Web development

* refers to the creation of an application that works over the internet i.e. websites.
* It includes aspects such as web design, web publishing, web programming, and database management.

**Web Development can be classified into two ways:**

1. **Frontend Development (how a web page looks):**

* The part of a website where the user interacts directly is termed as front end.
* It is also referred to as the ‘client side’ of the application.
* It includes HTML, CSS, Javascript etc.

1. **Back-end** **development** **(how a web page works):**

* Backend is the server side of the application.
* It is the portion of software that does not come in direct contact with the users.
* It is used to store and arrange data.
* It includes Node.js, Java, Python, C#, SQL, etc.

**HTML (HyperText Markup Language):**

* It is the standard language used to create and structure content on the web.
* HTML sets up the basic structure of a website, and then CSS and JavaScript add style and interactivity to make it look and function better.
* It is not a programming language.
* Founded by “Tim Berners-Lee” in 1993.
* Its latest version is: HTML5

**Tools required:**

1. VS Code (an IDE) -> extension “Live Server” -> to preview HTML pages in real-time.

OR any text-editor -> Save the text file using the “**.html”** or “**.htm”**extension.

2. Any web-browser like Crome etc. to open the file.

**HTML Element and HTML Tag:**

HTML Element and HTML Tags are related but distinct.

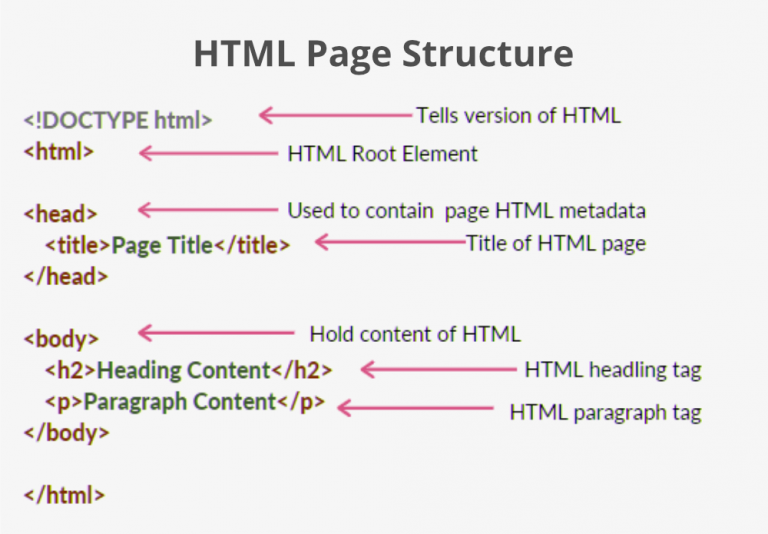
An **HTML** **element** is the complete structure, including the opening tag, content (if any), and the closing tag (if applicable).

On the other hand, A **tag** is the actual keyword or name enclosed in angle brackets (< >) that tells the browser what kind of content to expect. Tags are not case-sensitive.

<tagname> Content goes here... </tagname>

Some HTML elements have no content (like the <br> element). These elements are called empty elements. Empty elements do not have an end tag!

**HTML Page Structure:**



* [**<!DOCTYPE html>**](https://www.geeksforgeeks.org/html-doctypes/) – This is a declaration that defines the document type and version of HTML, helping browsers render the page correctly. Without <!DOCTYPE html>, your HTML code can still run, but it may face several significant drawbacks.
* [**<html>**](https://www.geeksforgeeks.org/html-html-tag/) – This is called the HTML root element. All other elements are contained within it.
* [**<head>**](https://www.geeksforgeeks.org/html-head-tag/) – The head tag contains the “behind the scenes” elements for a webpage. Elements within the head aren’t visible on the front end of a webpage. Typical elements inside the <head> include:
  + [**<title>**](https://www.geeksforgeeks.org/html-title-tag/)**:** Defines the title displayed on the top of the browser tab.
  + [**<meta>**](https://www.geeksforgeeks.org/html-meta-tag/): Provides information like the character set or viewport settings.
  + [**<link>**](https://www.geeksforgeeks.org/html-link-tag/): Links external stylesheets or resources.
  + [**<style>**](https://www.geeksforgeeks.org/html-style-tag/): Embeds internal CSS styles.
  + [**<script>**](https://www.geeksforgeeks.org/html-script-tag/): Embeds JavaScript for functionality.
* [**<body>**](https://www.geeksforgeeks.org/html-body-tag/) – The body tag is used to enclose all the visible content of a webpage.
  + **<h2>** – The <h2> tag is a second-level heading tag. There are a total of 6 heading tags from h1 to h6.
  + [**<p>**](https://www.geeksforgeeks.org/html-p-tag/)– The <p> tag represents a paragraph of text.

