Client-side Technologies

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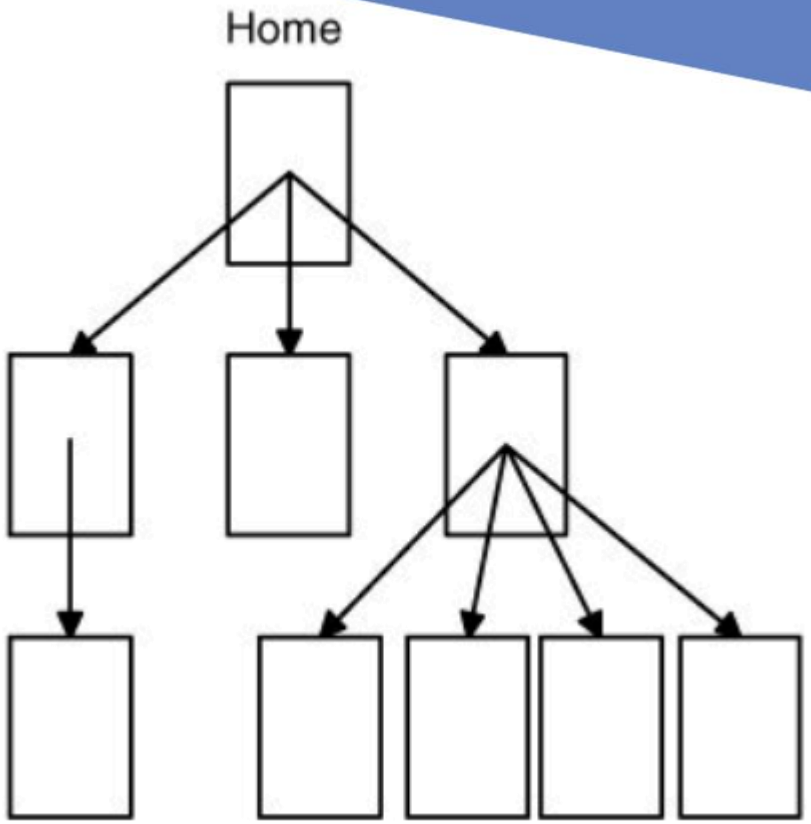
iTi

Day 1

World Wide Web

- The *World Wide Web (Web)* is a network of information resources.
- The Web relies on three mechanisms to make these resources readily available to the widest possible audience:
  - A uniform naming scheme for locating resources on the Web (e.g., URLs).
  - Protocols, for access to named resources over the Web (e.g., HTTP).
  - Hypertext, for easy navigation among resources (e.g., HTML).

Website



Client-side technologies used to create web sites.

Client-Server Model

Full Stack

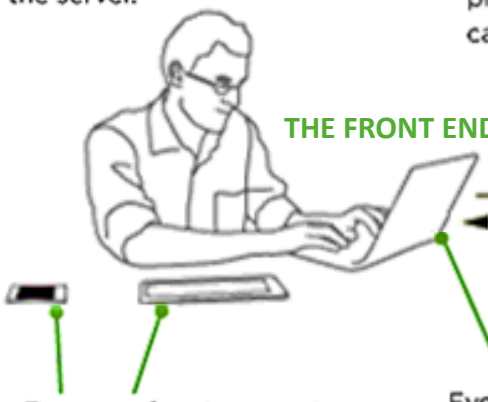
4 The **back-end server-side scripts** process the request, pull what they need from the database then send it back.

Web Server

1 A site is loaded in a browser from the server.

2 **Client-side scripts** Run in the browser and process requests without call-backs to the server

3 When a call to the database **is** required JavaScript and AJAX send requests to the back end.



THE FRONT END

Request

Internet

Response

Responsive front-end design allows a site to adapt to a user's device.

Everything a user sees in the browser is a mix of **HTML**, **CSS**, and **JavaScript**.

5 **Server-side scripts** process the data, then update the site—populating drop-down menus, loading products to a page, updating a user profile, and more.

https://www.upwork.com/hiring/development/how-scripting-languages-work/

Essential Technologies of WWW

HTML

Content & Structure.

CSS

Presentation

JavaScript

Behavior

HTML

The Mother Tongue of The Browser

HTML Background

- HTML stands for “Hyper Text Mark-up Language”.
- The language used to design Web Page.
- HTML was invented in 1990 by a scientist called Tim Berners-Lee. The purpose was to make it easier for scientists at different universities to gain access to each other's research documents.
- HTML standards are organized by W3C : http://www.w3.org/MarkUp/

Hyper-Text-Markup-Language

- **Hyper** is the method by which you move around on the web.
- **Text** is self-explanatory.
- **Mark-up** is what **HTML tags** do to the text inside them.
- **Language** is what HTML is. It uses many English words.

