code embedded in a website. The interpreted results are sent to the rendering engine for display. If the script is external then first the resource is fetched from the network. Parser keeps on hold until the script is executed.
6. **UI Backend**: UI backend is used for drawing basic widgets like combo boxes and windows. This backend exposes a generic interface that is not platform specific. It underneath uses operating system user interface methods.
7. **Data Persistence/Storage:** This is a persistence layer. Browsers support storage mechanisms such as localStorage, IndexedDB, WebSQL and FileSystem. It is a small database created on the local drive of the computer where the browser is installed. It manages user data such as cache, cookies, bookmarks and preferences.

A typical website has **at least 3 parts** in its URL like *www.google.com* but some complex URLs might also have 8 to 9 parts namely scheme, subdomain, domain name, top-level domain, port number, path, query, parameters, and fragment.

Internet
he Net," is a worldwide system of computer networks -- a network of networks in which users at any one computer can, if they have permission, get information from any other computer
The Internet can be seen as having two major components: network protocols and hardware. The protocols, such as the TCP/IP suite, present sets of rules that devices must follow in order to complete tasks.

DNS

The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.
Each device connected to the Internet has a unique IP address which other machines use to find the device. DNS servers eliminate the need for humans to memorize IP addresses such as 192.168.1.1 (in IPv4), o

The process of DNS resolution involves converting a hostname (such as www.example.com) into a computer-friendly IP address (such as 192.168.1.1). An IP address is given to each device on the Internet, and that address is necessary to find the appropriate Internet device - like a street address is used to find a particular home.

Text structuring
An HTML instance is like a text file, except that some of the characters are interpreted as markup. The markup gives

structure to the document.
The instance represents a hierarchy of elements. Each element has a name , some attributes , and some content. Most elements are represented in the document as a start tag, which gives the name and attributes, followed by the content, followed by the end tag
The element name immediately follows the tag open delimiter. Names consist of a letter followed by up to 33 letters, digits, period
In a start tag, whitespace and attributes are allowed between the element name and the closing delimiter. An attribute consists of a name, an equal sign, and a value.

What is World Wide Web?

World Wide Web, which is also known as a Web, is a collection of websites or web pages stored in web servers and connected to local computers through the internet. These websites contain text pages, digital images, audios, videos, etc. Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc. The WWW, along with internet, enables the retrieval and display of text and media to your device.
he building blocks of the Web are web pages which are formatted in HTML and connected by links called "hypertext" or hyperlinks and accessed by HTTP.
A web page is given an online address called a Uniform Resource Locator (URL). A particular collection of web pages that belong to a specific URL is called a website

Hypertext Transfer Protocol (HTTP) is an application-layer protocol for transmitting hypermedia documents, such as HTML. It was designed for communication between web browsers and web servers, but it can also be used for other purposes. HTTP follows a classical client-server model, with a client opening a connection to make a request, then waiting until it receives a response. HTTP is a stateless protocol, meaning that the server does not keep any data (state) between two requests.

A dynamic website is a website that displays different types of content every time a user views it. This display changes depending on a number of factors like viewer demographics, time of day, location, language settings, and so on.

Web Application	Website
Web application is designed for interaction with end users.	Website basically contains static content.
The user of web application can read the content of web application and also manipulate the data.	The user of website only can read the content of website but not manipulate .
The web application site should be precompiled before deployment.	The website does not need to be precompiled .
The function of a web application is quite complex.	The function of website is simple.
Web application is interactive for users.	Web site is not interactive for users.

Defining Web Design vs. Web Development

Web design specifically refers to the processes required to make the front end of the website — the part that a webpage visitor sees — visually appealing and understandable. Web designers make sure the site looks clear and clean-cut and that customers instinctively know how to interact with it. They are sometimes referred to as user experience, or “UX,” designers.

Web development focuses on the behind-the-scenes programming that makes a website work

Web Hosting is a service that allows hosting/post-web-server applications(website or web page) on a computer system through which web-browser clients can have easy access to electronic content on the Internet.

Web Server or **Web Host** is a computer system that provide web hosting. When Internet user’s want to view your website, all they need to do is type your website address or domain into their browser.