**HTML Horizontal Line:**

The HTML **<hr>** tag is used to divide a page into sections by creating a horizontal line that spans from the left to the right side of the page. This is an empty tag and does not require a closing tag or any additional attributes.

**HTML Comments:**

*To add a comment in your HTML code, you enclose the text you want to hide from display within <!--  and -->*

Example:

*<!-- This is a comment and will not be displayed on the webpage -->*

<**p**>This is visible text.</**p**>

***Note:*** *The shortcut for adding the comment through the keyboard is by typing* ***Ctrl + / in Windows****, and* ***Command + / for Mac users****.*

**HTML attributes:**  provide additional information about HTML elements and are always specified in **the start tag.**

**Block-Level Elements and Inline Elements:**

In HTML, elements are broadly categorized into two main types based on how they display in the document layout:

**1. Block-Level Elements –** Block-level elements typically start on a new line and take up the full width available to them, regardless of their actual content width.

**Examples:**

* <div>: A general-purpose container for other elements.
* <p>, <h1>, <h2>, …, <h6>.
* <ol>, <ul>: Ordered and unordered lists.
* <table>: Defines a table.
* <form>: Used for HTML forms to collect user inputs.
* **Semantic** **elements** that give meaning to areas of a webpage:
  + <section>: defines a section in a document.
  + <article>: specifies independent, self-contained content.
  + <nav>: defines a set of navigation links.
  + <aside>: defines some content aside from the content it is placed in.
  + <dialog open> : defines a dialog box or subwindow.
  + <summary>: defines a visible heading for the [<details>](https://www.w3schools.com/tags/tag_details.asp) element. Can be hide.
  + <header>: represents a container for introductory content.
  + <footer>: defines a footer for a document or section like copyrights, etc..

**2. Inline Elements –** Inline elements do not start on a new line; they appear on the same line as adjacent content, as long as there is space.

**Examples:**

* <span>: A general-purpose inline container for phrasing content.
* <a>: Creates hyperlinks.
* <img>: Embeds an image.
* <strong>, <b>: Used for strong emphasis and bold text, respectively.
* <em>, <i>: Used for emphasis and italic text, respectively.
* <br>: Inserts a line break within text.
* <input>: Creates interactive controls for forms.

**Some HTML Formatting Tags:**

1. **<abbr>** : defines an abbreviation or an acronym.

Example: <abbr title="World Health Organization">WHO</abbr>

1. **<b>:** bold text without any extra importance.

Example: <p>This is normal text - <b>and this is bold text</b>.</p>

1. **<del>:** Defines text that has been deleted from a document. Browsers will usually strike a line through deleted text.

Example: <del>blue</del>

1. **<em>:** used to define emphasized text or importance. The content inside is typically displayed in *italic*.

Example: <p>You <em>have</em> to hurry.</p> = You *have* to hurry.