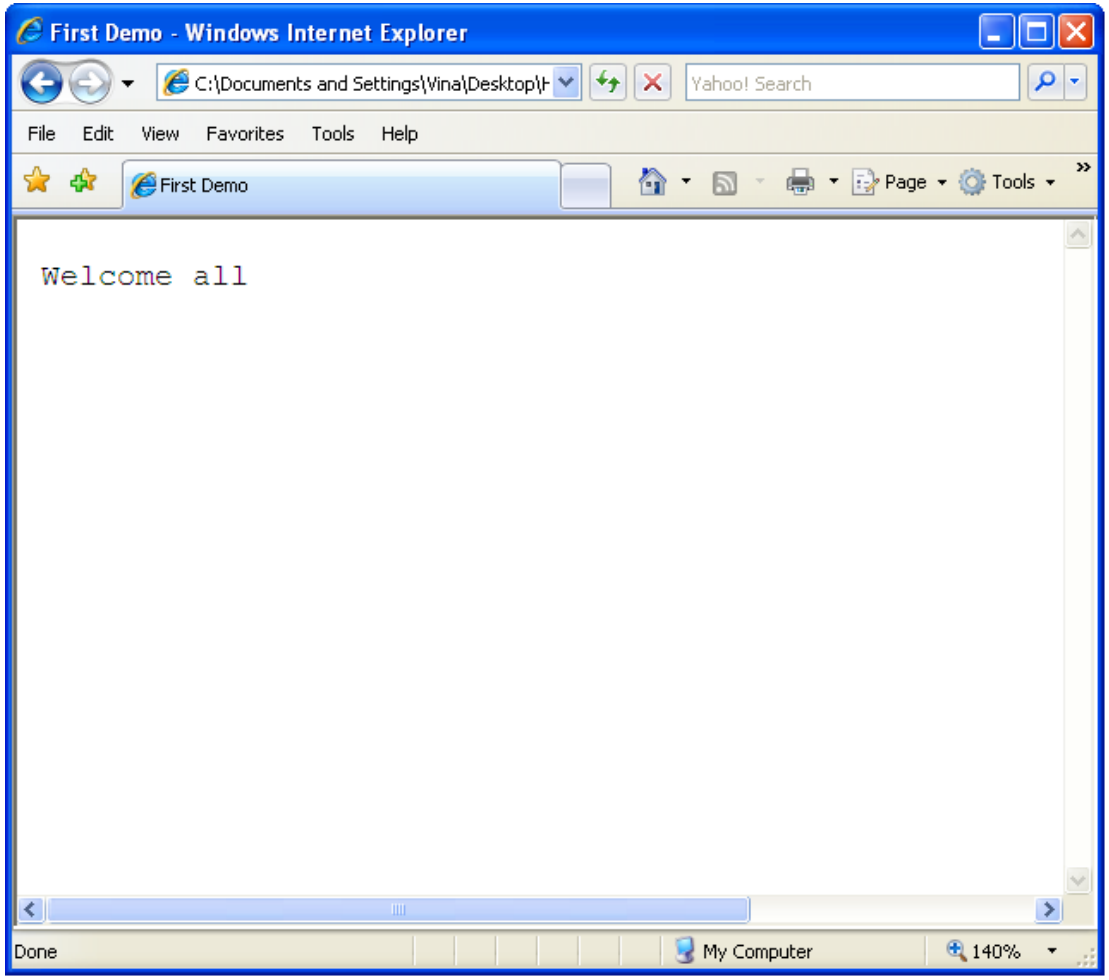
HTML

- HTML is used for creating static web pages.
- It is designed to display data & focus on how data looks.
- HTML's role on the web is to tell the browser how a document should appear.

HTML Functionalities

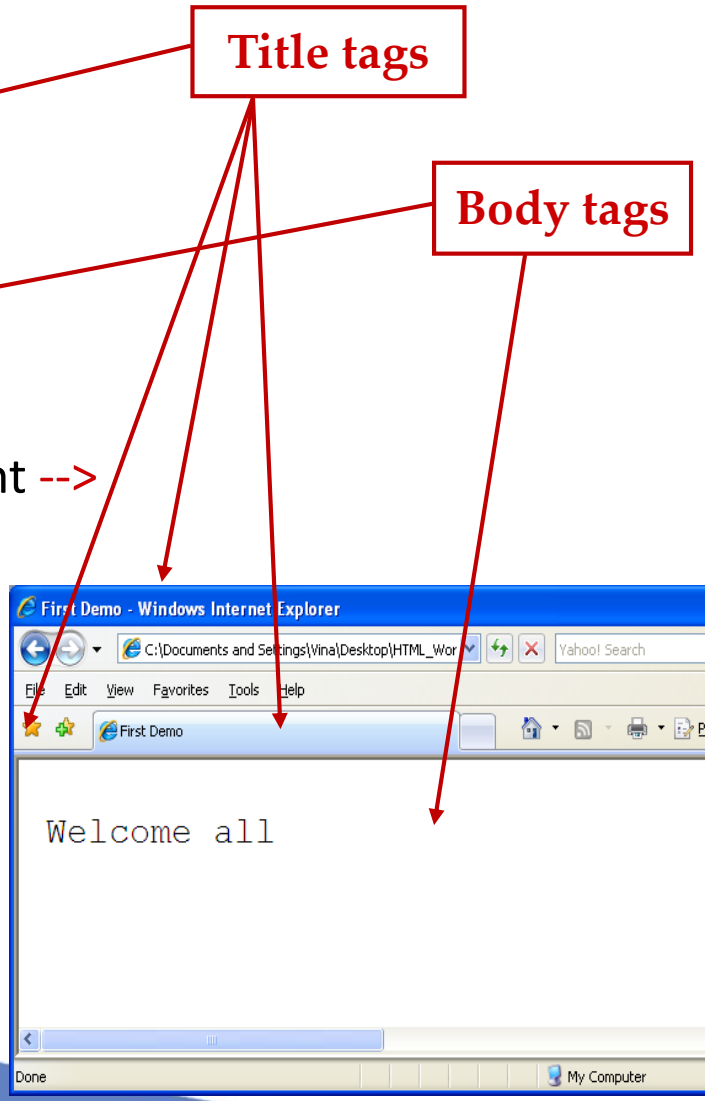
- HTML gives authors the means to:
  - Publish online documents with headings, text, tables, lists, photos, etc.
    - Include video clips, sound clips, and other applications directly in their documents.
  - Link information via hypertext links, at the click of a button.
  - Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.