- Free Hosting
- Virtual or Shared Hosting
- Dedicated Hosting
- Co-location Hosting

Prinicples of web designing

1. Purpose
2. Simpliciyt - color ,type , imagery
3. Navigation
4. Responsiveness
5. Content
6. Laod time;

The main difference between absolute and relative paths is that **absolute URLs always include the domain name of the site with http://www. Relative links show the path to the file or refer to the file itself**. A relative URL is useful within a site to transfer a user from point to point within the same domain

- SS plays an important role, by using CSS you simply got to specify a repeated style for element once & use it multiple times as because CSS will automatically apply the required styles.
- The main advantage of CSS is that style is applied consistently across variety of sites. One instruction can control several areas which is advantageous.
- Web designers needs to use few lines of programming for every page improving site speed.

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What is External JavaScript?

External JavaScript is when the *JavaScript* Code(script) is written in another file having an extension .js and then we link this file inside the <head> or<body> tag of our *HTML* file in which the code is to be added. The use of external JavaScript is more practical when the same code is to be used in many different web pages. Using an external script is easy , just put the name of the script file(our .js file) in the src (source) attribute of <script> tag. External **JavaScript** file can not contain <script> tags.

From <https://www.geeksforgeeks.org/what-is-external-javascript/>

Before submitting data to the server, it is important to ensure all required form controls are filled out, in the correct format. This is called **client-side form validation**, and helps ensure data submitted matches the requirements set forth in the various form controls. This article leads you through basic concepts and examples of client-side form validation.

From <https://developer.mozilla.org/en-US/docs/Learn/Forms/Form_validation>

. Client-side scripting :

Web browsers execute client-side scripting. It is used when browsers have all code. Source code is used to transfer from webserver to user's computer over the internet and run directly on browsers. It is also used for validations and functionality for user events.

It allows for more interactivity. It usually performs several actions without going to the user. It cannot be basically used to connect to databases on a web server. These scripts cannot access the file system that resides in the web browser. Pages are altered on basis of the user's choice. It can also be used to create "cookies" that store data on the user's computer.

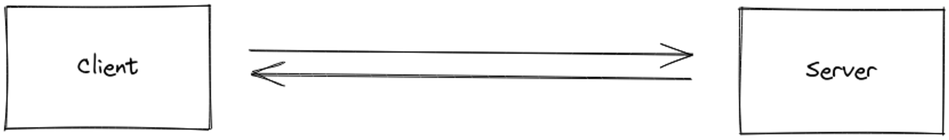
2. Server-side scripting :

Web servers are used to execute server-side scripting. They are basically used to create dynamic pages. It can also access the file system residing at the webserver. A server-side environment that runs on a scripting language is a web server.

Scripts can be written in any of a number of server-side scripting languages available. It is used to retrieve and generate content for dynamic pages. It is used to require to download plugins. In this load times are generally faster than client-side scripting. When you need to store and retrieve information a database will be used to contain data. It can use huge resources of the server. It reduces client-side computation overhead. The server sends pages to the request of the user/client.

From <https://www.geeksforgeeks.org/difference-between-server-side-scripting-and-client-side-scripting/>

Socket.IO is a library that enables **low-latency**, **bidirectional** and **event-based** communication between a client and a server.



It is built on top of the WebSocket protocol and provides additional guarantees like fallback to HTTP long-polling or automatic reconnection.

From <https://socket.io/docs/v4/>

Form validation normally used to occur at the server, after the client had entered all the necessary data and then pressed the Submit button. If the data entered by a client was incorrect or was simply missing, the server would have to send all the data back to the client and request that the form be resubmitted with correct information. This was really a lengthy process which used to put a lot of burden on the server.
JavaScript provides a way to validate form's data on the client's computer before sending it to the web server. Form validation generally performs two functions.

- **Basic Validation** – First of all, the form must be checked to make sure all the mandatory fields are filled in. It would require just a loop through each field in the form and check for data.
- **Data Format Validation** – Secondly, the data that is entered must be checked for correct form and value. Your code must include appropriate logic to test correctness of data.

From <https://www.tutorialspoint.com/javascript/javascript_form_validations.htm>

The difference between Java and JavaScript is as follows:

Java	JavaScript
Java is a strongly typed language and variables must be declared first to use in the program. In Java, the type of a variable is checked at compile-time.	JavaScript is a loosely typed language and has a more relaxed syntax and rules.
Java is an object-oriented programming language.	JavaScript is an object-based scripting language.
Java applications can run in any virtual machine(JVM) or browser.	JavaScript code used to run only in the browser, but now it can run on the server via Node.js.
Objects of Java are class-based even we can’t make any program in java without creating a class.	JavaScript Objects are prototype-based.
Java program has the file extension “.Java” and translates source code into bytecodes	JavaScript file has the file extension “.js” and it is interpreted but not compiled, every

which are executed by JVM(Java Virtual Machine).	browser has the Javascript interpreter to execute JS code.if compile time
Java is a Standalone language.	contained within a web page and integrates with its HTML content.
Java has a thread-based approach to concurrency.	Javascript has an event-based approach to concurrency.
Java supports multithreading.	Javascript doesn’t support multi-threading.
Java is mainly used for backend	Javascript is used for the frontend and backend both.
Java uses more memory	Javascript uses less memory.