1. **<i>:** defines a part of text in an alternate voice or mood. The content inside is typically displayed in *italic*.
2. **<ins>:** defines a text that has been inserted into a document. Browsers will usually underline inserted text.
3. **<mark>:** Mark or Highlight parts of a text:
4. **<pre>:** defines preformatted text. The text will be displayed exactly as written in the HTML source code.
5. **<s>:** strikethrough tag: specifies text that is no longer correct, accurate or relevant. The text will be displayed with a line through it similar to <del> tag.
6. **<small>**Tag: defines smaller text (like copyright and other side-comments).
7. **<strong>** Tag: used to define text with strong importance. The content inside is typically displayed in **bold**.
8. **<sub>** Tag: defines subscript text. Subscript text appears half a character below the normal line, and is sometimes rendered in a smaller font. Subscript text can be used for chemical formulas, like H2O.
9. **<sup>** Tag: defines superscript text. Superscript text appears half a character above the normal line, and is sometimes rendered in a smaller font. Example: 2<sup>5</sup> = 25
10. **<template>** Tag: used as a container to hold some HTML content hidden from the user when the page loads. The content inside it can be rendered later with a JavaScript.
11. **<u>** Tag: use to mark up a misspelled word. The content inside is typically displayed with an underline.
12. **<wbr> (Word Break Opportunity) tag**: specifies where in a text it would be ok to add a line-break based on window size.

**Forms and Input tag:**

The <form> tag is used to create an HTML form for user input.

The <form> element can contain one or more of the following form elements:

1. **<input>**tag specifies an input field where the user can enter data.

The different input types are as follows:

<input type="**button**">, <input type="**checkbox**">, <input type="**color**">,

<input type="**date**">, <input type="**email**">, <input type="**file**">,

<input type="**hidden**">, <input type="**image**">, <input type="**number**">

<input type="**password**">, <input type="**radio**">, <input type="**range**">

<input type="**submit**">,

<input type="**text**"> (default value)

1. [**<textarea>**](https://www.w3schools.com/tags/tag_textarea.asp)**:** Defines a multiline input control (text area)
2. **<button>:** Defines a clickable button. Inside a <button> element you can put text (and tags like <i>, <b>, <strong>, <br>, <img>, etc.). That is not possible with a button created with the [<input>](https://www.w3schools.com/tags/tag_input.asp) element!
3. **<select>:** Defines a drop-down list.
4. **<optgroup>:** used to group related options in a [<select>](https://www.w3schools.com/tags/tag_select.asp) element (drop-down list).
5. **<option>:** Defines an option in a drop-down list. It goes inside a [<select>](https://www.w3schools.com/tags/tag_select.asp), [<optgroup>](https://www.w3schools.com/tags/tag_optgroup.asp), or [<datalist>](https://www.w3schools.com/tags/tag_datalist.asp) element.
6. **<label>:** Defines a label for an <input> element
7. **<fieldset>:** Groups related elements in a form. It draws a box around the related elements.
8. **<legend>:** Defines a caption for a <fieldset> element.
9. **<datalist>:** Specifies a list of pre-defined options for input controls.
10. **<output>:** used to represent the result of a calculation (like one performed by a script).

**Attributes for Form tag:**

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Value** | **Description** |
| [accept-charset](https://www.w3schools.com/tags/att_form_accept_charset.asp) | character\_set | Specifies the character encodings that are to be used for the form submission |
| [action](https://www.w3schools.com/tags/att_form_action.asp) | URL | Specifies where to send the form-data when a form is submitted |
| [autocomplete](https://www.w3schools.com/tags/att_form_autocomplete.asp) | on off | Specifies whether a form should have autocomplete on or off |
| [enctype](https://www.w3schools.com/tags/att_form_enctype.asp) | application/x-www-form-urlencoded multipart/form-data text/plain | Specifies how the form-data should be encoded when submitting it to the server (only for method="post") |
| [method](https://www.w3schools.com/tags/att_form_method.asp) | dialog get post | Specifies the HTTP method to use when sending form-data |
| [name](https://www.w3schools.com/tags/att_form_name.asp) | text | Specifies the name of a form |
| [novalidate](https://www.w3schools.com/tags/att_form_novalidate.asp) | novalidate | Specifies that the form should not be validated when submitted |
| [rel](https://www.w3schools.com/tags/att_form_rel.asp) | external help license next nofollow noopener noreferrer opener prev search | Specifies the relationship between a linked resource and the current document |
| [target](https://www.w3schools.com/tags/att_form_target.asp) | \_blank \_self \_parent \_top | Specifies where to display the response that is received after submitting the form |