Sample Webpage



Sample Webpage HTML Structure

```
<!DOCTYPE HTML>
<html>
   <head>
         <title>First Demo</title>
   </head>
   <body>
         <p>Welcome all</p>
         <!-- The content of the document -->
   </body>
</html>
```



HTML Document Basic Structure

- HTML documents contain text and various tags that define elements .

- HTML document contains <html> element that wraps
  - **head** section
    - The **title** of the document appears in the head along with other information about the document related to browser & search engine.
  - **body** section
    - The content of the document appears in the body.

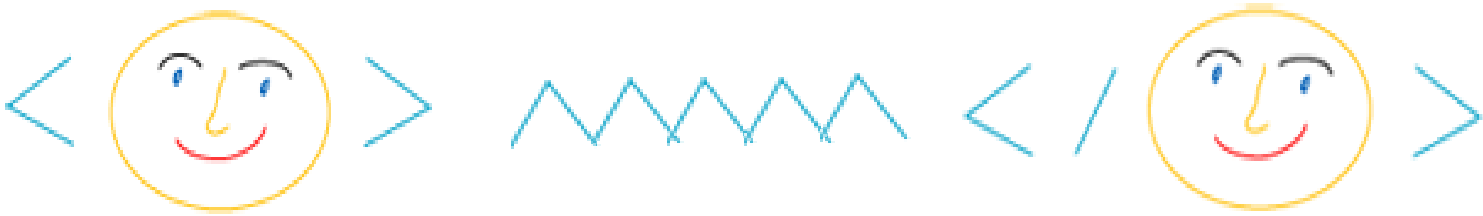
Example!

Sample HTML Tags Example

- This is a paragraph.
- Hello world
- Hi Ahmed Ali
- < a href="http://www.gamingegypt.com">
  click here

- Hello world
- <hr/>
- etc...

HTML Element Syntax



HTML Element Syntax

```
<start_of_tag attribute_name="attribute value">
        Content
</end_of_tag>
```

- An HTML element consists of an opening tag, a closing tag and the content inside.
- Tags tell the browser how it should display content on screen.
- Tags can have attributes, some tags have obligatory attributes.

HTML Element Syntax

```
<start_of_tag attribute_name="attribute value">
        Content
</end_of_tag>
```

- Attributes provide **additional information** about the element to configure and adjust the behavior of tag.
- Attributes are always specified in **the start tag**.
- Attributes come in name/value pairs like: **name="value"**.

HTML Element Syntax

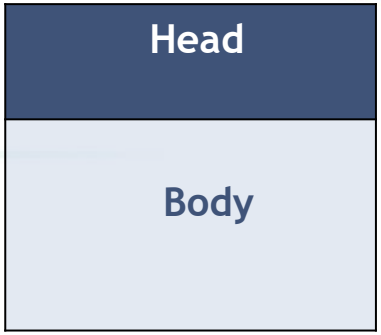
- Each element has a number of properties associated with it:
  - starts with a **start tag / opening tag,** begins with a (<) and ends with a (>)**.**
  - ends with an **end tag / closing tag,** begins with a (</) and ends with a (>)**.**
  - The **element content** is everything between the start and the end tag.
  - Some HTML elements have **empty content.**
  - Empty elements are **closed in the start tag.**
  - Most HTML elements can have **attributes.**
  - HTML documents consist of nested HTML elements.
    - Most elements can contain other HTML elements.