From <https://www.geeksforgeeks.org/difference-between-java-and-javascript/>

Advantage of Server side Scripting

There are several advantages of using server side scripting languages that are as follows:
1. The main advantage of using server side scripting is that all the processing of data takes place before a web page is sent to the browser. As a result, server side script code remains hidden from users.
2. Server side scripting is an independent of browser. That is, browser does not impact on the processing of script code because all the data processing takes place on the server end.
3. It allows database interactivity with web pages.
4. Furthermore, it allows the use of templates for creating HTML web pages. A template is a file that contains HTML code to which contents from a text file, database, and other data retrieves dynamically before displaying the web page to the user.
5. Server side script cannot be disabled at the client side.
6. Server side scripting is more secure than client side scripting.
7. It can access files and database that do not normally be available to the client or user.
8. It provides code reusability.

From <https://www.scientecheasy.com/2021/12/server-side-scripting.html/>

Advantages of CSS:

- CSS plays an important role, by using CSS you simply got to specify a repeated style for element once & use it multiple times as because CSS will automatically apply the required styles.

- The main advantage of CSS is that style is applied consistently across variety of sites. One instruction can control several areas which is advantageous.
- Web designers needs to use few lines of programming for every page improving site speed.
- Cascading sheet not only simplifies website development, but also simplifies the maintenance as a change of one line of code affects the whole web site and maintenance time.
- It is less complex therefore the effort are significantly reduced.
- It helps to form spontaneous and consistent changes.
- CSS changes are device friendly. With people employing a batch of various range of smart devices to access websites over the web, there's a requirement for responsive web design.
- It has the power for re-positioning. It helps us to determine the changes within the position of web elements who are there on the page.
- These bandwidth savings are substantial figures of insignificant tags that are indistinct from a mess of pages.
- Easy for the user to customize the online page
- It reduces the file transfer size.

From <https://www.geeksforgeeks.org/advantages-and-disadvantages-of-css/>

CSS Background

- Difficulty Level : Medium
- Last Updated : 07 Oct, 2021
- Read
- Discuss

The CSS background properties are used to define the background effects for elements. There are lots of properties to design the background.

CSS background properties are as follows:

- CSS Background-color Property: The background-color property in CSS is used to specify the background color of an element.
- CSS Background-image Property: The background-image property is used to set one or more background images to an element.
- CSS Background-repeat Property: The background-repeat property in CSS is used to repeat the background image both horizontally and vertically.
- CSS Background-attachment Property: The property background-attachment property in CSS is used to specify the kind of attachment of the background image with respect to its container.
- CSS Background-position Property: In CSS body-position property is mainly used to set an image at a certain position.
- CSS Background-origin Property: The background-origin is a property defined in CSS which helps in adjusting the background image of the webpage.
- CSS Background-clip Property: The background-clip property in CSS is used to define how

to extend background (color or image) within an element.

From <https://www.geeksforgeeks.org/css-background/>

Definition and Usage

The comment tag is used to insert comments in the source code. Comments are not displayed in the browsers.

You can use comments to explain your code, which can help you when you edit the source code at a later date. This is especially useful if you have a lot of code.

```
<script type="text/javascript">
<!--
function displayMsg() {
  alert("Hello World!")
}
//-->
</script>
```

From <https://www.w3schools.com/tags/tag_comment.asp>

From <https://www.w3schools.com/tags/tag_comment.asp>

The CSS Box Model

In CSS, the term "box model" is used when talking about design and layout.

The CSS box model is essentially a box that wraps around every HTML element. It consists of: margins, borders, padding, and the actual content. The image below illustrates the box model:

Explanation of the different parts:

- **Content** - The content of the box, where text and images appear
- **Padding** - Clears an area around the content. The padding is transparent
- **Border** - A border that goes around the padding and content
- **Margin** - Clears an area outside the border. The margin is transparent

From <https://www.w3schools.com/css/css_boxmodel.asp>