**Attributes for input tags:**

|  |  |  |
| --- | --- | --- |
| Attribute | Value | Description |
| height | pixels | Specifies the height of an <input> element (only for type="image") |
| max | number | max |
| maxlength | number | Specifies the maximum number of characters allowed in an <input> element |
| [min](https://www.w3schools.com/tags/att_input_min.asp) | number date | Specifies a minimum value for an <input> element |
| [minlength](https://www.w3schools.com/tags/att_input_minlength.asp) | number | Specifies the minimum number of characters required in an <input> element |
| placeholder | text | Specifies a short hint that describes the expected value of an <input> element |
|  |  |  |
| [readonly](https://www.w3schools.com/tags/att_input_readonly.asp) | readonly | Specifies that an input field is read-only |
| [required](https://www.w3schools.com/tags/att_input_required.asp) | required | Specifies that an input field must be filled out before submitting the form |
| [size](https://www.w3schools.com/tags/att_input_size.asp) | number | Specifies the width, in characters, of an <input> element |
| type | Button, submit etc. | Specifies the type <input> element to display |
| [value](https://www.w3schools.com/tags/att_input_value.asp) | text | Specifies the value of an <input> element |
| [width](https://www.w3schools.com/tags/att_input_width.asp) | pixels | Specifies the width of an <input> element (only for type="image") |

**Example:**

<form action="/action\_page.php">

<fieldset>

<legend>Personalia:</legend>

<label for="fname">First name:</label>

<input type="text" id="fname" name="fname"><br><br>

<label for="lname">Last name:</label>

<input type="text" id="lname" name="lname"><br><br>

<label for="email">Email:</label>

<input type="email" id="email" name="email"><br><br>

<label for="birthday">Birthday:</label>

<input type="date" id="birthday" name="birthday"><br><br>

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

</fieldset>

</form>

**HTML <iframe> Tag:**

* It specifies an inline frame which is used to embed another document within the current HTML document like embedding a youtube video, ads etc. in website.
* Use case:- Creating a separate section or page.
  + Displaying advertises.
  + Creating an image gallery or slideshow.
  + Embedding social media feeds.
* Some websites don’t allow embedding because it may lead security risks.

Example:

<iframe src="https://www.w3schools.com"

title="W3Schools Free Online Web Tutorials"></iframe>

## Attributes for <iframe>:

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Value** | **Description** |
| allow |  | Specifies a feature policy for the <iframe> |
| allowfullscreen | true false | Set to true if the <iframe> can activate fullscreen mode by calling the requestFullscreen() method |
| loading | eager lazy | Specifies whether a browser should load an iframe immediately or to defer loading of iframes until some conditions are met |
| [name](https://www.w3schools.com/tags/att_iframe_name.asp) | text | Specifies the name of an <iframe> |
| [referrerpolicy](https://www.w3schools.com/tags/att_iframe_referrerpolicy.asp) | no-referrer, origin, etc. | Specifies which referrer information to send when fetching the iframe |
| [sandbox](https://www.w3schools.com/tags/att_iframe_sandbox.asp) | allow-forms, allow-popups | Enables an extra set of restrictions for the content in an <iframe> |
| [src](https://www.w3schools.com/tags/att_iframe_src.asp) | URL | Specifies the address of the document to embed in the <iframe> |
|  |  |  |

**Image tags**:

1. **<img> tag** is used to embed an image in an HTML page.

* Images are not technically inserted into a web page; images are linked to web pages. The <img> tag creates a holding space for the referenced image.
* The <img> tag has two required attributes:
  + **src** - Specifies the path to the image
  + **alt** - Specifies an alternate text for the image, if the image for some reason cannot be displayed.

1. **<map>** Tag: used to define an image map. An image map is an image with clickable areas. The required name attribute of the <map> element is associated with the [<img>](https://www.w3schools.com/tags/tag_img.asp)'s usemap attribute and creates a relationship between the image and the map.