General Element Attributes

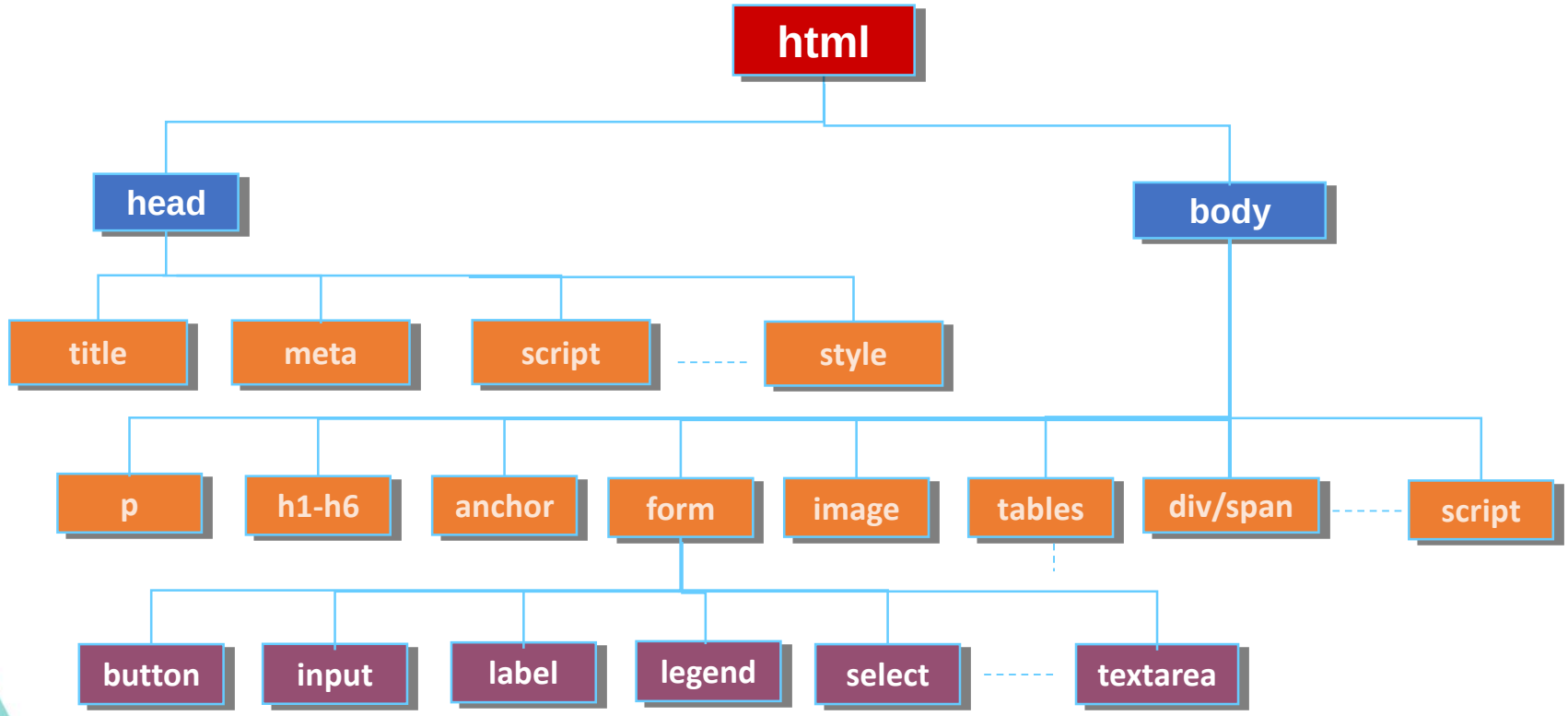
- Core Attributes
  - Used on the majority of HTML elements (although not all)
  - Not valid in base, head, html, meta, script, style, and title elements.

Attribute	Value	Description
class	*classname*	Specifies a classname for an element
id	*id*	Specifies a unique id for an element
style	*style_definition*	Specifies an inline style for an element
title	*text*	Specifies extra information about an element. It is often displayed as a tooltip or while the element is loading.

HTML Document Elements Hierarchy



HTML page is like a tree, series of nested elements (tags)



<head> Element

- 1st Child of <html> element
- Many elements may be nested as a child for <head>

Child Tag	Description
<title>	defines the title of the document, its required.
<style>	Defines style information for a document
<script>	Used to define a Client-Side script. Either contains scripting statements or points to an external file
<link>	Defines the relationship between a document and an external resource
<meta>	provides metadata about the HTML document, like page description, keywords, author of the document, last modified
<base>	specifies a default address or a default target for all links on a page

<title> Tag

- Defines the title of the document
- Shown in Tab
- Used in adding the page to favorite or bookmark list

```
<html>
  <head>
        <title>Trial Demo</title>
  </head>
</html>
```

<meta> Tag

- Meta tags are used to store information usually relevant to browsers and search engines.
  - Provides additional information about the page; for example, which character encoding the page uses, a summary of the page's content, instructions to search engines about whether or not to index content, and so on.
  - Define the author of the document as well as the content of the webpage.

```
<meta name="description" content="an html tutorial“ />

<meta name="keywords" content="html, webdesign, javascript“ />

<meta name="author" content="bill gates“ />

<meta http-equiv="refresh" content="5; url=http://www.abc.com“ />
```

<!-- --> Tag

- <!-- --> is the comment tag of html.
- Its used to insert comments in the source code, either as head child or body child.
- Comments are not displayed in the browsers.

- Example:

```
<html>
        <head>
                <!--This is a comment in head section-->
        </head>
        <body>
                <!--This is a comment in body section-->
                <p>This is a paragraph.</p>
        </body>
</html>
```

<body> Element

- Last Child of <html> element
- The <body> element defines the document's body.
- Many elements may be nested as a child for <body>
- Inside <body> Section:

- **Text**
  - Formatting
  - Resizing
  - Layout
  - Listing
- **Images**
  - Inserting images (GIF & jpg)
  - Adding a link to an image
- **Links**
  - To local pages
  - To pages at other sites
  - To bookmarks
- **Forms**
- **Tables**

Text Format Appearance

Tag	Description
text	writes text as bold
text	writes text in italics
<u>text</u>	writes underlined text
text	defines emphasized text
_{$_{text}$}	lowers text and makes it smaller
^{^{text}}	lifts text and makes it smaller
~~text~~	defines text that has been deleted from a document.
<ins>text</ins>	defines text that has been inserted into a document.
text	usually makes text bold

Text Size Appearance

Tag	Description
<big>text</big>	increase the size by one
text	decrease the size by one
text	writes text in biggest heading
text	writes text in smallest heading

Text Layout

Tag	Description
text	Adds a paragraph break after the text.
<p ~~align="left|center|right"~~> text 	Directs the alignment of text in paragraph.
<pre>text</pre>	writes text exactly as it is, including spaces.
text	Defines a section in a document
text	

Example!

Block vs. Inline Elements

- Block elements
  - Container elements for grouping other elements.
  - May contain other block elements & inline elements.
  - Normally start (and end) with a new line when displayed in a browser.
    e.g. , <p>, <h1>..<h6> etc.

- Inline elements
  - Container for text and other inline elements.
  - Normally displayed without starting a new line.
    e.g. , <b>, <td>, <a>, <i> etc.

vs.

- Defines a section in a document (block-level)
  - creates logical divisions within a page
- Defines a section in a document (inline)
  - Useful for modifying a specific portion of text
- HTML elements can be grouped together with and .
- Useful with CSS

Example!

Text breaking and white space

- Whitespace generally ignored in block and inline
- <pre>
  - whitespace is respected
-
  - Explicit line break
- <hr />
  - Horizontal rule
- Use Character entities

  →entities for HTML markup characters.

Special Character Entities

- Entities are used to implement reserved characters or to express characters that cannot easily be entered with the keyboard.

- Syntax:
  &entity_name or &#entity_num

Special Character Entities

Name	Symbol	HTML Equivalent
Ampersand	&	& or &
cent sign	¢	¢ or ¢
copyright symbol	©	© or ©
degree sign	°	° or °
greater than	>	> or >
less than	<	< or <
non-breaking space		or
registered trademark	®	® or ®

https://dev.w3.org/html5/html-author/charref

Special Character Entities

Name	Symbol	HTML Equivalent
trademark	™	™ or ™
quotation mark	“	" or "
apostrophe	‘	' or '
Euro	€	€ or €
British Pound	£	£ or £
Japanese Yen	¥	¥ or ¥
Cent sign	¢	¢ or &#162

HTML Lists

- HTML supports
  - ordered “Numbered” lists,
  - unordered “Bulleted” lists, &
  - description “Definition” lists.

Numbered List

Attribute	Value	Description
Start	Number (default) Capital letter Small letter Capital Roman # Small Roman #	Use styles instead. Specifies the start point in a list
Type		Use styles instead. Specifies which kind of bullet points will be used

- An ordered list starts with the <ol> tag
- tag to define list items.

```
<ol start="5">
        <li>text</li>
        <li>text</li>
</ol>
```

5. text
6. text
7. text
8. text
9. text

```
<ol type="A" reversed >
        <li>text</li>
        <li>text</li>
</ol>
```

E. text
D. text
C. text
B. text
A. text

Bulleted Lists

```
<ul type=“circle”>
   <li>text</li>
   <li>text</li>
</ul>
```

```
<ul type="disc">
<ul type="circle">
<ul type="square">
```

- An unordered list starts with the <ul> tag.
- tag to define list items.
- You have the following bullet options as a value for *type* attribute:
  - **disc (default)**
  - **circle**
  - **square**

Example!

Description List

- An description list starts with the <dl> tag.
- <dt> description term tag present the item in the list to be defined.
- <dd> description details tag is used to describe an item in a definition list.

```
<dl>
   <dt>Coffee</dt>
   <dd>- black hot drink</dd>

   <dt>Milk</dt>
   <dd>- white cold drink</dd>
</dl>
```

Example!

HTML Links

```
<a href="url“ target=“”>Link text</a>
```

Click here to go to yahoo.

- **Image link content**
  <img src="rainbow.gif">

- **Link Within a Page**
  - To link to an anchor you need to:
    - Create a link pointing to the anchor
    - Create the anchor itself.

```
< tag id|name=“top"></tag>

<a href="#top">Top</a>
```

- **Link to email**

```
<a href="mailto:email@hotmail.com?subject=SweetWords
  &body=Please send me a copy of your new program!">
  Email Me
</a>
```

HTML Images

```
<img src=“” width=“” height=“” alt=“” />
```

- **Images commonly types used in browsers are : GIFs, JPEGs, & PNGs**

  ****

  ****

- **Alternative Text**

  ****

- **Resizing**

  ****

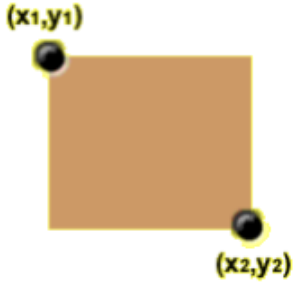
Image Map

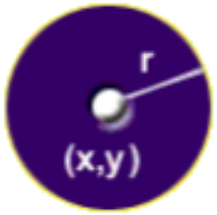
- Image maps are images, that have been divided into regions.
- Clicking in a region of the image cause the web surfer to be connected to a new URL.
- Image maps are graphical form of creating links between pages