The <map> element contains a number of [<area>](https://www.w3schools.com/tags/tag_area.asp) elements, that defines the clickable areas in the image map.

1. **<area>** tag: Defines an area inside an image map.
2. **<canvas>** tag: Used to draw graphics, on the fly, via scripting (usually JavaScript)
3. **<figcaption>** tag: Defines a caption for a <figure> element
4. **<figure>** tag: Specifies self-contained content
5. **<picture>:** Defines a container for multiple image resources
6. **<svg>:** Defines a container for SVG graphics.

Example:

<img src="workplace.jpg" alt="Workplace" usemap="#workmap" width="400" height="379">

<map name="workmap">

<area shape="rect" coords="34,44,270,350" alt="Computer" href="computer.htm">

<area shape="rect" coords="290,172,333,250" alt="Phone" href="phone.htm">

<area shape="circle" coords="337,300,44" alt="Cup of coffee" href="coffee.htm">

</map>

**Audio / Video tags:**

1. **<audio> tag:** is used to embed sound content in a document, such as music or other audio streams. There are three supported audio formats in HTML: MP3, WAV, and OGG.

The <audio> tag contains one or more [<source>](https://www.w3schools.com/tags/tag_source.asp) tags with different audio sources. The browser will choose the first source it supports.

The text between the <audio> and </audio> tags will only be displayed in browsers that do not support the <audio> element.

1. **<video> tag:** is used to embed video content in a document, such as a movie clip or other video streams. There are three supported video formats in HTML: MP4, WebM, and OGG.

Example:

<video width="320" height="240" controls>

        <source src="./movie.mp4" type="video/mp4">

        <source src="./movie.ogg" type="video/ogg">

        Your browser does not support the video tag.

      </video>

**Optional Attributes for Audio and Video:**

|  |  |  |
| --- | --- | --- |
| Attribute | Value | Description |
| [autoplay](https://www.w3schools.com/tags/att_video_autoplay.asp) | autoplay | Specifies that the video will start playing as soon as it is ready |
| [controls](https://www.w3schools.com/tags/att_video_controls.asp) | controls | Specifies that video controls should be displayed (such as a play/pause button etc). |
| [height](https://www.w3schools.com/tags/att_video_height.asp) | pixels | Sets the height of the video player |
| [loop](https://www.w3schools.com/tags/att_video_loop.asp) | loop | Specifies that the video will start over again, every time it is finished |
| [muted](https://www.w3schools.com/tags/att_video_muted.asp) | muted | Specifies that the audio output of the video should be muted |
| [poster](https://www.w3schools.com/tags/att_video_poster.asp) | URL | Specifies an image to be shown while the video is downloading, or until the user hits the play button |
| [preload](https://www.w3schools.com/tags/att_video_preload.asp) | auto metadata none | Specifies if and how the author thinks the video should be loaded when the page loads |
| [src](https://www.w3schools.com/tags/att_video_src.asp) | URL | Specifies the URL of the video file |

**Links:**

1. **<a> tag**: defines a hyperlink, which is used to link from one page to another.

The most important attribute is the **href** attribute, which indicates the link's destination.

By default, links will appear as follows in all browsers:

* An unvisited link is underlined and blue
* A visited link is underlined and purple
* An active link is underlined and red

1. **<link> tag:** defines the relationship between the current document and an external resource.

The <link> tag is most often used to link to external **style sheets** or to add a **favicon** to your website.

The <link> element is an empty element, it contains attributes only.

Example:

<link rel="stylesheet" href="./styles.css">

**List tags:**

1. **<menu>** tag Or **<ul>** tag: defines an unordered (bulleted) list of contents.

Use the <ul> tag together with the **<li>** tag to create unordered lists.

Set the different list style types (with CSS) : <ul style="list-style-type:circle">

1. **<ol> tag:** defines an ordered list. An ordered list can be numerical or alphabetical.