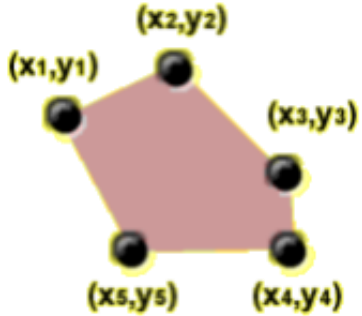
Image Map

- Possible shapes for areas inside image are

```
<img src="" usemap= "#example" />

<map name= "example">
   <area shape=rect coords= "x1,y1,x2,y2"
   href="http://www.abc.com" />

   <area shape=circle coords= "x1,y1,x2,y2"
   href="http://www.abc.com" />

   <area shape=polygon coords= "x1,y1,x2,y2,.., xn,yn"
   href="http://www.abc.com" />
.....
</map>
```





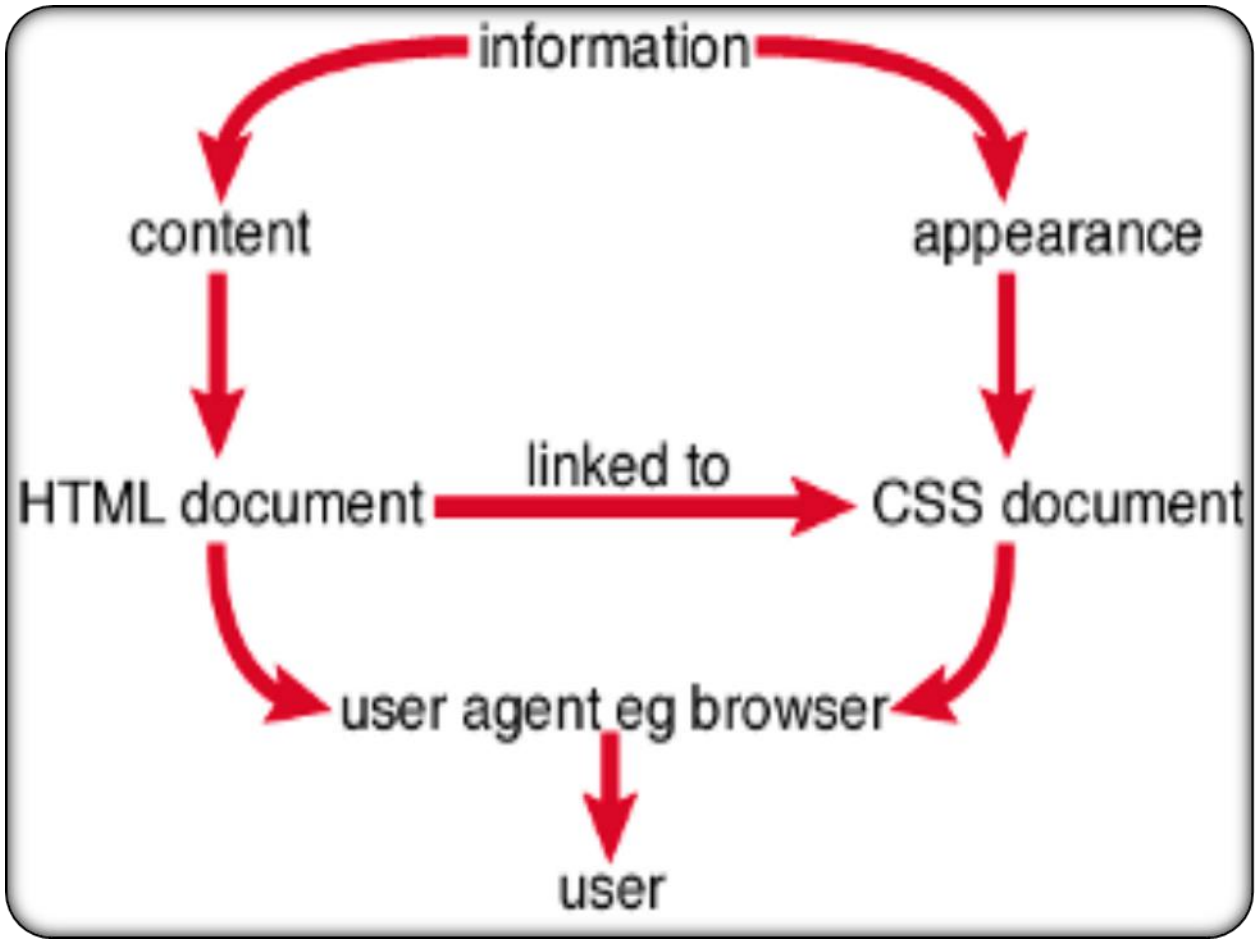


https://developer.mozilla.org/en-US/docs/Web/HTML/Element/map

Cascading Style Sheets

the sister technology to HTML
that is used to style your web pages

Separation of Concern



Designed to separate presentation from content

CSS

- CSS stands for Cascading Style Sheets.
- CSS was developed by the W3C.
- CSS is a style sheet language used to describe the presentation of a document written in a markup language.
- Its most common application is to style web pages written in HTML, XHTML and any kind of XML document.
- Styles define how to display HTML elements (font face, size, color, alignment, …etc)
- Styles are normally stored in *Style Sheets*
- The term *cascading* derives from the fact that multiple style sheets can be applied to the same Web page.
- Due to CSS, all HTML presentation tags and attributes are deprecated, e.g. font, center, etc

CSS Benefits

- With CSS we have the following benefits:

1. The Separation of Structure and Presentation

2. Managing Style at Large Sites
    - Easy maintenance.

3. Improved performance
    - Page load faster.

4. Decreased production work
    - Saves time.

5. Rich design and layout

CSS Features

- Provides precise control over margins, line spacing, element placement, colors, font faces, and font sizes.
- Removes the need to re-type HTML style tags each time a new style is needed.
- Ensures every user sees the same view regardless of the ways in which the browser's size and colors are configured.
- Provides the ability to change the overall look of a Web page or even an entire site by changing a single style sheet.