Example: <ol type=1 start="50"> <li>abc</li> </ol>

**Some useful attributes for Ordered List:**

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Value** | **Description** |
| [reversed](https://www.w3schools.com/tags/att_ol_reversed.asp) | reversed | Specifies that the list order should be reversed (9,8,7...) |
| [start](https://www.w3schools.com/tags/att_ol_start.asp) | number | Specifies the start value of an ordered list |
| [type](https://www.w3schools.com/tags/att_ol_type.asp) | 1, A, a, I, i | Specifies the kind of marker to use in the list |

1. **<li> tag:** defines a list item. used inside ordered lists([<ol>](https://www.w3schools.com/tags/tag_ol.asp)) and unordered lists ([<ul>](https://www.w3schools.com/tags/tag_ul.asp)).

It have a **value** attribute to specifies the start value of a list item in <ol> list.

1. **<dl> tag**: defines a description list.

The <dl> tag is used in conjunction with [<dt>](https://www.w3schools.com/tags/tag_dt.asp) (defines terms/names) and [<dd>](https://www.w3schools.com/tags/tag_dd.asp) (describes each term/name).

Example: <dl>

        <dt>Coffee</dt>

        <dd>- 500 gms</dd>

        <dt>Milk</dt>

        <dd>- 1 ltr Tetra Pack</dd>

</dl>

**Table tags:**

**<table> tag** defines an HTML table.

An HTML table consists of one <table> element and one or more <tr>, <th>, and <td> elements.

The **<tr>** element defines a table row, the **<th>** element defines a header cell in the table, and the **<td>** element defines a standard data cell in the table.

By Default, The text in <th> elements are bold and centered. While, The text in <td> elements are regular and left-aligned.

An HTML table may also include <caption>, <colgroup>, <col>, <thead>, <tfoot>, and <tbody> elements to define structure of the table.

**Some important attributes:**

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Value** | **Description** |
| [colspan](https://www.w3schools.com/tags/att_td_colspan.asp) | number | Specifies the number of columns a cell should span |
| [rowspan](https://www.w3schools.com/tags/att_td_rowspan.asp) | number | Sets the number of rows a cell should span |

**Meta Info tags:**

1. **<head> tag:** Defines information about the document.
2. **<base> tag:** specifies the base URL and/or target for all relative URLs in a document.

The <base> tag must have either an **href** or a **target** (values = \_blank, \_parent, \_self, \_top) attribute present, or both.

There can only be one single <base> element in a document, and it must be inside the <head> element.

1. **<meta> tag:** Defines metadata about an HTML document. Metadata is data (information) about data.

* <meta> tags always go inside the <head> element, and are typically used to specify character set, page description, keywords, author of the document, and viewport settings.
* Metadata will not be displayed on the page, but is machine parsable.
* Metadata is used to improve visibility (by browser) and Search Engine Optimization (using keywords).

**Some Attributes:**

|  |  |  |
| --- | --- | --- |
| **Attribute** | **Value** | **Description** |
| [charset](https://www.w3schools.com/tags/att_meta_charset.asp) | character\_set | Specifies the character encoding for the HTML document |
| [content](https://www.w3schools.com/tags/att_meta_content.asp) | text | Specifies the value associated with the http-equiv or name attribute |
| [http-equiv](https://www.w3schools.com/tags/att_meta_http_equiv.asp) | content-security-policy, content-type, default-style, refresh | Provides an HTTP header for the information/value of the content attribute |
| [name](https://www.w3schools.com/tags/att_meta_name.asp) | application-name, author, description, generator, keywords, viewport | Specifies a name for the metadata |

**Examples:**

* Define keywords for search engines:

<meta name="keywords" content="HTML, CSS, JavaScript">

* Define a description of your web page:

<meta name="description" content="Free Web tutorials for HTML and CSS">

* Define the author of a page:

<meta name="author" content="John Doe">

* Refresh document every 30 seconds:

<meta http-equiv="refresh" content="30">

* Setting the viewport to make your website look good on all devices:

<meta name="viewport" content="width=device-width, initial-scale=1.0">

* Provide instruction to search engine about whether to index a page or follow its link:

<meta name="robots" content="noindex, nofollow">