CSS Versions

- Cascading Style Sheets 1 (CSS1)
  - Features: Fonts, Colors, Alignment, Spacing
- Cascading Style Sheets 2 (CSS2-CSS2.1)
  - Features: Layout, Positioning… (CSS-P)
- Cascading Style Sheets 3 (CSS 3)
  - Features: Effect, Sizing…

CSS Syntax

- A style sheet consists of the style rules that tell your browser how to present a document.

- The CSS syntax rule is made up of 5 parts:
  1. selector
  2. property
  3. value
  4. declaration block
  5. declaration

- *selector* is a pattern to be affected; separated by commas.

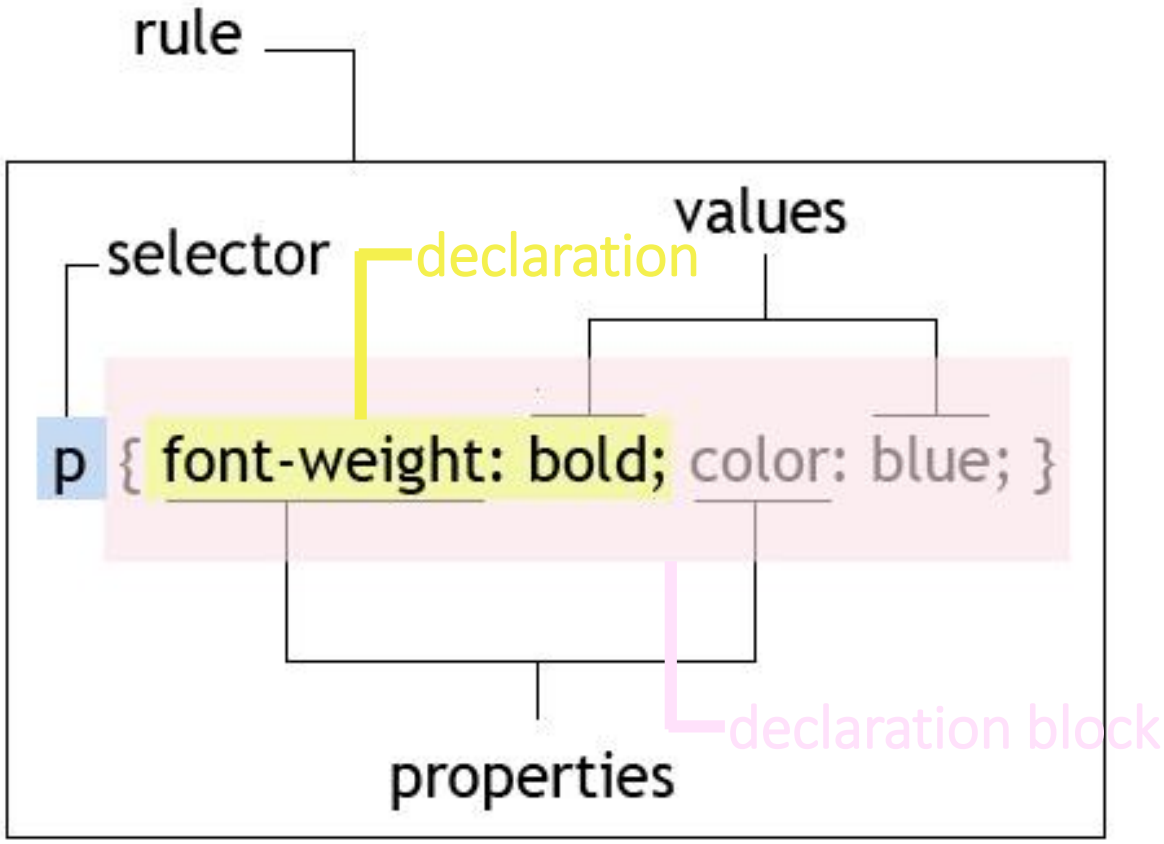
- *property* and *value* describe the appearance of that pattern; separated by colons; building a *declaration*.

- *declarations* are property-value pair; separated by semicolons; building a *declaration block*.

- Style rules are formed as follows:

  selector {property: value}

CSS Rule


rule
selector
declaration
values
p { font-weight: bold; color: blue; }
declaration block
properties

Implementing CSS

- CSS can be linked to an HTML document as:
    1. Embedding in <head> section using <style>
    2. Linking to an external style sheet file using
        - <link> element within head section
        - @import rule within style tag in the head section
    3. Inline style using style attribute

- Using external files is highly recommended

1. Embedding in a Style Tag

- Embedded, or **internal** styles are used for the whole page.
- You define internal styles in the head section by using the <style> tag
- An embedded (internal) style sheet should be used when a single document has a unique style.

```
<head>
   <style type="text/css">
            h1 { color: blue; }
            h2 { color: red}

   </ style >
</head>
```

H1 header with blue color

H2 header with red color

Example!

2. Linking to an External Style Sheet File

SoC

- An external style sheet is ideal when the style is applied to many pages.
- With an external style sheet, you can change the look of an entire Web site by changing one file.

- Using <link> tag.
  - Basically links an external style sheet to the document.
  - The <link> tag goes inside the head section.

```
<head>
    <link rel=stylesheet type="text/css" href="style.css">
</head>
```

Example!

2. Linking to an External Style Sheet File

- Using @import rule
  - Another way to link external CSS files
  - Basically imports one style sheet into another.
  - Placed at the top of the <style> or in external style sheets.
  - Must come before any other declaration

```
<style type="text/css">
    @import url("styles1.css");
  /*same as*/
    @import "style1.css";

    p {color: yellow }
</style>
```

3. In-line Style

- **In-line** styles are plunked straight into the HTML tags using the style attribute.
- **In-line** style loses many of the advantages of style sheets by mixing content with presentation.
- **In-line** style should be avoided wherever possible

- **Example:**

```
<p style="color: red; font-family: ‘Arial‘ ">
        This paragraph is styled in red with the Arial font, if
        available.
</p>
```

Example!

CSS Comments

```
<style type="text/css">
    /*
    h1 {  color: red; font-family: “Calibri“;}
    */
</style>
```

Cascading Order

- "Cascading " reflects the way styles are applied to the elements in a document, because style declarations cascade down to elements from many origins.

- Styles will be applied to HTML in the following order:
    1. Browser default
    2. External style sheet
    3. Internal style sheet (in head)
    4. Inline style

- When styles conflict, the "nearest" (most recently applied) style wins.

Grouping

DRY

- Grouping selectors is done by separating each selector with a comma to give the same properties to a number of selectors without having to repeat

```
h1,h2,h3,h4,h5,h6 { color: green; font-family: "Arial" }
```

Selectors

Example:

```
h1 { font-family: "sans-serif "}
h2 { font-family: "sans-serif" }
h3 { font-family: "sans-serif "}
```

is equivalent to:

```
h1, h2, h3 { font-family: "sans-serif" }
```

Example of Cascading Order

- External Style sheet

```
h3  {    color: red;
         text-align: left;
         font-size: 8pt   }
```

- Internal Style sheet

```
h3  {    text-align: right;
         font-size: 20pt;
         text-decoration: underline
     }
```

- Resultant attributes

```
color: red;
text-align: right;
font-size: 20pt;
text-decoration: underline
```

Example!

CSS Selectors

- Selectors determine which element the rule applies to:
  - All elements of specific type (tag)
  - Those that match a specific attribute (id, class)
  - Elements may be matched depending on how they are nested in the document tree (HTML)
  - Examples:
    - `.header{ color: green }`
    - `#menu{ padding-top: 8px }`

CSS Selectors

- Several types of selectors are defined for use when implementing Style Sheets:
    1. Simple Basic Selectors
    2. Attribute selectors
    3. Combinators
    4. Pseudo-Classes
    5. Pseudo-Elements

- A selector can contain a chain of one or more simple selectors separated by combinators, optionally followed by attribute selectors, ID selectors, or pseudo-classes. but it can contain only one pseudo-element, which must be appended to the last simple selector in the chain

1. Simple Basic Selectors

1. **Type Selector**
2. **IDs**
3. **Classes**
4. **Universal Selector**

1.1 Type Selector

- In general, STYLE attribute can be added to any HTML element.

- Example:

```
<span style = ‘ font-family: "sans serif "; color: blue; text-align:
   center ’>
   Hello There!
</span>
```

- Type selector selects an element of the HTML document: P, H1, BODY, etc.

- Example:

```
h1 {color: blue;}
```

1.2 ID Selector

- **The ID attribute is used to define a unique style for an element.**

- **Example:**

  ✓**In the CSS**

```
#id1 {color: red}
```

  ✓**In the HTML**

```
<div id="id1">
    This is the div with the id.
</div>
```

1.2 ID Selector

- **Example2:**

  ✓**In the CSS**

```
div#id1 {color: red}
```

  ✓**In the HTML**

```
<div id="id1">
    This is the div with the id.
</div>
```

Example!

1.3 Classes Selector

- **Classes allow you to define a style which can be applied to multiple elements on your page.**

- **Example 1:**

  - To apply one class over more than one different HTML element:

  ✓ In the CSS

```
.bold { font-weight: bold }
```

  ✓ In the HTML

```
<p class="bold">
 This paragraph will be Bold.</p>
<span class="bold">
 This SPAN will be Bold too.</span>
```

- **Both the paragraph & the span elements will be styled by the class "bold".**

1.3 Classes Selector

- **Example 2:**

  - To apply more than one class per given element:

  ✓In the CSS

```
.bold { font-weight: bold }
.large { font-size: 20pt}
```

  ✓In the HTML

```
<p class="bold large">
    This paragraph will be Bold & very large.
</p>
```

- **The paragraph above will be styled by the class "bold" AND the class "large".**

1.3 Classes Selector

- **Example 3:**
  - **Say that you would like to have two types of paragraphs in your document: one right-aligned paragraph, and one center-aligned paragraph. Here is how you can do it with styles:**
    - ✓ **In the CSS**

```
p.right {text-align: right}

p.center {text-align: center}
```

    - ✓ **In the HTML**

```
<p class="right"> This paragraph will be right-aligned.</p>
<p class="center">
        This paragraph will be center-aligned.
</p>
```

Example!

Assignments